US Army Corps of Engineers®
Portland District

ALTERNATIVES REPORT

LOOKOUT POINT DAM
MIDDLE FORK WILLAMETTE RIVER, OREGON

LOOKOUT POINT HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

Prepared by:

CH2MHILL AECOM BioAnalysts, Inc.

100 Percent Backcheck AR
March 2011

US Army Corps of Engineers
Portland District

ALTERNATIVES REPORT

LOOKOUT POINT DAM
MIDDLE FORK WILLAMETTE RIVER, OREGON

LOOKOUT POINT HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

Prepared by:

CH2MHILL AECOM BioAnalysts, Inc.

100 Percent Backcheck AR
March 2011

LOOKOUT POINT DAM

HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

SYNOPSIS

1. INTRODUCTION

This Alternatives Report (AR) presents an evaluation of conceptual head-of-reservoir and in-tributary collection and transportation facilities for the provision of downstream passage for juvenile salmonids at Lookout Point Dam. At-dam and/or operational alternatives have intentionally not been evaluated nor compared to the head-of-reservoir systems considered herein.

2. PURPOSE

The purpose of this AR is to provide an assessment of the technical feasibility of providing safe and efficient downstream passage for juvenile salmonids around Lookout Point Dam via head-of-reservoir and/or in-tributary collection and transportation facilities. This report is related to specific actions as described in the National Marine Fisheries Service's (NMFS) 2008 Biological Opinion (BiOp) for the Willamette Valley. Reasonable and Prudent Alternative (RPA) 4.9 in the BiOp requires that a go/no-go decision be made near the end of 2010 with regard to the feasibility of a prototype facility at Lookout Point. NMFS defines "prototype" as a temporary facility intended for concept evaluation only, as opposed to a full-scale production facility for long-term operation. In addition, prototype does not necessarily refer to a single concept; multiple concepts or facility components may be evaluated simultaneously.

To address the RPA 4.9 requirement, the U.S. Army Corps of Engineers (USACE) Project Delivery Team (PDT) performed an alternatives study and prepared this report. Initial consideration was given to full-scale production facilities consistent with the long-term objectives of the BiOp. Assessments were then made concerning the feasibility of prototype testing and/or a phased implementation of the selected facilities.

This report will be used by USACE and the Willamette Action Team for Ecosystem Restoration (WATER) group to inform decision-making processes related to the overall coordination and implementation of the Willamette Valley BiOp.

3. LOOKOUT POINT DAM

Lookout Point Dam is located approximately 19 miles southeast of Eugene, Oregon, on the Middle Fork Willamette River (a tributary of the Willamette River). The dam is located near river mile 20 and the town of Lowell. The heads of reservoir at the minimum flood control pool and the maximum conservation pool are located near river miles 27 and 33, respectively, an annual horizontal fluctuation of approximately 6 miles. The reservoir water surface elevations similarly fluctuates a total of 101 vertical feet annually.

Hills Creek Dam is located at river mile 46 on the Middle Fork approximately 5 miles upstream from the town of Oakridge. Dexter Dam is located downstream near Lowell at river mile 17.

4. DESCRIPTION OF SELECTED ALTERNATIVES

A total of 28 head-of-reservoir and in-tributary conceptual alternatives were evaluated as part of this study and both types of alternatives have the potential to be biologically and technically feasible. Given the information currently available, as well as identified risks and uncertainties, two alternatives are recommended for further study and evaluation. They include a floating surface collector (FSC) located in the upper reservoir, and an in-tributary off-channel collection facility located on the lower North Fork River at Westfir. This recommendation should not preclude consideration of an at-dam alternative, as discussed further below.

The FSC consists of a floating structure with a pumped attraction flow and a screening system; fish collection, sorting, and holding facilities; and an exclusion net system with a net transition structure (NTS). Other project features include a fish transfer facility located at Lookout Point Dam and a fish recovery and release facility located below Dexter Dam.

The FSC is a technology that has been developed and implemented successfully for the collection and transport of smolts at other high-head projects in the Pacific Northwest. Both the PSE Upper Baker Project and the PGE Round Butte Project have demonstrated promising results during the first few years of operation. Construction of another FSC will begin in May 2011 at the PacifiCorp Lewis River Project Swift Reservoir. Special consideration needs to be given to site-specific factors at Lookout Point to ensure that an FSC would achieve regional fish passage goals. Prototyping of the exclusion net system in particular may be required.

The in-tributary off-channel collector alternative at Westfir consists of an adjustable diversion weir; an intake and fish screen; a canal with outfall; a fish collection, sorting, holding and transfer facility; and a fishway for upstream passage. Other project features include a fish recovery and release facility below Dexter Dam.

The in-tributary collector utilizes proven technology which would likely not require prototyping. The major components of this facility are commonly used in large irrigation and hydropower intakes throughout the western U.S. However, while this technology has been applied successfully elsewhere, the authors of this report are not aware of a facility of this type that has been constructed exclusively for the purposes of collecting juvenile fish.

Given the significant risks and uncertainties associated with both alternatives, it is recommended that a research, monitoring and evaluation (RM&E) program be undertaken prior to preliminary design of a selected alternative. It is anticipated that the information obtained by such a program would allow for the quantification or, at least, minimization of the identified risks and uncertainties. Such unknowns include the ability to successfully collect and transport fry, the effect of reservoir conditions on juveniles (a benefit or detriment), and the ability to achieve biological performance goals (which have yet to be defined). Key management decisions are contingent upon the results of certain studies. For example, if reservoir rearing is found to be beneficial to juvenile Chinook (and predation is insignificant), it may be worthwhile to pursue evaluation of an at-dam alternative.

Following completion of the RM&E program, if the decision is made to move forward with the in-reservoir FSC alternative located at the head of reservoir, it is further recommended that prototype testing of the net system take place prior to construction of a full-scale production facility. A partial-depth net could also be tested within this same timeframe. A phased implementation of pumped attraction flow rates (for example, 500 to 1,000 cfs) may also be beneficial in optimizing the ultimate configuration of the facility. It is anticipated that the in-tributary alternative, if selected, could be constructed and operated at full production capacity from the outset.

5. CONSTRUCTION SCHEDULE

If a downstream collection facility at Lookout Point is determined to be feasible, the 2008 NMFS BiOp requires construction of a prototype by September 2014. A full-scale production facility is to be constructed by December 2021 and be operational by March 2022.

The resource agencies have indicated that there may be some flexibility with regard to the 2014 prototype deadline given the significant amount of RM&E that needs to take place. It is anticipated that once an alternative has been selected and the required design studies (i.e. biological and physical characterizations) have been completed, approximately 5 years would be required to prepare the design documentation report (DDR), to prepare the plans and specifications, to build the facility and to begin operations. It is anticipated that additional authorizations and appropriations from Congress would be required to fund and complete construction of the full production facility.

RM&E activities commenced in 2010 and are expected to continue until approximately 2016. It is assumed that prototype testing, if required for the selected alternative, would occur over a similar time period. An example program schedule is provided in Appendix G.

6. COST

Order-of-magnitude conceptual construction and project cost estimates were developed to facilitate relative comparisons of the selected alternatives. The costs reflect construction of full-scale production facilities and, where appropriate, include costs for prototyping and phased implementation of the alternatives.

The selected in-reservoir FSC alternative in the ultimate configuration (1,000 cfs with full exclusion nets) has an estimated capital construction cost of approximately $139 million, an estimated project cost of approximately $251 million, and estimated annual operations and maintenance (O&M) costs of approximately $3.4 million. An estimate of prototyping costs for the net system is included.

The selected in-tributary alternative located at Westfir has an estimated capital construction cost of approximately $95 million, an estimated project cost of approximately, $164 million, and estimated annual O&M costs of approximately $1.9 million. Detailed cost information and assumptions are provided in Appendix G.

TABLE OF CONTENTS

SECTION 3 – DESIGN CRITERIA AND METHODOLOGY

SECTION 4 – DESCRIPTION OF ALTERNATIVES

SECTION 5 – DETAILED DESCRIPTION OF SELECTED ALTERNATIVES

SECTION 6 – EVALUATION OF ALTERNATIVES

SECTION 7 – SUMMARY AND CONCLUSIONS

SECTION 8 – REFERENCES

APPENDIXES

PLATES

TABLES

FIGURES

LOOKOUT POINT PROJECT
PERTINENT DATA

1. Project Location	
Nearest town	Lowell, Oregon, approximately 19 miles southeast of Eugene, Oregon
County and state	Lane County, Oregon
Stream	Middle Fork of the Willamette River
Distance above mouth	19.9 river miles
2. General	
Drainage area, square miles	991
Pool elevations (feet MSL; NGVD 1929)	
Maximum pool	934.0
Full pool (top of spillway gates)	929.0
Maximum conservation pool	926.0
Minimum flood control pool	825.0
Minimum power pool	819.0
Fluctuation (feet)	
Normal (maximum conservation pool minus minimum flood control pool)	101.0
Maximum (Maximum pool minus minimum power pool)	115.0
3. Reservoir	
Maximum pool, acre-feet	478,000
Full pool, acre-feet	456,000
Maximum conservation pool, acre-feet	443,000
Minimum flood control pool, acre-feet	118,700
Minimum power pool, acre-feet	106,400
4. Dam	
Type	Earth-filled gravity dam with concrete gravity spillway section
Length of embankment, feet	1,874.8
Length of concrete dam, feet	1,387.6
Crest length, feet	3,262.4
Crest elevation, feet MSL	941.0
Crest width, feet	24
Height (foundation to top of dam), feet	246
Freeboard (above maximum pool), feet	7
5. Spillway	
Type	Concrete gravity, gate-controlled, ogee overflow section
Crest length, feet	
Number of gates	274
Gate size – width and height, feet	Five, radial (tainter)
Crest elevation, feet MSL	42.5 by 41.5
Design discharge, cfs	887.5
	270,000

6. Outlet Works	
Type	Gate-controlled conduits, each with invert elevation of 723.33 feet MSL
Number of gates	Four, radial-type (tainter) Walker
Gate size – width and height, feet	6.75 by 12
7. Power Plant	
Penstocks	3 steel, 18-foot diameter
Intake invert elevation, feet MSL	771.0
Type of turbines	Francis
Number of units	3
Installed capacity, megawatts	120
Turbine discharge, cfs	9,300 at effective head of 185.0 feet

LOOKOUT POINT PROJECT
PREVIOUS DESIGN MEMORANDUMS AND INSPECTION REPORTS

DM No.	Subject	Date
	Design Analysis – Penstock Trashracks, Stoplogs, Lifting Beams	1952
	Reservoir Regulation Manual	1954
	Sedimentation Ranges – Established 1953-55	1956
	Foundation Report	1965
	Master Plan – Reservoir Management and Public Use Development	1955
1	Public Use and Access Facility	1960
	Supplement No. 1	1962
2	Service Buildings	1964
3	Public Use and Access Facility	1968
	Supplement No. 1	1975
4	Spillway Crane	1968
5	Electronic Distance Measuring (EDM) Trilateration	
	Survey System – Real Estate	1981
6	Earthquake and Fault Study	1981
7	Electronic Distance Measuring System (EDM) Trilateration	
	Survey System	1981

Report Title	Date
Periodic Inspection Report No. 1	1967
Periodic Inspection Report No. 2	1972
Periodic Inspection Report No. 3	1975
Periodic Inspection Report No. 4	1980
Report of Dam Safety Assurance Study	1981
Periodic Inspection Report No. 5	1985
Periodic Inspection Report No. 6	1990
Periodic Inspection Report No. 7	1995
Periodic Inspection Report No. 8	1999
Periodic Inspection Report No. 9	2004
Addendum – Regulating Outlet Inspection	2005
Tainter Gate Operating Inspection	2009

ABBREVIATIONS AND ACRONYMS

<	less than
>	greater than
ACID	Anderson-Cottonwood Irrigation District
ac-ft	acre-feet
ac-ft/day	acre-feet per day
AFEP	Anadromous Fish Evaluation Program
AR	Alternatives Report
AWS	auxiliary water supply
BIA	Bureau of Indian Affairs
BiOp	Biological Opinion
BPA	Bonneville Power Administration
CE	fish collection efficiency
CENWD	USACE Northwestern Division
CENWP	USACE Portland District
CFD	computational fluid dynamics
cfs	cubic feet per second
CHU	critical habitat unit
CWA	Clean Water Act
CWT	coded wire tag
dbh	diameter at breast height
DDR	design document report
DEM	digital elevation model
EF	egg-to-fry survival rate
El.	elevation
EM	engineering manual
ESA	Endangered Species Act
EWEB	Eugene Water and Electric Board
FCE	fish collection efficiency
FCP	fish collection potential

ABBREVIATIONS AND ACRONYMS

FCRC	flood control rule curve
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
fpp	fish per pound
fps	feet per second
FSC	floating surface collector
ft	foot or feet
ft/hr	feet per hour
ft-lb/s	foot-pounds per second
FY	fiscal year (October 1 through September 30)
gal	gallon
gpm	gallons per minute
gpm/fish	gallons per minute per fish
HEC-RAS	Hydrologic Engineering Center River Analysis System
IBC	International Building Code
IHOT	Integrated Hatchery Operations Team
lb/cf-in.	pounds per cubic foot per inch
lb/gpm-in.	pounds per gallon per minute per inch
LiDAR	Light Detection and Ranging
LOP	Lookout Point
LSR	Late Successional Reserves
MCACES	Micro Computer Cost Estimating System
mm	millimeter(s)
MSA	Magnuson-Stevens Fishery Conservation and Management Act
MSL	mean sea level
MW	megawatt(s)
N/A	not applicable
NEPA	National Environmental Policy Act
NFMF	North Fork of the Middle Fork Willamette River
NGVD 29	National Geodetic Vertical Datum of 1929

ABBREVIATIONS AND ACRONYMS

NMFS	National Marine Fisheries Service
NSO	northern spotted owl
NTS	net transition structure
ODEQ	Oregon Department of Environmental Quality
ODFW	Oregon Department of Fish and Wildlife
O&M	operations and maintenance
oz	ounce(s)
P	proportion of fish subpopulation present
PDT	project delivery team
PGE	Portland General Electric
PIT	passive integrated transponder
POP	proportion of entire spring Chinook population
ppm	parts per million
PSE	Puget Sound Energy
RCRA	Resource Conservation and Recovery Act
RM	river mile
RM&E	research, monitoring, and evaluation
RMIS	Regional Mark Information System
RO	regulating outlet
RPA	Reasonable and Prudent Alternative
S	fish survival
SAR	smolt-to-adult ratio
sq ft	square foot or square feet
TPCS	Total Project Cost Summary
TSH	Total amount of spawning habitat
USACE	U.S. Army Corps of Engineers
USDA	U.S. Department of Agriculture
USDI	U.S. Department of the Interior
USFS	U.S. Forest Service
USGS	U.S. Geological Survey

ABBREVIATIONS AND ACRONYMS

WATER	Willamette Action Team and Ecosystem Restoration
WDF	Washington Department of Fisheries
WSEL	water surface elevation
WSTCS	Willamette System Temperature Control Study

This page was intentionally left blank.

SECTION 1

PURPOSE AND INTRODUCTION

1.1 SCOPE AND PURPOSE

1.1.1 General

The purpose of this Alternatives Report (AR) is to provide an assessment of the technical feasibility of providing safe and efficient downstream passage for juvenile salmonids around Lookout Point Dam via head-of-reservoir and/or in-tributary collection and transportation facilities. Near or at-dam collection facilities have intentionally been excluded from this study.

This report is related to specific actions as described in the National Marine Fisheries Service's (NMFS) 2008 Biological Opinion (BiOp) for the Willamette Valley. Reasonable and Prudent Alternative (RPA) 4.9 in the BiOp requires that a go/no-go decision be made near the end of 2010 with regard to the feasibility of a prototype facility at Lookout Point. NMFS defines "prototype" as a temporary facility intended for concept evaluation only, as opposed to a full-scale production facility for long-term operation. In addition, prototype does not necessarily refer to a single concept; multiple concepts may be evaluated simultaneously.

To address the RPA 4.9 requirement, the U.S. Army Corps of Engineers (USACE) Project Delivery Team (PDT) performed an alternatives study and prepared this report. Initial consideration was given to full-scale production facilities consistent with the long-term objectives of the BiOp. Assessments were then made concerning the feasibility of prototype testing and/or a phased implementation of the selected facilities.

This report will be used by the U.S. Army Corps of Engineers (USACE) and the Willamette Action Team for Ecosystem Restoration (WATER) group to inform decision-making processes related to the overall coordination and implementation of the Willamette Valley BiOp.

The primary species of concern is spring Chinook salmon. This evaluation also includes consideration of Oregon chub, Pacific lamprey, bull trout, and rainbow and cutthroat trout populations. Other fish species that may affect collection operations include large-scale suckers, northern pikeminnow, three-spined stickleback, redside shiner, largemouth and smallmouth bass, white and black crappie, walleye, bluegill, and pumpkinseed sunfish.

1.1.2 Reports and Studies Used in the Alternatives Report

The following significant reports and studies were referenced during the preparation of this report:

1. AECOM and BioAnalysts. 2010. *Willamette Downstream Fish Passage Design Requirements Report.* Prepared for USACE Portland District. AECOM. June.

2. Fish Commission of the State of Oregon. 1958. *Evaluation of the Ability of an Artificial Outlet to Attract Downstream Migrant Salmonids from the Reservoir of Lookout Point Dam.*

3. National Marine Fisheries Service (NMFS), Northwest Region. 2008a. *Anadromous Salmonid Passage Facility Design.* February.

4. National Marine Fisheries Service (NMFS), Northwest Region. 2008b. *Endangered Species Act Section 7(a)(2) Consultation, Biological Opinion & Magnuson-Stevens Fishery Conservation & Management Act Essential Fish Habitat Consultation on the "Willamette River Basin Flood Control Project."* July.

5. U.S. Army Corps of Engineers (USACE)/Bell, Milo C. 1991. *Fisheries Handbook of Engineering Requirements and Biological Criteria.*

6. U.S. Army Corps of Engineers (USACE). 2009. *Willamette Valley Projects Configuration/Operation Plan (COP)*. October.

7. U.S. Army Corps of Engineers (USACE). 2010. Cougar Dam Downstream Alternatives Study. Working Draft.

A comprehensive list of references is provided in Section 8. Meeting agendas and summaries are presented in Appendix A.

1.2 GENERAL DESCRIPTION

1.2.1 Location

Lookout Point Dam is located approximately 19 miles southeast of Eugene, Oregon, on the Middle Fork Willamette River, a tributary of the Willamette River. The dam is located near river mile 20 and the town of Lowell, Oregon. Plates 1 and 2 are vicinity maps of the project area.

Lookout Point Reservoir is approximately 13 miles long at the maximum conservation pool and approximately 7 miles long at the minimum flood control pool, which represents an annual vertical operating range of 101 vertical feet, and a horizontal fluctuation of 6 miles. The head of reservoir at the maximum conservation pool is located near the U.S. Forest Service (USFS) Black Canyon Campground near river mile 33. The head of reservoir at the minimum flood control pool is located just upstream of Crale Creek and Rhodes Creek near river mile 27.

A majority of inflows to the reservoir are provided by the Middle Fork Willamette River itself, although approximately 12 named creeks do discharge into the reservoir. The creeks do not provide any significant spawning habitat. A tributary of the Middle Fork, the North Fork of the Middle Fork Willamette River, is located approximately 4 miles above the Black Canyon Campground near river mile 37 and the town of Westfir. Flows in the Middle Fork above this confluence are regulated by Hills Creek Dam, which is located near river mile 46 approximately 5 miles upstream from the town of Oakridge, Oregon.

1.2.2 History

Lookout Point Dam and Reservoir became operational in 1954. Fish passage was not provided as part of the original construction. In 1957 and 1958, USACE tested a floating artificial outlet that consisted of a steel barge-supported tank with pumped attraction flow. This facility was located in the forebay near the upstream face of the dam. The project was abandoned because of poor downstream fish passage results, wherein fewer than 14 percent of the coho juvenile migrants were collected. Fishery mitigation is currently provided through hatchery production. The primary means of downstream fish passage at Lookout Point Dam today is via the spillway and turbines. Studies are currently underway to quantify fish survival through the dam.

1.2.3 Project Authorization

The existing authorized purposes for Lookout Point Dam are flood control, power, navigation, and irrigation. Other uses include fisheries and wildlife, water quality, municipal and industrial water supply, and recreation.

As noted above, this report is related to specific actions as described in the National Marine Fisheries Service's (NMFS) 2008 BiOp for the Willamette Valley (NMFS, 2008b). Reasonable and Prudent Alternative (RPA) 4.9 in the BiOp requires that a go/no-go decision be made near the end of 2010 with regard to the feasibility of a prototype head of reservoir downstream fish collection facility at Lookout Point.

1.2.4 Construction Authorization

If a downstream collection facility at Lookout Point is determined to be feasible, the BiOp (NMFS, 2008b) requires construction of a prototype by September 2014. A full-scale production facility is to be constructed by December 2021 and be operational by March 2022.

The resource agencies have indicated that there may be some flexibility with regard to the 2014 prototype deadline given the significant amount of research, monitoring and evaluation (RM&E) that needs to take place. It is anticipated that once an alternative has been selected and the required design studies (i.e. biological and physical characterizations) have been completed, approximately 5 years would be required to prepare the design documentation report (DDR), to prepare the plans and specifications, to build the facility and to begin operations. It is anticipated that additional authorizations and appropriations from Congress would be required to fund and complete construction of the full production facility.

RM&E activities commenced in 2010 and are expected to continue until approximately 2016. It is assumed that prototype testing, if required for the selected alternative, would occur over a similar time period. An example program schedule is provided in Appendix G.

1.3 AGENCY COORDINATION

This report was prepared in cooperation with the National Oceanic and Atmospheric Administration, NMFS; the Oregon Department of Fish and Wildlife (ODFW); USFS; the Bonneville Power Administration (BPA) and the Confederated Tribes of the Grand Ronde. Coordination with other agencies, if required, will be conducted as necessary prior to final design and construction.

1.4 ENVIRONMENTAL COMPLIANCE

It is anticipated that any project construction will be required to comply with the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Magnuson-Stevens Fishery Conservation and Management Act (MSA), The Clean Water Act (CWA), and various other federal, state, and local regulations. Specific environmental considerations are identified in the descriptions of the alternatives.

This page was intentionally left blank.

SECTION 2

BACKGROUND INFORMATION

2.1 GENERAL

This section presents background information describing the existing physical and biological conditions at the project site, as well as a summary of Lookout Point Dam operations and relevant real estate ownership information.

2.2 PHYSICAL DATA

2.2.1 Topography and Bathymetry

Topographic data for this study were obtained from the State of Oregon and are based on a U.S. Geological Survey (USGS) 10-meter digital elevation model (DEM). The vertical datum is the National Geodetic Vertical Datum of 1929 (NGVD 29). This information is comparable to the topography as shown on hardcopy record drawings of the project. Photogrammetric and Light Detection and Ranging (LiDAR) data are available in the general vicinity of Lookout Point Dam, but not in the specific areas of interest. Aerial photos were obtained from Google Earth Pro, which references State of Oregon imagery.

Bathymetric data are limited to record drawings of the pre-dam topography. Information on sedimentation rates is not available at present. For the purposes of this study, 5 feet was added to the historical contours to take into account sedimentation or movement of the original river thalweg over the last 50 years.

2.2.2 Reservoir Hydrology

Lookout Point Reservoir: Lookout Point Reservoir is approximately 13 miles long at the maximum conservation pool and approximately 7 miles long at the minimum flood control pool, which represents a normal operating range of 101 feet. The head of reservoir at the maximum conservation pool is located near the USFS Black Canyon Campground near river mile 33. The head of reservoir at low pool is located just upstream of Crale Creek and Rhodes Creek near river mile 27.

The Lookout Point reservoir elevation water control diagram and flood control rule curve (FCRC) is presented in Appendix B, Reservoir Hydrologic Data. Water surface elevations are mean sea level (MSL) or NGVD 29. The reservoir is operated such that the reservoir water surface elevation is located at or below the value indicated by the FCRC except during flood control operations. A full pool is maintained from mid-May to 1 September, and the reservoir normally is evacuated between 1 September and 1 February.

The water control diagram also presents typical filling and evacuation rates for the reservoir in units of acre-feet per day (ac-ft/day). These rates provide a means for calculating reservoir storage during these periods. The two filling rates presented on the FCRC (5,211 and 2,510 ac-ft/day) are equivalent to 2,630 and 1,270 cubic feet per second (cfs), respectively. The three evacuation rates listed on the FCRC (5,040, 3,271, and 980 ac-ft/day) are equivalent to 2,549, 1,650, and 490 cfs, respectively. Regulated inflow and outflow frequency information is also presented in Appendix B.

Hourly water surface data for the reservoir were obtained for a period from 1970 to 2010. It should be noted that these data are unverified; they may contain bad data, or data may be missing. An analysis of the data set identified the 1 percent exceedence values for reservoir rise and fall rates to be 0.29 and 0.20 feet per hour (ft/hr), respectively. This information is relevant for the design of the in-reservoir alternatives described later in this report.

2.2.3 River Hydrology and Hydraulics

A majority of inflows to the reservoir are provided by the Middle Fork Willamette River, although approximately 12 named creeks do discharge into the reservoir. The creeks are ungaged. A tributary of the Middle Fork, the North Fork of the Middle Fork Willamette River (NFMF), is located approximately 4 miles above the Black Canyon Campground near river mile 37 and the town of Westfir. Flows in the Middle Fork above this confluence are regulated by Hills Creek Dam which is located near river mile 46 upstream from the town of Oakridge, Oregon.

Appendix C, River Hydrologic and Hydraulic Data includes annual and monthly flow-duration curves, flow-duration curves for the design migration period (January through September) and a hydrograph of daily average flows for the Lower Middle Fork, the NFMF, and the Upper Middle Fork. The 100-year flood data were obtained from a 1999 Federal Emergency Management Agency (FEMA) flood insurance study report.

Lower Middle Fork Willamette River: The lower reach of the Middle Fork Willamette River is defined as the section immediately upstream of the head of reservoir up to the confluence with the NFMF. Table 2-1 provides a summary of flows for the Middle Fork immediately upstream of Lookout Point Reservoir. Flow-duration curves were prepared using average daily data from USGS stream gage number 14148000 on the Middle Fork near Oakridge, Oregon, with data from 1985 to 2010. The gage location is shown on Plate 2.

Table 2-1. Hydrologic Data – Lower Middle Fork Willamette River

Criteria	Flow (cfs)
95 percent exceedence flow	849
50 percent exceedence flow	2,105
5 percent exceedence flow	6,960
100-year flood	57,000

NOTES:

cfs = cubic feet per second

North Fork of the Middle Fork Willamette River (NFMF): Table 2-2 provides a summary of flows for the NFMF. Flow-duration curves, which are presented in Appendix C, were prepared using average daily data from USGS stream gage number 14147500 on the NFMF near Oakridge, Oregon, with data from 1910 to 1994. A dam associated with the Western Lumber Company was located just upstream of the gage location and was removed in 1994, at approximately the same time that the gage became inactive. The dam likely was operated as a run-of-river diversion, with no significant storage or associated impacts to the natural streamflow regime. The NFMF streamflow is approximately one-third of the total flow of the Middle Fork below the NFMF confluence.

Table 2-2. Hydrologic Data – North Fork of the Middle Fork Willamette River

Criteria	Flow (cfs)
95 percent exceedence flow	130
50 percent exceedence flow	552
5 percent exceedence flow	2,140
100-year flood	24,300

NOTES:
cfs = cubic feet per second

Upper Middle Fork Willamette River: The upper reach of the Middle Fork Willamette River is defined as the section immediately upstream of the confluence with the NFMF. The Upper Middle Fork flow-duration curves were prepared using the difference between the average daily data from USGS stream gage number 14147500 on the NFMF near Oakridge, Oregon, and the average daily data from USGS stream gage number 14148000 on the Middle Fork Willamette River near Oakridge for the overlapping duration of October 1986 to September 1994. The streamflow is approximately two-thirds of the total flow of the Lower Middle Fork. Table 2-3 provides a summary of flows.

Table 2-3. Hydrologic Data – Upper Middle Fork Willamette River

Criteria	Flow (cfs)
95 percent exceedence flow	564
50 percent exceedence flow	1,448
5 percent exceedence flow	3,945
100-year flood	32,700

NOTES:
cfs = cubic feet per second

2.2.4 Environmental and Cultural Resources

It is anticipated that any project construction will be required to comply with NEPA, ESA, MSA, CWA, and various other federal, state, and local regulations.

Known and predicted northern spotted owl nesting, roosting, foraging, and dispersal areas are located in the project vicinity as described in Section 3 and Appendix D, Biological Data. Protected land use areas also exist.

2.3 BIOLOGICAL DATA

2.3.1 Species of Concern

The primary species targeted for downstream collection is spring Chinook salmon (*Oncorhynchus tshawytscha*). This anadromous species was historically present in the Middle Fork subbasin before construction of the federal projects. The run in the Middle Fork was estimated to be 2,550 returning adults annually, which accounted for 21 percent of the total production above Willamette Falls (USACE 1997). This evaluation also includes management considerations for Oregon chub *(Oregonichthys crameri),* Pacific lamprey

(*Lampetra tridentata*), bull trout (*Salvelinus confluentus)*, and rainbow trout (*Oncorhynchus mykiss*) and cutthroat trout (*Oncorhynchus clarkii*) populations. Other fish species that may affect collection operations include large-scale suckers (*Catostomus macrocheilus)*, northern pikeminnow (*Ptychocheilus oregonensis*), three-spined stickleback (*Gasterosteus aculeatus)*, redside shiner *(Richardsonius balteatus*), largemouth bass *(Micropterus salmoides)*, smallmouth bass *(Micropterus dolomieu*), white and black crappie (*Pomoxis nigromaculatus*), walleye (*Sander vitreus)*, bluegill (*Lepomis macrochirus)*, pumpkinseed sunfish *(Lepomis gibbosus)*, mountain whitefish (*Prosopium williamsoni*), and other native and non-native species.

2.3.2 Migration Characteristics

The best data available on spring Chinook juvenile migration from the system are for the NFMF and are shown graphically in Figure 2-1.[1] The data indicate that fish may be present most months, but the vast majority (greater than [>] 95 percent) of the juvenile migration occurs from December through June. This timing is typical of spring Chinook observed at other USACE projects, such as Cougar Dam (Zymonas and Hogansen, 2010).

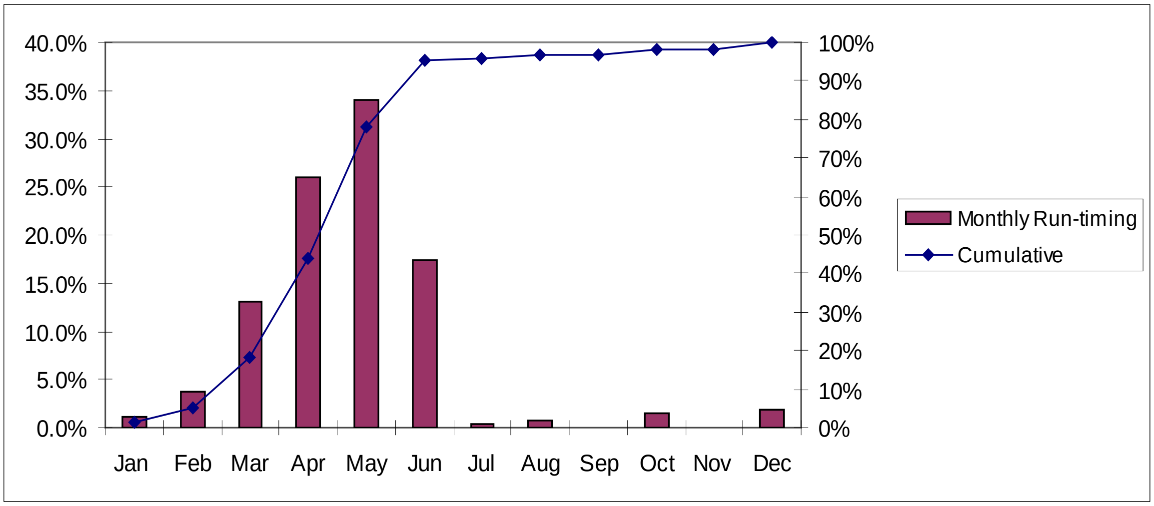


Figure 2-1. Monthly and Cumulative Juvenile Spring Chinook Run-Timing for the NFMF (Taylor, 2010)

The majority of the fish migrating from the NFMF are fry, defined as juveniles less than 60 millimeters (mm) in length (Figure 2-2).

[1] Data on juvenile timing/entry to the reservoir are not available. This type of data may be available in 2011. Until then, it is assumed that migration timing observed in the NFMF applies to the reservoir.

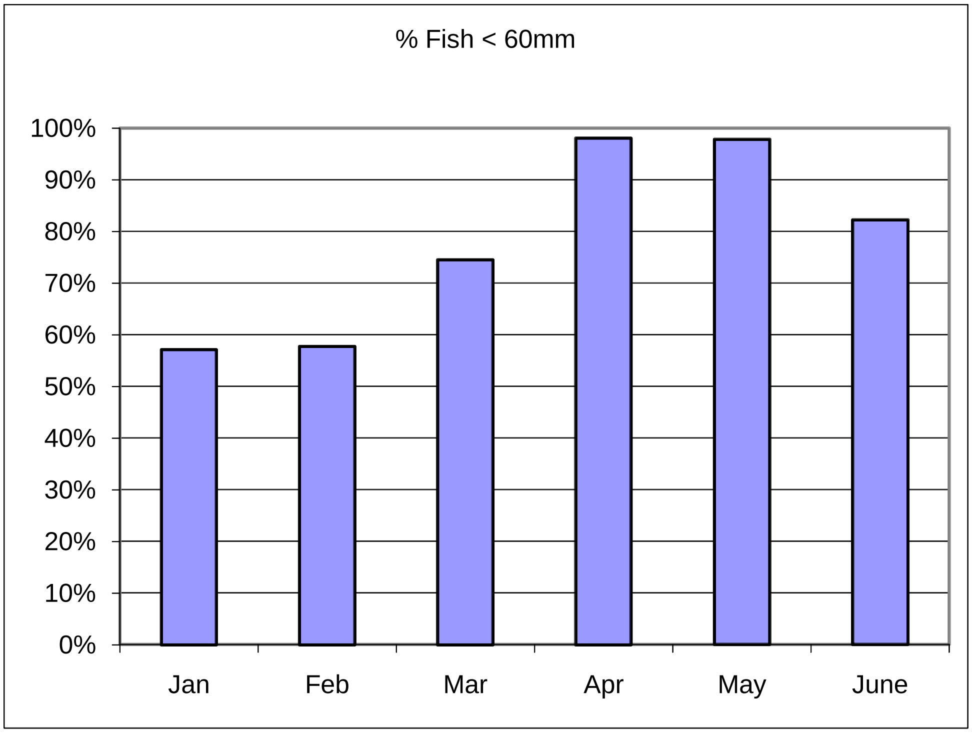


Figure 2-2. Percentage of the Juvenile Migration in the NFMF Composed of Chinook Fry (less than [<] 60 mm) (Taylor, 2010).

The average size of fish observed, by month, is shown in Figure 2-3. Of interest for fish passage design is that fish migrating from January through April are generally less than 40 mm in length. Because of their small size, these fish will need to be handled with care to reduce losses from injury when they encounter the collection facilities.

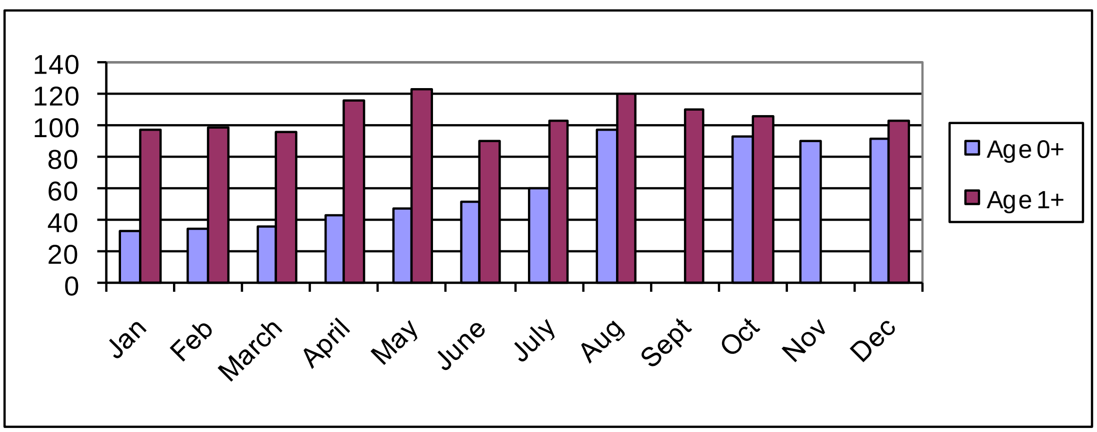


Figure 2-3. Average Size (mm) of Age 0+ and Age 1+ Spring Chinook Juveniles Migrating from the NFMF (Taylor, 2010)

2.3.3 Enumeration

Juvenile salmonid abundance estimates are required in order to properly scale the sorting, handling, and holding facilities, all the way from fish collection through transport and release. Also of concern is the abundance of incidental species that may enter the collector and compete for space. Salmonid estimates provided by USACE (Griffith, 2010) are presented and discussed herein. Information on abundance of other species/life stages in the system is not available. Therefore, the salmonid information has been used to size facilities, but high optimistic estimates have been adopted to provide an adequate spatial buffer.

Total Fry and Smolt Potential Production: Griffith (2010) estimated that stream habitat in the NFMF and Middle Fork upstream of Hills Creek Dam could produce approximately 2.1 million fry, under what was considered to be very high egg-to-fry survival rates (30 percent) (Table 2-4). However, the estimate did not include any fry production for the Middle Fork reach from Lookout Point Reservoir to the confluence of the NFMF, or for the Middle Fork from the NFMF confluence to Hills Creek Dam (including Salt Creek). Fry estimated potentials for these two reaches were developed based on a spawning habitat analysis using the following formula:

$$\#FRY = TSH/R_{AREA} * F * EF$$

where:

#FRY =	number of fry produced
TSH =	total amount of spawning habitat in square feet (sq ft)
R_{AREA} =	average size of a single spring Chinook redd in sq ft (45.2 per Murdock et al., 2009)
F =	5,000 eggs per female (Griffith, 2010)
EF =	30% egg-to-fry survival rate (Griffith, 2010)

Resulting estimated potentials of fry production for the stream reach extending from Lookout Point Reservoir to the confluence of the NFMF, and from the NFMF to Hills Creek Dam were 69,800 and 81,300, respectively. Total fry potential production for all stream reaches combined is estimated at approximately 2.25 million (Table 2-4). Griffith (2010) assumed no pre-spawning mortality in these calculations. Estimated potentials from other basins indicate that pre-spawning mortality typically is substantial and quite variable. Thus, these estimated potential production should be viewed as optimistic and represent the high end of the range for these populations. This characterization also applies to the smolt estimated potential production reported herein.

Table 2-4. Potential Spring Chinook Fry Production by Stream Reach

Stream Reach	Method	Habitat (sq ft)*	Fry
North Fork of the Middle Fork Willamette River (NFMF)	Griffith (2010)	N/A	1,222,200
Middle Fork Willamette River above Hills Creek Dam	Griffith (2010)	N/A	873,000
Lookout Point Reservoir to NFMF Confluence	Spawning habitat	2,102	69,800
NFMF Confluence to Hills Creek Dam (includes Salt Creek)	Spawning habitat	2,450	81,300
Total Fry Production			2,246,300

NOTES:

*Habitat data obtained from USACE database; sq ft = square feet

N/A = not applicable

Griffith (2010) also estimated that total smolt potential production for the NFMF was approximately 30,000 (based on limited data). The author did not provide smolt estimated potential production for any other reach. For this analysis, smolt potential production for these other reaches was calculated using the following formula, based on fry and smolt potential production estimates for the NFMF:

$$R_{Smolts} = (\#FRY/\ FRY_{NFMF})*\ SMOLT_{NFMF}$$

where:

R_{Smolts} =	number of smolts per reach
# FRY =	number of fry per reach
$\#FRY_{NFMF}$ =	number of fry in NFMF (1,222,200)
$SMOLT_{NFMF}$ =	number of smolts in NFMF (30,000)

Total smolt potential production for all stream reaches is estimated at 55,000 (Table 2-5). Combined fry and smolt potential production for each reach is presented in Table 2-6.

Table 2-5. Potential Spring Chinook Smolt Production by Stream Reach

Stream Reach	Method	Smolt
North Fork of the Middle Fork Willamette River (NFMF)	Griffith (2010)	30,000
Middle Fork Willamette River above Hills Creek Dam	NFMF Fry/Smolt	21,300
Lookout Point Reservoir to NFMF Confluence	NFMF Fry/Smolt	1,700
NFMF Confluence to Hills Creek Dam (includes Salt Creek)	NFMF Fry/Smolt	2,000
Total Smolt Production		55,000

Table 2-6. Potential Spring Chinook Fry and Smolt Production by Stream Reach

Stream Reach	Smolt	Fry	Total	Percentage of Total Basin Production
North Fork of the Middle Fork Willamette River (NFMF)	30,000	1,222,200	1,252,200	54%
Middle Fork Willamette River above Hills Creek Dam	21,300	873,000	894,300	39%
Lookout Point Reservoir to NFMF Confluence	1,700	69,800	71,500	3%
NFMF Confluence to Hills Creek Dam (includes Salt Creek)	2,000	81,300	83,300	4%
Total Production	55,000	2,246,300	2,301,300	100%

In practice, fry and smolt potential production will vary by year based on adult escapement, sex-ratio, pre-spawning survival, and egg-to-fry-to-smolt survival rates, each of which may be highly variable. Although the juvenile potential production estimates are uncertain, they represent the high range and, thus, are adequate for collector design development.

2.4 LOOKOUT POINT PROJECT OPERATIONS

The Lookout Point Project is composed of Lookout Point Dam and Dexter Dam. The Lookout Point Dam is operated as a peaking facility, with Dexter Dam acting as the re-regulating facility. The existing authorized purposes for Lookout Point Dam are flood control, power, navigation, and irrigation. Other uses include fisheries and wildlife, water quality, municipal and industrial water supply, and recreation.

Operations of the Lookout Point Dam are dictated by the water control diagram included in Appendix B, Reservoir Hydrologic Data. The FCRC represents the regulated maximum reservoir water surface elevation throughout the year. Reservoir elevations typically are maintained at or below this value. The year is divided into three seasons: major flood season (16 November – 31 January), conservation storing season (1 February – 10 May), and conservation release season (11 May – 15 November).

During the major flood season, the reservoir is operated to maximize flood storage by keeping water surface elevations low, typically between elevation (El.) 856 and El. 825. The reservoir is held low to regulate flood peaks using reservoir storage volume. Once a flood has passed, the reservoir is drawn down as quickly as downstream conditions allow.

The conservation storing season consists of filling the reservoir at a controlled rate, with the intent of reaching an elevation of 926 by 10 May. By then the typical flood-prone months have passed and operations are in accordance with the project's secondary objectives that necessitate a full reservoir.

Conservation release season covers the summer recreation period as well as the drawdown to prepare for the major flood season. Reservoir elevations remain high (up to El. 926) until 31 August, when the reservoir is drafted down to prepare for flood season.

Outflows from the Lookout Point Dam can be released via the powerhouse, the regulating outlets (RO), or the spillway. The powerhouse consists of three Francis turbines, with a combined maximum discharge of 9,300 cfs at 185 feet of head. There are four ROs controlled by radial-type (tainter) Walker valves. Combined maximum discharge for the ROs is 12,088 cfs. The spillway includes five radial (tainter) gates with a design discharge of 270,000 cfs.

2.5 REAL ESTATE OWNERSHIP

In general, lands adjacent to Lookout Point Reservoir are owned by USFS, USACE, and various private parties. It is assumed that lands adjacent to the Middle Fork Willamette River and other tributaries located upstream of the reservoir are owned primarily by USFS and various private parties.

SECTION 3

DESIGN CRITERIA AND METHODOLOGY

3.1 GENERAL

This section presents general design criteria and methodologies used to define the overall scope of the conceptual alternatives and associated facility components. Existing standard criteria are included by reference only. Anticipated deviations from such criteria are described specifically below. A summary of general design criteria is presented in Table 3-1.

Table 3-1. General Design Criteria

Criteria	Standard/Guideline	Comments	Reference
Hydrologic and Hydraulic Criteria			
Design flow range for juvenile collection (in-tributary collectors from January through September)	Up to the 5 percent exceedence flow rates for the design migration period (January through September). Note: For evaluation purposes, 95 percent of the available fish are assumed to be collected at this flow rate; however, this does not represent the anticipated performance of an actual facility.	The 5 percent exceedence flow rates are as follows: Middle Fork Willamette River (Black Canyon) = 6,530 cubic feet per second (cfs) Middle Fork Willamette River, above the North Fork confluence = 3,750 cfs North Fork of the Middle Fork Willamette River (Westfir) = 2,000 cfs	Section 3.2.2 and Appendix B
Design flow range for juvenile collection (in-reservoir collectors from January through September)	Floating surface collector (FSC) attraction flow: 500 to 1,000 cfs Maximum flow through FSC exclusion nets: 8,180 cfs	Net flow rate calculated as the sum of the 5 percent exceedence river inflow (6,530 cfs) and the maximum reservoir evacuation rate (1,650 cfs), as described on the water control diagram.	Section 3.2.3 and Appendix B
Floodplain impacts	No net rise in the 100-year flood profile when building in the floodplain		Section 3.2.2, Appendix B, and Executive Order 11988

Criteria	Standard/Guideline	Comments	Reference
Biological Criteria			
Primary species of concern	Spring Chinook salmon		Section 2.3.1
Other species of concern	Rainbow trout, northern pikeminnow, bull trout, Oregon chub, redside shiner, largemouth bass, smallmouth bass, Pacific lamprey, mountain whitefish, black crappie, and other native and non-native species.		Section 2.3.1
Fish size	Fry length = 60 millimeters (mm) weight = 1.78 grams Smolt (average) length = 100 mm weight = 8.35 grams Smolt (maximum) length = 200 mm weight = 69.78 grams		Section 3.3.1
Design migration period	January through September	Spring Chinook juveniles only	Section 2.3.2
Estimated total basin production	Total fry production = 2,246,300 Total smolt production = 55,000	The estimated total number of juvenile spring Chinook produced and the estimated peak day at each site are presented in Table 3-3.	Tables 2-4 and 2-5
Fish sorting/handling	Separation into two size classes: fry and smolts (less than [<] 200 mm) adults (greater than [>] 200 mm)	All fry and smolts (including resident fish) will be transported downstream. All adults will be returned immediately to the water body.	Section 3.3.2.1
Fish holding	Capacity for 10 percent of the total annual basin production	Assumes one transport trip per day over the period of migration	Section 3.3.2.2
Fish transport	Hopper loading and transport via barge and/or tanker truck	Mobile hoppers or tanks may also be used.	

Criteria	Standard/Guideline	Comments	Reference
Biological Criteria (Continued)			
Fish release	Direct release or holding in recovery ponds for 24 hours prior to release		Section 3.3.2.4
Operational Criteria			
Operational impacts	No impacts to existing reservoir or powerhouse operations		

3.2 HYDROLOGIC AND HYDRAULIC CRITERIA

The NMFS (2008a) guidelines generally were followed for the conceptual design of all fish collection, screening, bypass, handling, and transport facilities. Significant exceptions and additions to these guidelines are described in the following sections.

3.2.1 In-Reservoir Collectors

Because all of the in-reservoir collection systems considered herein (except the Merwin traps) use floating surface collectors (FSC), these criteria focus on specific aspects of the FSC design. Merwin traps generally would not adhere to criteria provided by NMFS 2008a as they rely on fish behavior rather than attraction flow to collect fish.

FSC Design Water Surface Elevations: It is assumed that the existing reservoir and powerhouse operations will not be modified for fish collection purposes. As such, the FSC would be designed to operate from the minimum flood control pool water surface elevation (WSEL) of 825.0 up to the maximum conservation pool WSEL of 926.0. These values are described on the water control diagram (Appendix B) and represent the planned high and low reservoir WSELs throughout the year. Reservoir WSELs do occasionally rise above or fall below these defined points, and the facility would be designed to accommodate short durations outside the typical range (from WSEL 819.0 to 934.0). This criterion largely applies to the FSC and exclusion net mooring systems.

Average daily stage data for the reservoir were evaluated to identify the frequency with which reservoir elevations occurred outside the design range. From 1970 to 2010, the reservoir dropped below an elevation of 825 feet (ft) only 1.8 percent of the time and exceeded an elevation of 926 ft only 4.9 percent of the time. When the data set was limited to the January through September timeframe (the design migration period), the reservoir dropped below an elevation of 825 ft only 1.1 percent of the time and exceeded an elevation of 926 ft only 6.5 percent of the time.

Water surface elevations below 825 ft could affect the ability of the exclusion nets to meet approach velocity criteria and could also influence the selected location of the FSC in the reservoir. Given the minimal amount of bathymetric data currently available and the infrequency of reservoir elevations below 825 ft, it was decided to use 825 ft as the minimum design elevation until better information becomes available. Water surface elevations above 926 ft do not have any negative impacts on the ability of the nets to meet approach velocity criteria.

The design WSELs (and ramping rates) are also relevant for design of mooring systems for the in-reservoir alternatives. Fixed mooring towers, dolphins, marine anchors and/or mooring lines to the shore with actively managed winch systems may be required to hold the collector on station throughout the full range of reservoir water surface elevations.

FSC Design Flow: The only FSCs currently in operation in the western U.S. are the Puget Sound Energy (PSE) Upper Baker Project and the Portland General Electric (PGE) Round Butte Project. PacifiCorp intends to begin construction of an FSC on Swift Reservoir at the Lewis River Project in May 2011. For the purposes of this evaluation, a collector with a design flow rate similar to the Upper Baker Project, 500 cfs (expandable to 1,000 cfs), was selected. The reservoir characteristics (length, depth, shoreline, withdrawal rates) do differ between Baker Lake and the Lookout Point Reservoir, and additional study will be required to refine flow rates specifically for Lookout Point. However, this analysis was deemed too detailed for this Alternatives Study and can be investigated further if required in the future, most likely with a computational fluid dynamics (CFD) model study.

In addition, while the PSE Upper Baker FSC is located immediately upstream of the Upper Baker Dam (a distance of approximately 350 ft from the dam to the net transition structure [NTS] entrance), ambient velocities are still comparable to those at Lookout Point. CFD results presented by ENSR (2005) show that the releases from the dam exert little influence at the Upper Baker NTS entrance. Given a yearly average discharge of 2,520 cfs and a typical cross-section of the Upper Baker Reservoir, the ambient velocity is roughly 0.02 feet per second (fps) (ENSR, 2005). The average velocity is 0.04 fps at the maximum powerhouse discharge of 5,050 cfs. These values are very similar to ambient velocities at Lookout Point during the design discharge, as presented in Table 5-1. This is particularly true when considering the 101-ft reservoir fluctuation and the effect it has on ambient velocities.

Exclusion Net Design Flow: Selection of a design river inflow is necessary for siting and alignment of the in-reservoir collector exclusion nets. This value, in conjunction with the reservoir filling/evacuation rates, determines the rate of flow and corresponding approach velocity through the nets, assuming a full-depth net. The approach velocity associated with the maximum discharge would be required to meet specific design criteria.

The 5 percent exceedence river inflow for the fish passage season was selected for consistency with the exceedence value used in sizing the in-tributary collectors. The 5 percent inflow from the Middle Fork Willamette River from January to September was determined to be 6,530 cfs.

Continuity dictates that during filling of the reservoir, inflow is greater than outflow and during reservoir drafting, inflow is less than outflow. Using this logic and assuming that the discharge rates in the reservoir vary uniformly from the dam face (outflow) to the head of the reservoir (inflow), the maximum discharge experienced by the FSC nets would occur during reservoir evacuation. The maximum evacuation rate during the period of migration is 3,271 ac-ft/day or 1,650 cfs, as described on the water control diagram.

Given the design river flow and variable reservoir inflow and outflow rates, a ratio of the reservoir storage volumes upstream and downstream of the collector could be used to identify a discharge for each specific FSC location. However, to be conservative, the design river flow was added directly to the full evacuation rate discharge to calculate the exclusion net design flow of 8,180 cfs.

An alternative method of selecting a net design flow rate is to use the 5 percent exceedence discharge from Lookout Point Dam. NMFS criteria state that the high design flow rate for a fish passage facility should be the 5 percent exceedence value of the previous 25 years of mean daily flows during the fish passage season. An analysis of the average daily outflows at Lookout Point from 1985 to 2010 (January through September) results in a discharge of 6,160 cfs. Expanding the data to the full period of record (1960 to 2010), while still limiting them to the fish passage season, results in a value of 6,670 cfs. Incorporating the full calendar year into the analysis results in discharges of 7,290 and 8,400 cfs for the past 25 years and the full period of record, respectively. The associated exceedence graphs for these four values are presented in Appendix B. Given these values, particularly the discharges during the fish passage season, it was determined that use of the 5 percent inflow exceedence combined with the maximum evacuation rate during fish passage season would be adequately conservative.

While not required to meet fish criteria during high flow events, the exclusion nets and associated equipment would also need to be designed to withstand the forces associated with these events. The following net design criteria were adapted from the criteria used for the Upper Baker design (ENSR, 2007; AECOM and BioAnalysts, 2010).

Table 3-2. Exclusion Net Design Criteria

Parameter	Value	Comments
Net material	Knotless mesh, mesh size less than or equal to ¼ inch clear opening	Net will be resistant to rot and ultraviolet degradation. To improve the guidance of fish to the FSC, the net in the upper 30 to 50 feet of the water column may incorporate a knotless mesh (with the mesh size not to exceed 3/32 inch) or an impermeable membrane.
Velocity along guidance devices	Positive sweeping velocity (towards the FSC)	There should be a continuous sweeping component of velocity parallel to the nets (or, at least, no adverse currents) to guide fish toward the NTS.
Approach velocity	Approach velocity less than or equal to 0.20 fps	For exclusion nets, the component of velocity perpendicular to the nets should be < 0.2 fps; and positive (downstream) through the nets. To account for non-uniformity in approach flow, gross net area should be sized to provide an average approach velocity component of approximately 0.1 fps, which is consistent with the PSE Upper Baker project.
Hydraulic conditions		Eddying or down-welling should be avoided near the guidance devices or FSC.

NOTES:
< = less than
fps = feet per second
FSC = floating surface collector
PSE = Puget Sound Energy
NTS = net transition structure

3.2.2 In-Tributary Collectors

River Design Flows: The in-tributary collectors will be designed to operate over the typical range of fish passage flows, from the 95 to the 5 percent exceedence points for the subject river reach during the design migration period of January through September. It is assumed that this criterion also applies to required adult upstream passage facilities.

Juveniles are known to migrate during the spring freshet and other high-flow events; however, existing data suggest that the migration is relatively evenly distributed across the range of flows in the Middle Fork Basin. The 5 percent exceedence point was used to determine the maximum hydraulic capacity of the facility and, thus, the juvenile collection efficiency of 95 percent. However, it should be noted that the collection efficiency value is for evaluation purposes only and does not represent the anticipated performance of an actual facility. For example, it is anticipated that the facility will be able to collect some juveniles at streamflows greater than the 5 percent exceedence, with the remaining fish passing over the diversion weir via spill.

Floodplain Regulatory Requirements: It is assumed that the design and construction of any facilities will be required to follow Executive Order 11988, which requires no net rise in the 100-year flood profile when building in the floodplain.

3.3 BIOLOGICAL CRITERIA

All fish collection, sorting, handling, holding, and transport facilities will be designed in accordance with the NMFS fish passage design criteria (NMFS, 2008a).

3.3.1 Fish Sorting

The need for juvenile sorting facilities depends on assumptions about the ultimate disposition of collected fish, predation concerns with regard to the mixing of large and small fish into a single system, and research and monitoring needs of the spring Chinook reintroduction program. The approach taken in this report is one of minimalism. Sorting and handling facilities presented for each alternative assume the following[1]:

1. Fish would be separated into only two categories, small (less than [<] 200 mm) and large (larger than [>] 200 mm).
2. All small fish would be diverted to a single tank, transported, and released downstream of Dexter Dam. Fish smaller than 200 mm are assumed to be juvenile spring Chinook, rainbow trout, cutthroat trout, bull trout, or other native or non-native (especially for the in-reservoir collectors) fish species.
3. Large fish (that is, adult rainbow trout, bull trout, cutthroat trout) would be released back to the river or reservoir from which they were collected.
4. No fish-marking facilities would be provided at the collection location/facility. Because marking or direct fish handling is not needed, nor feasible, anesthesia systems would not be provided.

This approach reduces facility size and cost, and it assumes that USACE and its partners/stakeholders have a goal to connect fish populations (that is, create gene flow) above and below Lookout Point Dam. One major issue with this approach is that non-

[1] Because of the way in which a Merwin trap is operated, sorting facilities are not included in its design. As fish are removed from the Merwin traps by hand, biologists could perform a manual sort.

native fish species, such as smallmouth bass or black crappie, may be released below Dexter Dam.

A second approach, requiring more complex and costly facilities is described below.

Alternative Strategy for Fish Sorting: With the exception of the Merwin trap alternative, all the collection facilities could be designed to allow for the separation of fry (< 60 mm) and smolt (> 60 mm) into separate holding facilities for transport. This action would protect smaller fish from predation by the larger smolts. It would also provide managers the ability, if required, to prevent resident (rainbow, cutthroat, and bull trout) and non-native species (bass, crappie, etc.) from being transported and released downstream of Lookout Point Dam.[2]

The collection facilities could also be equipped with the ability to subsample a portion of the juvenile migrants entering the collectors. This equipment would be used to enumerate the number of fish collected (by species), to determine injury and mortality rates for the facility, and to allow fish marking in support of fish survival research. Fish counts would be used to help determine the number of truck trips required to transport fish safely to the lower river each day, and to ensure that the holding facilities do not become overcrowded and thereby reduce fish survival.[3]

The collection facilities could also be designed to allow 100 percent sorting and handling (including anesthesia) of smolt or larger fish. Because upwards of 1.3 million spring Chinook fry may enter a facility over the course of the migration season, the systems likely would not include provisions to allow biologists to handle, identify, and sort every fry. If fry needs to be sorted to achieve management objectives, the cost and complexity of the facility would increase. The requirement to sort fry is a critical uncertainty that will need to be addressed prior to preliminary design.

In addition, the management agencies need to articulate clearly the fate and handling of catchable-size rainbow trout, cutthroat trout, and other sport fishes that may be encountered. On the basis of human health concerns, it may not be appropriate to anesthetize fish (using chemicals such as MS-222) that may be consumed by sportsmen. To prevent this from occurring, a third separator that prevents fish bigger than the largest expected spring Chinook migrant (about 200 mm) from entering the anesthesia tanks could be included. Adding such a separator would also prevent adult spring Chinook that “fall back” downstream from entering the smolt holding tanks.

3.3.2 Fish Holding

The flow and density indexes are important factors when sizing a recovery and release facility. According to Piper et al. (1982) and NMFS (2008a), the selected density index is 0.2 pound per cubic foot per inch (lb/cf-in.) and the flow index is 1.0 pound per gallons per minute per inch (lb/gpm-in.). Fish are assumed to be 60 mm in length for fry and a maximum of 200 mm in length for smolts, with weights of 1.78 and 69.78 grams,

---

[2] The fisheries management agencies will need to provide guidance prior to system design on the preferred fate (transport, release downstream, or elimination (non-natives) of all fish collected.

[3] Automatic fish-counting systems may be considered at a later date if ongoing research indicates that the accuracy of these types of systems meets management criteria. A collection system proposed for Swift Reservoir on the Lewis River (Washington) in 2012 is being equipped with automatic fry and smolt counters. Test results on their accuracy should be available at that time (Shrier, 2010).

respectively. The recommended flows and holding vessel sizes for the selected alternatives are presented in Appendix D.

The water quality in the holding vessels will be as follows:

- Temperature shall be less than 50 degrees Fahrenheit when possible. When temperature is greater than this value fish density and flow criteria would be adjusted accordingly.

- Dissolved nitrogen shall be near or below 100 percent saturation, in accordance with Integrated Hatchery Operations Team (IHOT) guidelines.

- Dissolved oxygen shall be greater than 7 milligrams per liter or 90 percent saturation, in accordance with IHOT guidelines. I

Fish-holding facilities located adjacent to the collection facilities would be designed to hold 10 percent, on any given day, of the total number of spring Chinook expected over the course of the migration season. In other words, if 1 million fry are expected over the course of the migration season, a maximum of 100,000 would be expected to arrive in a single day, with holding facilities designed accordingly. If this number were exceeded because of larger run size or collection of non-target species, transport trucks would be required to make multiple trips per day to prevent fish-rearing densities from exceeding the system holding capacity.

3.3.3 Fish Transport and Loading

Depending on the selected alternative, captured fish may need to be transported from the collector to the shore (for the in-reservoir alternatives), then transported to below Dexter Dam. Truck-loading guidelines, by species, are shown in Table 3-3.

Table 3-3. Fish Truck-Loading Guidelines

Species	Size	Loading Criteria (lb fish/gal H_20)	Max. Load in lb with 1,000 gal H_20	11.4 lb/mm Tank Displacement
Spring and fall Chinook	Swim up to 101 fish per pound (fpp)	0.285	285	25
	100 fpp to > 51 fpp	0.75	750	66
	50 fpp to > 21 fpp	1	1,000	88
	20 fpp and larger	1.2	1,200	105
Steelhead and cutthroat	Swim up to 101 fpp	0.285	285	25
	100 fpp to > 21 fpp	0.5	500	44
	20 fpp and larger	1	1,000	88

NOTES:
> = greater than
gal = gallon(s)
H_20 = water
lb = pound(s)
mm = millimeter(s)

It is anticipated that the same trucks being used to transport adult spring Chinook to above Lookout Point Dam could also be used to transport juvenile fish downstream. If this is feasible, the trucks would need to be disinfected transporting the juveniles. Disinfection would be performed using chlorine at the rates shown in Table 3-4.

Table 3-4. Chlorine Disinfection

Tanker Size	Amount of 12.5 Percent Chlorine Bleach	Parts per Million of Chlorine	Grams of Sodium Thiosulphate
1,500 gallons	32 ounces (one quart) for 30 minutes	20	900 for 15 minutes

3.3.4 Fish Release

There are two release options for captured juvenile spring Chinook:

1. Direct release to the river below Dexter Dam.
2. Temporary (24-hour) holding in recovery ponds or raceways prior to release to the river.

The fisheries resource agencies will need to provide guidance to select the release option. This decision may be better informed if research were conducted on fry and smolt survival rates from both types of systems at Lookout Point. Fry survival rate estimates over an identified river segment may be problematic because of difficulties associated with marking (the fish are very small) and the large sample sizes required to achieve sufficient precision in survival estimates (natural survival rates of fry are quite low).

Because Dexter Hatchery is located below Dexter Dam, it may be possible to use a spread-the-risk strategy where some fish are held in hatchery raceways for 24 hours prior to release, and others are released directly from trucks to the river. Release-to-adult survival studies for the two release groups could be undertaken by marking all (or a subset) of fish with a suitable mass mark or perhaps a half-length coded wire tag (CWT). Regardless of which approach is adopted, preference will be given to release sites with the following characteristics (NMFS, 2008a):

- Located to minimize predation. The location must be free of eddies, reverse flow, or known predator habitat. The point of impact for bypass outfalls should be located where ambient river velocities are greater than 4.0 fps during the *smolt* out-migration. Predator control systems may be required in areas with high avian predation potential. Bypass outfalls should be located to provide good egress conditions for downstream migrants.

- Located where the receiving water is of sufficient depth (depending on the impact velocity and quantity of *bypass flow*) to ensure that fish injuries are avoided at all river and *bypass flow*s. The *bypass flow* must not affect the river bottom or other physical features at any stage of river flow.

3.4 CIVIL AND GEOTECHNICAL CRITERIA

The civil and geotechnical design will conform to all applicable federal, state, and local regulations, codes, and standards. It is anticipated that provisions for power, water, sanitary sewer, and communications will be included for each site location. Stormwater management and erosion and sediment control measures will be required during both construction and operation of shore-based facilities. Special provisions likely will also be required for the use and disposal of anesthetics. Where applicable, foundation rock and soil properties documented as part of the original project construction will be used.

The existing project vertical datum is NGVD 29, as shown on the Lookout Point Dam and Reservoir record drawings (Appendix E – Reference Drawings). The horizontal control for the original construction of the project was not stated.

3.5 MECHANICAL AND ELECTRICAL CRITERIA

The mechanical and electrical design will conform to all applicable federal, state, and local regulations, codes, and standards. It is anticipated that project-specific design of fish sorting, handling, and sampling equipment may be required.

3.6 STRUCTURAL CRITERIA

The structural design will conform to all applicable federal, state, and local regulations, codes, and standards, including applicable USACE engineering manuals (EM). It is anticipated that the design will conform specifically to the 2009 International Building Code (IBC), as supplemented by the 2007 Oregon Structural Specialty Code, Chapter 16, "Wind and Snow Load Analysis."

3.7 ENVIRONMENTAL AND CULTURAL RESOURCE CRITERIA

The downstream collection facility will be required to comply with NEPA, ESA, MSA, CWA, and various other federal, state, and local regulations. It is anticipated that environmental and cultural resource surveys will be performed once a preferred site has been located, and prior to any detailed design activities to ensure compliance with the required regulations.

Known and predicted northern spotted owl (NSO) *(Strix occidentalis caurina)* nesting, roosting, foraging, and dispersal areas are located in the project vicinity, as described in Appendix D – Biological Data. The project likely would have to comply with the requirements of the *Draft Revised Recovery Plan for the Northern Spotted Owl,* Strix occidentalis caurina (USFWS, 2010) and the *Northwest Forest Management Plan* (USDA and USDI, 1994). A summary of habitat definitions is provided in Table 3-5.

Table 3-5. Northern Spotted Owl Habitat Definitions

Critical habitat unit (CHU)	Areas with features that support nesting, roosting, foraging and dispersal of northern spotted owls. CHUs were designated based on large blocks of suitable habitat identified for NSO conservation from the 2008 Draft NSO Management Plan. CHUs encompass clusters of 20 or more owl activity sites. CHUs include connective corridors that space distances less than 12 miles between activity centers.
Known spotted owl activity centers	Applies to known NSO activity centers not protected by the Northwest Forest Management Plan or Draft NSO Management Plan. "Activity Center" is an area of concentrated activity of either a pair of NSO or one territorial single owl.

Table 3-5. Northern Spotted Owl Habitat Definitions

Known owl site	A site that was or is occupied by a pair or resident single (1990 to present) as defined by the survey protocol. The specific site location is determined based on the best and/or most recent information. A known site may be determined to be inactive only in accordance with the survey protocol (USFWS 2010).
Predicted NSO site:	An area able to support resident spotted owls (i.e. a potential breeding pair) as determined by the interagency occupancy template (USFWS 2008). This is used for determining potential effects to spotted owls where survey data are insufficient.
NSO 12-mile home range	Three concentric circles surround known or predicted NSO nest sites. The inner most circle encompasses the "nest patch." The second circle encompasses the "core area." The outermost circle encompasses the "home range." Habitats within the "core area" and within the "home range" include areas used for foraging, roosting, and thermal regulation. The far circle's outer ring encircles the entire protected home range circle.
Nest patch (or stand)	300-meter radius circle around a point (known or predicted owl site), where a spotted owl would be likely to select a nesting tree (USFWS et al., 2008).
Core area	0.5-mile radius circle around a known or predicted owl site, which delineates the area most heavily used during the nesting season (USFWS et al., 2008).
Home range	An estimated area for habitat use of a spotted owl pair. For the Oregon Cascades Physiographic Province, this estimate is a 1.2-mile-radius circle around a known or predicted owl site (Thomas et al., 1990; USFWS et al., 2008).
Breeding period	The breeding period for NSO in the Oregon Cascades Physiographic Province is March 1 through September 30. The critical breeding period is March 1 through July 15.
Late Successional Reserves (LSR)	The Northwest Forest Plan designated Late Successional Reserves on some federal lands in Oregon, Washington, and California. These lands are managed to protect and enhance old-growth forests and habitat conditions for species dependent on old growth, such as NSO and other species associated with older late seral forests, within a system of well-distributed, large blocks of forest (USDA and USDI, 1994). Some limited land management activities, including timber harvest and salvage logging, are allowed for stands less than 80 years old in order to enhance late-successional and old-growth characteristics.

NSO dispersal-only habitat	Dispersal-only habitat refers to the subset of habitat used by dispersing spotted owls that does not contain suitable habitat. These stands provide protection from avian predators and at least minimal foraging opportunities during dispersal. At a minimum, dispersal habitat is composed of conifer and mixed mature conifer-hardwood habitats, with a canopy cover greater than or equal to 40 percent and conifer trees greater than or equal to 11 inches average diameter at breast height (dbh) but less than the habitat characteristics described for suitable habitat above. Generally, spotted owls use younger stands to move between blocks of suitable habitat, roost, forage, and survive until they can establish a nest territory. Juvenile owls also use dispersal habitat to move from natal areas.
NSO foraging habitat	Designated foraging habitat provides foraging opportunities for NSO, but it lacks the structure to support nesting and roosting habitat.
NSO nesting and roosting habitat	Designated nesting and roosting habitats are forested sites that have characteristics suitable for NSO nesting and roosting. Characteristics include high canopy closure, a multilayered and diverse canopy layer (including larger overstory trees), and forest stands with nesting platforms (snags, broken tops, mistletoe clumps).
NSO non-habitat	Non-habitats are forested areas that do not have all the characteristics to fall into one of the designated owl habitat types. Stands under 25 years of age are also included in this designation.
NSO suitable habitat	Consists of stands with sufficient structure (large trees, snags, and downed wood) to provide opportunities for owl nesting, roosting, and foraging. Generally, these conditions are associated with conifer-dominated stands 80 years old or older that are multistoried in structure, have trees greater than or equal to 18 inches mean dbh, and a canopy closure that generally exceeds 60 percent. Stands are defined at a larger scale (that is, province) as suitable based on age or size (80 years, greater than 18 inches dbh) alone.

NOTES:
NSO = northern spotted owl
USFWS = U.S. Fish and Wildlife Service

Noise, smoke, and human presence in the canopy can result in a significant disruption of breeding, feeding, or sheltering behavior of the northern spotted owl such that it creates the potential for injury to individuals (that is, incidental take in the form of harassment). Therefore, USFWS has determined effects on northern spotted owls from disturbance associated with habitat modification activities near an active nest site based on the source of disturbance, distance from nest patch, and time period. Table 3-6 provides a summary of auditory harassment thresholds for nesting NSO in Oregon national forests.

Table 3-6. Auditory Harassment Thresholds

Activity	Harassment Threshold Distance
Blasting (greater than 2-pound charge)	1.0 mile
Blasting (less than 2-pound charge)	360 feet
Pile driving, jackhammer, or rock drill	180 feet
Helicopter or single-engine aircraft	360 feet
Chainsaws	195 feet
Heavy equipment	105 feet

The noise distances were developed based on a threshold of 92 decibels. Noise restrictions are implemented during the breeding season in Oregon (30 March through 30 September) in order to eliminate or minimize noise disturbances to nesting owls.

3.8 OPERATIONAL CRITERIA

The downstream collection facility will not be allowed to affect any of the Lookout Point Project's authorized purposes of flood control, hydropower, irrigation, or navigation. Similarly, impacts to all existing dam and reservoir operations will be minimized.

The facility itself should be designed and configured to have low operations and maintenance requirements over a project life cycle of 50 years. These requirements may vary for a prototype as opposed to a full-scale production facility.

This page was intentionally left blank.

SECTION 4
DESCRIPTION OF ALTERNATIVES

4.1 GENERAL

This section provides a general description of the various site locations and juvenile fish collection technologies evaluated as part of this study. A list of comprehensive alternatives, including specific technologies proposed for each site, is also provided. Detailed descriptions of the selected alternatives are presented in Section 5. Appendix F contains information concerning alternatives that were de-prioritized.

4.2 SITE LOCATIONS

The project delivery team (PDT) visited the site locations shown on Plates 1 and 2 in April and October 2010. Eleven general site locations were considered: one site in the upper reservoir, four sites on the Middle Fork Willamette River, and six sites on the NFMF.

4.2.1 Upper Reservoir

At the minimum flood control pool (WSEL 825.0), a meandering river channel enters the reservoir adjacent to State Highway 58, as shown in the background of Figure 4-1. Sufficient reservoir width and water depth are required to achieve adequate approach velocities for exclusion net systems. A facility at this location also would have to function up to the maximum conservation pool (WSEL 926.0)—a vertical rise of 101 feet from the minimum flood control pool—while also accommodating the maximum possible WSEL range from the minimum power pool (WSEL 819.0) to the maximum pool (WSEL 934.0) without damage to the facility.

Figure 4-1. Upper Reservoir Site (in background)

The selection of the head-of-reservoir location considered the draft (from the waterline to the bottom of the structure) of an FSC, so that the facility could be operated throughout the reservoir pool range without moving to a different location. Two specific locations were evaluated, the selected location and an alternate location. The Upper Reservoir site also includes the Merwin trap location. The alternate FSC location is outside the Willamette National Forest; the selected FSC location and the Merwin trap location are inside it.

Site access is good, with State Highway 58 to the south of the reservoir and the North Boundary Road to the north. A railroad right-of-way is located between State Highway 58 and the reservoir. It is anticipated that some utilities are available along the highway right-of-way.

4.2.2 Hampton Site

The Hampton site is located on the left (southerly) bank, downstream from the USFS Black Canyon Campground, and is an existing boat ramp and picnic area. The site is located directly across from Hospital Creek and includes a narrow channel with several rock outcroppings, as shown on Figure 4-2. A large, benched area is located just downstream on the left (southerly) bank; however, it is unknown to what extent this area would be inundated at the maximum conservation pool. A facility at this site would have to accommodate both inundation by the reservoir and the full range of river conditions.

Figure 4-2. Hampton Site

4.2.3 USFS Black Canyon Campground

The USFS Black Canyon Campground site is located near the maximum conservation pool location, as shown on Plate 2 and Figure 4-3. At this site, the facility would be located just downstream of the reservoir at full pool and would have to accommodate some minor backwater effects from the reservoir. The Middle Fork Willamette River exhibits a meandering pattern at this location with pool/riffle combinations, gravel point bars, and alluvial channels. The site has good access from State Highway 58 and is heavily wooded with mature fir and cedar trees. The existing campground includes 74 camping sites, an amphitheater, a day use area, restrooms, and a boat ramp. A fish facility located in or near the campground likely would require a boat portage and/or other features to accommodate river recreation in the immediate area. It is anticipated that some utilities are available along the highway right-of-way.

The USFS Black Canyon Campground site is located in an NSO habitat, where development restrictions apply. In addition, it is anticipated that impacts to the existing campground would be significant from a facility at this site. As such, an alternate USFS Black Canyon Campground site was identified at a location upstream, as shown on Plate 2. The new site appears to be outside NSO habitat (both known and predicted), but it is located within an LSR area. Historical river channels and gravel bars in this vicinity are known to be Oregon chub habitat. It is understood that the new location is within or adjacent to the Buckhead Wildlife Area. The alternative Black Canyon site area includes an interpretive trail used for public education. Other recreational activities include fishing, boating, and both private and commercial rafting. Boats typically are put in upstream near Oakridge and taken out downstream at the USFS Black Canyon Campground boat ramp. Portage facilities would be required for any diversion structures within this reach. It is anticipated that the backwater from a facility at this location would extend approximately 3.5 miles upstream.

Figure 4-3. USFS Black Canyon Campground Site

4.2.4 Lower North Fork (Westfir)

The Lower North Fork of the Middle Fork Willamette River (Lower NFMF) site is located approximately 1.3 river miles upstream from the Middle Fork confluence near the town of Westfir, as shown on Plate 2. A lumber mill was located at this site previously and was operated from approximately 1923 to 1985. A concrete dam associated with the mill was removed in 1994; however, the abutments remain largely intact. The river is channelized in this area with pool/riffle combinations, as shown on Figure 4-4.

Figure 4-4. Lower North Fork (Westfir) Site

The site has good access via the North Fork Road and two nearby bridges. The left (southerly) riverbank is steep, especially near the roadway embankment. The northerly bank has a low overbank area that could facilitate siting of a facility. The site is privately owned. It is anticipated that some existing utilities would be available in the immediate vicinity.

4.2.5 Upper North Fork

The Upper North Fork site is located approximately 2.4 river miles upstream from the Middle Fork confluence, as shown on Plate 2. The river is channelized in this area and has a moderate gradient dominated by riffles, as shown on Figure 4-5. The right (westerly) riverbank exhibits some instability at this location. The left (easterly) bank is gently sloping, with mature fir and cedar trees.

The site has good access via the North Fork Road and a paved access road. It is owned by USFS and is generally free of other encumbrances. Utilities are not readily available at this location. This site is located within the North Fork Wild and Scenic Area.

Figure 4-5. Upper North Fork Site

4.2.6 Additional Upper North Fork Sites

The following four sites were visited during the October 2010 site visit and are also presented on Plate 2.

1910 Road and 1912 Road Bridge Sites: Two bridges were visited that provide access to roads on the west side of the river – the 1910 road and the 1912 road. Both sites appeared to be too narrow, with steep slopes unsuitable for siting of the facility.

Roadside Pullout: A site in the vicinity of Leapfrog Creek was accessed via a roadside pullout. Siting of a facility at this site seemed technically feasible; however, much less overbank area is available at this location compared with the Upper North Fork and Westfir alternatives.

North Fork Road Bridge: This site was the upstream limit of the reconnaissance. The river channel is relatively narrow, with exposed rock banks near the bridge; however, suitable areas immediately downstream for siting of the facility appeared to be limited.

The NFMF includes one of the most significant sections of whitewater in Oregon and is a federally designated Wild and Scenic River. The reach above the North Fork Road Bridge contains the “Miracle Mile,” a steep, tightly constrained, and very technical section on which numerous professional kayakers have trained. The river provides intermediate whitewater opportunities in the reaches below the Miracle Mile, with boaters typically exiting the river downstream from the town of Westfir. USFS has noted that this entire reach is popular with kayakers and should not be considered for the siting of a fish collection facility.

4.2.7 Lower Middle Fork (Island)

The Lower Middle Fork site is located approximately 1/2 mile upstream from the North Fork confluence and just upstream of the Old Willamette Highway S. Bridge, as shown on Plate 2. The site includes an island formed by the main river channel and a side channel to the east, visible on aerial photos. This configuration may allow a portion of the total river flow to be diverted to a fish collection facility. The right (easterly) riverbank is steep, but the island and left bank areas offer level sites suitable for a fish facility. The site has fair road access and presumably is owned by a private party.

4.2.8 Upper Middle Fork

The Upper Middle Fork site is located just upstream from the Lower Middle Fork site. It includes an old side channel to the west (visible on aerial photos), as shown on Plate 2. Similar to the Lower Middle Fork site, the site geomorphology may allow a portion of the total river flow to be diverted to a fish facility. The left (westerly) bank appears to be open and level.

The site has good access from State Highway 58 and presumably is owned by a private party.

4.3 TECHNOLOGIES

The following descriptions of downstream collection technologies are organized first by their application to a particular site (such as in-reservoir, in-tributary, and/or mobile) and then by their respective components.

It is likely that all the facilities will include the following major features:

1. A fish exclusion or guidance device, such as a net or weir.
2. A collection facility with a screen system for reducing flows to an amount practical for fish bypass and handling.
3. Fish sorting and handling facilities for the sorting, holding, and transportation of collected juvenile fish. (It is assumed that a volitional bypass is not feasible.) Fish enumeration and sampling, monitoring, and evaluation facilities will also be provided if necessary.
4. Provisions for maintaining upstream adult fish passage and resident fish passage.

4.3.1 In-Reservoir Technologies

In-reservoir technologies are located at the upstream end of the Lookout Point Reservoir, where the water level is directly influenced by reservoir operations. The head of reservoir is defined as the farthest upstream location where the water level is directly controlled by the reservoir operations. This location will vary longitudinally along the river thalweg, depending on reservoir level. A mobile fish collector may have the ability to follow the head of reservoir across the full range of reservoir operations, as described in Section 4.3.3. For a fixed location collector, head of reservoir is defined by the lowest reservoir level at which the collector can function.

Only one technology is considered feasible for a fixed-location, in-reservoir (head-of-reservoir) collector—an FSC. The FSC is a technology that has been developed and implemented successfully at other high-head projects in the Pacific Northwest. Both the PSE Upper Baker Project (Figure 4-6) and the PGE Round Butte Dam Project are showing promising results in the first few years of full-scale operation. Special consideration needs to be given to site-specific factors at Lookout Point to ensure that an FSC would achieve regional fish passage goals. The resource agencies likely would require a monitoring and evaluation program to demonstrate compliance with a selected performance standard. The Upper Baker FSC has average coho and sockeye collection efficiencies of 81 and 76 percent, respectively (PSE. 2009). Several FSCs are currently under design or being planned at other

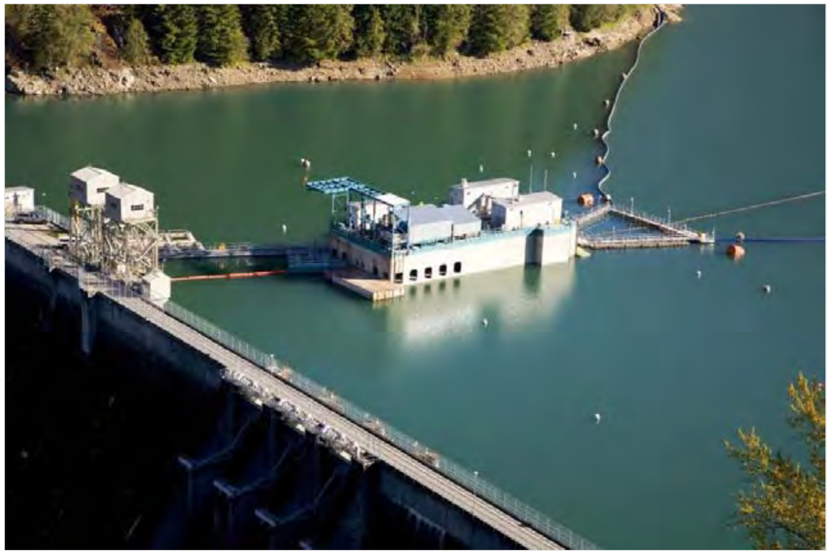


Figure 4-6. Upper Baker FSC (from PSE)

locations throughout the Pacific Northwest, including Lower Baker Dam (PSE), Swift Reservoir (PacifiCorp), Cushman Dam (Tacoma Power), and North Fork Dam (PGE).

FSCs generally employ full exclusionary nets to guide fish to the FSC entrance. The nets can be either full exclusionary (and extend from surface to bottom of the reservoir) or partially exclusionary (the net blocks approximately the upper 40 ft of the water column, where the majority of juvenile fish are found) (AECOM and BioAnalysts, 2010).The nets must be designed for very low approach velocities over the full range of reservoir operations and design flows. An NTS is used to connect the nets to the FSC, to control the acceleration of flow into the collector, and to extend the entrance hydraulic signature into the reservoir. The FSC itself is a floating structure, with a pumped collection flow at the entrance. A set of dewatering screens is used to remove a portion of the collected flow and to direct a bypass flow containing fish into handling facilities on the floating structure. Fish can then be counted, separated by size and species, and placed into holding vessels. Transport of the fish to their final destination is via a barge or a shore-based truck loading and transport facility.

FSCs generally include vertical screens oriented in a vee configuration that is symmetric about the FSC centerline. The first set of screens is referred to as the primary screens and removes the majority of the collection flow. Secondary screens are located downstream. Depending on the design, the secondary screens can be arranged in a parallel or skewed configuration. Larger vee-screen designs occasionally require tertiary screens to allow further dewatering of the bypass water to an amount suitable for fish-handling needs. Vee-screens typically are cleaned by a brush bar, a water jet backwash system, or a combination of both.

4.3.2 In-Tributary Technologies

In-tributary locations generally are defined as in-river sites located upstream of the influence of reservoir operations and reservoir backwater effects. At these locations, water level is only a function of the tributary flow rate. A limitation of in-tributary collection systems is that in order to achieve high fish collection efficiency (FCE), it may be necessary to divert and dewater the entire river flow during fish migration. This is generally not feasible, particularly in rivers with flashy hydrology (high peak flows) that occurs during the spring freshet when many juvenile fish are moving downstream. In-tributary collector concepts have been proposed for a number of projects, such as Cougar Dam (USACE) and Cowlitz Falls Dam (Tacoma Power), but the authors are not aware of any locations where they have actually been constructed. In-tributary collectors can be classified into two types, in-river and off-channel collectors.

<u>In-River Collectors:</u> In-river refers to the location of an in-tributary collector entrance and dewatering system within the bank-to-bank width of the tributary river (AECOM and BioAnalysts, 2010). The collectors consist of a diversion structure, dewatering screens, and a fish-handling facility. The diversion structure can be a concrete ogee with a fixed-crest dam or an adjustable-crest dam such as an inflatable rubber dam. The collector entrance and dewatering screens are located adjacent to the diversion, typically on one abutment within the river channel. Design concepts have employed both vee-screens, as described above, and high-velocity floor screens. It is anticipated that high-velocity screens will not be acceptable for fry; thus, they were not considered for this study. Following dewatering, fish and bypass flows are routed to a fish-handling facility located in the adjacent overbank area. An adjustable weir in the channel downstream of the screen is used to control water levels. One significant disadvantage of in-river collectors is the reduction in cross-sectional conveyance area of the river channel, and associated upstream flood impacts.

<u>Off-Channel Collectors:</u> Off-channel refers to the location of an in-tributary collector entrance and dewatering system outside of the bank-to-bank width of the tributary river, that is, in a side channel or over-bank location (AECOM and BioAnalysts, 2010). The collectors consist of a diversion structure, dewatering screens, and a fish-handling facility. However, the screens are located off-channel, downstream of a headgate structure. There are many examples of off-channel facilities that exclude fish from irrigation or power plant intake canals and then return them to the river. The authors are not aware of a facility of this type that has been built exclusively for the purposes of juvenile fish collection.

Most variants of these facilities are according to the type of dewatering system employed. For example, the Leaburg Diversion (Eugene Water and Electric Board [EWEB]) uses a vee-screen for a hydroelectric power plant canal. Similarly, the Anderson-Cottonwood Irrigation District (ACID) uses a vee-screen on an irrigation canal on the Sacramento River, as shown on Figure 4-7. The Wapato Irrigation Canal screen operated by the Bureau of Indian Affairs (BIA) uses rotating drum screens. The Sullivan Power Plant forebay exclusion screen (PGE) uses louvers. These existing facilities all provide direct return of fish to the river via fish bypass and return pipes. Other technologies, such as vertical traveling screens and inclined flat plate screens, are also prevalent.

Rotating drum screens largely have been abandoned for application in new facilities because of problems associated with maintaining the seals to exclude fish, and the maintenance of the very large rotating machinery. Fixed-louver systems have been employed with some success for smolt-sized fish. However, louvers do not provide full exclusion and depend instead on the behavioral avoidance response of fish when exposed to the turbulence generated by sweeping flows parallel to the louver array and flows perpendicular to the louver bar orientation. Louvers may not be suitable for fry, as they are weaker swimmers and may not be able to avoid the turbulence near the louver racks.

Figure 4-7. Anderson-Cottonwood Irrigation District Canal Screen

4.3.3 Mobile Technologies

Mobile technologies include various types of fish traps that can be deployed in variable and/or multiple locations, either in-tributary or in-reservoir. Portable traps provide a low-cost means of testing multiple site locations and of collecting data on run-timing and fish size. These data may assist in determining the feasibility of implementing a larger collection system in the future. If the combined collection efficiency is high, a series of multiple, portable trapping systems may be used as a full-scale system to collect juvenile fish.

The advantages of using small traps for fish sampling are their low cost, portability, ability to collect fish in free-flowing and slack-water environments, and simple mechanics (which do not require highly trained field crews and costly support facilities to operate). The disadvantages of these traps generally have been low juvenile fish collection efficiencies, the inability to operate the traps during high flows when the majority of migrants may be present, and the high risk of trap damage from debris. Four types of traps are described below: the Merwin trap, screw trap, scoop trap, and dipper trap.

Merwin Trap: A Merwin trap is a floating system that utilizes long net leads to guide fish to the trap (Figure 4-8). They are generally used in low velocity areas such as reservoirs and lakes to collect fish migrating near the shore. Merwin traps were used at Mossyrock Reservoir (Riffe Lake) in the late 1960s and early 1970s to collect juvenile fish for transport and release below Mayfield Dam on the Cowlitz River (Hager and DeCew 1970). Merwin traps located at the head of the reservoir and near the dam were used to collect subyearling and yearling Chinook, steelhead and coho, respectively. From 1968 through 1973 yearly catches ranged from 11,000 to 321,000 juvenile salmonids, with the vast majority being coho. No direct estimates of fish collection efficiency were made for the traps at this project. The system was abandoned as the resource agency did not feel sufficient numbers of fish were collected to maintain the run over time. The basic design of Merwin Traps has not changed much in the past 40 years; however the materials have improved which has increased their durability.

Screw trap: Screw traps employ an Archimedes screw built into a screen-covered cone mounted on a floating platform. The large end of the cone is oriented into the flow and half of the screw is submerged. The moving water forces the screw to turn and thus the cone. This process traps any fish entering the cone and deposits them in a holding box located at the rear of the trap. Sufficient water velocity (>1.5 ft sec) is needed in order to turn the screw that collects fish from the river (Figure 4-9). Screw traps may employ screws anywhere from a few feet to on the order of 10 ft in diameter, though most are in the 4 to 8 ft range.

These traps are usually used to sample a subset of the migrants passing through an area for evaluation purposes. Fish collection efficiency is generally quite low (<5%) and can be highly variable dependent on such factors as site conditions, flow and size of fish being collected. Trap efficiency for the screw trap operated below Lookout Point Dam in 2009 was less than 2% (Taylor 2010).

In contrast, a screw trap operated during low summer flows (<1,000 cfs) in the Lewis River was able to capture between 10% and 40% of the juvenile coho, Chinook and steelhead entering Swift Reservoir (PacifiCorp 2005). The length of the fish collected ranged from 30-190 mm. During higher flows the trap was susceptible to debris problems that made it inoperable during peak juvenile migration periods.

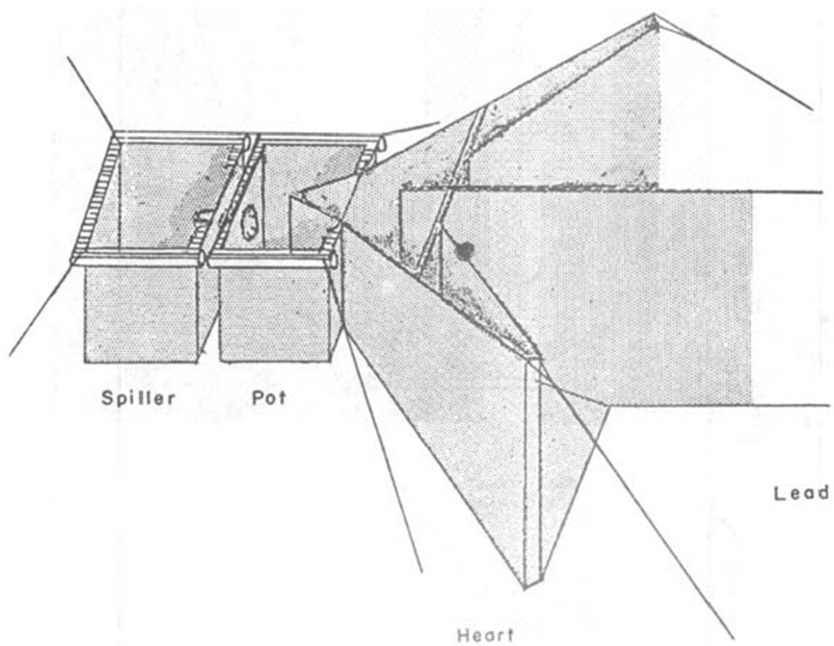


Figure 4-8. Example of Merwin Trap
(reproduced from Raymond and Collins, 1975)

Figure 4-9. Screw Trap Being Fished Below Lookout Point Dam in 2009

Scoop trap: Self-cleaning scoop traps can be used in riverine environments where water velocity is higher than 3 fps and depth is greater than 5 ft (Figure 4-10). A set of traveling screens is used to remove debris entering the trap. Net leads (or louvers) can be used to guide fish to the scoop, thereby increasing fish-capture efficiency. According to Raymond and Collins (1975), fish-trapping efficiency has ranged from 3 to 15 percent.

Dipper trap: A dipper trap is similar to a screw trap, as it uses a continuously rotating scoop to remove fish from the water and transfer them to a trough. The trap works best in riverine environments where flows are less than 3 fps (Figure 4-11). Because debris can be an issue for the trap, some dipper traps incorporate traveling screens to move accumulated debris to the downstream end of the trap, where it is removed.

Data collected in Idaho (Eagle Creek) on a dipper trap equipped with a louver system showed that from 14 to 91 percent of marked fish were recaptured in the system. Collection efficiency on average was greater than 50 percent, and it appeared to be higher in the fall when flows were lower. Louver angle affected the size of fish actually collected in the trap, with a 10- to 15-degree angle working the best for all size classes collected (that is, fish length greater than 53 mm) (Krcma and Raleigh, 1970).

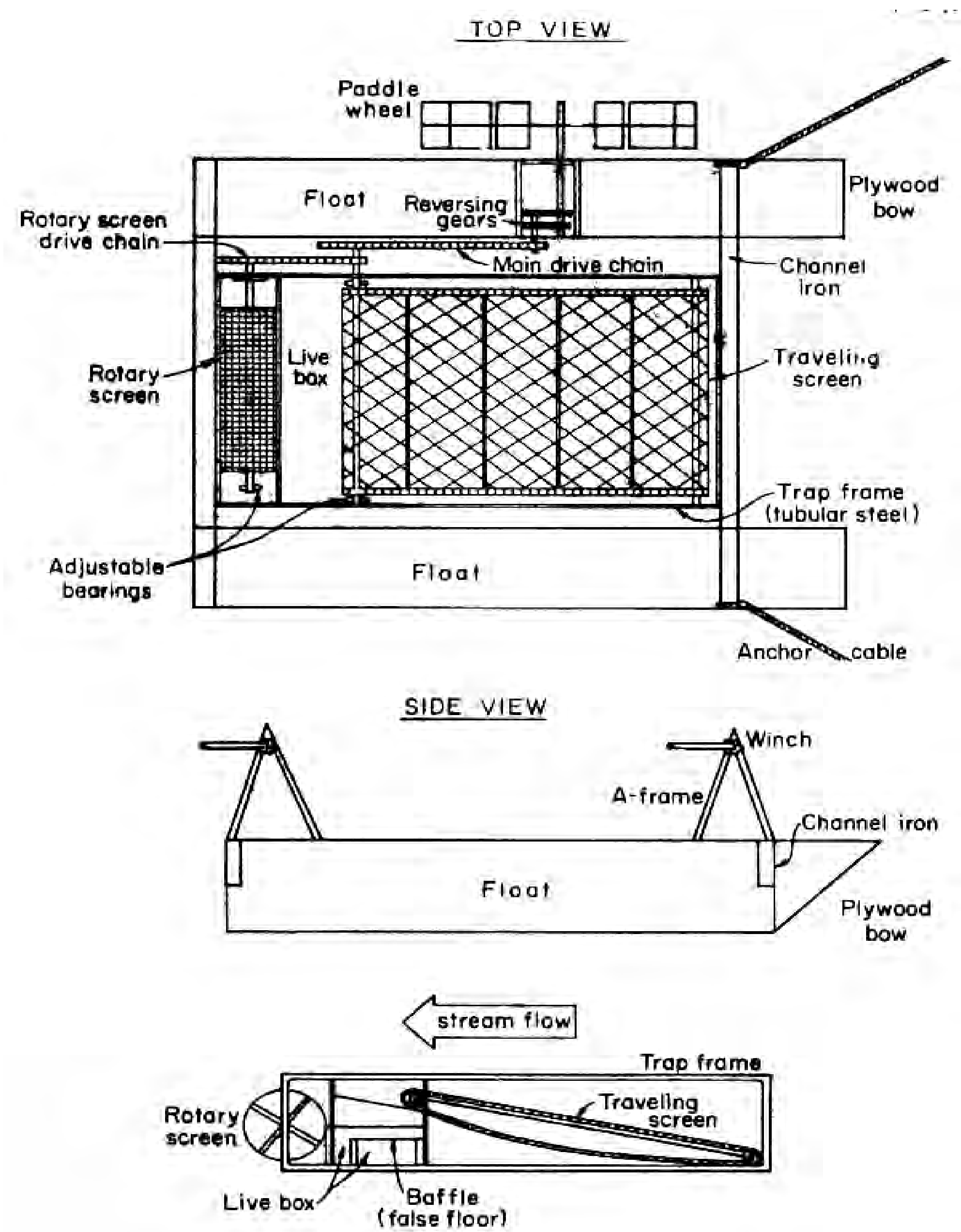


Figure 4-10. Self-Cleaning Scoop Trap
(reproduced from Raymond and Collins, 1975)

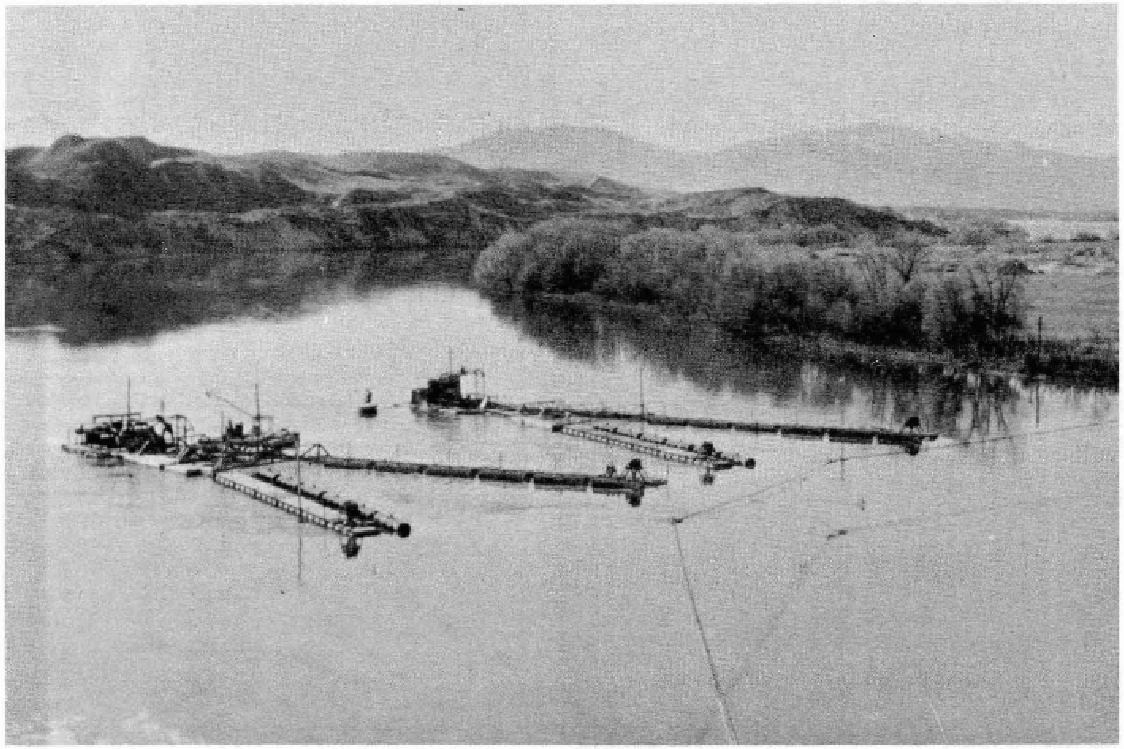


Figure 4-11. Migrant Dipper Traps Being Operated in the Snake River
(reproduced from Krcma and Raleigh, 1970)

4.4 LIST OF COMPREHENSIVE ALTERNATIVES

Table 4-1 provides a list of comprehensive alternatives, including identification of the most appropriate technologies by site location, developed during an initial brainstorming session. Where applicable, multiple sizes or capacities of a facility were proposed for consideration and evaluation. The selected alternatives are described in Section 5 and the alternatives evaluation is presented in Section 6.

Table 4-1. List of Comprehensive Alternatives

Site Location		Collection Technology	Notes	Status of Alternative
1	Upper Reservoir	In-reservoir: FSC with nets	500-cfs attraction flow	Selected for further evaluation
1a	Upper Reservoir	In-reservoir: FSC without nets	500-cfs attraction flow	De-prioritized following Checkpoint Meeting No. 3
2	Upper Reservoir	In-reservoir: FSC with nets	1,000-cfs attraction flow	Selected for further evaluation
3	Upper Reservoir	Mobile: Merwin trap		De-prioritized following Checkpoint Meeting No. 3
4	Upper Reservoir	Mobile: dipper trap		De-prioritized following Checkpoint Meeting No. 1
5	USFS Black Canyon Campground	In-tributary: in-channel collector	Adjustable crest diversion	De-prioritized following Checkpoint Meeting No. 2
6	USFS Black Canyon Campground	In-tributary: off-channel collector	Adjustable crest diversion	De-prioritized following Checkpoint Meeting No. 3
7	USFS Black Canyon Campground	Mobile: screw trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
8	USFS Black Canyon Campground	Mobile: scoop trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
9	Lower North Fork (Westfir)	In-tributary: off-channel collector	Adjustable crest diversion	Selected for further evaluation
10	Lower North Fork (Westfir)	Mobile: screw trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
11	Lower North Fork (Westfir)	Mobile: scoop trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
12	Upper North Fork	In-tributary: in-channel collector	Fixed or adjustable crest	De-prioritized following Checkpoint Meeting No. 2
13	Upper North Fork	Mobile: screw trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
14	Upper North Fork	Mobile: scoop trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
15	Lower Middle Fork (Island)	In-tributary: in-channel collector	Adjustable crest diversion	De-prioritized following Checkpoint Meeting No. 2
16	Lower Middle Fork (Island)	In-tributary: off-channel collector	Adjustable crest diversion	De-prioritized following Checkpoint Meeting No. 2
17	Lower Middle Fork (Island)	Mobile: screw trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
18	Lower Middle Fork (Island)	Mobile: scoop trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
19	Upper Middle Fork	In-tributary: in-channel collector	Adjustable crest diversion	De-prioritized following Checkpoint Meeting No. 1
20	Upper Middle Fork	In-tributary: off-channel collector	Adjustable crest diversion	De-prioritized following Checkpoint Meeting No. 1
21	Upper Middle Fork	Mobile: screw trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1
22	Upper Middle Fork	Mobile: scoop trap	One or multiple traps	De-prioritized following Checkpoint Meeting No. 1

Site Location		Collection Technology	Notes	Status of Alternative
23	Hampton	In-tributary: off-channel collector	Fixed or adjustable crest	De-prioritized following Checkpoint Meeting No. 3
24	Upper North Fork (1910 Road Bridge)	In-tributary: off-channel collector	Fixed or adjustable crest	De-prioritized following Checkpoint Meeting No. 3
25	Upper North Fork (1912 Road Bridge)	In-tributary: off-channel collector	Fixed or adjustable crest	De-prioritized following Checkpoint Meeting No. 3
26	Upper North Fork (Roadside Pullout)	In-tributary: off-channel collector	Fixed or adjustable crest	De-prioritized following Checkpoint Meeting No. 3
27	Upper North Fork (North Fork Bridge)	In-tributary: off-channel collector	Fixed or adjustable crest	De-prioritized following Checkpoint Meeting No. 3

Note: Shading denotes alternatives that were de-prioritized (see Appendixes A and F).

cfs = cubic feet per second

FSC = floating surface collector

USFS = U.S. Forest Service

SECTION 5

DETAILED DESCRIPTION OF SELECTED ALTERNATIVES

5.1 GENERAL

This section provides detailed descriptions of the final selected alternatives:

1. Upper Reservoir, In-Reservoir: FSC with a phased implementation:
   a. Phase 1 – 500-cfs FSC with nets
   b. Phase 2 – 1,000-cfs FSC with nets

2. Lower North Fork (Westfir), In-Tributary: Off-Channel Collector

Facilities common to both alternatives are also described.

5.2 UPPER RESERVOIR, IN-RESERVOIR: FSC

5.2.1 Site Selection and Description

Potential locations for the FSC in the reservoir are driven by the draft of the facility and the total cross-sectional area available for the exclusion nets. Because this Alternatives Study is investigating head-of-reservoir collection, the focus is on the farthest upstream location that would accommodate the draft of the facility at the minimum flood control pool while also providing adequate net area to meet approach velocity criteria. It is anticipated that the facility would be located in the historical river thalweg, that is, the deepest portion of the reservoir at a given cross-section.

The only bathymetric data currently available for the reservoir are from 1957 and were collected before the reservoir was filled. Potential FSC locations were identified assuming a minimum of 5 ft of clearance for the facility. As stated previously, 5 ft was also added to the historical bathymetric data to account for any potential sedimentation or movement of the thalweg in the 50 years since the original data were collected. Two locations are presented in Plate 3, the selected location and an alternate location. The selected location is the farthest upstream location where the 25-ft draft FSC can be located without grounding (35-ft minimum water depth). The alternate location allows for up to a 50-ft draft (60-ft minimum water depth) and is presented as the next downstream location that makes sense for an FSC.

In between the two identified locations is a large, shallow shelf located on the north side of the reservoir that would increase the complexity of the net system. The selected location is approximately 5 miles upstream of Lookout Point Dam, and the alternate site is approximately 3 miles upstream from the dam. In selecting these two locations, care was taken to allow the required draft as well as take into account reservoir features that would facilitate design of the net system. Other potential FSC locations between the two identified sites are limited because of the meandering thalweg and shoreline conditions.

Forested land designated as an NSO Critical Habitat Unit (CHU) and LSR extends to the west bank of the Middle Fork Willamette River, less than 1/8 mile west of the proposed FSC facility. The 12-mile, home-range circle for Known NSO Site 2876 extends to the west bank of the river. The proposed FSC facility is just beyond the NSO circle (see Appendix D).

5.2.2 Description of Components

The FSC alternative consists of the following components:

1. **Floating Surface Collector –** The design capacity of the FSC would be 500 cfs, with the capability to expand to 1,000 cfs if required. Fish sorting, handling, and holding facilities would be provided on the FSC.

2. **Net Transition Structure (NTS) –** The NTS physically connects the FSC to the exclusion net system and establishes the entrance velocity to the FSC.

3. **Exclusion Net System –** The exclusion nets may be either partial-depth or full-depth. The system would include consideration of upstream passage for adult salmonids and resident fish, boat passage, and operations and maintenance requirements.

4. **Fish Transfer Facility –** The transfer of fish from the FSC to transport trucks would be by boat to a transfer facility located on the upstream face of the dam.

The following sections describe the conceptual development of each of these components.

<u>Floating Surface Collector:</u> The existing PSE Upper Baker FSC design is the basis for evaluation of this alternative. The FSC consists of a floating barge with a large vee-screen and onboard pumps to draw the flow through the system. A fish sorting, handling, and holding facility is located at the rear of the FSC. The basic design includes a collector with 500 cfs of attraction flow, as shown in Plates 4 and 5.

Only two of the four pumps are needed to provide 500 cfs of attraction flow. The other two pumps are redundant for the 500-cfs option but can be used in addition to the two main pumps to provide a total attraction flow of 1,000 cfs. No backup pumping capacity is provided with the 1,000-cfs option. The facility is designed such that an additional section of screens can be added in front of the vee-screen to maintain screen approach velocities at the higher flow rate, if required. Plan and section views of the 1,000-cfs facility are presented in Plates 6 and 7. The only differences between the two facilities are the 50-ft screen extensions and a wider NTS structure. The rest of the structure is exactly the same for both configurations. While an FSC attraction flow rate of 500 to 1,000 cfs is presented for the purposes of this Alternatives Study, flow rates specifically optimized for Lookout Point would be required prior to preliminary design. The intent would be to provide an appropriate hydraulic signature, similar to the Upper Baker facility. CFD modeling could be used for this purpose.

A water surface profile and velocity data from the field startup of the Upper Baker FSC are presented in Figure 5-1 (AECOM, 2009) and are representative of the conditions for the Lookout Point FSC. The data were collected at 10-ft intervals along the centerline of the screens. Velocities gradually increase across the primary screens and peak in the secondary channel, where a capture velocity is obtained. If the screen capacity were expanded to meet the approach velocity criteria for the 1,000-cfs option, the velocity profile would look similar to the one presented in Figure 5-1 with 50 additional feet of primary screening.

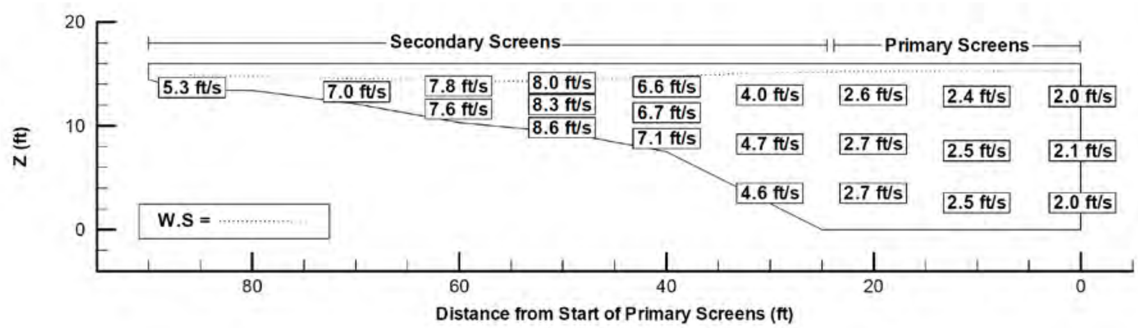


Figure 5-1. Screen Outline, Water Surface Profile, and Velocities for 500-cfs FSC

The mooring system for the FSC would need careful consideration to accommodate the 101-ft design WSEL range in the reservoir while maintaining a relatively constant horizontal location and keeping the exclusion nets taut. Occasional exceedences outside this reservoir WSEL range as well as variable loads transferred from the exclusion net system would have to be accommodated. Additional design considerations include prevailing winds, fetch, reservoir currents and debris loading.

It is anticipated that the FSC would be moored to a drilled pile-supported steel-braced frame located on the downstream side of the FSC. This structure would be approximately 60 feet square in plan and approximately 170 feet tall. A guide would allow the FSC to travel vertically over the full range of reservoir operations. In addition, two drilled-pile-group dolphins would be located on either side of the NTS to further support the FSC and to serve as anchorages for the exclusion net system. Access to the FSC and mooring tower would be by boat.

During the off-season, the FSC belly ballast tanks could be filled with air to raise the whole structure (except for the belly ballast tanks) out of the water. This capability would facilitate dewatering and regular maintenance of the FSC while reducing the exposure of selected components. The FSC could also be detached from the mooring tower and floated to a different location if required.

<u>Net Transition Structure:</u> The primary purpose of the NTS is to provide a gradual hydraulic transition from the low ambient velocities in the reservoir to the higher velocities at the entrance to the FSC. The NTS provides a controlled velocity and acceleration gradient, and it also creates a larger entrance signature than does the FSC alone. Without an NTS, the velocities at the FSC entrance would dissipate rapidly immediately upstream of the FSC entrance.

The dimensions of the NTS (50 ft deep by 75 ft wide) at Upper Baker were developed in consultation with NMFS and the design team, and they reflect specific conditions found at Baker Lake. A structure of this same size at Lookout Point would result in a large total draft – 50 ft compared with 25 ft for the FSC alone. This would drive the location of the FSC down reservoir approximately 2 miles to avoid potential grounding of the NTS at the minimum flood control pool (El. 825 ft). For the purposes of this evaluation, a smaller NTS with a draft of 21.5 ft is considered. This configuration – or the need for an NTS at all – could be confirmed with research, monitoring, and evaluation (RM&E) studies and CFD modeling.

Velocities at the entrance of the FSC (that is, without an NTS) and the entrance of the NTS are presented in Table 5-1. The table includes values at flows of 500 and 1,000 cfs for the basic 500-cfs FSC design. It also includes values for the 1,000-cfs FSC with provision of the additional screen capacity necessary to meet screen approach velocity criteria. Average ambient reservoir velocities for the minimum flood control pool and the maximum conservation pool are included in the table for comparison. These values were calculated using the reservoir cross-sectional area at the stated pool elevation for the reservoir design discharge.

Table 5-1. Net Transition Structure Entrance Velocities

	FSC Entrance			**NTS Entrance**		
Discharge (cfs)	500	1,000		500	1,000	
Width (ft)	16	16	32.8*	40	40	57. 5*
Depth (ft)	15.5	15.5	15.5	21.5	21.5	21.5
Area (sq ft)	248	248	508	860	860	1,236
Entrance velocity (fps)	2.02	4.03	1.97	0.58	1.16	0.81
Selected Location						
Ambient velocity at minimum flood control pool (825 ft) – (fps)	0.120					
Ambient velocity at maximum conservation pool (926 ft) – (fps)	0.022					
Alternate Location						
Ambient velocity at minimum flood control pool (825 ft) – (fps)	0.044					
Ambient velocity at maximum conservation pool (926 ft) – (fps)	0.015					

NOTES:
*Width expanded to allow for additional primary screens to meet criteria at 1,000 cfs
cfs = cubic feet per second
fps = feet per second
ft = feet
sq ft = square feet

As stated previously, the entrance signature from the NTS would not extend very far in front of the FSC structure. Compared with the full cross-sectional area of the reservoir, this area of influence is quite small. As such, without exclusion nets, the FSC would likely have difficulty collecting juveniles, particularly those that are located along the shallow shorelines of the reservoir.

A trashrack would be also installed on the front of the NTS to prevent large floating debris from entering the FSC. The trashrack would have a 1H:4V slope, vertical bars with 9-inch clear openings, and a total height of approximately 26 feet. The trashrack would be removable if it was determined to be unnecessary following project startup and initial operations.

Exclusion Net System: To the knowledge of the PDT, a full-depth exclusion net system that accommodates an annual reservoir fluctuation of the magnitude seen at Lookout Point has not been constructed or operated anywhere else. PacifiCorp is in the process of constructing a downstream fish passage facility for the Swift No. 1 hydroelectric project on the Lewis River in southwest Washington State. That project will accommodate an annual reservoir fluctuation of approximately 50 ft and a total fluctuation of approximately 121 ft.

The Swift FSC will be moored to a fixed 130-ft-tall mooring tower and will have a full exclusion net with a maximum depth of approximately 240 feet. Different net materials are used at different locations to optimize performance, for example, an impermeable membrane is used in the top 15 feet of the net to manage floating debris. Fry net is used at depths from 15 to 30 feet deep, and a net with larger openings is used elsewhere. Access to the FSC will be provided via a pile-supported bridge. The construction contractor is scheduled to mobilize to the site in May 2011.

The exclusion net system at Lookout Point could be implemented with partial-depth or full-depth exclusion nets. It is anticipated that drilled-pile-group dolphins would be required at either shoreline to anchor the nets. The dolphins would be founded near the minimum flood control pool elevation and would provide attachment points to anchor the net over the full range of WSELs, as shown on Plate 9. This configuration would allow the length of the top guide wire from the tower to the FSC to be held relatively constant, reducing the need for frequent adjustments associated with varying reservoir elevations.

It is proposed that the sections of net covering the portions of the reservoir from the tower towards the maximum conservation pool shoreline be composed of a solid curtain. This would facilitate the guidance of fish in the shallows, an area where they are suspected to congregate. It would also increase the durability of these particular sections, which may be exposed to the bottom of the reservoir as well as stumps, debris, etc. It is anticipated that the top cable for this section of netting would be actively managed, allowing the curtain to be laid on the ground at low reservoir WSELs. Sections of the curtain in the water would remain supported by the floats attached at the top. Weights on the curtain throughout its height would be required to assure that folds or billowing do not occur. The solid curtain sections at the shoreline would decrease the overall net cross-sectional area and thus increase net approach velocities, but only for reservoir levels above the minimum flood control pool where velocities are already well below criteria. The selected FSC location and net alignment includes steep banks on the shoreline that would minimize this issue associated with the reservoir shoreline.

The partial-depth net option would include main sections of net with a 50-ft depth. The net would be held in place by a top line with a float system. The bottom of the net would be weighted with anchors. The depth of the net could be revised during preliminary design based on the results of RM&E studies or, perhaps, CFD modeling.

If the performance of the partial-depth net system was found to be inadequate, a full-depth net system could be installed. A two-part net system located between the towers is proposed to minimize the challenges presented by the reservoir fluctuations, as shown on Plate 8. A fixed section of net, providing coverage from the reservoir bottom up to the minimum flood control pool, would compose the lower part of the system. This net would be anchored to the bottom of the reservoir and suspended vertically by a top line and floats attached to the top of the net. A second net section would provide coverage from the minimum flood control pool (El. 825) to the maximum conservation pool (El. 926) and would be actively managed. This upper net section would include a top line with floats, as well as intermediate weights and battens distributed throughout its height and attached to vertical guidelines by grommets. The guidelines would be held taut throughout the full range of reservoir elevations and would facilitate folding of the upper net section at various reservoir WSELs, as shown on Plate 8. The upper net section would be stored behind the lower net section, reducing the possibility of fish becoming trapped between the nets. Care would be required to minimize the gap between the upper and lower net sections. The area below the FSC and NTS would also require special consideration. A stiff frame could potentially be installed to maintain the shape of the nets in this vicinity. The selected location would require 558,200 sq ft of net for the full exclusion scenario.

The net approach velocity criteria are of particular concern when designing an exclusion net system. No formal written criteria exist; however, NMFS has accepted a velocity of 0.1 fps elsewhere. The proposed FSC locations provide adequate net area to meet these criteria. If the nets were placed at an angle of 45 degrees to the prevailing current, they would meet the 0.1-fps approach velocity criteria, assuming that ambient velocities were 0.14 fps or below (as shown in Table 5-1). The proposed FSC location has a velocity of 0.12 fps at the minimum flood control pool. Assuming that the cross-sectional area of the reservoir decreases as one proceeds up the reservoir, it is believed that the exclusion nets could not be placed much farther upstream while continuing to meet the approach velocity criteria. Thus, even if the FSC had a shallower draft, the net approach velocity criteria would limit moving the facility farther up reservoir.

While not required to meet fish criteria during high flow (above the 5% exceedence discharge) events, the system would need to be designed to withstand the forces associated with the high ambient velocities resulting from these events. Debris management would be of particular concern. An example event at Lookout Point is shown in Figure 5-2. In January 2011, debris from a large flow event moved down reservoir and accumulated in the forebay. Potential features to accommodate such an event include: a) log booms, b) solid curtains in the top 15 ft of the net, and c) the ability to lower (sink) the top portion of the net during large events.

It is anticipated that log booms would be placed upstream and downstream of the facility. Depending on the prevailing winds, fetch, and source of the debris, a single log boom potentially could be located on the upstream side of the facility only. It is suggested that the top fifteen feet of the exclusion net be comprised of a solid curtain to minimize damage caused by any floating debris that may make it past the log boom. For large flood events, the net system would have the capability (by adjusting ballast) to drop the top portion of the net to the invert of the NTS (a depth of approximately 21.5 ft). This would protect the net from potential damage caused by floating debris. This would also allow for any debris accumulating on the NTS trashrack to be maneuvered downstream.

Recreational boat passage through the nets and log boom also needs to be addressed. This could be accomplished by providing open sections in the net and log boom to allow passage. However, any gaps in the netting would also allow juveniles to pass, reducing collection efficiencies. It may be possible to provide a removable net section, perhaps adjacent to one of the shoreline towers. An automated system that includes a short section of net that could be lowered to allow a boat to pass, and then raised back into place, may be feasible.

Resident fish passage would also need to be considered if full exclusionary nets were employed. Solutions for this issue could be as simple as having one or several open areas in the net to allow passage (possibly coinciding with boat passage) or as complex as using the pumped discharge flow from the FSC as attraction water and providing a fish ladder with a false weir over the top of the exclusion net. Management decisions with regard to the handling of resident fish should dictate the level of complexity necessary. It is assumed that all adult salmonids collected at Dexter Hatchery would be planted upstream of Lookout Point Reservoir.

Figure 5-2. Example debris event in Lookout Point system

Fish Transfer Facility: Fish collected by the FSC would be held in a raceway located on the structure until ready for transport, at which time they would be crowded into a hopper and loaded onto a boat for transport to the dam. The estimated transport time from the proposed FSC location to Lookout Point Dam is approximately 30 minutes. Upon arrival at the dam, the boat would dock at a floating dock adjacent to the powerhouse intakes near the right (or northerly) abutment. This location is presented on Plate 10. The floating dock would be anchored to guide rails, allowing it to follow the full 101 ft of reservoir fluctuation. Once the boat is in position, a jib crane located at the top of the dam would lift the hopper and position it for a water-to-water transfer to a waiting transport truck, located on the deck of the dam, as shown on Plates 10 and 11.

Several other options for fish transfer were considered but not evaluated further; they are described in Appendix F. It is anticipated that the fish transfer process typically would occur only once a day, with a maximum of two trips per day. It is anticipated that the provision of adequate flow, fish densities, and water quality would minimize stress on the fish. Cycle times are not an issue because the trips would be short and infrequent. A second boat, likely a small runabout work boat, would be located at the FSC for routine O&M tasks and personnel safety purposes.

5.2.3 Potential for Prototyping or Phased Implementation

Prototype testing may be valuable in filling critical data gaps concerning the performance of the proposed alternative. For example, on the basis of experience at the Upper Baker project, it is known that a properly designed FSC will collect fish as long as they can be delivered to the vicinity of the NTS/FSC entrance. In general, the NTS/FSC components are proven for migratory smolt and do not require prototyping. However, the proposed design is not proven for non-migratory stages like fry and parr.

In addition, while there is the potential to have valuable operating and maintenance data in the future from the PacifiCorp Swift facility once it is constructed, significant risks and uncertainties remain in developing an exclusion net system specifically for Lookout Point. Prototype testing of various net systems or a phased implementation approach could partially mitigate these concerns.

<u>Prototype Testing:</u> Prototype testing would allow evaluation of certain aspects of the facility before committing to the full cost and time associated with designing and constructing a full production facility. Specific questions that could be addressed during prototyping of the FSC facility include the following:

1. Will fish (in particular, fry and parr) guide along the exclusion net over the long distances from shallow water habitat towards the FSC entrance (several thousand ft) with little or no sweeping velocity?

2. Will full-depth nets be required to successfully exclude/guide fish or can production goals be achieved with partial-depth nets?

3. What is the optimum attraction water flowrate for the FSC?

4. How will the nets respond to storm and debris-loading events? What is the magnitude of a typical event? How durable are the nets?

5. Specifically what level of capital and O&M investment is required to construct, operate and maintain a full-depth net system over the range of annual WSEL fluctuations at Lookout Point?

It may be possible to develop and implement prototype exclusion net tests to answer these questions at least partially and to reduce the risks and uncertainties associated with the FSC alternative. An initial prototype test could include a partial-width, partial-depth net system with a mobile Merwin trap collector. Evaluation of this prototype could occur in two areas:

1. Radio-tagged smolts would be tracked to determine whether they guided along the nets to the trap or whether they sounded and passed beneath the nets. Direct determination of whether fry guide along or sound under the nets is problematic because fry are too small to be tagged and hydro-acoustic techniques cannot discern species. Multiple species of similar size to Chinook fry may be present.

2. The Merwin trap would be monitored to determine whether fry and parr were collected in sufficient numbers (target yet to be determined) for the nets and FSC to be considered a viable collection system.

If it is determined from the initial net tests that fish guide along the net but also sound beneath it, then full-depth nets may be required. A section of the net could be tested individually (for example, a partial-length, shorter, southerly net could be tested at full depth first). If the full-depth, two-part net system proved both to be technically feasible and to show promise for smolt guidance, the full net could also be constructed to assist in determining fry guidance performance or to initiate the phased implementation process for the full-production alternative.

Phased Implementation: If the decision were made to design and construct an FSC after the prototype net tests, deployment of the full-production FSC and NTS could be implemented in phases to optimize the facility configuration. Specific questions to be addressed for the FSC alternative include the following:

1. Is a shallow-draft NTS (with a 25-ft draft similar to the FSC) adequate or is a deeper draft required?

2. Which FSC attraction flow is required, 500 or 1,000 cfs?

The first phase of the FSC implementation would be the 500-cfs collector with pumping capacity to allow testing up to 1,000 cfs and the capability for future expansion of the screens (to accommodate 1,000 cfs while meeting approach velocity criteria per Upper Baker). The first phase would employ a shallow-draft NTS. Initial operations would include both 500- and 1,000-cfs operating points to allow evaluation of the collection performance at both flow rates. If the performance were found to be unsatisfactory, a larger NTS could be implemented. The final phase would include expansion of the FSC to accommodate the 1,000-cfs criteria screen, if deemed necessary.

Figure 5-3 presents a flow chart that describes an example approach for prototyping and phasing implementation of the FSC alternative. It should be noted that the collection criteria may differ between the prototype and phased implementation stages. For example, prototype net test success likely would be dictated by the number of fish arriving at the apex of the net, not necessarily by the number of fish collected by the Merwin trap. Specific steps in the prototype or phased implementation process could be omitted, depending on the results of ongoing RM&E studies or the specific management objectives of the resource agencies.

5.2.4 Construction Approach and Schedule

If a prototype downstream collection facility at Lookout Point is determined to be feasible, the BiOp (NMFS, 2008b) requires construction completion by September 2014. A full-scale production facility is to be constructed by December 2021 and be operational by March 2022.

The resource agencies have indicated that there may be some flexibility with regard to the 2014 deadline, given the significant amount of RM&E that needs to take place prior to selection of a preferred alternative. However, prototype testing of fish behavior in proximity to an exclusion net could begin earlier, in parallel with other RM&E studies.

5.2.5 Opinion of Cost

Order-of-magnitude, conceptual construction and project cost estimates were developed to facilitate relative comparisons of the selected alternatives. The costs reflect construction of full-scale production facilities and, where appropriate, include costs for phased implementation of the alternatives.

The in-reservoir FSC alternative (1,000 cfs with full exclusion nets) has an estimated capital construction cost of approximately $139 million, an estimated project cost of approximately $251 million, and estimated annual operations and maintenance (O&M) costs of approximately $3.4 million. Detailed cost information is provided in Appendix G.

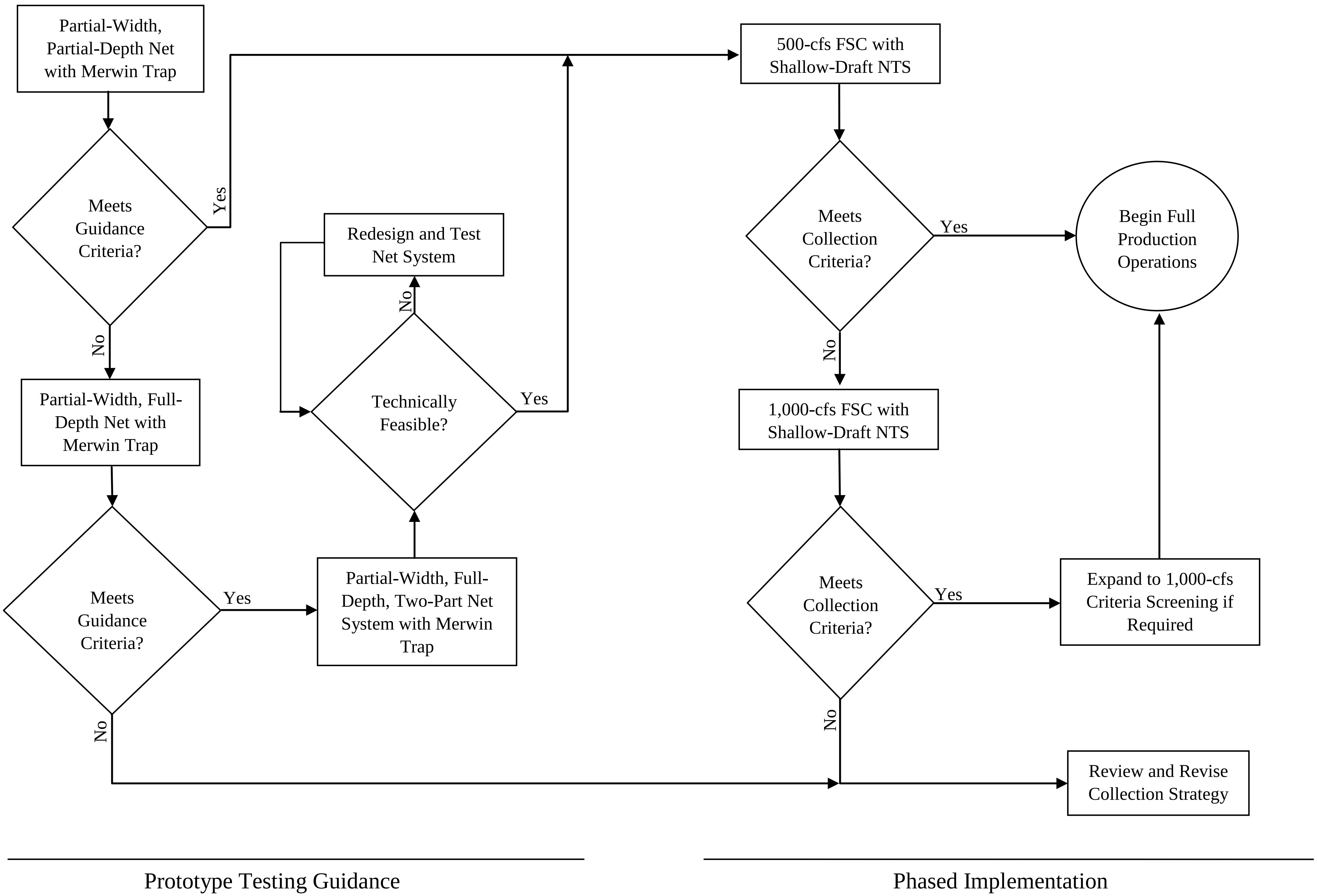


Figure 5-3. Flow Chart of an Example Prototype and Phased Implementation Process

5.3 LOWER NORTH FORK (WESTFIR), IN-TRIBUTARY: OFF-CHANNEL COLLECTOR

5.3.1 Site Selection and Description

The lower North Fork of the Middle Fork Willamette River (Westfir) site is located approximately 1.3 river miles upstream from the Middle Fork confluence, near the town of Westfir, as shown on Plate 2. A lumber mill was located at this site previously and was operated from approximately 1923 to 1985. A concrete dam associated with the mill was removed in 1994; however, the abutments remain largely intact. The river is channelized in this area with pool/riffle combinations. The site has good access via the North Fork Road and two nearby bridges. The left (southerly) riverbank is steep, especially near the roadway embankment. The northerly bank has a low overbank area that could facilitate siting of a facility. The site is privately owned. It is anticipated that some existing utilities would be available in the immediate vicinity.

From a practical perspective, the screen and diversion cannot be sized for all flows; therefore, the installed capacity would have a direct effect on collection efficiency. Flows greater than the screen capacity would have to be spilled. For this Alternatives Study, the off-channel collector at the Lower North Fork (Westfir) facility was sized to match the January through September 5 percent exceedence flowrate of 2,140 cfs. For evaluation purposes, 95 percent of the available fish are assumed to be collected at this flow rate; however, it should be noted that this does not represent the anticipated performance of an actual facility. This assumes that streamflow is directly correlated to the collection potential of juvenile fish, but variation may exist in the field.

The in-tributary off-channel collector alternative is presented on Plate 12. USGS gage No. 14147500 is located just downstream of the site. The FEMA flood insurance study identifies a 100-year peak discharge of 24,300 cfs at this location. The river gradient is approximately 1.1 percent per the FEMA flood profile; therefore, the pool created by a 12-ft diversion dam would extend approximately 0.2 mile upstream. The Westfir site itself is located on private land and is bordered on the north by a railroad line. There is NSO dispersal habitat and NSO non-habitat to the north of the railroad line. The NFMF is a federally designated Wild and Scenic River upstream of Westfir.

5.3.2 Description of Components

The In-Tributary: Off-Channel collector alternative consists of the following components:

1. **Diversion Weir –** The diversion weir has two functions: divert flow and check up the river depth.

2. **Intake –** The intake is designed to protect the fish screen from large debris and to facilitate shutdown of the fish collection facility for maintenance.

3. **Fish Screen –** The fish screen will be a standard vee-screen designed to meet fry criteria.

4. **Canal and Outfall –** The canal will convey screened water back into the river. The canal outfall will be located as close as possible to the intake to minimize the reach of the river with low flows.

5. **Fish Bypass and Fish Transfer Facility –** The bypass will be designed to meet the NMFS criteria. The transfer facility will be sized to accommodate the peak day of fry migration, using flow and fish-density indexes.

6. **Upstream Fishway –** During the fish collection period, the diversion weir will be in the up position. Therefore, a fish ladder will provide upstream passage to migratory fish.

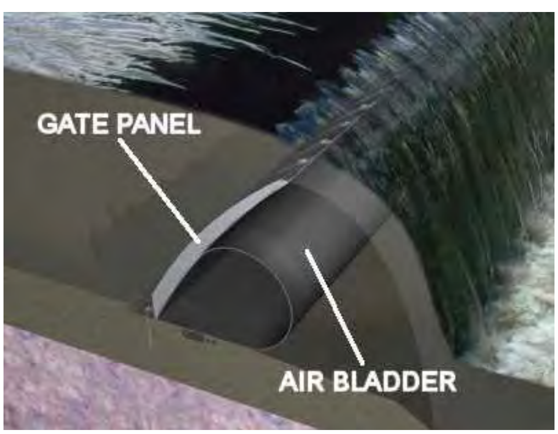
The following sections describe the conceptual development of each of these components. The components described below are arranged to facilitate upstream and downstream movement of all life stages of fish. With the exception of the canal and outfall, these facilities are not appreciably different from any other large irrigation or hydropower diversion facility in the western U.S.

Diversion Weir: During the design fish migration period (January through September), the diversion weir would be operated to check up the river in order to collect fish. During other periods when fish collection was not required, the weir would be lowered to facilitate fish migration, passage of flood flows, and/or the movement of bed load (Figure 5-4).

The proposed diversion weir at Lookout Point would have two parts, a radial gate and an inflatable rubber weir. The 30-ft radial gate would have a suppressed sill to facilitate passage of fish and bed load when the gate is raised. Bascule, Obermeyer, or rubber dam weirs would be used for the remainder of the structure, a length of approximately 120 ft. When deflated, this section would cause no net rise in the 100-year flood profile at the site.

The height of the diversion weir is directly proportional to the size of the vee-screen. Because the fish screen needs to meet an approach velocity of 0.4 fps, the submerged area of the screen is important. Both the height and the length of the screen would be optimized to meet local site constraints.

For the purposes of this study, it was assumed that the diversion weir would check up the water level in the river to a point approximately 12 ft above the existing stream bed. This assumption will need to be verified during subsequent design phases, when detailed topographic and bathymetric survey information is available.



Obermeyer weir in raised position

Alameda Creek rubber dam in the “down” position

Figure 5-4. Inflatable Rubber Weir

The diversion weir would be located near where the lumber mill concrete dam was located previously. The concrete dam was removed in 1994; however, the abutments remain largely intact and could potentially be refurbished and used for the diversion weir. A backwater pool would be created when the diversion weir was operated. The facility and the resulting backwater pool would be located outside the federally-designated Wild and Scenic River boundary. The drinking water intake for the town of Westfir is also located outside of the proposed backwater pool.

Intake: The intake structure would be located on the right bank of the river, upstream of the fish screen. It would have a 2-ft-high sill and a water depth of approximately 10 ft. The approach velocity would be approximately 3 fps. Consequently, the intake width would be approximately 70 ft for a flow of 2,140 cfs. The intake structure would be designed to screen out large debris and to facilitate shutdown of the fish collector for maintenance. Because most of the streamflow would pass through the intake during fish collection, a trashrack would be required to protect the facility. The trashrack would have 2-inch-thick bars, 10 inches on center, to allow for the passage of large fish. A trashrack cleaning mechanism would be provided. In addition, bulkhead gates would be provided to allow dewatering of the canal and fish collection facility.

Fish Screen: The fish screen would be a standard vee-screen designed to meet fry criteria (that is, an approach velocity of 0.4 fps and slot size of 0.069 inch). It would be 240 ft long by 12 ft deep and have primary and secondary screens. The length of the vee-screen is directly related to the depth of water in the river. If required to minimize the height of the diversion weir, a dual vee-screen system could be provided. The screens are considered active because a brush system would be provided to clean the surface of the screens. The fish screens would be designed so that the velocity does not drop within the vee-screen but continues to increase as the fish reaches the throat of the screen. The throat would be a nominal 42-inch throat. A 30-cfs bypass flow would be provided to transfer all the fish into the fish sorting, handling, and transfer facility. The vee-screen would be designed for approximately 2,140 cfs (see Plate 13).

Canal and Outfall: A rectangular canal would convey the screened water from the fish screen back into the river below the diversion weir. The canal width would be approximately equal to the width of the intake (that is, 70 ft). The water depth would be approximately 12 ft minus any head losses associated with the trashrack and fish screen. The freeboard would be approximately 3 ft. The outfall at the end of the canal is assumed to be an ogee weir, which would be designed to serve as an adult velocity barrier as well. The ogee-crested weir invert would be about 3.6 ft below the water level in the canal. The ogee weir would be equipped with an adjustable crest to address variable conditions easily.

Fish Bypass and Fish Transfer Facility: A 36-inch-diameter, fish bypass pipe would be provided to convey 30 cfs to the fish transfer facility while flowing half-full. The velocity in the pipe would be approximately 7 fps. At the fish transfer facility, fish would be separated by size and then routed to holding raceways to await truck transport or be placed in a fish return to the river below the diversion weir. The fish return would be designed in accordance with the NMFS criteria. The post-sort ponds would be designed using typical fish flow and density indexes. Similarly to the FSC, the fish transport to below Dexter Dam would occur only once daily, at which time the fish would be crowded in a hopper and loaded in a truck using water-to-water transfer.

Upstream Fishway: A fish ladder would be needed to provide upstream passage during periods when the weir is in the raised position. The diversion weir would be operated to maintain a constant upstream pool WSEL. Depending on the location of the canal outfall and the gradient of the tributary, either the fish ladder would operate according to the normal tailwater or a short bypass reach would be required. It is assumed that a single fish ladder would be provided. A vertical slot ladder with 6-inch steps between pools is assumed. An auxiliary water supply (AWS) would be provided by gravity from the diversion pool. The AWS system would be sized so that the attraction flow from the fish ladder entrance is a minimum of 5 percent of the high fish passage design flow. The fish ladder flow would be approximately 30 cfs; therefore, the AWS flow would be approximately 77 cfs. Because the head created by the diversion weir would be 12 ft, about 24 steps would be required. A transport channel (about 850 ft long) designed to meet the NMFS criteria would need to be used so that the fish could be delivered away from and upstream of the fish screen intake to prevent fall back.

5.3.3 Potential for Prototyping or Phased Implementation

In-tributary collector concepts have been proposed for a number of projects, such as Cougar Dam (USACE) and Cowlitz Falls Dam (Tacoma Power), but the PDT is not aware of any locations where they have actually been constructed for the purpose of collecting fish. Facilities with similar features have been constructed for the purpose of excluding fish from irrigation, hydropower, and water supply headworks. As a result, the individual components of this alternative are well-known, well-understood technologies that are in use across the western U.S., and prototyping would not be required.

In addition, it is anticipated that construction of the Lower North Fork (Westfir) facility would not be phased and that it would be constructed initially at full-production capacity. Post-construction modifications to major components of the structure (for example, the diversion weir, intake, or fish screens) likely would require significant heavy civil and structural work. The magnitude of this work and associated disruptions to facility operations likely would diminish any benefits of a phased approach.

5.3.4 Construction Approach and Schedule

If a prototype downstream collection facility at Lookout Point is determined to be feasible, the BiOp (NMFS, 2008b) requires construction completion by September 2014. A full-scale production facility is to be constructed by December 2021 and be operational by March 2022.

The resource agencies have indicated that there may be some flexibility with regard to the 2014 deadline, given the significant amount of RM&E that needs to take place prior to selection of a preferred alternative. It is anticipated that only the later deadlines would apply to this in-tributary alternative.

5.3.5 Opinion of Cost

Order-of-magnitude, conceptual construction and project cost estimates were developed to facilitate relative comparisons between the selected alternatives. The costs reflect construction of full-scale production facilities and where appropriate include costs for a phased implementation of the alternative.

The in-tributary alternative at Westfir has an estimated capital construction cost of approximately $95 million, an estimated project cost of approximately $164 million, and estimated annual O&M costs of approximately $1.9 million. Detailed cost information is provided in Appendix G.

5.4 FACILITIES COMMON TO BOTH SELECTED ALTERNATIVES

The following paragraphs summarize the facilities that likely would be common to both selected alternatives.

5.4.1 Fish Transport

It is anticipated that while transport distances would vary between alternatives, all fish would be transported downstream in tanker trucks to recovery ponds or a direct-release site. The trucks are assumed to be the standard Oregon Department of Fish and Wildlife (ODFW) tandem-axel trucks with a 2,000-gallon tank capacity.

Fish would be crowded from holding ponds directly into a hopper at the collection facility. The hopper would be hoisted over the truck and the hopper drained to transfer the fish. Supplemental oxygen would be provided on the truck.

In some cases, it may be desirable to place fish directly from the short-term holding ponds into a mobile hopper or tank. This tank would then be placed onto a barge and/or a flatbed truck for transportation downstream.

5.4.2 Recovery and Release Facility

Fish collected and transported downstream would either be released directly downstream or placed into recovery ponds or stress-relief raceways located below Dexter Dam. The purpose of this facility would be to allow the fish to recover from the trip downstream, to observe latent mortalities, and to acclimate fish to the release location. It is assumed that the facility would include a pumped water supply, holding ponds or raceways, and a drain suitable for volitional release of the fish.

While there may be opportunities to use existing infrastructure at the Dexter Hatchery, construction of separate holding vessels is assumed for the purposes of this study, as shown on Plate 14. Detailed sizing information is provided in Appendix D.

SECTION 6

EVALUATION OF ALTERNATIVES

6.1 GENERAL

This section presents the criteria and process used to evaluate the various conceptual alternatives. The criteria were adapted from the *Cougar Dam Downstream Alternatives Study* (USACE, 2010), which evaluated at-dam alternatives, in order to maintain consistency between the two studies and to facilitate programmatic decision making.

The process included population of an alternatives evaluation matrix, with numerical ratings assigned to each criterion, as discussed and agreed to by the PDT. The total ratings were then compiled to develop a prioritized ranking of alternatives. The highest ranked alternatives were selected for further evaluation. The evaluation matrix was then updated at the Checkpoint Meetings after each milestone deliverable, and was used with supporting information to further refine the list of alternatives for subsequent submittals, as follows:

- **10 Percent Evaluation.** Twenty-two initial alternatives were identified and described in the 10 Percent AR, with one additional alternative added during Checkpoint Meeting No. 1. During this meeting, ten alternatives were prioritized for further evaluation.

- **30 Percent Evaluation.** The 30 Percent AR provided additional information on the ten selected alternatives. During Checkpoint Meeting No. 2, four of these alternatives were prioritized for further evaluation.

- **60 Percent Evaluation.** The 60 Percent AR provided more information on the four selected alternatives and generally confirmed the overall feasibility of a head-of-reservoir or in-tributary collection facility at Lookout Point. Five new sites were considered during a second site visit; however, none were prioritized for further evaluation. During Checkpoint Meeting No. 3, two of the four alternatives identified during the previous Checkpoint Meeting were prioritized for further evaluation: Upper Reservoir, In-Reservoir: FSC with Nets, and Lower North Fork (Westfir), In-Tributary: Off-Channel Collector.

- **90 Percent Evaluation.** The 90 Percent AR provided detailed information on the final two alternatives. During Checkpoint Meeting No. 4, the decision was made to not de-prioritize an otherwise high-ranking alternative based solely on social or environmental factors. As such, both alternatives identified at 60 percent evaluation were recommended for further evaluation, including RM&E studies to address outstanding risks and uncertainties.

The evaluation criteria are presented below. Detailed descriptions of the evaluations and analysis that took place at each stage of the study are presented in Appendix F.

6.2 EVALUATION CRITERIA

The following describes the biological, technical, economic, and other criteria used for the evaluation process.

6.2.1 Biological Evaluation Criteria

Seven major biological criteria were developed to evaluate the biological effectiveness of each alternative; these criteria are described below.

Fish Collection Potential: For head-of-reservoir and in-tributary systems, important fish passage parameters include the proportion of all subpopulations encountering the facility site location (P), the survival probability of juveniles en route to the collector (S), and the collection efficiency of the collector (CE). The product of these parameters yields an estimate of total fish collection potential (FCP). This index is useful in prioritizing biologically effective collection alternatives, especially if a corresponding goal or standard has been clearly established.

The proportion of subpopulations encountered is based on the estimated amount of spawning habitat available upstream of the site location. Survival probability considers mortalities that may occur en route to the collection site. For head-of-reservoir alternatives, this may also reflect the probability of fish taking up residence in the reservoir. Collection efficiency is defined as the proportion of fish surviving to the site that locate, enter, remain in, and are ultimately captured by the collector.

Reservoir Conditions: This parameter considers the impact of reservoir conditions for both juveniles and adults under the proposed alternative. It also assesses whether exposure to the reservoir environment is beneficial or detrimental to the target species. Factors to be considered include temperature, predation, reservoir rearing, shoreline complexity, flow vectors, etc. It should be noted that reservoir conditions are not applicable to the in-tributary alternatives because juveniles would not be exposed to the reservoir.

Downstream Passage Conditions: This parameter considers the ability of the proposed collector technology and site location to collect all life stages of downstream migrants. It also assesses whether part of the run will be missed because of facility operational constraints (such as high flows and/or velocities, fish abundance, reservoir fluctuations, etc.). This parameter also evaluates the effectiveness of the specific collector entrance, including attraction flow, proper entrance conditions, and its ability to be readily located by juveniles.

Bypass Conditions: It is assumed that a volitional bypass (that is, a gravity bypass to the release site with no handling) would be preferred, but this likely is not feasible given the head-of-reservoir facility locations. For example, the most downstream in-reservoir alternative is located approximately 3 miles upstream from Lookout Point Dam. In addition, the typical annual reservoir water surface fluctuations likely would prohibit such a system. Therefore, this parameter considers the various fish bypasses at the collector, as well as subsequent transportation methods (including their ability to provide downstream transport with minimal fish mortality, injury, and stress from handling).

Some alternatives may require fish pumping. Other design requirements (such as enumeration, sorting, and monitoring and evaluation) are considered for their ability to be accomplished without excess handling and/or without anesthesia. The length and duration of downstream transport (that is, barge or truck trips) are also considered. It is assumed that all alternatives likely would require a separate downstream recovery facility adjacent to the point of release.

Effects on Other ESA Fish: Native fish, including bull trout and Oregon chub, are specifically considered by this parameter. It is assumed that alternatives with criteria screening would be safer for both species. Guidance from USFWS is required to quantify the benefit of separating life stages.

Effects on Other Fish of Concern: This parameter primarily considers effects on desirable resident species (such as Pacific lamprey) that currently exist at the project or may be introduced in the future.

Effects on Upstream Passage (All Species): It is anticipated that all alternatives would have some effect on upstream adult migration of target and non-target species. This parameter considers the ability to maintain upstream adult passage in conjunction with operation of the downstream collection facility.

6.2.2 Technical Evaluation Criteria

Three major criteria were developed to evaluate the technical effectiveness of each alternative; these are described below.

Current Operations (Flows and Water Surface Elevations): This parameter considers the compatibility of the alternatives with the existing reservoir operations and water surface elevations. In-reservoir FSC alternatives with full exclusionary nets may be effective over the full operating range of the reservoir.

It is anticipated that in-tributary systems would have little to no effect on existing reservoir operations but would be required to withstand flood flows, as well as to operate over a wide range of streamflows.

Operations and Maintenance: This parameter considers the relative complexity of the O&M of the alternative. The risk or precedence of the specific technology is also taken into account.

Design/Constructability: This parameter considers the anticipated difficulty or complexity of design and construction of the facility. This includes relative risks to cost, schedule, and personnel.

6.2.3 Economic Impacts and Other Evaluation Criteria

Five major criteria were developed to evaluate the economic impacts and miscellaneous other criteria of each alternative; these are described below.

Design/Construction Cost: This criterion considers the relative magnitude of anticipated design/construction costs, including effects on existing facilities, major excavation, need for temporary cofferdams, mechanical and electrical components, etc. Costs of existing similar facilities are referenced where possible.

O&M Cost: The relative magnitude of anticipated O&M costs, including the frequency or risk of required O&M tasks, is considered.

Recreation: This parameter considers compatibility of the alternative with current recreational activities (boating, fishing, camping, etc.). Environmental and cultural impacts are also considered

Hydropower: Impacts to existing project power generation are considered, including the potential for lost generation, modifications to the existing reservoir rule curve or power pool WSEL, and operational timing or cost effectiveness.

Real Estate/Access/Utilities: This parameter considers the extent to which the alternative would affect or encroach upon existing private property, either through construction of facilities or modifications to the flood profile. Access requirements for construction and ongoing project operations are also evaluated, as is proximity to existing power/water/communication utilities.

6.3 EVALUATION OF SELECTED ALTERNATIVES

Following evaluation of the alternatives as described above, two alternatives were selected for further evaluation:

1. Upper Reservoir, In-Reservoir: FSC with a phased implementation:
   a. Phase 1 – 500-cfs FSC with nets
   b. Phase 2 – 1,000-cfs FSC with nets

2. Lower North Fork (Westfir), In-Tributary: Off-Channel Collector

6.3.1 Biological Evaluation

The biological evaluation is based on the performance criteria established in Section 6.2.1 and the risks and uncertainties associated with each of the two alternatives. A brief summary of the seven performance criteria used to evaluate the two alternatives is presented in Table 6-1.

Of the two remaining alternatives, the fish collection potential of the two selected systems is similar. Both systems have the potential to collect approximately 1 million fry and 20,000 smolts, and could produce approximately 1,100 adult spring Chinook (Table 6-1). The major difference between the two sites is that the Westfir system would collect fish only from the NFMF, while the FSC located in the reservoir would collect fish produced from all upstream river reaches. This difference in the origin of fish collected could be important if estimates of fish production are biased. For example, if fish production estimates for the NFMF are too high, system performance may be substantially less than anticipated for the Westfir system. Additionally, reliance on a single stream (NFMF) to achieve production goals means that system performance is completely reliant on habitat conditions in a smaller portion of the basin. Catastrophic events such as landslides or chemical spills in this stream, or continued habitat degradation by humans, could completely eliminate or reduce fish production for many generations.

The FSC system is located at the upper end of the reservoir. Juvenile Chinook entering the reservoir may experience high mortality rates as a result of reservoir predation by native and non-native fish. The higher the predation losses, the lower the performance of the system. In contrast, allowing juvenile fish to rear in the reservoir may increase the proportion of smolt-sized fish (> 100 mm) collected at the FSC. Smolt-to-adult survival rates are expected to be higher (upwards of an order of magnitude) than fry-to-adult survival rates. Finally, fluctuating reservoir elevations may reduce the collection efficiency of the system, again reducing performance.

Downstream fish passage conditions at the Westfir site are expected to be excellent. The system relies on proven technology to collect juvenile migrants. Collection efficiency for the system is expected to be near 94 percent (that is, it would collect 94 percent of the fish arriving at the site). The effect of flows greater than the system design capacity on the overall fish collection efficiency is not known. FSC system collection efficiency is estimated at 80 percent. The value is lower than the Westfir system because the FSC relies on nets to guide fish a long distance to the entrance of the collector. It is not known how well fry would guide along these nets; therefore, there is a concern that collection efficiency for fry would be less than anticipated. The effect that fluctuating reservoir WSELs or water temperatures may have on this value is not known.

This page was intentionally left blank.

Table 6-1. Biological Evaluation of the Selected Alternatives

Performance Criteria	Upper Reservoir, In-Reservoir: FSC with nets	Lower North Fork (Westfir), In-Tributary: Off-Channel Collector
Fish collection potential (Section 3; Appendix F)	Fry (< 60 mm length) collected = 957,581 Smolt (> 60 mm length) collected = 22,904 Total adult Chinook production = 1,065	Fry (< 60 mm length) collected = 1,095,703 Smolt (> 60 mm length) collected = 18,627 Total adult Chinook production = 1,150
Reservoir conditions	The reservoir may provide high- quality habitat for juvenile rearing. This could result in the production of larger smolt-sized fish from the basin. Smolts generally have a higher survival rate to adults (that is, produce more adults) than either parr or fry. The proportion of the fry, parr, and smolts that enter the reservoir and encounter the FSC may be reduced as a result of predation by both native and non-native fish species. If fish loss is high, system performance (that is, number of juveniles collected and adults produced) will be reduced.	No effect.
Downstream passage conditions	The FSC design is based on the successful PSE Upper Baker FSC. System collection efficiency is estimated at approximately 80 percent. The impact of fluctuating reservoir operations or water temperatures is not known.	The system relies on proven technology to collect juvenile migrants. Collection efficiency for the system is expected to be near 94 percent (that is, it will collect 94 percent of the fish arriving at the site). The effect of flows greater than the system design capacity on the overall fish collection efficiency is not known.
Bypass conditions	Because of its location in the reservoir, fish collected by the FSC will need additional handling, which may result in increased fish stress, de-scaling, and lower survival than the other alternative. Survival rates are still likely to be greater than 95 percent.	Gravity-fed system that results in minimal fish handling. Fish survival through the system should be very high (> 98 percent). The ability to handle and transport fry successfully is largely unknown.
Effects on other fish of concern	The guidance nets may create a migration barrier to resident fish such as Oregon chub and rainbow trout. Incorporation of upstream passage facilities may reduce these impacts but their effectiveness is unknown. Although net openings will be designed to prevent most fish from becoming entangled in the guide nets, some smaller fish (i.e. juvenile Oregon chub) may still be injured by the netting system. If Pacific Lamprey were reintroduced to project waters then ammocoetes may also become entangled in the netting. The facility may collect large numbers of resident fish. These fish, dependent on management direction, may need to be sorted and released back to the reservoir or hauled and released downstream. Handling of these fish may result in mortality and loss in fish population abundance and productivity. Juvenile chinook entering the reservoir may provide a food source for resident trout species. Increased food may result in increased growth rates, size and population productivity.	Because the facility will be designed to NMFS fish passage criteria impacts to resident rainbow trout, bull trout should be minimal. Dependent on fisheries management, resident trout entering the system may need to be sorted and released just downstream of the facility, or transported and released below the dam. Handling of these fish may result in mortality and loss in fish population abundance and productivity. Few Oregon chub are expected to encounter the system, due to system location and the size of upper basin population. Juveniles less than ~30 mm that enter the system may become impinged on the fish screens; resulting in increased mortality on the population. The same effect may occur to Pacific Lamprey ammocoetes if this species was reintroduced to the area. The system will be equipped with upstream fish passage facilities that have been proven effective throughout the Pacific Northwest to pass juvenile and adult anadromous and resident salmon species and other species as well.
Effects on upstream passage	Resident fish passage would need to be addressed if full exclusionary nets are employed. This could be accomplished by providing one or several gaps in the net (reducing collection efficiency) or by incorporating a fish ladder on the FSC complete with attraction water and a false weir over the exclusion net.	The system would be equipped with a fish ladder to provide upstream fish passage at the site. The facility would be designed to NMFS fish passage criteria, so passage effectiveness is expected to be quite high for anadromous and resident fish alike.

NOTES:
< = less than
> = greater than
ESA = Endangered Species Act
FSC = floating surface collector
NFMF = North Fork of the Middle Fork Willamette River
NMFS = National Marine Fisheries Service

This page was intentionally left blank.

The Westfir system relies on proven screen and bypass technology to collect and bypass fish to holding tanks and, eventually, to the transport system. Gravity flow is used to move both fish and water from the entrance of the collector to the holding tanks. Fish handling is minimized in this type of system, which should result in high survival rates (> 98 percent) and low de-scaling and injury rates (< 2 percent) (FERC, 2007; Serl and Morrill, 2004). However, the ability to successfully handle and transport fry is largely unknown.

Because of the FSC's location in the reservoir, collected fish would require additional handling during the transfer to a boat for transport to shore. The additional handling may result in increased stress, de-scaling, and a lower survival rate than the Westfir alternative. Survival rates are still likely to be greater than 95 percent (Feldman, 2010).

ESA-listed Oregon chub and bull trout could be collected in either system. Because of its location in the NFMF, few Oregon chub are expected to be collected at Westfir. Oregon chub collection numbers may be higher at the FSC system because of its location in the reservoir, where more Oregon chub are likely to reside. In addition, the nets used to guide fish to the FSC may delay or prevent this species from reaching important rearing and spawning habitats (although this assumption is speculative at this time). Bull trout abundance in this portion of the basin is assumed to be very low; thus, impacts from the operation of either facility should be minimal. Additional sorting may be required for the FSC alternative because of the increased presence of non-native species in the reservoir.

Upstream fish passage at Westfir would be provided by a fishway designed in accordance with agency criteria (NMFS, 2008a). Upstream fish passage efficiency is therefore expected to be high, with a minimum of migration delay for both anadromous and resident fish species. The nets used to guide fish to the entrance of the FSC may delay or prevent the upstream migration of some species, even if provisions for upstream passage are provided. The nets would not affect anadromous fish, as these fish would be transported from Dexter Dam and released upstream of the reservoir. Resident fish (native and non-native) movement would be restricted, as fish are found throughout the reservoir. As mentioned previously, it might be possible to use the outflow of the FSC as an attraction water to facilitate the passage of fish upstream past the nets; however, this would be an experimental facility with unknown effectiveness.

6.3.2 Technical Evaluation

<u>Current Operations (Flows and Water Surface Elevations):</u> The FSC alternative is required to function over the design range of reservoir fluctuations (101 ft) while withstanding a total range of 115 ft. This requirement adds technical difficulty to the design and operations of the proposed mooring system as well as the net system, particularly if full-depth exclusion netting would be required. Full-depth exclusion netting accommodating this range of forebay fluctuations is unprecedented and increases the technical risk of this alternative.

The in-tributary alternative is composed of elements that have been implemented and proven elsewhere, but never in this capacity as a juvenile collector. Most applications are in controlled situations (power canals, irrigation diversions) unlike the flashy, debris-laden environment that would be found at the proposed Westfir location. Final design of this facility would have to ensure that the facility could withstand flood flows and manage debris to limit impacts to normal operations. The off-channel intake and screening configuration minimizes the risk associated with these issues in comparison with an in-channel configuration, however debris would remain a significant issue.

Operations and Maintenance: Both alternatives require a significant investment in infrastructure and ongoing O&M. The FSC alternative would include a floating surface collector (a vee-screen with a pumped attraction water supply and a fish sorting and holding facility), a mooring system, an exclusion net (partial- or full-depth), a transport boat, and a fish transfer facility. The in-tributary alternative would include a vee-screen system; a fish sorting, holding, and transfer facility; and a diversion weir. Both alternatives would include fish transport trucks and an offsite recovery and release facility.

The range of the reservoir WSEL fluctuation at Lookout Point is unprecedented for operating FSC facilities, and it increases the complexity of systems required for normal operation. While most of the systems in question (mooring and exclusion net systems) would be automated, they result in significant O&M requirements, particularly if full-depth exclusion netting is employed (approximately 560,000 sq ft of netting). In addition, there is the potential to lose fish collection capability for an extended period of time due to failure of a key component, such as a log boom, the exclusion net system, or an attraction water pump.

The Westfir alternative has numerous comparable facilities in operation, but to the author's knowledge none are employed to collect and transport juveniles. The in-tributary environment is characterized by large and variable flow rates as well as a high debris load that will complicate operations. Specifically, the sorting of fry-size fish is anticipated to be difficult in a tributary environment.

Design/Constructability: Both remaining alternatives include technical aspects that are unprecedented, although those associated with the FSC alternative appear to result in more significant design challenges. The FSC design would need to overcome difficulties associated with the head-of-reservoir location, as well as the design and operation of an exclusion net system subject to 101 ft of elevation change. The Westfir alternative would have to address the tributary environment. At this alternatives analysis stage, it appears that the technical design obstacles presented by the in-tributary alternative at Westfir could be overcome more easily and may involve less technical risk than the in-reservoir FSC alternative.

6.3.3 Economic Impacts and Other Evaluation

The FSC alternative has an estimated construction cost of approximately $139 million and an estimated total project cost of approximately $251 million. The Westfir alternative has an estimated construction cost of $95 million and an estimated total project cost of approximately $164 million. For either alternative, additional studies are recommended prior to preliminary design. The cost of those studies is assumed to be equal for both alternatives, assuming that all the studies are required prior to making a decision.

The FSC alternative likely would require prototype testing, while the Westfir alternative would not. The FSC project cost includes an allowance for prototyping. Costs for a phased implementation approach are also provided.

While construction and operation of a weir at the Westfir site is assumed to be technically feasible, it is anticipated that the siting of a facility at this location may be subject to significant public and resource agency opposition.

Both the FSC and the Westfir alternatives have the potential to be biologically and technically feasible. However, additional studies are required to address critical risks and uncertainties prior to design and construction.

6.4 CRITICAL RISKS AND UNCERTAINTIES

There are multiple risks and uncertainties associated with the development of a fish collection system upstream at Lookout Point Dam that may affect the biological success of the program or complicate the design, construction and operation of the selected alternatives. These risks and uncertainties are discussed below.

Table 6-2. Technical, Economic, and Other Evaluation of the Selected Alternatives

Performance Criteria	Upper Reservoir, In-Reservoir: FSC	Lower North Fork (Westfir), In-Tributary: Off-Channel Collector
Current operations	No changes to the existing operation of the reservoir are anticipated for either alternative.	
Operations and maintenance and O&M cost	It is anticipated that O&M of the FSC facility would be significant, particularly with regard to operation of the exclusion net system and pump energy costs. The annual O&M cost is estimated to be approximately $3.4 million.	The annual O&M cost is estimated to be approximately $1.9 million.
Design/ constructability and design/ construction cost	The FSC concept has been developed and operated successfully at other high-head projects. However, the range of reservoir fluctuations at Lookout Point is unprecedented and would increase the complexity of the facility, particularly with regard to the mooring and anchorage systems, the NTS, and the exclusion nets. Notwithstanding the potential for operations and maintenance data to be available from the PacifiCorp Swift FSC in the future, prototyping and/or a phased implementation process may be required to fully address certain design issues. The construction cost is estimated to be approximately $139 million.	The individual components of the in-tributary alternative at Westfir are similar to typical hydropower and irrigation facilities throughout the western U.S. It is assumed that they could be employed successfully for the purpose of collecting juvenile fish. It is anticipated that construction of a full-production facility could occur without the need for prototyping. The construction cost is estimated to be approximately $95 million.
Recreation	The FSC would have minor impacts to recreation, and it is anticipated that a boat passage could be provided for recreational users.	The Westfir collector would be located outside the federally designated Wild and Scenic Area; however, it is anticipated that the diversion weir, when operated, would cause some impacts to fishing and kayaking activities in this reach
Hydropower	No changes to existing hydropower operations are anticipated for either alternative.	

Performance Criteria	**Upper Reservoir, In-Reservoir: FSC**	**Lower North Fork (Westfir), In-Tributary: Off-Channel Collector**
Real estate/access/ Utilities	The reservoir is adjacent to USACE- and USFS-owned lands in the vicinity of the head-of-reservoir at the minimum flood control pool. As such, it is anticipated that land acquisition would be facilitated. Typical access to the facility would be by boat, presumably launched from the fish transfer facility at the dam. Construction access is available from existing roads on both sides of the reservoir. It is anticipated that utilities would be available on the south side of the reservoir near State Highway 58. Special provisions would be required for the handling of pollutants, such as anesthetics and lubricants, in the reservoir environment.	The Westfir alternative is located on private property within the town of Westfir, at the location of a previous lumber mill and log pond. Site access is good via the Old Westfir Road and two bridges across the North Fork Road. It is anticipated that utilities would be available immediately adjacent to the site.

NOTES:
FSC = floating surface collector
NMFS = National Marine Fisheries Service
NTS = net transition structure
USACE = U.S. Army Corps of Engineers
USFS = U.S. Forest Service

6.4.1 Biological Risks and Uncertainties

Lack of Defined Performance Criteria: While the overall goal of the program is to restore a viable spring Chinook population to the area upstream of Lookout Point Dam, the level of FCP required from proposed collectors to achieve this goal has not been defined clearly. In this Alternatives Study, it is assumed that systems with higher FCP are preferred. However, even the highest ranked systems may fall short of what is required to achieve fish population objectives. Fish population modeling may be one approach that could be used to determine the minimum FCP required for a collection system.

Fish Production Potential: In regard to overall fish production potential, both Westfir and the FSC may collect similar numbers of juveniles and produce similar numbers of adults. However, these numbers are based solely on estimates of habitat quality and quantity and on expert opinion of juvenile migration survival rates to each site. More information is needed on actual Chinook juvenile production numbers for stream reaches upstream of the reservoir. Monitoring of resulting juvenile production from the release of hatchery spring Chinook to the upper basin may help to better quantify fish production potential. Data to confirm migration timing and fish size at each site would also be helpful in determining risks associated with each alternative.

Target Life Stage: Collection systems located closer to spring Chinook spawning grounds are likely to collect more fry than smolt-sized fish. This is because fry disperse quickly (after they emerge from the gravel) to downstream areas, where they then seek available rearing habitat. In these locations they then rear for an extended period, becoming larger over time and eventually leaving the system as smolts the next year. The closer the collector is to spawning grounds, the greater the probability of collecting more fish that are in early fry stages. Because of natural mortality associated with rearing, smolt production is substantially less than fry production. Data presented in Table 6-1 show that smolt numbers are expected to be less than 3 percent of the number of fry produced. However, smolts may have a survival rate to adult that is an order of magnitude greater than that of fry (see below).

The FSC may have a greater potential than the Westfir site to collect more smolts if it is found that fry and parr entering the reservoir are able to rear successfully in this environment. The smolt collection number estimate (23,000) used for this alternative does not include this possibility. Data reported by Taylor (2010) indicate that spring Chinook with lengths ranging from 100 to 300 mm have been captured in screw traps in the tailrace of Lookout Point Dam. These data indicate that spring Chinook juveniles do rear for extended periods in the reservoir; however, production potential is unknown.

Juvenile-to-Adult Survival Rates: Data presented in Figure 2-3 indicate that in the early spring, fry are expected to have lengths ranging from 35 to 50 mm. Thus, many of the fish expected to be collected by both alternatives can be considered emergent fry. A query of the Regional Mark Information System (RMIS) for spring Chinook released from hatcheries on the West Coast (including Alaska and Canada) indicated that fry (or fed fry) had a total survival rate that averaged 0.09 percent (RMIS, 2010). If this survival rate for primarily hatchery fish held for wild fish, then for every 1 million fry collected, a total of approximately 900 adults would be produced (Table 6-3).

In contrast with fry, the survival rate (smolt-to-adult) for spring Chinook smolts released from the Dexter Ponds has averaged 0.86 percent for the 1986 to 2003 brood years, an order-of-magnitude increase over fry releases (RMIS, 2010). Estimated adult returns for each system, based on hatchery smolt-to-adult ratios (SAR), are shown in Table 6-3. This should be viewed as a generic relative index, which assumes that the risks and qualifications presented in Table 6-4 are not significant issues (an unrealistic scenario). Furthermore, these values are not to be viewed as predictions, but rather a means to assess relative performance in an idealized case. On balance, the overall potential adult yield from fry and smolts of each alternative is similar, 1,150 for Westfir and 1,065 for the FSC, given the many assumptions described in Appendix F. Reliance on this index alone to select a preferred alternative is not recommended.

Table 6-3. Adult Production Estimates for Fry and Smolts Collected at the Westfir and FSC Alternatives

Alternative	Fry		Smolts	
	Number of Fry Collected	Number of Adults Produced	Number of Smolts Collected	Number of Adults Produced
Westfir	1,095,703	986	18,627	164
FSC	957,581	862	22,904	203

The data in Table 6-3 show that resulting adult production for the alternatives relies heavily on collecting large numbers of fry and transporting them safely to the lower river. However, the effects that collection, handling, transport, and release techniques may have on resulting fry survival rates are unknown. If survival rates are reduced because of these factors, then the ability of either system to achieve adult production targets is compromised. Other important biological issues, most of which constitute risks or uncertainties, are summarized in Table 6-4.

Reservoir Conditions and Fry Migratory Behavior: Because of their small size and poor swimming ability, fry entering the reservoir may be consumed by both native and non-native fish species. If predation rates are high, then the number of fry entering the FSC may be substantially less than anticipated. It is extremely difficult to estimate fry mortality because some fry may actually rear for extended periods in the reservoir and migrate from the system as smolts the following year. Thus, fry survival studies are confounded by natural fish behavior.

Additionally, it is unknown whether the nets used to guide fish to the FSC located in the middle of the reservoir would be effective for fry. This life stage prefers shallow-water habitat, with its food source and protection from larger predators, for rearing. This type of habitat is found along the margins of the reservoir, which poses an additional problem for fry. The Lookout Point Reservoir undergoes both seasonal and daily reservoir water surface fluctuations that may dewater this habitat. This leads to fish stranding with resultant increased mortality.

6.4.2 Technical, Economic, and Other Risks and Uncertainties

Extreme Reservoir Fluctuations: An FSC that operates on a reservoir with the extreme WSEL fluctuations that occur at Lookout Point is unprecedented and brings additional risk to the project, particularly with regard to the operation of a full-depth exclusion net. Significant and complex structures (that is, shoreline towers, anchorages and moorings, and upstream fish and boat passage facilities) likely would be required to provide an adequate level of operability for this site.

Sorting and Handling Requirements: The disposition of resident fish species and the associated sorting and handling requirements are not well defined. This has the potential for added facility complexity. Post-construction monitoring and evaluation requirements have not yet been identified.

Sorting and Handling of Fry: The sorting, handling, and transport of fry is uncommon and expected to be technically difficult. This would have cost implications associated with the sorting and handling facility. Sorting of fry by species, if required, would be particularly difficult. Of particular concern is the reasonable likelihood that substantial amounts small debris (needles &twigs) will be collected with fry at the Westfir facility. This could result in unacceptable high injury rates or mortality, given this fragile life stage.

Investment of Resources, Capital, and Time: Both alternatives require a significant investment of resources, capital, and time. The advantages and disadvantages of prototype testing, a phased approach, or immediately implementing a full-production facility should be evaluated carefully before committing to a particular strategy.

Public Relations: The Westfir site, which has been identified as the most appropriate location for an in-tributary facility, is located near a federally-designated Wild and Scenic

River reach. In addition, a diversion dam used by the lumber mill formerly occupying this site was recently removed in an action that had strong local resident and resource agency support.

Table 6-4 provides an overall summary of the advantages and disadvantages associated with each alternative.

6.5 RATIONALE FOR SELECTION OF THE PREFERRED ALTERNATIVES

During Checkpoint Meeting No. 4 it was decided that the final alternatives should be prioritized solely based on technical issues and not on identified social, environmental or political issues. Consequently, the Upper Reservoir, In-reservoir FSC with nets alternative and the Lower North Fork (Westfir), In-Tributary: Off-Channel Collector alternative are both selected for further evaluation, pending completion of an RM&E program as described in Section 7.

This page was intentionally left blank.

Table 6-4. Summary Evaluation of Selected Alternatives

Alternative	Area of Evaluation	Advantages	Disadvantages
Upper Reservoir, In-Reservoir: FSC with nets	Biological	• Has the potential (particularly with full exclusion nets) to intercept the entire juvenile fish population migrating out of the basin. • Reduces reservoir predation due to head-of-reservoir location, compared to an FSC located at Dam. • Reservoir may provide rearing habitat that produces a large number of smolts, compared to in-tributary alternatives. • Ratio of smolt to fry collected may be higher than the in-tributary alternative, resulting in fewer mortalities during collection, sorting, and handling.	• Has the potential (with full exclusion nets) to delay or prevent the movement of adult and resident fish, such as ESA-listed Oregon chub. • Nets may cause additional mortalities of target fish species. • Predation may be a problem for juvenile migrants due to the in-reservoir location. • Reservoir fluctuations may reduce system effectiveness. • Fish need to be handled multiple times before release below Dexter Dam; this may reduce survival rates.
	Technical	• Little or no disturbance to riparian habitat or river channel geomorphology.	• A precedent does not currently exist for an operating FSC that is able to accommodate the large annual WSEL fluctuations that occur at Lookout Point (construction of the PacifiCorp Swift FSC, with 50 feet of annual fluctuation, will begin in May 2011). • Prototyping may be required to evaluate and prove certain components. • Operates via a pumped bypass system. • High operational risk (potential to lose fish collection capability for a season because of component failure, such as log boom, exclusion nets, and attraction water pumps). • Difficult to transfer fish to transport trucks. • May require more sorting and handling than the Westfir alternative because of the increased presence of non-native fish.
	Economic and other	• Limited impact to existing recreational activities. • Implementation can be phased.	• Estimated capital construction cost is higher than in-tributary alternative: Approximately $139 million. • Estimated O&M cost is higher than in-tributary alternative: Approximately $3.4 million. • Access to facility is by boat. • More difficult to provide utilities to the facility.

Alternative	Area of Evaluation	Advantages	Disadvantages
Lower North Fork (Westfir), In-Tributary: Off-Channel Collector	Biological	• Does not preclude upstream movement of adult and resident fish. • Smaller effect on ESA-listed Oregon chub than in-reservoir alternative. • Decreased handling of fish may increase survival rates. • No risk of reservoir predation.	• When facility is operating, has the potential to cause false attraction or delay for upstream migrants. • Does not intercept entire juvenile fish population and relies on a smaller portion of the basin for fish production; potential genetic implications • Precludes reservoir rearing of fry. • May collect high volumes of small debris at certain times that could increase fry injury and mortality. • River flows exceeding than design flow may reduce collection efficiency. • Collecting and sorting juvenile fish and small debris, like fir needles, in a confined space could result in pronounced mortality or injury. • Ratio of fry to smolt collected may be greater than the in-reservoir alternative, resulting in greater mortalities during collection, sorting, and handling.
	Technical	• Many existing examples of the proven components that comprise this alternative, that is, inflatable diversion weirs and off-channel vee-screens. • Good construction and O&M access. • Operates via a gravity bypass system. • Lower operational risk (potential to lose fish collection capability for season due to component failure) in comparison to the in-reservoir alternative. • May not require complex sorting and handling requirements due to the decreased presence of non-native fish.	• Potential to disturb riparian habitat or river channel geomorphology. • Risk of damage to facility from flood events or debris in the river.
	Economic and Other	• No prototyping required. • Estimated capital construction cost is lower than in-reservoir alternative: Approximately $95 million. • Estimated O&M cost is lower than in-reservoir alternative: Approximately $1.9 million. • Good access for construction, O&M, and utilities	• Impacts recreational boating and fishing. • Near federally-designated Wild and Scenic River reach. • Site is at the location of a recently removed dam and, therefore, may face strong public and resource agency (ODFW and USFS) opposition. • Implementation cannot be phased.

NOTES:
ESA = Endangered Species Act
FSC = floating surface collector
O&M = operations and maintenance
ODFW = Oregon Department of Fish and Wildlife
USFS = U.S. Forest Service
WSEL = water surface elevation

SECTION 7

SUMMARY AND CONCLUSIONS

7.1 GENERAL

This section summarizes the results of the Alternatives Study and presents conclusions with regard to selection of the preferred alternatives for further study, as well as recommendations for ongoing and future studies.

7.2 PREFERRED ALTERNATIVES FOR FURTHER STUDY

A total of 28 head-of-reservoir and in-tributary conceptual alternatives were evaluated as part of this study. Given the information currently available, both in-reservoir and in-tributary alternatives have the potential to be biologically and technically feasible. The Upper Reservoir, In-Reservoir FSC with nets and the Lower North Fork (Westfir), In-Tributary: Off-Channel collector are specifically recommended for further study and evaluation. This recommendation should not preclude consideration of an at-dam alternative, as discussed further below.

The FSC consists of a floating structure with a pumped attraction flow and a screening system; fish collection, sorting, and holding facilities; and an exclusion net system with an NTS. Other project features include a fish transfer facility at Lookout Point Dam and a fish recovery and release facility below Dexter Dam.

The FSC is a technology that has been developed and implemented successfully for the collection and transport of smolts at other high-head projects in the Pacific Northwest. Both the PSE Upper Baker Project and the PGE Round Butte Dam Project have demonstrated promising results during the first few years of operation. Another FSC is currently under construction at the PacifiCorp Lewis River Project at Swift Reservoir. Special consideration needs to be given to site-specific factors at Lookout Point to ensure that an FSC would achieve regional fish passage goals. Prototyping of the exclusion net system in particular may be required.

The in-tributary collector alternative at Westfir consists of an adjustable diversion weir; an intake and fish screen; a canal with outfall; a fish collection, sorting, holding and transfer facility; and a fish ladder for upstream passage. Other project features include a fish recovery and release facility below Dexter Dam.

The in-tributary collector utilizes proven technology which would likely not require prototyping. The major components of this facility are commonly used in large hydropower and irrigation intakes throughout the western U.S. However, while this technology has been applied successfully elsewhere, the authors of this report are not aware of a facility of this type that has been built exclusively for the purposes of collecting juvenile fish.

7.2.1 Biological Risks and Uncertainties

The following biological risks and uncertainties are common to both preferred alternatives:

- Lack of clearly defined and quantifiable biological objectives and performance criteria.

- Minimal information supporting the strategy that emphasizes the collection and transport of fry or parr over the collection and transport of smolts.
- Juvenile-to-adult survival rates are heavily dependent on the fate of fry (in-reservoir vs. in-tributary).

Key biological risks and uncertainties associated with an in-reservoir FSC located at the head-of-reservoir include the following:

- Potential effects of exclusion nets on other sensitive fish species (that is, Oregon chub and resident trout species).
- Unknown impact of reservoir conditions on juvenile survival within the reservoir (that is, potential benefits of reservoir rearing versus the risk of predation).
- Uncertainty with regard to the proclivity for fry/parr to migrate along the face of an exclusion net toward a collector, and their response to the flow-field at the entrance to the collector.
- Uncertainty with regard to the size of the signature of the NTS entrance and its effect on the attraction of juvenile fish.
- The provision of upstream fish passage through the exclusion net system will also require particular consideration.

Key biological risks and uncertainties associated with the in-tributary off-channel collector located at Westfir include the following:

- Does not intercept the entire juvenile fish population and relies on one tributary (which accounts for approximately two thirds of the fish population in the basin) to achieve production goals.
- Precludes reservoir rearing of fry which may be an advantage or disadvantage.
- The presence of small debris such as pine or fir needles, particularly during the spring freshet, may elevate fry injury and mortality during collection, sorting, holding and transport.
- River flows greater than the design flow may reduce collection efficiencies during certain periods.
- Ratio of fry to smolt collected may be greater than the in-reservoir alternative, potentially resulting in greater mortalities during collection, sorting, and handling.

7.2.2 Technical, Economic, and Other Risks and Uncertainties

The following technical, economic, and other risks and uncertainties are common to both preferred alternatives:

- The extent of sorting and handling required (as well as post-construction monitoring and evaluation requirements) is not well defined at this time.
- The successful sorting, handling, and transport of fry may require the development of special procedures or equipment, particularly if sorting of fry by species is required.

Key technical, economic, and other risks and uncertainties associated with an in-reservoir FSC located at the head-of-reservoir include the following:

- The design and operation of an FSC and net system at a reservoir with WSEL fluctuations as extreme as those at Lookout Point is unprecedented, particularly with regard to the mooring/anchorage systems and the exclusion nets.

- The provision of boat passage through the exclusion net system will also require particular consideration.
- A significant investment of resources, time, and capital is required to study, design, construct, and operate an FSC at Lookout Point. The advantages and disadvantages of prototype testing, a phased approach, or immediately implementing a full-production facility should be evaluated carefully before committing to a particular strategy.

Key technical, economic, and other risks and uncertainties associated with the in-tributary off-channel collector located at Westfir include the following:

- Potential to disturb riparian habitat or river channel geomorphology.
- Risk of damage to facility from flood events or debris in the river.
- Impacts to recreational boating and fishing.
- Proximity to a federally-designated Wild and Scenic River reach.
- Site is at the location of a recently removed dam and, therefore, may face strong public and resource agency (ODFW and USFS) opposition.

7.2.3 Strategy for Future Decisions

Given the significant risks and uncertainties associated with the both alternatives, it is recommended that a RM&E program be undertaken prior to preliminary design of a selected alternative. It is anticipated that the information obtained by such a program would allow for the quantification or, at least, minimization of the identified risks and uncertainties. Key management decisions are contingent upon the results of certain studies. For example, if reservoir rearing is found to be beneficial to juvenile Chinook (and predation is insignificant), it may be worthwhile to evaluate an at-dam alternative.

It is anticipated that juvenile fish collected by an at-dam facility would likely be larger on average which could minimize issues related to fish guidance along nets and/or injury to fish during handling. Similarly, the need to prototype the net system may be reduced or eliminated. The proximity to the dam may also provide advantages in terms of additional structural anchor points for the facility and it could also facilitate required O&M activities.

Following completion of the RM&E program, if the decision is made to move forward with the FSC alternative, it is further recommended that prototype testing of the net system take place prior to full-scale production. A partial-depth net could also be tested within this same timeframe. Depending upon final production goals, the possibility exists to fulfill biological requirements through operation of a prototype facility alone. However, it is anticipated that a full production facility would be required to meet long-term operations and maintenance requirements. A phased implementation of pumped attraction flow rates (for example, 500 to 1,000 cfs) may provide additional benefit by optimizing the ultimate configuration of the facility. It is anticipated that the in-tributary alternative at Westfir, if selected, could be constructed and operated at full production capacity from the outset.

7.3 RECOMMENDATIONS FOR FUTURE STUDIES

It is recommended that the RM&E program include consideration of the studies and key issues described below to facilitate further evaluation of a head-of-reservoir fish collection facility at Lookout Point Dam. The issues are not listed in any particular order and are not prioritized.

7.3.1 Biological Characterization

Recommended biological characterization studies and key issues are as follows; selected elements of these studies are already underway as part of the Anadromous Fish Evaluation Program (AFEP):

- Fish Life-Cycle Modeling – Spring Chinook life-cycle modeling of different collection strategies may help in selecting a preferred alternative for implementation at Lookout Point Dam. While the results of such modeling would not be definitive, they can help identify alternatives (and strategies) that achieve objectives over a range of assumptions. Alternatives that are less sensitive to the assumptions used would be preferred for implementation.
- Juvenile-to-Adult Survival Study – The reservoir system may collect different ratios of fry and smolt migrants. Because the juvenile-to-adult survival rates for these fish may be different by an order of magnitude (see Section 5), survival rate information is needed to determine whether a collection system targeting one life stage over another would have a greater probability of achieving management objectives. If insufficient numbers of fry can be collected above the reservoir for testing, then releasing fry from Dexter Ponds could be used as a surrogate.
- Juvenile Salmonid Out-Migration Timing, Size, and Abundance at Head of Reservoir – More information is needed on these parameters to determine the feasibility and likely success of a head-of-reservoir collection system.
- Juvenile Chinook Migratory Behavior and Survival Rate through Reservoir – Information on spring Chinook migratory behavior through the reservoir would be helpful in locating collection facilities. Studies using radio or acoustic tags (smolt-size fish only) may show that fish follow certain pathways during their migration (shoreline, thalweg, etc.) or concentrate in areas that make them more susceptible to collection.
- Life-History Characteristics of Juvenile Spring Chinook Rearing in the Reservoir – Quantifying the importance of reservoir rearing is important in defining where to locate a fish collection system. If reservoir rearing has population benefits, then locating the collector closer to the dam (which increases habitat available for rearing) may result in more fish production, increasing the probability that fisheries goals would be achieved.
- Prototype Net/Fish Behavior Study – A prototype investigation of fry-parr guidance by nets, as described in Section 5.2.3 and shown on Figure 5-2, should be performed to fill critical data gaps with respect to the FSC/exclusion net system biological performance potential.
- Habitat Surveys – Field habitat surveys (for example, confirmation of northern spotted owl nest locations and habitat) may be required.

7.3.2 Physical Characterization

Recommended physical characterization studies and key issues are as follows:

- Aerial Photogrammetry and/or LiDAR Survey – Ground contour information would assist in final site selection of head-of-reservoir and in-tributary concepts. This survey should be supplemented with a topographic ground survey for data verification and for collection of property, right-of-way, and utility information.
- Supplemental Topographic Ground Survey – Detailed ground elevations would assist in site selection for head-of-reservoir and in-tributary concepts. The ground survey

would be needed to verify aerial photogrammetry or LiDAR data and for collection of property, right-of-way, and utility information.

- Reservoir Bathymetric Survey – These data are needed to site the FSC accurately, as well as to design the exclusion net system. Bathymetric data along the face of the dam would also be useful in refining design of the in-reservoir details of the at-dam fish transfer facility.
- River Bathymetric Cross-Section Survey – These data are needed to design the in-river structures for the in-tributary collector. They are also needed for a river hydraulic modeling study to investigate the flood impacts of the proposed facility.
- River Hydraulic Modeling – A one-dimensional (1-D) numerical model study, using HEC-RAS or similar software, would help determine potential flood impacts of an in-tributary facility. The in-tributary cross-section data must be collected before this study can be performed.
- FSC Computational Fluid Dynamics Study – A CFD model study should be performed to investigate entrance hydraulic signature, guidance velocity along nets, approach velocity for nets, and net alignment. This study would also be used to analyze potential effects of the FSC pump discharge on localized flow patterns and to analyze the potential use of that discharge to help the circulation patterns along and through the nets.
- Debris Load Study – Provide estimate of potential debris and sediment loads for Lookout Point Reservoir and tributaries based on current and future land use practices. Would include an evaluation of prevailing wind conditions and fetch.
- Geotechnical Investigations – Test pits and bore holes may be needed to characterize the subsurface conditions of the selected site.
- Cultural Resource Surveys – Cultural resource surveys may be required, depending on the final site selection.
- Real Estate Study – Property ownership, title, and easement information will need to be investigated, particularly if acquisition of private property is required.
- Utility Study – Locations of existing utilities and points of connection for utilities to be extended to the site will have to be identified.

As noted previously, the RM&E activities would need to be complete by approximately 2016 to allow the design and construction phases to proceed in accordance with the BiOp requirements.

This page was intentionally left blank.

SECTION 8

REFERENCES

8.1 GENERAL

This section provides a list of references used during preparation of this study.

8.2 REFERENCES

AECOM. 2009. *Upper Baker Floating Surface Collector Fish Screen Performance Testing Final Report*. Prepared for Puget Sound Energy. AECOM Inc. June.

AECOM and BioAnalysts. 2010. *Willamette Downstream Fish Passage Design Requirements Report.* Prepared for USACE Portland District. AECOM. June 2010.

Allen, R.L. and L.O. Rothfus. 1976. *Evaluation of a Floating Salmon Smolt Collector at Merwin Dam.* Washington Department of Fisheries (WDF).

ENSR. 2005. *Computational Fluid Dynamics Model of the Upper Baker Project Forebay Draft Final Report*. Prepared for Puget Sound Energy. ENSR Corporation. May.

ENSR. 2007. *Surface Bypass Program Comprehensive Review Report*. Prepared for USACE Portland District. ENSR Corporation. December 31.

Feldman, Cary. 2010. Personal communication with Cary Feldman, Puget Sound Energy Biologist for the Baker River Project. June.

Federal Emergency Management Agency (FEMA). 1999. *Flood Insurance Study, Lane County, Oregon.* June 2, 1999

Federal Energy Regulatory Commission (FERC). 2007. *Final Report – Biological Evaluation – Leaburg Canal Fish Screen, Leaburg - Walterville Project, Articles 418 and 420 (FERC Project No. 2496)*. Prepared by R2 Resource Consultants, Inc., and Eugene Water and Electric Board.

FERC. See Federal Energy Regulatory Commission.

Fish Commission of the State of Oregon. 1958. *Evaluation of the Ability of an Artificial Outlet to Attract Downstream Migrant Salmonids from the Reservoir of Lookout Point Dam.*

Griffith, David W. 2010. *North Fork of the Middle Fork Willamette Juvenile Run Size Estimates.* U.S. Army Corps of Engineers, Portland, Oregon.

Hager, R.C. and M. DeCew. 1970. *Cowlitz River Salmon Hatchery and Reservoir Production and Evaluation Program, Annual Report, 1969*. Washington Department of Fisheries.

Krcma, Richard and Robert Raleigh. 1970. “Migration of Juvenile Salmon and Trout into Brownlee Reservoir, 1962-1965.” *Fishery Bulletin* 68:2. April.

Mann, R.D., C.C. Caudill, M.L. Keefer, and C.A. Peery. 2010. *Migration Behavior and Spawning Success of Spring Chinook Salmon in Fall Creek and the North Fork Middle Fork Willamette River: Relationships Among Fate, Fish Condition, and Environmental Factors.*

Murdoch, Andrew R., Todd N. Pearsons, and Travis W. Maitland. 2009. "The Number of Redds Constructed per Female Spring Chinook Salmon in the Wenatchee River Basin." *North American Journal of Fisheries Management* 29:441–446.

National Marine Fisheries Service (NMFS), Northwest Region. 2008a. *Anadromous Salmonid Passage Facility Design.* February.

NMFS, Northwest Region. 2008b. *Endangered Species Act Section 7(a)(2) Consultation, Biological Opinion & Magnuson-Stevens Fishery Conservation & Management Act Essential Fish Habitat Consultation on the "Willamette River Basin Flood Control Project."* July.

NMFS. 2008c. *Biological Opinion for ESA Section 7 Consultation for the Baker River Hydroelectric Project (FERC No. 2150)*. NMFS Consultation 2006/05514.

NMFS. See National Marine Fisheries Service.

Oregon Department of Fish and Wildlife (ODFW). 1992. *Middle Fork Willamette Subbasin Fish Management Plan.*

PacifiCorp. 2005. *Evaluation of Anadromous Salmon Behavior and Habitat Selection in the Upper Lewis River Watershed, Phase 2 (AQU 13).*

Piper, Robert G., I.B. McElwain, L.E. Orme, J.P. McCarren, L.G. Fowler, and J.R. Leonard. 1982. *Fish Hatchery Management*. U.S. Department of the Interior, U.S. Fish and Wildlife Service.

Puget Sound Energy. 2009. PowerPoint presentation of 2008–2009 Baker FSC Evaluation.

Raymond, Howard and Gerald B. Collins. 1975. *Techniques for Appraisal of Migrating Juvenile Anadromous Fish Populations in the Columbia River Basin.*

Regional Mark Information System (RMIS). *Spring Chinook survival rate.* http://www.rmpc.org/. Accessed December 2010.

Serl, John and C. Morrill. 2004. *Draft 2004 Annual Report for the Cowlitz Falls Project.*

Shrier, Frank. 2010. Personal communication with Frank Shrier, PacifiCorp Fisheries Biologist. June.

Taylor, Greg. 2010. PowerPoint presentation on Lookout Point Fish Study Results. April 5.

Thomas, J.W., E.D. Forsman, J.B. Lint, E.C. Meslow, B.R. Noon, and J. Verner. 1990. *A Conservation Strategy for the Northern Spotted Owl.* Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl. Portland, Oregon.

U.S. Army Corps of Engineers (USACE)/Bell, Milo C. 1991. *Fisheries Handbook of Engineering Requirements and Biological Criteria.*

USACE. 1997. *Fishery Restoration.* Reconnaissance Study of the Middle Fork Willamette River, Oregon. January.

USACE. 2009. *Willamette Valley Projects Configuration/Operation Plan (COP).* October.

USACE. 2010. Cougar Dam Downstream Alternatives Study. Working Draft.

U.S. Department of Agriculture (USDA) and U.S. Department of the Interior (USDI). 1994. *Record of Decision for the Final Supplemental Environmental Impact Statement on Management of Habitat for Late-Successional and Old-Growth Forest Related Species within the Range of the Northern Spotted Owl*. Standards and guidelines for management of habitat for late-successional and old-growth forest related species within the range of the northern spotted owl. Portland, Oregon.

U.S. Fish and Wildlife Service (USFWS). 2008. "Endangered and Threatened Wildlife and Plants; Revised Designation of Critical Habitat for the Northern Spotted Owl." 50 *Code of Federal Regulations* CFR Part 17. *Federal Register* 73:157. August 13. Portland, Oregon.

USFWS. 2008. *Final Recovery Plan for the Northern Spotted Owl,* Strix occidentalis caurina. U.S. Fish and Wildlife Service. Portland, Oregon.

USFWS. 2010. *Draft Revised Recovery Plan for the Northern Spotted Owl*, Strix occidentalis caurina. U.S. Fish and Wildlife Service. Portland, Oregon.

WDFW, BPA Contract Number 96BI92557.

Willis, C.F. 2008. Proposed incidental take tables for N. Santiam, S. Santiam, McKenzie, and Middle Fork Willamette Rivers. Personal communication to J. Johnson, National Marine Fisheries Service.

Zymonas, Nik and Michael Hogansen. 2010. *Downstream Passage of Chinook Salmon Through Cougar Dam ODFW Screw Trapping Data Analyses*.

This page was intentionally left blank.

APPENDIX A

MEETING SUMMARIES

Appendix A includes the following meeting summaries:

1. 5 April 2010 Site Visit
2. 8 April 2010 Team Coordination Meeting No. 1
3. 22 April 2010 Team Coordination Meeting No. 2
4. 6 May 2010 Team Coordination Meeting No. 3
5. 20 May 2010 Team Coordination Meeting No. 4
6. 26 May 2010 Checkpoint Meeting No. 1 (Agenda and meeting summary)
7. 3 June 2010 Team Coordination Meeting No. 5
8. 17 June 2010 Team Coordination Meeting No. 6
9. 1 July 2010 Team Coordination Meeting No. 7
10. 15 July Team Coordination Meeting No. 8
11. 22 July 2010 Checkpoint Meeting No. 2 (Agenda and meeting summary)
12. 29 July 2010 Team Coordination Meeting No. 9
13. 12 August 2010 Team Coordination Meeting No. 10
14. 26 August 2010 Team Coordination Meeting No. 11
15. 9 September 2010 Team Coordination Meeting No. 12
16. 23 September 2010 Team Coordination Meeting No. 13
17. 19 October 2010 Land Use Discussion with USFS (Agenda and meeting summary)
18. 20 October 2010 Checkpoint Meeting No. 3 (Agenda and meeting summary)
19. 04 November 2010 Team Coordination Meeting No. 14
20. 18 November 2010 Team Coordination Meeting No. 15
21. 02 December 2010 Team Coordination Meeting No. 16
22. 16 December 2010 Team Coordination Meeting No. 17
23. 13 January 2011 Team Coordination Meeting No. 18
24. 19 January 2011 Checkpoint Meeting No. 4 (Agenda and meeting summary)
25. To Be Determined - Team Coordination Meeting No. 19

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Site Visit and Kickoff Meeting
Date: 5-April-2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James (via phone)
☐ Fortuny, Kristina	☒ Scullion, Mary Karen	☐ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☒ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Dorothy
☒ Bardy, David		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☒ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☐ Spear, Daniel

ODFW

☒ Friesen, Tom

NMFS

☒ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☒ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

Arrive at Project (meet at Project Office): 11:00

Introductions – Roles and Responsibilities

- Distribute meeting notes; see attachment.

Project Overview – Lookout Point Head of Reservoir Project

- Briefly describe why Head of Reservoir at Lookout Point.

High-Level Overview – How this work fits into the 2008 Biological Opinion (BiOP) for the Willamette Valley and other Willamette Work

- Willamette COP Diagram.
- Monthly reporting to Fish Hatchery and Passage Team.
- Biological Opinion Reference.

Tentative Schedule – When we need/want to make decisions

- 10% Submittal ~ End of April
- 10% Checkpoint Meeting ~ End of May
- 30% Checkpoint Meeting ~ Mid June
- 60% at end of Fiscal Year
- 90% Checkpoint ~ Late December
- Completion near end of Calendar Year

Lookout Point Project Details

- Physical Project Details – Operating Range, Flows, Rule Curve, etc.
- Bounding Constraints – Encompass authorized purposes.
- Existing GIS information – Aerial Photo, bathymetry, LiDAR, etc.
- Existing Hydrologic Information – ?
- USGS Gage Information – Location.
- Biological Information – Passage Timing, Species, Predators, etc.

Potential Available Data

- Some Cougar alternatives, Cougar evaluation matrix as template, GIS, bio studies.

Routine Meeting Schedule

- Every Other Thursday at 0900 AM (opposite of Cougar meetings).
- Next meeting currently scheduled for 8-April if needed.

Sharepoint? - Describe best way to have information in a common location.

Lunch (Tentative 12:30)

Move upstream to Head of Reservoir Area – Walk general area (Tentatively 13:00 to 14:00)

Return to Portland (14:00 to 17:00)

Meeting Summary:

Introductions:

- Each individual introduced themselves, and described their roles and responsibilities for the project.
- A meeting information package was distributed (see Attachment No. 1).
- A PDT contact list is included as Attachment No. 2.

Project Overview:

- The objective of this project is to prepare an Alternatives Report (AR) evaluating the feasibility of head-of-reservoir and/or in-tributary collection at the USACE Lookout Point Dam.
- The PDT will coordinate with the Fish Facility Design Oversight Workgroup which is part of the Willamette Action Team for Ecosystem Restoration (WATER). The WATER team is responsible for overall coordination and implementation of the Willamette Valley BiOP.
- The PDT is to focus on the technical feasibility of proposed alternatives. Questions concerning policy and/or high-level biological issues should be referred to the Oversight Workgroup.
- This project will be conducted in parallel with preparation of the Willamette Design Requirements Report and a downstream migrant collection Alternatives Study at Cougar Dam.
- The Lookout Point evaluation criteria should be consistent with criteria already developed for Cougar to facilitate decision making.
- If head-of-reservoir or in-tributary collection is found to be infeasible at Lookout Point, a collection facility located at the dam may be investigated in the future (in consultation with the Cougar study results).

High-Level Overview:

- Greg Taylor provided a presentation of downstream fish passage data (Attachment No. 4).
- Prior to construction of Dexter and Lookout Point Dams, approximately 80 percent of spring Chinook spawned above Lookout Point.
- Since 1993, ODFW has outplanted adult spring Chinook above Hills Creek.
- Outmigration occurs year-round but the peak is from January through July, and fish also migrate when the reservoir is low.
- The facilities should be designed to fry criteria (<60 mm fish length).
- The habitat value of the Lookout Point reservoir and the magnitude of predation taking place have not been quantified.
- Existing passage efficiency through Lookout Point Dam is estimated to be from approximately 20 to 60 percent.
- Collected outmigrants will be transported to the Middle Fork below Dexter Dam.

- A North Fork in-tributary collection facility may have the ability to capture approximately 2/3 of the total outmigrants while being required to accommodate only approximately 1/3 of the total flow of the Middle Fork.

Tentative Schedule:

- The schedule was discussed and will be adjusted based on the 5-April NTP date and additional input from USACE and the Consultant Team.
- A scope clarification memorandum will be prepared to identify aspects of the project that are unclear or anticipated to be different from the scope of work (See Parking Lot below).
- A Quality Control Plan (QCP) will also be prepared.

Lookout Point Project Details:

- Lookout Point is a peaking power plant with 3 units and can ramp from no flow to full capacity in approximately 5 minutes. Daily reservoir fluctuations due to power production range up to a maximum of approximately 5 to 8 feet. Greater fluctuations can take place as a result of flood inflows.
- The reservoir is approximately 14 miles long. Due to fluctuations in the reservoir, the actual location of the head-of-reservoir can vary greatly.
- Limited topography, aerial photography, LiDAR data, GIS data and real estate ownership information is available. Most of the potential sites for the facility are owned by the United States Forest Service (USFS).
- No bathymetry is available. USACE will provide record drawings and mapping from the original dam construction.
- A hydrology study of the Middle Fork was completed in 2008 and may provide useful streamflow information; however, and ITR review has not yet been performed. USACE will check on the progress of the hydrology report and make it available to the PDT.
- Current data from USGS Gage No. 14148000 on the Middle Fork of the Willamette River is available. A USGS gage on the North Fork operated from approximately 1930 to 1996. Recent flow data is included as Attachment No. 3.

Potential Available Data:

1) USACE Cougar Downstream Collection Alternatives Report, including evaluation criteria
2) USACE Willamette COP Report
3) North Fork Hydrology Report
4) Current draft of Willamette Design Requirements Report
5) Any available topographic/bathymetric mapping including original reservoir civil design drawings
6) Real estate/property ownership data
7) Aerial photography
8) Lookout Point reservoir ramp rates (hourly and daily if available)

9) Greg Taylor's summary PowerPoint presentation
10) Species of concern and migration timing by life stage

Routine Meeting Schedule:

- Regular Team Coordination Meetings will be held in the Summit Room and via conference call every other Thursday at 09:00 AM, starting Thursday 8 April.

Sharepoint:

- USACE will create a Sharepoint site and provide access to the PDT.

Site Visit:

Four potential facility locations were visited in the afternoon:

1. **Current Head-of-Reservoir.** The first site was at the head of reservoir as it was currently located the day of the meeting. A meandering river channel entered the reservoir along State Highway 58. A facility at this location would have to accommodate varying head-of-reservoir locations (both horizontal and vertical). A railroad right-of-way is located between the Highway and the reservoir.
2. **Black Canyon Campground.** The second site was a USFS campground located near the most upstream head-of-reservoir location. The Middle Fork had an average discharge of 2,780 cfs on the day of the site visit per USGS gage No. 14148000. A collection facility sited near the campground would likely require a boat portage or other features to accommodate river recreation in the immediate area.
3. **Upper North Fork.** The third site was located on the North Fork of the Willamette River, approximately 4.0 river miles upstream from the confluence. The site is owned by the USFS. The North fork has good spawning areas and may account for approximately 2/3 of the total outmigrants. The right bank slope showed some instability at this location; however, the site was isolated and generally free from other encumbrances.
4. **Lower North Fork (Westfir).** The fourth and final site was located approximately 1.3 river miles upstream from the confluence near the town of Westfir. The site was previously a lumber mill which was operated from approximately 1923 to 1985. A concrete dam associated with the mill was removed in 1994; however, the abutments are largely intact. This site is open and has a lower overbank area that could facilitate siting of a facility.

Decisions Made:
• In-tributary collection should only be investigated on the Middle and North Forks.

Action Items:
• Data needs will be discussed at the 8-April Team Coordination Meeting (Various). • USACE will create a Sharepoint site and provide access to the PDT (Askelson). • The project schedule will be adjusted based on the 5-April NTP date and additional input from USACE and the Consultant Team (Askelson and Kapla).

Parking Lot:
• The intent of the project is to provide the most effective fish passage facility at reasonable cost; however, these parameters are not well defined. • The BiOP and scope of work requires that a prototype facility be identified for implementation; however, the alternatives evaluation should ideally consider full-scale production facilities first, with the ability to prototype as a secondary issue. • A fish passage efficiency goal for the facility has not yet been identified. For example, does the facility have to operate year-round or is a behavioral (vs. a positive) exclusion/collection system acceptable?

Look Ahead:
Team Coordination Meeting on 8-April.

Attachments:

1. Meeting information package
2. PDT contact list
3. Recent flow and temperature data
4. Presentation: Review of Downstream Fish Passage Data

The depth and timing of the drawdown may be adjusted in subsequent years, based upon monitoring results, with NMFS' agreement.[28] During this operation, when inflow is less than Project minimum flow objectives and the reservoir is at or below 714.0', then outflow will equal inflow and this will not be considered a deviation from flow objectives.

Rationale/Effect of RPA 4.8.1: Past studies have indicated that juvenile spring Chinook salmon migrate from Fall Creek Reservoir primarily during November, and that smolts passing through the regulating outlet under conditions of lower reservoir elevations survived at higher levels than when the reservoir was held high (see Section 4.2.3 Middle Fork Willamette Baseline). Also, smolts migrating late in the season under conditions of very low head appeared to sustain lower injury or mortality rates compared to passage under high reservoir levels. If the reservoir is drawn down to an elevation below minimum conservation pool, NMFS would expect increased survival of juvenile Chinook salmon emigrating during November.

The effect of this measure will be to improve downstream fish passage survival through Fall Creek dam and reservoir, increasing productivity of the Fall Creek Chinook salmon population and ultimately resulting in increased abundance and improved spatial distribution. Another effect of this measure will be to minimize adverse effects on critical habitat by providing a component of the PCE, "migration corridors free of obstruction."

4.9 **<u>Head-of-Reservoir Juvenile Collection Prototype</u>: The Action Agencies will plan, design, build, and evaluate a prototype head-of-reservoir juvenile collection facility above either Lookout Point or Foster reservoir. If Foster reservoir is chosen for testing the prototype, the Action Agencies will design for collecting both juvenile salmonids and steelhead kelt. The Action Agencies will complete construction by September 2014. As an interim step, the Action Agencies will complete feasibility studies as part of the COP (described in RPA measure 4.13) near the end of 2010. At that time, the Action Agencies will make a "go/no go" decision on the feasibility of the prototype facility(s) and the preferred location(s) and design(s) for construction of the prototype(s). The Action Agencies will make the go/no go decision in coordination with the FPHM, and after agreement by NMFS.**

After construction is completed, the Action Agencies will conduct biological and physical evaluations of the head-of-reservoir prototype collection facilities in 2015 and 2016, with opportunities for review and comment by the FPHM and RM&E committee of study proposals and draft reports. After receiving comments, including the Services' statements regarding whether they agree[29] with the draft report, the Action Agencies will make necessary revisions to the draft report and issue a final report by December 31, 2016, on the effectiveness of the facilities, including recommendations for installing full-scale head-of-reservoir facilities at

[28] See RPA 1.3 & 1.4 for elaboration of decision making process.
[29] See RPA 1.3 & 1.4 for elaboration of decision making process.

this and other reservoirs. If the report concludes that head-of-reservoir facilities are technically feasible, capable of safely collecting downstream migrating fish, and capable of increasing the overall productivity of the upper basins, then the Action Agencies will include such facilities in the design alternatives that they consider in the COP studies described in RPA measure 4.13 below.

Rationale/Effect of RPA 4.9: This measure addresses the lack of effective downstream fish passage facilities described in the Effects sections for the major subbasins with Project dams (Middle Fork Willamette, section 5.2; McKenzie, section 5.3; South Santiam, section 5.5; and North Santiam, section 5.6). Past monitoring of downstream juvenile migration through the reservoirs and dams was minimal, although in some reservoirs (e.g., Green Peter, South Santiam, section 5.5) studies indicated that juvenile fish were not successfully migrating through the reservoir to collection facilities at the face of the dam. Regardless of whether this was caused by predation, lack of attraction to collection facilities, or another reason, these results support the notion that collecting fish near the head of a reservoir might be an effective means to achieve safe downstream passage.

Because the head-of-reservoir fish collection concept is virtually untested, it would be imprudent to require such facilities without prior field studies, design, and prototype testing to validate the concept. For this measure, NMFS defines "prototype" to refer to temporary facilities intended for concept evaluation, not long-term operations. Further, "prototype" does not necessarily refer to a single concept; multiple concepts may be experimented with simultaneously. The FPHM subcommittee of the WATER group, comprised of fish biologists and engineers with experience in fish passage design, will be an appropriate forum in which to develop concepts. NMFS' current thinking on possible means to accomplish this is 1) floating collectors in the reservoir near the mouths of tributaries and 2) fish collection facilities on tributaries above the reservoir pools. After several years of field monitoring and conceptual design review, the Action Agencies will identify a Major Milestone (MM2) (as described in RPA measure 4.13 below) near the end of 2010 in conjunction with completion of the DDR. The major decision associated with that milestone will be "go/no go" on the feasibility of the prototype facility(s), after coordination with the FPHM and agreement by NMFS. If the decision is to construct and evaluate the prototype(s), the focus of the decision will potentially be focused on alternative location(s) and design(s) for the prototype facility(s). Among the questions to be answered are whether such a device could capture enough fish to be biologically useful, and whether it could be operated during periods of high flow and debris loading.

The effects of this measure would be to initially demonstrate whether this concept is feasible, and if so, to use head-of-reservoir facilities in Project reservoirs where indicated to increase downstream fish survival. Safe and timely downstream passage of juvenile Chinook salmon and juvenile and kelt steelhead is a critical component to the success of the Outplant Program. In order to restore access to historical habitat above Project dams, and address the spatial distribution VSP parameter, the juvenile fish produced from adults released above the dams need to safely pass through reservoirs and dams on their downstream migration. Sustainable production above the dams would improve productivity and abundance of populations by increasing the total available habitat while limiting dam-related losses. Providing access will also benefit critical habitat because lack of access was a limiting factor.

4.10 **Assess Downstream Juvenile[30] Fish Passage through Reservoirs: The Action Agencies will, in coordination with and review by the Services, assess juvenile fish passage through the following Project reservoirs:**

1. **Cougar**
2. **Lookout Point and Dexter**
3. **Detroit and Big Cliff**
4. **Green Peter and Foster**
5. **Fall Creek**
6. **Hills Creek**

These evaluations will be developed consistent with the RM&E process described below in RPA measure 9 (RM&E). The Action Agencies must seek NMFS' review of evaluation proposals. Comments submitted by NMFS on draft evaluation proposals must be reconciled by the Action Agencies in writing to NMFS' satisfaction prior to initiating any research-related activities anticipated in this RPA.[31] The proposals must identify annual anticipated incidental take levels by species, life stage, and origin[32] for each year. The Services will inform the Action Agencies whether they agree[33] with the proposed studies, reports, and NEPA alternatives. The Action Agencies will begin these studies in 2008; field investigations, study reports, and NEPA analyses, if necessary, will be completed by December 31, 2015.

Rationale/Effect of RPA 4.10: Juvenile fish (and kelts) need to emigrate through reservoirs, or be transported around them, in order to continue their downstream migration and complete their life cycles. Effects are unique at each reservoir: fish may pass satisfactorily through some reservoirs, but have problems, such as loss by predation or residualism (failure to continue migrating) at others. For instance, preliminary results at Fall Creek and Cougar indicated juvenile Chinook salmon were able to safely migrate through the reservoirs, yet studies at Green Peter in the 1980s showed few fish released near the head of the reservoir reached the dam.

There is little information on fish use, migration rates, and survival in the Willamette Project reservoirs.[34] Most of the information on Project reservoir fish passage has been

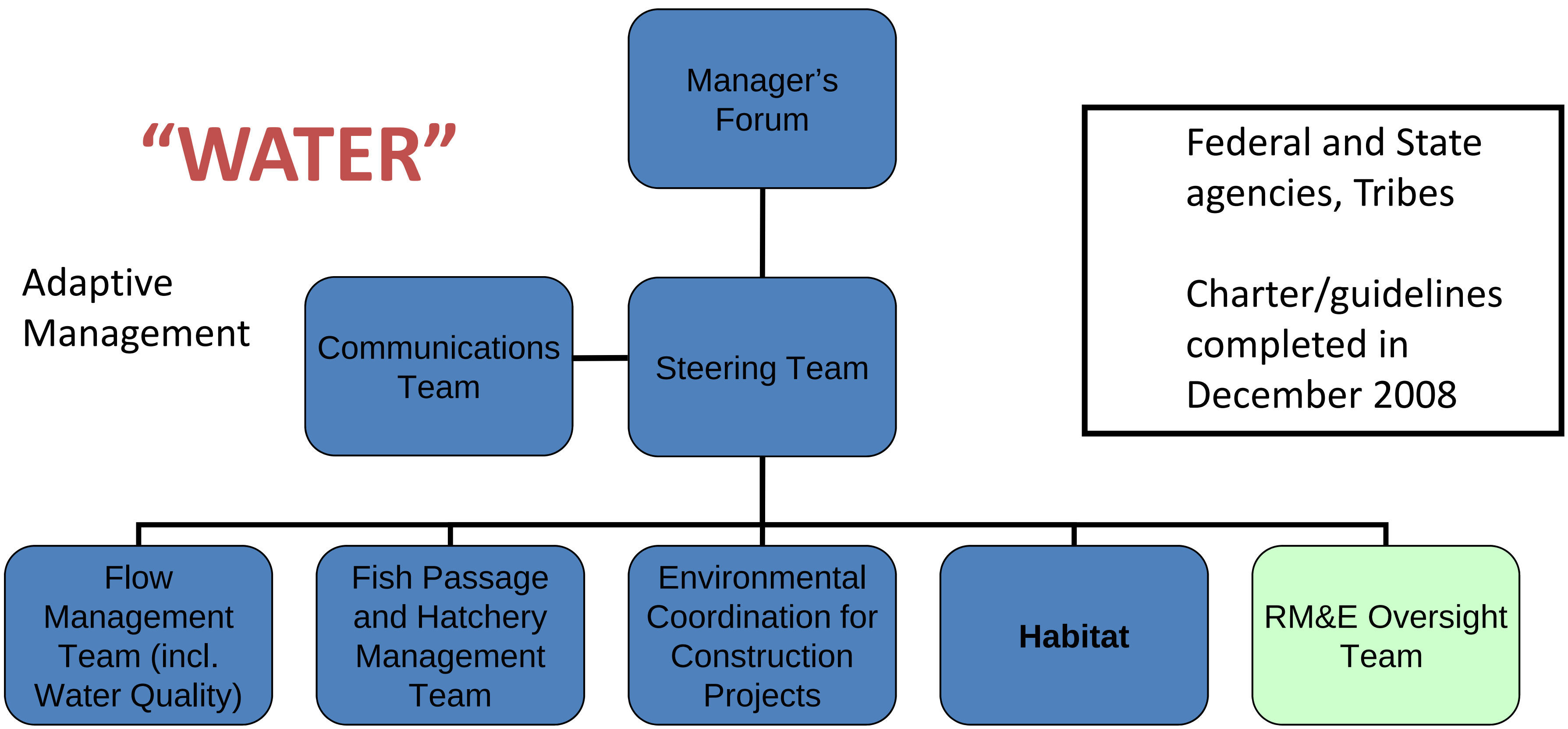
---

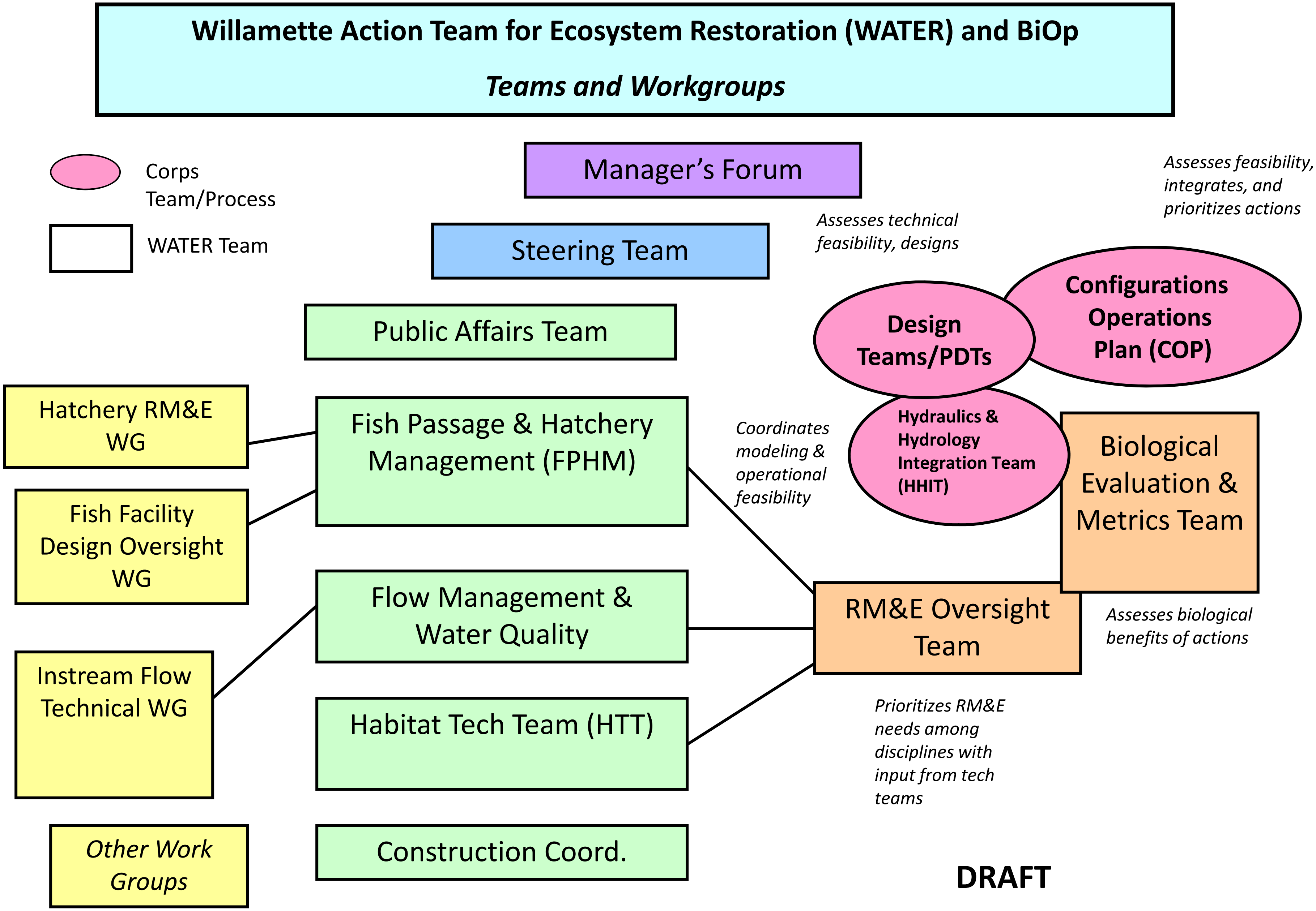
[30] Include downstream steelhead kelt passage in Santiam studies through Detroit, Big Cliff, Green Peter, and Foster.
[31] See RPA 1.3 & 1.4 for elaboration of decision making process.
[32] That is, hatchery-origin or non-hatchery origin fish.
[33] See RPA 1.3 & 1.4 for elaboration of decision making process.

[34] This RPA does not include small reservoirs such as at Minto and those with the Long Tom dams.

This page was intentionally left blank.

Implementation Coordination: Willamette Action Team for Ecosystem Restoration




Willamette Action Team for Ecosystem Restoration (WATER) and BiOp
Teams and Workgroups
Corps Team/Process
WATER Team
Manager's Forum
Steering Team
Public Affairs Team
Assesses feasibility, integrates, and prioritizes actions
Assesses technical feasibility, designs
Design Teams/PDTs
Configurations Operations Plan (COP)
Hatchery RM&E WG
Fish Passage & Hatchery Management (FPHM)
Fish Facility Design Oversight WG
Coordinates modeling & operational feasibility
Hydraulics & Hydrology Integration Team (HHIT)
Biological Evaluation & Metrics Team
Flow Management & Water Quality
RM&E Oversight Team
Assesses biological benefits of actions
Instream Flow Technical WG
Habitat Tech Team (HTT)
Prioritizes RM&E needs among disciplines with input from tech teams
Other Work Groups
Construction Coord.
DRAFT

[WM Homepage] [Water Control Data Page]

Provisional Data Warning
Realtime Hydrologic Data: [Hourly] [8 Days Hourly] [30 Days]

Lookout Point Dam and Lake


Full-Size Photo = 193K

Project Description

- Stream: Middle Fork, Willamette River
- Location: Lowell, Oregon
- Type of Project: Storage
- Authorized Purpose: Flood Control, Power, Navigation, Irrigation
- Other Uses: Fishery, Water Quality, Recreation

Hydrologic Data

- Drainage area = 991 sq mi
- Maximum historical discharge (estimated) = 87,000 cfs (1861)
- Lake Elevation
  Maximum pool = 934.0 ft
  Full pool = 929.0 ft
  Minimum flood control pool = 825.0 ft
- Usable Storage (819.0 to 926.0) = 336,400 AF

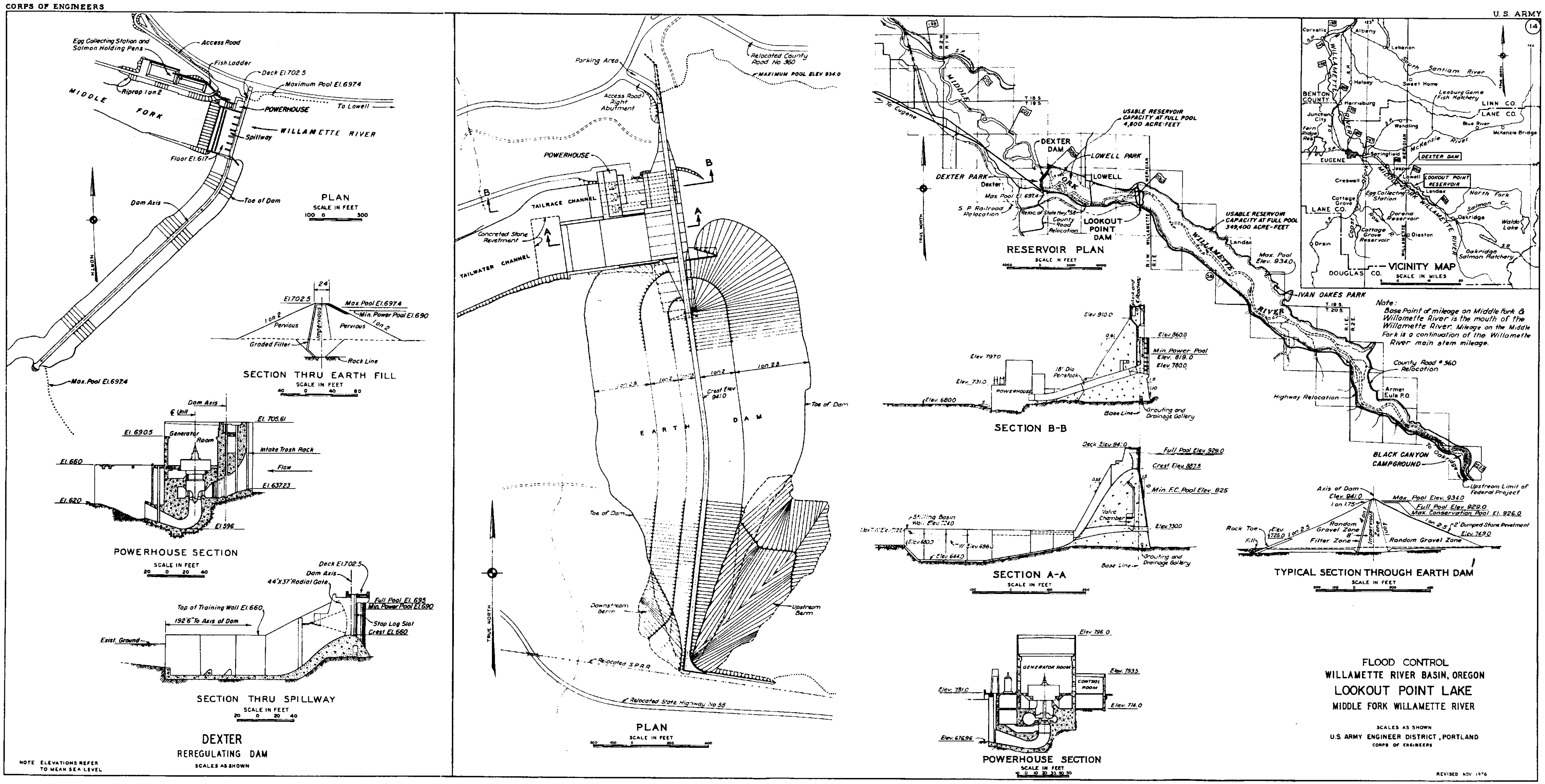
Powerhouse

- Number of units................................3
- Nameplate capacity..........................120 MW
- Overload capacity............................138 MW
- Hydraulic capacity............................9,300 cfs

U.S. Army Corps of Engineers, Columbia Basin Water Management Division
Email: Information Provider | Webmaster
Page Updated: Friday, 31-May-2002

[WM Homepage] [Water Control Data Page]

This page was intentionally left blank.


CORPS OF ENGINEERS
U.S. ARMY
PLAN
SECTION THRU EARTH FILL
POWERHOUSE SECTION
SECTION THRU SPILLWAY
DEXTER
REREGULATING DAM
SCALES AS SHOWN
NOTE: ELEVATIONS REFER TO MEAN SEA LEVEL
MIDDLE FORK WILLAMETTE RIVER
POWERHOUSE
TAILRACE CHANNEL
TAILWATER CHANNEL
EARTH DAM
Toe of Dam
Upstream Berm
Downstream Berm
PLAN
RESERVOIR PLAN
USABLE RESERVOIR CAPACITY AT FULL POOL 4,800 ACRE-FEET
USABLE RESERVOIR CAPACITY AT FULL POOL 349,400 ACRE-FEET
DEXTER DAM
LOOKOUT POINT DAM
LOWELL PARK
DEXTER PARK
IVAN OAKES PARK
BLACK CANYON CAMPGROUND
VICINITY MAP
Note: Base Point of mileage on Middle Fork & Willamette River is the mouth of the Willamette River. Mileage on the Middle Fork is a continuation of the Willamette River main stem mileage.
SECTION B-B
SECTION A-A
TYPICAL SECTION THROUGH EARTH DAM
POWERHOUSE SECTION
FLOOD CONTROL
WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT LAKE
MIDDLE FORK WILLAMETTE RIVER
SCALES AS SHOWN
U.S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS
REVISED NOV 1976

LOOKOUT POINT PROJECT
PRIOR DESIGN MEMORANDA AND INSPECTION REPORTS

DM No.	Subject	Date
	Design Analysis - Penstock Trash Racks, Stoplogs, Lifting Beams	1952
	Reservoir Regulation Manual	1954
	Sedimentation Ranges - Established 1953-55	1956
	Foundation Report	1965
	Master Plan - Reservoir Management and Public Use Development	1955
1	Public Use and Access Facility	1960
	Supplement No. 1	1962
2	Service Buildings	1964
3	Public Use and Access Facility	1968
	Supplement No. 1	1975
4	Spillway Crane	1968
5	Electronic Distance Measuring (EDM) Trilateration	
	Survey System - Real Estate	1981
6	Earthquake and Fault Study	1981
7	Electronic Distance Measuring System (EDM) Trilateration	
	Survey System	1981

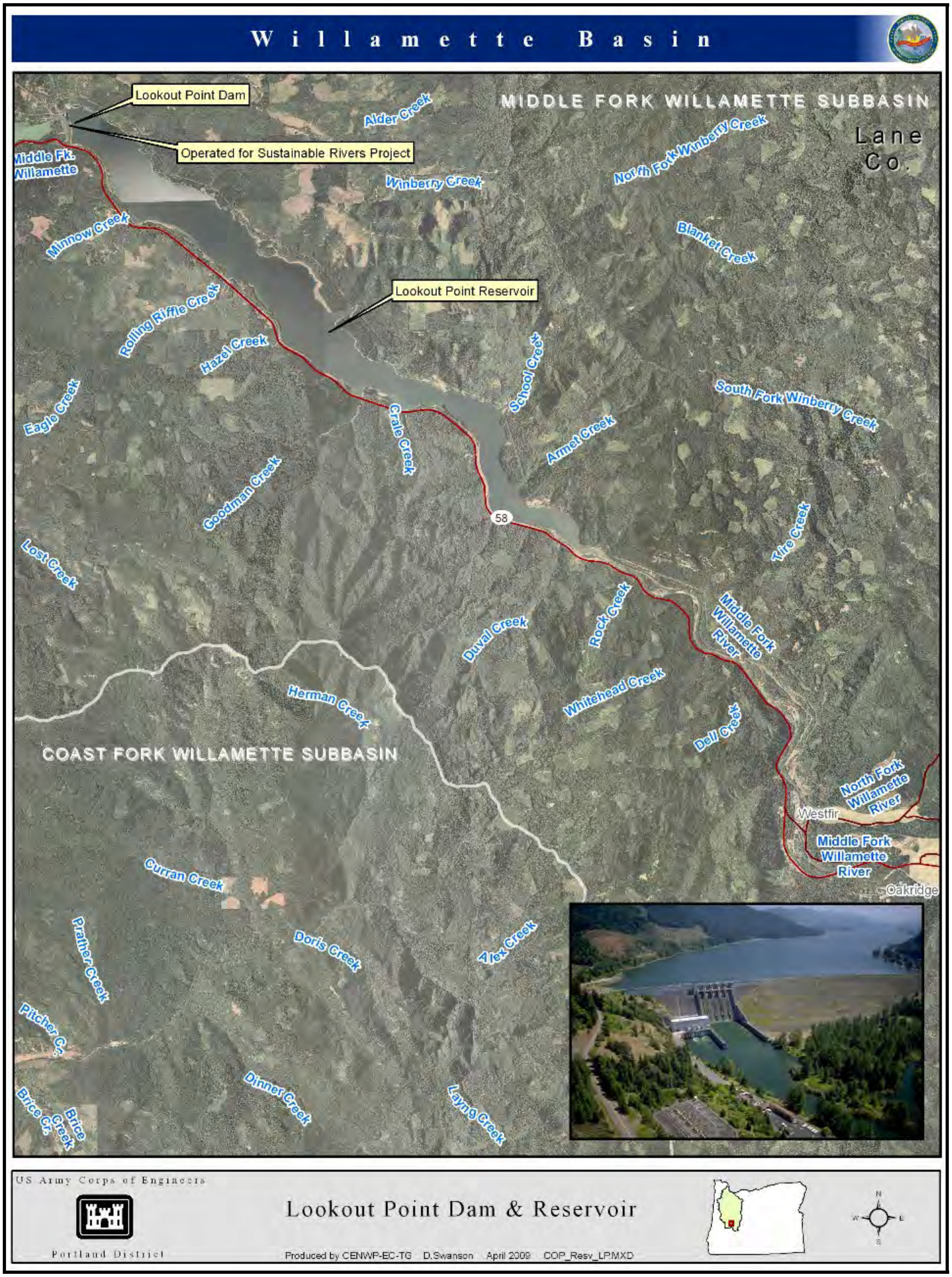
Report Title	Date
Periodic Inspection Report No. 1	1967
Periodic Inspection Report No. 2	1972
Periodic Inspection Report No. 3	1975
Periodic Inspection Report No. 4	1980
Report of Dam Safety Assurance Study	1981
Periodic Inspection Report No. 5	1985
Periodic Inspection Report No. 6	1990
Periodic Inspection Report No. 7	1995
Periodic Inspection Report No. 8	1999
Periodic Inspection Report No. 9	2004
Addendum- Regulating Outlet Inspection	2005
Tainter Gate Operating Inspection	2009

LOOKOUT POINT PROJECT
PERTINENT DATA

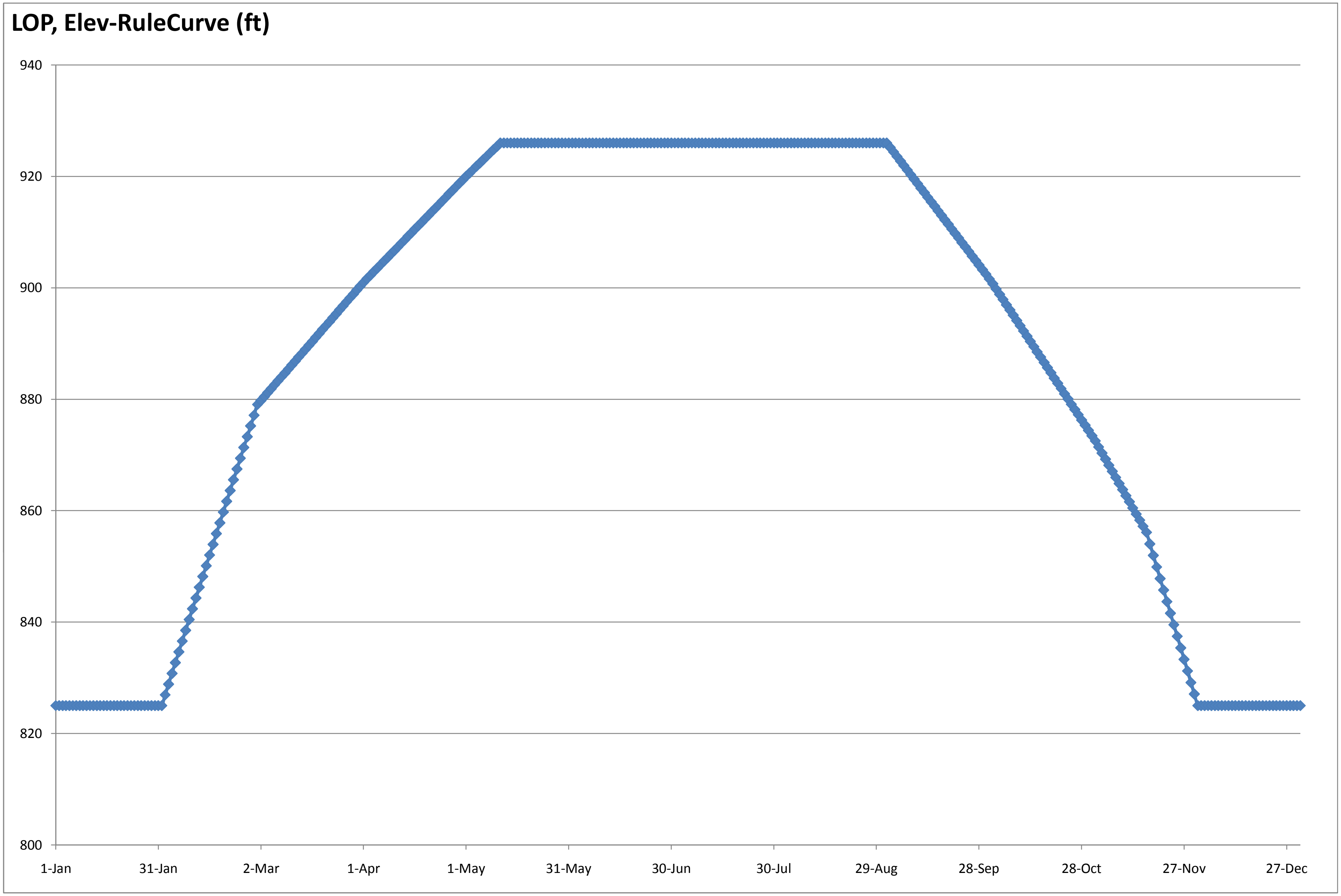
GENERAL	
Drainage area, square miles	991
Pool elevations *	
Maximum full pool	934.0
Maximum conservation pool	926.0
Minimum flood control pool	825.0
Minimum power pool	819.0
RESERVOIR	
Maximum full pool, acre-feet	477,700
Maximum conservation pool	443,000
Minimum flood control pool	118,800
Minimum power pool	106,600
DAM	
Type	Earth and gravel filled
Crest length, feet	3,175
Crest elevation	941.0
Crest width, feet	24
Maximum height, ft above lowest pt of foundation	250
Freeboard (above maximum pool)	7
SPILLWAY	
Type	Concrete gravity, gate controlled, overflow
Crest length, feet	274
Number of gates	5
Crest elevation	887.5
Design discharge, ft^3/s	270,000
OUTLET WORKS	
Type	4 Walker valves
POWER PLANT	
Penstocks	3 steel, 18-ft. diameter
Type of turbines	Francis
Number of units	3
Installed capacity, kilowatts	120,000

* All elevations in feet above mean sea level

Figure 2-13. Lookout Point Dam and Reservoir



This page was intentionally left blank.


LOP, Elev-RuleCurve (ft)
940
920
900
880
860
840
820
800
1-Jan
31-Jan
2-Mar
1-Apr
1-May
31-May
30-Jun
30-Jul
29-Aug
28-Sep
28-Oct
27-Nov
27-Dec

This page was intentionally left blank.

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Contact List
14 April 2010

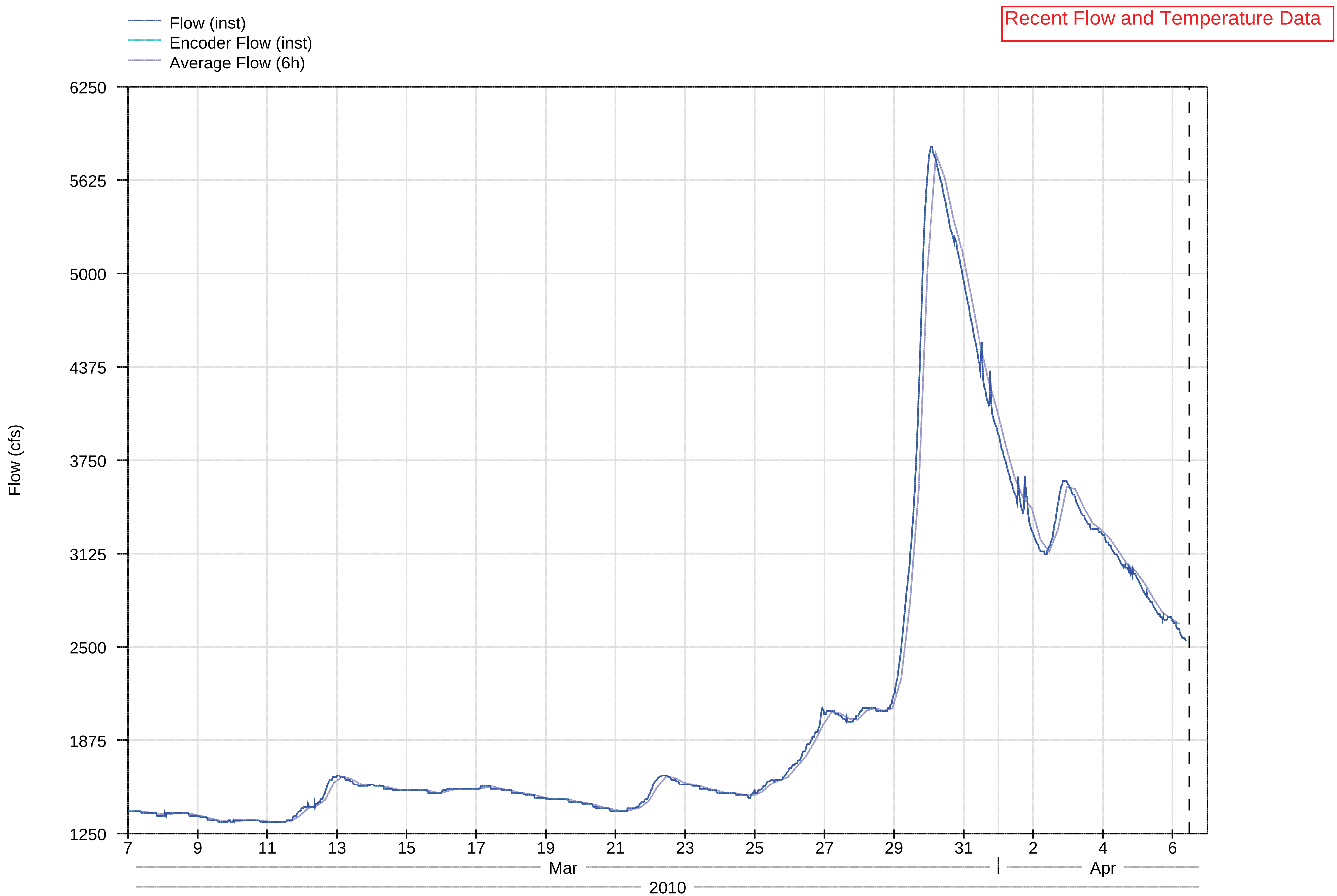
Team Member	Role	Telephone	Email
USACE			
Christine Budai	Project Manager	(503) 808-4725	Christine.M.Budai@usace.army.mil
Elizabeth Roy	Technical Lead – Hydraulic Design	(503) 808-4849	Elizabeth.W.Roy@usace.army.mil
Sean Askelson	Technical Lead (Deputy) – Hydraulic Design	(503) 808-4882	Sean.K.Askelson@usace.army.mil
Mark Heiller	Contracting Officer	(503) 808-4612	Mark.F.Heiller@usace.army.mil
Kyle McCune	Contracting Officer's Representative	(503) 808-4835	Kyle.C.McCune@usace.army.mil
Kathleen Seitz	Contract Specialist	(503) 808-4628	Kathleen.D.Seitz@usace.army.mil
Leslie Conklin	Contract Coordinator	(503) 808-4815	Leslie.M.Conklin@usace.army.mil
Eleanor (Vickie) Collins	Invoicing	(503) 808-4817	Eleanor.V.Collins@usace.army.mil
Greg Taylor	Lookout Point POC / Fisheries biology	(541) 937-2131 x146	Gregory.A.Taylor@usace.army.mil
Mary Karen Scullion	Lookout Point Dam Hydraulics/Reservoir Control	(503) 808-4869	Mary.K.Scullion@usace.army.mil
David Bardy	Assistant Operations PM/Chief Technical Staff	(541) 937-2131 x154	David.M.Bardy@usace.army.mil
David Griffith	Fisheries Biology	(503) 808-4773	David.W.Griffith@usace.army.mil
James Calnon	Mechanical	(503) 808-4928	James.D.Calnon@usace.army.mil
Kristina Fortuny	Structural	(503) 808-4940	Kristina.R.Fortuny@usace.army.mil
Jeff A. Sedey	Cost Engineer	(503) 808-4423	Jeffrey.A.Sedey@usace.army.mil
Mike Langeslay	NWP Lead Fisheries Biology	(503) 808-4774	Mike.J.Langeslay@usace.army.mil
Joseph Brackin	Electrical	(503) 808-4922	Joseph.P.Brackin@usace.army.mil
Anil Naidu	Willamette Valley Mechanical	(541) 937-2131	Anil.Naidu@usace.army.mil
Greg Smith	Environmental Resources	(503) 808-4783	Gregory.M.Smith@usace.army.mil
James Burton	Hydrology	(503) 808-4852	James.C.Burton@usace.army.mil
Dorothy McCrae	Economist	(503) 808-4758	Dorothy.P.McCrae@usace.army.mil

Team Member	Role	Telephone	Email
ODFW			
Tom Friesen			Tom.Friesen@oregonstate.edu
NMFS			
Melissa Jundt			Melissa.Jundt@noaa.gov
Stephanie Burchfield		(503) 736-4720	Stephanie.Burchfield@noaa.gov
FWS			
Ann Gray		(503) 231-6179	Ann_E_Gray@fws.gov
Confederated Tribes of the Grand Ronde			
Brandy Humphreys			Brandy.Humphreys@grandronde.org
Lawrence Schwabe			
BPA			
Dan Spear			djspear@bpa.gov

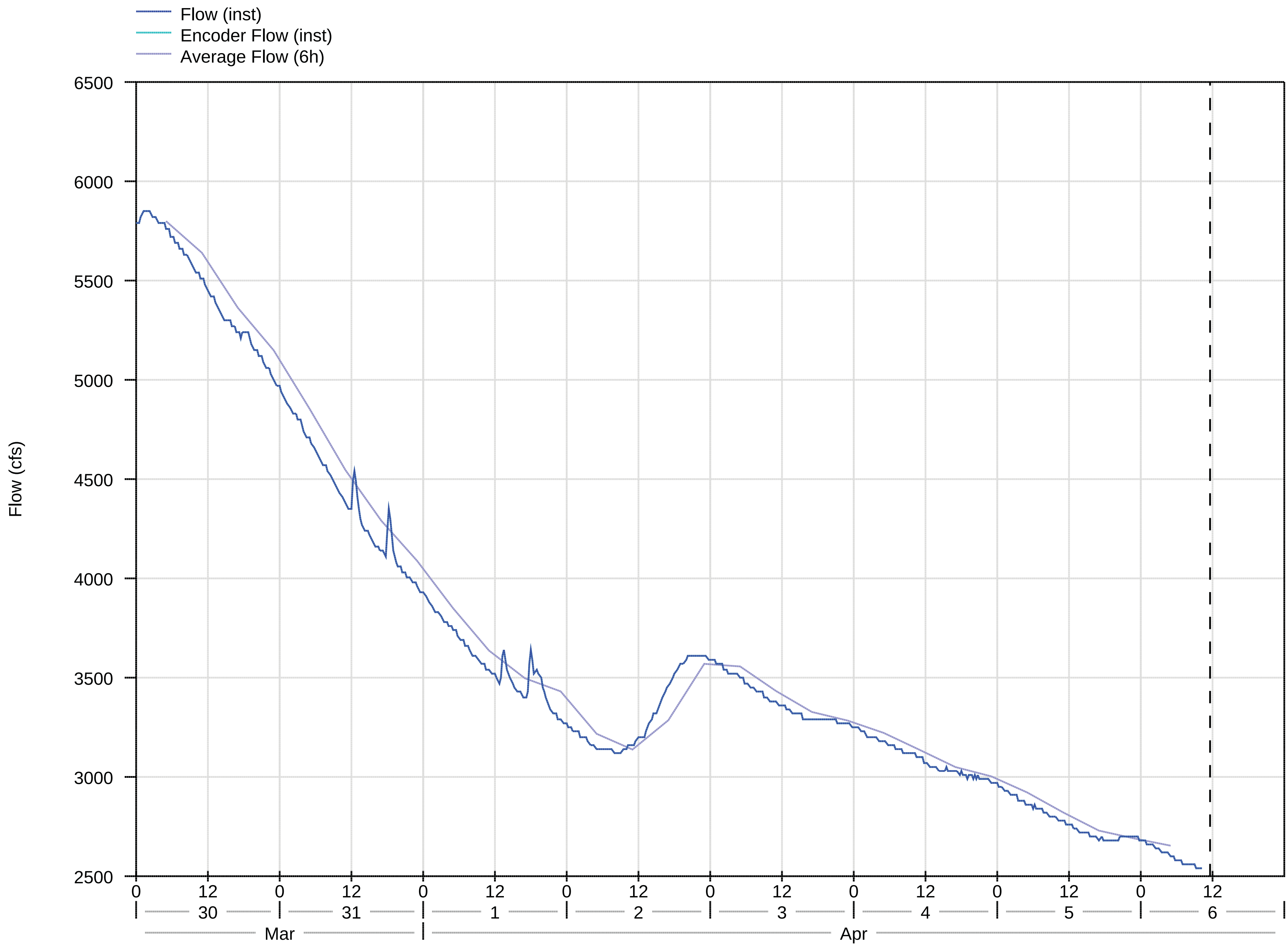
Team Member	Role	Telephone	Email
CH2M HILL/ BioAnalysts/ AECOM			
James Kapla	Project Manager / Fisheries Engineering	(425) 233-3239	James.Kapla@ch2m.com
Wally Hickerson	Principal-in-Charge	(509) 375-0683	Wally.Hickerson@ch2m.com
Juli Ewings	Administrative	(425) 233-3133	Julianne.Ewings@ch2m.com
Wally Bennett	Structural	(425) 233-3122	Wally.Bennett@ch2m.com
Ken Hansen	Civil/Hydraulics	(307) 789-0541	Ken.Hansen@ch2m.com
Bob Gatton	Fisheries Engineering	(425) 233-3508	Bob.Gatton@ch2m.com
Vince Rybel	Geotechnical	(541) 768-3564	Vince.Rybel@ch2m.com
Don Wagner	Electrical	(425) 233-3428	Donald.Wagner@ch2m.com
John Crowe	Mechanical	(530) 243-5886	John.Crowe@ch2m.com
Vincent Autier	Civil/Hydraulics	(425) 233-3352	Vincent.Autier@ch2m.com
Steve Bakken	I&C	(425) 233-3134	Steven.Bakken@ch2m.com
Craig Moore	Cost Estimating	(425) 233-3243	Craig.Moore@ch2m.com
Ken Weigum	CADD	(435) 233-3504	Ken.Weigum@ch2m.com
Al Giorgi	Fisheries biology	(425) 883-8295	Al.Giorgi@bioanalysts.net
Kevin Malone	Fisheries biology	(425) 753-0011	kmmalone@wavecable.com
Chick Sweeney	Hydraulics	(425) 881-7700	Chick.Sweeney@aecom.com
Isaac Willig	Hydraulics	(425) 881 - 7700	Isaac.Willig@aecom.com
Michael Rounds	Hydraulics	(503) 227-1042	Michael.Rounds@aecom.com

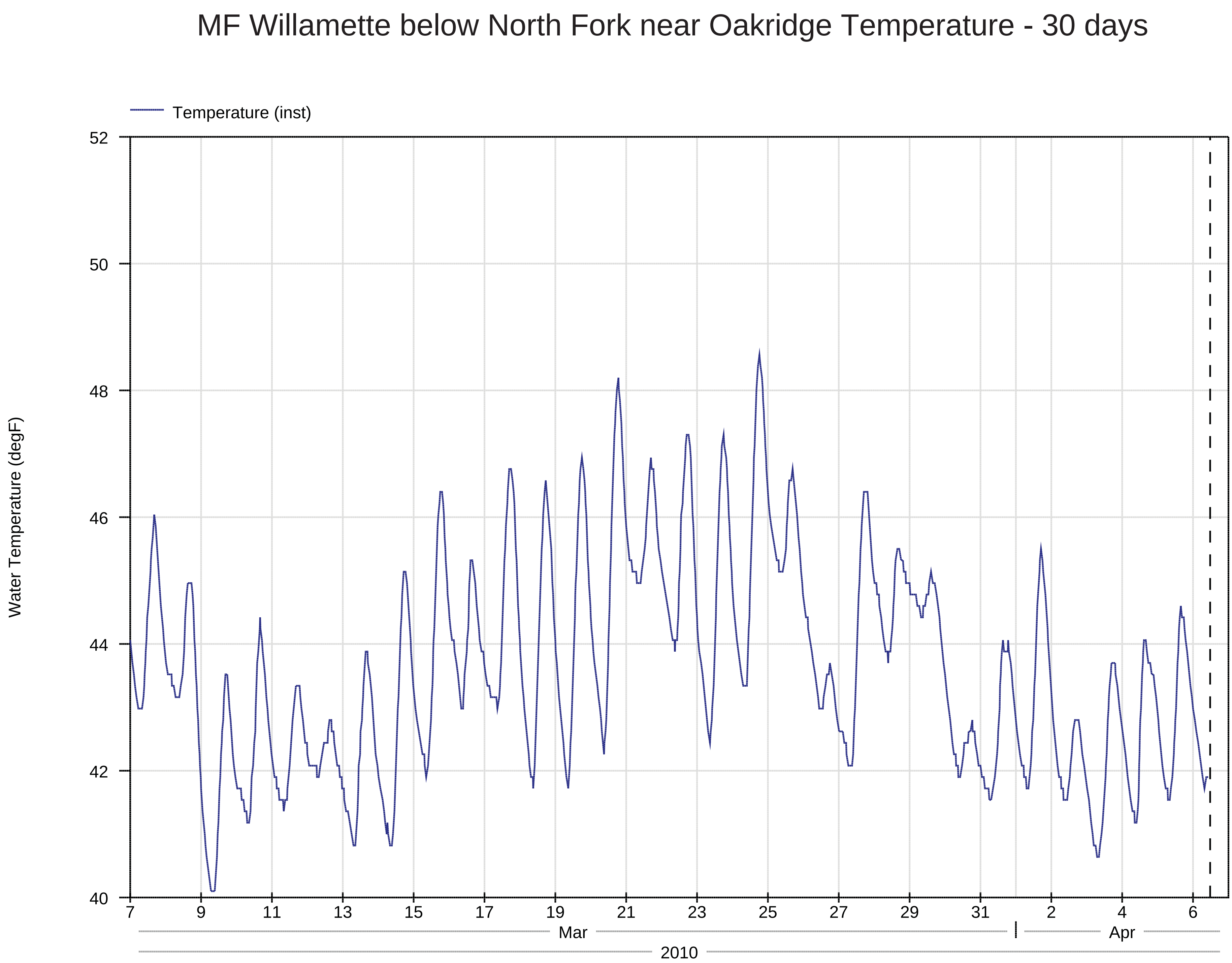
This page was intentionally left blank.

Middle Fork Willamette River below North Fork near Oakridge - 30 days



Middle Fork Willamette River below North Fork near Oakridge - 7 days





MF Willamette below North Fork near Oakridge Temperature - 30 days
Temperature (inst)
Water Temperature (degF)
52
50
48
46
44
42
40
7
9
11
13
15
17
19
21
23
25
27
29
31
2
4
6
Mar
Apr
2010

Review of Downstream Fish Passage Data – Middle Fork Willamette River, Oregon

LOP Downstream Passage PDT

April 05, 2010

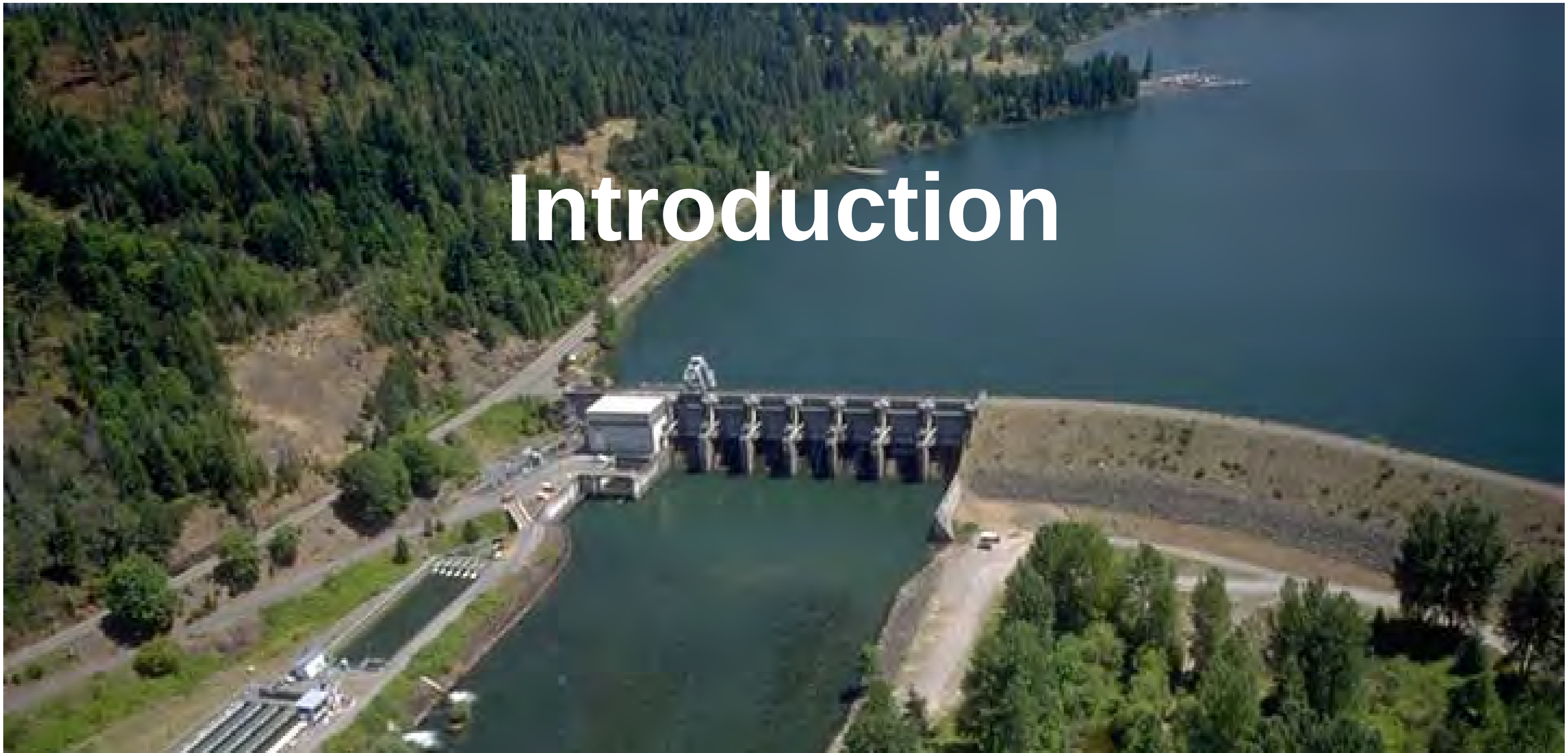
Greg Taylor – Willamette / Rogue Projects

US Army Corps of Engineers

BUILDING STRONG®

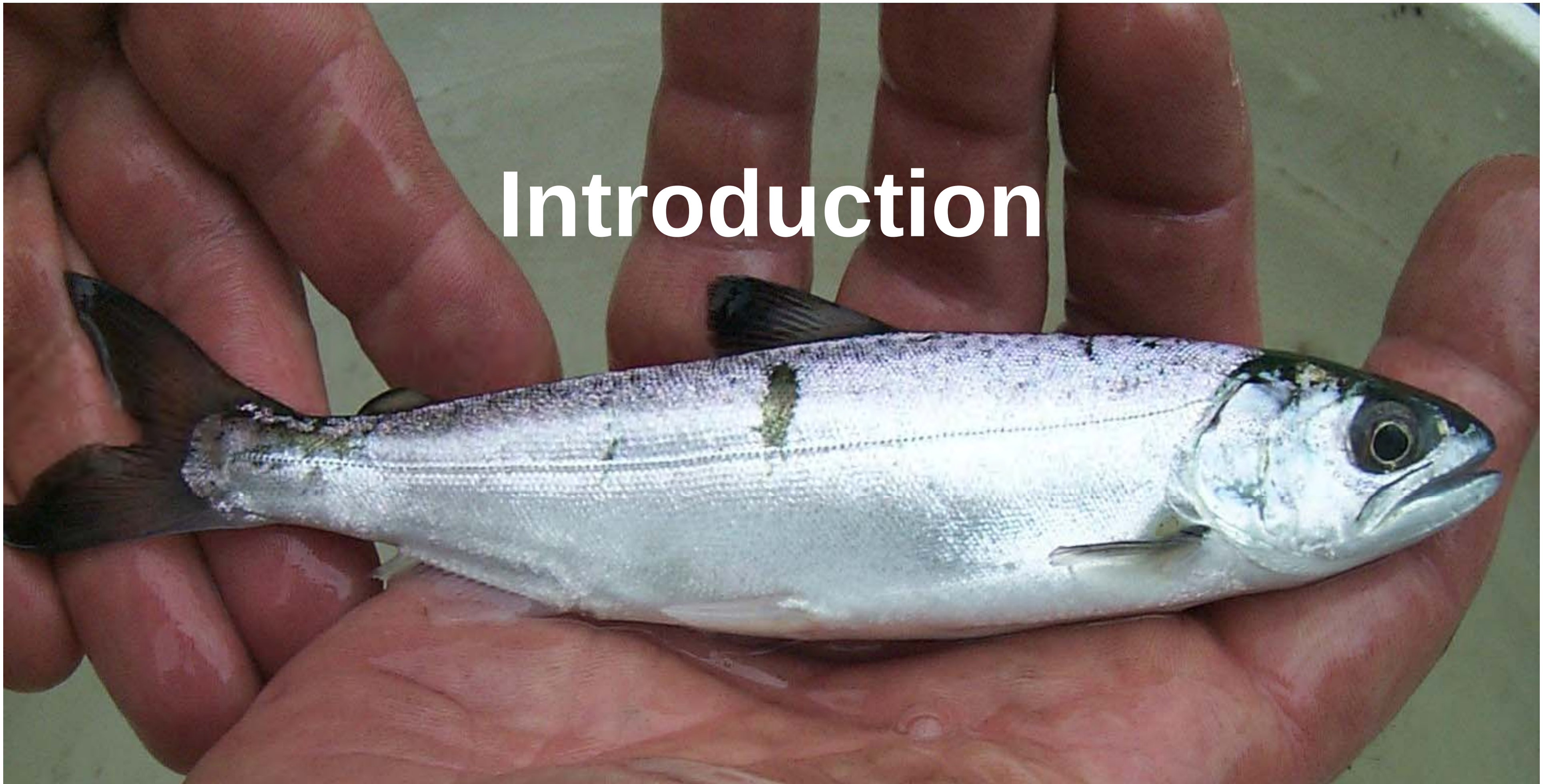

Introduction
• 80% of spring chinook salmon returning to the Middle Fork Willamette subbasin spawned above Dexter, Lookout Point, Hills Creek and Fall Creek dams.
• Following dam construction in the mid 1950’s natural production of spring chinook has been confined to the habitat remaining above and below Fall Creek Dam and below Dexter dam.
OSU Archives

Introduction



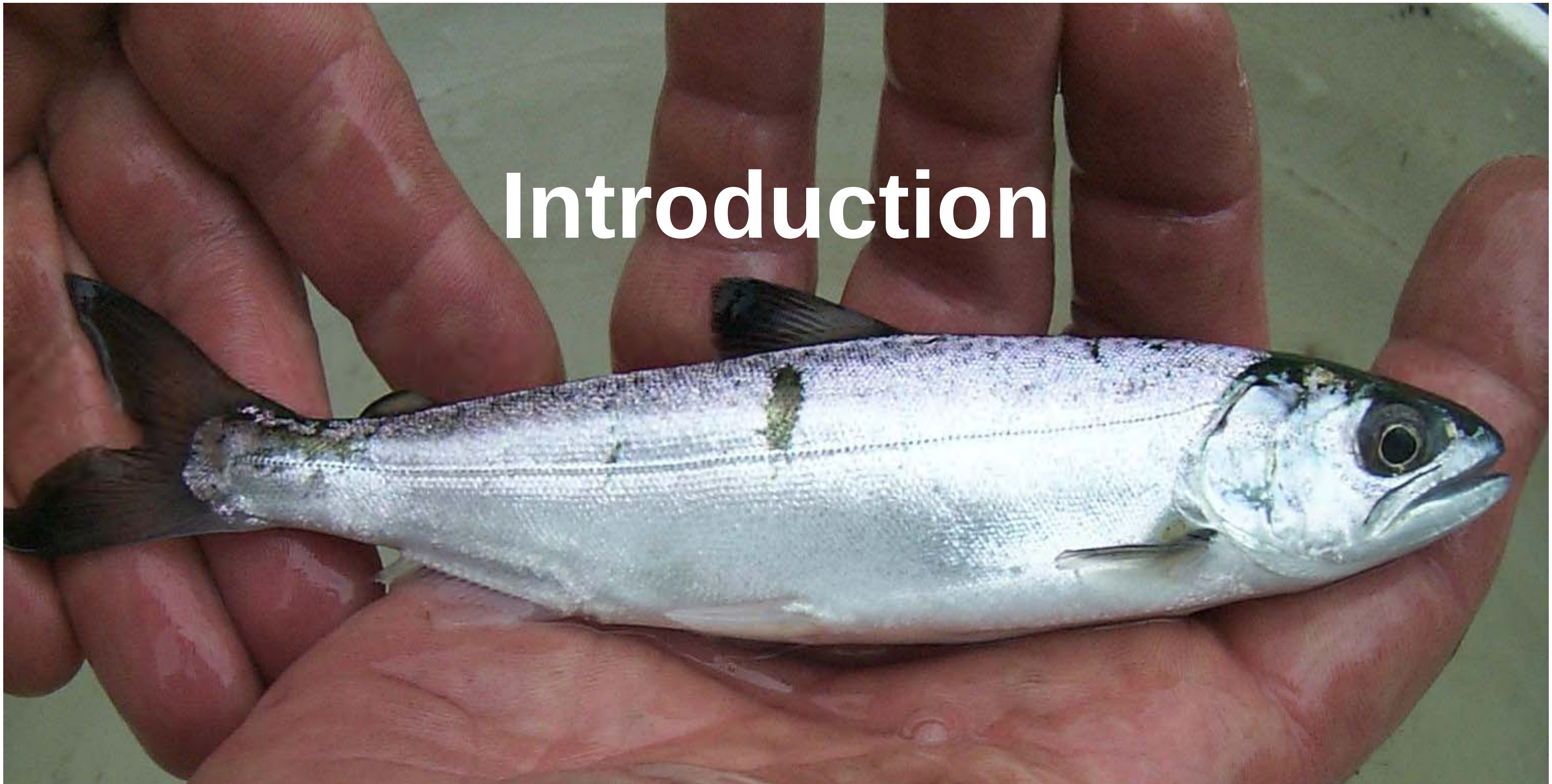
- Early surveys following construction of Dexter Dam documented spawning, but did not document successful hatching and rearing.
- Subsequent investigations of egg survival documented 100 percent or nearly 100 percent loss of incubating eggs.
- Surviving spring chinook fry emerge pre-maturely because of warm water discharges from Dexter and Lookout Point dams in the fall and winter
- Sampling below Dexter has produced an extremely small number of naturally produced juvenile chinook.
- Little or no natural production has contributed to returns to the Middle Fork Willamette subbasin

Introduction



- In 1993, ODFW began releasing marked adult spring chinook above Cougar and Hills Creek dams.
- Intended to provide nutrient transfer from the ocean to freshwater and juvenile fish to serve as a prey base for native resident fish (bull trout) and wildlife.
- Supplementing natural production of spring chinook was not one of the original goals of these releases and most biologists believed that juvenile fish would not pass successfully downstream through the dams

Introduction



•Field observations from 1994-97 indicated that some juvenile fish were passing downstream successfully. Monitoring of downstream passage at Cougar Dam on the South Fork McKenzie indicated passage mortality of 7 and 32 percent for turbine and regulating outlet passage respectively (Taylor 2000).

•In 1998, ODFW began releasing outplants at an additional four locations in the McKenzie and Middle Fork subbasins. Objectives of these releases were the same, however, an additional objective of increasing natural production above dams and in under utilized historical habitat below dams was added.

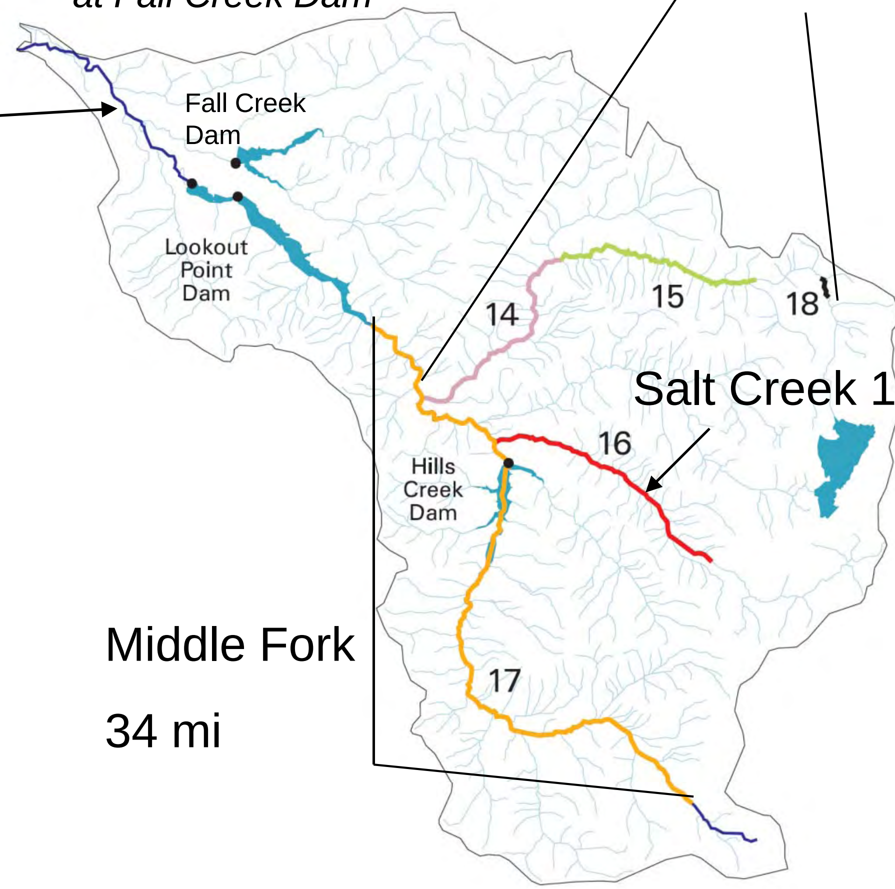
Middle Fork Willamette- Habitat blocked

Middle Fork below Dexter

17 mi

Passage provided at Fall Creek Dam

North Fork Middle Fork 35 mi



Salt Creek 15 mi

Middle Fork

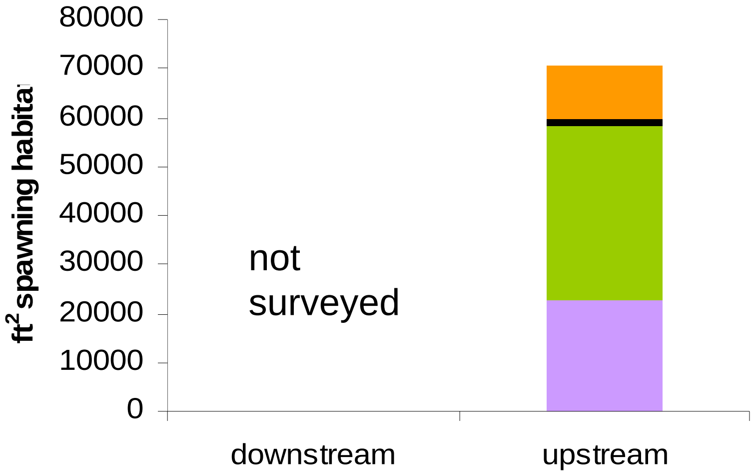
34 mi

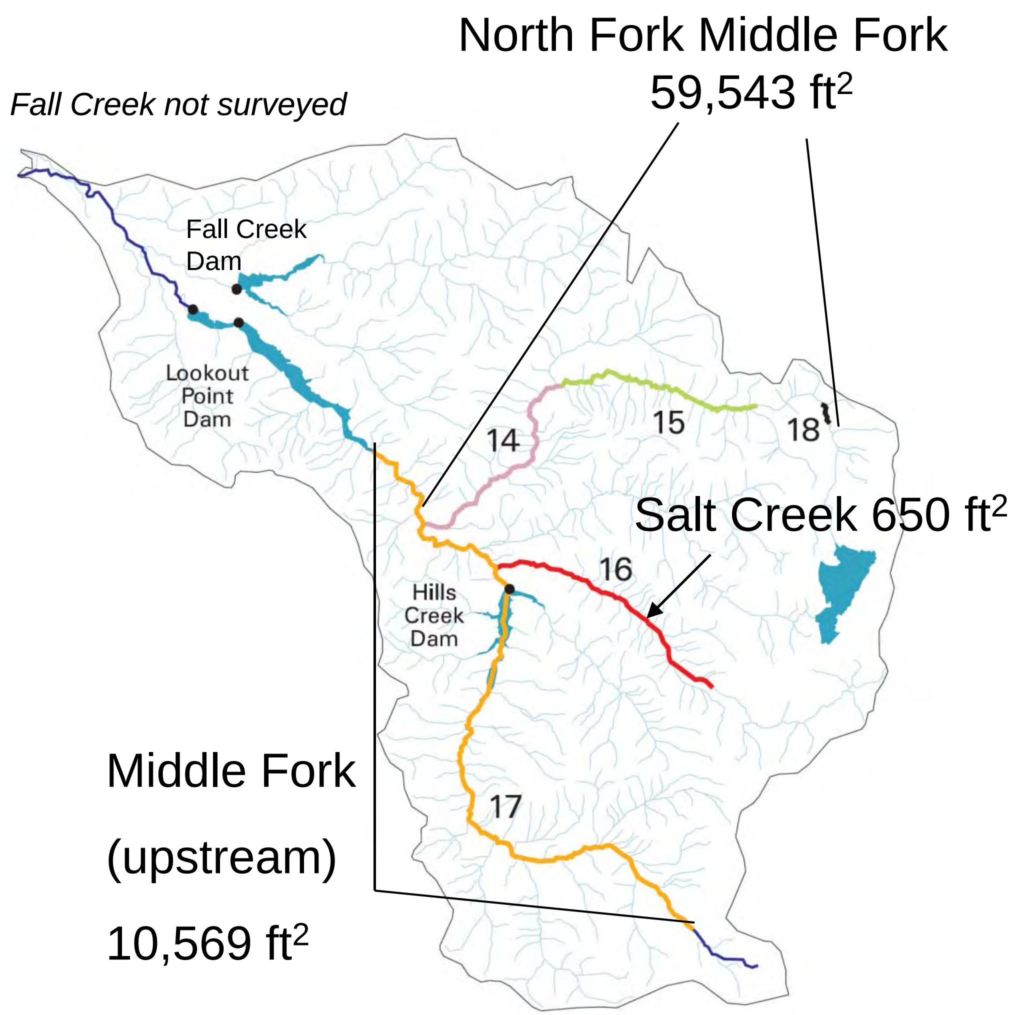
Dexter, Lookout Point, and Hills Creek Dams:

- 27 miles inundated
- 97 miles blocked
- Blocked nearly 100% of historical spawning habitat

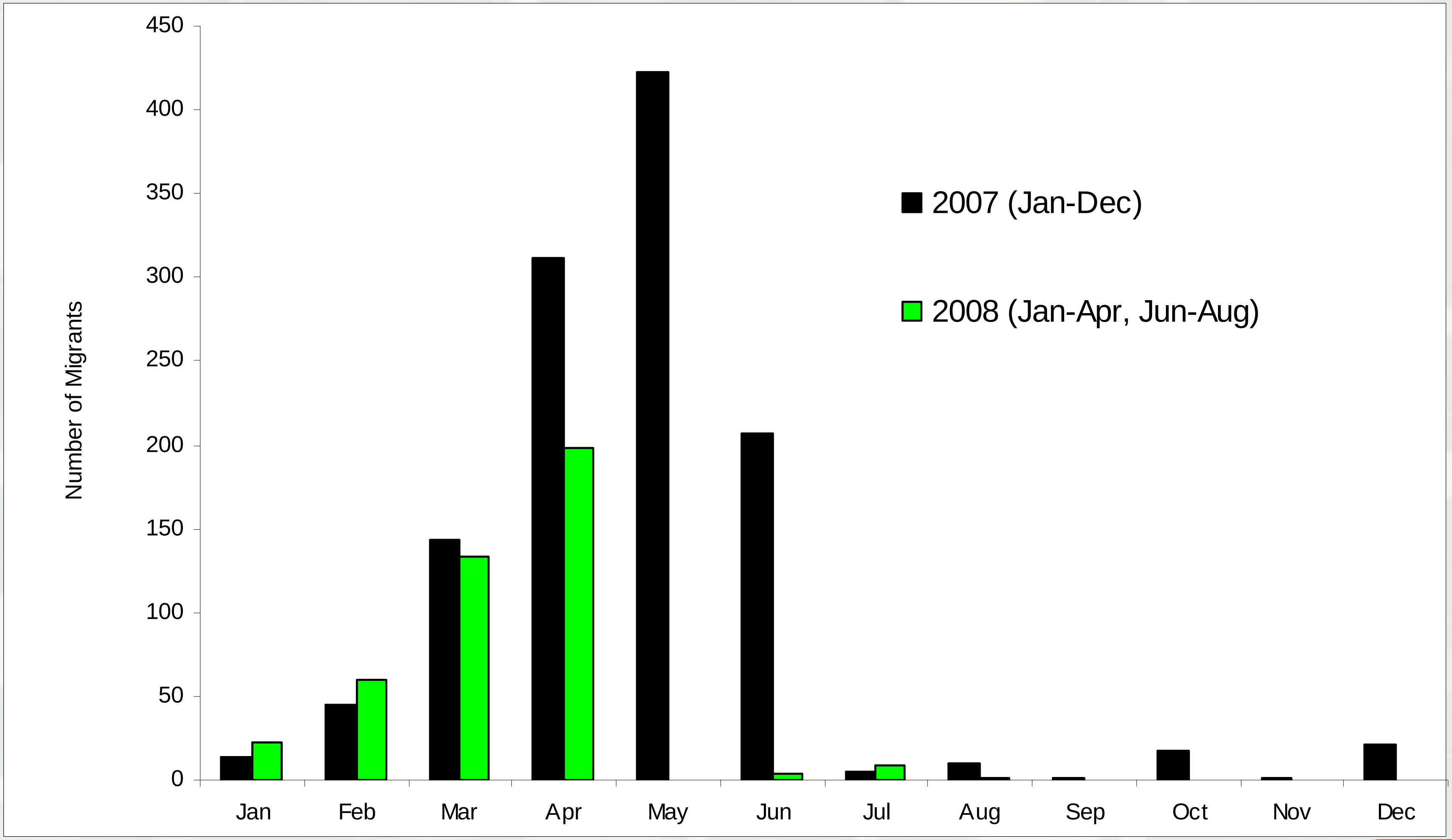
Significant downstream water temperature issues

Middle Fork Willamette- Spawning Habitat





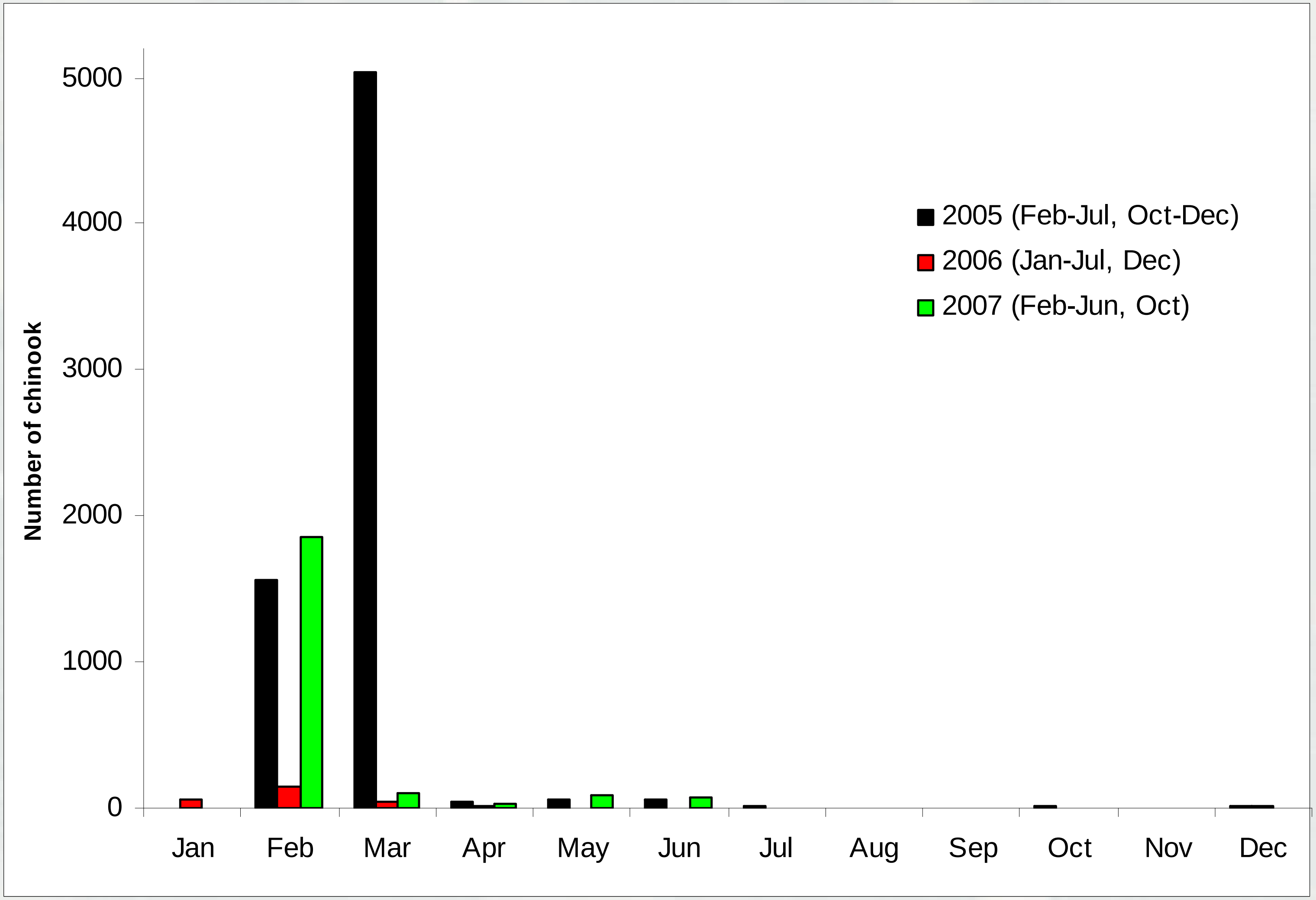
Juvenile Migration Timing - NFMFW



BUILDING STRONG®

Juvenile Migration Timing

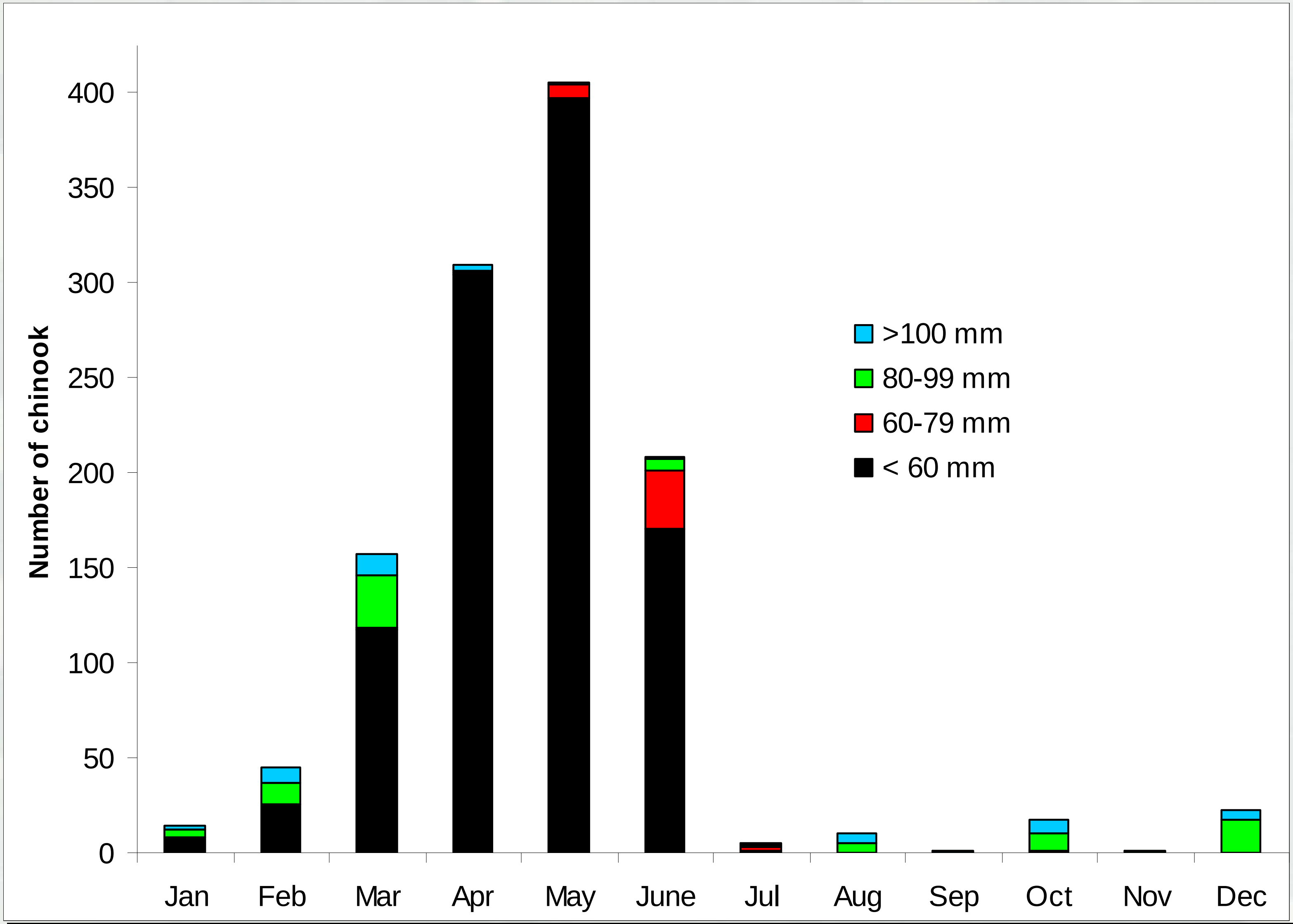
Fall Creek 2005-07



BUILDING STRONG®

Size v Time

NFMFW 2007



BUILDING STRONG®

TRAPPING EFFORT

Table 1. Trapping effort of 2.44 m rotary screw located 200 meters downstream of Lookout Point Dam, Lane County, OR, 2007-2010.

Year	Days Operating
2007	96
2008	304
2009*	85
2010*	90

*fished two traps simultaneously (5 m apart); second trap operational on 3 November 2009).

Table 2. Trapping effort of 2.44 m rotary screw(s) located 200 meters downstream of Lookout Point Dam, Lane County, OR, 1 Nov 2007- 30 Feb 2010.

Year range	% of time operating
1 Nov 2007 - 30 Feb 2008	64
1 Nov 2008 - 30 Feb 2009	100
1 Nov 2009 - 30 Feb 2010	98*

*fished two traps simultaneously (5 m apart); second trap operational on 3 November 2009).

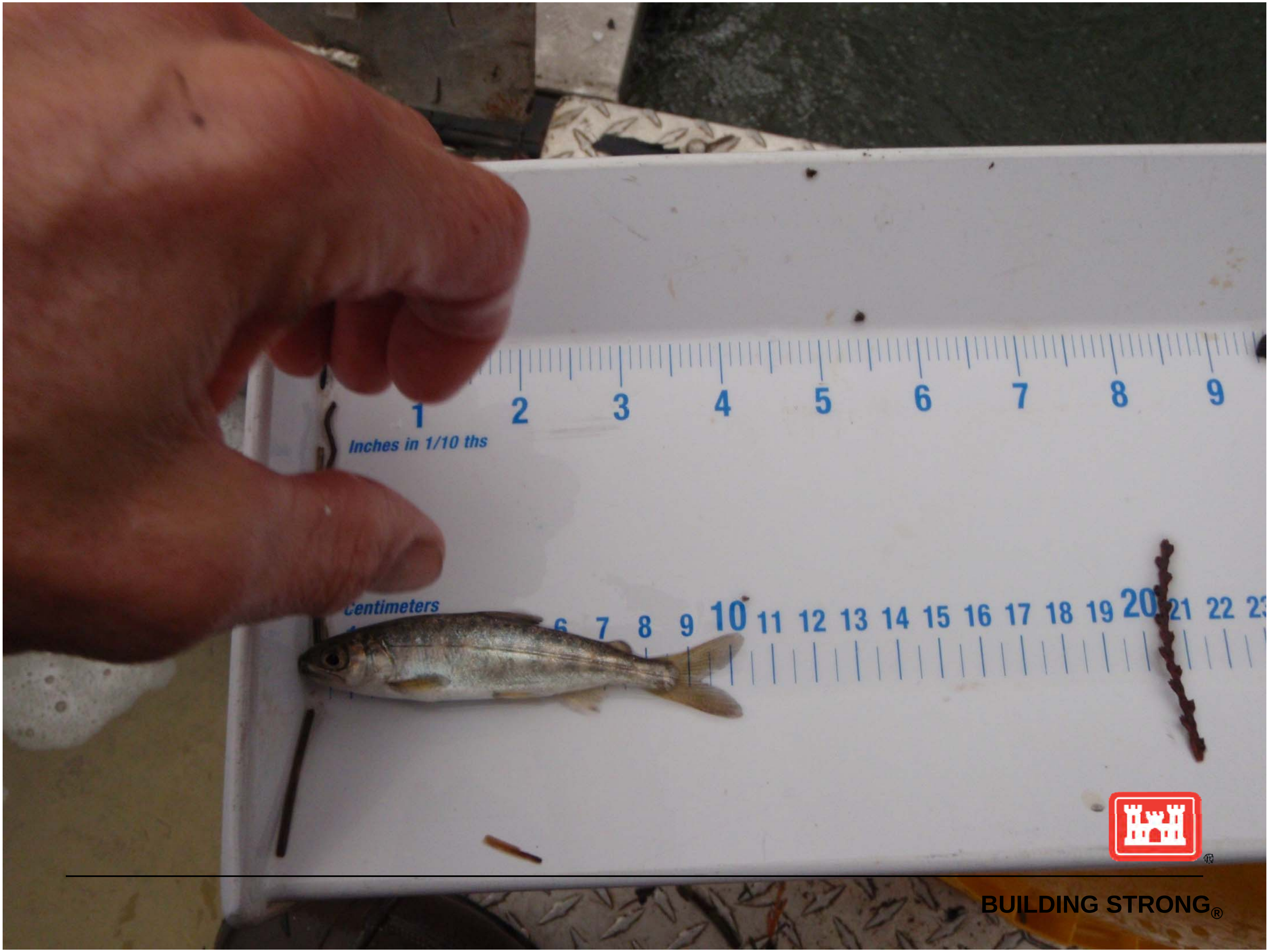
Species Composition - LOP

Table 3. Species Composition of 8 ft. rotary screw traps located 200 meters downstream of Lookout Point Dam, Lane County, OR, 2007-2010.

Scientific Name	Common Name	2007-2008	2008-2009	2009-2010*
Ameiurus sp	Bullhead	0	0	1
Catostomus macrocheilus	Largescale sucker	11	1	5
Cottus sp.	Sculpin	13	8	16
Lepomis macrochirus	Bluegill	42	0	31
Micropterus salmoides	Largemouth bass	33	0	12
Oncorhyncus clarki	Cutthroat trout	0	1	0
Oncorhyncus mykiss	Rainbow trout	1	0	3
Oncorhyncus mykiss/ clarki	Cuttbow	0	0	1
Oncorhyncus tshawytscha	Chinook salmon	182	35	416
Oncorhyncus tshawytscha	Chinook salmon (hatchery)	43	0	1320
Pomoxis annularis	White crappie	13528	44	181
Pomoxis nigromaculatus	Black Crappie	0	0	1
Ptychocheilus oregonensis	Northern pikeminnow	28	39	18
Richardsonius balteatus	Redside shiner	0	1	33
Sander vitreus	Walleye	9	1	0

*second trap installed on 3 November 2009

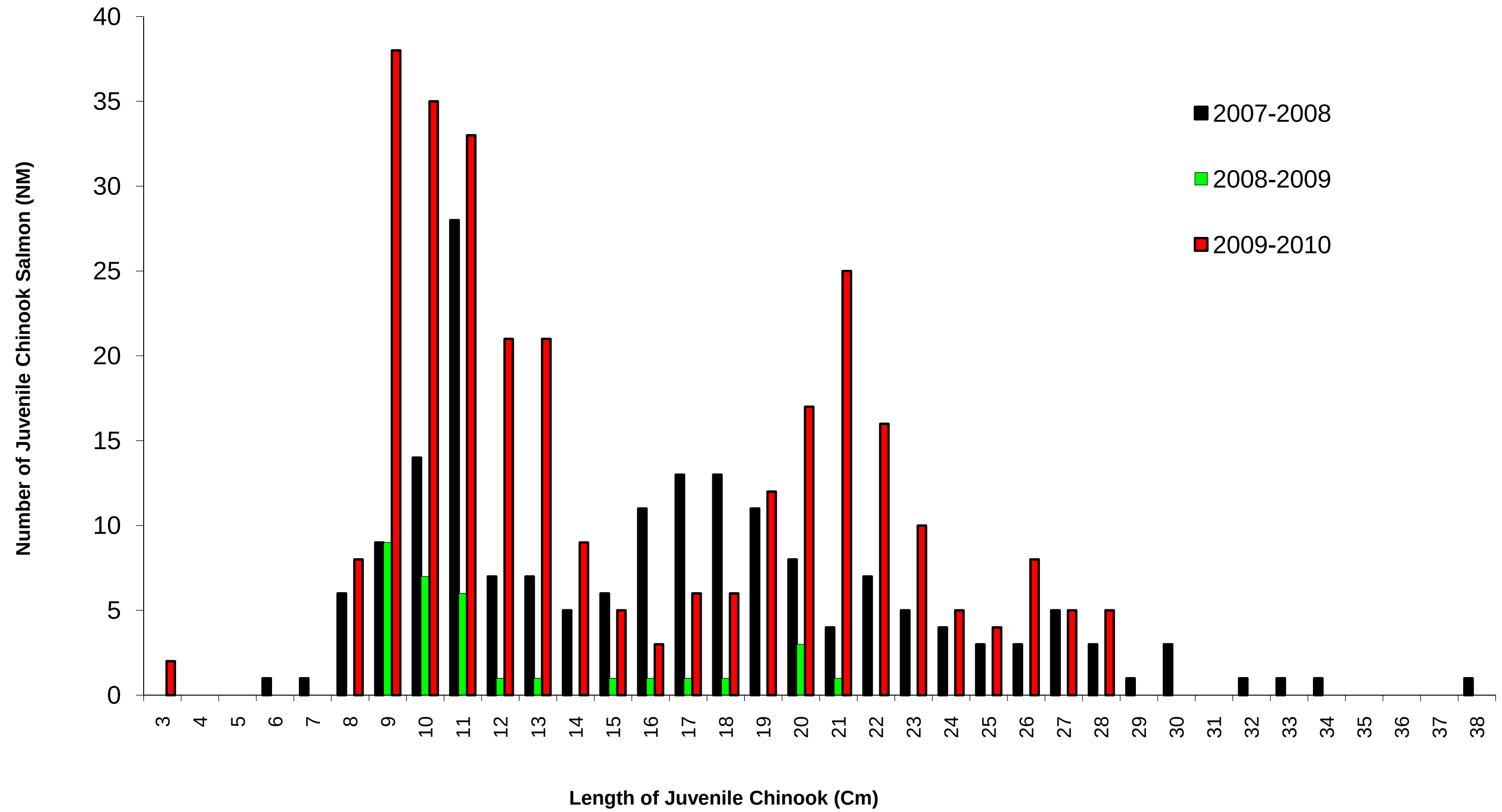
BUILDING STRONG®


1
2
3
4
5
6
7
8
9
Inches in 1/10 ths
Centimeters
6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22
BUILDING STRONG®

BUILDING STRONG®

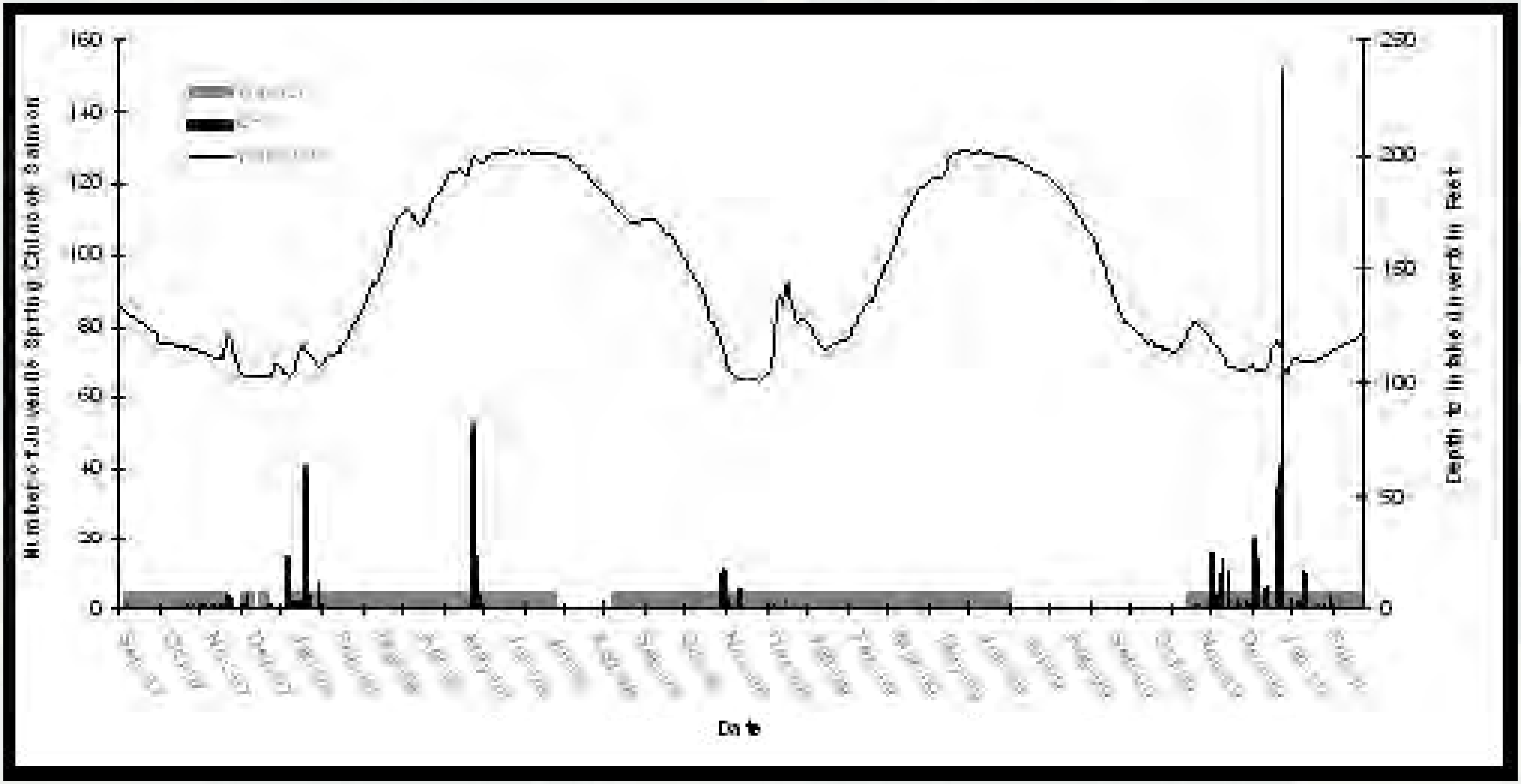
Lookout Point

Length Frequency Histogram



BUILDING STRONG®

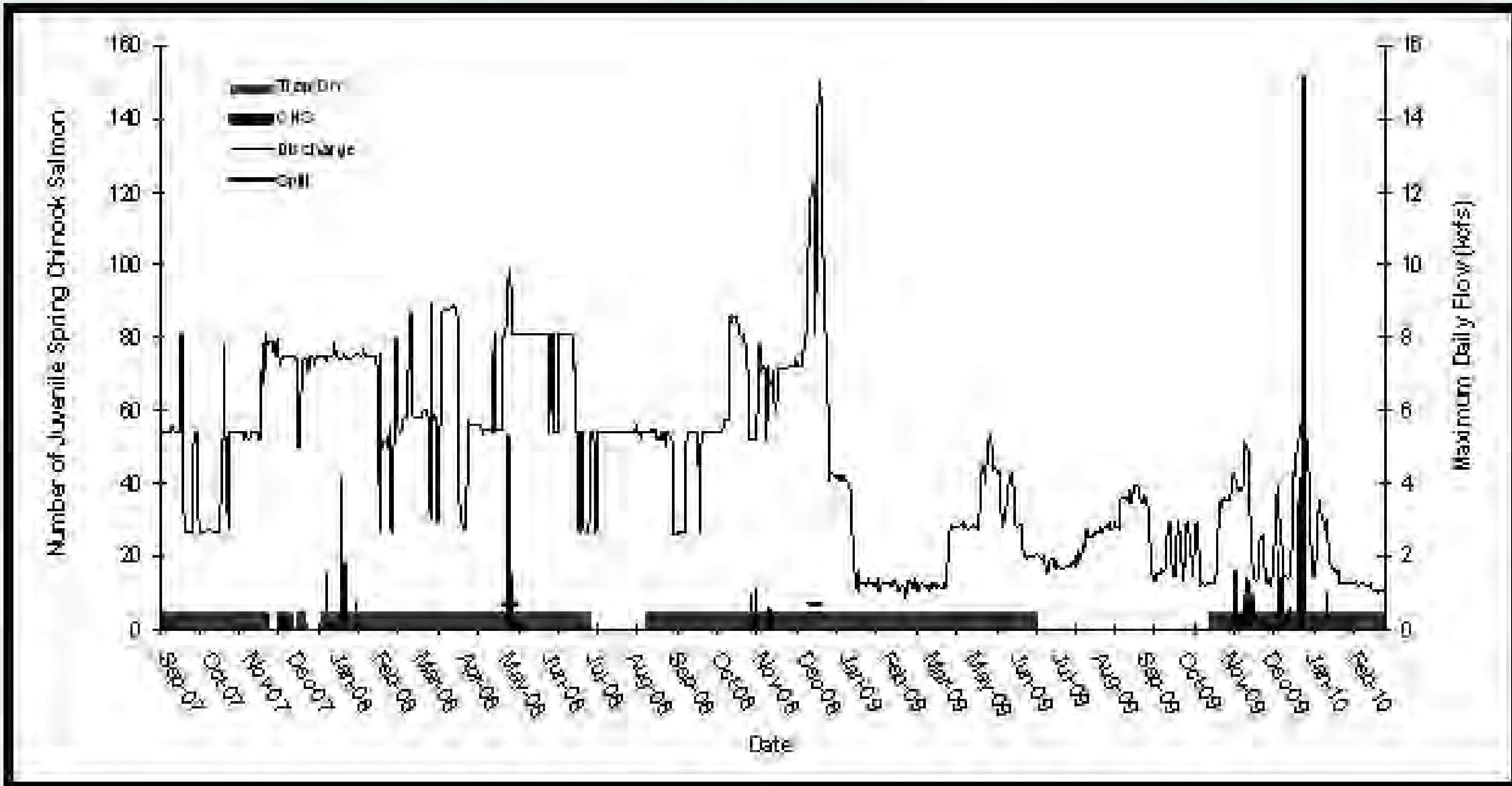
Lookout Point
Migration versus Depth to Intake



BUILDING STRONG®

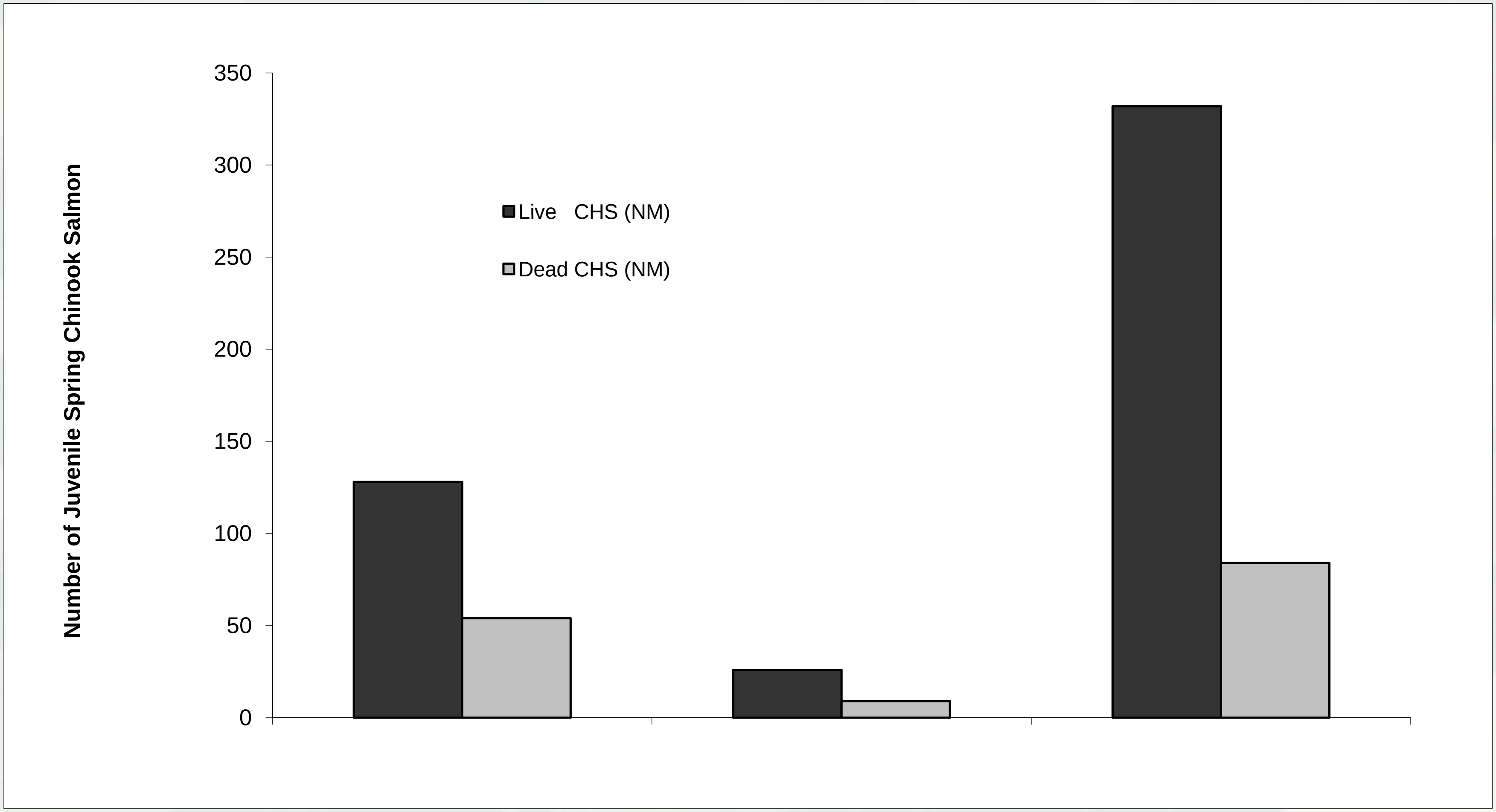
Lookout Point

Migration Timing v Discharge



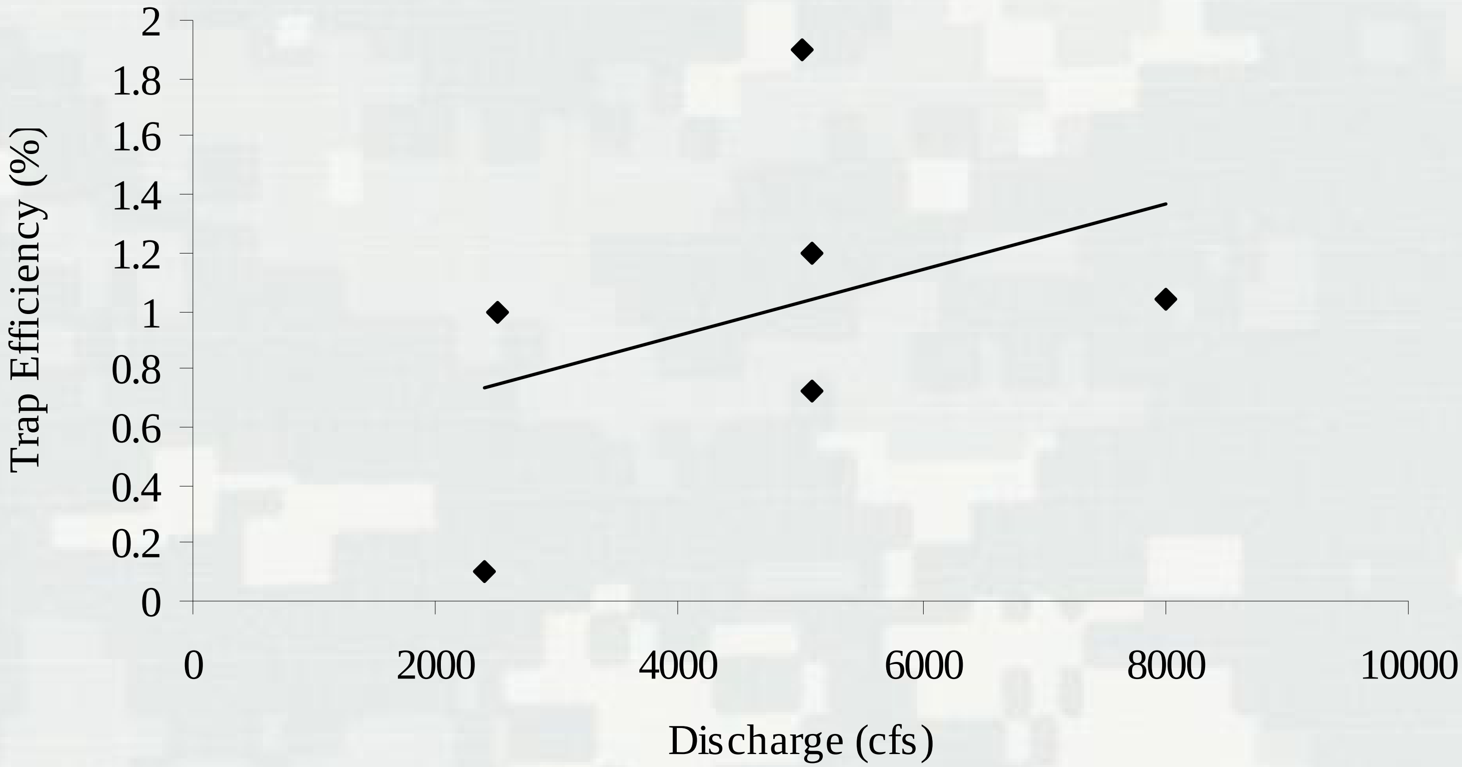
BUILDING STRONG®

Mortality



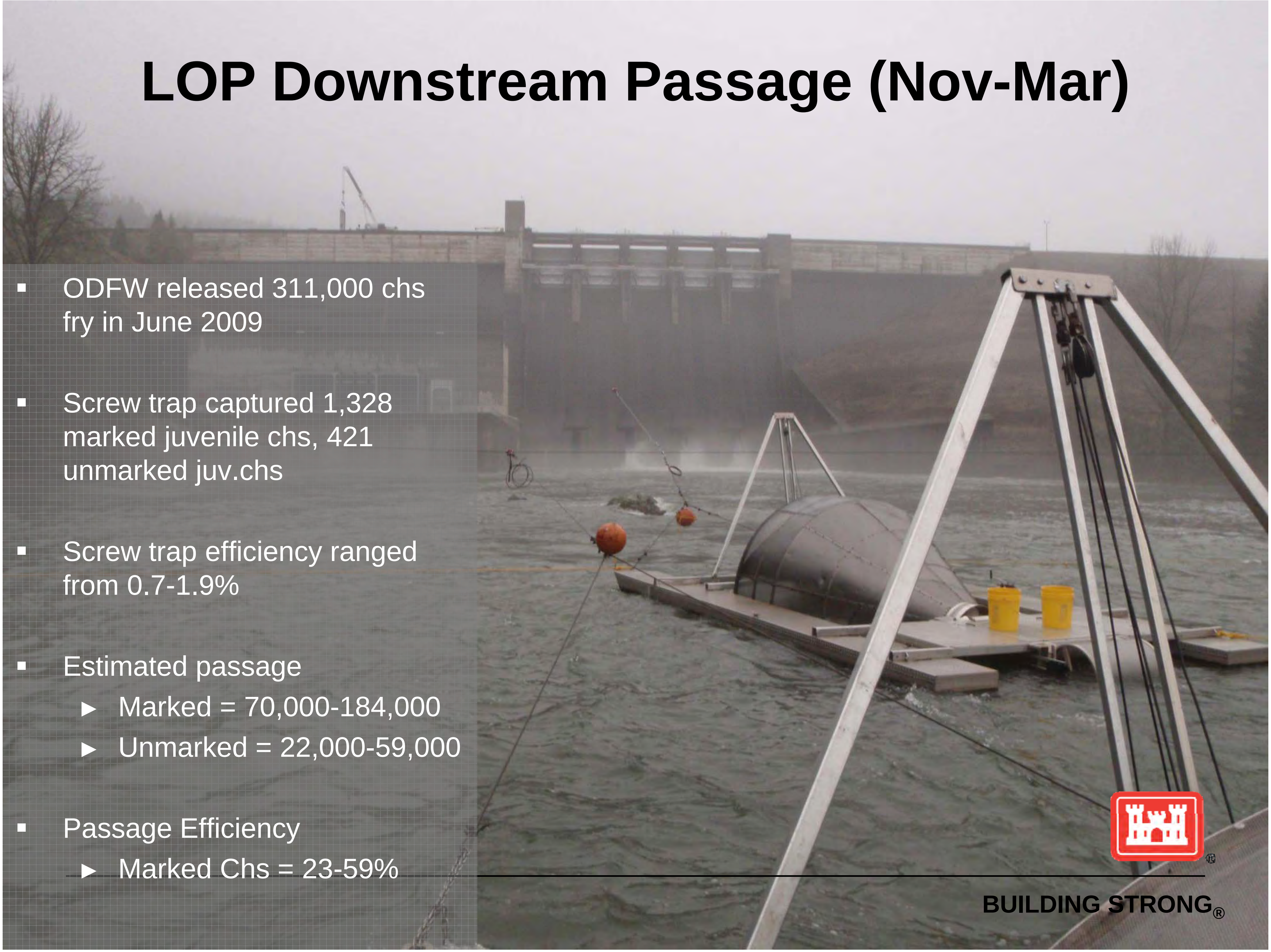
BUILDING STRONG®

Trap Efficiency



BUILDING STRONG®

LOP Downstream Passage (Nov-Mar)



- ODFW released 311,000 chs fry in June 2009
- Screw trap captured 1,328 marked juvenile chs, 421 unmarked juv.chs
- Screw trap efficiency ranged from 0.7-1.9%
- Estimated passage
  - Marked = 70,000-184,000
  - Unmarked = 22,000-59,000
- Passage Efficiency
  - Marked Chs = 23-59%

BUILDING STRONG®

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 8-April-2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James (via phone)
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☒ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Dorothy
☐ Bardy, David		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☐ Spear, Daniel

ODFW

☐ Friesen, Tom

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☐ Schwabe, Lawrence

Meeting Agenda:

The team reviewed the following list of data needs:

1) USACE Cougar Downstream Collection Alternatives Report, including evaluation criteria
2) USACE Willamette COP Report
3) Middle Fork Hydrology Report
4) Current draft of Willamette Design Requirements Report

5) Any available topographic/bathymetric mapping including original reservoir civil design drawings
6) Real estate/property ownership data
7) Aerial photography
8) Lookout Point reservoir ramp rates (hourly and daily if available)
9) Greg Taylor's summary PowerPoint presentation
10) Species of concern and migration timing by life stage
11) Any others

Meeting Summary:

The following assignments were made for the provision of project data. Where noted, the information has been provided:

1) 10 Percent USACE Cougar Downstream Collection Alternatives Report, including evaluation criteria (Roy)
2) USACE Willamette COP Report (AECOM; completed 8-April)
3) Middle Fork Hydrology Report (Burton?)
4) Current draft of Willamette Design Requirements Report (AECOM; completed 8-April)
5) Any available topographic/bathymetric mapping including original reservoir civil design drawings (Askelson)
6) Real estate/property ownership data (Askelson)
7) Aerial photography (Askelson)
8) Lookout Point reservoir ramp rates, hourly and daily if available (Scullion?).
9) Greg Taylor's summary PowerPoint presentation (Taylor; completed 8-April)
10) Species of concern and migration timing by life stage (Griffith)
11) 2008 Willamette BiOP (AECOM)

Decisions Made:
• Regular Team Coordination Meetings will be held in the Summit Room and via conference call every other Thursday at 09:00 AM, starting Thursday 8 April. • A Sharepoint project site has been created at the following location for non-USACE personnel:https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx • USACE personnel can access the site at the following location: \\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir • LiDAR data exists for the reservoir but it has not yet been digitized. A request to digitize data will be made once the site locations are better defined. •

Action Items:
• Schedule Checkpoint Meeting No. 1 (Kapla). • Provide historical photos of Westfir area (Kapla; completed 8-April) • Provide Scope Clarification Memo (Kapla, Sweeney, Giorgi) • Provide Quality Control Plan (Kapla)

Previous Unaddressed Action Items:
• The project schedule will be adjusted based on the 5-April NTP date and additional input from USACE and the Consultant Team (Askelson and Kapla).

Parking Lot:
• The intent of the project is to provide the most effective fish passage facility at reasonable cost; however, these parameters are not well defined. • The BiOP and scope of work requires that a prototype facility be identified for implementation; however, the alternatives evaluation should ideally consider full-scale production facilities first, with the ability to prototype as a secondary issue. • A fish passage efficiency goal for the facility has not yet been identified. For example, does the facility have to operate year-round or is a behavioral (vs. a positive) exclusion/collection system acceptable?

Look Ahead:
Team Coordination Meeting on 22-April.

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 22-April-2010

Attendees:

USACE
☒ Budai, Christine
☒ Griffith, David
☐ Fortuny, Kristina
☐ Sedey, Jeffrey A
☐ Langeslay, Mike
☐ Bardy, David
☐ Roy, Liza
☐ Brackin, Joseph
☒ Scullion, Mary Karen
☐ Naidu, Anil
☐ Smith, Gregory
☒ Askelson, Sean
☐ Calnon, James
☒ Burton, James
☒ Taylor, Gregory
☒ McCrae, Pat

CH2M/AECOM/BioA
☒ Kapla, James
☐ Rounds, Michael
☐ Gatton, Bob
☒ Sweeney, Chick
☐ Willig, Isaac
☒ Malone, Kevin
☒ Giorgi, Al
☒ Autier, Vincent

BPA
☒ Spear, Daniel

ODFW
☐ Friesen, Tom

NMFS
☐ Jundt, Melissa
☐ Burchfield, Stephanie

FWS
☐ Gray, Ann

Confederated Tribes of the Grand Ronde
☐ Humphreys, Brandy
☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the meeting was:

1) Discuss and finalize meeting summaries from the 5-April Site Visit/Kickoff Meeting and the 8-April Team Coordination Meeting.
2) Review select items from Scope Clarification Memo.
3) Discuss preliminary alternatives currently being developed for the 10 Percent AR.
4) Review outstanding action items and data needs.
5) Review schedule and pick date for Checkpoint Meeting No.1

Meeting Summary:

The team was reminded to visit the Sharepoint site to review and provide comments on the meeting summaries from 5-April and 8-April.

The team reviewed the scope clarification memorandum dated 20-April and generally agreed with the proposed approaches as described in the memorandum. Means for providing adult upstream passage and for enumerating, sorting and evaluating juveniles will be considered for each alternative. Full-scale production facilities (along with the ability to prototype) will also be considered.

The A/E team conducted a preliminary internal brainstorming meeting on 16-April. Three primary technologies and seven site locations were identified. The technogies include the following:

- Gulper (Floating surface collector with exclusion nets)
- River diversion with fixed screens (Both fixed- and adjustable-crest diversions; both in-river and off-channel screens)
- Trap (including screw traps, Merwin traps and dipper traps)

The site locations include the following:

- Low Reservoir (The PDT decided to remove this site from further consideration; see below)
- Upper Reservoir (Head of reservoir at low pool)
- Black Canyon Campground (Head of reservoir at high pool)
- Lower North Fork (Westfir)
- Upper North Fork
- Middle Fork Island
- Upper Middle Fork

The team also discussed fish passage efficiency goals and behavioral vs. positive exclusion, i.e. EWEB Walterville and Leaburg. See Parking Lot below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look ahead schedule.

Decisions Made:
• Agendas for the Team Coordination Meetings will be made available to the PDT at least 24 hours prior to the meeting if possible. • A downstream collection system (such as a gulper) located in close proximity to Lookout Point Dam (i.e. the "Low Reservoir" site location) is beyond the scope of this project. The project will consider facilities only as far downstream as the head of reservoir at low pool ("Upper Reservoir" site location). • CFD and/or physical modeling of the river system was discussed as a means to characterize debris loading and to facilitate the siting of downstream collection facilities. However, this activity would likely not take place prior to the 30 percent design phase (DDR phase). • LiDAR data exists for the reservoir but it has not yet been digitized. A request to digitize data will be made once the site locations are better defined.

Action Items:
• Provide Greg Taylor and Dave Griffith a summary including fish species of concern and migration timing to obtain their input. Characterize fish abundance for facility sizing purposes (Malone). • Confirm that recreation and utility access are part of the ranking criteria (Kapla). • Provide 1997 Middle Fork Willamette River Fisheries Reconnaissance and Restoration Report (Griff). • Request LiDAR data reduction for six site locations (Autier).

Previous Unaddressed Action Items:
• The project schedule will be adjusted based on the 5-April NTP date and additional input from USACE and the Consultant Team (Askelson and Kapla) • Schedule Checkpoint Meeting No. 1 (Kapla; completed 23-May) • Provide Quality Control Plan (Kapla) • Provide any available topographic/bathymetric mapping including original reservoir civil design drawings (Askelson) • Provide real estate/property ownership data (Askelson) • Provide aerial photography (Askelson)

Parking Lot:
• The intent of the project is to provide the most effective fish passage facility at reasonable cost; however, these parameters are not well defined. • The BiOP and scope of work requires that a prototype facility be identified for implementation; however, the alternatives evaluation should ideally consider full-scale production facilities first, with the ability to prototype as a secondary issue. • A fish passage efficiency goal for the facility has not yet been identified. For example, does the facility have to operate year-round or is a behavioral (vs. a positive) exclusion/collection system acceptable?

Look Ahead:
Team Coordination Meeting on 6-May via conference call. Team Coordination Meeting on 20-May via conference call. Checkpoint meeting No. 1 on 26-May at USACE Portland District offices.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 6-May-2010

Attendees:

USACE

☒ Budai, Christine	☐ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☒ Fortuny, Kristina	☒ Scullion, Mary Karen	☒ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☒ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom

NMFS

☒ Jundt, Melissa ☒ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting was as follows:

1) Discuss Preliminary NMFS Proposal Concerning Schedule
2) Discuss USACE Sharepoint Site
3) Review Data Needs and Action Items
4) Review Evaluation Criteria and Matrix
5) Review Project Schedule

Meeting Summary:

NMFS Schedule Proposal. As of today, there is no change in BiOP Willamette Project Implementation Schedule. A go/no-go decision regarding the feasibility of a prototype collection facility at Lookout Point will be made before the end of 2010, consistent with the current project schedule.

USACE Sharepoint Site. The team was reminded to visit and utilize the USACE Sharepoint site. It is anticipated that the site will provide an effective way to share information and to collaborate with other team members. A large amount of information has already been posted. A link to USACE Sharepoint site is provided below:

https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:

\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

It was also brought to the team's attention that the "Alert me" function of the Sharepoint site is not working for internal (USACE) users; however this function is currently working for external users. The function automatically sends the user an email if new documents have been posted or edited. If you do not have access to the USACE Sharepoint site, please contact Sean and he can request that you be added to the user list.

Data Needs. Current data needs are listed in the action items below.

Evaluation Criteria and Matrix. The team discussed the evaluation matrix to be used at Checkpoint Meeting No. 1 on 26-May. The evaluation matrix will be based upon the example matrix for Cougar to ensure consistency, but will include minor changes specific to Lookout Point. Examples include the addition of criteria related to the effects of the conceptual facility on upstream fish passage for adults (all species), and the removal of criteria related to temperature and total dissolved gas (TDG). Construction access and utilities will also have to be considered.

Project Schedule. The look-ahead project schedule is summarized below. The 10 Percent AR will be submittal on 10-May and review comments are due on 20-May.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• Meeting summaries will be posted directly to the Sharepoint site. The summaries will also be distributed via email until the issue with the "Alert Me" function has been resolved for internal (USACE) users. • The evaluation matrix will be based upon the example matrix for Cougar to ensure consistency, but will include minor changes specific to Lookout Point.

Action Items:
• Provide fish migration timing and hydrologic data to Stephanie (Kapla; completed 6-May) • Locate and distribute daily biological data from Fisheries Science Review (Taylor) • Provide any available topographic/bathymetric mapping including original reservoir civil design drawings (Askelson; Completed 6-May)

Previous Unaddressed Action Items:
• Provide 1997 Middle Fork Willamette River Fisheries Reconnaissance and Restoration Report (Askelson; Completed 7-April). • Provide Quality Control Plan (Kapla)

Parking Lot:
• The intent of the project is to provide the most effective fish passage facility at reasonable cost; however, these parameters are not well defined. • A fish passage efficiency goal for the facility has not yet been identified. For example, does the facility have to operate year-round or is a behavioral (vs. a positive) exclusion/collection system acceptable?

Look Ahead:
10 Percent AR submittal on 10-May. 10 Percent AR review comments are due on 20-May. Team Coordination Meeting on 20-May via conference call. Checkpoint meeting No. 1 on 26-May at the USACE Portland District office.

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 20-May-2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☐ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom

NMFS

☐ Jundt, Melissa	☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☒ Humphreys, Brandy	☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting was as follows:

1) Discuss 10 Percent Alternatives Report
2) Review draft agenda for Checkpoint Meeting No. 1
3) Review draft evaluation matrix
4) Review project schedule and action items

Meeting Summary:

10 Percent Alternatives Report. The 10 Percent AR and specifically the Table of Contents present the proposed outline of the final report. The report identifies 22 comprehensive alternatives (site location + collection technology). Two site location alternatives on the Middle Fork River were not visited by the team but were included in the report for consideration. The collection technologies are organized by type: in-reservoir, in-tributary and mobile.

The report also includes proposed evaluation criteria to be used at the Checkpoint Meeting. Background information (Section 2) and design criteria (Section 3) will not be provided until the 30 Percent AR submittal; however, available information will be summarized in a meeting information package for use during the Checkpoint Meeting.

Checkpoint Meeting No. 1 Draft Agenda. The draft agenda for the Checkpoint Meeting was reviewed. The agenda includes a discussion of programmatic goals by the group in order to more effectively evaluate the alternatives.

It was noted that the term "Fish Collection Potential" is more appropriate for this study and should be used in lieu of "Fish Passage Efficiency." It may be desirable to define a range of fish collection potentials (both program goals and technological capabilities) to assist in evaluating the alternatives.

Reservoir rearing should be considered but only in the head-of-reservoir context. Full reservoir rearing, say in conjunction with an at-dam collection alternative, is beyond the scope of this study. In addition, the size of juvenile fish at Lookout Point is typically more temporal than spatial, indicating that it may not be possible to discern where rearing is taking place given the available data.

It is not the objective of this study to make a go/no-go decision regarding the feasibility of a head of reservoir collection facility at Lookout Point. The objective is to appropriately inform higher-level decision makers tasked with that responsibility. As such, the assumptions used for this study should be well-documented.

Discussion of the programmatic goals at the Checkpoint Meeting will be managed to allow adequate time for population of the evaluation matrix. A draft matrix will be completed by the A-E team to facilitiate this process.

Draft Evaluation Matrix. The team also discussed the evaluation matrix to be used at Checkpoint Meeting No. 1. The matrix is based upon the example matrix for Cougar to ensure consistency, but includes minor changes specific to Lookout Point.

Fish Collection Potential criteria has been added, including consideration of both survival probability and collection efficiency. Findings from the Design Requirements Report (90 percent draft) should also be referenced and utilized where possible.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• The term “Fish Collection Potential” is more appropriate for this study and should be used in lieu of “Fish Passage Efficiency.” • Reservoir rearing should be considered but only in the head-of-reservoir context. • It is not the objective of this study to make a go/no-go decision regarding the feasibility of a head of reservoir collection facility at Lookout Point. The objective is to appropriately inform higher-level decision makers tasked with that responsibility. • The evaluation matrix will be completed with draft ratings by the A-E team to facilitiate Checkpoint Meeting No. 1 discussions.

Action Items:
• Review 10 Percent AR report and provide comments via Dr. Checks (PDT team). • Review draft evaluation criteria and draft evaluation matrix (attached), and identify any recommended changes. Populate matrix with your ratings in preparation for the 26-May Checkpoint Meeting (PDT Team). • Provide supporting information package for Checkpoint Meeting No. 1 (Kapla, with A-E team).

Previous Unaddressed Action Items:
• None.

Parking Lot:
• The intent of the project is to provide the most effective fish passage facility at reasonable cost; however, these parameters are not well defined. • A fish passage efficiency goal for the facility has not yet been identified. For example, does the facility have to operate year-round or is a behavioral (vs. a positive) exclusion/collection system acceptable?

Look Ahead:
• 10 Percent AR review comments are due on 20-May. • Checkpoint meeting No. 1 on 26-May at the USACE Portland District office.

A link to USACE Sharepoint site is provided below:

https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:

\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

USACE Lookout Point – Head of Reservoir Collection Alternatives Study
19 May 2010

<u>Numerical Rating Description</u>
5 = Excellent
4 = Very Good
3 = Good
2 = Fair
1 = Poor

Table 5-2
Evaluation Matrix

Comprehensive Alternative			Biological Evaluation Criteria							Technical Evaluation Criteria			Economic Impacts and Other Criteria						
	Site Location	Technology	Fish ~~Passage Efficiency~~Collection Potential	Reservoir Conditions	Downstream Passage Conditions	Bypass Conditions	Effects on Other ESA Fish	Effects on Other Fish of Concern	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Operations and Maintenance (O&M)	Design/ Constructibility	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
1)	Upper Reservoir	In-Reservoir: Gulper/FSC																	
2)	Upper Reservoir	In-Reservoir: Gulper/FSC																	
3)	Upper Reservoir	Mobile: Merwin Trap																	
4)	Upper Reservoir	Mobile: Dipper Trap																	
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector																	
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector																	
7)	USFS Black Canyon Campground	Mobile: Screw Trap																	
8)	USFS Black Canyon Campground	Mobile: Scoop Trap																	
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector																	
10)	Lower North Fork (Westfir)	Mobile: Screw Trap																	
11)	Lower North Fork (Westfir)	Mobile: Scoop Trap																	
12)	Upper North Fork	In-Tributary: In-Channel Collector																	
13)	Upper North Fork	Mobile: Screw Trap																	
14)	Upper North Fork	Mobile: Scoop Trap																	
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector																	
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector																	
17)	Lower Middle Fork (Island)	Mobile: Screw Trap																	
18)	Lower Middle Fork (Island)	Mobile: Scoop Trap																	
19)	Upper Middle Fork (Island)	In-Tributary: In-Channel Collector																	
20)	Upper Middle Fork (Island)	In-Tributary: Off-Channel Collector																	
21)	Upper Middle Fork (Island)	Mobile: Screw Trap																	
22)	Upper Middle Fork (Island)	Mobile: Scoop Trap																	

Table 5-1

Evaluation Criteria Descriptions

Evaluation Criteria	Description
Biological Evaluation Criteria	
Fish ~~Passage Efficiency~~Collection Potential	This parameter includes the survival probability of juveniles en-route to the collector (S), and the collection efficiency of the collector (CE). The product of these yields an estimate of fish collection potential (FCP).
Reservoir Conditions	What are the reservoir conditions for fish (juveniles/adults) under the proposed alternative? Is exposure to the reservoir environment beneficial to the target species? Factors to be considered include temperature, predation, reservoir rearing, shoreline complexity, flow vectors, etc. It should be noted that reservoir conditions are not the same for all alternatives as the in-tributary alternatives do not expose juveniles to reservoir.
Downstream Passage Conditions	Does the proposed collector technology and site location provide the potential to collect all life stages of downstream migrants, or will part of the run be missed due to facility operational constraints including high flows, fish abundance, reservoir fluctuations, etc. Is the collector entrance readily located by juveniles? Does the collector provide adequate attraction flow and proper entrance conditions?
Bypass Conditions	It is assumed that a volitional bypass is preferred but this may not be possible given the head-of-reservoir facility locations. Does the fish bypass and/or transportation method provide downstream transport with minimal fish mortality, injury and stress due to handling? Is fish pumping required? Can design requirements such as enumeration, sorting and monitoring & evaluations be met without excess handling and without anesthesia? How long in duration are the truck trips? • Fish pumping = 1 • Holding and transport = 3 • Volitional bypass = 5
Effects on Other ESA Fish	To what extent does the proposed alternative impact bull trout or Oregon Chub? It is assumed that alternatives with criteria screening would be safer for bull trout or Oregon chub Guidance is needed from USFWS regarding the benefit of separating life stages. • Non-screened=2 • Screened=4
Effects on Other Fish of Concern	To what extent does the proposed alternative impact lamprey?
Effects on Upstream Passage (All Species)	To what extent does the proposed alternative impact adult migration of target and non-target species? Adult passage will be required at all facilities. • Adult passage at exclusion net facilities = 1 • Traditional ladder for in-tributary structures = 3
Technical Evaluation Criteria	
Current Operations	What is the compatibility of the alternative with the full range of existing reservoir operations and water surface elevations? FSC designs with full exclusionary nets may be feasible over the full reservoir operating range. In-tributary systems are unaffected by reservoir operations.
Operations and Maintenance (O&M)	What is the relative complexity of operations and anticipated maintenance issues? • O&M of floating facility with exclusionary nets = 1 • O&M of a off-channel facility using proven technology = 3
Design/ Constructibility	What is the degree of complexity of the design/ construction process? What design or construction risks to cost, schedule, and/or personnel exist? • Remote in-tributary site with cofferdam = 1 • Floating facility constructed in graving yard and floated into position without cofferdams = 4
Economic Impacts and Other Criteria	
Design/ Construction Cost	What is the potential to minimize design/construction costs, including impacts to existing facilities, excavation, use of cofferdams, mechanical and electrical components, etc.?
O&M Costs	To what extent can O&M costs be minimized including a reduced frequency of O&M tasks or lower-risk O&M activities? Exclusion nets would have significant O&M costs for the removal of debris and net retrieval for inspection and repair. O&M costs for pumps and tanker trucks would also be significant.
Recreation	What is the compatibility of the subject alternative with current recreational uses? • Boat passes required for head-of-reservoir concepts = 1 • Portages required for in-tributary concepts below confluence = 2 • Minimal facilities required for Upper North Fork concepts = 4
Hydropower	What is the compatibility of the subject alternative with current hydropower uses and operations, including the potential for lost generation, modifications to the operating rule curve or power pool, timing of operations and/or cost effectiveness?
Real Estate/ Access/ Utilities	Is it anticipated that real estate and construction access will not significantly impact the design, construction or O&M activities? Is public land available or is a purchase of private land required? Is there available road access for construction, operations personnel, and tanker truck transport (if required)? • Sites on tributaries without good road and utility access = 2 • Sites along the reservoir with good road and utility access = 4

Comment [JGK1]: Note: This criteria considers existing hydropower/reservoir operations only. Operation of the proposed facility (i.e. operation of an in-tributary collector during a flood event) is considered in "Downstream Passage Conditions" above.

This page was intentionally left blank.

USACE Lookout Point Head of Reservoir Collection Alternatives Study – Checkpoint Meeting No. 1

DATE:	26 May 2010
TIME:	9:00 – 15:00
LOCATION:	USACE Portland District, Summit Conference Room (10th Floor)
DIAL-IN INFORMATION:	Phone number: 877.873.8018 Access Code: 2646958

General 9:00-9:15

1. Introductions
2. Purpose and goals of the meeting
3. Review meeting information package

Discuss Programmatic Goals for Lookout Point 9:15-11:30

1. Fish Collection Potential – Survival probability and collection efficiency
2. Head of reservoir rearing – Detriment vs. betterment
3. Feasibility of prototype facility vs. Full production facility
4. Required future studies
5. Facility monitoring and evaluation (M&E) requirements
6. Upstream adult passage
7. Definition of feasibility – Cost vs. benefit

Lunch 11:30-12:30

1. Lunch on your own

Alternatives Evaluation 12:30-14:45

1. Review alternatives – Site locations and collection technologies
2. Review evaluation criteria
3. Populate master evaluation matrix

Project Schedule and Meeting Wrap-Up 14:45-15:00

1. Action items
2. Review project schedule
   - Next Team Coordination Meeting – 3 June 2010
   - 30 Percent AR Submittal – 13 July 2010

This page was intentionally left blank.

Observation: The peak migration period is December through July for all species and life stages.

SUBJECT:	Lookout Point	**BY:**	Malone **CHK'D BY:**
	Fish Migration Timing at Lookout Point	**DATE:**	25-April
		PROJECT NO.:	

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Species of Concern												
Spring Chinook												
Juveniles[1]												
In-tributary (NFMFW)												
< 60 mm												
> 60-79 mm												
80-99 mm												
100+ mm												
Lookout Dam Tailrace												
Adult[2]												
Winter Steelhead												
Juvenile (Generic)												
Adult (Foster Dam)												
Bull Trout (Generic)												
Juvenile												
Adult												
Pacific Lamprey (Bonneville Dam)												
Juvenile												
Adult												
Mountain Whitefish (Generic)												
Juvenile												
Adult												
Reservoir Operations												
Lookout Point Reservoir	Evacuated	Filling				Full			Evacuating			Evacuated
High Flow Periods												
Middle Fork												
North Fork												

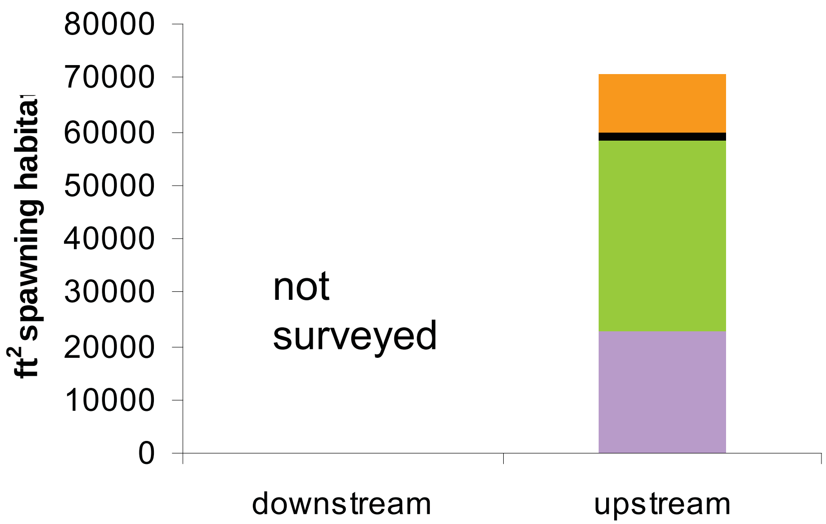
1- Juvenile run-timing from Greg Taylor Powerpoint presentation
2- Adult run-timing from streamnet (www.streamnet.org)

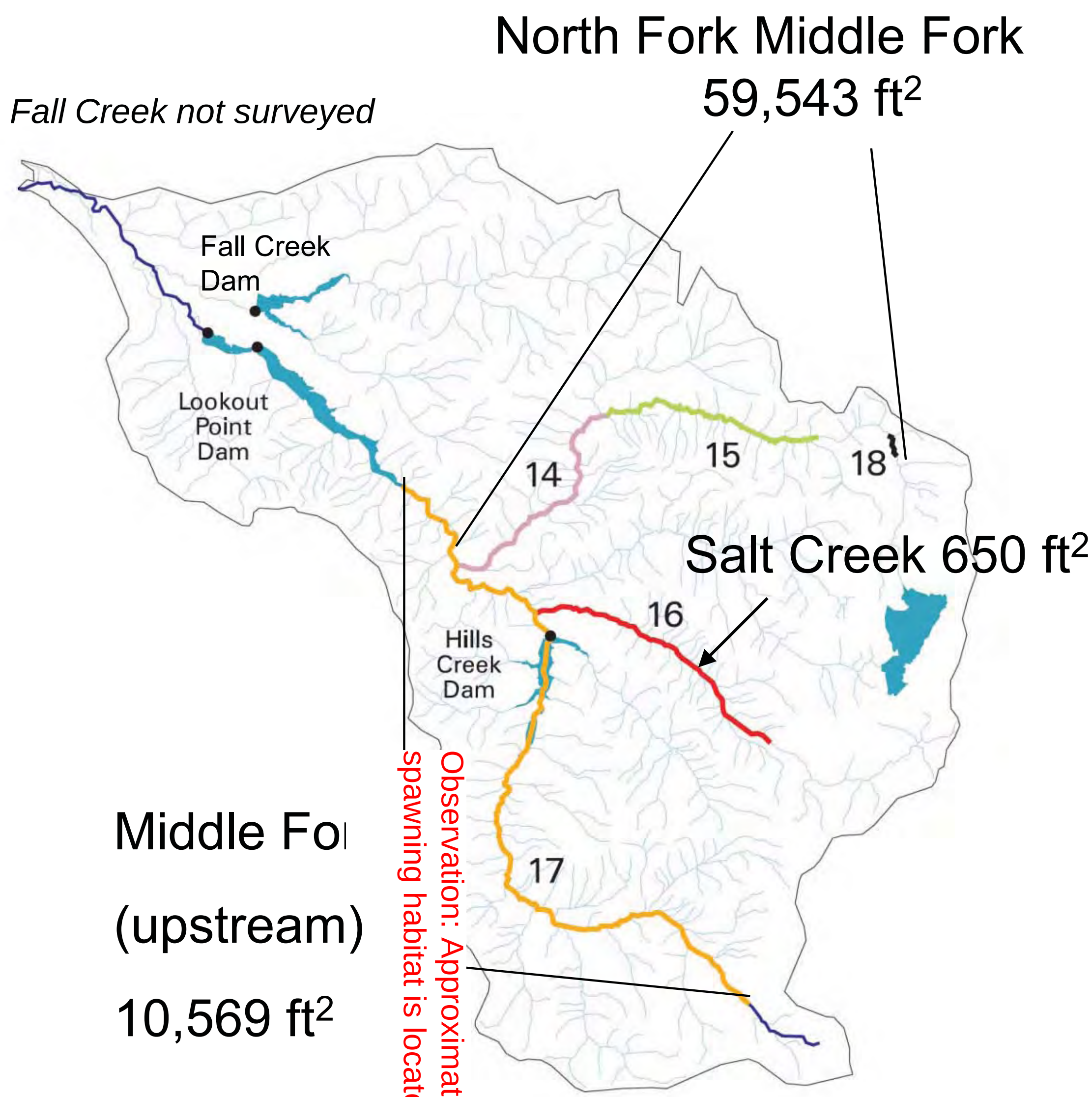
Legend for Species of Concern

Migration Period
Peak Migration Period

Observation: Approximately 84 percent of available spawning habitat is located in the NF.

Middle Fork Willamette- Spawning Habitat

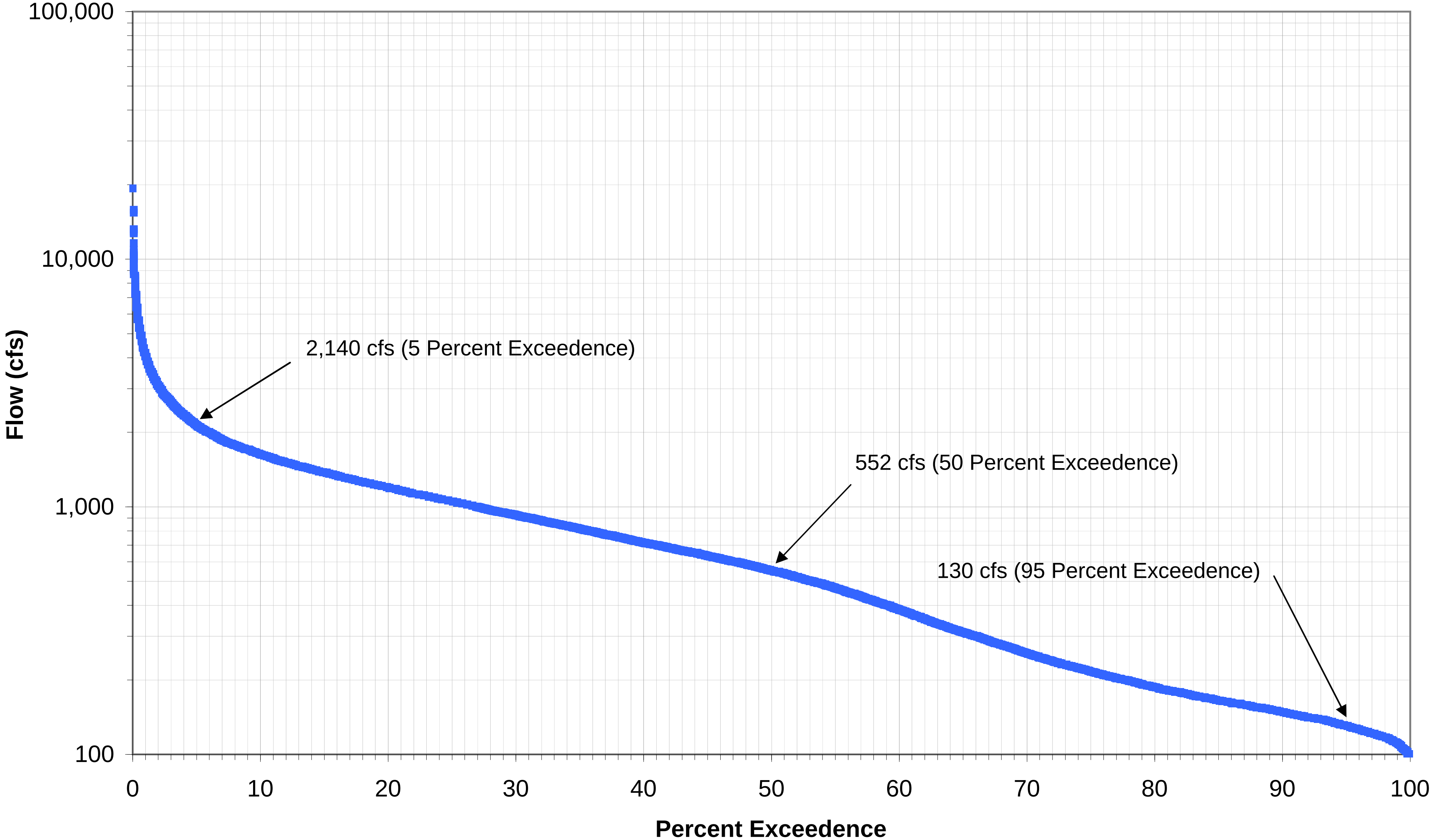




Observation: Approximately 84 pe
spawning habitat is located in the

North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500) Annual Flow-Duration Curve

Observation: Flows in the NF are approximately 1/3 of flows in the MF (below the confluence).

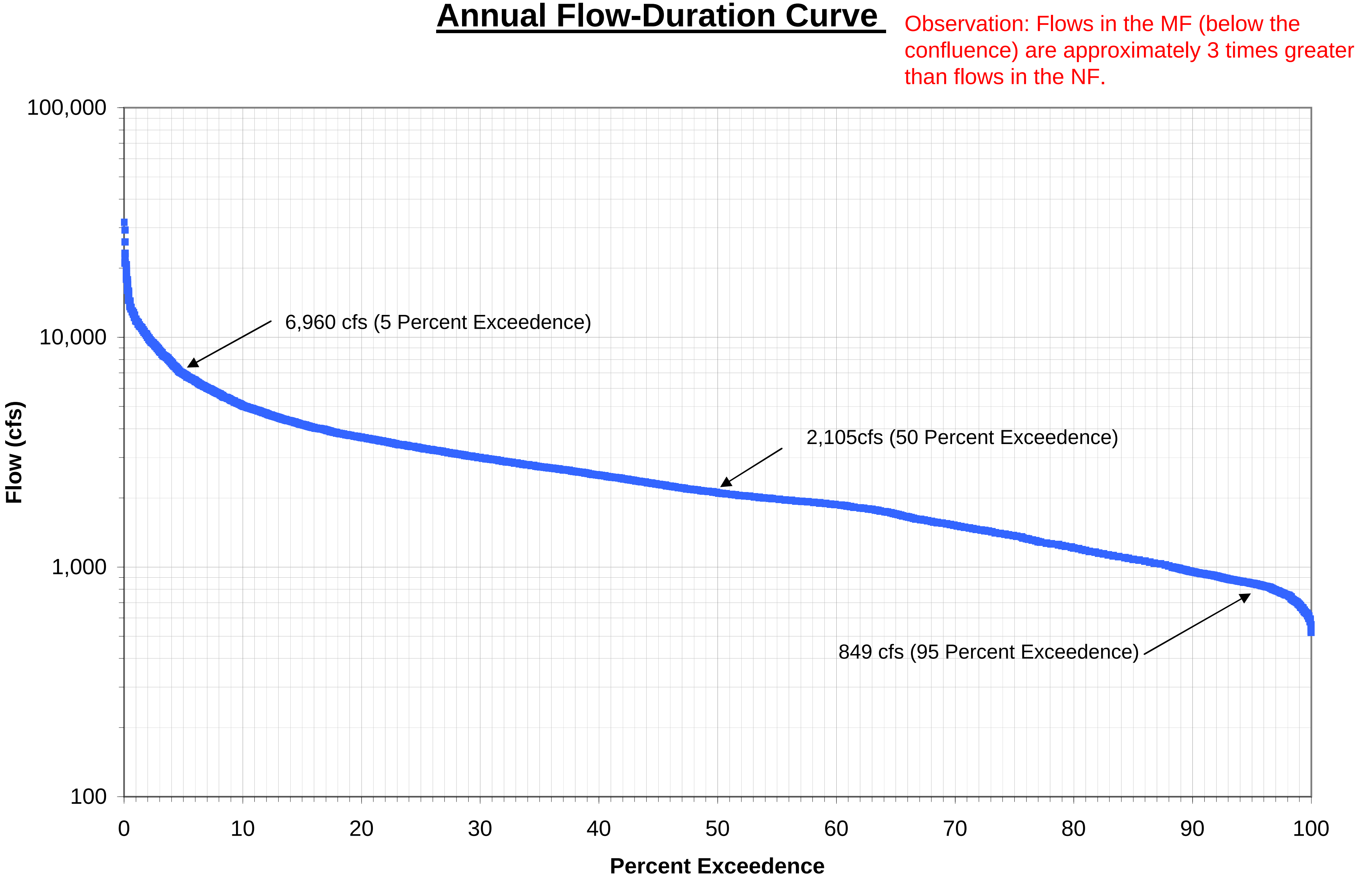


(Average Daily Data from October 1910 - September 1994)

4/29/2010

Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)

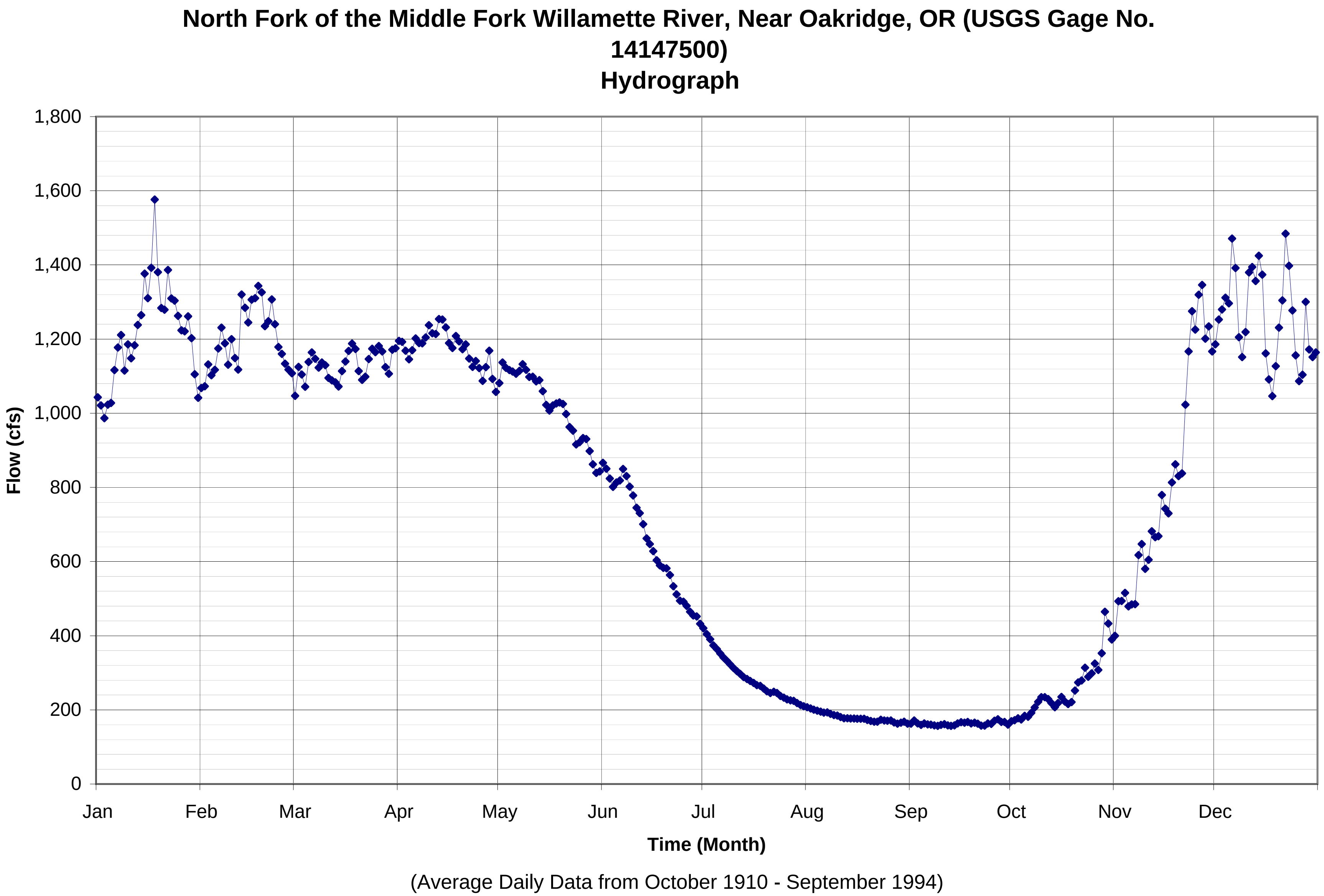
Annual Flow-Duration Curve



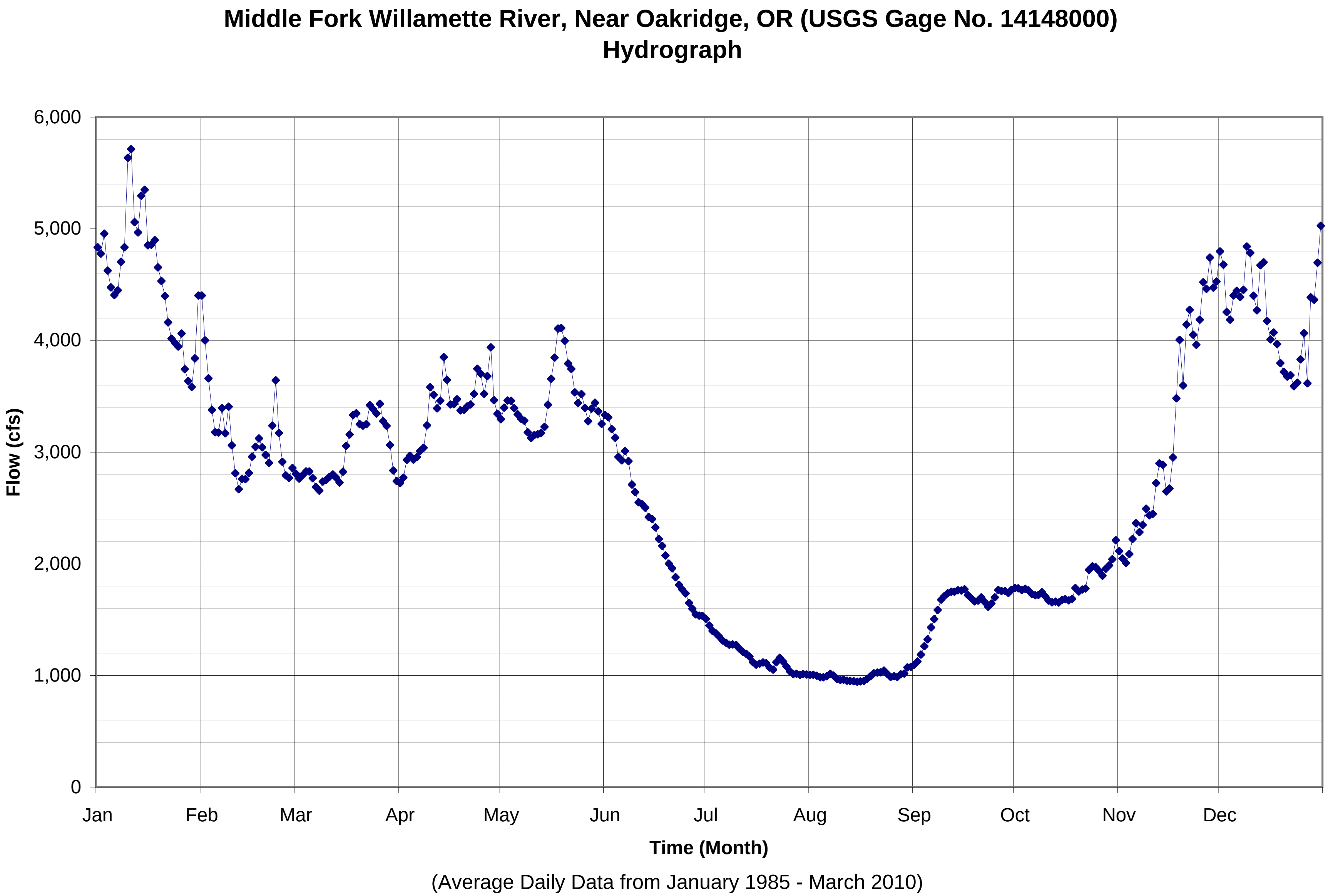
(Average Daily Data from January 1985 - March 2010)

4/22/2010

Observation: Peak flows typically occur from November through May.



Observation: Peak flows typically occur from November through May.



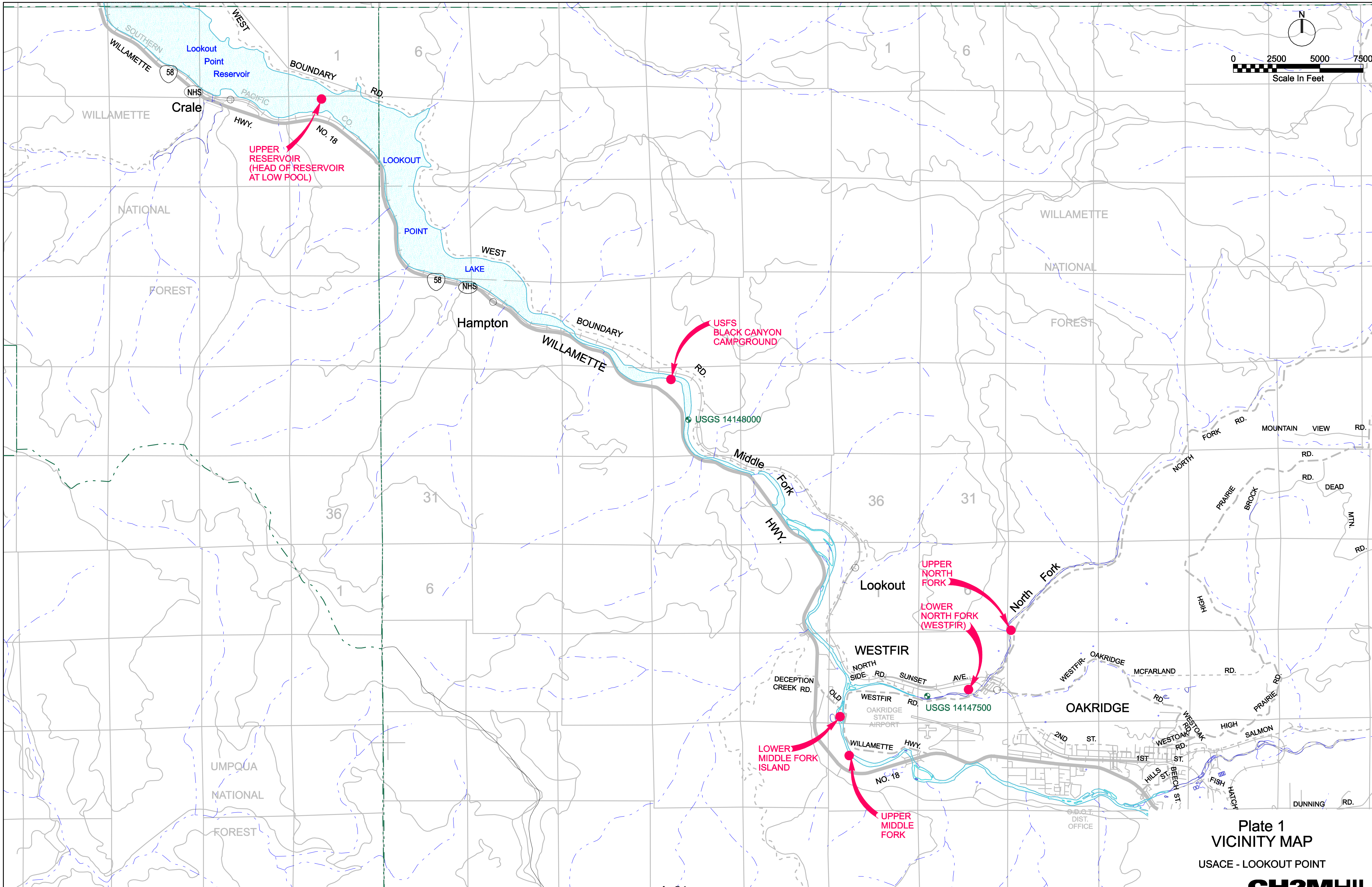


Plate 1
VICINITY MAP
USACE - LOOKOUT POINT

CH2MHILL

402429. FILENAME: 402429-Plate1.dgn PLOT DATE: 5/3/2010 PLOT TIME: 3:05:06 PM

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 3-June-2010

Attendees:

USACE

☐ Budai, Christine	☒ Roy, Liza	☐ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☐ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☐ Spear, Daniel

ODFW

☐ Friesen, Tom

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Follow-up from Checkpoint Meeting No. 1.
2) Review completed evaluation matrix (attached).
3) Discuss 10 Percent AR review comments.
4) Review project schedule and action items

Meeting Summary:

Checkpoint Meeting No. 1 and Evaluation Matrix. The 10 selected alternatives provide a good variety of sites and technologies. It is believed that the ranking is generally accurate with the exception of perhaps the Black Canyon Campground in-tributary alternatives (Alternative Nos. 5 and 6) and the Upper Reservoir FSC alternatives (Alternative Nos. 1 and 2), which could be swapped. In any case, the actual ranking of alternatives is of minor importance at this level of screening and analysis.

It was noted that a variant on the Upper Reservoir FSC without guide net alternative (Alternative No. 2a) could include a partial-depth net oriented at the surface, or a similar guidance net or device as opposed to a full exclusionary net.

Discuss 10 Percent AR Comments. 31 review comments have been provided via Dr. Checks. The A-E team is currently preparing responses to the comments and will upload them into Dr. Checks for backchecking. It is anticipated that some comments will not be closed out until after the 30 Percent AR submittal can be reviewed.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
None.

Action Items:
• Create Doodle poll for scheduling Checkpoint Meeting No. 2 to be held around 20-July (Kapla). • Prepare list of proposed discussion topics/agenda items in support of USACE/Agency breakout meeting. (Kapla, Sweeney, Giorgi). • Provide current Lookout Point sampling data set (Griff).

Previous Unaddressed Action Items:
• Provide R2 Resources habitat assessment report (Griff). • Provide Cougar migration study/data (Griff). • Schedule and hold breakout meeting between USACE and action agencies, including Stephanie Burchfield, to confirm the intent of BiOP RPA 4.9. This would include quantifying future recovery or escapement goals for Lookout Point, i.e. future fry production or numbers of returning adults (Jundt and Griff). • Clarify breakdown of juvenile Spring Chinook migration in fish migration timing matrix (Malone).

Parking Lot:
• None.

Look Ahead:
• The next Team Coordination Meeting is on 17-June. • The 30 Percent Alternatives Report will be submitted on 13-July.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx
The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

USACE Lookout Point – Head of Reservoir Collection Alternatives Study
Summary Evaluation Matrix

This is a summary evaluation matrix listing alternatives that have been selected for further evaluation in rank order.

Numerical Rating Description
5 = Excellent
4 = Very Good
3 = Good/Neutral
2 = Fair
1 = Poor

Table 5-2
Evaluation Matrix (2 June 2010)

Comprehensive Alternative			Biological Evaluation Criteria									Technical Evaluation Criteria	Economic Impacts and Other Criteria					Total Rating	Rank
Site Location		Technology	Quantity of Fish Available (%)	Survival Probability (%)	Collection Efficiency (%)	Total Fish Collection Potential (%)	Fish Collection Potential (Double Weighted)		Bypass Conditions	Effects on Other ESA Fish	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities		
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	84%	95%	50%	40%	4	4	4	4	4	3	3	4	2	3	4	38	1
2)a	Upper Reservoir	In-Reservoir: Gulper/FSC w/o net	100%	70%	45%	32%	3	3	3	3	5	3	3	3	4	3	4	37	2
12)	Upper North Fork	In-Tributary: In-Channel Collector	80%	100%	50%	40%	4	4	4	4	4	3	3	4	4	3	1	37	2
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	100%	80%	50%	40%	4	4	4	4	4	3	3	4	1	3	3	36	4
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100%	80%	50%	40%	4	4	4	4	4	3	3	4	1	3	3	36	4
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100%	70%	70%	49%	5	5	3	3	3	3	2	2	2	3	4	34	6
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100%	70%	80%	56%	5	5	3	3	3	3	1	1	2	3	4	33	7
3)	Upper Reservoir	Mobile: Merwin Trap	100%	70%	20%	14%	2	2	2	2	5	3	4	2	3	3	4	31	8
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	16%	85%	50%	7%	1	1	4	4	4	3	3	4	1	3	3	31	8
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	16%	85%	50%	7%	1	1	4	4	4	3	3	4	1	3	3	31	8

This page was intentionally left blank.

USACE Lookout Point – Head of Reservoir Collection Alternatives Study

This is the complete evaluation matrix following Checkpoint Meeting No. 1

<u>Numerical Rating Description</u>
5 = Excellent
4 = Very Good
3 = Good/Neutral
2 = Fair
1 = Poor

Table 5-2
Evaluation Matrix (25 May 2010)

Comprehensive Alternative			Biological Evaluation Criteria													Technical Evaluation Criteria			Economic Impacts and Other Criteria						
	Site Location	Technology	Quantity of Fish Available (%)	Survival Probability (%)	Collection Efficiency (%)	Total Fish Collection Potential (%)	Fish Collection Potential		Reservoir Conditions	Downstream Passage Conditions	Bypass Conditions	Effects on Other ESA Fish	Effects on Other Fish of Concern	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Operations and Maintenance (O&M)	Design/ Constructibility	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100%	70%	70%	49%	5	5			3	3		3	3			2	2	2	3	4	34	6
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100%	70%	80%	56%	5	5			3	3		3	3			1	1	2	3	4	33	7
		FSC w/o net	100%	70%	45%	32%	3	3			3	3		5	3			3	3	4	3	4	37	2
3)	Upper Reservoir	Mobile: Merwin Trap	100%	70%	20%	14%	2	2			2	2		5	3			4	2	3	3	4	31	8
4)	Upper Reservoir	Mobile: Dipper Trap	100%	70%	25%	18%	2	2			2	2		5	3			4	2	3	3	4	31	8
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	100%	80%	50%	40%	4	4			4	4		4	3			3	4	1	3	3	36	4
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100%	80%	50%	40%	4	4			4	4		4	3			3	4	1	3	3	36	4
7)	USFS Black Canyon Campground	Mobile: Screw Trap	100%	80%	20%	16%	2	2			1	1		5	3			4	2	3	3	3	28	15
8)	USFS Black Canyon Campground	Mobile: Scoop Trap	100%	80%	10%	8%	1	1			1	1		5	3			4	2	3	3	3	27	18
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	84%	95%	50%	40%	4	4			4	4		4	3			3	4	2	3	4	38	1
10)	Lower North Fork (Westfir)	Mobile: Screw Trap	84%	95%	20%	16%	2	2			1	1		5	3			4	2	3	3	4	29	14
11)	Lower North Fork (Westfir)	Mobile: Scoop Trap	84%	95%	10%	8%	1	1			1	1		5	3			4	2	3	3	4	28	15
12)	Upper North Fork	In-Tributary: In-Channel Collector	80%	100%	50%	40%	4	4			4	4		4	3			3	4	4	3	1	37	2
13)	Upper North Fork	Mobile: Screw Trap	80%	100%	20%	16%	2	2			1	1		5	3			4	2	5	3	1	28	15
14)	Upper North Fork	Mobile: Scoop Trap	80%	100%	10%	8%	1	1			1	1		5	3			4	2	5	3	1	27	18
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	16%	85%	50%	7%	1	1			4	4		4	3			3	4	1	3	3	31	8
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	16%	85%	50%	7%	1	1			4	4		4	3			3	4	1	3	3	31	8
17)	Lower Middle Fork (Island)	Mobile: Screw Trap	16%	85%	20%	3%	1	1			1	1		5	3			4	2	3	3	3	27	18
18)	Lower Middle Fork (Island)	Mobile: Scoop Trap	16%	85%	10%	1%	1	1			1	1		5	3			4	2	3	3	3	27	18
19)	Upper Middle Fork	In-Tributary: In-Channel Collector	15%	95%	50%	7%	1	1			4	4		4	3			3	4	1	3	2	30	12
20)	Upper Middle Fork	In-Tributary: Off-Channel Collector	15%	95%	50%	7%	1	1			4	4		4	3			3	4	1	3	2	30	12
21)	Upper Middle Fork	Mobile: Screw Trap	15%	95%	20%	3%	1	1			1	1		5	3			4	2	3	3	2	26	22
22)	Upper Middle Fork	Mobile: Scoop Trap	15%	95%	10%	1%	1	1			1	1		5	3			4	2	3	3	2	26	22

Shading denotes alternatives that were removed from further consideration.

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 17-June-2010

Attendees:

USACE

☒ Budai, Christine	☐ Roy, Liza	☒ Askelson, Sean
☐ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☒ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☒ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☐ Spear, Daniel

ODFW

☐ Friesen, Tom

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Discuss juvenile run size estimates developed by Griff (attached).
2) Discuss in-tributary collection efficiency data (attached).
3) Discuss implications to Fish Collection Potential: Quantity of Fish Available x Survival Probability x Collection Efficiency.
4) Review action items.
5) Finalize schedule for Checkpoint Meeting No. 2 (afternoon of Thursday, 22 July is proposed).
6) Review project schedule.

Meeting Summary:

Juvenile run size estimates. Griff previously provided an estimate of the juvenile run size for various locations in the Middle Fork basin including the North Fork of the Middle Fork. The estimate is based on the NMFS Draft Recovery Plan with adjustments per discussions with Lance Kruzic. Approximately 1.2M fry are estimated for the North Fork. Assuming a peak day of 10 percent of the run, a North Fork sorting/handling facility should be sized to accommodate approximately 120,000 fry per day.

Approximately 1.7M fry are estimated for the Black Canyon Campground site, assuming 50 percent survival through the Hills Creek Project. This would require a sorting/handling facility with the ability to accommodate approximately 170,000 fry per day.

The assumption of 50 percent survival through the Hills Creek Project is conservative and would likely over-estimate actual survival. In addition, downstream fish passage enhancements are not currently being considered for this Project under the current BiOp or any other means.

In-tributary collection efficiency data. A graph presenting in-tributary collection efficiencies was also distributed and discussed. The data was calculated from flow-duration curves based on average daily data assuming a collector capacity of 2,000 cfs. No adjustments for survival to the collector, fish behavior or latent mortality were made. The Upper Middle Fork flow was calculated by subtracting North Fork Middle Fork daily flows from Lower Middle Fork daily flows for the overlapping period of record.

A 2,000 cfs collector on the North Fork would provide much greater collection efficiencies than similar size collectors located on the Upper Middle Fork or the Lower Middle Fork due to the smaller average daily flows at this location. The graph will be revised to consider collectors for the Middle Fork sites which provide similar collection efficiencies.

Implications to Fish Collection Potential. Fish Collection Potential is defined as the product of 1) the quantity of fish available, 2) survival probability and 3) collection efficiency. Available information will be used to rank alternatives for the 30 Percent AR. A list of critical information needs and data gaps will be developed.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• 10 percent of the annual run is a reasonable peaking factor for use in sizing fish sorting/handling facilities. This assumption is similar to what was used for the Cowlitz facility. • A list of critical information needs and data gaps should be developed and included with the 30 Percent AR.

Action Items:
• Identify in-tributary collector capacities for the Middle Fork sites with collection efficiencies similar to the 2,000 cfs North Fork Middle Fork alternative to facilitate evaluation and comparison (Autier). • Provide Hills Creek Reservoir Rule Curve (Askelson; completed 17-June)

Previous Unaddressed Action Items:
• Schedule and hold breakout meeting between USACE and action agencies, including Stephanie Burchfield, to confirm the intent of BiOP RPA 4.9. This would include quantifying future recovery or escapement goals for Lookout Point, i.e. future fry production or numbers of returning adults (Jundt and Griff).

Parking Lot:
• None.

Look Ahead:
• The next Team Coordination Meeting is on 1-July. • The 30 Percent Alternatives Report will be submitted on 13-July. • Checkpoint Meeting No.2 will be held on the afternoon of 22-July.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

North Fork of the Middle Fork Willamette (NFMF) Juvenile Run Size Estimates

Compiled By David Griffith (CENWP-PM-E) david.w.griffith@usace.army.mil

Fry Estimate based on Recovery Plan

Basin	IP	A/P	Fry Estimate
MF Basin	100%	5820	
Fall Crk	17%	989	593640
NFMF	29%	1688	1012680
Above HCR	20%	1164	698400
Below LOP	33%	1921	1152360

Fry Estimate based on feedback from L. Kruzic (i.e. the assumption of 33% production below LOP/Dexter seemed overly optimistic)

Basin	IP	A/P	Fry Estimate
MF Basin	100%	5820	
Fall Crk	20%	1164	698400
NFMF	35%	2037	1222200
Above HCR	25%	1455	873000
Below LOP	20%	1164	698400

IP = Intrinsic potential (table 6-4 in NMFS Draft Recovery Plan)

A/P = Abundance Productivity (table 4-9 in NMFS Draft Recovery Plan)

"*Further, the A/P conservation gaps estimated for some populations are very large relative to the current size of the population. It is likely that some of these estimates are too large and may be an artifact of the gap estimation methodology, which assumes a linear population response at all population densities and conservation states. For the nearly extinct populations, this linear assumption is probably incorrect and has likely led to the generation of some exceptionally large A/P conservation gaps.*" – (NMFS Draft Recovery Plan pp. 69)

SR = Sex ratio ~60/40 M/F (Dan Peck, ODFW pers. Com)

F = 5,000 eggs per female from Groot Margolis*

EF = 30% Egg to fry from Groot Margolis*

Fry Estimate = SP*SR*F*EF

Recovery plan based NFMF Fry Estimate = 1688 X .4 X 5,000 X .3 = 1,012,800

Revised NFMF Fry Estimate based on NMFS feedback = 1,222,200

NOTE: Assumes 0% pre-spawn mortality and no density dependence.

*conservative estimate reflecting best case scenario (more fish).

NFMF Smolt “ESTIMATE” = 30,000

Based on ~ 15,000 smolt estimate 2007 & 2008 X factor of 2

It appears, based on extremely limited data from the NFMF, that the number of smolts has a density dependent response where there is less of one for migrant fry, based on years with large differences in redd counts(see table below). This is consistent with studies by Lister & Walker (1966), and Major & Mighell (1969). This makes intuitive sense since the resource needs of individuals at the fry stage are much less than at the yearling stage. Also all in tributary juveniles must survive the winter months, a time of limited resources and high flows to, make it to the yearling migrant life stage.

	2005 Spawner	2006 Spawner	2007 Spawner
Outplants	798	827	555
# of Redds	42	363	118
Peak of fry migration	Spring 2006	Spring 2007	Spring 2008
Fry caught	???	1050	283
Fry migrant estimates*	???	152,173	41,014
Peak of Yearling out migration	Spring 2007	Spring 2008	Spring 2009
Smolts caught in trap	102	110	???
Estimate of yearling out migrants*	14,782	15,942	???

*based on lowest trap efficiency observed (0.69%)

ABOVE TO BE UPDATED WHEN UofI DATA ANALYSIS IS COMPLETE AND ADITIONAL INFORMATION IS AVAILABLE FROM 2010 STUDIES!! ROUGH ESTIMATE!

INFORMATION ON 2009 ODFW LOP LIBERATION

LOP release

June 18th

311,600 fish

Mean size 70mm

Tailrace Recapture

Most fish recaptured in late fall early winter (NOV-DEC)

Fish were 100-120 mm at recapture

1328 Captured Live fish

.72-1.9 % trap efficiency

Using above range **70,000-184,000** marked fish passed LOP = **23-59%** of release

Minimum estimate based on live fish recaptures and likely predation in trap by otters

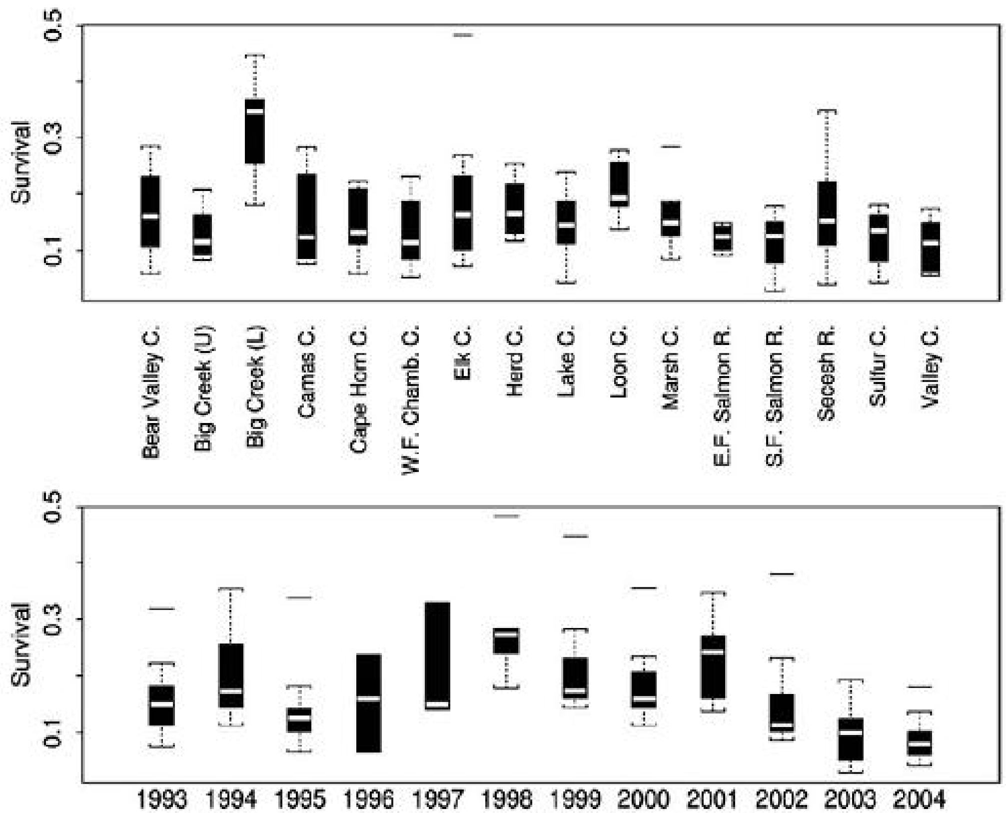


FIGURE 2.—Box plots (Cleveland 1993) of estimated parr-to-smolt survival to Lower Granite Dam (Snake River) for wild spring–summer Chinook salmon tagged in the Salmon River basin, Idaho, by tagging site (upper panel) and migration year (lower panel). Medians (unshaded portions of bars), upper and lower quartiles (dark areas within bars), upper and lower adjacent values (capped vertical lines), and outliers (isolated horizontal lines) are presented. (Reproduced from Achord 2007, *Migration Timing, Growth, and Estimated Parr-to-Smolt Survival Rates of Wild Snake River Spring–Summer Chinook Salmon from the Salmon River Basin, Idaho, to the Lower Snake River*)

"Fry to parr survival 15% for Idaho streams"
Scully, R.J., Leitzinger, E.J., and Petrosky, C.E. 1990. Idaho habitat evaluation for off-site mitigation record. Annual report 1988. Idaho Department of Fish and Game. Prepared for U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife. Project 83-7. Contract No. DE-AI79-84BP13381. StreamNet Library, Columbia River Inter-Tribal Fish Commission, 729 Oregon St., Suite 190, Portland, OR 97232 <www.fishlib.org>.

OTHER IMPORTANT REFERENCES

Mattson, C.R. 1962. Early life history of Willamette River spring Chinook salmon. Oregon Fish Commission, Portland, Oregon.

Mattson, C.R. 1963. An investigation of adult spring Chinook salmon for the Willamette River system, 1946-51. Oregon Fish Commission, Portland.

"*The Corps installed a semipermanent evaluator in the fishway approach channel designed to capture all emigrants passing through the transport system. Collection of marked juvenile fish released into the reservoir never exceeded 15.6% for spring chinook, and passage efficiencies of steelhead smolts were even lower. We ascribed these poor passage efficienciesto improper placement of the fish collection horns and low attraction flows to the horn entrances during much of the migration period.*"

"*We generally concluded that the transport system was ineffective in collecting adequate numbers of downstream migrants and that most of the juvenile salmon and steelhead passing through the facility were injured.*

We ascribed most of the successful emigration of juvenile salmonids from the reservoir to passage through the regulating outlet. Because of limited direct information, most of our knowledge of emigration via the outlet is inferential. We could not estimate mortalities sustained during emigration via the outlet."

"We set large-mesh and small-mesh nets in the reservoir monthly to obtain data on depth distribution, species composition, growth and age of fish populations. Juvenile chinook grew well, attaining emigration size in 7or 8 months of reservoir rearing."

Smith, E. M. and L. Korn. 1970. Evaluation of fish facilities and passage at Fall Creek Dam on Big Fall Creek in Oregon. Final report. Fish Commission of Oregon, Research Division, Portland.

Fall Creek_Smith and Korn 1970.pdf

"In 1990 ODFW released one million size (mean weight= 245 fish/lb, S.D.= 75.0) fingerlings into the reservoir in mid-April. In 1991 ODFW released 950,000 slightly larger but more uniformly-sized fingerlings (mean weight= 205 fish/lb, st. dev.=53.1) into the reservoir in late May.

"Study results indicated 28.5% of the 950,000 fingerlings stocked in the reservoir in late May 1991 survived to smolt. This is an increase in survival over 1990 , when one million fingerlings stocked in the reservoir in mid-April survived at a 19.7% rate. Smolts leaving the reservoir in 1991, although much more abundant, were correspondingly smaller."

Downey, T. W. and E. M. Smith. 1992. Evaluation of spring Chinook salmon passage at Fall Creek Dam, 1991. Draft report. Fish Research and Development Section, Oregon Department of Fish and Wildlife.

DowneySmith1992.doc

"Above Reservoir

► High numbers of fry migrating out of tributaries and into the reservoirs in Feb.-June.

► Low numbers of juveniles migrating out of tributaries and into reservoirs in July-Jan.

Below Dam

► Species Composition –Fall Creek, LOP have high numbers of warm water fish. Cougar has lowest number.

► Can estimate numbers of live fish migrating downstream using fish captured in screw traps and efficiency tests for live fish.

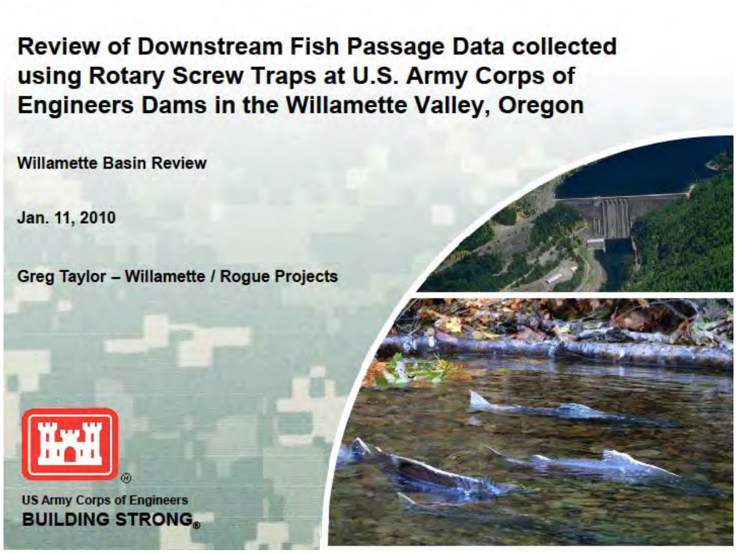
► Mortality estimates are unreliable at (LOP at FC) due to inability to generate dead fish efficiency tests.

► Length frequency histograms indicate two "size classes" of fish passing downstream. Likely different life histories

► Reservoir elevation is primary variable affecting juvenile migration timing (flow also important)

► Migration timing changed dramatically at Cougar following completion of new water temperature control tower."

Taylor, G. T.. 2010 *Review of Downstream Fish Passage Data collected using Rotary Screw Traps at U.S. Army Corps of Engineers Dams in the Willamette Valley, Oregon.* Presentation at the 2009 Willamette Fisheries Science Review. Grand Ronde, OR.

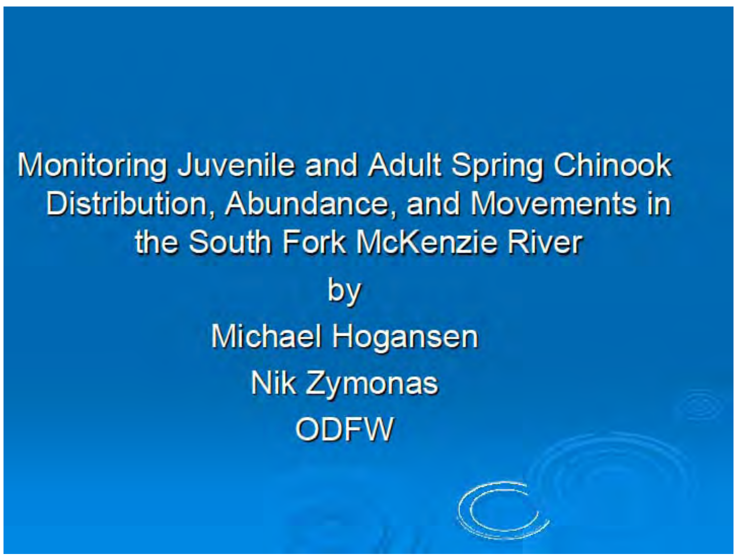


(double Click to open)

“ 43% of outplanted adult Chinook survive to Spawn

* *Large number of fry move down stream in April and May to Res. Don’t see fry in tail race or RO*
* *Most fish passing through dam are age 1 or older*
* *Mortality can be high through RO*
* *Tail race mortality is related to size and many other variables”*

Hogansen, M. & N. Zymonas. 2010 *Monitoring Juvenile and Adult Spring Chinook Distribution, Abundance, and Movements in the South Fork McKenzie River. .* Presentation at the 2009 Willamette Fisheries Science Review. Grand Ronde, OR.



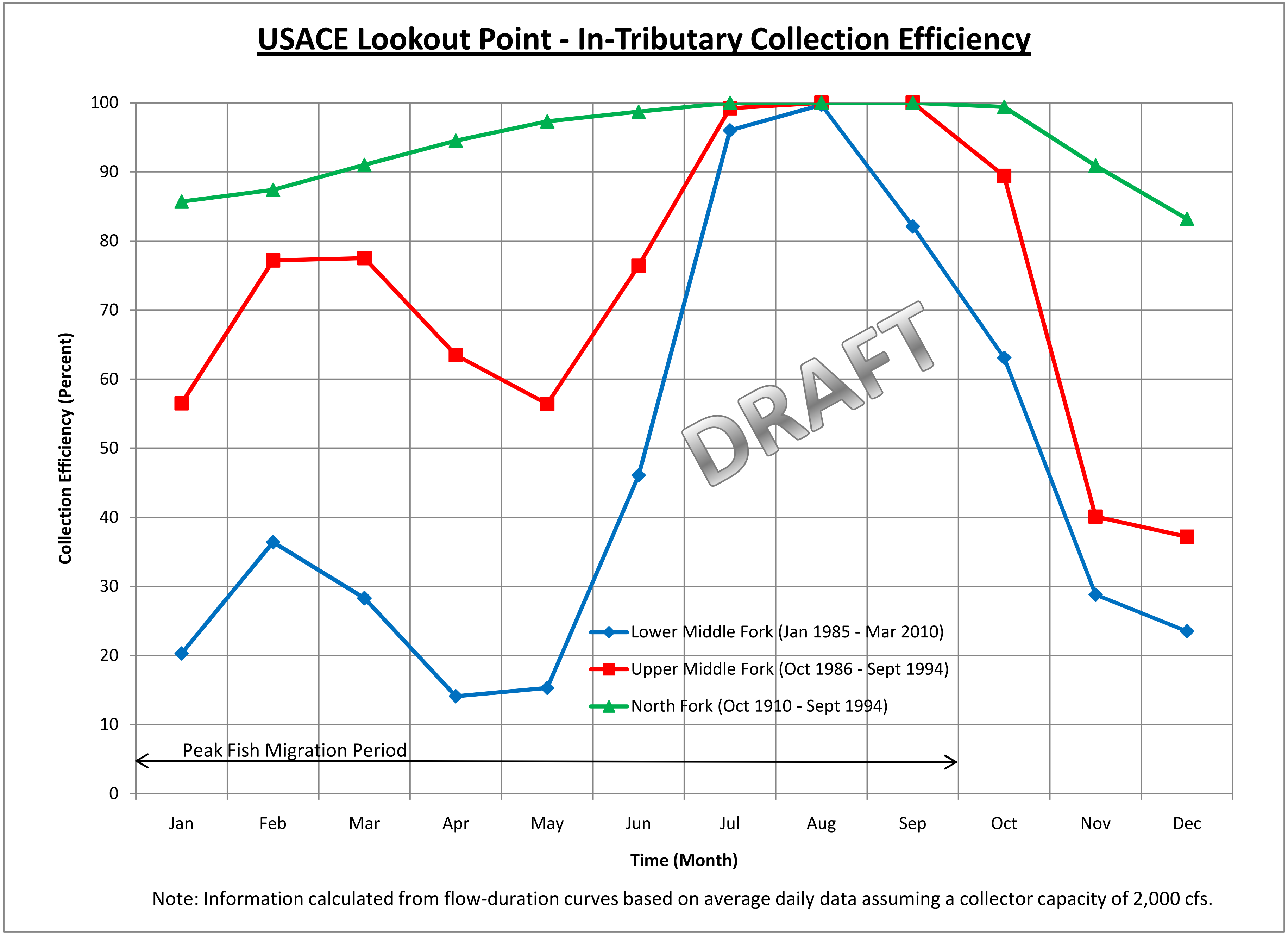
(double Click to open)

Major, R.L., and Mighell, J.L. 1969. Egg-to-migrant survival of spring chinook salmon (Oncorhynchus tshawytscha) in the Yakima River, Washington. Fish. Bull. U.S. 67: 347–359.

“*Historical impacts of humans have greatly reduced population sizes of salmon, and the density dependence we report may stem from a shortage of nutrients normally derived from decomposing salmon carcasses. Cohorts of juvenile salmon may experience density-dependent mortality at population sizes far below historical levels and recovery of imperiled populations may be much slower than currently expected.*”

Achord, S., Levin, P.S., and Zabel, R.W. 2003*. Density-dependent mortality in Pacific salmon: the ghost of impacts past?* Ecol. Lett. 6: 335–342.

Lister, D. B., and C. E. Walker. 1966. *The effect of flow control on freshwater survival of chum, coho, and chinook salmon in the Big Qualicum River*. Canadian Fish Culturist 37:3-25.



USACE Lookout Point - In-Tributary Collection Efficiency
Collection Efficiency (Percent)
100
90
80
70
60
50
40
30
20
10
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Time (Month)
Lower Middle Fork (Jan 1985 - Mar 2010)
Upper Middle Fork (Oct 1986 - Sept 1994)
North Fork (Oct 1910 - Sept 1994)
Peak Fish Migration Period
DRAFT
Note: Information calculated from flow-duration curves based on average daily data assuming a collector capacity of 2,000 cfs.

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 01-July-2010

Attendees:

USACE

☐ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☒ Burton, James
☐ Sedey, Jeffrey A	☒ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☐ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1. Follow-up discussion on juvenile run size estimates.
    - What if fish passage at Hills Creek is improved in the future?
2. Review and discuss proposed FSC reservoir locations (see attached).
3. Review and discuss FSC-to-shore transportation concepts (see attached).
    - Barge to dam
    - Barge to tower/bridge
    - Barge to shoreline/channel
    - Crane to aerial tram
    - Adjustable aerial tram
    - Boat ramp and amphibious vehicle

4. Review and discuss revised in-tributary collection efficiencies (see attached).
5. Review action items.
6. Review project schedule.

Meeting Summary:

Juvenile run size estimates. Griff previously provided an estimate of the juvenile run size for various locations. Approximately 1.7M fry are estimated for the Black Canyon Campground site, assuming 50 percent survival through the Hills Creek Project (and 100 percent survival elsewhere). This would require a sorting/handling facility with the ability to accommodate approximately 170,000 fry per day.

A 50 percent survival rate through the Hills Creek project is conservative (i.e. reflects a higher than anticipated survival rate), and is based on historical turbine fish passage data. In addition, fish passage improvements at Hills Creek are not a requirement of the current Willamette BiOp.

Proposed FSC reservoir locations. Two proposed FSC locations were discussed. The locations were selected largely based on the draft of the FSC (from waterline to the bottom of the structure) at low pool. The structure's proximity to the shoreline and the exclusion net area (and resulting approach velocity) were also considered.

The maximum flow through the nets was calculated as the sum of the 5 percent exceedence inflow (6,530 cfs) from the Middle Fork plus the maximum reservoir evacuation rate of 3,271 acre-feet/day for a total flow of approximately 8,180 cfs.

Location A is approximately 3.5 miles upstream from Lookout Point Dam. It is anticipated that an FSC at this location could have a non-adjustable net transition structure (NTS) with a total draft of approximately 50 feet, similar to the PSE Baker FSC. This location is approximately 250 feet from the southerly shore. The net approach velocity is on the order of 0.04 fps.

Location B is approximately 5.5 miles upstream from the Dam and would require an adjustable NTS to reduce the FSC's draft at low pool. Location B is approximately 600 feet from the shore. The net approach velocity is on the order of 0.07 fps.

Both locations will require log booms (both upstream and downstream) and boat passages. There was a general perception that location A was too close to the dam, and that location B was therefore preferred. Both locations will be further investigated as each presents unique advantages and disadvantages.

FSC-to-shore transportation concepts. The following FSC-to-shore transportation concepts where discussed:

- Barge to dam
- Barge to tower/bridge
- Barge to shoreline/channel
- Crane to aerial tram
- Adjustable aerial tram
- Boat ramp and amphibious vehicle

It is anticipated that fish collected by the FSC will be sorted by size and directed to holding pools. The fish will then be crowded into hoppers for transport. Once on shore, the hoppers could be transferred to a liberation truck for transport down river.

Several additional concepts were discussed by the group and will be also presented in the 30 percent AR:

- An inclined rail system in lieu of a boat ramp
- Helicopter transport.

Fish pumping was not considered due to static heads exceeding 100 feet at low pool.

Revised in-tributary collection efficiency data. The in-tributary collection efficiencies were calculated using average daily data and the assumption that juvenile fish collection efficiencies are equivalent to the streamflow collection efficiencies. The collector facilities are sized to match the January through September five percent exceedance flowrates at each site. The collector capacities are as follows: Lower Middle Fork - 6,530cfs, Upper Middle Fork - 3,750 cfs, and the North Fork - 2,000 cfs. Fish migration timing information should be added to the figure to assist in evaluating the performance of each facility.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• None.

Action Items:
• Provide record drawings of Lookout Point Dam (Askelson; completed 7/2/2010). • Provide Walterville PIT tag data (Griffith). • Verify the reservoir evacuation rates (Burton and Askelson; completed 7/2/2010). • Add fish migration timing information to the in-tributary collection efficiency figure (Autier).

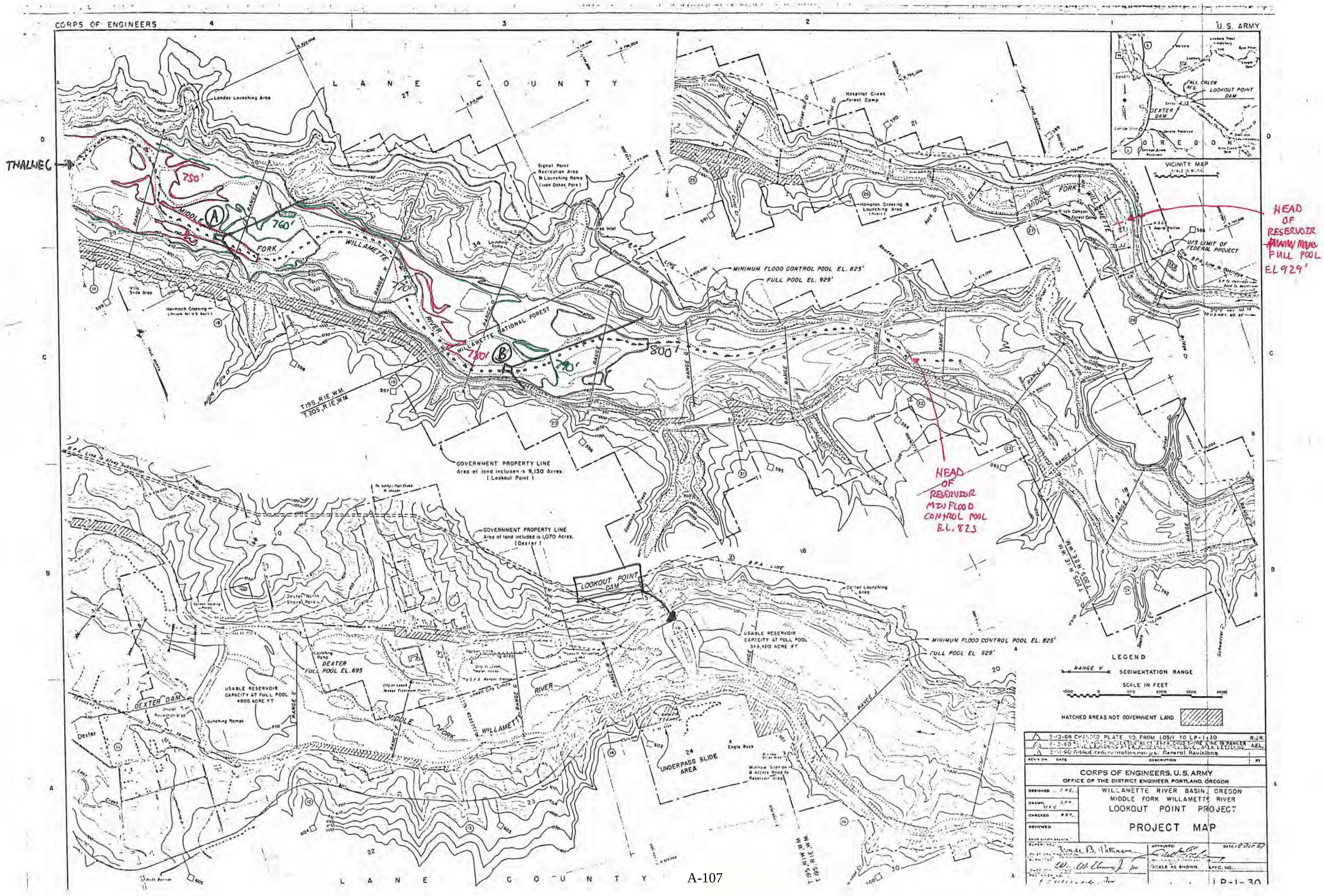
Previous Unaddressed Action Items:
• Schedule and hold breakout meeting between USACE and action agencies, including Stephanie Burchfield, to confirm the intent of BiOP RPA 4.9. This would include quantifying future recovery or escapement goals for Lookout Point, i.e. future fry production or numbers of returning adults (Jundt and Griff).

Parking Lot:
• None.

Look Ahead:
• The 30 Percent Alternatives Report will be submitted on 13-July. • Next Team Coordination Meeting on 15-July. • Checkpoint Meeting No.2 will be held on the afternoon of 22-July.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

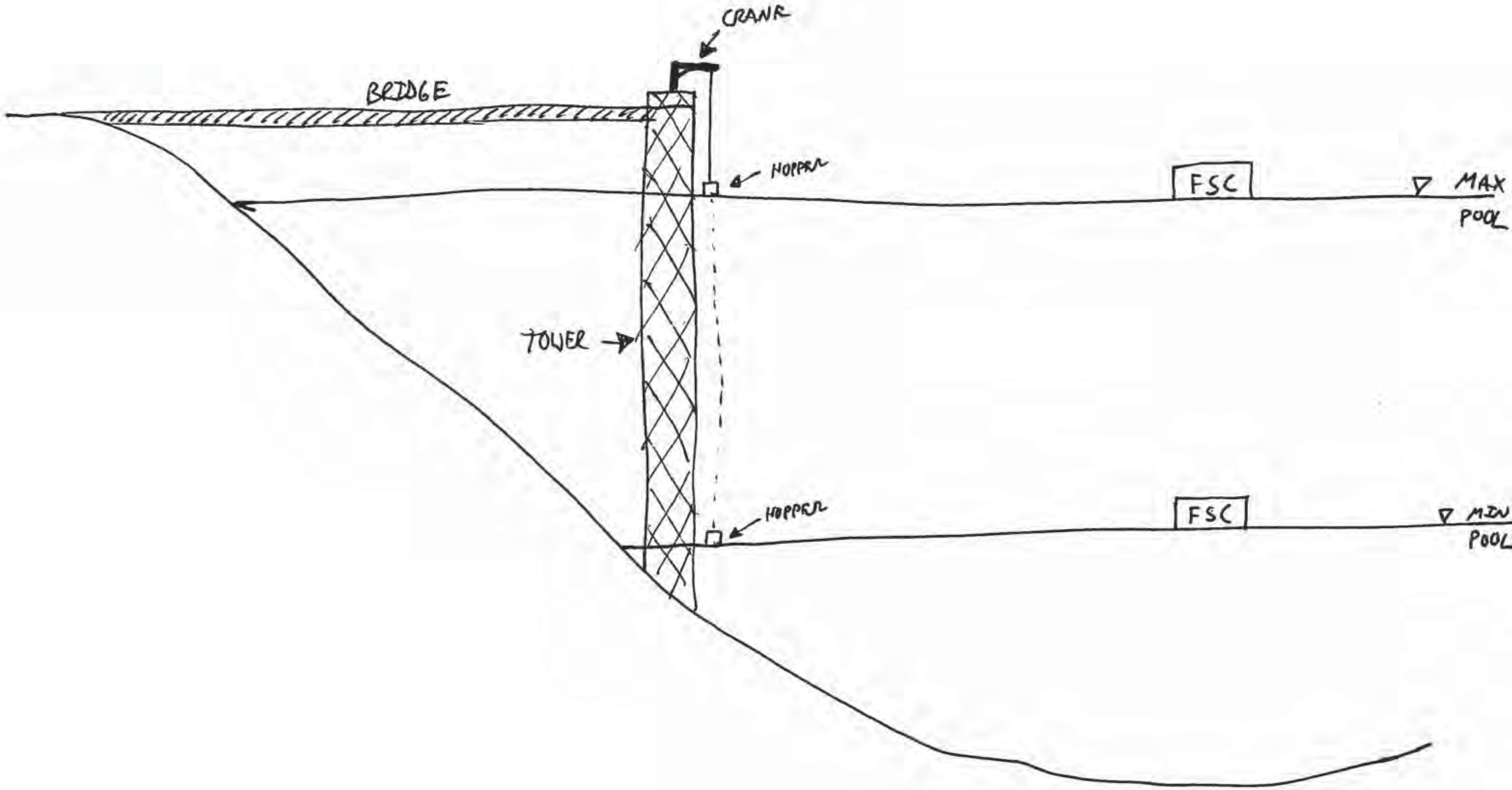
The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir



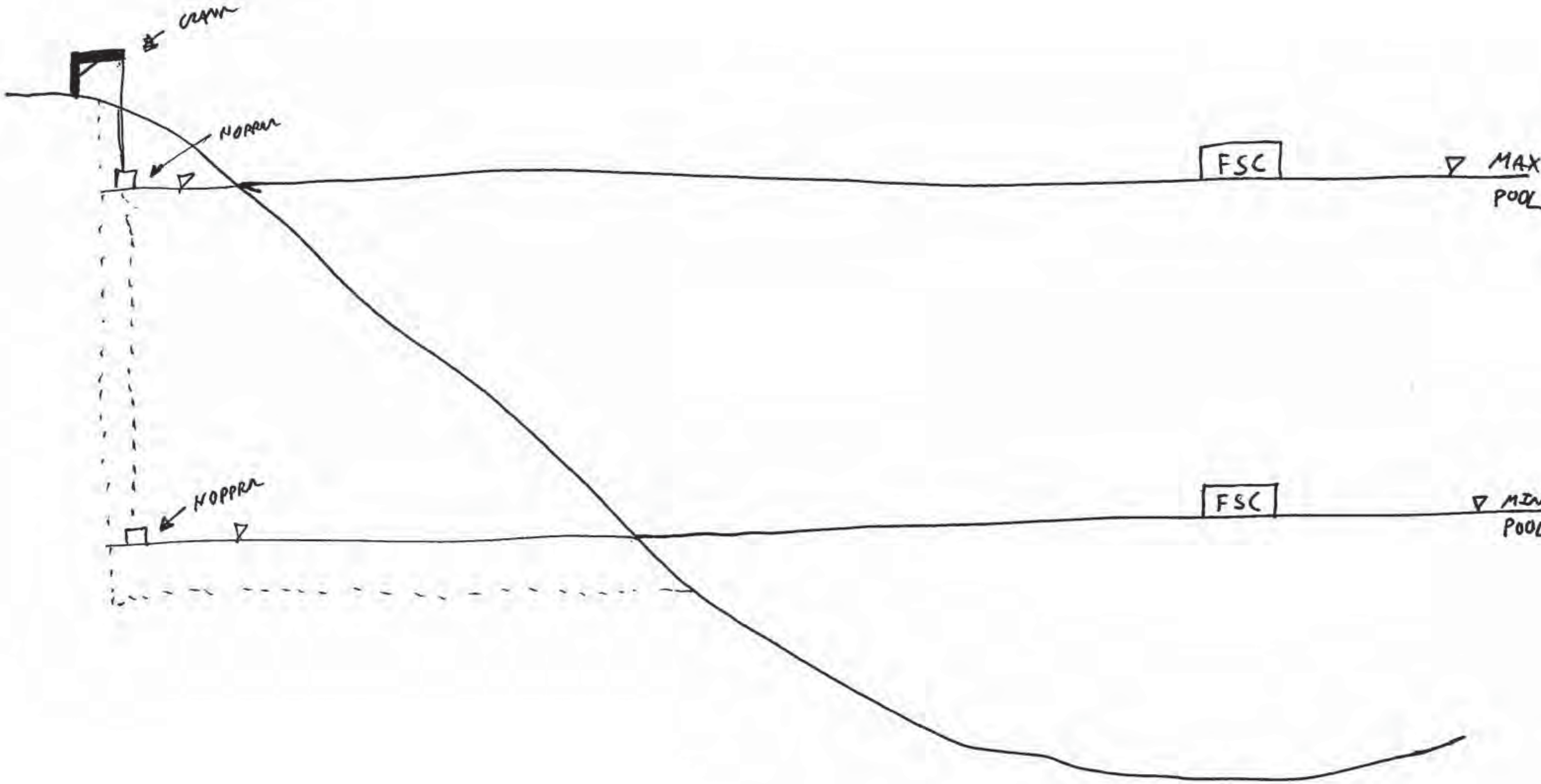
CORPS OF ENGINEERS
U.S. ARMY
LANE COUNTY
THALWEG
750'
760'
770'
780'
790'
800'
MIDDLE FORK WILLAMETTE RIVER
WILLAMETTE NATIONAL FOREST
MINIMUM FLOOD CONTROL POOL EL. 825'
FULL POOL EL. 929'
HEAD OF RESERVOIR FULL POOL EL 929'
HEAD OF RESERVOIR MIN FLOOD CONTROL POOL EL. 825
U/S LIMIT OF FEDERAL PROJECT
GOVERNMENT PROPERTY LINE
Area of land included is 9,130 Acres. (Lookout Point)
GOVERNMENT PROPERTY LINE
Area of land included is 1,070 Acres. (Dexter)
LOOKOUT POINT DAM
DEXTER DAM
DEXTER FULL POOL EL. 695
USABLE RESERVOIR CAPACITY AT FULL POOL 4800 ACRE FT
USABLE RESERVOIR CAPACITY AT FULL POOL 349,400 ACRE FT
UNDERPASS SLIDE AREA
T.19S.,R.1E.,W.M.
T.20S.,R.1E.,W.M.
VICINITY MAP
OREGON
LOOKOUT POINT DAM
DEXTER DAM
LEGEND
SEDIMENTATION RANGE
SCALE IN FEET
HATCHED AREAS NOT GOVERNMENT LAND
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
WILLAMETTE RIVER BASIN, OREGON
MIDDLE FORK WILLAMETTE RIVER
LOOKOUT POINT PROJECT
PROJECT MAP
SCALE AS SHOWN
LP-1-30

This page was intentionally left blank.

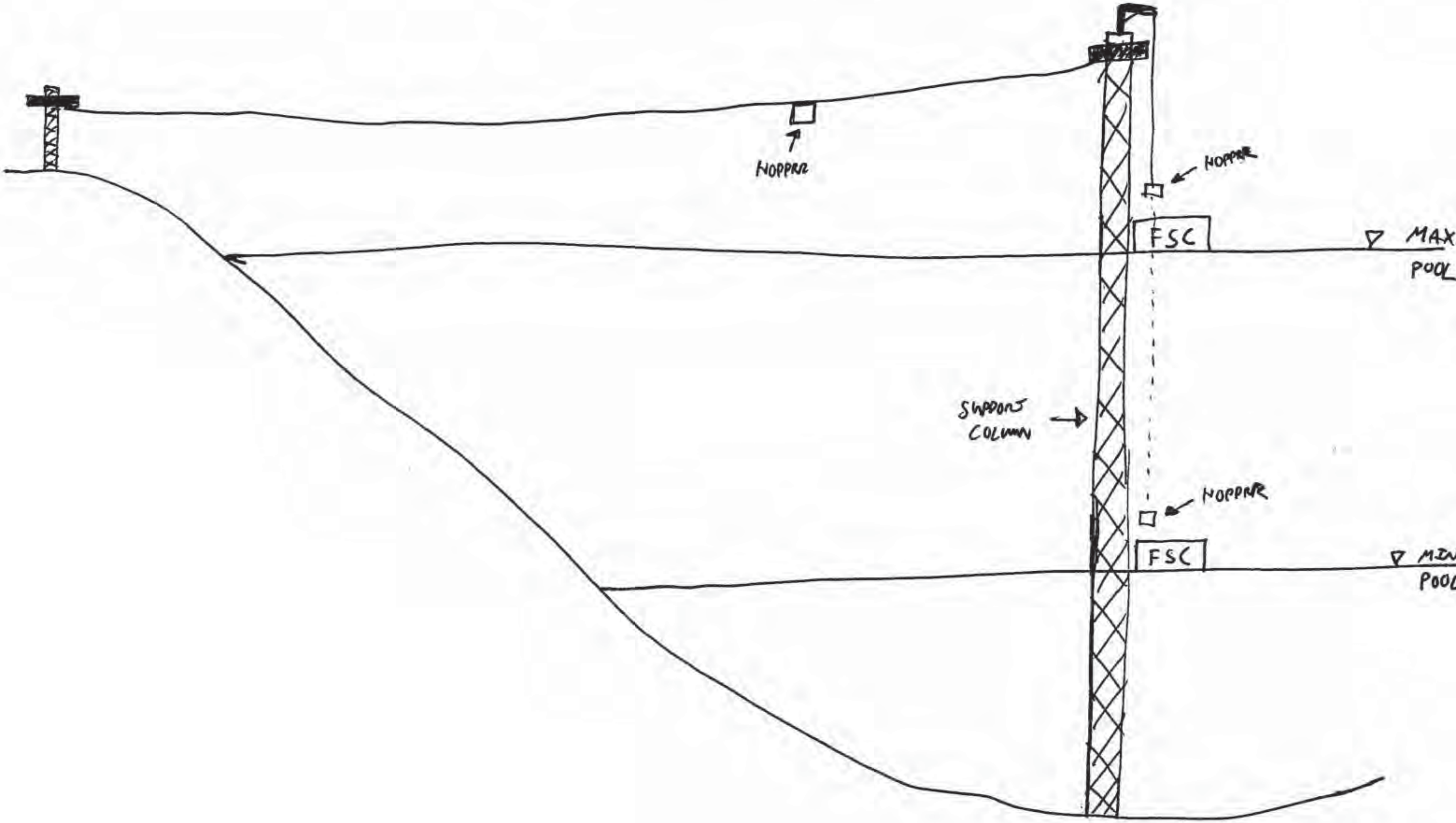
BARGE TO TOWER/BRIDGE



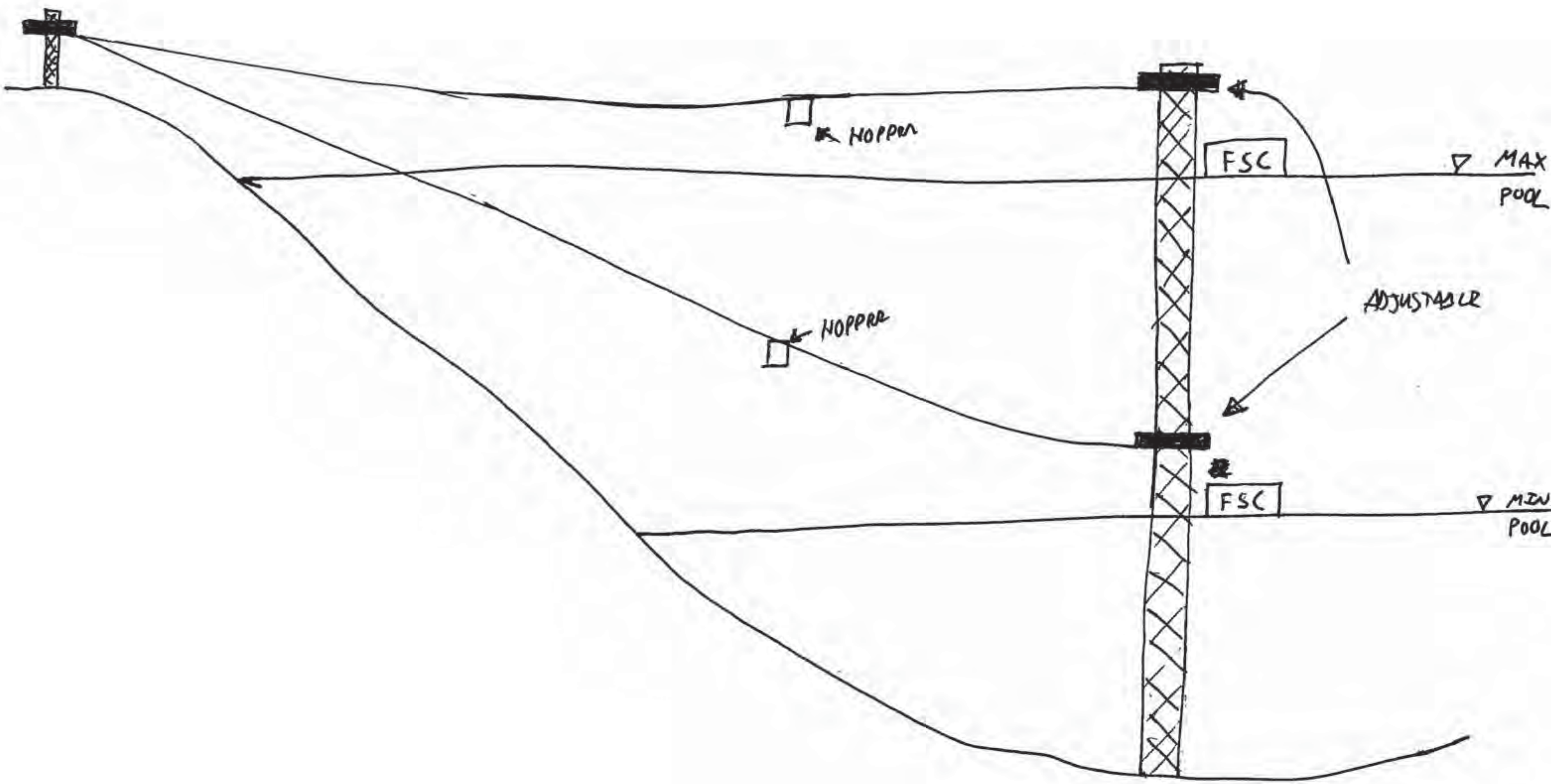
BARGE TO SHORELINE CHANNEL/CRANE

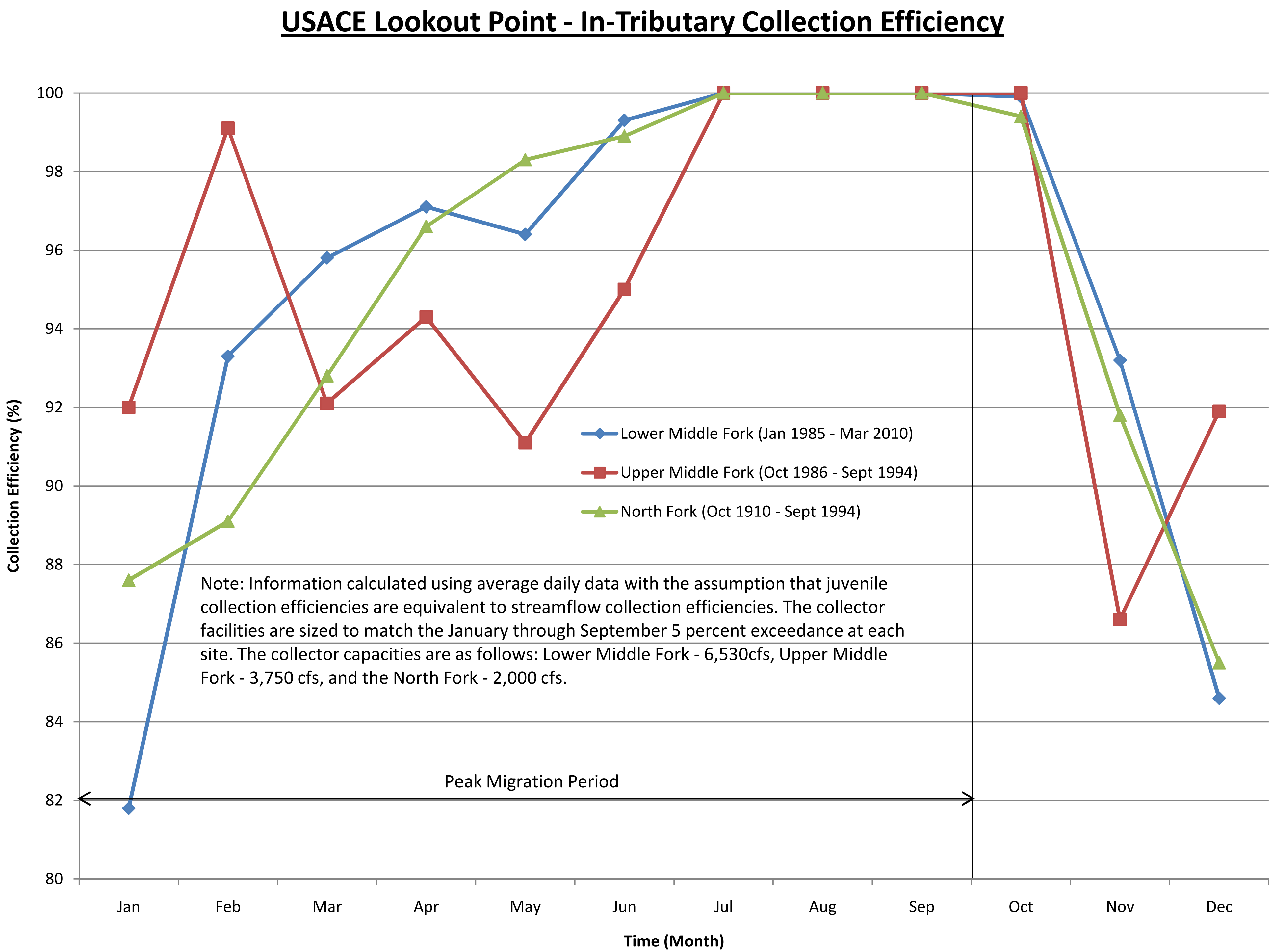


CRANE TO AERIAL TRAM



ADJUSTABLE AERIAL TRAM




USACE Lookout Point - In-Tributary Collection Efficiency
Collection Efficiency (%)
100
98
96
94
92
90
88
86
84
82
80
Lower Middle Fork (Jan 1985 - Mar 2010)
Upper Middle Fork (Oct 1986 - Sept 1994)
North Fork (Oct 1910 - Sept 1994)
Note: Information calculated using average daily data with the assumption that juvenile collection efficiencies are equivalent to streamflow collection efficiencies. The collector facilities are sized to match the January through September 5 percent exceedance at each site. The collector capacities are as follows: Lower Middle Fork - 6,530cfs, Upper Middle Fork - 3,750 cfs, and the North Fork - 2,000 cfs.
Peak Migration Period
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Time (Month)

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 15-July-2010

Attendees:

USACE

☒ Budai, Christine	☐ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☐ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1. Discuss highlights of the 30 Percent AR submittal.
2. Review action items
    - Backcheck your Dr. Checks comments for the 10 Percent AR
3. Review project schedule

Meeting Summary:

The team reviewed the recent 30 Percent AR submittal. Selected changes and updates from the 10 Percent AR include the following:

- Additional biological information has been provided in Section 2, including an estimate of the number of fish collected at each location by alternative.
- Section 3 references the February 2008 NMFS Anadromous Salmonid Passage Facility Design manual rather than listing all applicable criteria in the text. However, select criteria that deviate from this standard are identified.
- Section 4 was expanded to include detailed descriptions of the selected alternatives.
- Section 5 includes the evaluation matrix with the additional refinements discussed during Checkpoint Meeting No. 1.

James encouraged the team to focus their review on the descriptions of the alternatives in Section 4 and the Plates in preparation for Checkpoint Meeting No. 2.

It was noted that the In-Tributary In-Channel alternatives are likely not feasible due to the Floodplain Management executive order which restricts USACE from constructing projects in the floodplain.

It is understood that ESA Spotted Owl habitat may be located in and around the USFS Black Canyon Campground area. GIS information is available and will be reviewed to determine the location of nests in this area.

The In-Reservoir alternatives are located near the minimum flood control pool head-of-reservoir which is located approximately 7 miles upstream from Lookout Point Dam. The 50-foot draft associated with the FSC net transition structure (NTS) further constrains the location of these FSC alternatives.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• None.

Action Items:
• Provide information related to Floodplain Management executive order (Askelson; completed 23-July) • Backcheck your Dr. Checks comments for the 10 Percent AR (All) • Confirm design reservoir water surface elevations: Minimum flood control pool = 825.0 and maximum conservation pool = 926.0, or Minimum power pool = 819.0 and Maximum pool = 934.0) (Scullion) • Determine extent of Spotted Owl habitat and identify design and construction constraints (Kapla and Smith)

Previous Unaddressed Action Items:
• Schedule and hold breakout meeting between USACE and action agencies, including Stephanie Burchfield, to confirm the intent of BiOP RPA 4.9. This would include quantifying future recovery or escapement goals for Lookout Point, i.e. future fry production or numbers of returning adults (Jundt and Griffith). • Provide Walterville PIT tag data (Griffith; completed 16-July). • Add fish migration timing information to the in-tributary collection efficiency figure (Autier).

Parking Lot:
• None.

Look Ahead:
• Checkpoint Meeting No.2 will be held on the afternoon of 22-July. • 30 Percent AR Dr. Checks comments due on the 27-July • Next Team Coordination Meeting on 29-July.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

USACE Lookout Point Head of Reservoir Collection Alternatives Study – Checkpoint Meeting No. 2

DATE: 22 July 2010

TIME: 13:00 – 17:00

LOCATION: USACE Portland District, Summit Conference Room (10th Floor)

DIAL-IN INFORMATION: Phone number: 877.873.8018
Access Code: 2646958

General 13:00-13:15

1. Introductions
2. Purpose and goals of the meeting
3. Discuss any general comments on the 30 percent AR Report

Review Current Alternatives 13:15-15:00

1. In-Reservoir Alternatives
    - Location A vs. Location B and adjustable NTS concept
    - Fish transport to shore options
    - Exclusion net options, including consideration of upstream fish passage and recreational boating
2. In-Tributary Alternatives
    - Floodplain impacts – in-channel vs. off-channel
    - Energy dissipation of screened flows and impacts to river geomorphology
    - Upstream passage – false attraction and/or delay
3. Discuss advantages and disadvantages

Alternatives Evaluation 15:00-16:30

1. Discuss adaptive management approach
    - In-Reservoir Alternatives – Phased implementation possible
    - In-Tributary Alternatives – Full-scale production facilities only
    - Prototyping only of non-proven technologies
2. Review evaluation criteria
    - Updated fish collection potential data
3. Select up to five alternatives for further evaluation

Project Schedule and Meeting Wrap-Up 16:30-17:00

1. Action items
2. Review project schedule
    - Next Team Coordination Meeting – 29 July 2010
    - 60 Percent AR Submittal – 21 September 2010

Review Current Alternatives

The following ten alternatives were selected for further evaluation during Checkpoint Meeting No. 1:

Site Location	Collection Technology	Notes
1) Upper Reservoir	In-Reservoir: FSC with Nets	500 cfs attraction flow.
1a) Upper Reservoir	In-Reservoir: FSC w/o Nets	500 cfs attraction flow.
2) Upper Reservoir	In-Reservoir: FSC with Nets	1,000 cfs attraction flow.
3) Upper Reservoir	Mobile: Merwin Trap	
5) USFS Black Canyon Campground	In-Tributary: In-Channel Collector	Adjustable crest diversion.
6) USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	Adjustable crest diversion.
9) Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	Adjustable crest diversion.
12) Upper North Fork	In-Tributary: In-Channel Collector	Fixed or adjustable crest.
15) Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	Adjustable crest diversion.
16) Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	Adjustable crest diversion.

1) Upper Reservoir, In-Reservoir FSC with nets (500 cfs attraction flow)

Reference Plates 1, 3, 4, 7, 8 and 9

Advantages

- Proven existing technology
- Candidate for phased implementation: expandable to 1,000 cfs
- Relatively high fish collection potential
-

Disadvantages

- Fish transfer to shore is difficult
- High O&M cost associated with exclusion nets
- Requires special provisions for upstream fish passage and recreational boat passage
-

General

- The head of reservoir at the minimum flood control pool is located approximately 7 miles upstream from the Dam.
- The head of reservoir at the maximum conservation pool is located approximately 13 miles upstream from the Dam.
- Location A is approximately 3 miles upstream from the Dam.
- The adjustable NTS concept may allow the facility to be located further upstream at Location B which is approximately 5 miles upstream from the Dam.
-

1a) Upper Reservoir, In-Reservoir FSC without nets (500 cfs attraction flow)

Reference Plates 1, 3, 4, 8 and 9

Advantages

- Proven existing technology
- Candidate for phased implementation: expandable with nets or to 1,000 cfs
- Lower initial O&M costs (no nets)
- Does not require special provisions for upstream fish passage or recreational boat passage
-

Disadvantages

- Fish transfer to shore is difficult
- Lower fish collection potential
-

General

- The head of reservoir at the minimum flood control pool is located approximately 7 miles upstream from the Dam.
- The head of reservoir at the maximum conservation pool is located approximately 13 miles upstream from the Dam.
- Location A is approximately 3 miles upstream from the Dam.
- The adjustable NTS concept may allow the facility to be located further upstream at Location B which is approximately 5 miles upstream from the Dam

2) Upper Reservoir, In-Reservoir FSC with nets (1,000 cfs attraction flow)

Reference Plates 1, 5, 6, 7, 8 and 9

Advantages

- Proven existing technology
- Relatively high fish collection potential
-

Disadvantages

- Fish transfer to shore is difficult
- High O&M cost associated with exclusion nets
- Requires special provisions for upstream fish passage and recreational boat passage
-

General

- The head of reservoir at the minimum flood control pool is located approximately 7 miles upstream from the Dam.
- The head of reservoir at the maximum conservation pool is located approximately 13 miles upstream from the Dam.
- Location A is approximately 3 miles upstream from the Dam.
- The adjustable NTS concept may allow the facility to be located further upstream at Location B which is approximately 5 miles upstream from the Dam
-

3) Upper Reservoir, Mobile: Merwin Trap

Reference Plates 1 and 10

Advantages

- Proven existing technology
- Easily expandable through the provision of additional traps
- Candidate for phased implementation: trap locations and/or quantity
- Relatively low capital cost
-

Disadvantages

- Fish sorting, handling and transport is difficult
- Relatively low fish collection potential
-

General

-

5) and 6) USFS Black Canyon Campground, In-Tributary: In-Channel and Off-Channel Collectors

Reference Plates 2, 11, 12 and 17

Advantages

- Fish sorting, handling and transport is facilitated
- Relatively high fish collection potential
-

Disadvantages

- Very large facility with significant impacts to existing recreational facilities
- Potential ESA wildlife impacts
- Diversion dam would create a pool extending 5 miles upstream
- Excavation of flood conveyance channel likely required
- Energy dissipation of screened flows is required and may impact river geomorphology
- Potential impacts to upstream fish passage including false attraction and delay
- Not a good candidate for phased implementation
-

General

- Collector capacity of 6,530 cfs
-

9) Lower North Fork (Westfir): Off-Channel Collector

Reference Plates 2, 13 and 17

Advantages

- Fish sorting, handling and transport is facilitated
- Relatively high fish collection potential
- Relatively small facility on existing disturbed site
-

Disadvantages

- Diversion dam would create a pool extending 0.2 mile upstream
- Energy dissipation of screened flows is required and may impact river geomorphology
- Potential impacts to upstream fish passage including false attraction and delay
- Not a good candidate for phased implementation
-

General

- Site location has approximately 1/3 of the total Middle Fork flow and approximately 2/3 of the fish in the basin
- Collector capacity of 2,000 cfs
-

12) Upper North Fork: In-Channel Collector

Reference Plates 2, 14 and 17

Advantages

- Fish sorting, handling and transport is facilitated
- Relatively high fish collection potential
- Relatively small facility
-

Disadvantages

- Significant impacts to existing forested site
- Utilities likely not available at this site
- Diversion dam would create a pool extending 0.4 miles upstream
- Energy dissipation of screened flows is required and may impact river geomorphology
- Potential impacts to upstream fish passage including false attraction and delay
- Not a good candidate for phased implementation
-

General

- Site location has approximately 1/3 of the total Middle Fork flow and approximately 2/3 of the fish in the basin
- Collector capacity of 2,000 cfs
-

15) and 16) Lower Middle Fork: In-Channel and Off-Channel Collectors

Reference Plates 2, 15,16 and 17

Advantages

- Fish sorting, handling and transport is facilitated
-

Disadvantages

- Excavation of a secondary flood conveyance channel likely required with significant impacts to existing private property
- Relatively low fish collection potential
- Diversion dam would create a pool extending 0.45 miles upstream
- Energy dissipation of screened flows is required and may impact river geomorphology
- Potential impacts to upstream fish passage including false attraction and delay
- Not a good candidate for phased implementation
-

General

- Collector capacity of 3,750 cfs
-

Review Evaluation Criteria - Updated fish collection potential data

Comprehensive Alternative			Biological Criteria				
Number	Site Location	Technology	Proportion of Population Intercepted (POP)	Survival Probability, (S)	Collection Efficiency (CE)	Total Fish Collection Potential, (FCP)	Estimated Total Fish Collected
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100% [a,b,c]	70%	70%	70%	864,688
1)a	Upper Reservoir	In-Reservoir: Gulper/FSC w/o net	100% [a,b,c]	70%	40%	40%	494,108
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100% [a,b,c]	70%	80%	80%	988,215
3)	Upper Reservoir	Mobile: Merwin Trap	100% [a,b,c]	70%	12%	12%	148,232
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	100% [a,b,c]	80%	94%	94%	1,331,202
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100% [a,b,c]	80%	94%	94%	1,331,202
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	71%	95%	94%	67%	1,121,784
12)	Upper North Fork	In-Tributary: In-Channel Collector	66%	100%	94%	62%	1,094,673
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	25%[b]	85%	94%	24%	353,484
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	25% [b]	85%	94%	24%	353,484

[a]- No reduction in survival or habitat loss due to facility location was assigned to this site

[b] - Survival rates for fish passing through Hills Creek Dam were set at 40 percent to determine total population production for all facilities that would collect these juveniles.

[c] - Total fish production potential for the upper basin is 2.3 million

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Checkpoint Meeting No. 2
Date: 22-July-2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☒ Smith, Gregory	☒ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	☒ McCune, Kyle

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☐ Autier, Vincent
☒ Gatton, Bob	☒ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom ☒ Ziller, Jeff

NMFS

☒ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for Checkpoint Meeting No. 2 is attached and included the following items:

1) General
2) Review Current Alternatives
3) Alternatives Evaluation
5) Project Schedule and Meeting Wrap-up

Meeting Summary:

General. The purpose of this meeting was to review the 30 Percent Alternatives Report and to perform a second screening of the downstream collection alternatives. The existing list of 10 alternatives was prioritized to identify approximately 5 alternatives to be evaluated in further detail as part of the 60 Percent Alternatives Report. The list attached to the agenda was reviewed during the meeting and includes advantages, disadvantages and general observations associated with each of the 10 alternatives.

Review Current Alternatives. The following observations were made concerning the In-Reservoir Alternatives:

- Oregon chub was identified as a secondary species of concern and all life stages of chub are assumed to exist in the reservoir, including the larval stage. The existing PSE Baker project utilizes an exclusion net with ¼- and 3/32-inch mesh size openings. As such, the net sizing may have to be quite different at Lookout Point to prevent injury to chub and other small species. In the extreme, this could require a porous membrane-type barrier.
- Likewise, if fry are present in the reservoir, a lower approach velocity on the FSC screens, for example a 0.2 fps delta smelt criteria, should be considered.
- Resident fish shouldn't necessarily be transported downstream with the anadromous fish. However, the sorting process is very complex, particularly when handling fry. It may only be feasible to sort smolt size and larger fish. Additional direction from ODFW is required in this regard.
- Juvenile fish are believed to reside in the shallow water near the head of reservoir and may also migrate near the shoreline. Stranding may be an issue and is dependent on flood events and ramping rates. The FSC alternatives typically require deep water to operate.
- During periods of high reservoir water temperatures in the summer, fish tend to travel in deeper water further offshore. Fred Monzyk/ODFW may have additional information.

The following observations were made concerning the In-Tributary Alternatives:

- Chub do not reside in the North Fork of the Middle Fork.
- The return water from the screen may delay or prevent upstream migrants from finding the entrance to the fish ladder. Similarly, there may be delay on the upstream side near the entrance to the fish screens.
- The potential impacts to the Black Canyon Campground are significant. Northern Spotted Owl may also be present in this area.

The following observations were common to both the In-Reservoir and In-Tributary Alternatives:

- Marking, such as adipose fin removal, may be required for management of the fishery.
- Upstream fish passage for all species should be maintained as part of all alternatives. Fish ladders with 9-inch high steps would be required due to the presence of suckers, rainbow trout, pike minnow, cutthroat trout and lamprey.
- Specific truck-plant and/or release sites have not yet been identified. Recovery ponds may be required at the point of release. The ponds would provide

acclimation and temperature recovery for transported fish, which is particularly important for fry. The ponds could also support RM&E activities, i.e. latent mortality studies.

Alternatives Evaluation.

- The issue of reservoir rearing (a betterment) vs. predation in the reservoir (a detriment) is critical to the evaluation of the in-reservoir alternatives. The evaluation matrix ratings currently include a slight decrease in survival (detriment) for the in-reservoir technologies as compared to the in-tributary alternatives.
- There was a strong preference for FSC site location B, the most upstream location.
- Due to their low cost and flexibility, the Merwin traps could be part of a RM&E program prior to construction of a prototype or full-scale production facility. They are easily located close to the shoreline.
- The impacts to recreation at the Black Canyon Campground site, coupled with the presence of Northern Spotted Owls, make this site less attractive. Another site located upstream, but still below the confluence, would be preferable.
- As an option, the North Fork (Westfir) facility could be moved upstream to U.S. Forest Service land to avoid private property impacts.

The following alternatives were selected for further evaluation in the 60 Percent AR:

1. Upper Reservoir, In-Reservoir: FSC
    a) 500 cfs, without nets
    b) 500 cfs with nets
    c) 1,000 cfs with nets
2. Upper Reservoir, In-Reservoir: Merwin Traps
3. In-Tributary, Off-Channel: USFS Black Canyon Campground (Revised upstream location)
4. In-Tributary, Off Channel: Lower North Fork (Westfir)

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Provide hopper loading criteria (Jundt). • Confirm reservoir design water surface elevations (i.e. Minimum flood control pool = 825, and maximum conservation pool = 926; or, Minimum power pool = 819, and Maximum pool = 934) (Scullion). • Review reservoir flood event and ramp rate information in an effort to evaluate stranding (Willig). • Add Jeff Ziller/ODFW to email distribution (Kapla). • Update evaluation matrix for future discussion (Kapla). • Provide additional information regarding the sensitivity of the calculated fish collection potentials (Malone). • Contact Paul Scheerer regarding Oregon chub (Griffith). • Talk to FWS to identify appropriate juvenile Lamprey criteria (Griffith). • Provide input on disposition of resident fish by site location (Ziller).

Previous Unaddressed Action Items:
• Add juvenile Chinook migration timing information to the in-tributary collection figure (Autier).

Parking Lot:
• None.

Look Ahead:
• Next Team Coordination Meeting – 29-July. • 60 Percent AR Submittal – 21-September.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 29-July-2010

Attendees:

USACE

- [ ] Budai, Christine
- [x] Griffith, David
- [ ] Fortuny, Kristina
- [x] Sedey, Jeffrey A
- [ ] Langeslay, Mike
- [ ] Bardy, David
- [x] Roy, Liza
- [ ] Brackin, Joseph
- [ ] Scullion, Mary Karen
- [ ] Naidu, Anil
- [ ] Smith, Gregory
- [ ] Fielding, Scott
- [x] Askelson, Sean
- [ ] Calnon, James
- [ ] Burton, James
- [ ] Taylor, Gregory
- [ ] McCrae, Pat

CH2M/AECOM/BioA

- [x] Kapla, James
- [ ] Rounds, Michael
- [ ] Gatton, Bob
- [x] Sweeney, Chick
- [x] Willig, Isaac
- [x] Malone, Kevin
- [x] Giorgi, Al
- [ ] Autier, Vincent

BPA

- [x] Spear, Daniel

ODFW

- [ ] Friesen, Tom

NMFS

- [x] Jundt, Melissa
- [ ] Burchfield, Stephanie

FWS

- [ ] Gray, Ann

Confederated Tribes of the Grand Ronde

- [ ] Humphreys, Brandy
- [ ] Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Review updated evaluation matrix (attached).
2) Review action items.
   - Backcheck your Dr. Checks comments for the 10 Percent AR
   - Provide 30 Percent AR Dr. Checks comments
3) Review project schedule.
   - 30 Percent AR Dr. Checks Comments Due – 27 July
   - Next Team Coordination Meeting – 12 August

Meeting Summary:

Additional refinements were made to the evaluation matrix (attached) including updates to the fish collection potential calculation. This included a reduction in the collection efficiency for the FSC without a net alternative from 40 to 20 percent. As such, the following alternatives rank highest and were prioritized for further evaluation:

1) USFS Black Canyon Campground; In-Tributary: Off-Channel Collector
2) Lower North Fork (Westfir); In-Tributary: Off-Channel Collector
3) Upper Reservoir; In-Reservoir: FSC (500 cfs w/o net, 500 cfs w/net and 1,000 cfs w/net)

In addition, the following alternative was selected because it provides significant M&E benefits with a low capital investment:

4) Upper Reservoir; In-Reservoir: Merwin Trap

Possible future refinements to the evaluation matrix include the following:

- Removal of the “Downstream Passage” criteria, since this is already considered under “Survival.”
- Consideration of capital costs, once this information is available.
- Review of the “Recreation” criteria for the USFS Black Canyon Campground alternative, as this alternative will likely move upstream to avoid ESA Spotted Owl habitat.

Updated biological information was also discussed at the meeting:

- Salmon and steelhead are the priority species; however, Oregon chub will also need to be considered. These fish are on the order of 19-20 mm in length and little data is available regarding their behavior around net systems.
- Stranding of Chinook during reservoir fluctuations may be an issue, particularly in the shallow bench areas located around the reservoir.
- Rainbow trout and bass are also present and may be encountered in a collection facility.
- Lamprey have been extirpated from the area but provisions should be made for their return. Lamprey have been observed in Fall Creek. Criteria for juvenile lamprey does not currently exist.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• None.

Action Items:
• Provide comments on 30 Percent AR via Dr. Checks (All).
• Obtain Oregon chub information from FWS (Griff; completed).
• Discuss hopper holding criteria at 9 August NMFS engineering meeting (Jundt).
• Discuss Lamprey requirements with Lawrence Schwabe (Griff).

Previous Unaddressed Action Items:
• Confirm design reservoir water surface elevations: Minimum flood control pool = 825.0 and maximum conservation pool = 926.0, or Minimum power pool = 819.0 and Maximum pool = 934.0) (Scullion)
• Determine extent of Spotted Owl habitat and identify design and construction constraints (Kapla and Smith)
• Schedule and hold breakout meeting between USACE and action agencies, including Stephanie Burchfield, to confirm the intent of BiOP RPA 4.9. This would include quantifying future recovery or escapement goals for Lookout Point, i.e. future fry production or numbers of returning adults (Jundt and Griffith).
• Add fish migration timing information to the in-tributary collection efficiency figure (Autier).

Parking Lot:
• None.

Look Ahead:
• The next Team Coordination Meeting is on 12-August.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

USACE - Lookout Point
Evaluation Matrix (29 July 2010)

Comprehensive Alternative				Biological Evaluation Criteria												Technical Evaluation Criteria			Economic Impacts and Other Criteria						
	Site Location	Technology	Notes	Proportion of Population Available for Collection, POP (%)	Survival Probability, S (%)	Collection Efficiency, CE (%)	Total Fish Collection Potential, FCP (%)	Fish Collection Potential (Double Weighted)		Reservoir Conditions	Downstream Passage Conditions	Bypass Conditions	Effects on Other ESA Fish	Effects on Other Fish of Concern	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Operations and Maintenance (O&M)	Design/Constructibility	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	These three alternatives will be combined into a single, phased implementation alternative.	100%	70%	70%	49%	4	4	3	4	3	3	4	3	3			2	2	2	3	4	43	6
1)a	Upper Reservoir	In-Reservoir: Gulper/FSC w/o net		100%	70%	20%	14%	1	1	3	3	3	4	4	5	3			3	3	4	3	4	44	5
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs		100%	70%	80%	56%	4	4	3	4	3	3	4	3	3			1	1	2	3	4	41	9
3)	Upper Reservoir	Mobile: Merwin Trap (2 traps)	This alternative will continue to be evaluated because it has the potential for significant M&E benefits with a low capital investment.	100%	70%	12%	8%	1	1	4	1	2	2	5	5	3			4	2	3	3	4	40	10
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector		100%	80%	94%	75%	5	5	5	5	4	4	4	4	3			3	4	1	3	3	53	1
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	This site location will be moved upstream to avoid impacts to the existing campground.	100%	80%	94%	75%	5	5	5	5	4	4	4	4	3			3	4	1	3	3	53	1
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	This site location may be moved upstream if property ownership becomes a concern.	71%	95%	94%	63%	4	4	5	4	4	4	4	4	3			3	4	2	3	4	52	3
12)	Upper North Fork	In-Tributary: In-Channel Collector		66%	100%	94%	62%	4	4	5	3	4	4	4	4	3			3	4	4	3	1	50	4
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector		25%	85%	94%	20%	2	2	5	2	4	4	4	4	3			3	4	1	3	3	43	6
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector		25%	85%	94%	20%	2	2	5	2	4	4	4	4	3			3	4	1	3	3	43	6

Shading denotes alternatives that were removed from further consideration.

USACE - Lookout Point
Alternatives in Rank Order (29 July 2010)

Comprehensive Alternative				
	Site Location	Technology	Notes	Rank
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	This site location will be moved upstream to avoid impacts to the existing campground.	1
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	This site location may be moved upstream if property ownership becomes a concern.	2
1)	Upper Reservoir	In-Reservoir: FSC (500 cfs w/o net, 500 cfs with net, or 1,000 cfs with net)	Three FSC alternatives combined into a single, phased implementation alternative.	3
3)	Upper Reservoir	Mobile: Merwin Trap (2 traps)	This alternative will continue to be evaluated because it has the potential for significant M&E benefits with a low capital investment.	4

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 12-August-2010

Attendees:

USACE

☐ Budai, Christine	☐ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☒ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☒ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☐ Spear, Daniel

ODFW

☐ Friesen, Tom	☒ Ziller, Jeff

NMFS

☒ Jundt, Melissa	☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy	☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Discuss results of USACE/Action Agency meeting and any clarifications to the intent of the BiOP.
2) Discuss cost estimate format for 60 Percent AR to ensure consistency with the Cougar study.
3) Review "nice to have" vs. "need to have" facility components.
4) Review action items.
   - Provide 30 Percent AR Dr. Checks comments.
   - Other action items.
5) Review project schedule.
   - Discuss schedule for Checkpoint Meeting No. 3.

Meeting Summary:

USACE/Action Agency meeting. Melissa and Sean provided a summary of the breakout meeting between USACE and the action agencies. The meeting provided additional clarification regarding BiOP RPA 4.9 which is specifically related to Lookout Point. The following observations and guidance were provided:

- The Lookout Point feasibility study should be advanced through the 100 percent AR deliverable.
- Because the proposed technologies have largely been proven elsewhere, they likely will not need to be prototyped at Lookout Point. However, significant progress toward developing a full production facility is still required prior to the 2014 deadline.
- The collection efficiency parameter and related goals and/or specific targets were not discussed.
- Development of the Lookout Point downstream collection facility will have to be prioritized against other BiOp projects due to schedule and budget constraints. Such decisions will be made by others outside the PDT.

Cost estimate format. A draft cost estimate template has been developed to present capital construction and O&M costs associated with the priority alternatives. It is anticipated that modifications will be required to ensure consistency with the Cougar report.

Required Facility Components. Several components may not necessarily be required for operation of the facility and could perhaps be simplified, deferred or eliminated. Such components may include the following:

- Recovery ponds – Direct release below Dexter Dam is another option, similar to the current concept at Cougar.
- Various features to facilitate M&E activities, i.e. sampling and enumeration facilities - Could possibly be simplified or deferred.
- Sorting facilities – The complexity of the sorting/handling facility has significant capital and O&M cost impacts. It is currently assumed that collected fish will be sorted into two size classes: smolts and fry (<200 mm) and adults (>200 mm). It is anticipated that all fish smaller than 200 mm in size (both anadromous and resident fish) would be passed downstream. Adults would be placed back into the reservoir. Provisions for additional sorting or handling would increase the complexity of the facility.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• See USACE/Action Agency meeting summary above.

Action Items:
• Provide draft cost estimate template for USACE review. (Autier, completed 08/12/10). • Review draft cost estimate template for consistency with Cougar report and USACE standards/preferences (Askelson and Sedey). • Provide detailed site location information to facilitate review of spotted owl habitat areas (Kapla; completed 8/19/10). • Provide spotted owl habitat information (Smith). • Create Doodle poll for Checkpoint Meeting No. 3 schedule (Kapla). • Provide input on disposition of resident fish by site location (Ziller).

Previous Unaddressed Action Items:
• For the design which reservoir levels to use (i.e. Minimum flood control pool = 825, and maximum conservation pool = 926; or, Minimum power pool = 819, and Maximum pool = 934) (Scullion). • Contact Paul Scheerer regarding Oregon chub (Griffith). • Add fish migration timing information to the in-tributary collection efficiency figure (Autier).

Parking Lot:
• None.

Look Ahead:
• Next Team Coordination Meeting on 26-August. • Checkpoint Meeting No.3 will be held in October.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 26-August-2010

Attendees:

USACE

☒ Budai, Christine	☐ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☒ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☐ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom	☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa	☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy	☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Discuss selected 30 Percent AR Dr. Checks comments
   - Assumptions and limitations associated with collection efficiency parameter for in-tributary alternatives.
   - Location/orientation of collectors and nets for in-reservoir alternatives.
2) Review action items.
3) Review project schedule.

Meeting Summary:

30 Percent AR Dr. Checks Comments. The attached figure was discussed which presents both collection efficiencies and Chinook run timing data for the in-tributary sites on a monthly basis. The following observations were made:

- The collection efficiency (CE) parameter is used in conjunction with an estimate of fish population and an estimate of fish survival to determine the overall fish collection potential (FCP) for a given technology and site location.
- The primary assumption associated with the CE parameter is that collection efficiencies for in-tributary alternatives are assumed to be equivalent to the total hydraulic capacity of the collector. For example, a collector that has a capacity equivalent to the 5 percent exceedence streamflow (during the period of fish migration) is assumed to capture 95 percent of the available fish. This assumption is consistent with findings that indicate that the juvenile outmigration in the Middle Fork basin is evenly distributed across the range of streamflows and not necessarily weighted towards the upper end of the hydrograph; for instance, during the spring freshets.
- This assumption is also assumed to be conservative because it is likely that fish collection would continue to occur above the design capacity of the collector (although some fish arriving at the collector location would bypass the facility via spill).
- It should be noted that the 5 percent exceedance flow rate (95 percent CE) is used as an initial point of comparison only and is not actual performance criteria. Specific performance criteria will be defined by others during implementation of the BiOp.
- The peak migration period is from January through September; however, it may be possible to operate the facility outside this period if required.
- The total fish collection potential numbers represent both fry and smolts combined.
- The estimates of total FCP at Westfir and at Black Canyon are similar - 1,119,000 and 1,327,000 fish respectively. However, the Black Canyon facility would have to be over three times as large.
- Additional studies, sampling and modeling will be required to substantiate and confirm these assumptions.

In-Reservoir Collectors. The proposed location and orientation of the in-reservoir FSC alternatives was discussed with respect to juveniles migrating near the shoreline. Due to their deep draft, the FSCs must be located near the thalweg, particularly at low pool. Therefore, strategic placement of exclusion nets is essential. The FSC w/out net alternative may also perform poorly if fish are not otherwise guided to the collector. Additional sampling and modeling is required to determine the optimum location for an FSC. The Merwin traps can be deployed in shallow water and perhaps could be used alone or in conjunction with an FSC.

Northern Spotted Owl Habitat. Owl habitat mapping will be made available to the A-E team shortly. The area from the Black Canyon Campground upstream to the confluence with the North Fork of the Middle Fork is either existing home range habitat or Late Successional Reserve (LSR) area. The LSR land use designation would make it very difficult to construct any facilities in this area. The North Fork Westfir area appears to be free from encumbrances.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below. The Lookout Point and Cougar downstream collection studies are both approaching the 60 Percent AR stage. However, additional studies, sampling and modeling have been identified which may allow major report assumptions to be substantiated or revised. For example, life cycle modeling should be completed early next spring. USACE may decide to delay preparation of the 90 and 100 Percent ARs to allow for incorporation of this information.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Provide NSO habitat maps (Askelson; completed 27-August) • Review draft cost estimate template for consistency with Cougar report and USACE standards/preferences (Sedey; completed 27-August). • Provide list of ongoing and proposed biological studies at Lookout Point, i.e. Oneida net trapping (Griffith)

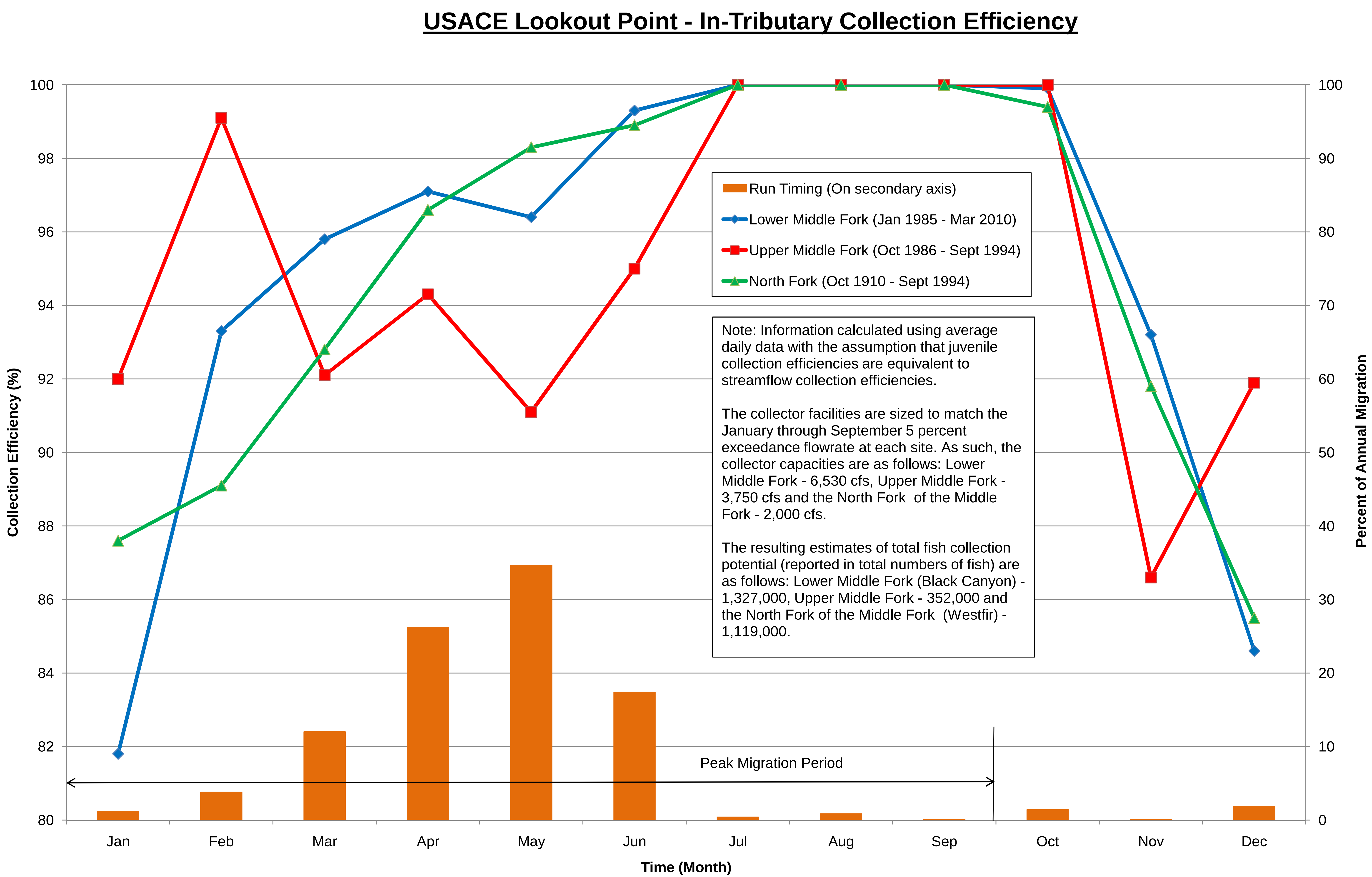
Previous Unaddressed Action Items:
• Confirm reservoir design water surface elevations (i.e. Minimum flood control pool = 825, and maximum conservation pool = 926; or, Minimum power pool = 819, and Maximum pool = 934) (Scullion). • Contact Paul Scheerer regarding Oregon chub (Griffith). • Provide input on disposition of resident fish by site location (Ziller).

Parking Lot:
• None.

Look Ahead:
• Next Team Coordination Meeting – 9-September. • 60 Percent AR Submittal – 21-September • Checkpoint Meeting No. 3 – Afternoon of Wednesday, 20-October is proposed.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir


USACE Lookout Point - In-Tributary Collection Efficiency
Collection Efficiency (%)
Percent of Annual Migration
Time (Month)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Run Timing (On secondary axis)
Lower Middle Fork (Jan 1985 - Mar 2010)
Upper Middle Fork (Oct 1986 - Sept 1994)
North Fork (Oct 1910 - Sept 1994)
Note: Information calculated using average daily data with the assumption that juvenile collection efficiencies are equivalent to streamflow collection efficiencies.
The collector facilities are sized to match the January through September 5 percent exceedance flowrate at each site. As such, the collector capacities are as follows: Lower Middle Fork - 6,530 cfs, Upper Middle Fork - 3,750 cfs and the North Fork of the Middle Fork - 2,000 cfs.
The resulting estimates of total fish collection potential (reported in total numbers of fish) are as follows: Lower Middle Fork (Black Canyon) - 1,327,000, Upper Middle Fork - 352,000 and the North Fork of the Middle Fork (Westfir) - 1,119,000.
Peak Migration Period

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 9-September-2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☐ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☐ Sweeney, Chick	☐ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☐ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom ☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Discuss cost estimate format
2) Discuss any other outstanding issues related to preparation of the 60 Percent AR
3) Review action items.
4) Review project schedule.

Meeting Summary:

Cost Estimate Format. Preliminary construction cost estimates have been prepared and will be included in the 60 Percent AR document. The cost estimates consist of a summary sheet with capital and O&M costs for all four alternatives and detail sheets (including the TPCS sheets provided by USACE). All costs are order-of-magnitude costs for comparative purposes only. A cost-effectiveness evaluation, similar to that described in the COP, will not be conducted at this time.

Ongoing Studies. Ongoing studies and modeling at Lookout Point include the following:

- Hydroacoustic study
- In-tributary sampling with screw traps
- In-reservoir sampling including snorkel surveys and Oneida/Merwin net trapping
- Pre-spawn mortality studies (adults)
- Life-cycle modeling (preliminary results available by the end of 2010/early 2011)

These studies will likely not produce information in a timely enough manner to incorporate findings into the AR. As such, delivery of the 90 Percent and Final ARs will not be delayed as discussed previously. The preferred collection facility site locations and technologies will be generally identified in the Final AR. Specific performance criteria will then be defined once the required studies and modeling have been completed.

Northern Spotted Owl Habitat. USACE has provided spotted owl habitat mapping information. Additional coordination with the USACE environmental resources lead is required to identify the constraints and limitations associated with each designated zone.

Real Estate. USACE has made initial contact with USFS regarding potential real estate requirements associated with the project. Any special constraints and/or coordination requirements will be identified in the AR. Discussions with private landowners will not be conducted at this time.

Debris Handling. It is anticipated that debris handling will be a significant operational issue, particularly for the in-tributary alternatives. The collection facilities will include a coarse trashrack with an automatic rake upstream of the dewatering screens. The screens themselves will have an automated brush system; however, small debris that passes through the trashrack will likely be swept into the bypass (along with the fish). This will make sorting and handling operations difficult, especially when dealing with fry and neutrally-buoyant debris. Periodic sluicing of debris and sediment in the forebay (either by opening a radial/sluice gate or by dropping the inflatable dam) may help mitigate this issue. Other measures may include manual separation of fish and debris in the short-term holding vessels, removal of floating debris with a skimmer, and/or simply transporting the debris along with the fish in the tanker trucks.

Project Schedule and Action Items. The look-ahead project schedule and action items are summarized below. As discussed above, USACE has decided not to delay preparation of the 90 and 100 Percent ARs.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items, and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Provide list of potential WATER attendees for Checkpoint Meeting No. 3 (Roy). • Distribute meeting invitation for Checkpoint Meeting No. 3 (Kapla). • Backcheck last remaining 10 Percent AR Dr. Checks comment (Roy and Brackin). • Provide copy of draft cost estimate summary sheets (Kapla; completed 9-Sept). • Show 30-day agency review period on project schedule (Kapla). • Discuss spotted owl habitat constraints with Greg Smith (Kapla). • Provide USFS contact information for real estate issues (Budai).

Previous Unaddressed Action Items:
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith) • Confirm reservoir design water surface elevations (i.e. Minimum flood control pool = 825, and maximum conservation pool = 926; or, Minimum power pool = 819, and Maximum pool = 934) (Scullion). • Contact Paul Scheerer regarding Oregon chub, including constraints related to the FSC exclusion net openings and sorting/handling facilities (Griffith). • Provide input on disposition of resident fish by site location (Ziller).

Parking Lot:
• None.

Look Ahead:
• 60 Percent AR Submittal – 21-September • Next Team Coordination Meeting – 23-September. • Checkpoint Meeting No. 3 – Afternoon of Wednesday, 20-October is proposed.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 23-September-2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☐ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☒ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☒ Smith, Gregory	☒ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☐ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom ☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa ☒ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Review highlights of 60 Percent AR.
    - Northern Spotted Owl discussion.
    - Updated biological evaluations.
    - Additional reservoir hydraulic data.
    - Preliminary recommendation of alternatives to be evaluated at 90 percent.
    - Recommendations for further studies.
2) Back check of 30 Percent AR Dr. Checks Comments.
3) Review action items.
4) Review project schedule.

Meeting Summary:

60 Percent AR. The 60 Percent AR document is complete and has been posted to Dr. Checks for review. Review comments are due on 8-October. The report is provided in three electronic files: text, appendices, and plates. Selected highlights of 60 Percent AR include the following:

Report Format. There have been minor changes to the overall organization of the report. Section 4 provides descriptions of all alternatives, including documentation of alternatives that were not considered beyond the 10 and 30 percent evaluations. Section 5 describes the evaluation process at each stage of the evaluation. Previous plates are provided in Appendix F.

Northern Spotted Owl Definitions. Section 3.7, Environmental and Cultural Resource Criteria, now includes a table of habitat definitions to be used in conjunction with the mapping provided in Appendix D.

Updated Biological Evaluations. Section 5 includes updated biological information including estimated collector capacities by month (Table 5-3) and fish collection potentials including estimates of total fish collected (Table 5-4).

Additional Reservoir Hydraulic Data. Appendix C now includes two outfall-duration curves, one for the annual reservoir outflow and one for the fish passage season outflow. Two periods of record are also considered. This information, particularly the 5 percent exceedence annual outflow, confirms the selected net design flow rate as described in Section 3.2.3.

Section 2.2.3 provides reservoir ramp rate information based on historical hourly water surface elevations. Maximum rates of +0.29 ft/hr and -0.20 ft/hr were calculated. These rates correlate reasonably well with the 5 ft/day rate discussed previously.

ITR comments. The A/E team conducted an ITR review of the draft 60 Percent AR. Comments and responses are included in Appendix H. Many of the comments were related to the FSC mooring and exclusion net systems, and the difficulty of operating over the full range of reservoir water surface elevations. The PSE Upper Baker normal operating range is 30 to 40 feet and the PacifiCorp Swift normal operating range is approximately 50 feet. The 101 feet of normal reservoir fluctuation at Lookout Point is somewhat unprecedented for the design of fish collection facilities.

Project Costs. Table 5-9 presents the total project costs for the 60 Percent AR alternatives, including both capital and O&M costs. Costs for the Black Canyon in-tributary alternative are significantly higher than the other alternatives due to the large hydraulic capacity of the facility. Detailed cost estimate information is provided in Appendix G.

Preliminary recommendation of 90 Percent Alternatives. Section 5.5.4 and Table 5-10 include preliminary recommendations of two alternatives to prioritize for consideration during the 90 Percent evaluation. The alternatives include the In-Reservoir FSC (500 and 1,000 cfs) and the Lower North Fork (Westfir) in-tributary off-channel collector. These recommendations will be discussed and confirmed during Checkpoint Meeting No. 3 on 20-October.

Recommendations for further studies. Section 7 includes a preliminary list of recommendations for further studies. This list includes information from the Design Requirements Report as well as .

Backcheck of 30 Percent AR Comments. The 60 Percent AR document has been posted to Dr. Checks for review and backcheck of 30 Percent AR comments.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Provide meeting notes from discussion with PacifiCorp regarding the Swift FSC (Roy; completed 23-Sept).
• Contact USFS and arrange for a meeting and site visit on 21-October if possible (Roy, Askelson, Kapla).
• Forward meeting invite to Sean and Liza for the A/E meeting on 6-October to discuss FSC net and mooring issues (Kapla; completed 23-Sept).
• Update real discount rate used for O&M present value cost calculations (Kapla).

Previous Unaddressed Action Items:
• Provide USFS contact information for real estate issues (Budai; completed 24-Sept).
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith)
• Contact Paul Scheerer regarding Oregon chub, including constraints related to the FSC exclusion net openings and sorting/handling facilities (Griffith).
• Provide input on disposition of resident fish by site location (Ziller).
• Back check last remaining 10 Percent AR Dr. Checks comment (Roy and Brackin).
• Provide list of potential WATER attendees for Checkpoint Meeting No. 3 (Roy).
• Show 30-day agency review period on project schedule (Kapla).
• Discuss spotted owl habitat constraints with Greg Smith (Kapla).
• Review schedule for the 90 percent submittal with Sean Askelson (Kapla)

Parking Lot:
• None.

Look Ahead:
• Next Team Coordination Meeting – 7-October. • Dr. Checks Review to the 60-percent AR due on 8-October. • Checkpoint Meeting No. 3 – Afternoon of Wednesday, 20-October in Portland.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Land Use Discussion with USFS
Date: 19-October-2010

Attendees:

USACE

☒ Budai, Christine	☐ Roy, Liza	☐ Askelson, Sean
☐ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☒ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	

CH2M/AECOM/BioA

☒ Kapla, James	☐ Sweeney, Chick	☐ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☐ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☐ Spear, Daniel

ODFW

☐ Friesen, Tom	☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa	☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy	☐ Schwabe, Lawrence

USFS

☒ Swanson, Nikki	☒ Larson, Doug	☒ Langum, Brandy
☒ Blundon, Brett		

Meeting Agenda:

The agenda for the land use discussion included the following items:

General
1) Introductions
2) Purpose and goals of the meeting

Project Background and Current Alternatives
1) Project Background
2) Project Schedule

3) Current Alternatives
    a. In-Reservoir Alternatives
        - Floating Surface Collector (FSC), Location A or B
        - Merwin Traps
    b. In-Tributary Alternatives
        - Black Canyon Collector
        - Westfir Collector
4) Discuss Land Use Considerations
    a. Property ownership
    b. Site access and utilities
    c. Wildlife habitat
    d. Flood impacts

Field Reconnaissance

1) Visit proposed site locations as necessary

Meeting Summary:

General

The purpose of this meeting was to brief USFS personnel on the Lookout Point Head of Reservoir Collection Alternatives Study and to solicit feedback on the 60 percent alternatives, especially with regard to land ownership, land use and habitat issues.

Project Background and Current Alternatives

This study is related to specific actions in the NMFS 2008 Biological Opinion (BiOP) for the Willamette Valley. The purpose of the alternatives report (AR) is to provide an assessment of the technical feasibility of providing downstream passage for juvenile salmon at Lookout Point Dam via head-of-reservoir and/or in-tributary collection and transportation facilities. The report is currently at the 60 percent level of completion and will be finalized in early February 2011.

Four alternatives from the initial list of twenty-three alternatives have been prioritized for further evaluation. They include two in-reservoir alternatives (FSC and Merwin Traps) and two in-tributary alternatives (Black Canyon and Westfir).

In-Reservoir Alternatives. The USFS boundary is located between FSC Locations A and B. Location A is outside the Willamette National Forest and Location B (and the Merwin Trap location) is located inside the Willamette National Forest.

Black Canyon Alternative. It was noted that the Black Canyon alternative as described in the 60 Percent AR (upstream from the campground) is within or adjacent to the Buckhead Wildlife Area. Historic river channels and gravel bars in this vicinity are also Oregon chub habitat. The site appears to be outside of northern spotted owl habitat (both known and predicted); however, it is located within a Late Successional Reserve area. The site includes an interpretive trail used for public education. Other recreational activities in this area include fishing, boating and both private and commercial rafting. Boats are typically put in upstream near Oakridge and taken out at the Black Canyon Campground boat ramp. Portage facilities would be required for any diversion structures within this reach. It is anticipated that the backwater from a facility at this location would extend approximately 5 miles upstream.

Westfir Alternative. It was noted that the North Fork was designated a federal Wild and Scenic River in 2001. It is understood that this designation extends from Waldo Lake downstream to the National Forest Boundary located just upstream of the town of Westfir (near the railroad bridge), and includes portions protected for wild, scenic and recreational values. This designation does not appear to include the site of the Westfir Alternative as defined in the 60 Percent AR. Recreational activities in this area include fishing and kayaking with a variety of put-in locations upstream of Westfir and a take out located just below Westfir near the confluence with the Middle Fork. It is anticipated that the backwater from a facility at this location would extend approximately 0.2 miles upstream. The drinking water intake for the town of Westfir is also located just upstream of the railroad bridge.

Bull Trout. Bull trout are currently being reintroduced into the basin. They reside primarily in the Middle Fork above Lookout Point Reservoir but may also be present in the North Fork. It is anticipated that any bull trout collected by the facility would need to be sorted out and transported above Hills Creek Dam. Coordination with the Upper Willamette Bull Trout Working Group would be required. No fish passage facilities are currently contemplated for Hills Creek Dam.

NEPA Process. If the project is determined to be feasible and authorized for preliminary planning and design, USACE would prepare the National Environmental Policy Act (NEPA) documentation with input and review from USFS. Any incidental take of ESA-listed species would likely be covered under the BiOP. A USFS special use permit may be required.

Field Reconnaissance

Several potential facility locations were visited by the group in the afternoon (see attached exhibits). In general, good in-tributary facility locations are characterized by a narrow defined channel upstream with stable banks for siting the diversion structure and intake screens, and a wide, low overbank area downstream with good access for the fish sorting and handling facilities. The full range of evaluation criteria is described in the AR. It is anticipated that any location would require a site-specific design to optimize the overall performance of the facility.

Hampton Site. The Hampton site is located on the left (southerly) bank downstream from the Black Canyon Campground and is an existing boat ramp and picnic area. The site is located directly across from Hospital Creek and includes a narrow channel with several rock outcroppings. A large benched area is located just downstream; however, it was unknown to what extent this area would be inundated at the maximum conservation pool. A collection facility at this site would be influenced by both the river and the reservoir over the annual period of operation. As such, a diversion weir elevation set approximately 3 feet above the maximum conservation pool water surface elevation would be necessary. This requires a structure that is able to handle submergence on the downstream side, and may require a weir taller than the 12 feet proposed for the other in-tributary alternatives. A design flowrate of 6,530 cfs is assumed for a collector at this location. It is also anticipated that this site would be too constrained for an FSC alternative with an exclusion net due to the high ambient velocities.

Upper North Fork Site. The Upper North Fork Site was visited previously during the initial site visit in April 2010 and was included in the full list of alternatives considered at Checkpoint Meeting No. 1. The alternative was de-prioritized due to concerns related to the right bank slope stability, lack of existing utilities, existing tree cover and the presence of a comparable yet slightly higher-ranked site located downstream (the Westfir alternative). The Upper North Fork site appears to remain feasible from a technical engineering perspective; however, it is believed to be located within the Wild & Scenic Area.

1910 Road and 1912 Road Bridge Sites. Two bridges were visited that provide access to roads on the west side of the river – the 1910 road and the 1912 road. Both sites appeared to be too narrow with steep slopes unsuitable for siting the facility.

Roadside Pull Out. A site in the vicinity of Leapfrog Creek was accessed via a roadside pullout. This site seemed technically feasible; however much less overbank area is available at this location in comparison to the Upper North Fork and Westfir alternatives.

North Fork Road Bridge. This site was the upstream limit of the reconnaissance. The river channel is relatively narrow with exposed rock banks near the bridge; however, suitable areas downstream for siting of the facility appeared to be limited.

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Provide citation for NMFS tech memo on Chinook salmon (Larson; completed 20-Oct). • Provide additional information regarding the location of and restrictions associated with the North Fork Wild & Scenic Area designation (Swanson). • Provide Checkpoint Meeting No. 3 conference call dial-in information to Nikki (Kapla; completed 19-Oct) • Provide USFS access to electronic copies of 60 Percent AR Report (Kapla; completed 22-Oct). • Add USFS staff (Nikki and Doug) to PDT distribution list (Kapla; completed 22-Oct).

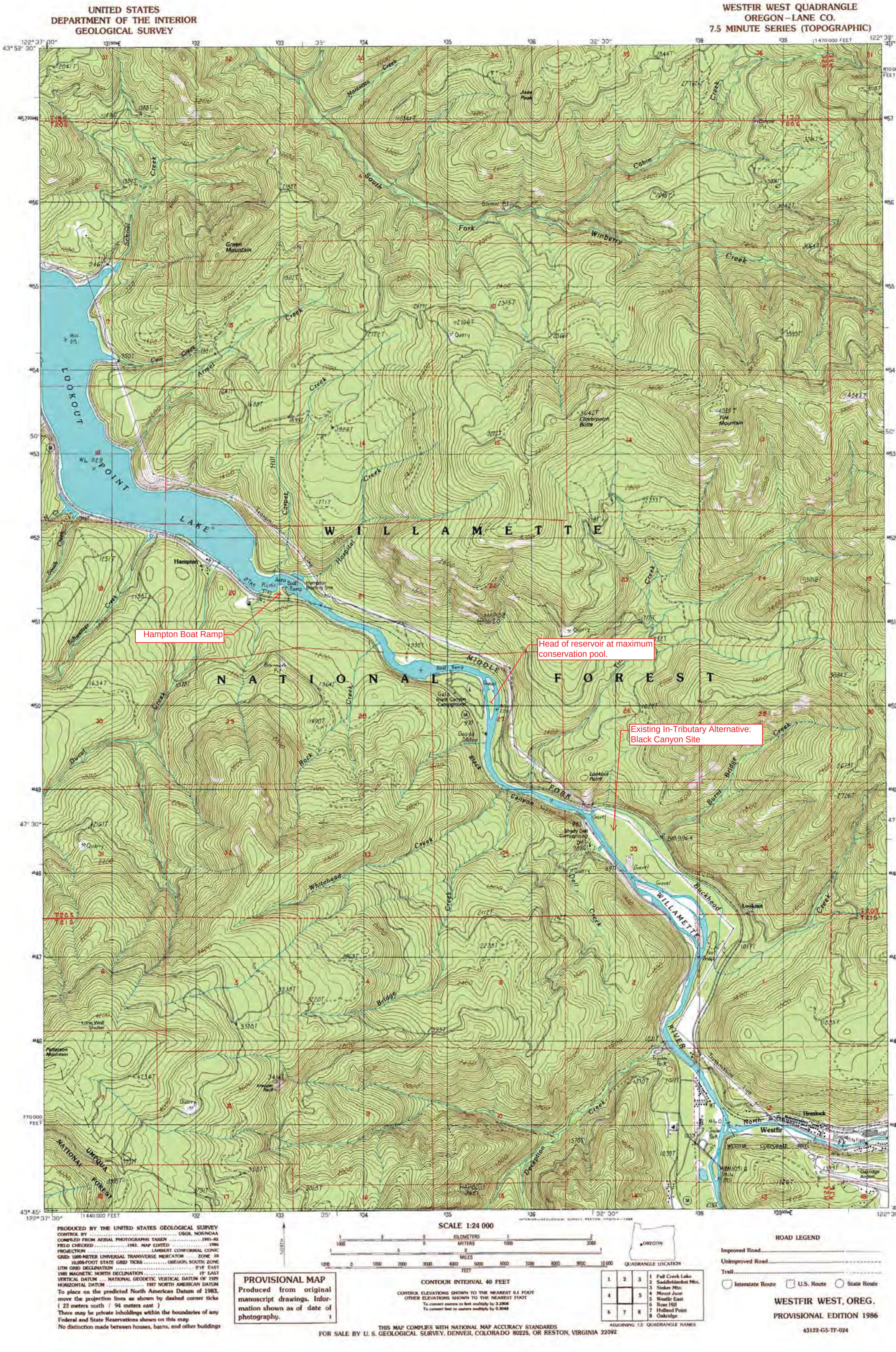
Previous Unaddressed Action Items:
• None.

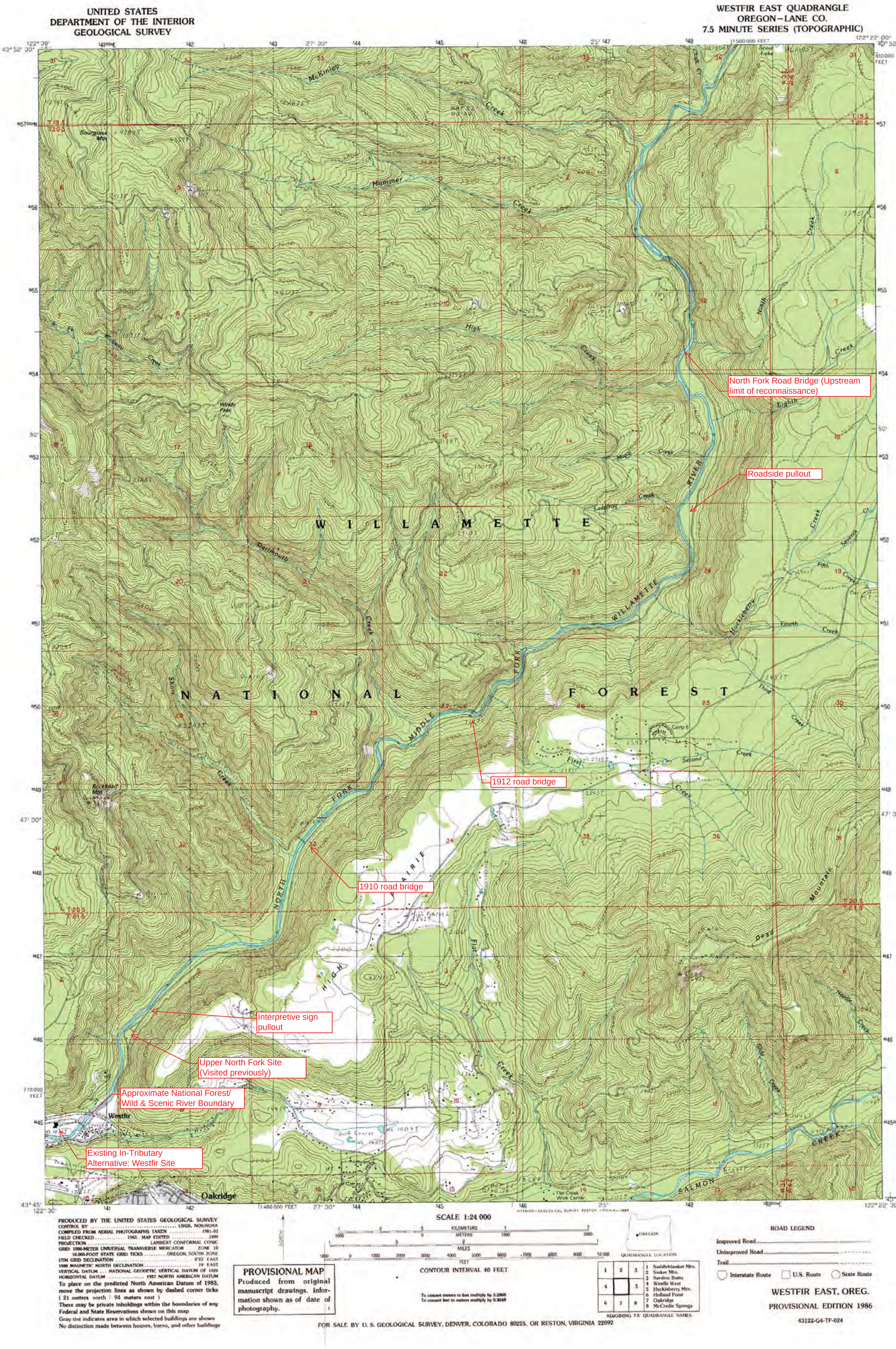
Parking Lot:
• None.

Look Ahead:
• Checkpoint Meeting No. 3 – 20-October. • Team Coordination Meeting – 21-October (cancelled). • Team Coordination Meeting – 4-November.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WESTFIR WEST QUADRANGLE
OREGON–LANE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
Hampton Boat Ramp
Head of reservoir at maximum conservation pool.
Existing In-Tributary Alternative: Black Canyon Site
LOOKOUT POINT LAKE
WILLAMETTE
NATIONAL FOREST
MIDDLE FORK
WILLAMETTE RIVER
Hampton
Green Mountain
Westfir
Hemlock
South Fork
Winberry Creek
Cabin Creek
Hospital Creek
Black Canyon
Whitehead Creek
Bridge Creek
Buckhead
UMPQUA NATIONAL FOREST
SCALE 1:24 000
CONTOUR INTERVAL 40 FEET
PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of photography.
THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
QUADRANGLE LOCATION
ROAD LEGEND
Improved Road
Unimproved Road
Trail
Interstate Route
U.S. Route
State Route
WESTFIR WEST, OREG.
PROVISIONAL EDITION 1986
43122-G5-TF-024
PRODUCED BY THE UNITED STATES GEOLOGICAL SURVEY


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
WESTFIR EAST QUADRANGLE
OREGON–LANE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
North Fork Road Bridge (Upstream limit of reconnaissance)
Roadside pullout
1912 road bridge
1910 road bridge
Interpretive sign pullout
Upper North Fork Site (Visited previously)
Approximate National Forest/ Wild & Scenic River Boundary
Existing In-Tributary Alternative: Westfir Site
WILLAMETTE
NATIONAL FOREST
Westfir
Oakridge
SCALE 1:24 000
CONTOUR INTERVAL 40 FEET
PROVISIONAL MAP
Produced from original manuscript drawings. Information shown as of date of photography.
ROAD LEGEND
FOR SALE BY U. S. GEOLOGICAL SURVEY, DENVER, COLORADO 80225, OR RESTON, VIRGINIA 22092
WESTFIR EAST, OREG.
PROVISIONAL EDITION 1986
43122-G4-TF-024

This page was intentionally left blank.

USACE Lookout Point Head of Reservoir Collection Alternatives Study – Checkpoint Meeting No. 3

DATE:	20 October 2010
TIME:	13:00 – 17:00
LOCATION:	USACE Portland District, HDC Conference Room (8th Floor)
DIAL-IN INFORMATION:	Phone number: 877.873.8018 Access Code: 2646958

General 13:00-13:15

1. Introductions
2. Purpose and goals of the meeting
3. Discuss any general comments on the 60 percent AR Report

Review Selected Dr. Checks Comments 13:15-14:30

1. Reservoir hydraulics – WSEL fluctuations beyond assumed range
2. Use of partial-depth nets
3. Holding pond sizing – consistency with the Cougar study
4. NSO habitat
5. Lands and damages costs
6. Oregon chub constraints related to net openings
7. Disposition of resident fish by site location

Review Current Alternatives.. 14:30-15:00

1. In-Reservoir Alternatives
   - FSC (500 cfs attraction flow w/o nets, 500 cfs with nets and 1,000 cfs with nets)
   - Merwin Trap
2. In-Tributary Alternatives
   - Black Canyon (Upstream of USFS campground).
   - Westfir

Alternatives Evaluation.. 15:00-16:30

1. Review advantages and disadvantages (attached)
2. Review construction cost information
3. Select two alternatives for further evaluation
4. Discuss recommendations for further studies

Project Schedule and Meeting Wrap-Up.. 16:30-17:00

1. Action items
2. Review project schedule
   - Next Team Coordination Meeting – 21 October 2010 (or 4 November 2010?)
   - 90 Percent AR Submittal – 14 December 2010

1), 1a) and 2) Upper Reservoir, In-Reservoir FSC (500 cfs attraction flow without nets, 500 cfs with nets and 1,000 cfs with nets)

Reference Plates 1 and 3 through 10

Advantages

- Candidate for phased implementation: expandable to 1,000 cfs.
- FSCs with nets are a proven, existing technology; however, the mid-reservoir location and the seasonal variability in the reservoir WSEL are unprecedented at Lookout Point.
- FSCs have a relatively high fish collection potential, particularly for smolts and when deployed near a dam which provides bulk flow attraction. FSCs are unproven in other applications such as those considered at Lookout Point which include a mid-reservoir location and the guidance of fry.
-

Disadvantages

- Net systems may require prototype testing. See second and third bullets above.
- High O&M cost associated with exclusion nets.
- Nets require special provisions for upstream fish passage or recreational boat passage.
- Location B necessitates a shallow-draft FSC. An adjustable NTS system would add additional complexity and may not be feasible.
- Fish transfer to shore is difficult.
-

General

- The head of reservoir at the minimum flood control pool is located approximately 7 miles upstream from the Dam.
- The head of reservoir at the maximum conservation pool is located approximately 13 miles upstream from the Dam.
- Location A is approximately 3 miles upstream from the Dam.
- Location B is approximately 5 miles upstream from the Dam.

3) Upper Reservoir, Mobile: Merwin Trap

Reference Plates 1, 11, 12

Advantages

- Proven existing technology.
- Easily expandable through the provision of additional traps.
- Candidate for phased implementation: trap locations and/or quantity
- Relatively low capital cost.
- Could be deployed at the minimum flood control pool which is located approximately 7 miles upstream from the Dam.
-

Disadvantages

- Fish sorting, handling and transport requires manual labor based from small watercraft.
- Relatively low fish collection potential in comparison to other alternatives.
-

General

-

6) USFS Black Canyon Campground, In-Tributary: Off-Channel Collector

Reference Plates 2, 13, and 15

Advantages

- Fish sorting, handling and transport is facilitated by having a land-based facility.
- Relatively high fish collection potential.
-

Disadvantages

- Very large facility with significant impacts to existing recreational facilities.
- Potential ESA wildlife impacts.
- Diversion dam would create a pool extending 5 miles upstream.
- Excavation of flood conveyance channel likely required.
- Energy dissipation of screened flows is required and may impact river geomorphology.
- Potential impacts to upstream fish passage including false attraction and delay.
- Not a good candidate for phased implementation.
- Uncertainty regarding the benefits/risks associated with collecting and transporting fry.
-

General

- Collector capacity of 6,530 cfs
-

9) Lower North Fork (Westfir): Off-Channel Collector

Reference Plates 2, 14 and 15

Advantages

- Fish sorting, handling and transport is facilitated by having a land-based facility.
- Relatively high fish collection potential.
- Relatively small facility on existing disturbed site.
-

Disadvantages

- Diversion dam would create a pool extending 0.2 mile upstream.
- Energy dissipation of screened flows is required and may impact river geomorphology.
- Potential impacts to upstream fish passage including false attraction and delay.
- Not a good candidate for phased implementation.
- Uncertainty regarding the benefits/risks associated with collecting and transporting fry.
- May require private property acquisitions.

General

- Site location has approximately 1/3 of the total Middle Fork flow and approximately 2/3 of the fish in the basin
- Collector capacity of 2,000 cfs
-

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Checkpoint Meeting No. 3
Date: 20-October-2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☐ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☒ Naidu, Anil	☒ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☒ Bardy, David	☐ Fielding, Scott	☒ McCune, Kyle
☒ Nicholson, John		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☐ Autier, Vincent
☒ Gatton, Bob	☐ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom ☒ Ziller, Jeff

NMFS

☒ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☒ Humphreys, Brandy ☒ Schwabe, Lawrence

USFS

☒ Swanson, Nikki	☐ Larson, Doug	☐ Langum, Brandy
☒ Blundon, Brett		

Meeting Agenda:

The agenda for Checkpoint Meeting No. 3 included the following items:

General

1) Introductions.
2) Purpose and goals of the meeting.
3) Discuss any general comments on the 60 Percent AR Report.

Review Selected Dr. Checks Comments
1) Reservoir hydraulics – WSEL fluctuations beyond assumed range
2) Use of partial-depth nets.
3) Holding pond sizing – consistency with the Cougar study.
4) NSO Habitat.
5) Lands and damages costs.
6) Oregon chub constraints related to net openings.
7) Disposition of resident fish by site locations.

Review Current Alternatives
1) In-Reservoir Alternatives.
    - FSC (500 cfs attraction flow w/o nets, 500 cfs with nets and 1,000 cfs with nets).
    - Merwin Trap.
2) In-Tributary Alternatives.
    - Black Canyon (Upstream of USFS campground).
    - Westfir.

Alternatives Evaluation
1) Review advantages and disadvantages.
2) Review construction cost information.
3) Select two alternatives for further evaluation.
4) Discuss recommendations for further studies.

Project Schedule and Meeting Wrap-Up
1) Action items.
2) Review project schedule.

Meeting Summary:

General

The purpose of this meeting was to review the 60 Percent Alternatives Report (AR) and to perform a third screening of the downstream collection alternatives. The existing list of 4 alternatives was prioritized to identify 2 alternatives to be evaluated in further detail as part of the 90 Percent Alternatives Report. The list attached to the agenda was reviewed during the meeting and includes advantages, disadvantages and general observations associated with each of the 4 alternatives.

Review Selected Dr. Checks Comments

Reservoir hydraulics. It was noted that design of the facility should consider reservoir water surface elevations (WSELs) outside of the normal operating range (Minimum Flood Control Pool of 825.0 to the Maximum Conservation Pool of 926.0). As such, historical WSELs from the database (rather than just the rule curve) should be evaluated. This may require the FSC moorings to be detached to allow the structure to be moved during extreme events.

Partial-depth nets. A brief summary of the exclusion net brainstorming meeting held on 6-October was provided. The issue of extreme reservoir fluctuations at Lookout Point is similar to Cougar, and it is anticipated that there will be opportunities to share technologies between the two projects. A two-net system that uses a series of floats and weights to fold the net at low pool may be feasible at Lookout Point. The A-E team will provide further detail in the 90 Percent AR.

Partial-depth nets rather that full exclusion nets may also be an option for the FSC alternatives. This approach could significantly reduce capital and O&M costs with only minor impacts to overall performance. Partial depth nets on the order of 10 to 15 meters in depth are currently being tested on the Columbia River. Hydro acoustical fish guidance data from 2010 is available.

Holding pond sizing. The report will be updated to include holding capacity for three times the peak daily fish count, consistent with the Cougar Dam Downstream Passage Alternatives Study. Assuming a peak day of 10 percent of the total annual fish count, holding capacity for 30 percent of the total annual count will be provided. NMFS's preference is for the trap to be emptied each day; however, this would require weekend operation. NMFS defines short-term holding as less than 72 hours.

The period of operation is currently defined as January through September (9 months); however, this may change once performance goals for the facility are established. A shorter period on the order of 6 months may be acceptable as indicated in Figure 2-1, but late-run fish are also important for stock diversity.

NSO habitat. Additional northern spotted owl habitat information has been provided by USACE and will be incorporated into the report. The Black Canyon alternative appears to be located within a Late Successional Reserve area.

Lands and damages costs. A brief summary of the 19-October meeting with USFS was provided (see previous meeting notes). The current Black Canyon site is within or adjacent to the Buckhead Wildlife Area and supports populations of Oregon chub and bull trout. This is also a popular recreational boating area. The North Fork is designated a Wild & Scenic River from the railroad bridge just east of the town of Westfir upstream to Waldo Lake. USFS strongly supports a free-flowing river in this reach.

Oregon chub constraints. Griff contacted Paul Scheerer regarding Oregon chub issues associated with the FSC alternatives. It is believed that impacts to chub would be minimal because 1) in general, affected populations are hydraulically isolated from the mainstem and the reservoir which would limit their access to the facility, and 2) any fish collected by the facility would likely be considered "lost" to the population due to the large number of predators and the lack of connectively between population centers. However, if chub were collected by the facility, there may be some biological benefit to transporting them downstream to facilitate the reconnection between the upstream and downstream populations.

Disposition of resident fish. It is currently anticipated that fish will be sorted into two size categories: greater than 200 mm and less than 200 mm. The adult fish will be returned to the waterbody and fry and smolts will be transported downstream below Dexter Dam. A size threshold of 120 or 180 mm may be more appropriate depending on the location of the selected facility. ODFW indicated that sorting by species or the removal of non-native fish (such as walleye) may be required. Coordination with the Upper Willamette Bull Trout Working Group is recommended.

Review Current Alternatives

FSC Alternatives. There are a variety of options associated with the FSC alternatives including 500 cfs attraction flow, 1,000 cfs attraction flow, no nets, partial-depth nets and full exclusion nets. The behavioral response of Chinook to the nets is currently unknown. The extent of predation in the reservoir, i.e. from pikeminnow, is also unknown.

It is anticipated that the fry and smolts will be oriented toward the shoreline. The current FSC alternatives, which are located at the thalweg, may be out of phase with the life history that we are trying to intercept.

Merwin Trap Alternative. The Merwin traps are not a full-production alternative but rather are candidates for prototype facilities and more appropriate for filling in data gaps as part of an RM&E program.

Black Canyon and Westfir Alternatives. The in-tributary alternatives will have to consider the additional constraints and limitations as identified during the meeting with USFS.

Alternatives Evaluation

The basic purpose of the Alternatives Report is to evaluate the feasibility of a head-of-reservoir or in-tributary collection system with three primary parameters being evaluated including technology, site location and cost. With that in mind, the advantages and disadvantages associated with each alternative were discussed and it was determined that the FSC and Westfir alternatives should continue to be evaluated for the 90 Percent AR. Given the behavioral guidance limitations of the FSCs described above, there may be an opportunity for a hybrid FSC/Merwin Trap alternative that would allow fish collection nearer to the head-of-reservoir or alternatively at the reservoir shoreline.

Project Schedule and Meeting Wrap-Up

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Provide comments on 60 Percent AR by 3-November (NMFS, ODFW, USFS and USACE ATR Team).
• Provide additional information regarding the location of and restrictions associated with the North Fork Wild & Scenic Area designation (Swanson).
• Provide Jeff Ziller access to Dr. Checks (Askelson).
• If possible, identify location of 12-foot tall dam below Black Canyon Campground that provides 3 feet of freeboard at the maximum conservation pool (Autier).
• Provide map showing backwater from in-tributary alternatives (Autier).

Previous Unaddressed Action Items:
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith).
• Provide input on disposition of resident fish by site location (Ziller).
• Discuss spotted owl habitat constraints with Greg Smith (Kapla).

Parking Lot:
• A policy decision regarding facility performance goals is required.
• The extent of reservoir predation (detriment) and/or rearing (betterment) is currently unknown.

Look Ahead:
• Next Team Coordination Meeting – 21-October (cancelled).
• Team Coordination Meeting – 4-November.
• 90 Percent AR Submittal – 14-December.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 04-November-2010

Attendees:

USACE

☐ Budai, Christine	☐ Roy, Liza	☒ Askelson, Sean
☐ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☒ Taylor, Gregory
☐ Langeslay, Mike	☒ Smith, Gregory	☒ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	☐ McCune, Kyle
☐ Nicholson, John		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom	☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa	☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy	☒ Schwabe, Lawrence

USFS

☐ Swanson, Nikki	☐ Larson, Doug	☐ Langum, Brandy
☐ Blundon, Brett		

Meeting Agenda:

The agenda for Team Coordination Meeting included the following items:

1) Status of review comments from USACE ATR team, NMFS, ODFW and USFS.
2) Backcheck of 30 Percent AR Dr. Checks Comments.
3) Follow-up items from Checkpoint Meeting No. 3.
4) Review action items.
5) Review project schedule.

Meeting Summary:

Status of Review Comments. The Agency Technical Review (ATR) by the Seattle District USACE has not yet been completed. Comments will be provided via Dr. Checks. The 90 Percent AR will be submitted on December 14th so review comments need to be submitted as quickly as possible. As of 4-November, USACE had received comments from USFS and USFWS; however, comments had not yet been received from NFMS or ODFW.

Backcheck of 30 percent AR. Several responses on the 30 Percent AR have not yet been backchecked. A list of open comments will be provided to USACE.

Follow-up items from Checkpoint Meeting No. 3. *In-Tributary Alternatives.* The North Fork is designated a Wild & Scenic River from approximately the railroad bridge just east of the town of Westfir upstream to Waldo Lake. The Westfir Site as described in the 60 Percent AR is located outside of the boundary; however the Upper North Fork site (which was previously de-prioritized) is located within the boundary. USFS strongly supports a free-flowing river in this reach and ODFW is opposed to constructing a new dam where one was just recently removed.

Additional detail regarding the proposed inflatable rubber weir, including operational information, will be provided in the 90 Percent AR. It is anticipated that the weir would be in the fully-lowered position approximately 3 to 6 months a year, allowing the river to flow unobstructed during this time. It may also be possible to operate the weir on a daily or hourly basis based on the presence of fish. A hydro-acoustic system, similar to those in use on the Columbia River, could perhaps be utilized for this purpose. There may be safety concerns associated with a fully-automated system given the recreation in this reach. Ramping rates would also have to be considered.

The Black Canyon Site as described in the 60 Percent AR is within or adjacent to the Buckhead Wildlife Area. The area supports populations of Oregon chub and was historically good bull trout habitat. This reach is also a popular recreational boating/fishing area.

In-Reservoir Alternatives. There are a variety of options associated with the FSC alternative including 500 cfs attraction flow, 1,000 cfs attraction flow, no nets, partial-depth nets and full exclusion nets. The behavioral response of Chinook to the nets is currently unknown. It is anticipated that fry and smolts will be oriented toward the shoreline. The current FSC alternatives, which are located at the thalweg, may be out of phase with the life history that we are trying to intercept. Therefore, it may make sense to evaluate a new option for the 90 percent AR which would include a small FSC with a shallow draft that could be positioned in close proximity to the head of reservoir proper. If required, small lead nets (similar to a Merwin Trap) could be used.

The Hampton site is located on the left (southerly) bank downstream from the Black Canyon Campground and is an existing boat ramp and picnic area. The limitations of this site from the perspective of the in-tributary technologies were previously discussed. It is also anticipated that this site would be too constrained for an FSC with an exclusion net due to the high ambient velocities. A small FSC with no nets may be able to operate in this area; however, it is unlikely that it would have the ability to intercept 100 percent of the fish. Barging the fish to the dam is still the preferred option for transport.

Construction Costs. USACE also provided the fiscal year 2011 (FY11) Federal discount rate. The FY11 rate is 4.125 percent.

Project Schedule and Meeting Wrap-Up

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Review meeting notes from Checkpoint Meeting No. 3 (All). • Provide comments on the 60 Percent AR if you haven't already (All). • Review meeting notes from the land use discussion with USFS (Taylor; completed 4-Nov). • Forward USFS letter to James (Askelson; completed 4-Nov). • Forward FWS review comments to James (Askelson; completed 4-Nov). • Send list of the 30 Percent AR Dr. Checks Comments to Sean (Kapla; completed 15-Nov).

Previous Unaddressed Action Items:
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith). • Provide map showing backwater from in-tributary alternatives (Autier). • If possible, identify location of 12-foot tall dam below Black Canyon Campground that provides 3 feet of freeboard at the maximum conservation pool (Autier).

Parking Lot:
• A policy/management decision is required to establish biological performance goals for the facility. • The ability to successfully collect and transport fry (particularly with regard to the in-tributary alternatives) is unknown. • The extent of reservoir predation (detriment) and/or rearing (betterment) is currently unknown.

Look Ahead:
• 60 percent AR review comments due – 03 November. • Next Team Coordination Meeting – 18 November. • 90 Percent AR Submittal – 14 December.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 18-November-2010

Attendees:

USACE

☐ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☐ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	☐ McCune, Kyle
☐ Nicholson, John		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☒ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom	☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa	☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy	☒ Schwabe, Lawrence

USFS

☐ Swanson, Nikki	☐ Larson, Doug	☐ Langum, Brandy
☐ Blundon, Brett		

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Review comments from USACE ATR team, NMFS, ODFW, USFWS and USFS.
2) Review action items.
3) Review project schedule.

Meeting Summary:

Review Comments. It was noted that BPA comments on the 60 Percent AR have been provided via Dr. Checks. Selected comments and preliminary responses include the following:

- Does spawning occur in the named tributaries to the reservoir? *Spawning is assumed to be minimal due to the lack of suitable habitat in these tributaries. This would remain true even if adult salmonids were successfully reintroduced into the reservoir.*

- Is it beneficial to transport fry-size fish? *Existing data regarding the trapping, hauling, and release of fry is very limited. It is anticipated that these concerns would be addressed through future RM&E studies and/or prototype testing. Specific concerns include the ability to guide and collect fry with a reservoir net system, sorting of collected fry, and well as predation at the release site. Another risk is the parasite Ceratomyxa Shasta (C-Shasta) that could impact fish being held in holding tanks.*

- Given the uncertain biological effectiveness, technological challenges and high cost of the current alternatives, more data is required, particularly with regard to reservoir conditions, prior to selecting and implementing an alternative. *USACE has indicated that the intent of the future RM&E program is to collect additional data which will support the decision to pursue a specific alternative, including a facility located at either the head-of-reservoir or at the dam.*

- Do reservoir and/or hydropower operational changes have the potential to facilitate fish passage? *It is possible that operational changes, including modifications to facilitate fish passage via the turbines may benefit fish passage. This would be particularly relevant for a facility located at the dam. A study of survivability through Lookout Point Dam has not been completed, apart from the ongoing screw-trap study.*

Hampton Site. The Hampton site has the potential to avoid many of the environmental concerns associated with the in-tributary alternatives; however, a facility at this location would face significant engineering and technological issues which will be identified in the 90 Percent AR.

Construction Cost Estimates. Construction of federal projects will be required to utilize to Davis-Bacon wages, therefore cost estimates scaled from private utilities may be on the order of 20 to 30 percent low. The cost estimates in the 60 Percent AR are order-of-magnitude costs for comparative purposes only so it is anticipated that they are reasonable given the current level of design. However, high and low range cost estimates (say +50 and -30 percent) will be provided in the 90 Percent AR.

Project Schedule and Meeting Wrap-Up

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• CH2M HILL to address review comments NOAA 005 and 006, and USFS 015 in 90 Percent AR (Autier; completed 19-Nov.). • Send downstream collection facility report to USACE (Kapla; completed 22-Nov.) • Locate any additional information related to the circa 1958 downstream collector at Lookout Point (Askelson and Roy).

Previous Unaddressed Action Items:
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith).

Parking Lot:
• A policy/management decision is required to establish biological performance goals for the facility. • The ability to successfully collect and transport fry (particularly with regard to the in-tributary alternatives) is currently unknown. • The extent of reservoir predation (detriment) and/or rearing (betterment) is currently unknown.

Look Ahead:
• Next Team Coordination Meeting – 02 December. • 90 Percent AR Submittal – 14 December.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 02 December 2010

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☐ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☐ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	☐ McCune, Kyle
☐ Nicholson, John		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom ☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☐ Schwabe, Lawrence

USFS

☒ Swanson, Nikki	☐ Larson, Doug	☐ Langum, Brandy
☐ Blundon, Brett		

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Review and discuss 90 Percent AR table of contents.
2) Follow-up on assignments for review comment responses.
3) Schedule Checkpoint Meeting No. 4.
4) Review action items.
5) Review project schedule.

Meeting Summary:

90 Percent AR. Ongoing changes to the organization of the alternatives report (AR) were discussed. The intent of the changes is to increase the overall clarity of the document and to reduce confusion related to de-prioritized alternatives. Section 5 is now a detailed description of the two selected alternatives and is followed by Section 6 which is an evaluation of these two alternatives. Descriptions, evaluations and plates describing the de-prioritized alternatives have been moved to Appendix F.

Section 6, an evaluation of the two selected alternatives, will include a list of the advantages and disadvantages associated with each of the alternatives. Critical risks and uncertainties will be identified as well.

It was decided that the AR should only identify and not prioritize ongoing and future required studies as described in Section 7.

Additional introductory information will be provided to clarify the scope of the AR and the overall decision making/implementation process, i.e. head-of-reservoir vs. at-dam alternative evaluations.

Follow-up on Assignments for Review Comment Responses. The USACE team planned to meet internally to follow-up on agency review comment responses. The A/E team will collaborate on selected responses as required.

Checkpoint Meeting No. 4. It was determined that the third week of January (week of 17 January) would be appropriate for holding Checkpoint Meeting No. 4. The 90 Percent AR will be distributed on 14 December so this allows for a 30-day agency review period. Monday (17-January) is a federal holiday.

Project Schedule and Meeting Wrap-Up

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Create Doodle poll to aid in scheduling Checkpoint Meeting No. 4 (Kapla; completed 3-Dec). • Provide A/E team draft review comment responses to USACE (Kapla/Autier). • Discuss and collaborate on review comment responses (Kapla/Askelson). • Discuss schedule for delivery of 100 Percent AR (Kapla/Askelson).

Previous Unaddressed Action Items:
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith).

Parking Lot:
• A policy/management decision is required to establish biological performance goals for the facility. • The ability to successfully collect and transport fry (particularly with regard to the in-tributary alternatives) is currently unknown. • The extent of reservoir predation (detriment) and/or rearing (betterment) is currently unknown.

Look Ahead:
• 90 Percent AR Submittal – 14 December. • Next Team Coordination Meeting – 16 December. • Checkpoint Meeting No. 4 – To be scheduled in January 2011.

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 16 December 2010

Attendees:

USACE

☐ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☒ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	☐ McCune, Kyle
☐ Nicholson, John		

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☐ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom ☐ Ziller, Jeff

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☐ Schwabe, Lawrence

USFS

☐ Swanson, Nikki	☐ Larson, Doug	☐ Langum, Brandy
☐ Blundon, Brett		

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Review and discuss highlights of the 90 Percent AR:

- 5 new site locations considered (Section 4 and Appendix F).
- Example prototype and phased implementation process (Section 5).
- Advantages and disadvantages of selected alternatives (Section 6).
- Conclusion and summary of significant risks and uncertainties (Section 7).
- Updated project costs (Appendix G).
- Recovery and Release Facility (Plate 14)

2) Review action items.
3) Review project schedule.

Meeting Summary:

Review and discuss highlights of the 90 Percent AR:

New Site Locations. Five new sites were considered in the 90 Percent AR, bringing the total number of comprehensive alternatives to twenty-eight. The Hampton site is presented in Section 4.2.2 and the our new sites on the Upper North Fork are presented in Section 4.2.6. None of these sites was selected for further evaluation. Detailed discussion is provided in Appendix F – De-Prioritized Alternatives, beginning on page F-46.

Additional information related to the fish sorting/handling process, including an alternative strategy for sorting fish is provided in Section 3.3.1 on page 3-6.

Prototype and Phased Implementation Process. Figure 5-2 on page 5-9 provides a graphical description of a prototype testing and phased implementation process for the FSC alternative. This is an example for discussion purposes only and is intended to illustrate one way in which the prototype testing and phased implementation processes could be integrated. It is anticipated that modifications would be required to address specific project goals and objectives. The identification of appropriate collection criteria at each decision point is particularly critical.

Table 6-3 on page 6-11 provides a summary of adult production estimates for the two selected alternatives. The estimates are 1,150 and 1,065 returning adults for the Westfir and FSC alternatives respectively.

Advantages and Disadvantages of Selected Alternatives. Table 6-4 on page 6-13 provides a summary list of advantages and disadvantages associated with the two final selected alternatives. Key rationale for selecting a single preferred alternative is presented in Section 6.5 on page 6-12. This approach will be confirmed during Checkpoint Meeting No. 4.

Summary and Conclusions. Section 7 presents an overall summary as well as conclusions related to selection of the preferred alternative. Significant risks and uncertainties are identified, and recommendations for future studies are made. The issues are not listed in any particular order and are not prioritized.

Project Cost Estimates. Updates were made to the costs based on the 60 Percent AR review comments. The total project capital costs for the two selected alternatives are within $10M of each other. The annual O&M cost for the FSC alternative in its ultimate configuration ($2.5M) is significantly higher than the annual O&M for the Westfir alternative ($1.3M).

Recovery and Release Facility. Plate 14 provides a schematic arrangement for a recovery and release facility located at Dexter hatchery. This type of facility would be common to all alternatives. Each pond is sized to accommodate the peak day of the migration, or approximately 10 percent of the total annual run. Pond volume and flow calculations are provided in Appendix D starting on page D-15.

Project Schedule and Meeting Wrap-Up

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Review and provide comments on the 90 Percent AR (All). • Backcheck 60 Percent AR comments via Dr. Checks (All). • Review and provide input specifically on Section 3.3.1 (Fish Sorting), and Sections 7.2.1 and 7.3.1. (Griffith)

Previous Unaddressed Action Items:
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith).

Parking Lot:
• A policy/management decision is required to establish biological performance goals for the facility. • The ability to successfully collect and transport fry (particularly with regard to the in-tributary alternatives) is currently unknown. • The extent of reservoir predation (detriment) and/or rearing (betterment) is currently unknown.

Look Ahead:
• Team Coordination Meeting – 30 December (Cancelled) • Next Team Coordination Meeting – 13 January • Checkpoint Meeting No. 4 – Afternoon of Wednesday, 19 January • Delivery of 100 Percent AR – Week of 7 March (Proposed)

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Team Coordination Meeting
Date: 13 January 2011

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☐ Griffith, David	☐ Brackin, Joseph	☐ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☒ Smith, Gregory	☒ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	☐ McCune, Kyle
☐ Nicholson, John	☒ Hackett, Tom	

CH2M/AECOM/BioA

☒ Kapla, James	☒ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☒ Autier, Vincent
☐ Gatton, Bob	☐ Malone, Kevin	

BPA

☐ Spear, Daniel

ODFW

☐ Friesen, Tom ☒ Ziller, Jeff

NMFS

☐ Jundt, Melissa ☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy ☒ Schwabe, Lawrence

USFS

☐ Swanson, Nikki	☐ Larson, Doug	☐ Langum, Brandy
☐ Blundon, Brett		

Meeting Agenda:

The agenda for the Team Coordination Meeting included the following items:

1) Discuss preliminary comments on the 90 Percent AR.
2) Discuss proposed agenda items for Checkpoint Meeting No. 4.
3) Review action items.
4) Review project schedule and discuss delivery of the Final AR.

5) Review and discuss the updated cost estimates.
6) Discuss technical aspects of the net and mooring systems associated with the FSC alternative.
7) Discuss other critical risks and uncertainties.
8) Discuss ongoing and proposed biological studies at Lookout Point.

Meeting Summary:

Discuss preliminary comments on the 90 Percent AR:

As of this morning, 26 comments had been received via Dr. Checks. USACE also received a comment letter from USFS. All comments on the 90 Percent AR are due on 17 January.

The 90 Percent AR proposes a preferred alternative in accordance with the A/E scope of work for consideration during Checkpoint Meeting No. 4 and for incorporation into the Final AR. Given the critical risks and uncertainties associated with the two remaining alternatives, it may be premature to identify a preferred alternative. USACE will meet internally to discuss this issue and to determine how best to proceed.

The annual O&M costs for the selected FSC alternative as described in the synopsis and Table 6-2 are incorrect. The cost should be $2.5M instead of $1.6M. The costs presented in Appendix G are correct.

Given the constraints associated with the in-tributary collection sites, particularly those located on the Middle Fork, the concept of a second facility located above Hills Creek Dam was discussed. This area was specifically excluded from consideration during the study because Chinook releases here are primarily to provide food for bull trout. However, the basin above Hills Creek Dam has the potential for producing 873,000 fry and 21,300 smolts which represents approximately 39 percent of the total production above Lookout Point Reservoir.

The existing in-tributary and reservoir alternatives do consider fish passage mortality through Hills Creek Dam (approximately 60 percent mortality). Mortality in Hills Creek Reservoir was not considered as data are not available. The dam passage mortality (and potentially any reservoir mortality) could be avoided with a facility located above the Dam but would forego the approximately 7 percent of total production in the Middle Fork downstream of the dam (including Salt Creek and Salmon Creek). As such, two facilities, one located on the North Fork and the other located above Hills Creek Dam, could potentially intercept 93 percent of the spring Chinook population in the basin. It should be noted that the resulting total fish collection potential would also be dependent on the survival rates and collection efficiencies associated with the selected sites and technologies.

Discuss proposed agenda items for Checkpoint Meeting No. 4:

The following potential agenda items were identified:

1) Summarize changes in the 90 Percent AR.
2) Review the unique characteristics and constraints of the Hampton site. This site is documented in Appendix F but has been de-prioritized.
3) Discuss the potential for a facility located above Hills Creek Dam.
4) Discuss the advantages and disadvantages of the selected alternatives (Table 6-4).

Project Schedule and Meeting Wrap-Up

The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• See summary above.

Action Items:
• Review and provide comments on the 90 Percent AR by 17 January (All). • Backcheck 60 Percent AR comments via Dr. Checks (All). • Send a copy of the 90 Percent AR via CD to Jeff Ziller (Sean, completed 01/13/2011). • Provide Sean a list of A/E participants for Checkpoint Meeting No. 4 (James, completed 01/14/2011). • Provide Willamette Basin Fisheries Science Review meeting information (Chris and Liza, completed 01/13/2011).

Previous Unaddressed Action Items:
• Provide list of ongoing and proposed biological studies at Lookout Point (Griffith). • Review and provide input specifically on Section 3.3.1 (Fish Sorting), and Sections 7.2.1 and 7.3.1. (Griffith)

Parking Lot:
• A policy/management decision is required to establish biological performance goals for the facility. • The ability to successfully collect and transport fry (particularly with regard to the in-tributary alternatives) is currently unknown. • The extent of reservoir predation (detriment) and/or rearing (betterment) is currently unknown.

Look Ahead:
• Checkpoint Meeting No. 4 – 19 January • Next Team Coordination Meeting – 27 January • Delivery of Backcheck AR – 14 February (Proposed) • Delivery of 100 Percent AR – 11 March 2011 (Proposed) • Contract end date – 8 April 2011 (Proposed)

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

USACE Lookout Point Head of Reservoir Collection Alternatives Study – Checkpoint Meeting No. 4

DATE: 19 January 2011

TIME: 13:00 – 17:00

LOCATION: USACE Portland District, Conference Room 3A&B (3rd Floor)

DIAL-IN INFORMATION: Phone number: 877.873.8018
Access Code: 2646958
Host Password: 7026
Security Code: 1234

WEB MEETING: http://www.webmeeting.att.com
Meeting No. 877.873.8018
Access Code: 2646958

General 13:00-13:15

1. Introductions
2. Purpose and goals of the meeting
3. Discuss any general comments on the 90 percent AR Report

Review Selected Items in the 90 Percent AR..13:15-14:00

1. Organizational changes to the report
2. Hampton site characteristics and constraints (Section 4.2.2 and Appendix F)
3. Proposed strategies for fish sorting and handling (Section 3.3.1)
4. Example prototype and phased implementation process (Section 5, Figure 5-2)

Discuss Current Alternatives 14:00-15:00

1. Summary evaluation of selected alternatives (Section 6, Table 6-4)
2. Cost estimates (Appendix G)
3. Critical risks and uncertainties (Sections 6.4 and 7.2)

Identify Next Steps 15:00-16:30

1. Physical and biological studies at Lookout Point (both ongoing and proposed)
2. Select/confirm preferred alternative for Final AR (if appropriate)
3. Need for further study and/or evaluation?

Project Schedule and Meeting Wrap-Up...16:30-17:00

1. Action items
   - Submit 90 Percent AR comments if you haven't already
   - Backcheck your 30 and 60 Percent AR Dr. Checks comments
   - What else?
2. Project schedule
   - Next Team Coordination Meeting – 27 January 2011
   - Backcheck AR Submittal – 14 February 2011 (Proposed)
   - 100 Percent AR Submittal – 11 March 2011 (Proposed)

Meeting Agenda and Summary

Team: Willamette Downstream Passage – Lookout Point Head of Reservoir PDT
Subject: Checkpoint Meeting No. 4
Date: 19 January 2011

Attendees:

USACE

☒ Budai, Christine	☒ Roy, Liza	☒ Askelson, Sean
☒ Griffith, David	☐ Brackin, Joseph	☒ Calnon, James
☒ Fortuny, Kristina	☐ Scullion, Mary Karen	☐ Burton, James
☒ Sedey, Jeffrey A	☐ Naidu, Anil	☐ Taylor, Gregory
☐ Langeslay, Mike	☐ Smith, Gregory	☐ McCrae, Pat
☐ Bardy, David	☐ Fielding, Scott	☐ McCune, Kyle
☐ Nicholson, John	☒ Hackett, Tom	

CH2M/AECOM/BioA

☒ Kapla, James	☐ Sweeney, Chick	☒ Giorgi, Al
☐ Rounds, Michael	☒ Willig, Isaac	☒ Autier, Vincent
☒ Gatton, Bob	☐ Malone, Kevin	

BPA

☒ Spear, Daniel

ODFW

☐ Friesen, Tom	☒ Ziller, Jeff

NMFS

☒ Jundt, Melissa	☐ Burchfield, Stephanie

FWS

☐ Gray, Ann

Confederated Tribes of the Grand Ronde

☐ Humphreys, Brandy	☒ Schwabe, Lawrence

USFS

☒ Swanson, Nikki	☐ Larson, Doug	☐ Langum, Brandy
☐ Blundon, Brett		

Meeting Agenda:

The agenda for the Check Point Meeting No. 4 included the following items:

General

1) Introductions.
2) Purpose and goals of the meeting.
3) Discuss any general comments on the 90 percent AR Report.

Review Selected Items in the 90 Percent AR

1) Organizational changes to the report.
2) Hampton site characteristics and constraints (Section 4.2.2 and Appendix F).
3) Proposed strategies for fish sorting and handling (Section 3.3.1).
4) Example prototype and phased implementation process (Section 5, Figure 5-2).

Discuss Current Alternatives

1) Summary evaluation of selected alternatives (Section 6, Table 6-4).
2) Cost estimates (Appendix G).
3) Critical risks and uncertainties (Sections 6.4 and 7.2).

Identify Next Steps

1) Physical and biological studies at Lookout Point (both ongoing and proposed).
2) Select/confirm preferred alternative for Final AR (if appropriate).
3) Need for further study and/or evaluation?

Project Schedule and Meeting Wrap-Up

1) Action Items.
2) Submit 90 Percent AR comments if you haven't already.
3) Backcheck your 30 and 60 Percent AR Dr. Checks comments.

Meeting Summary:

General

The purpose of this meeting was to review changes to the report since the 60 Percent AR and to evaluate, discuss and select a final alternative (or alternatives) for documentation in the 100 Percent AR.

Review Selected Items in the 90 Percent AR

1) Organizational Changes. The report was re-organized to increase the overall clarity of the document and to reduce confusion related to de-prioritized alternatives. Alternatives that were de-prioritized were moved to Appendix F.

It was noted that the PDF electronic version of the document contained jumbled text which was unreadable, for example at the end of Section 6. This issue will be resolved with the next deliverable.

2) Hampton Site. The Hampton site was identified and evaluated in the 90 Percent AR but was not selected for further evaluation. Detailed discussion is provided in Appendix F – De-Prioritized Alternatives, beginning on page F-46. The Hampton site is located on the left (southerly) bank downstream from the Black Canyon Campground and is an existing boat ramp and picnic area. The site is located directly across from Hospital Creek and includes a narrow channel with several rock outcroppings. A large benched area is located just downstream; however, it is unknown to what extent this area would be inundated at the maximum conservation pool.

A design flow rate of 6,530 cfs is assumed for a collector at the Hampton site, similar to the Black Canyon alternatives. However, because of the high ambient velocities, it is anticipated that the site would be too constrained for an FSC alternative with an exclusion net. An in-tributary type collector is assumed. A collection facility at this site would be influenced by both the river and the reservoir over the annual period of operation. As such, a diversion weir elevation set approximately 3 ft above the maximum conservation pool WSEL would be necessary. This would require a structure that is able to handle partial submergence on the downstream side, and it may require a weir significantly higher than the 12-ft weir proposed for the other in-tributary alternatives. For the purposes of this study, it is assumed that no modifications to operation of the reservoir or powerhouse would be permissible. However, a reduction in the maximum reservoir WSEL could enhance the feasibility of an in-tributary collector at this location by reducing the required height of the diversion weir. It is anticipated that a facility at this location would require a wing dam or levee section. It is further anticipated that the construction cost would be much greater than that of the Black Canyon alternatives.

It was noted that Hospital Creek and an adjacent pond are Oregon Chub habitat. The existing N. Boundary Road culvert connecting the pond to the creek is crushed, which limits connectivity to the reservoir. When operating, a fish facility at the Hampton site would likely maintain higher water surface elevations immediately upstream, which could provide some benefit to Oregon Chub populations in this area.

3) Fish Sorting and Handling. Additional information related to the fish sorting/handling process, including an alternative strategy for sorting fish is provided in Section 3.3.1 on page 3-6. The current concept for fish sorting assumes separation into two size classifications - small (<200 mm) and large (>200 mm). An alternative strategy could include a second sort of fry (<60 mm) from smolts (>60 mm). Further sorting by species would require anesthetization as the non-migratory (for example, trout) and migratory fish (Chinook) could be of similar size at a given life stage. If sorting by species is necessary, anesthetization of the fish, a visual sort, and a holding/recovery facility would be required. Monitoring and evaluation activities have also not yet been fully defined at this time. As such, additional capital and O&M costs may be warranted in anticipation of more complex facilities.

4) Example Prototype and Phased Implementation Process. Figure 5-2 on page 5-9 provides a graphical description of a prototype testing and phased implementation process for the FSC alternative. This is an example for discussion purposes only and is intended to illustrate one way in which the prototype testing and phased implementation processes could be integrated. It is anticipated that modifications would be required to address specific project goals and objectives. The identification of appropriate collection criteria at each decision point is particularly critical. Prototyping and/or a phased implementation process would likely not be required for the in-tributary Westfir alternative.

The intent of the FSC prototyping would be to 1) determine if juvenile fish will guide along the exclusion net, and 2) to determine if juvenile fish will move away from the shoreline towards deeper water and the location of the FSC entrance. These activities would be supported by ongoing and planned RM&E studies. It was noted that it may theoretically be possible to meet the (yet-to-be-identified) biological performance goals with an RM&E or prototype system alone. However, it is anticipated that a full production facility would reduce long term O&M requirements and provide a safer environment for fish handling. For example, a Merwin or Oneida trap system (likely RM&E or prototype tools) would require a significant investment in manual labor to maintain the traps and to collect and sort fish. Fish would also be subject to predation or injury while in the trap since sorting would be performed by hand on an intermittent basis.

Given the size and cost constraints associated with the in-tributary collection sites, particularly those located on the Middle Fork, the concept of a second facility located above Hills Creek Dam was discussed. This area was specifically excluded from consideration during the study because Chinook releases here are primarily to provide food for bull trout. However, the basin above Hills Creek Dam has the potential for producing 873,000 fry and 21,300 smolts which represents approximately 39 percent of the total production above Lookout Point Reservoir.

The existing in-tributary and reservoir alternatives do consider fish passage mortality through Hills Creek Dam (approximately 60 percent mortality). Mortality in the Hills Creek Reservoir was not considered as data are not available. The dam passage mortality (and potentially any reservoir mortality) could be avoided with a facility located above the Dam but would forego the approximately 7 percent of total production in the Middle Fork downstream of the dam (including Salt Creek and Salmon Creek). As such, two facilities, one located on the North Fork and the other located above Hills Creek Dam, could potentially intercept 93 percent of the total spring Chinook population in the basin. It should be noted that the resulting total fish collection potential would also be dependent on the survival rates and collection efficiencies associated with the selected sites and technologies. The migration timing also varies between the North Fork and the Middle Fork above Hills Creek which would potentially complicate operation of a multi-facility system.

Discuss Current Alternatives

1) Summary Evaluation of Selected Alternatives. Key rationale for the selection of a preferred alternative was presented in Section 6.5 on page 6-12. However, given the critical risks and uncertainties associated with the two remaining alternatives, as well as the desire to focus on biological and technical issues rather than broader social or environmental issues, it was considered premature for this study to identify a single preferred alternative. As such, the team agreed that the 100 Percent AR should recommend both remaining alternatives for further evaluation. The results of ongoing and planned RM&E activities will be critical in evaluating the final two alternatives, as well influencing the decision whether or not to evaluate at-dam alternatives. Social and environmental issues will be documented in the report but will not be used as the sole basis for de-prioritizing an alternative.

Table 6-4 on page 6-13 provides a summary of the advantages and disadvantages associated with the two final selected alternatives. It was noted that the biological uncertainties are slightly higher in the reservoir than in the tributaries. For example, predation and juvenile fish guidance along the exclusion net are concerns in the reservoir. The handling and transport of fry, particularly during periods of high debris load, would have to be addressed at the In-Tributary Westfir site.

A suggestion was made that it might be possible to rear and acclimate fry immediately adjacent to the in-tributary collection site at Westfir, which would allow the fish time to grow prior to transport and release. While this has the potential to reduce mortalities from handling and transport, this level of fish management may be beyond the intent the recovery program.

2) Cost Estimates. Updates were made to the cost estimates based on the 60 Percent AR review comments. The total project capital costs for the two selected alternatives are within $10M of each other. The annual O&M cost for the FSC alternative in it's ultimate configuration ($2.5M) is significantly higher than the annual O&M for the Westfir alternative ($1.3M). The annual O&M costs for the selected FSC alternative as described in the synopsis and Table 6-2 were incorrect. The costs presented in Appendix G are correct.

The FSC exclusion net system would need to accommodate upstream resident fish passage and recreational boat passage. Allowances were included in the construction cost estimates for these items.

The cost estimates do not currently capture the costs of prototyping the net system. Prototyping costs will be provided in the 100 Percent AR to facilitate comparison with the Westfir alternative on a programmatic level. Refinements to the exclusion net system costs, particularly for the required mooring towers, supports and anchorages will also be made based on updated conceptual design information.

3) Critical Risk and Uncertainties. Biological and Technical, Economic and Other risks and uncertainties are identified in Section 7. As discussed previously, the purpose of the ongoing RM&E program will be to resolve selected issues and to facilitate future decision making.

It was noted that the BiOP deadline for construction of a prototype facility by 1 September 2014 may not allow adequate time for the required RM&E, engineering design and construction activities to occur. The resource agencies indicated that there may be some flexibility with this schedule if it can be demonstrated that substantial progress is being made towards the final goal of a full production facility.

Identify Next Steps

1) Physical and Biological Studies at Lookout Point. A summary of FY11 RM&E activities related to Lookout Point and the Middle Fork of the Willamette was presented and is attached to these meeting minutes. The studies generally agree with the studies identified in Section 7 of the AR. Adult pre-spawn mortality and resident fish studies are not included. Additional information will be provided at the 2010 Willamette Basin Fisheries Science Review.

2) Select/Confirm Preferred Alternative for Final AR. As discussed, the 100 Percent AR will recommend two alternatives for further evaluation, the In-Reservoir FSC and the In-tributary facility located at Westfir. The decision whether or not to pursue an at-dam alternative will be made by others following a review of the RM&E study results. USACE will lead the NEPA process for any proposed actions in coordination with NMFS.

3) Need for Further Study and/or Evaluation. Section 7 presents recommendations for studies required to support future design and construction activities. The studies are not listed in any particular order and are not prioritized.

It was noted that the study assumes that operation of the Lookout Point project will not be modified to accommodate the fish collection facilities. However, future structural and operational improvements are planned for the dam and powerhouse, which could change the existing conditions assumed by this report.

Project Schedule and Meeting Wrap-Up
The following tables present the decisions made during the meeting, action items, previous unaddressed action items, parking lot items and the look-ahead schedule.

Decisions Made:
• Social and environmental issues will be documented in the report but will not be used as the sole basis for de-prioritizing an alternative. • The 100 Percent AR will recommend that both remaining alternatives be selected for further evaluation, particularly related to ongoing and future RM&E activities. • See above for additional conclusions and decisions.

Action Items:
• Review and provide comments on the 90 Percent AR by 17 January 2011 (All). • Backcheck 60 Percent AR comments via Dr. Checks (All). • Fix unreadable text in the electronic PDF file (Autier). • Add a discussion in Appendix F related to the Oregon Chub habitat adjacent to the Hampton site (Autier, completed 20 January 2011). • Increase capital and O&M costs in anticipation of a more complex fish sorting/handling facility. An example would be the sorting/handling facility at PGE Round Butte. Update text in Section 3.3.1 accordingly (Autier). • Include a cost allowance for an FSC prototype program (Kapla). • Remove reference to an adjustable net transition system (NTS). A fixed NTS system will be assumed (Willig, completed 20 January 2011). • Update the cost estimates per the refined design concepts for the FSC mooring towers, supports and anchorages (Kapla). • Determine if the northern spotted owl mapping in Appendix D should be included in copies of the report for public release (Swanson). • Provide timing of the ongoing and planned RM&E studies (Griffith). • Provide field report for the Oneida trap study (Griffith). • Add text prior to Figure 5-2 discussing the potential to meet biological performance goals with RM&E or prototype facilities alone (Kapla). • Clarify the biological disadvantages of the In-Reservoir FSC alternative (Autier, completed 20 January 2011). • Add a study to Section 7 to evaluate debris loading, both in the reservoir and in the North Fork River (Kapla).

Parking Lot:
• A policy/management decision is required to establish biological performance goals for the facility. • The ability to successfully collect and transport fry (particularly with regard to the in-tributary alternatives) is currently unknown. • The extent of reservoir predation (detriment) and/or rearing (betterment) is currently unknown.

Look Ahead:
• Review and provide comments on the 90 Percent AR – 17 January • Next Team Coordination Meeting – 27 January • NMFS 90 Percent AR Review Comments Submittal – 4 February • Backcheck AR Submittal – 14 February (Proposed) • 100 Percent AR Submittal – 11 March 2011 (Proposed) • Contract end date – 8 April 2011 (Proposed)

A link to USACE Sharepoint site is provided below:
https://onecorps.usace.army.mil/sites/Divisions/NWD/NWP/WBO/FP/FPW/WDPT/LHoRC/default.aspx

The USACE internal network folder is at the following location:
\\nwd\nwp\etds\Willamette\lookpt\Head_of_Reservoir

This page was intentionally left blank.

Project Title	Researcher	Objectives	Methods
Estimating relative abundance and production of Chinook salmon life history types in select Willamette River tributaries.	Chris Caudill UofI Brian Kennedy UofI Lisa Borgerson ODFW	• 1. Develop methods to identify outmigration pathway and timing, and growth and survival of juvenile Chinook salmon routed around, or passing through Willamette Valley Project reservoirs and dams. • Describe different juvenile Chinook life histories, including the relative abundance of life history types observed in cohorts of unmarked juveniles and returning adults. • Estimate relative abundance of juvenile Chinook life history types for unmarked juveniles passing Willamette Falls and other lower river sites where juveniles can be collected. • Use population models to estimate the relative contribution of life history types to current adult production and potential future biological benefits of implementing reservoir and dam passage vs. head-of-reservoir collection and transport operations.	• Sampling of juvenile salmon will focus on Middle Fork Willamette River (MF) populations surrounding Lookout Point Reservoir (LPR). Additional sampling in other basins, including Cougar and Detroit reservoirs, will be used for methods development and validation. Scales and otoliths from juveniles (collected by UI) will be used to identify life history types by visual scale reading using standard protocols (to be performed by ODFW) and analysis of the otoliths (UI). Otolith analyses will include quantification of growth increments and microchemical determination of isotopic ratios for elements known to record biological information (e.g., stable isotope ratios of strontium and calcium; Kennedy et al. 2002). Similar analyses of otoliths from adults will be used to infer juvenile life history, ocean entry timing, and (potentially) natal basin. Relative frequencies of life history types in out migrating juveniles will be compared to frequencies in returning adults to estimate relative performance of each life history type. Matrix population modeling methods will be used to estimate relative fitness of life history types for both migration routes (i.e., reservoir and dam passage vs. head-of-reservoir collection and transport) across a range of model assumptions.

Project Title	Researcher	Objectives	Methods
LIFE-HISTORY CHARACTERISTICS OF JUVENILE SPRING CHINOOK SALMON REARING IN WILLAMETTE VALLEY RESERVOIRS	Fred Monzyk ODFW	• During the first year of this study, we conducted pilot efforts at Cougar and Lookout Point reservoirs to develop reliable sampling techniques for collecting and assessing sub-yearling and yearling Chinook salmon distribution. We will continue efforts to develop a standardized sampling approach and apply the proven techniques we developed to date will be used to address the following questions related to juvenile use of reservoirs: • 1. What is the distribution of sub-yearling and yearling spring Chinook salmon at various times of year in the reservoir? 2. What is the relative growth of sub-yearling reservoir-rearing juvenile Chinook salmon compared to stream-rearing juveniles? 3. What are the major predator species in the reservoir during the time of year juvenile Chinook salmon are most vulnerable, and what is the composition of their diet?	• Use of multiple gear types to capture & observe fish within the reservoir: o Oneida traps (similar to Merwin) o Hoop traps o Snorkel surveys o Beach seines • Record data on fish community assemblage, fish size, growth rates, CPUE • Mark as many Chinook as possible with PIT tags

Project Title	Researcher	Objectives	Methods
JUVENILE SALMONID OUTMIGRATION MONITORING AT WILLAMETTE VALLEY PROJECT RESERVOIRS	Fred Monzyk ODFW	• Monitor the migration timing and size of juveniles entering and exiting reservoirs. • Estimate the relative abundance by life-stage of juvenile Chinook entering and exiting reservoirs. • We will also evaluate the feasibility of different marking techniques that could be used for mark-recapture studies of other research in the reservoirs. • Fish collected during this work will also provide an opportunity to assess the feasibility of mark-recapture studies in other RM&E work; specifically, in-reservoir and dam passage studies.	• We propose to continue juvenile salmonid monitoring at the head of four reservoirs in FY 2011 (Detroit, Foster, Cougar, and Lookout Point), primarily using rotary screw traps. • USACE will also be monitoring the LOP tailrace with two screwtraps • Chinook that are of sufficient size will be PIT tagged at both locations
Paired release study to examine biological effectiveness of Head of Reservoir	Tom Friesen ODFW Bill Muir NOAA	• Characterize fish migration, use, and survival through LOP reservoir • Characterize fish migration and survival for head of reservoir collected fish • Potentially compare paired releases at head of reservoir to tailrace releases. Comparison can look at survival to different points in migration and SARs.	• Use releases of marked hatchery fish to evaluate fish migration and use in LOP reservoir • Use releases of PIT tagged hatchery fish released in the tailrace to try and characterize HOR captured fish migration characteristics • Use information gathered in this first year to design more robust studies for FY12

Project Title	Researcher	Objectives	Methods
Hydroacoustic monitoring of fish passage at LOP Dam	Fenton Khan PNNL	• Monitor timing and abundance of downstream migrants through all routes at LOP • Obtain relative abundance and vertical distribution of fish in the immediate forebay. • Relate fish passage metrics to project operations (flow, outlets used, reservoir elevation etc).	• Data from hydroacoustics will be collected until January 31st • Analysis will focus on different times where there are project operations of interest (i.e. late June of 2010). • Hydroacoustic data will be compared to screwtrap monitoring data in tailrace

Team Coordination Meeting No. 19

Date To Be Determined

Place Holder

This page was intentionally left blank.

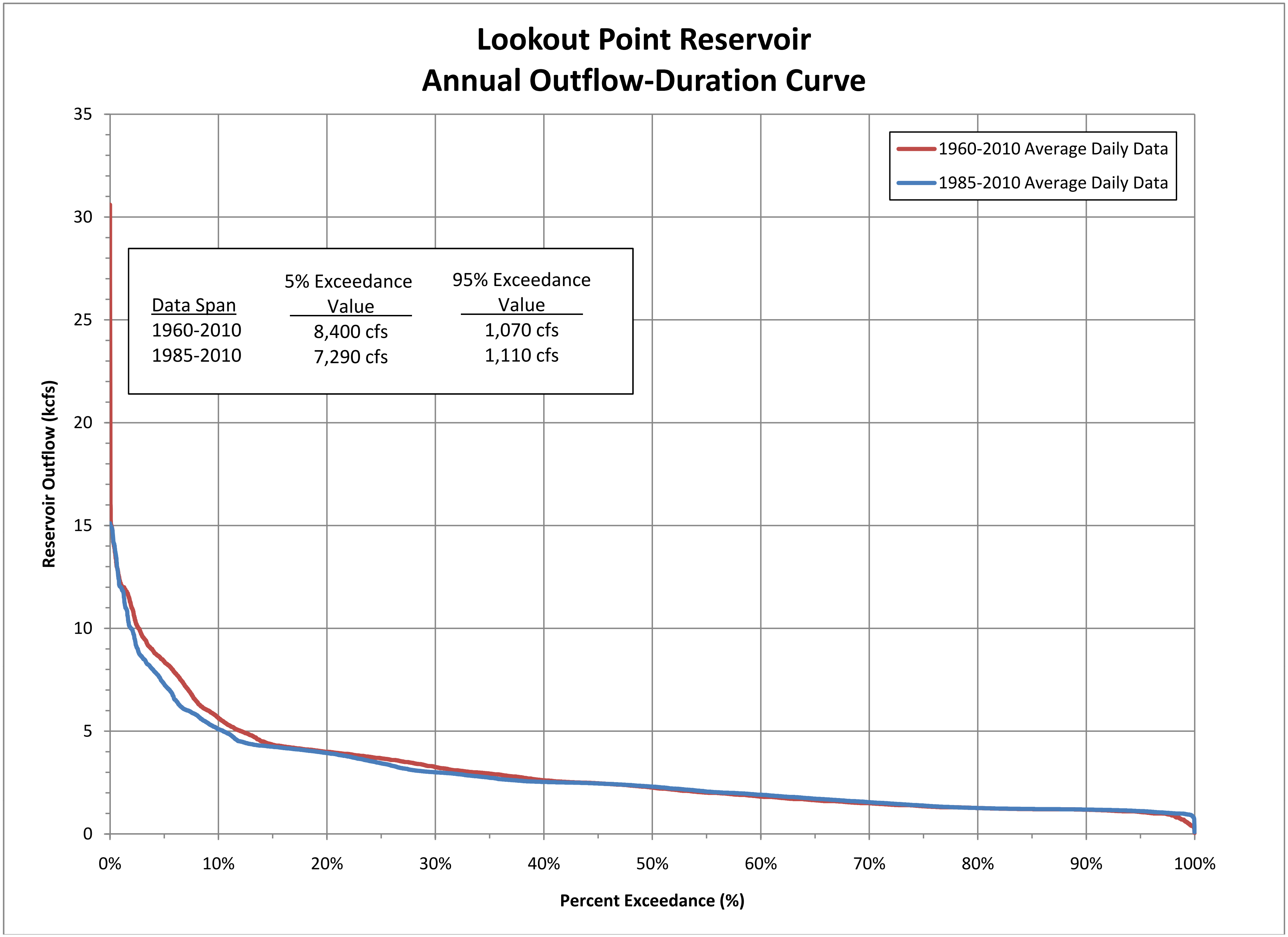
APPENDIX B

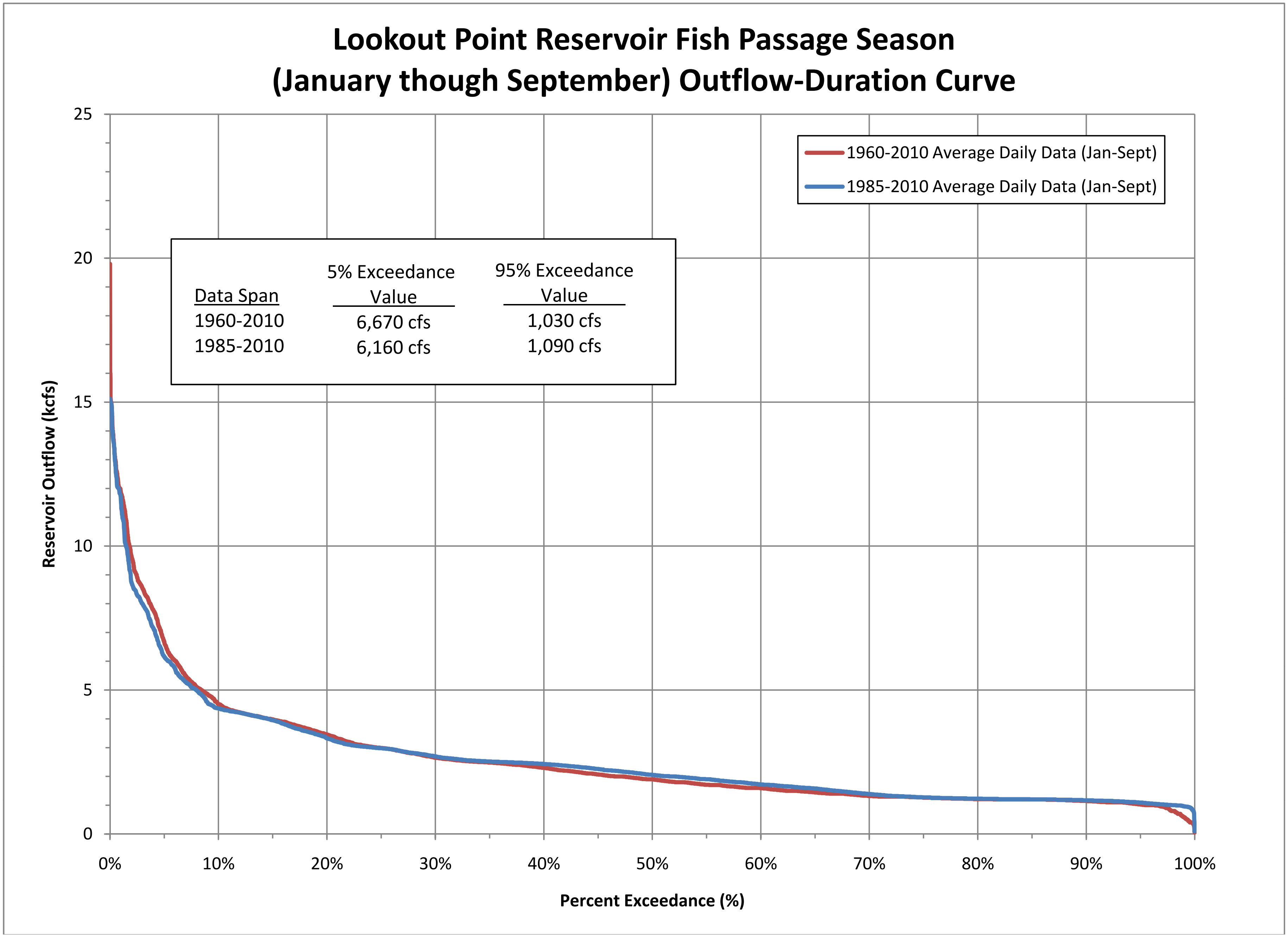
RESERVOIR HYDROLOGIC DATA

Appendix B includes the following:

1. Lookout Point Control Diagram
2. Lookout Point Outflow-Duration Curve (Annual)
3. Lookout Point Outflow-Duration Curve (Fish Passage Season)
4. Lookout Point Reservoir Temperature Data
5. Hills Creek Reservoir Rule Curve
6. Lookout Point Frequency Analysis

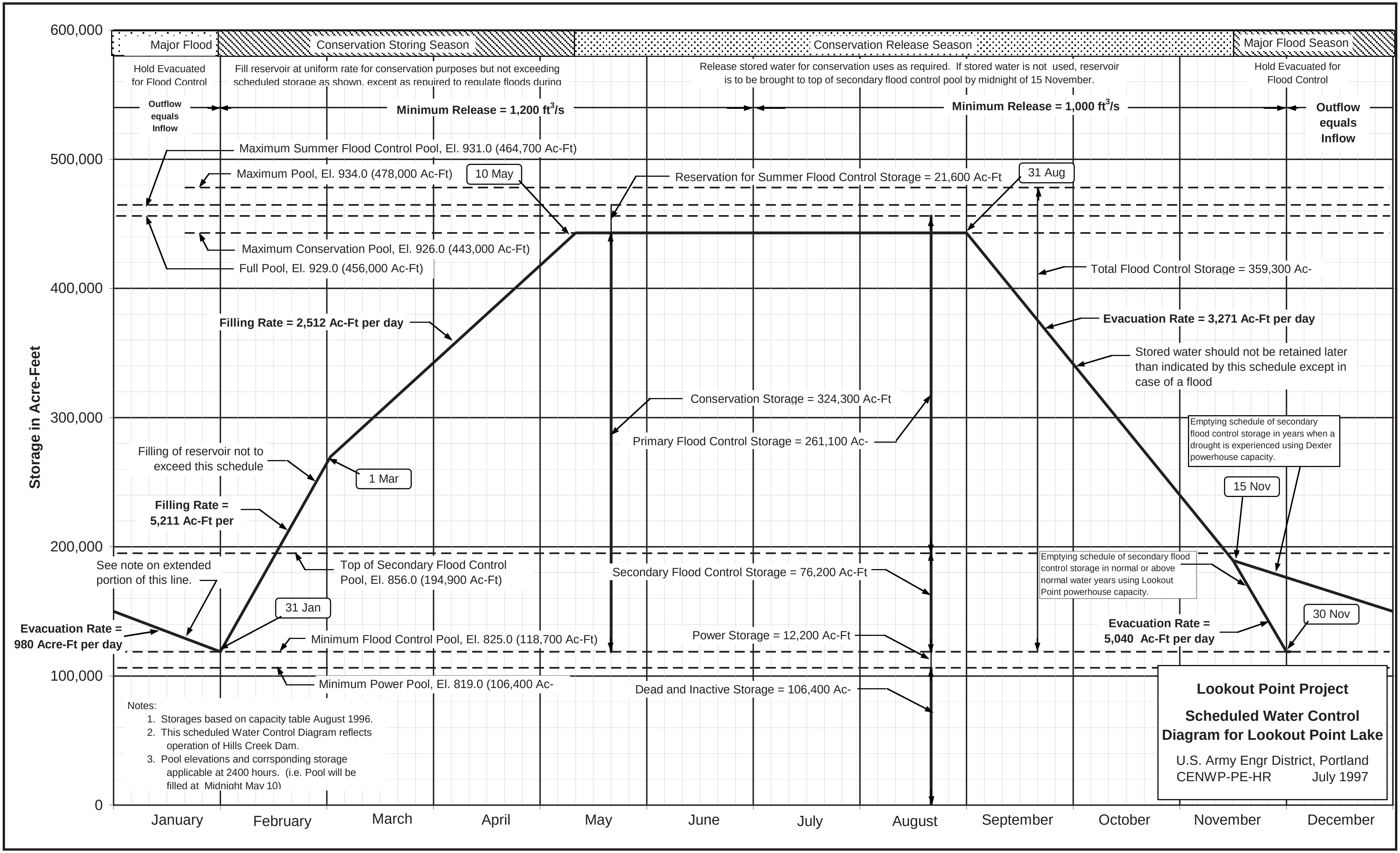
This page was intentionally left blank.


Lookout Point Reservoir
Annual Outflow-Duration Curve
1960-2010 Average Daily Data
1985-2010 Average Daily Data
Data Span
5% Exceedance Value
95% Exceedance Value
1960-2010
8,400 cfs
1,070 cfs
1985-2010
7,290 cfs
1,110 cfs
Reservoir Outflow (kcfs)
35
30
25
20
15
10
5
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent Exceedance (%)

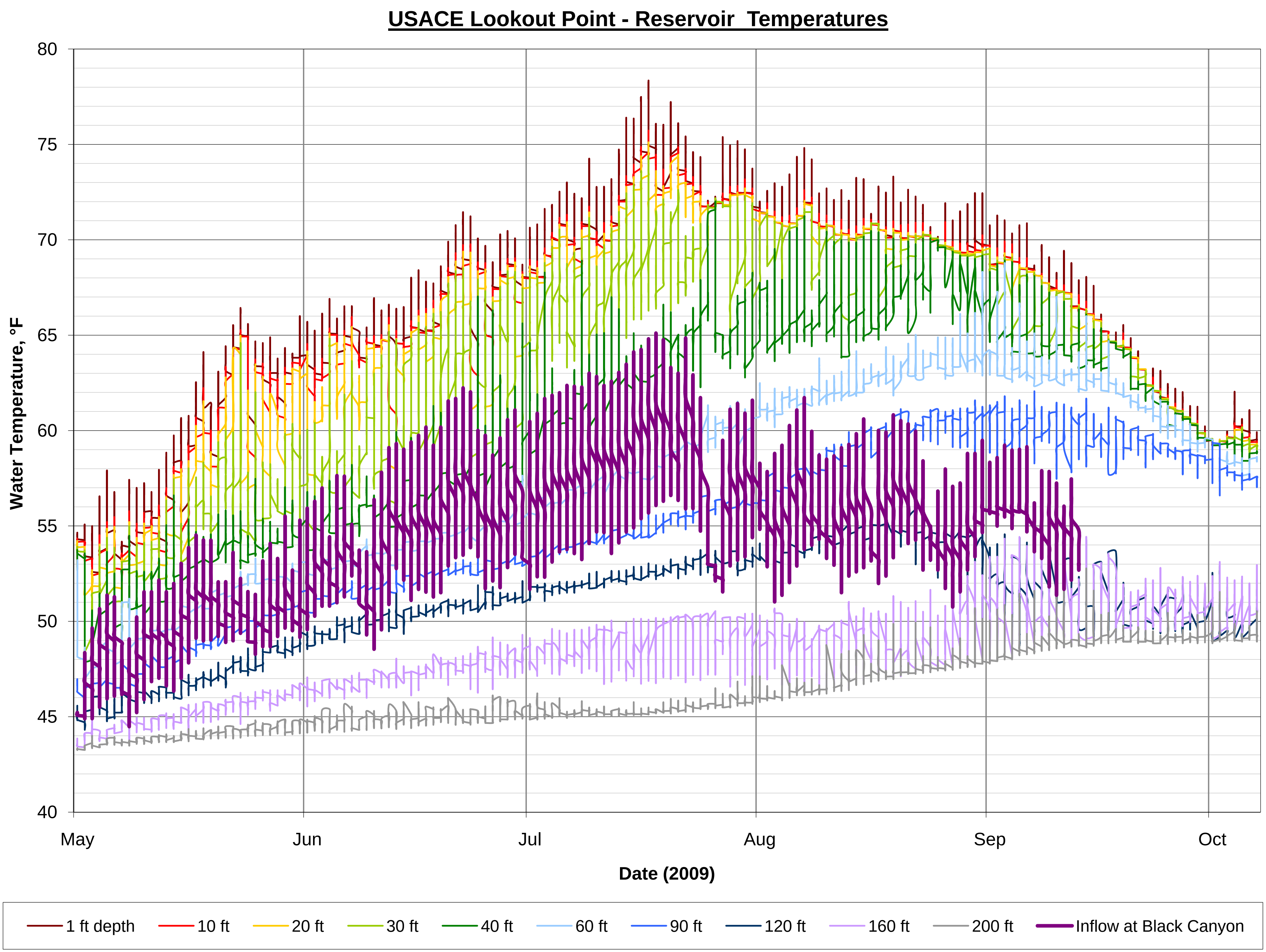


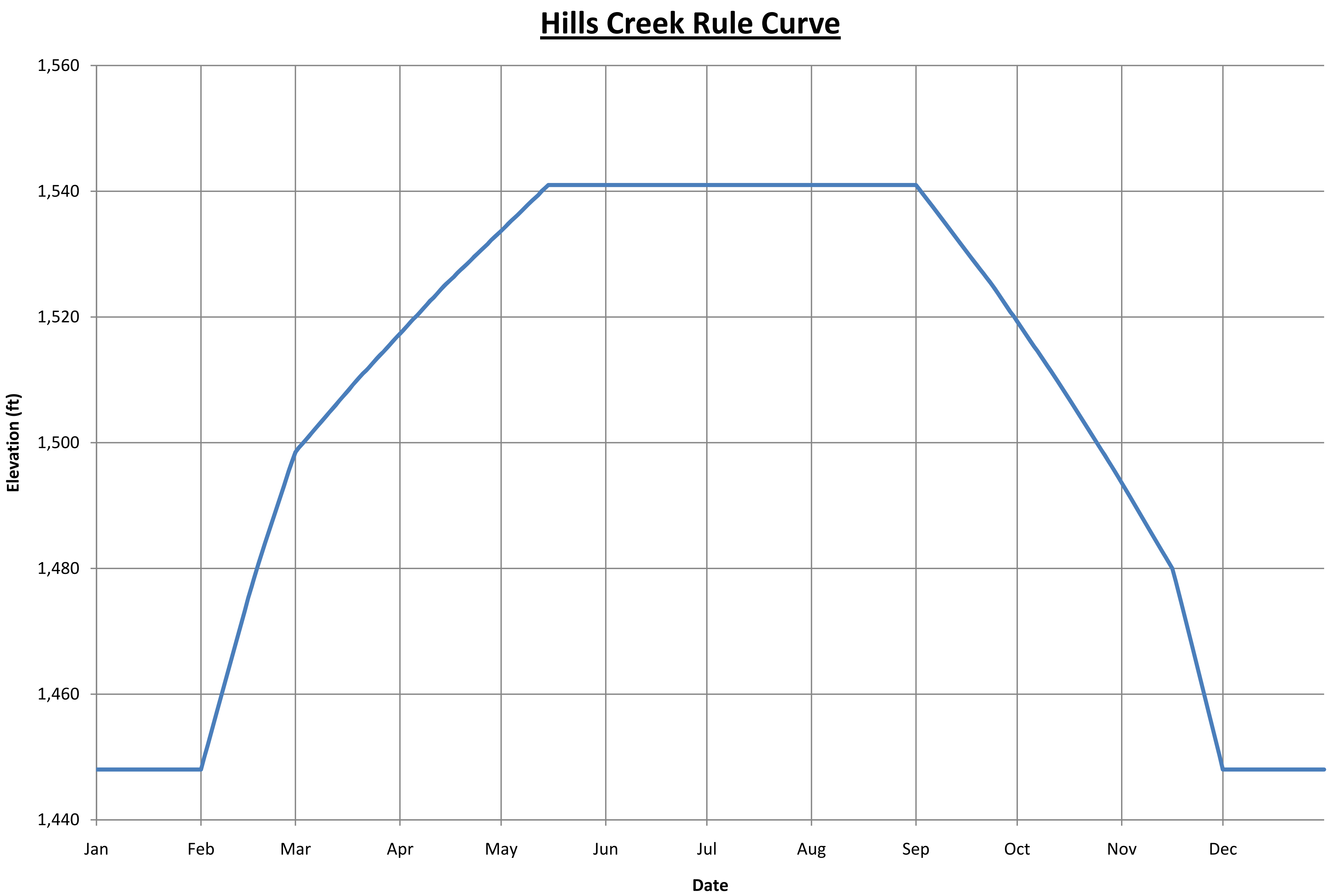
Lookout Point Reservoir Fish Passage Season
(January though September) Outflow-Duration Curve
1960-2010 Average Daily Data (Jan-Sept)
1985-2010 Average Daily Data (Jan-Sept)
Data Span
5% Exceedance Value
95% Exceedance Value
1960-2010
6,670 cfs
1,030 cfs
1985-2010
6,160 cfs
1,090 cfs
Reservoir Outflow (kcfs)
25
20
15
10
5
0
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Percent Exceedance (%)

Lookout Point Reservoir Control Diagram



Source: Willamette Valley Projects Configuration/Operation Plan, Phase I Report, Final October 2009


USACE Lookout Point - Reservoir Temperatures
Water Temperature, °F
80
75
70
65
60
55
50
45
40
May
Jun
Jul
Aug
Sep
Oct
Date (2009)
1 ft depth
10 ft
20 ft
30 ft
40 ft
60 ft
90 ft
120 ft
160 ft
200 ft
Inflow at Black Canyon



Hills Creek Rule Curve
1,560
1,540
1,520
1,500
1,480
1,460
1,440
Elevation (ft)
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Date

This page was intentionally left blank.

Frequency Analysis - Source Information

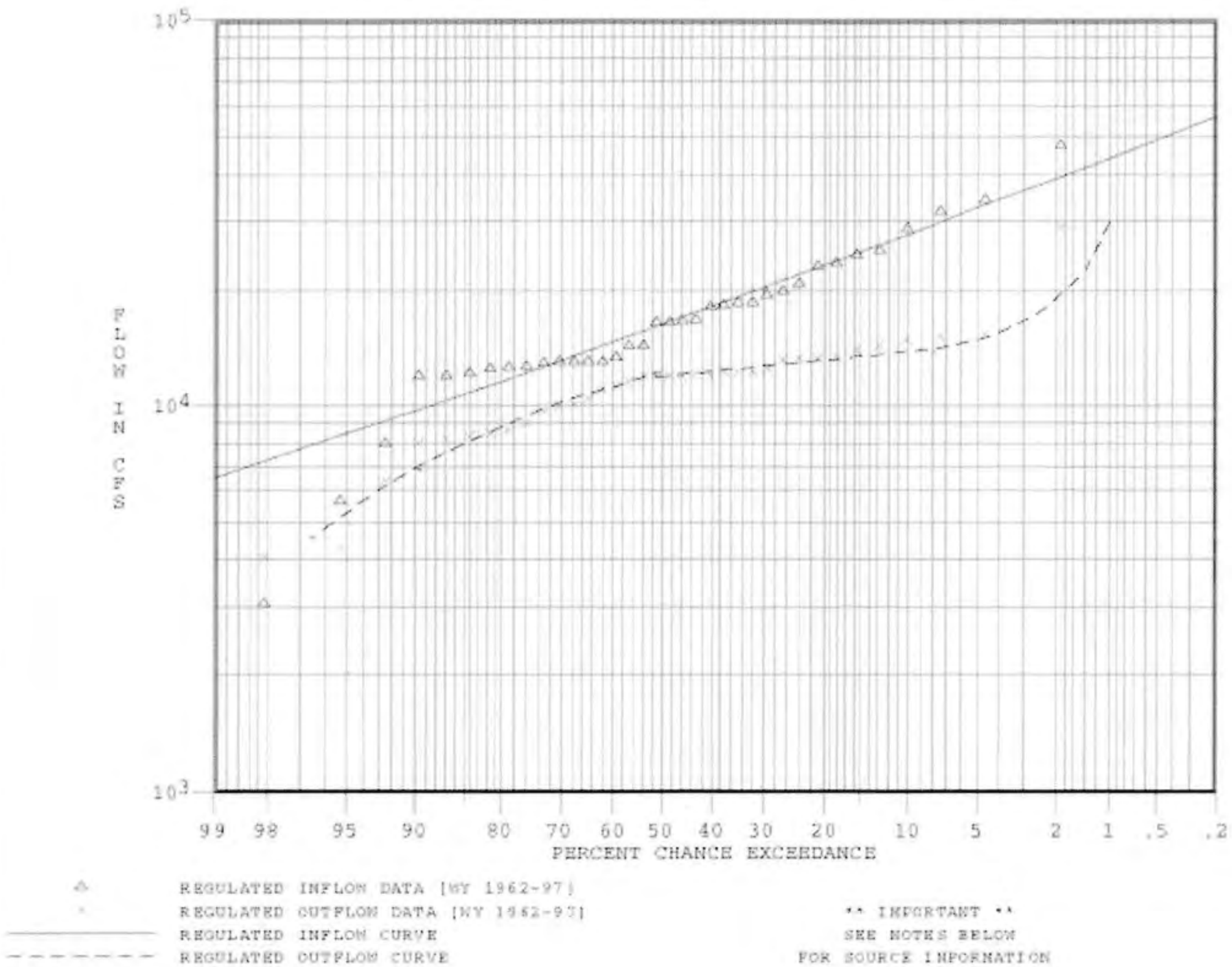
Lookout Point Project
Middle Fork Willamette River

1. Regulated Inflow Data. Period of Record: WY 1962-97 from CROHMS Database. Inflows to Lookout Point Dam are regulated by Hills Creek Dam. Mean daily data.

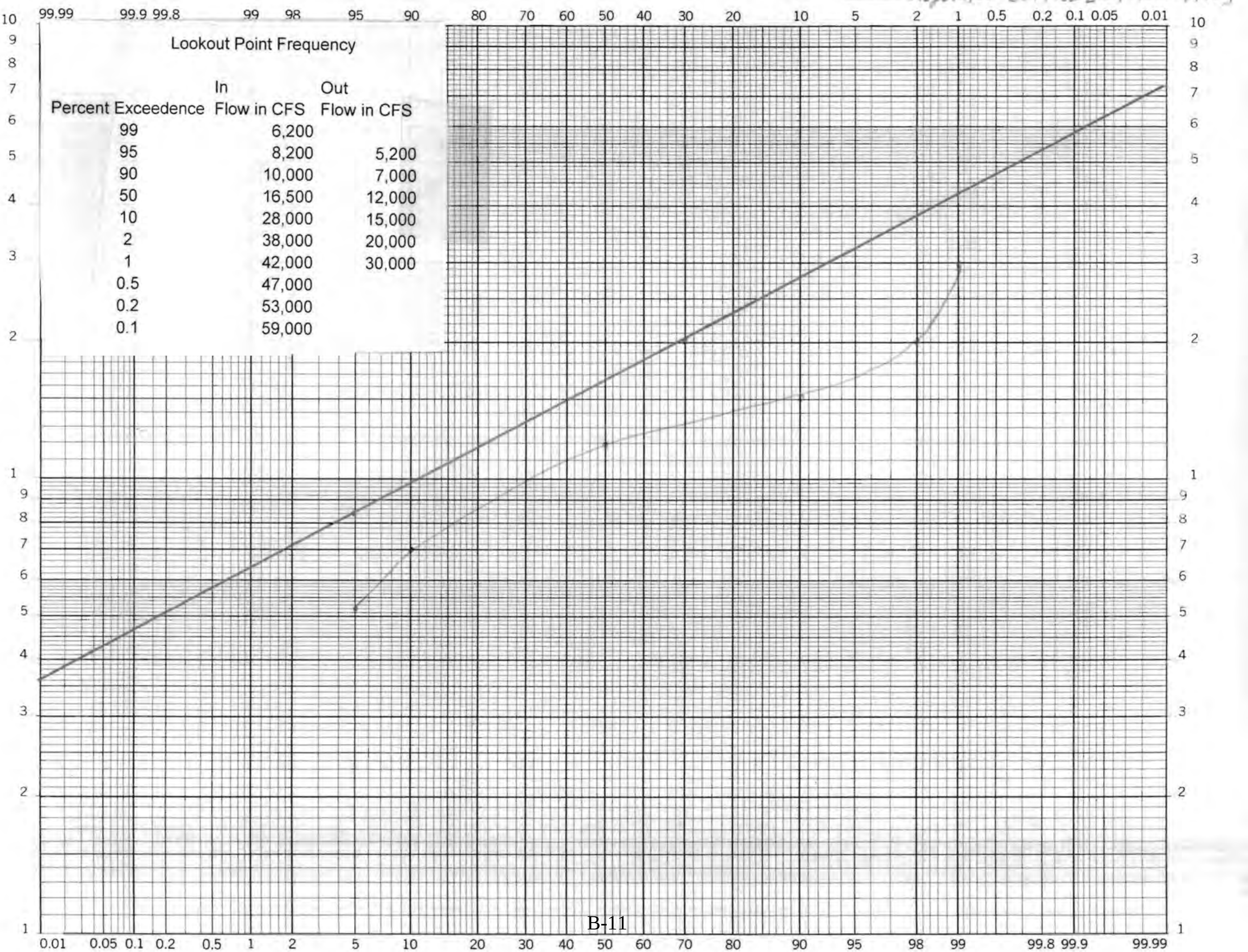
2. Regulated Outflow Data. Period of Record: WY 1962-97 WY 1962-83 from Middle Fork Willamette River near Dexter, Oregon (USGS #14150000). WY 1984-97 from CROHMS Database. Mean daily data.

3. Drainage Area = 991 Square Miles

LOOKOUT POINT PROJECT - FREQUENCY CURVE



Lookpoint Point



Lookout Point Frequency

Percent Exceedence	In Flow in CFS	Out Flow in CFS
99	6,200	
95	8,200	5,200
90	10,000	7,000
50	16,500	12,000
10	28,000	15,000
2	38,000	20,000
1	42,000	30,000
0.5	47,000	
0.2	53,000	
0.1	59,000	

This page was intentionally left blank.

APPENDIX C

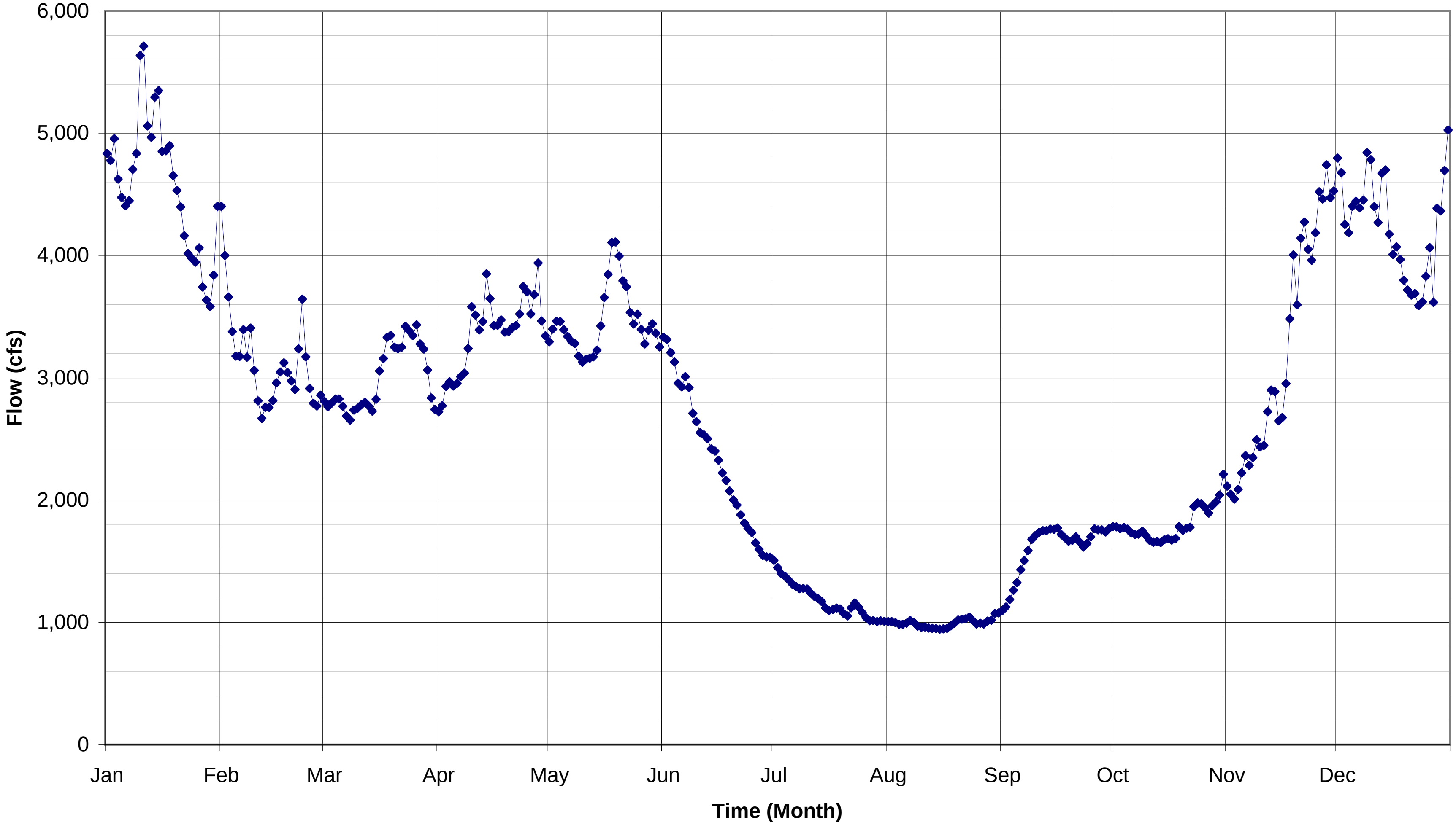
RIVER HYDROLOGIC AND HYDRAULIC DATA

Appendix C includes the following:

1. Middle Fork Willamette River: Average annual hydrograph and, annual, January-September and monthly flow-duration curves
2. North Fork of the Middle Fork Willamette River: Average annual hydrograph and, annual, January-September and monthly flow-duration curves
3. Middle Fork Willamette River (upper): Average annual hydrograph and, annual, January-September and monthly flow-duration curves
4. FEMA Flood Rate Insurance maps
5. Executive Order 11988

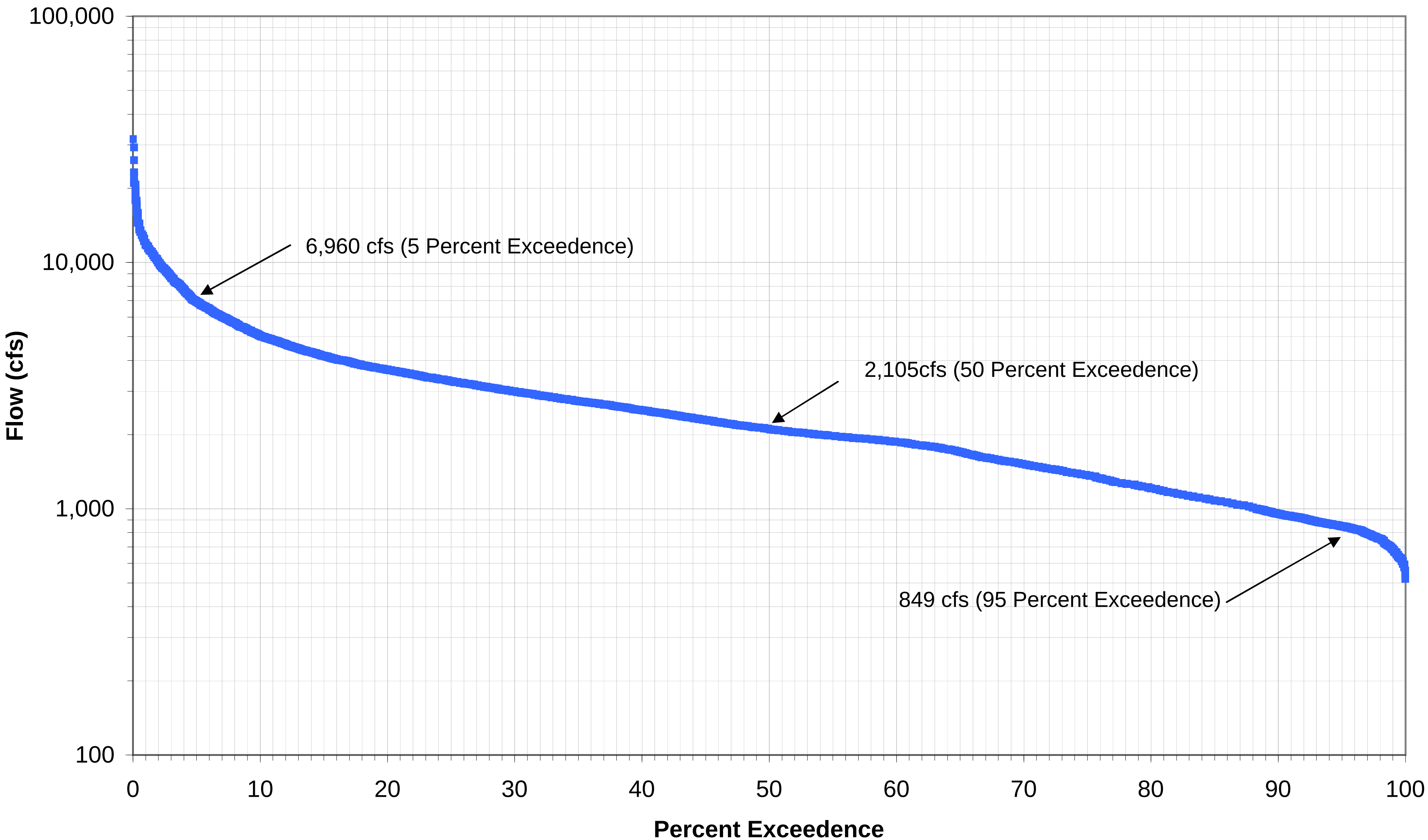
This page was intentionally left blank.

Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
Hydrograph



(Average Daily Data from January 1985 - March 2010)

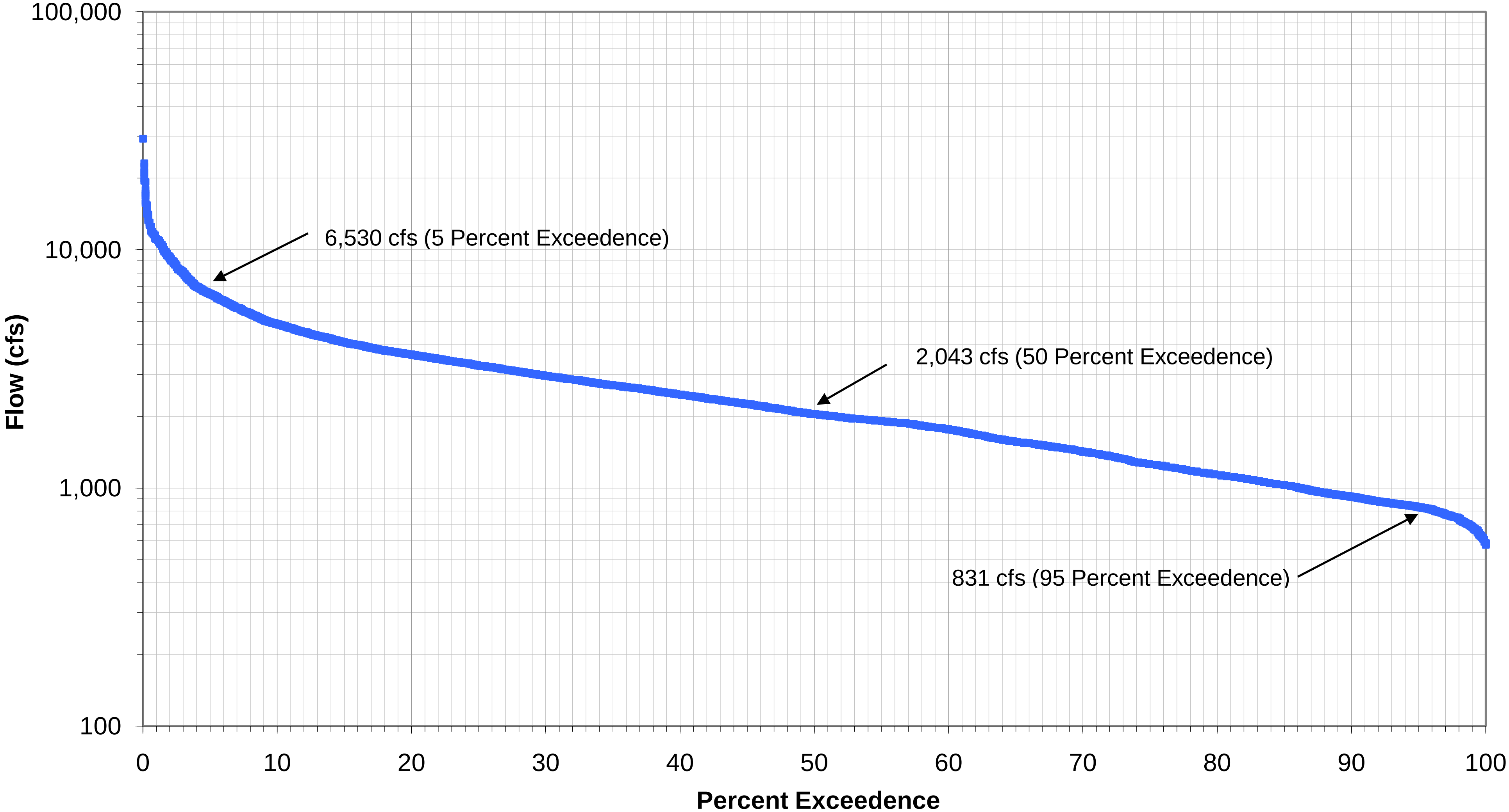
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
Annual Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

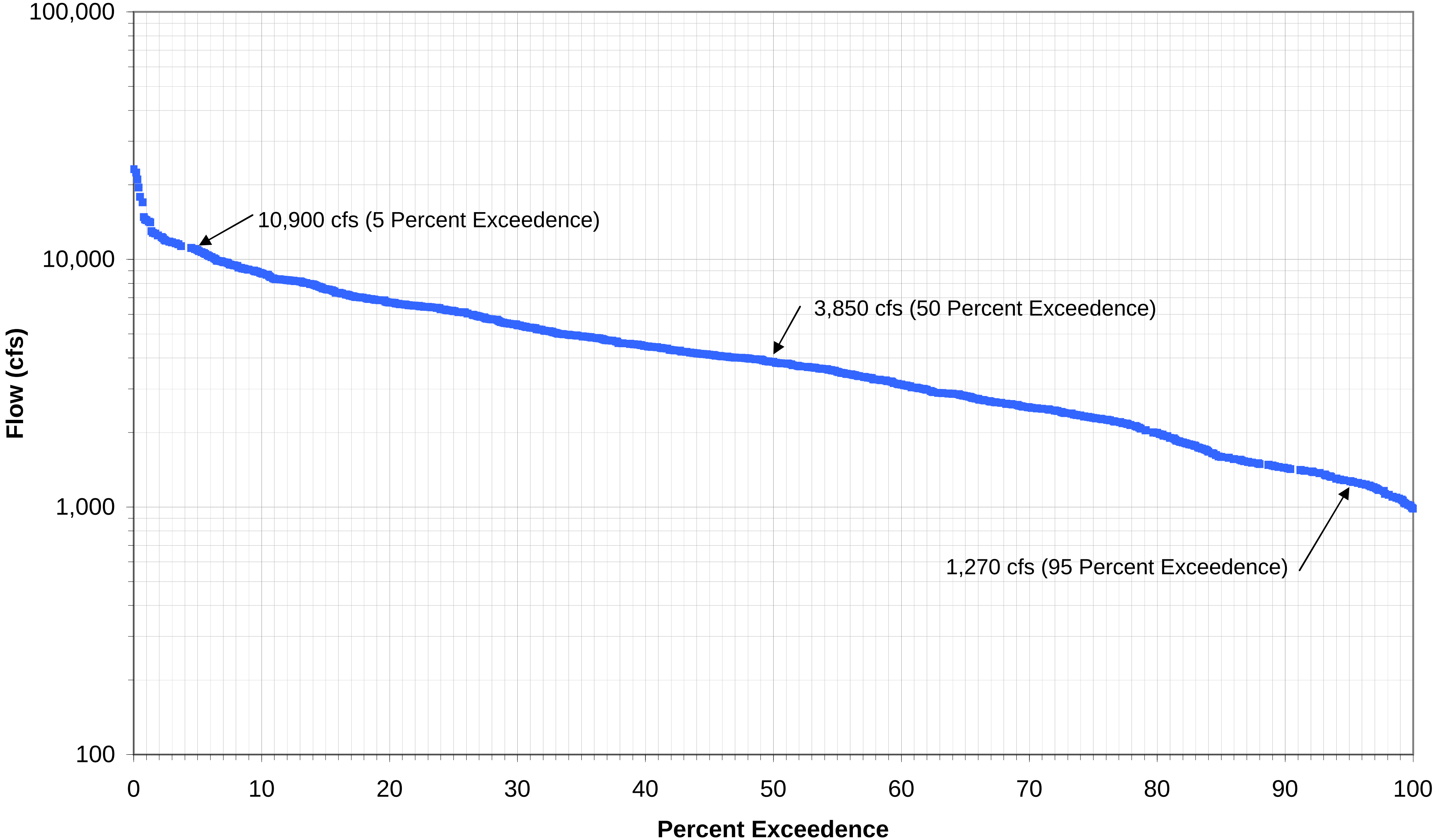
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
Jan - Sept Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

8/24/2010

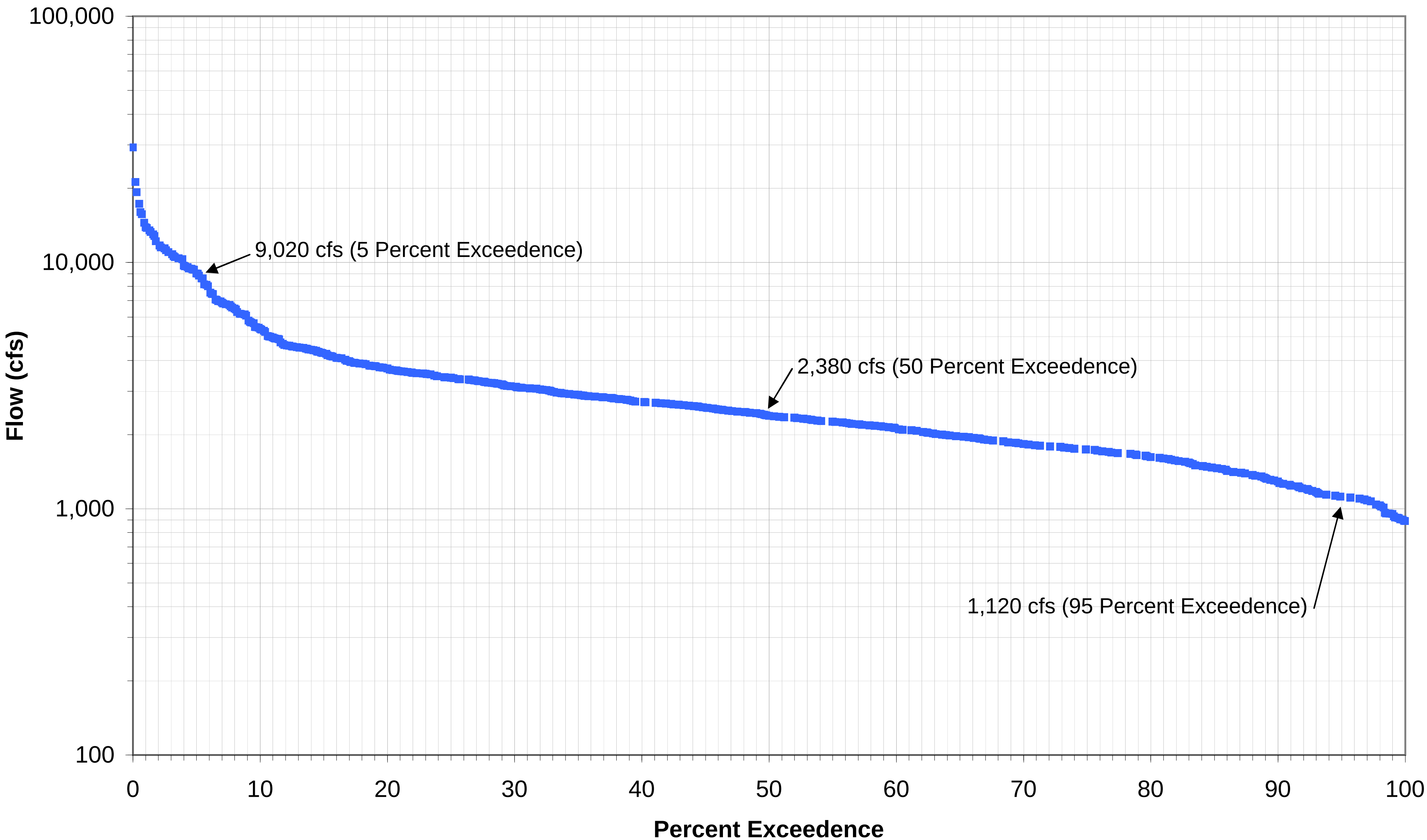
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
January Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

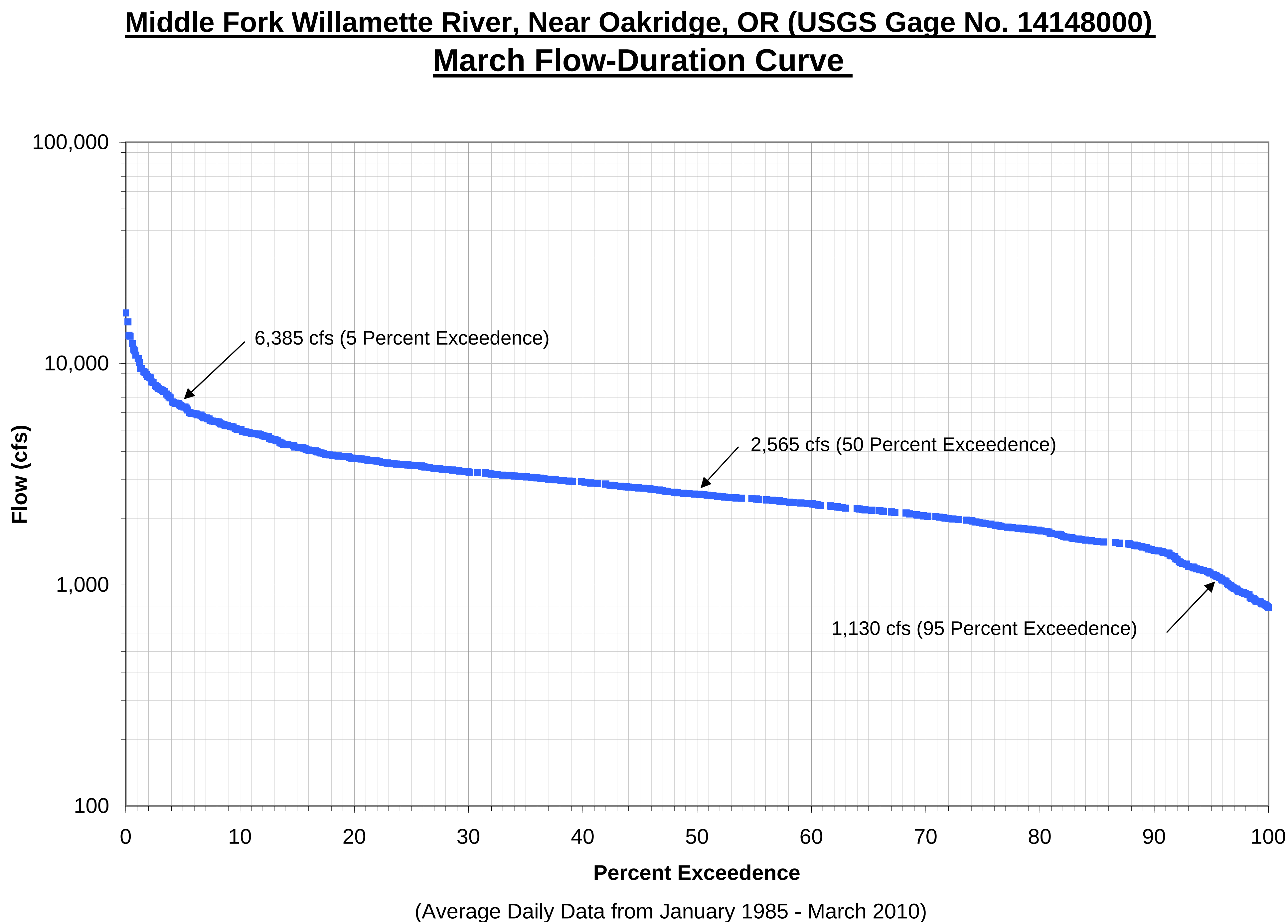
4/22/2010

Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
February Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

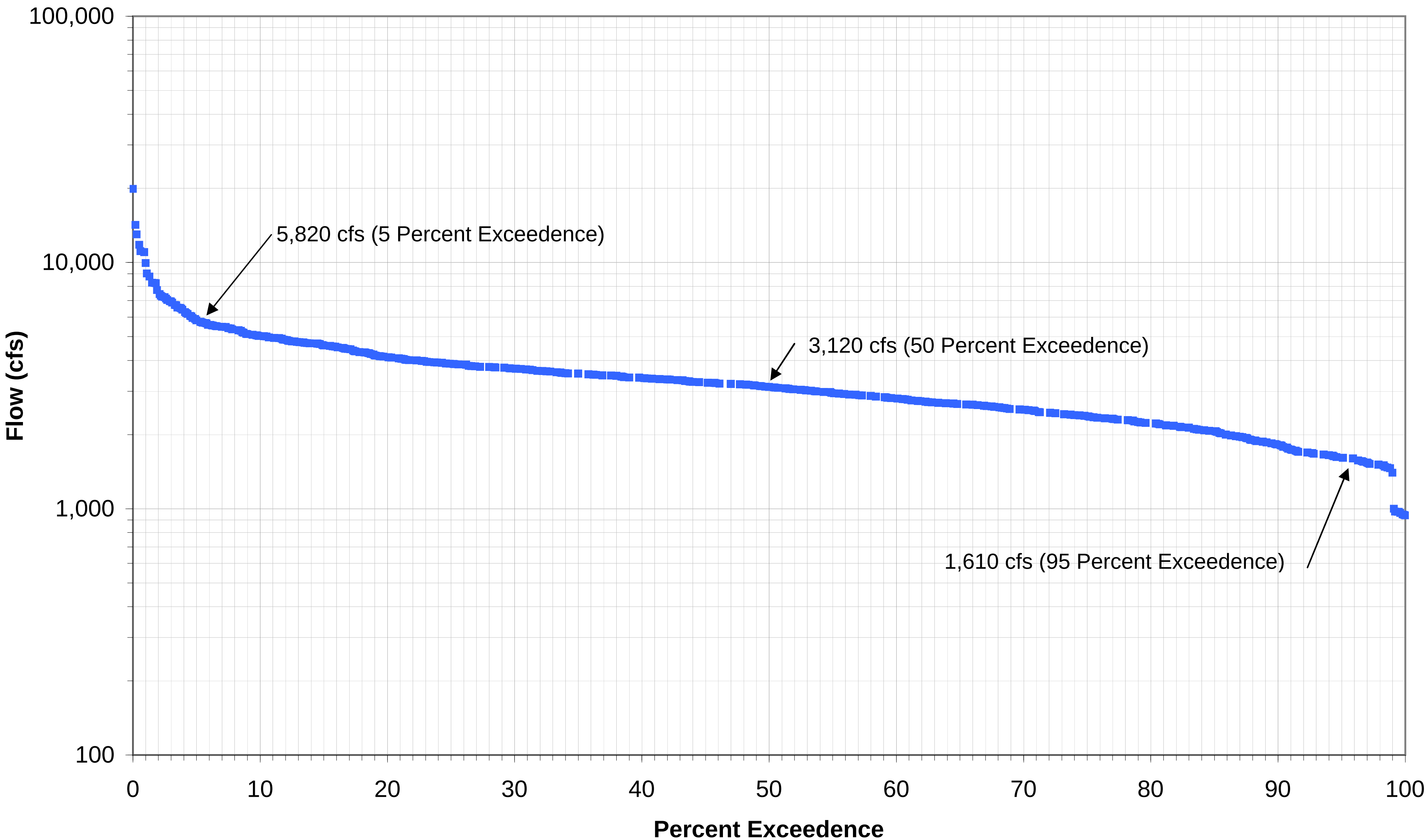
4/22/2010



Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
March Flow-Duration Curve
100,000
10,000
1,000
100
Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedence
6,385 cfs (5 Percent Exceedence)
2,565 cfs (50 Percent Exceedence)
1,130 cfs (95 Percent Exceedence)
(Average Daily Data from January 1985 - March 2010)

4/22/2010

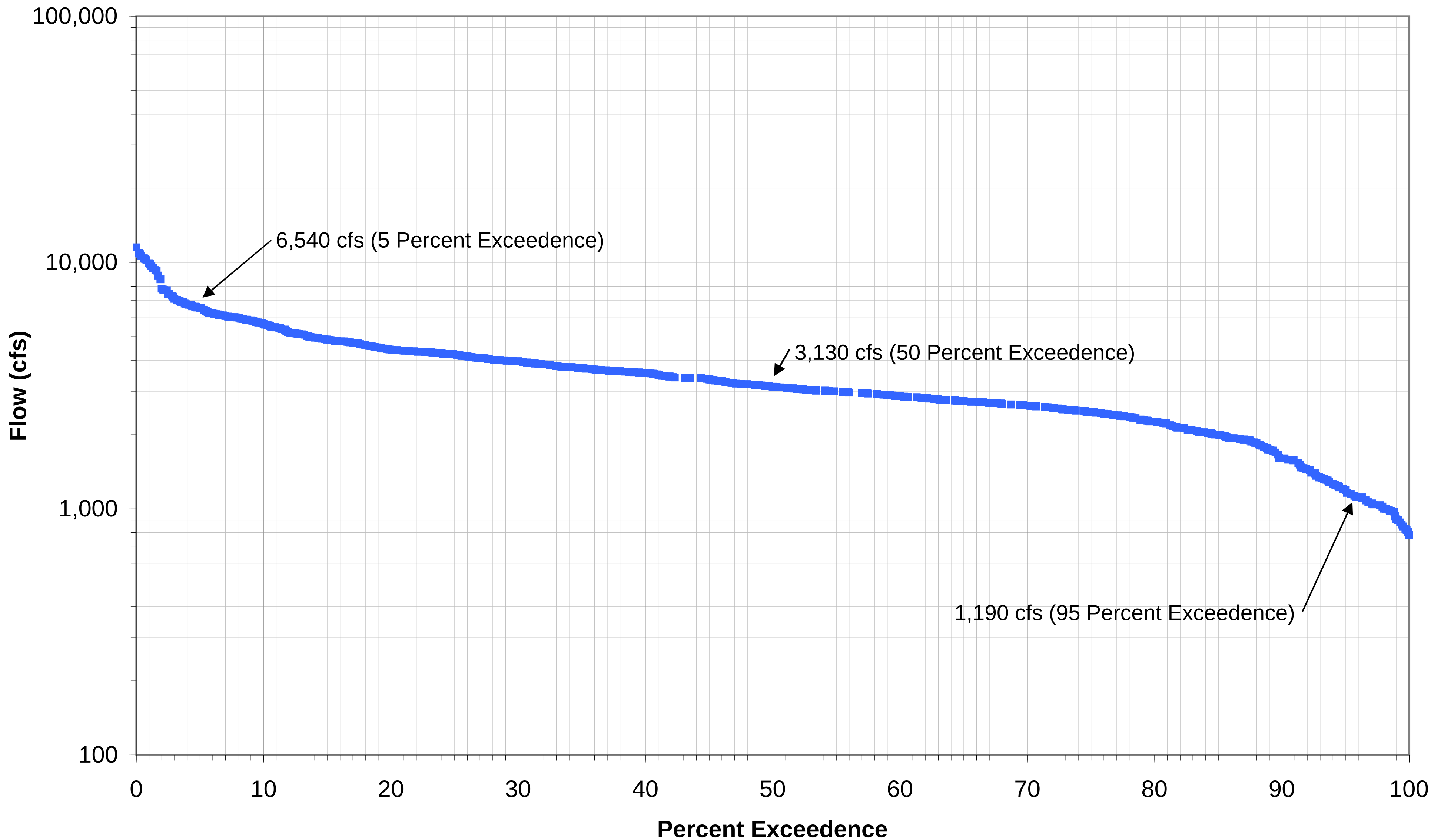
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
April Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

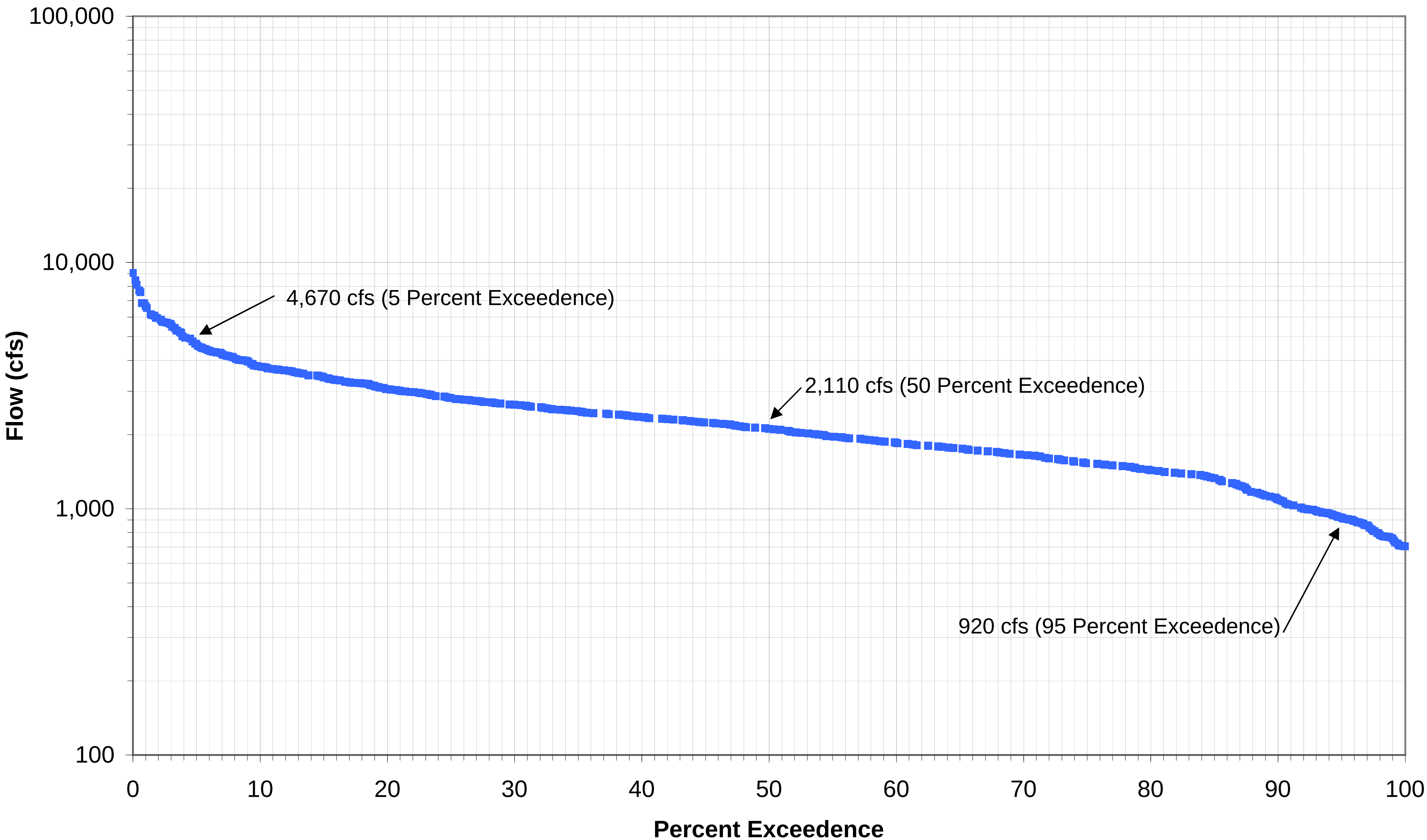
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
May Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

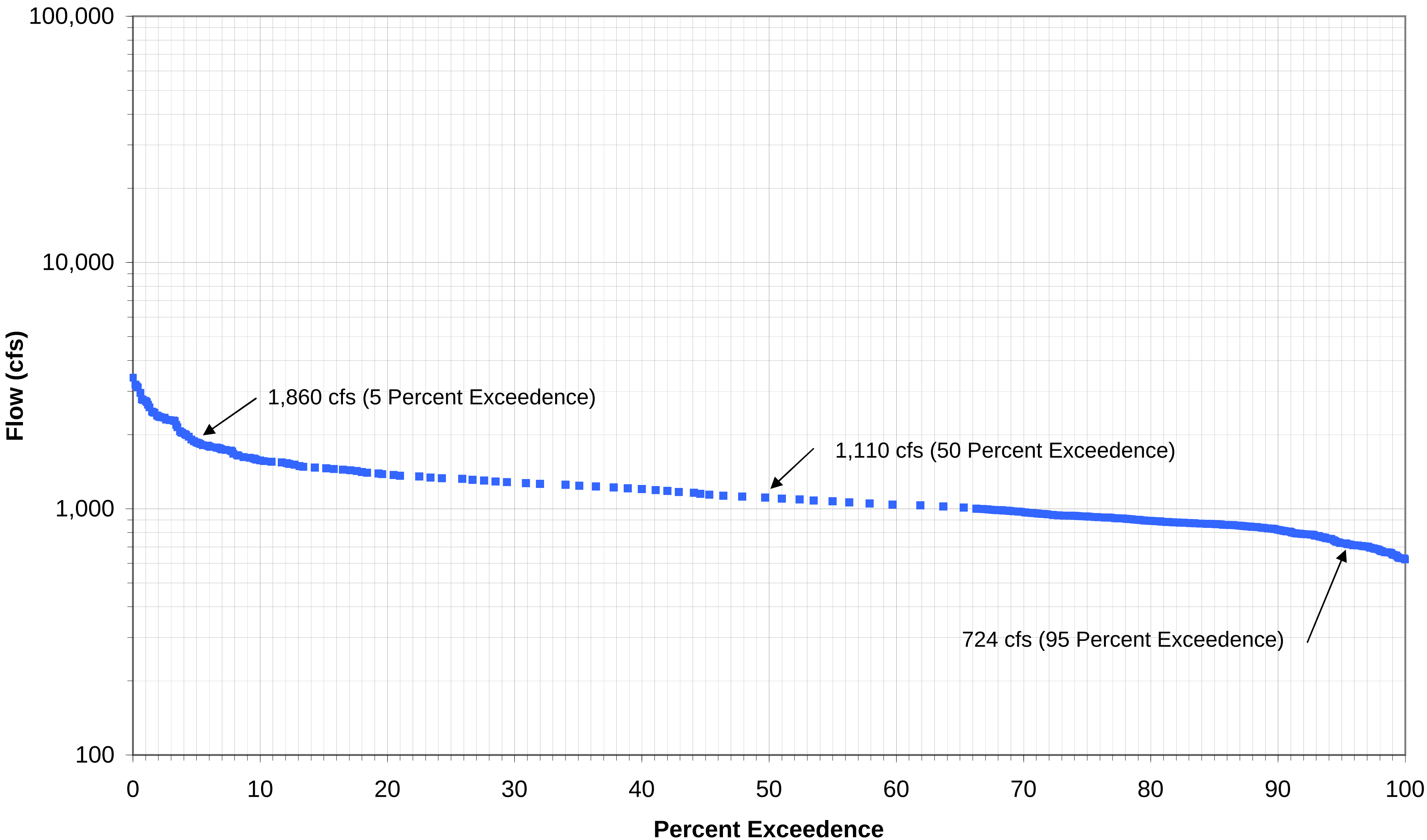
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
June Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

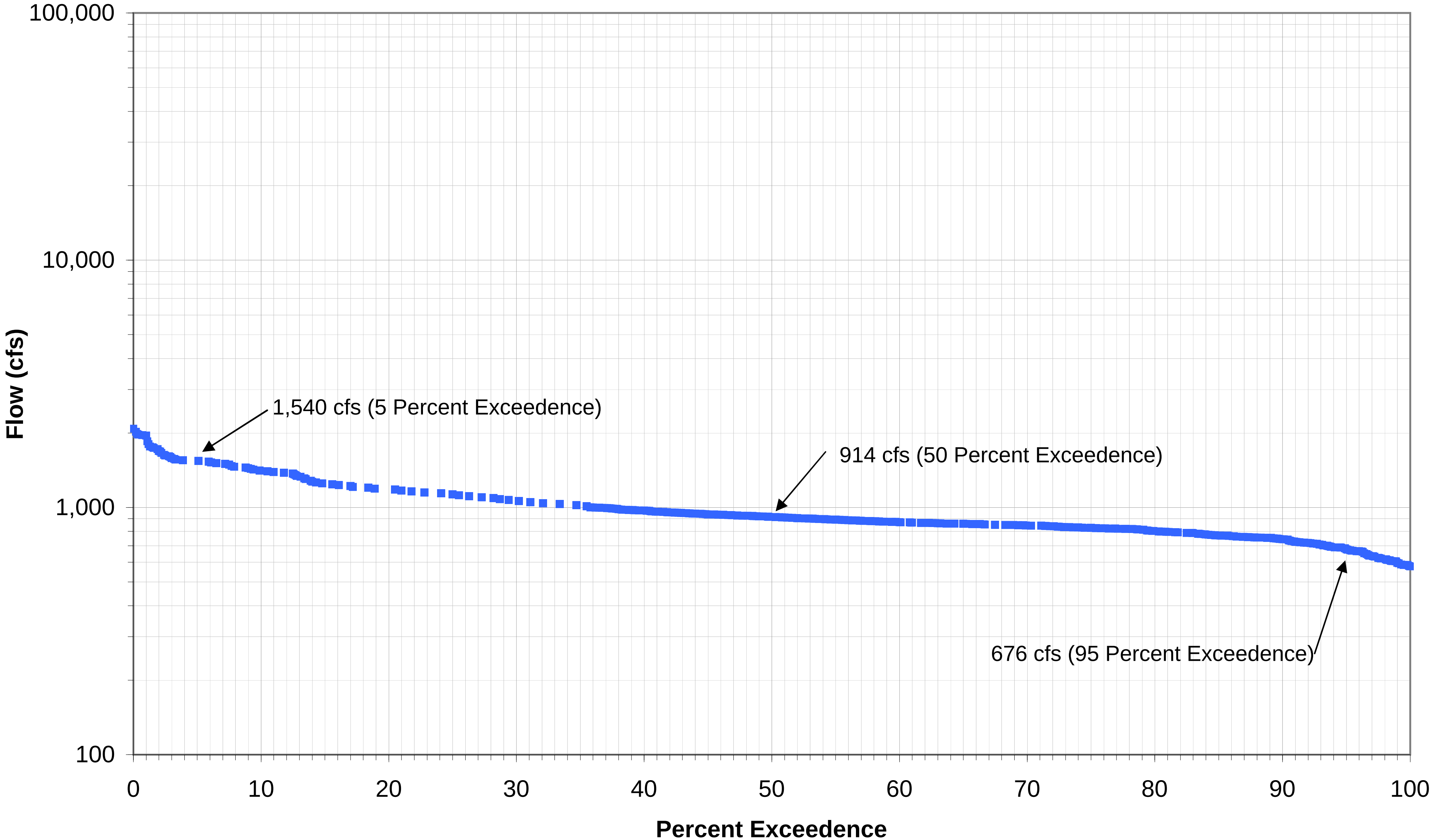
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
July Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

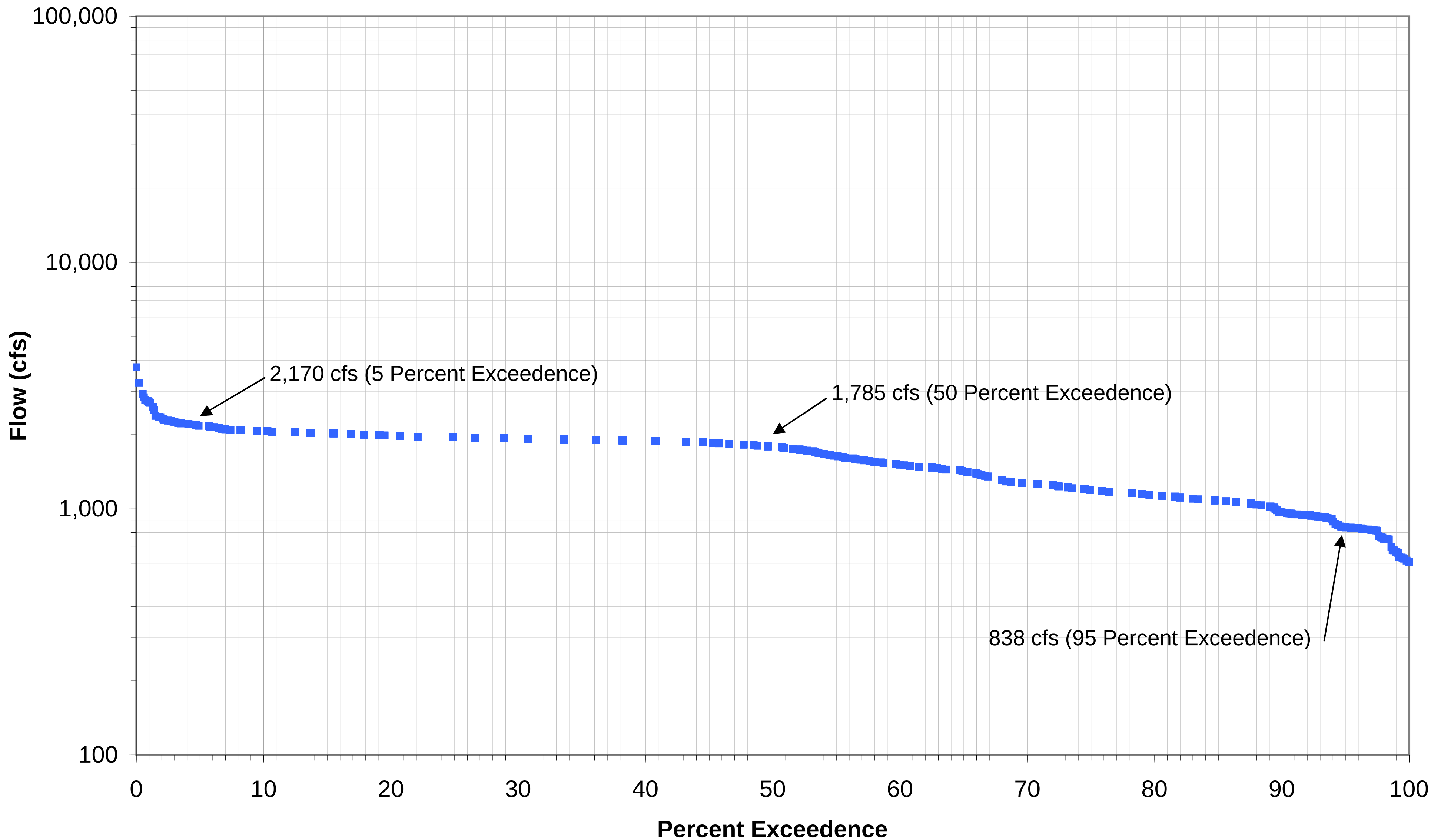
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
August Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

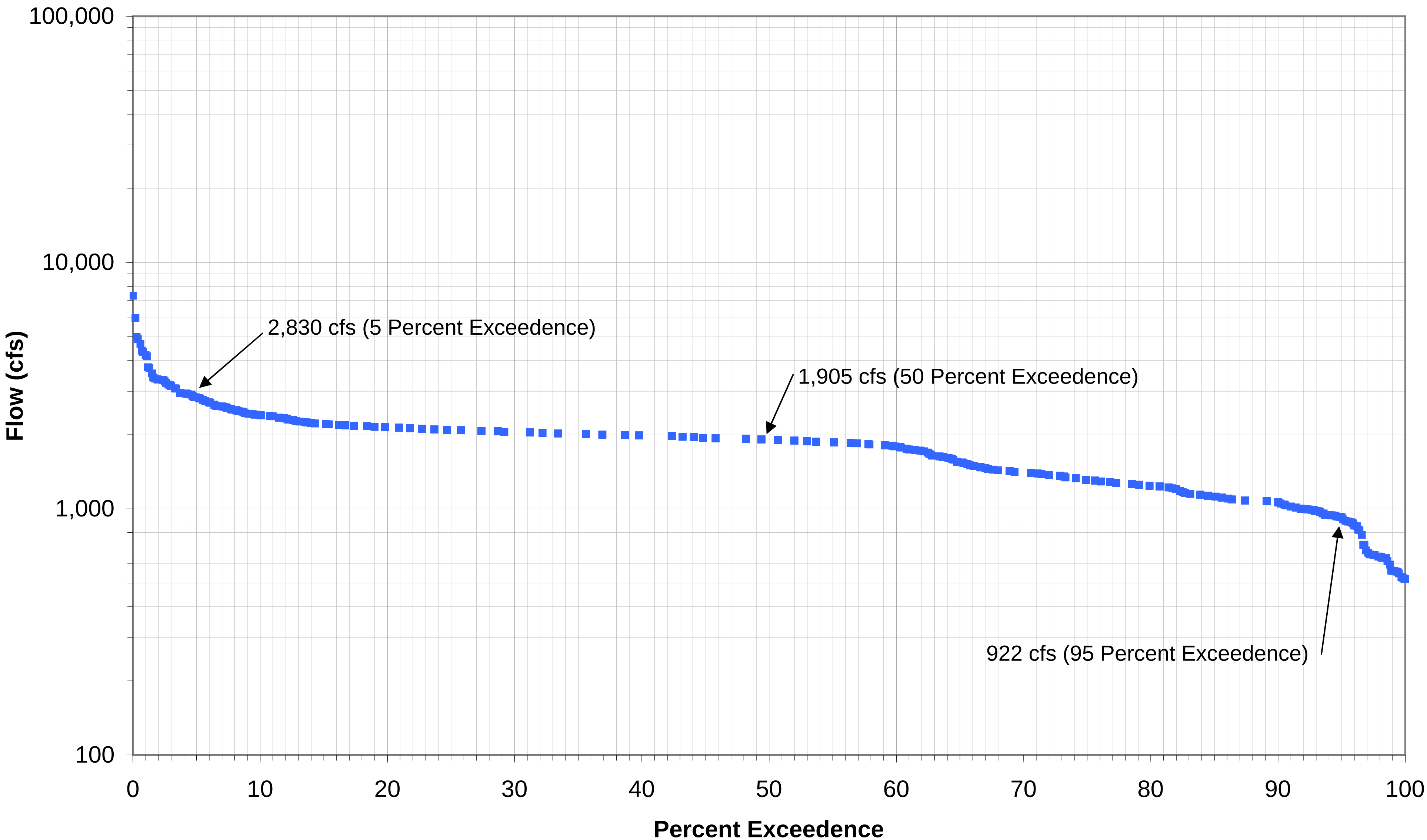
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
September Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

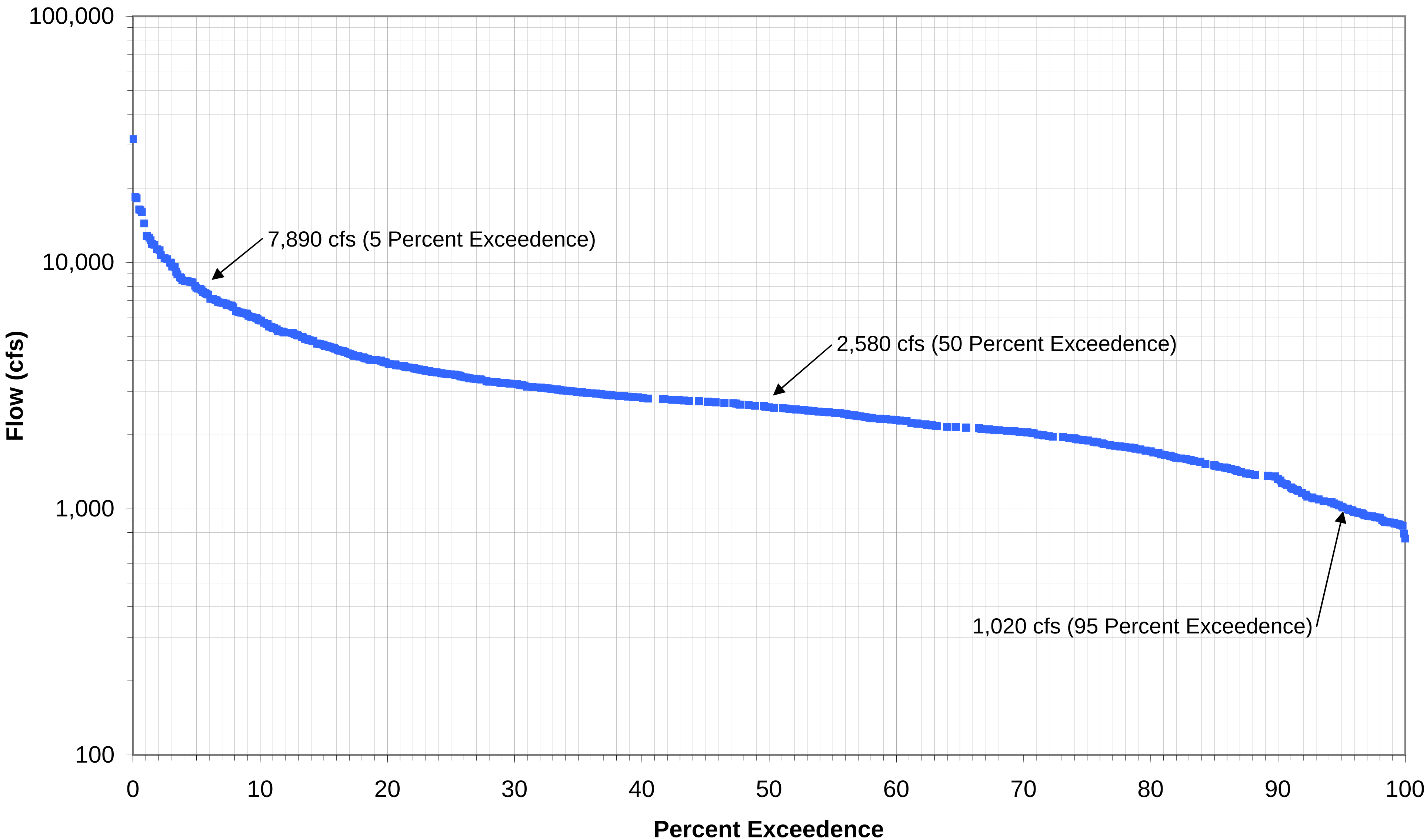
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
October Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

4/22/2010

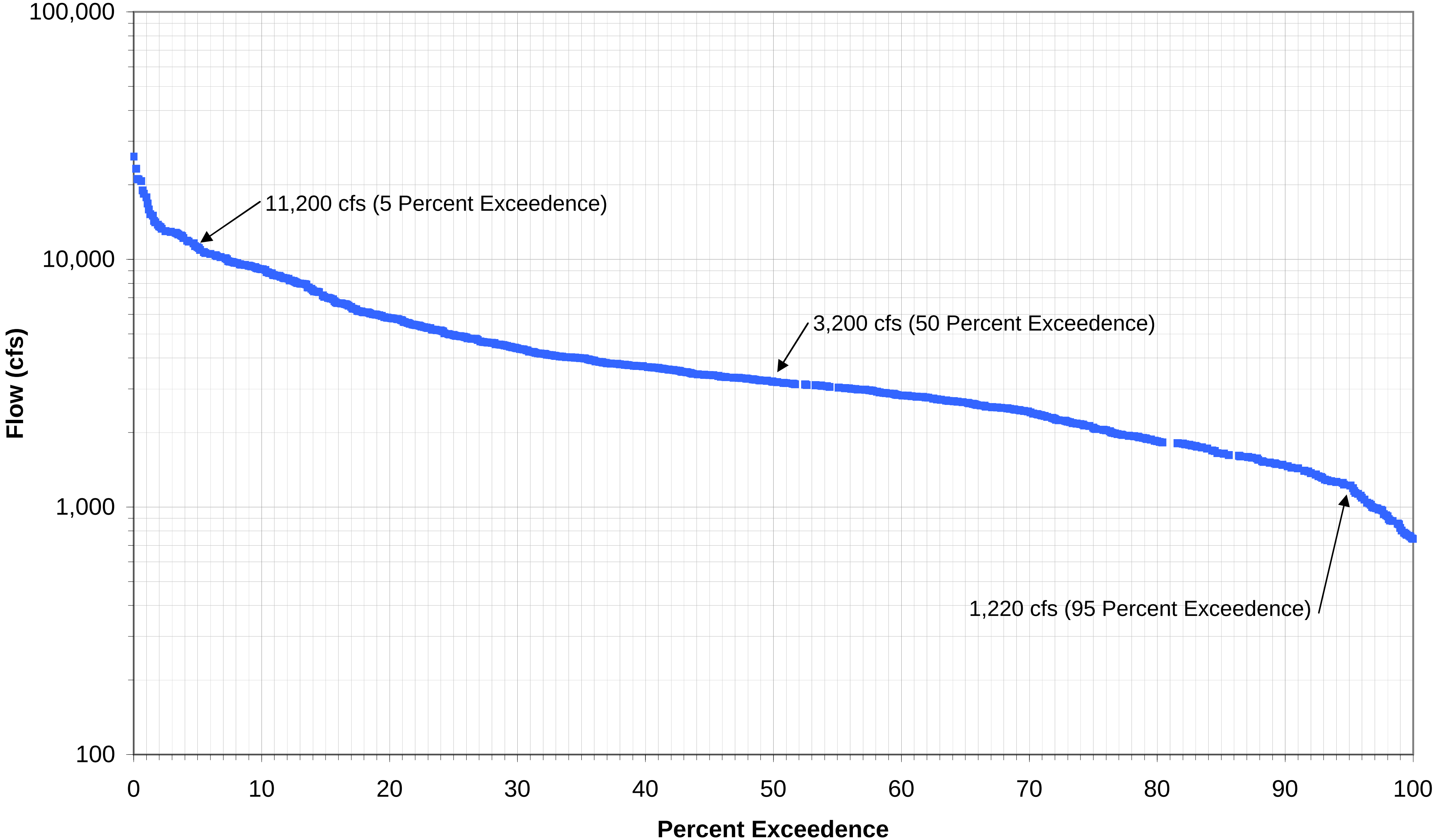
Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
November Flow-Duration Curve



(Average Daily Data from January 1985 - March 2010)

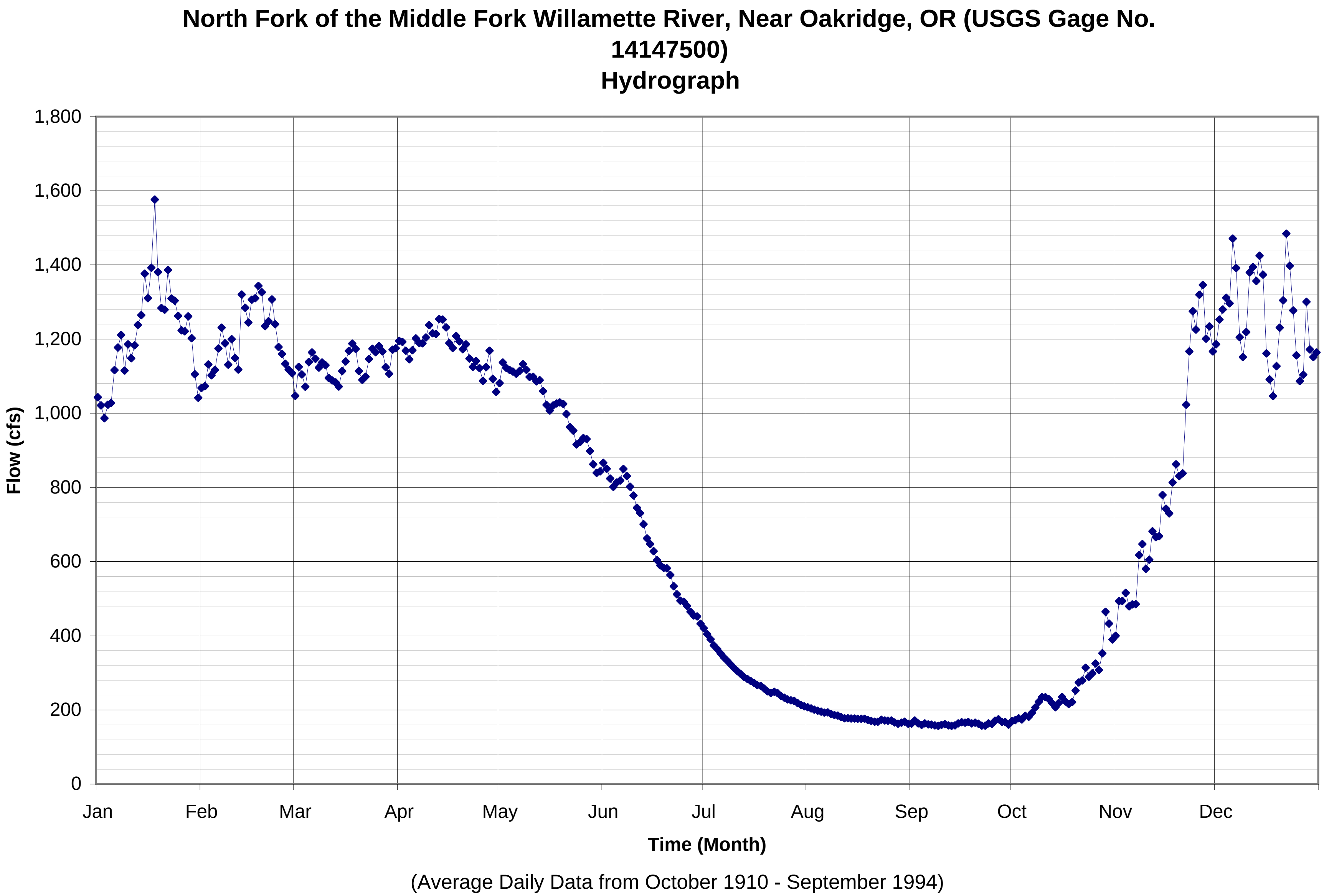
4/22/2010

Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14148000)
December Flow-Duration Curve

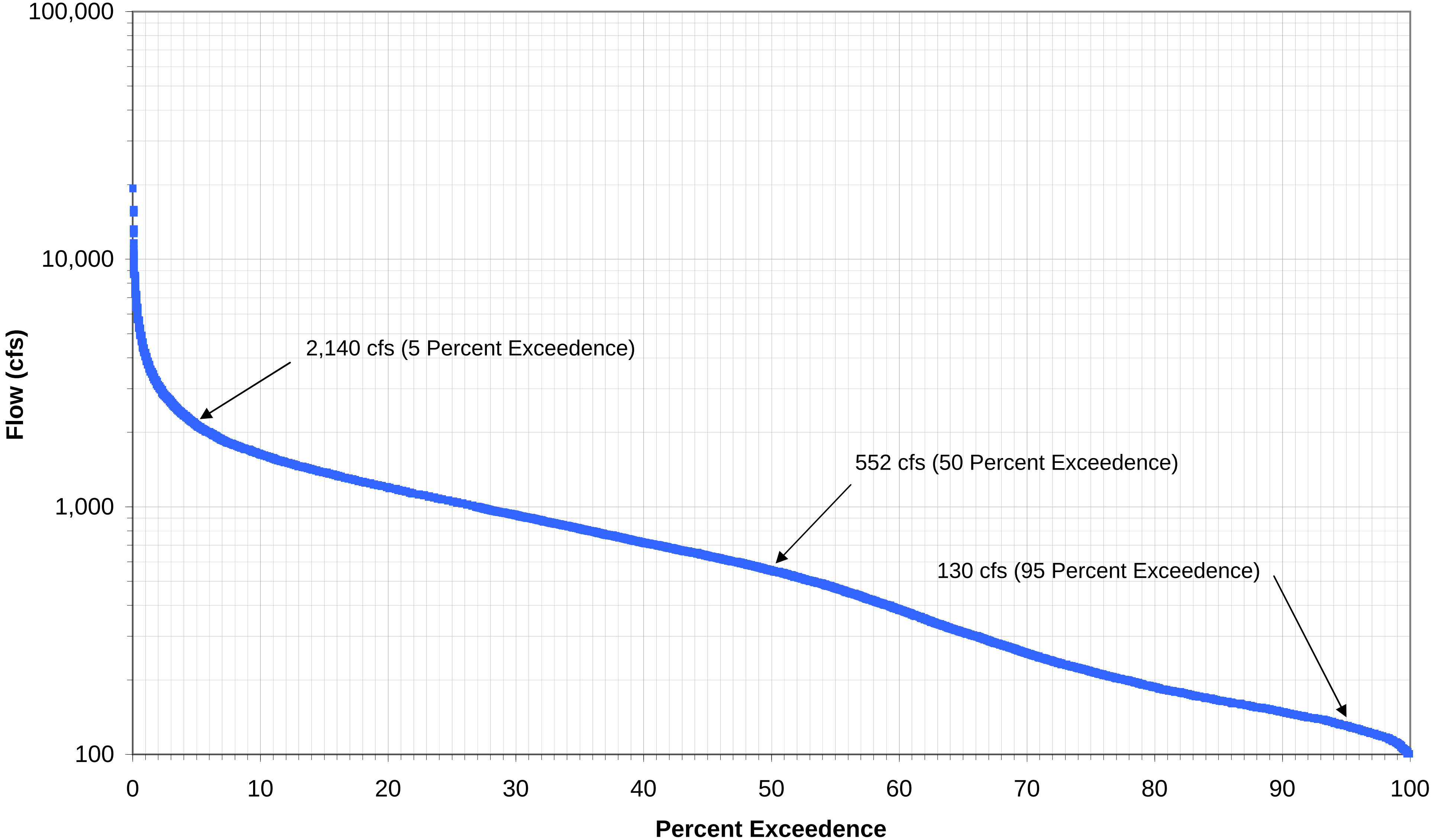


(Average Daily Data from January 1985 - March 2010)

4/22/2010


North Fork of the Middle Fork Willamette River, Near Oakridge, OR (USGS Gage No. 14147500)
Hydrograph
Flow (cfs)
1,800
1,600
1,400
1,200
1,000
800
600
400
200
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Time (Month)
(Average Daily Data from October 1910 - September 1994)

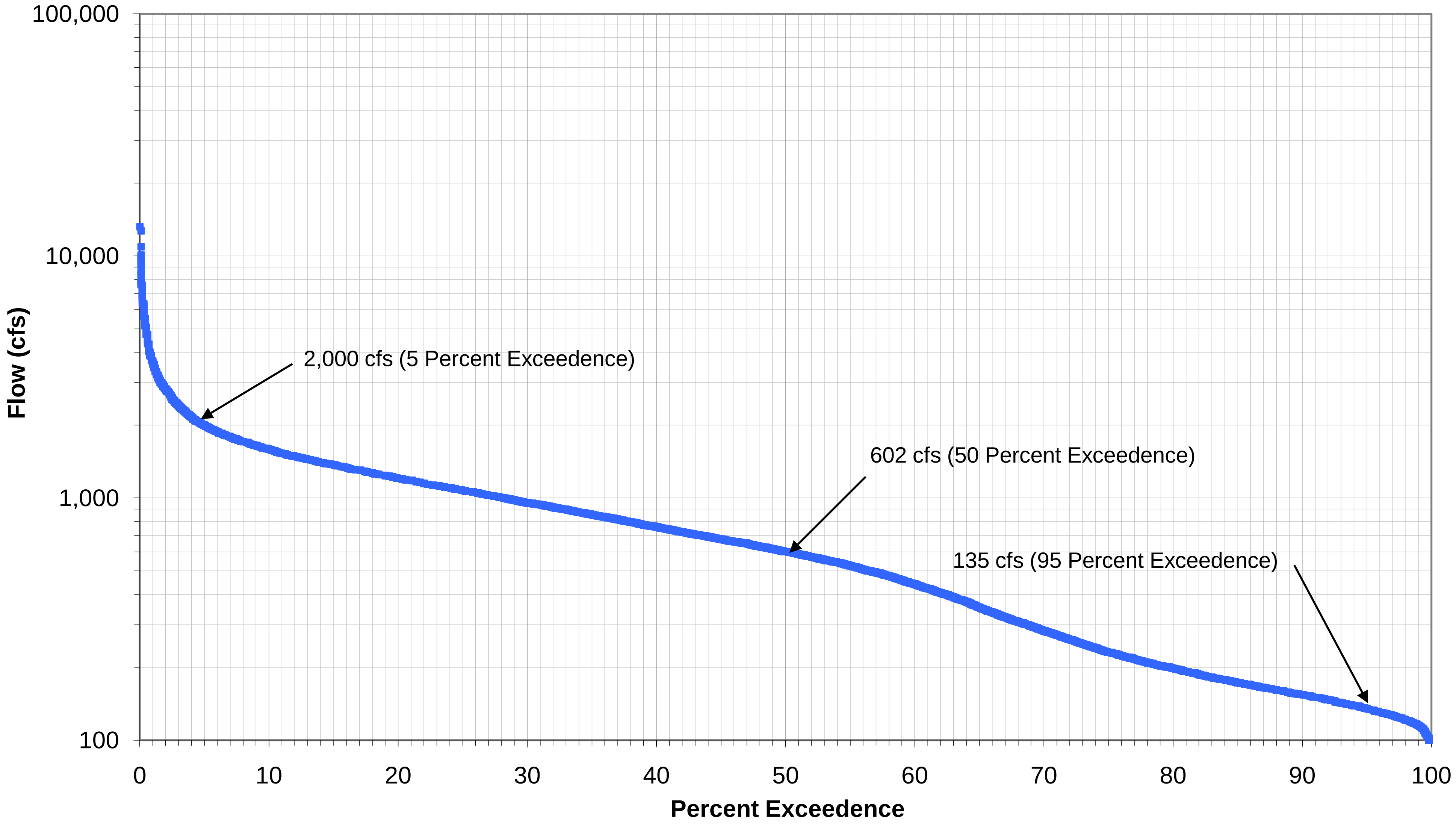
North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500) Annual Flow-Duration Curve



(Average Daily Data from October 1910 - September 1994)

4/29/2010

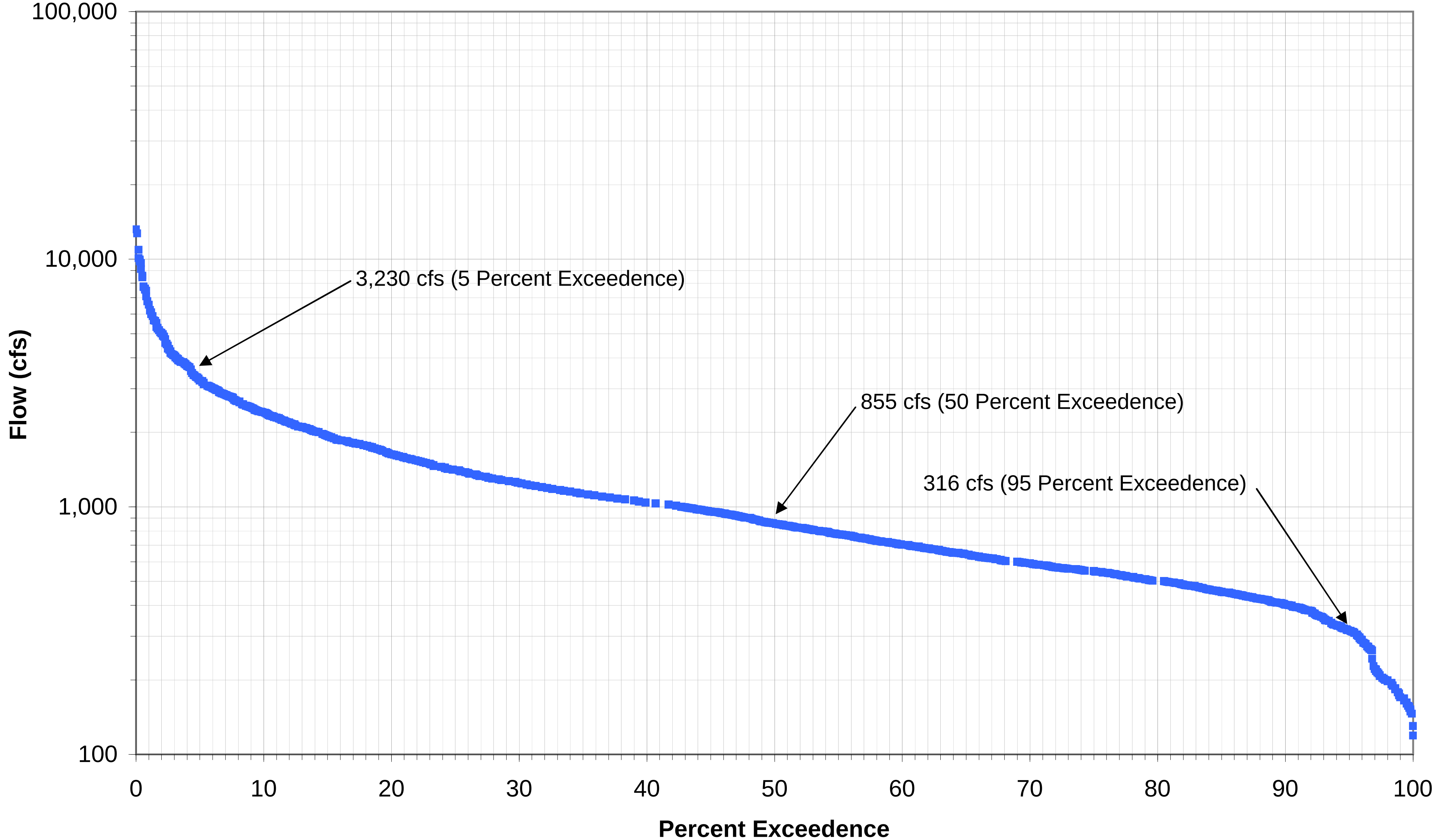
North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500) Jan -Sept Flow-Duration Curve



(Average Daily Data from October 1910 - September 1994)

8/24/2010

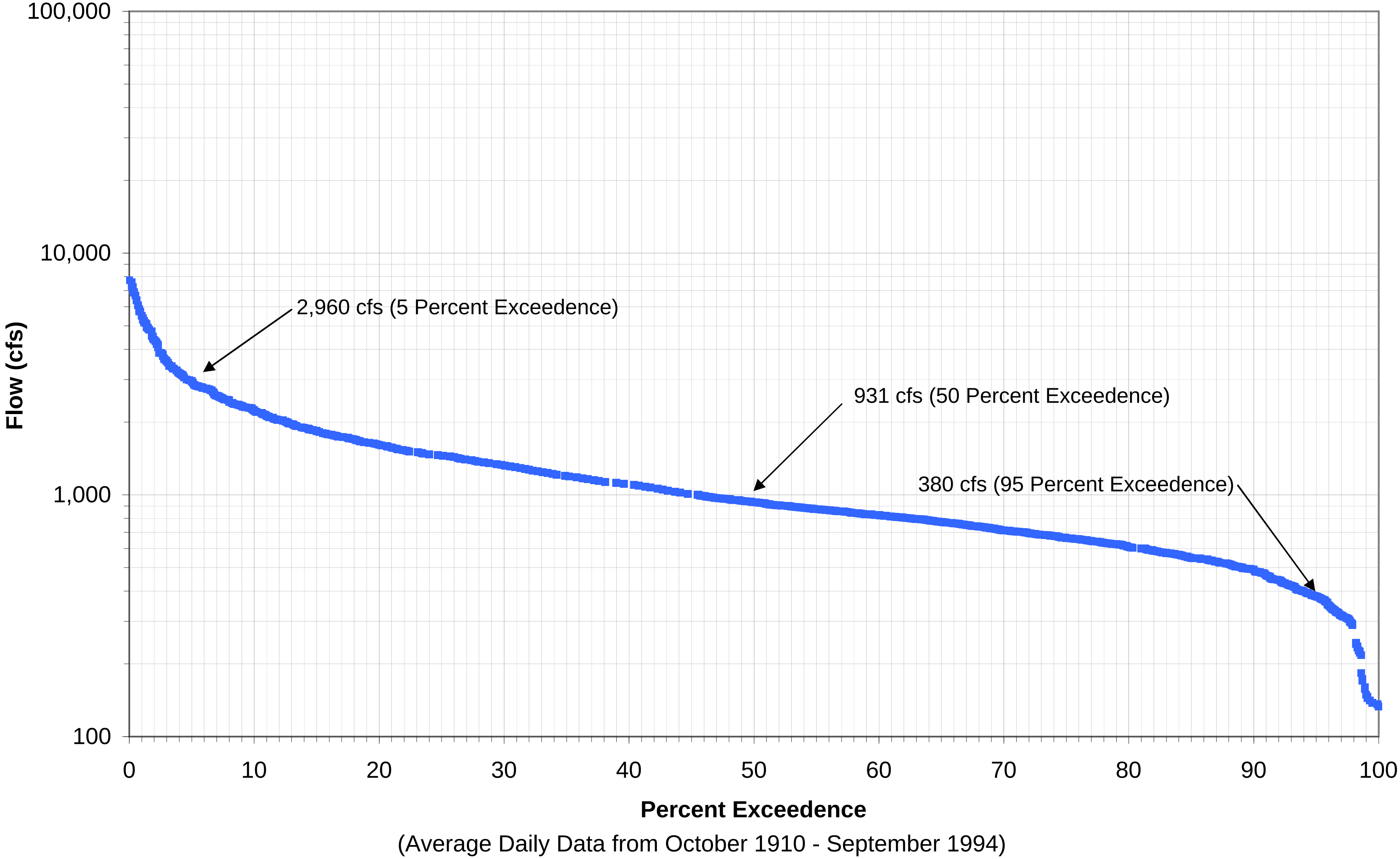
North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500) January Flow-Duration Curve



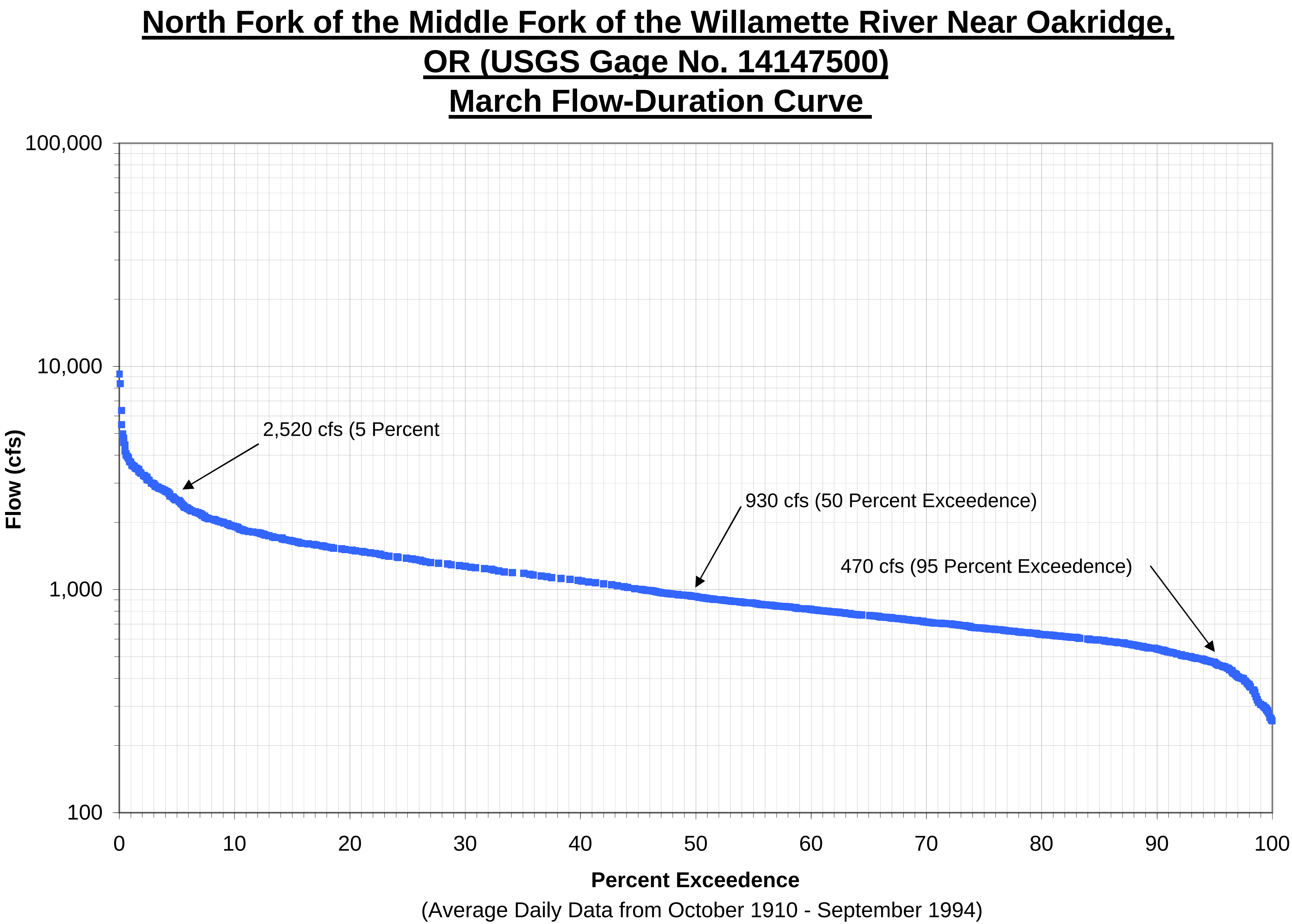
(Average Daily Data from October 1910 - September 1994)

4/29/2010

North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
February Flow-Duration Curve

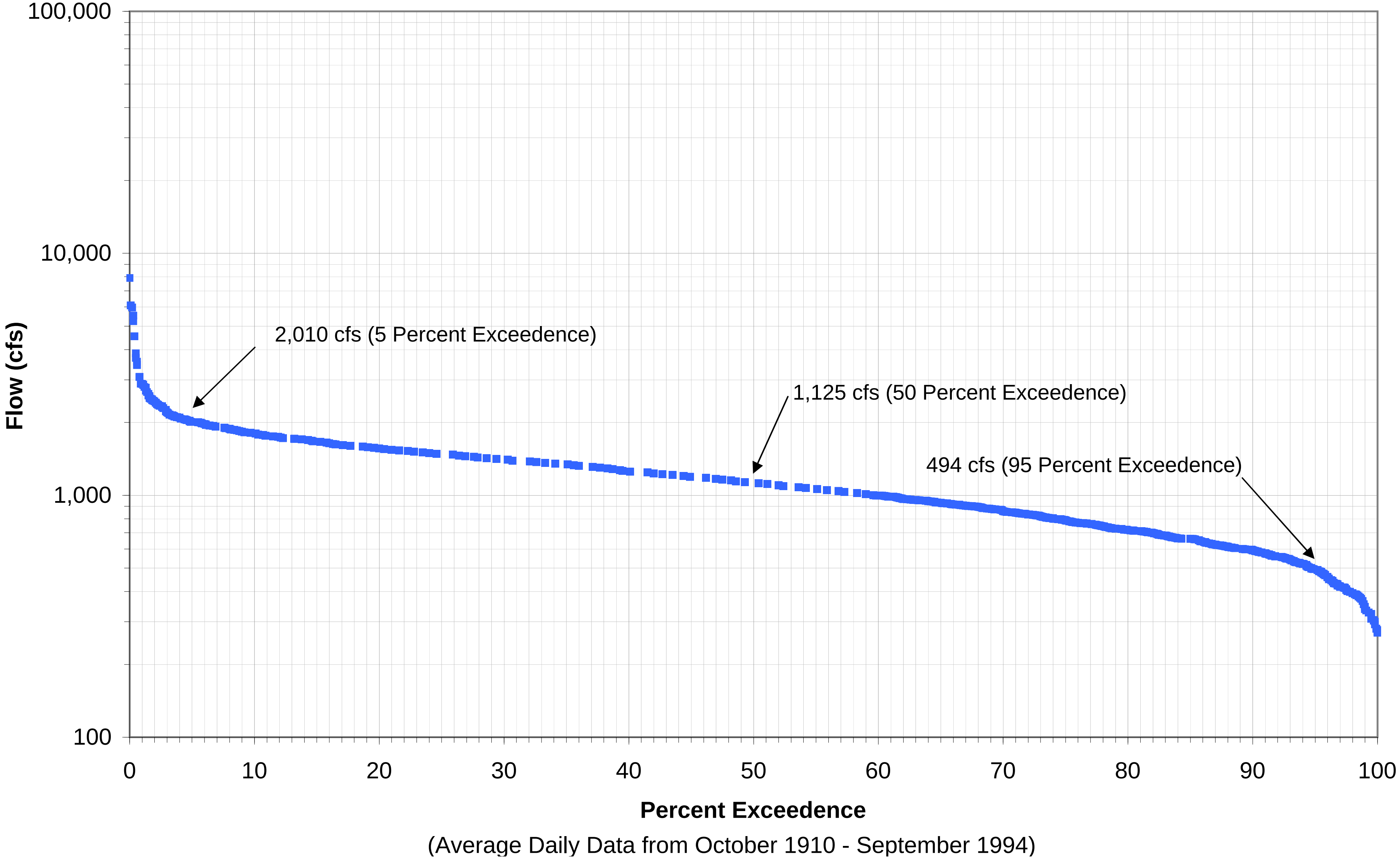


4/29/2010


North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
March Flow-Duration Curve
100,000
10,000
1,000
100
Flow (cfs)
2,520 cfs (5 Percent
930 cfs (50 Percent Exceedence)
470 cfs (95 Percent Exceedence)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedence
(Average Daily Data from October 1910 - September 1994)

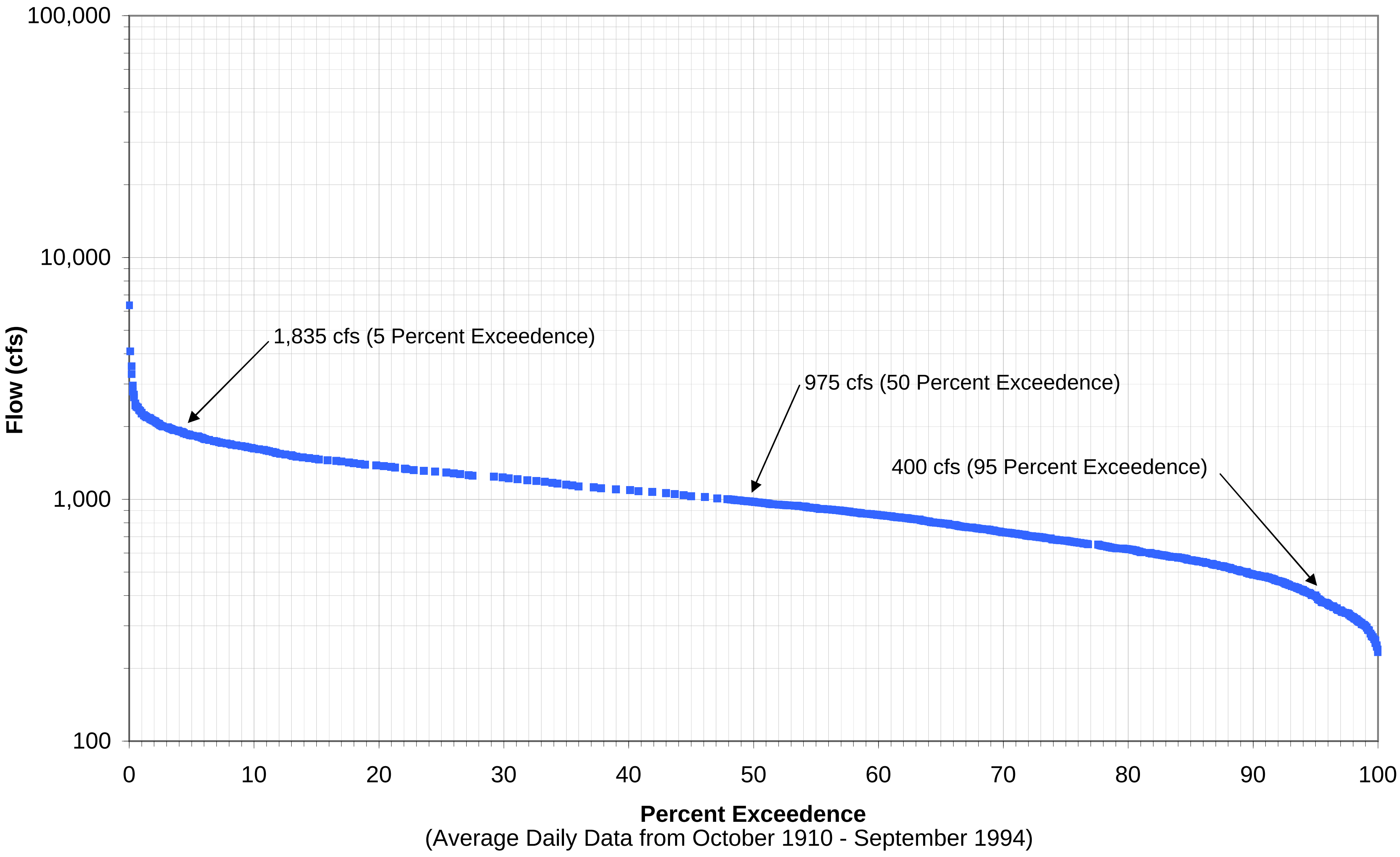
4/29/2010

North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
April Flow-Duration Curve



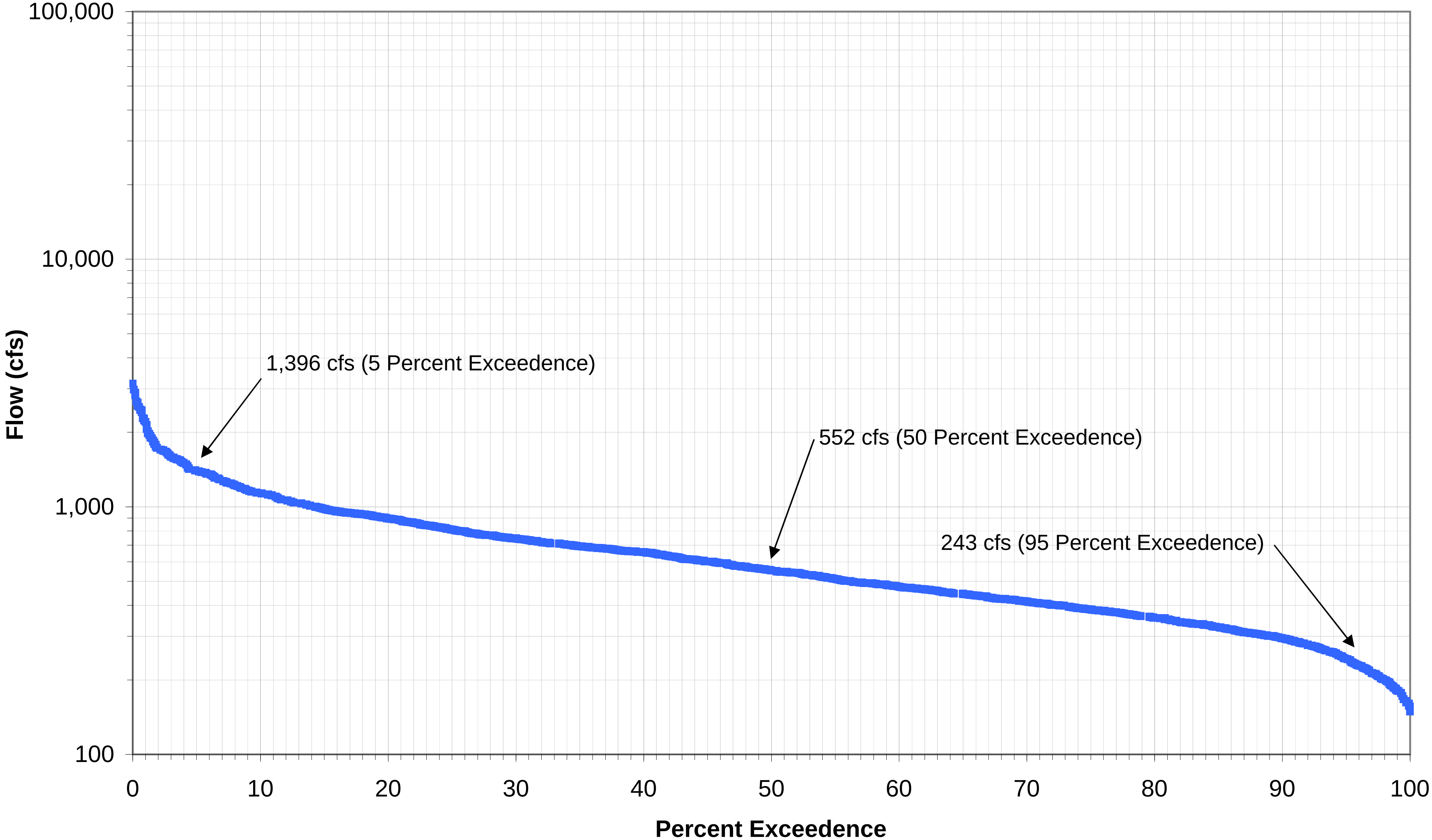
4/29/2010

North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500) May Flow-Duration Curve



4/29/2010

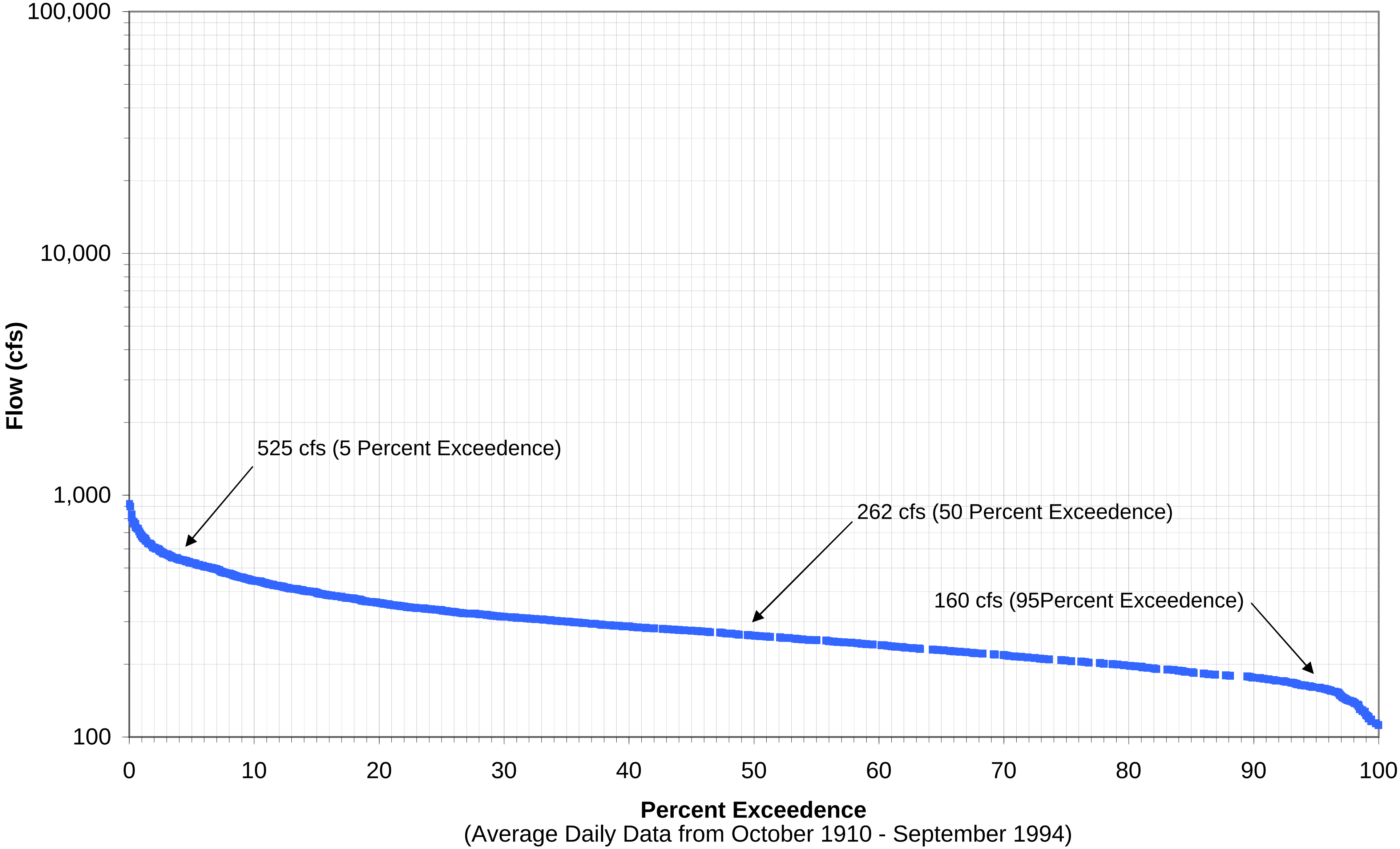
North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
June Flow-Duration Curve



(Average Daily Data from October 1910 - September 1994)

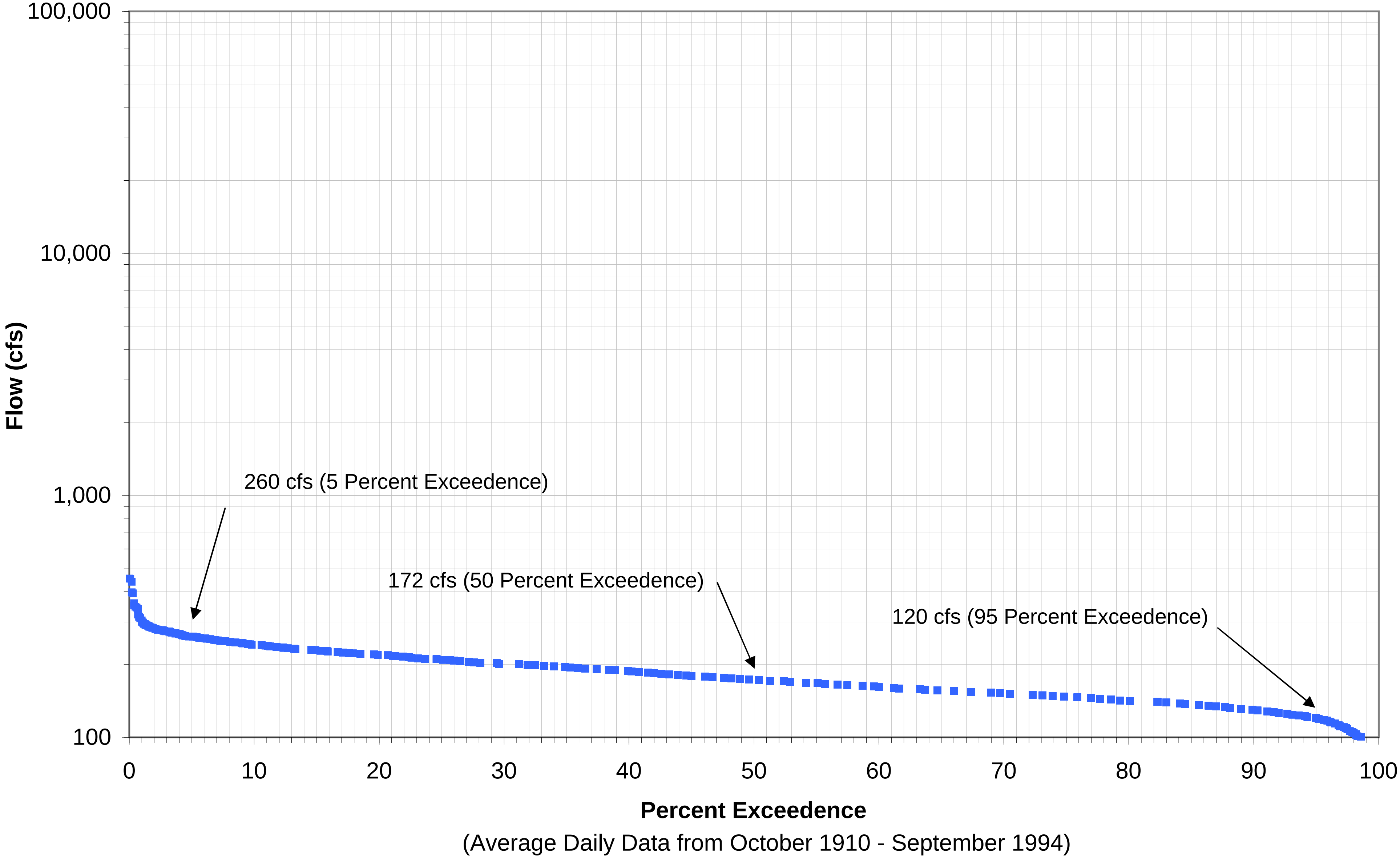
4/29/2010

North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
July Flow-Duration Curve

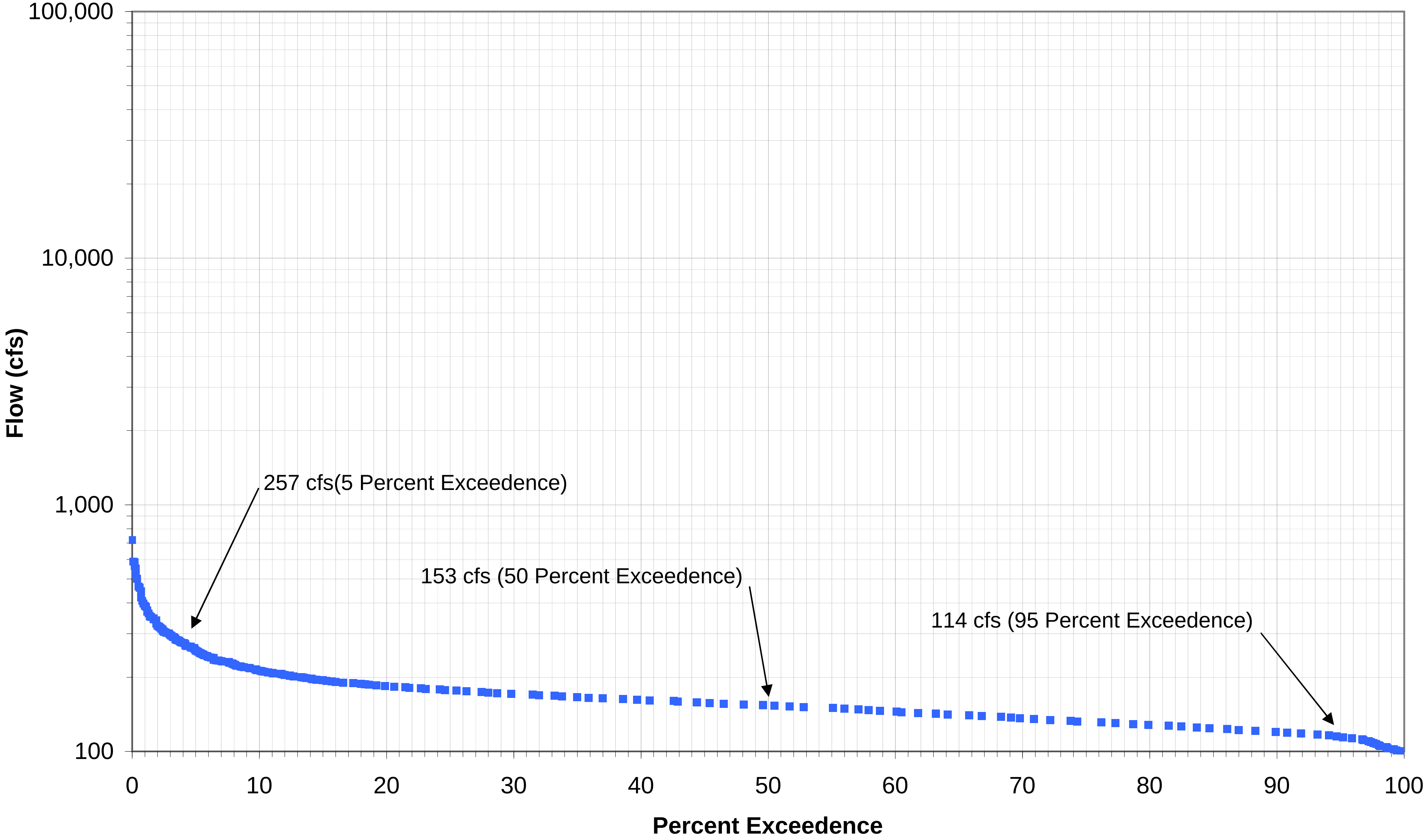


4/29/2010

North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
August Flow-Duration Curve



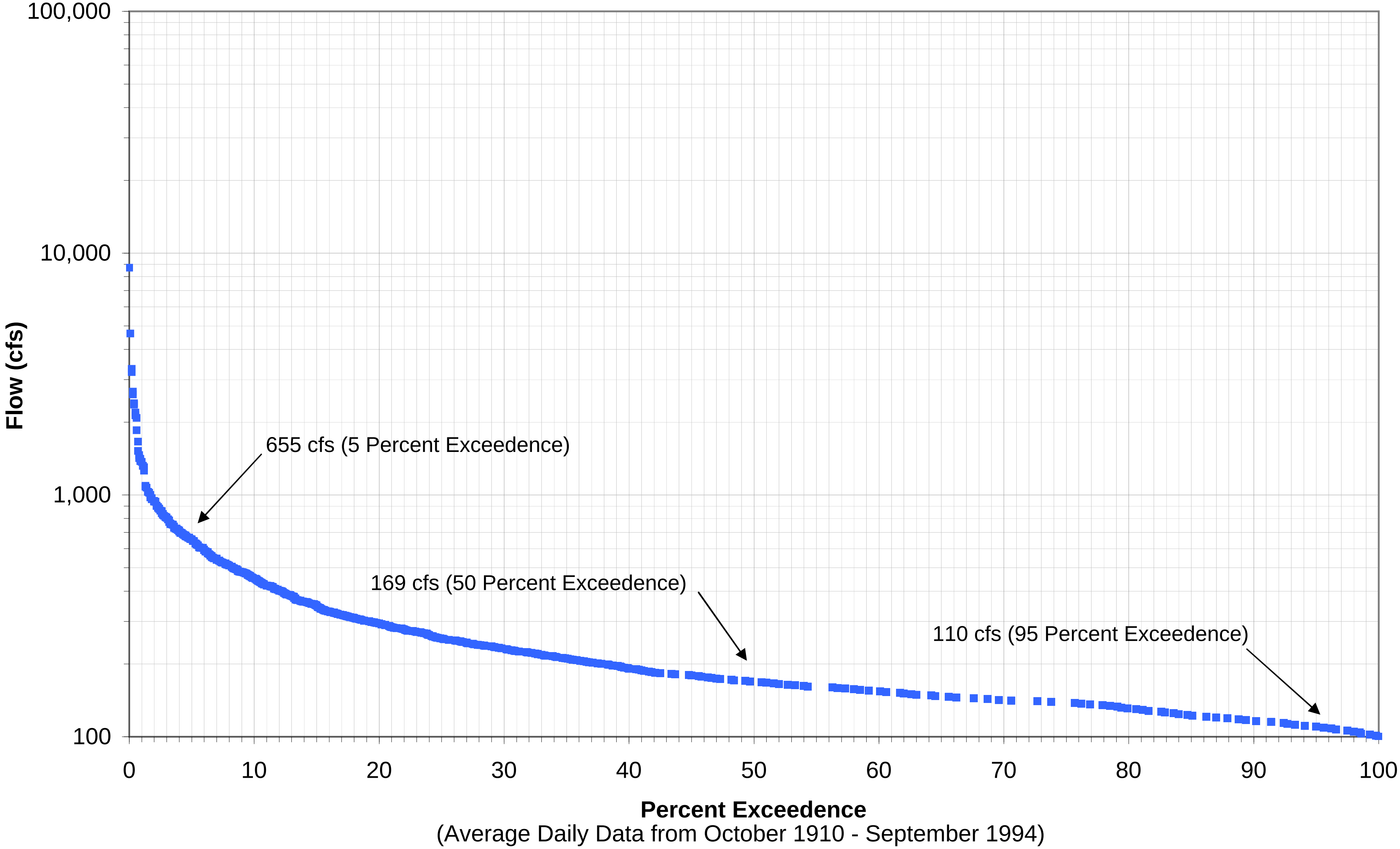
North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500) September Flow-Duration Curve



(Average Daily Data from October 1910 - September 1994)

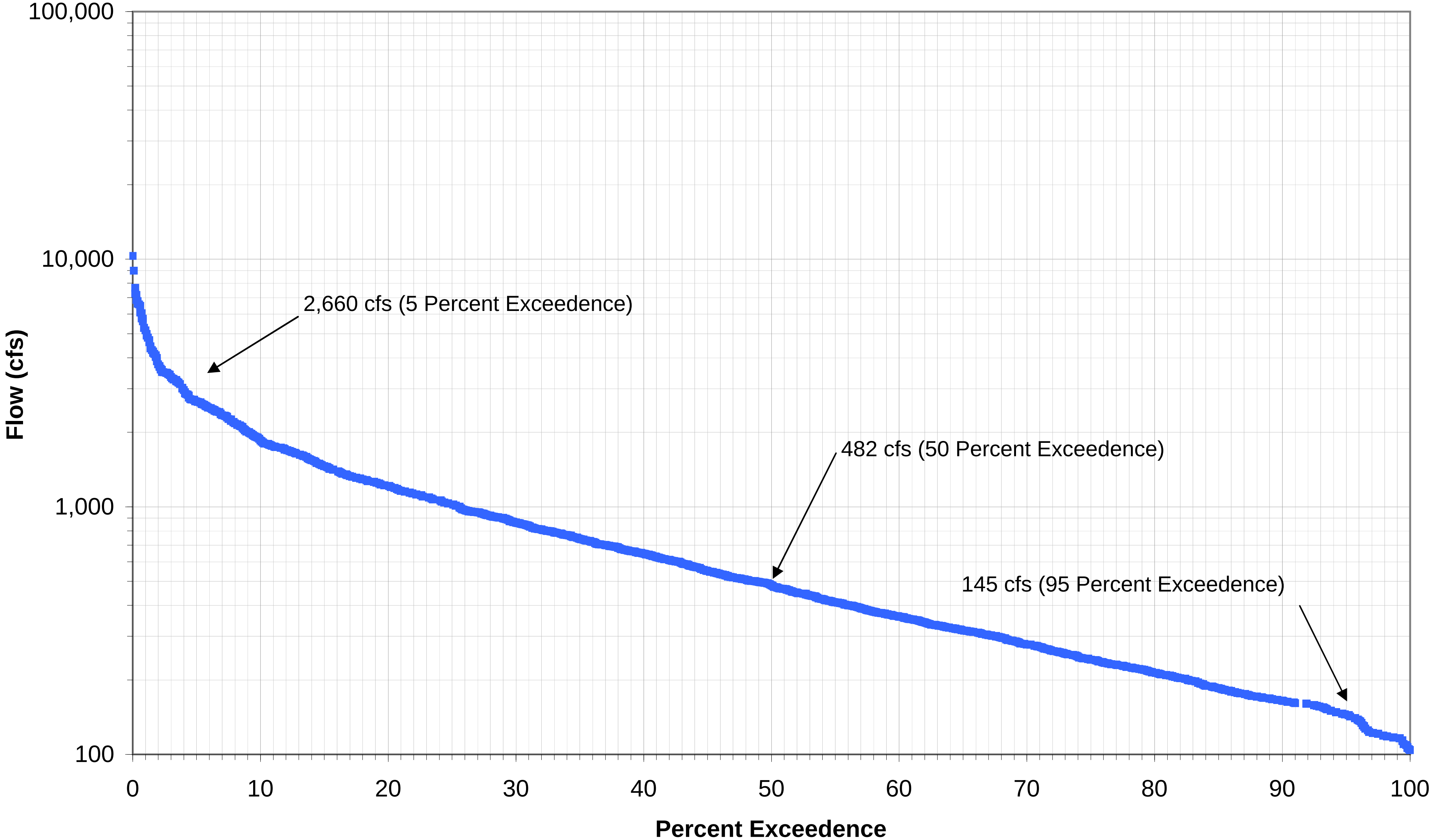
4/29/2010

North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
October Flow-Duration Curve



4/29/2010

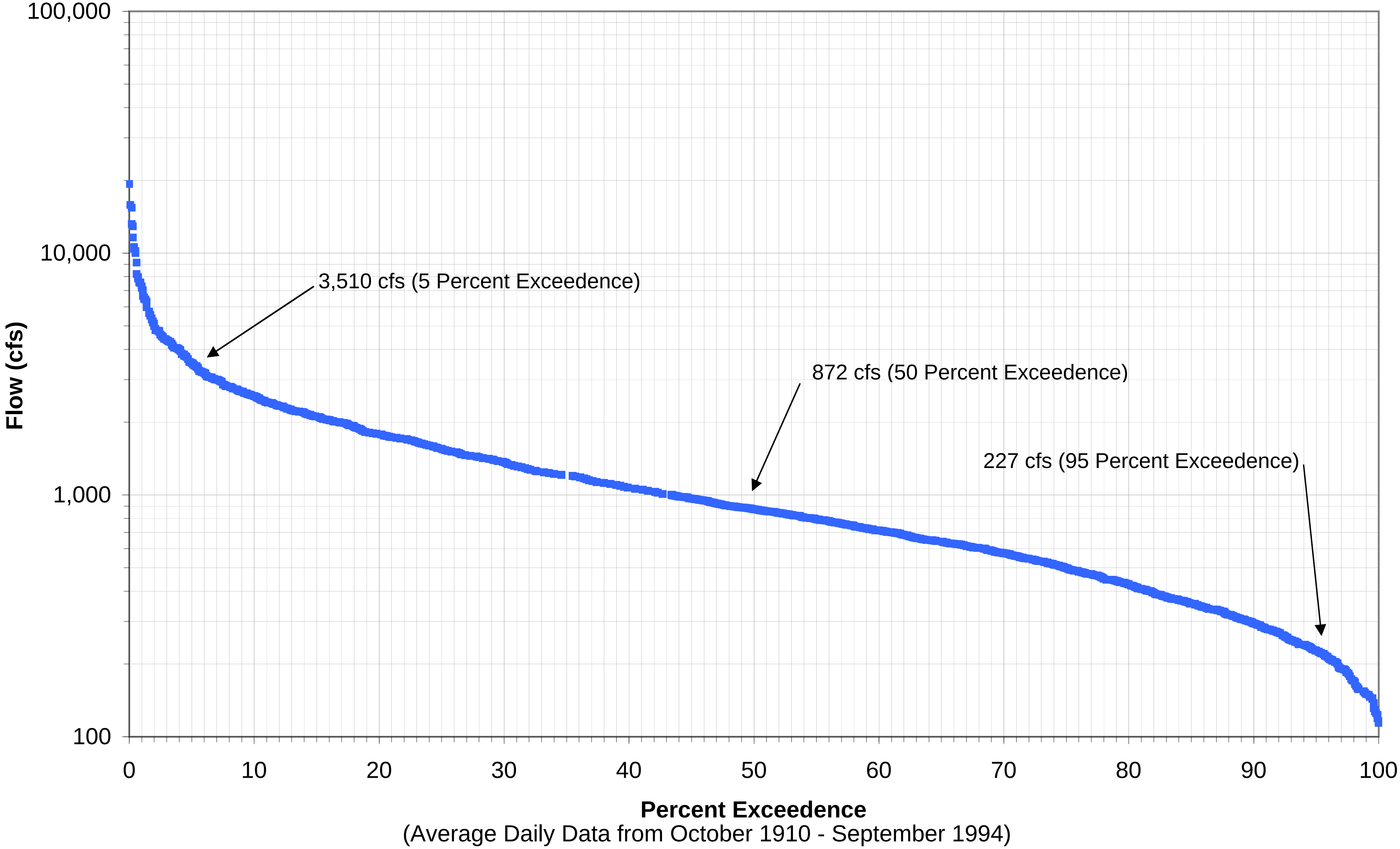
North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500)
November Flow-Duration Curve



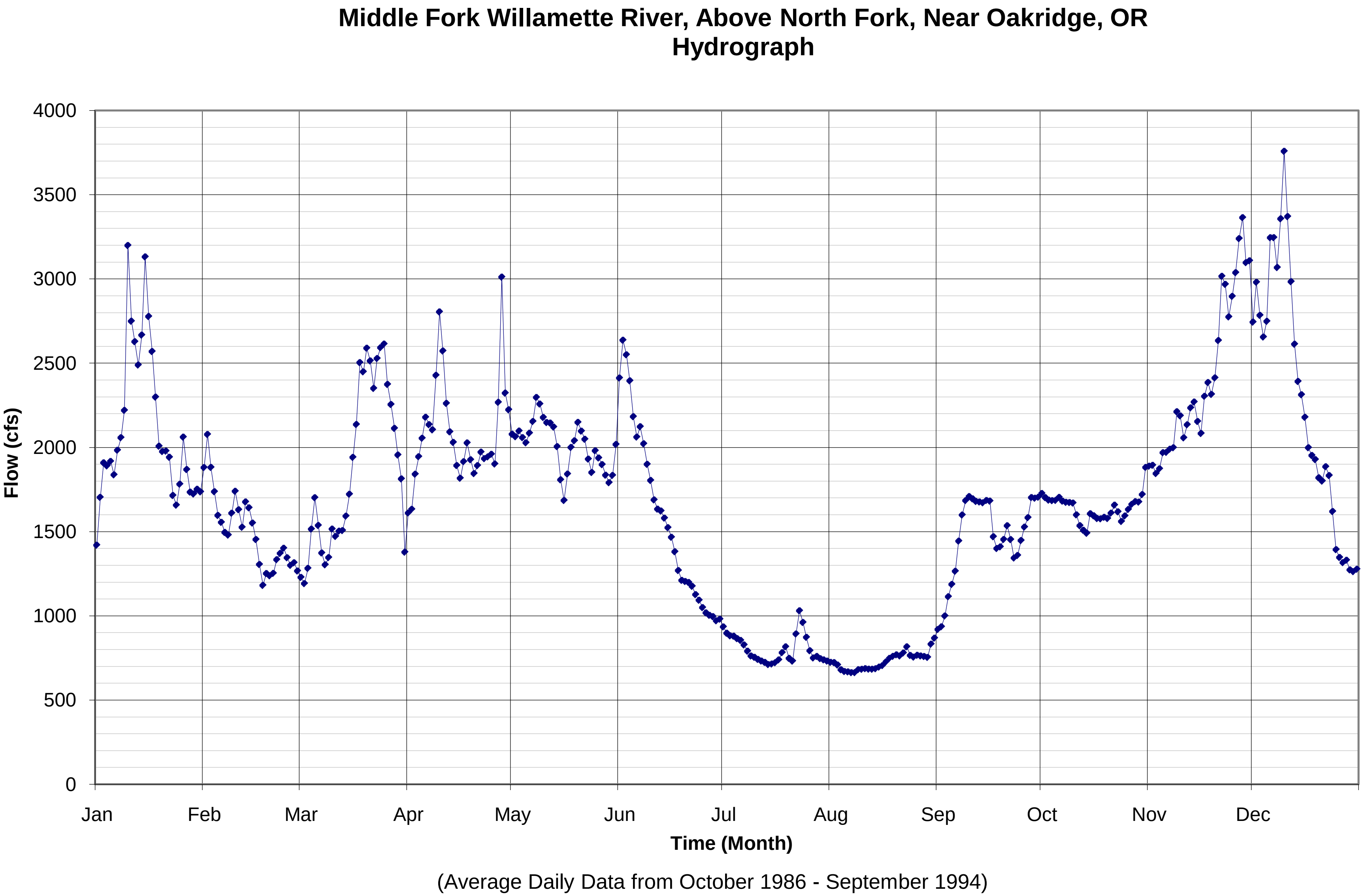
(Average Daily Data from October 1910 - September 1994)

4/29/2010

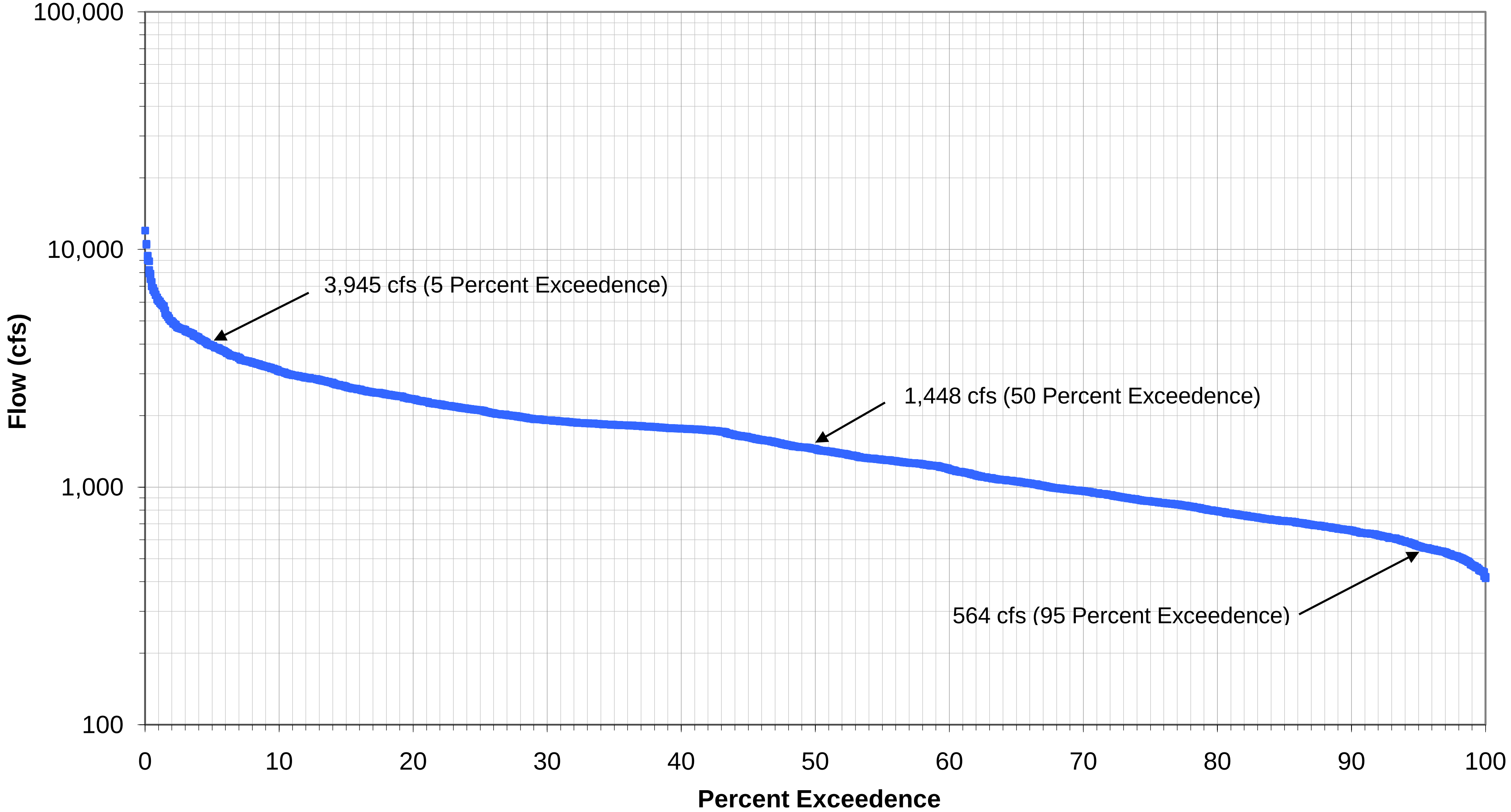
North Fork of the Middle Fork of the Willamette River Near Oakridge, OR (USGS Gage No. 14147500) December Flow-Duration Curve



4/29/2010


Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
Hydrograph
Flow (cfs)
4000
3500
3000
2500
2000
1500
1000
500
0
Jan
Feb
Mar
Apr
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Time (Month)
(Average Daily Data from October 1986 - September 1994)

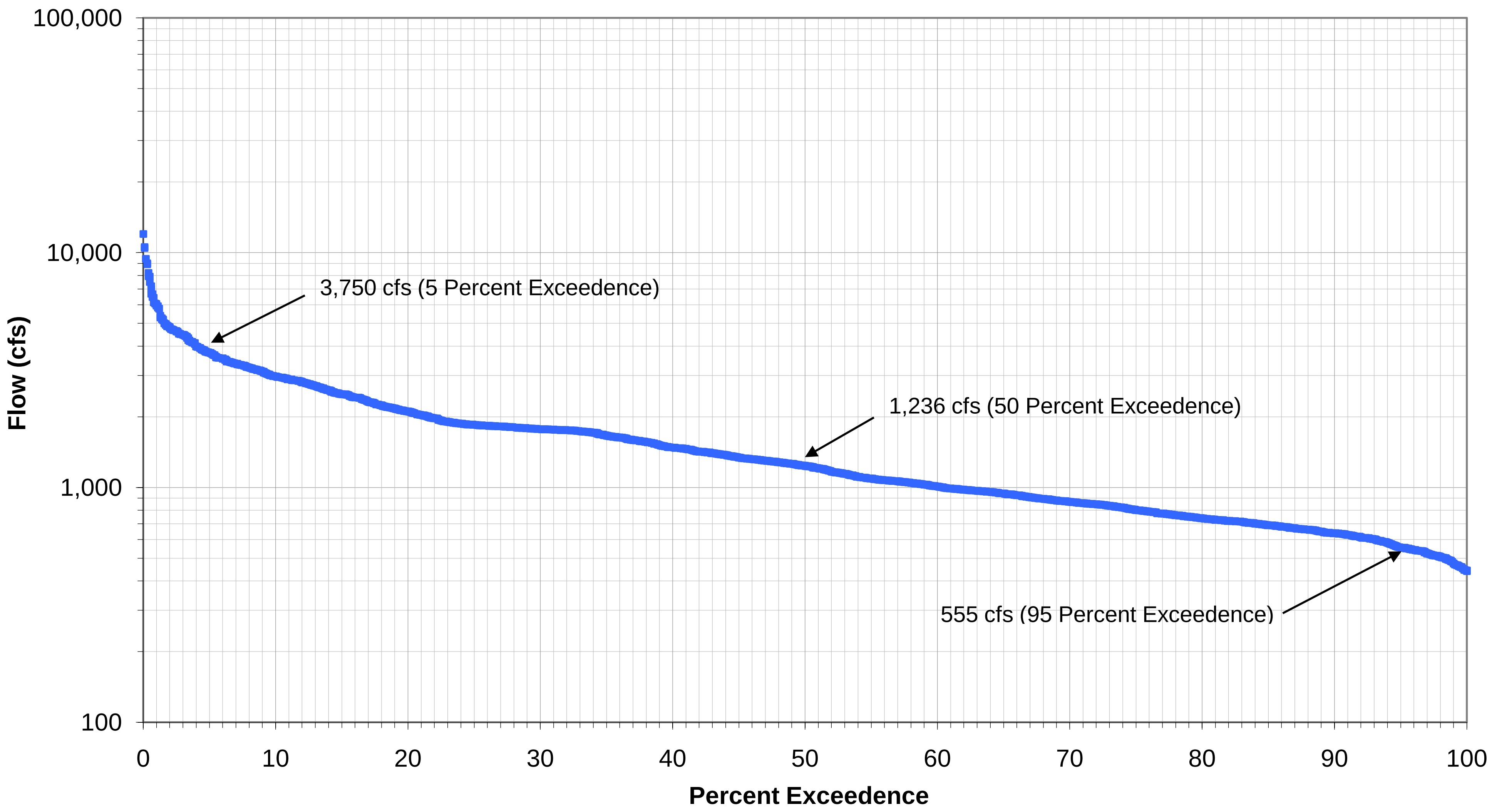
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
Annual Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

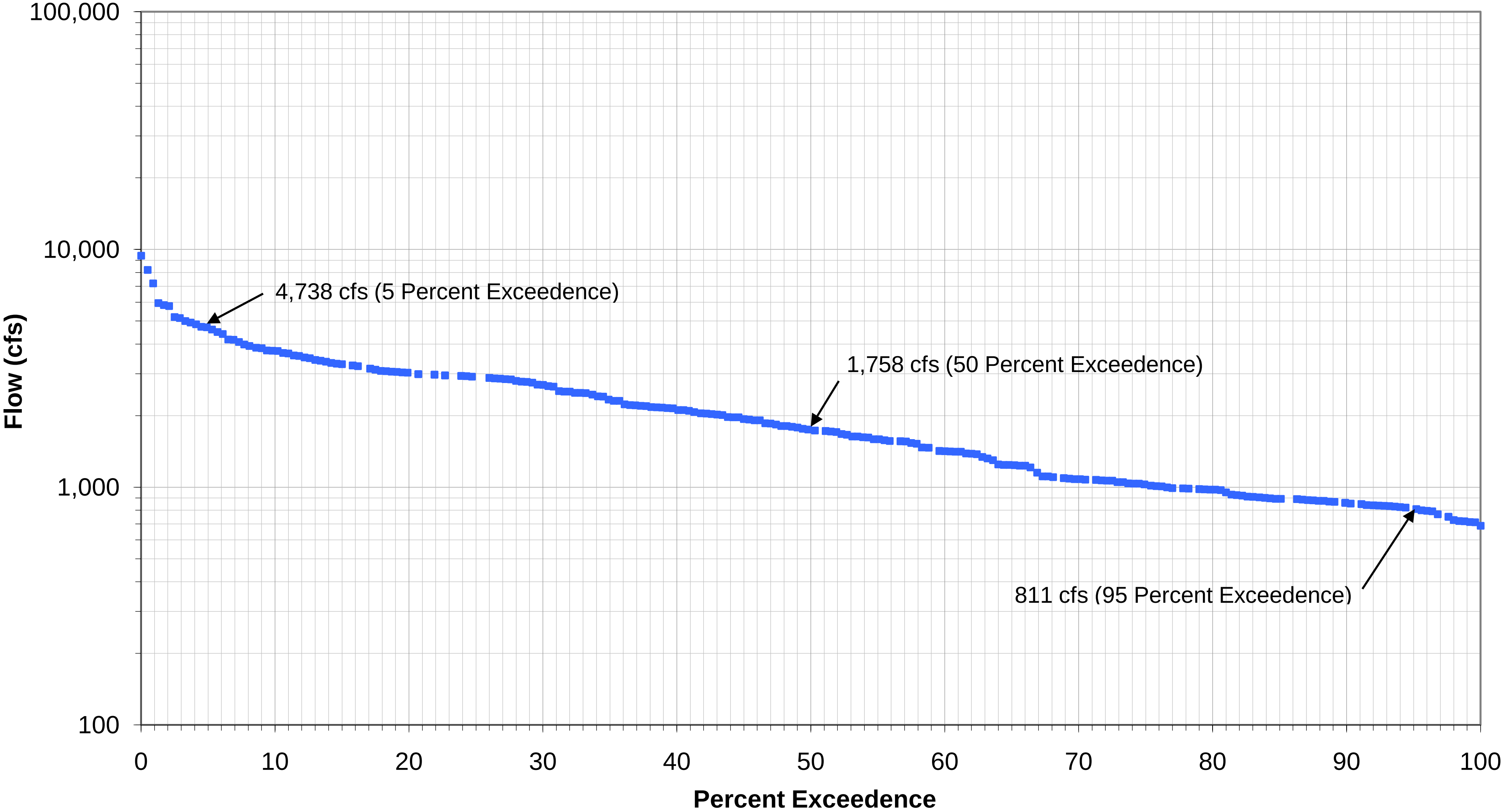
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
Jan - Sept Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

8/24/2010

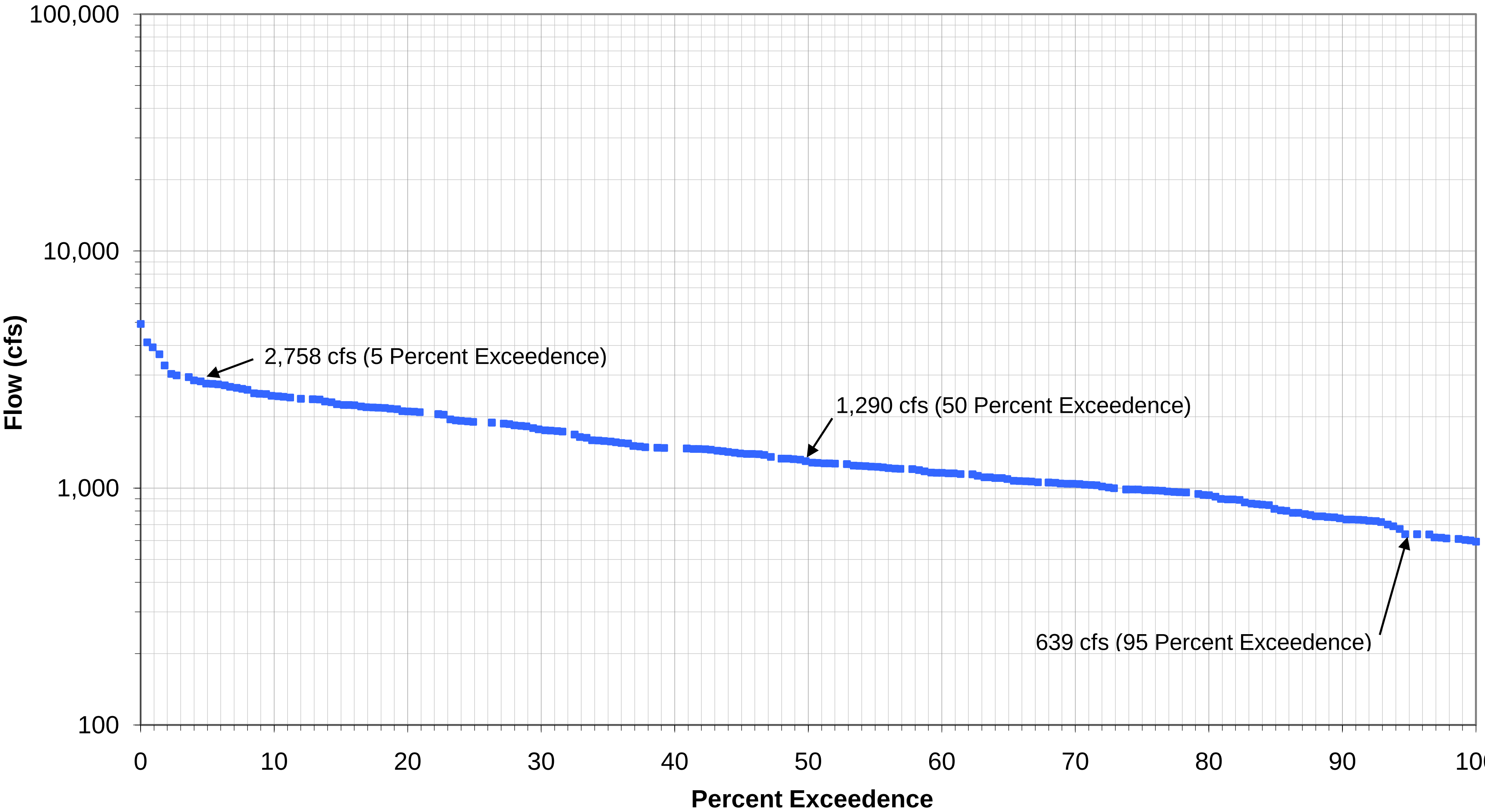
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
January Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

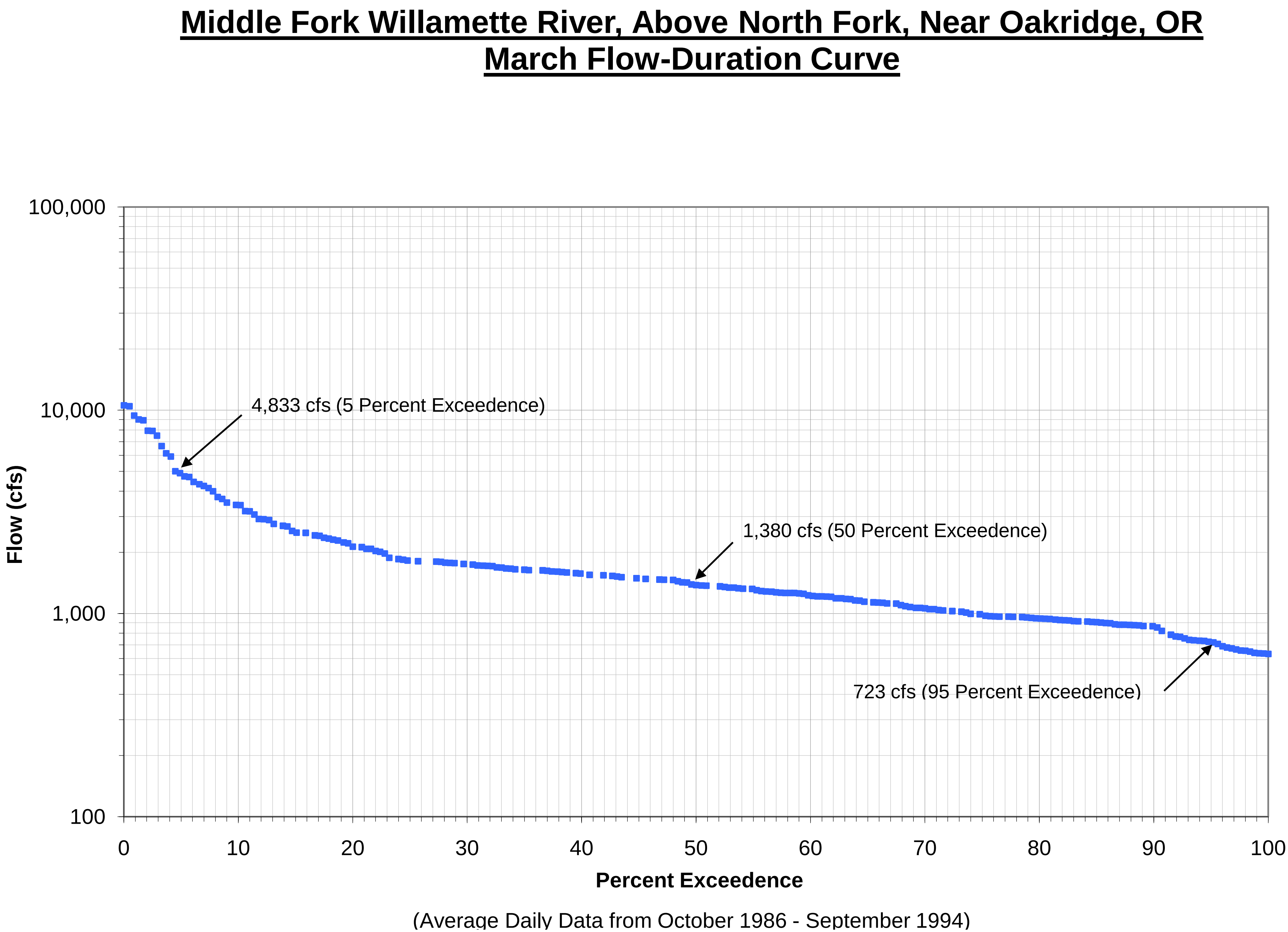
7/12/2010

Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
February Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

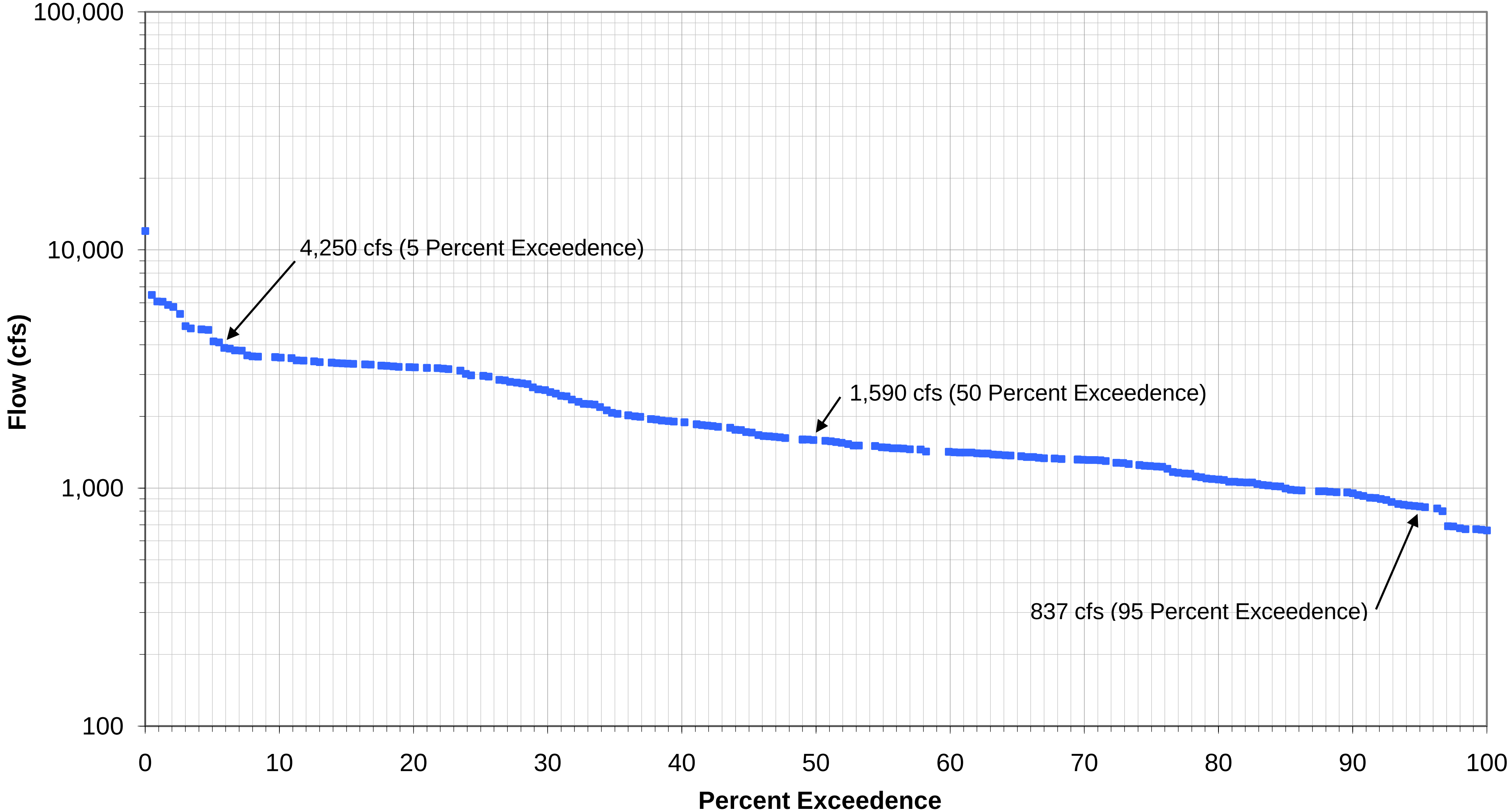
7/12/2010



Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
March Flow-Duration Curve
100,000
10,000
1,000
100
Flow (cfs)
0
10
20
30
40
50
60
70
80
90
100
Percent Exceedence
4,833 cfs (5 Percent Exceedence)
1,380 cfs (50 Percent Exceedence)
723 cfs (95 Percent Exceedence)
(Average Daily Data from October 1986 - September 1994)

7/12/2010

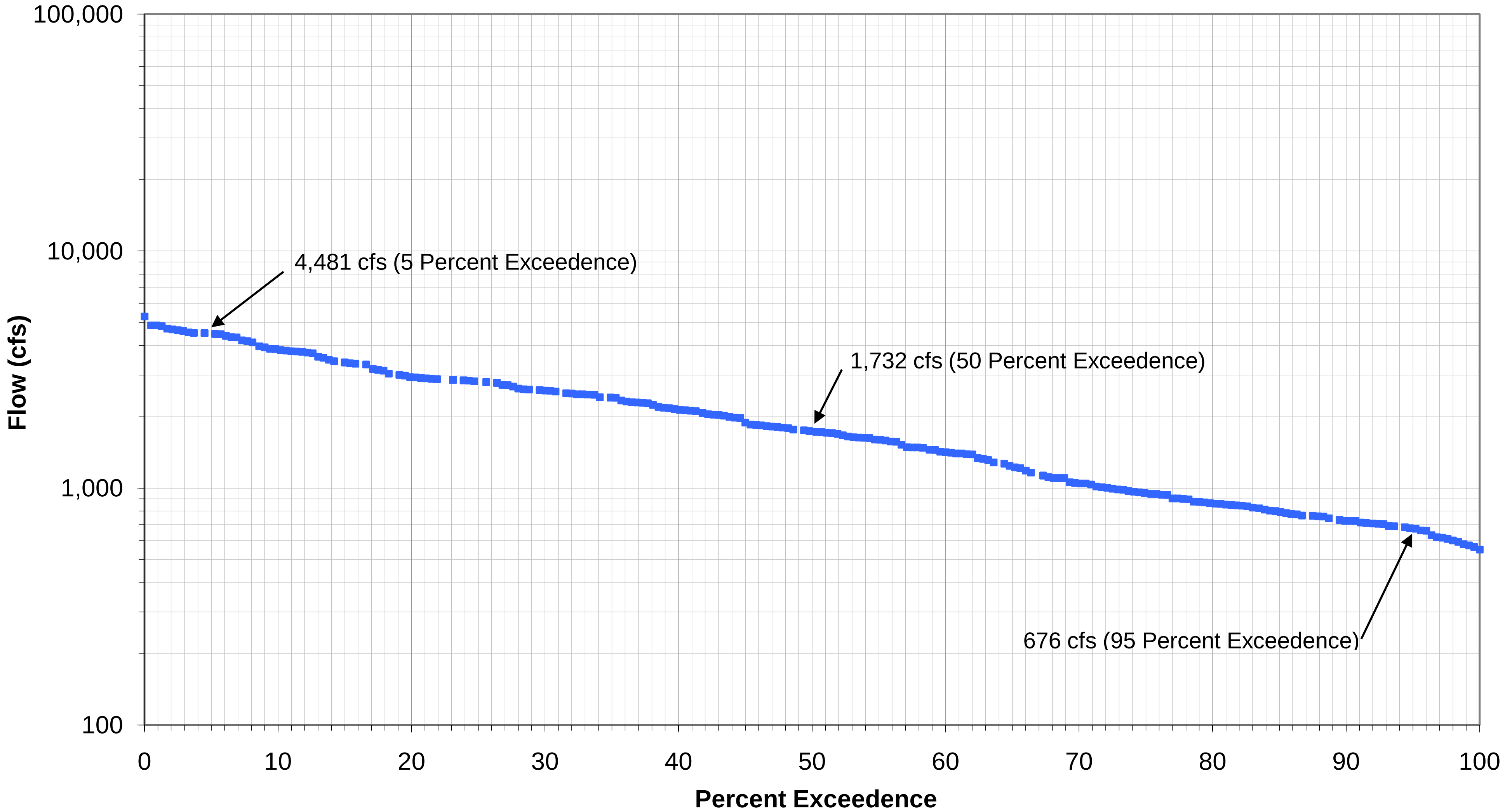
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
April Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

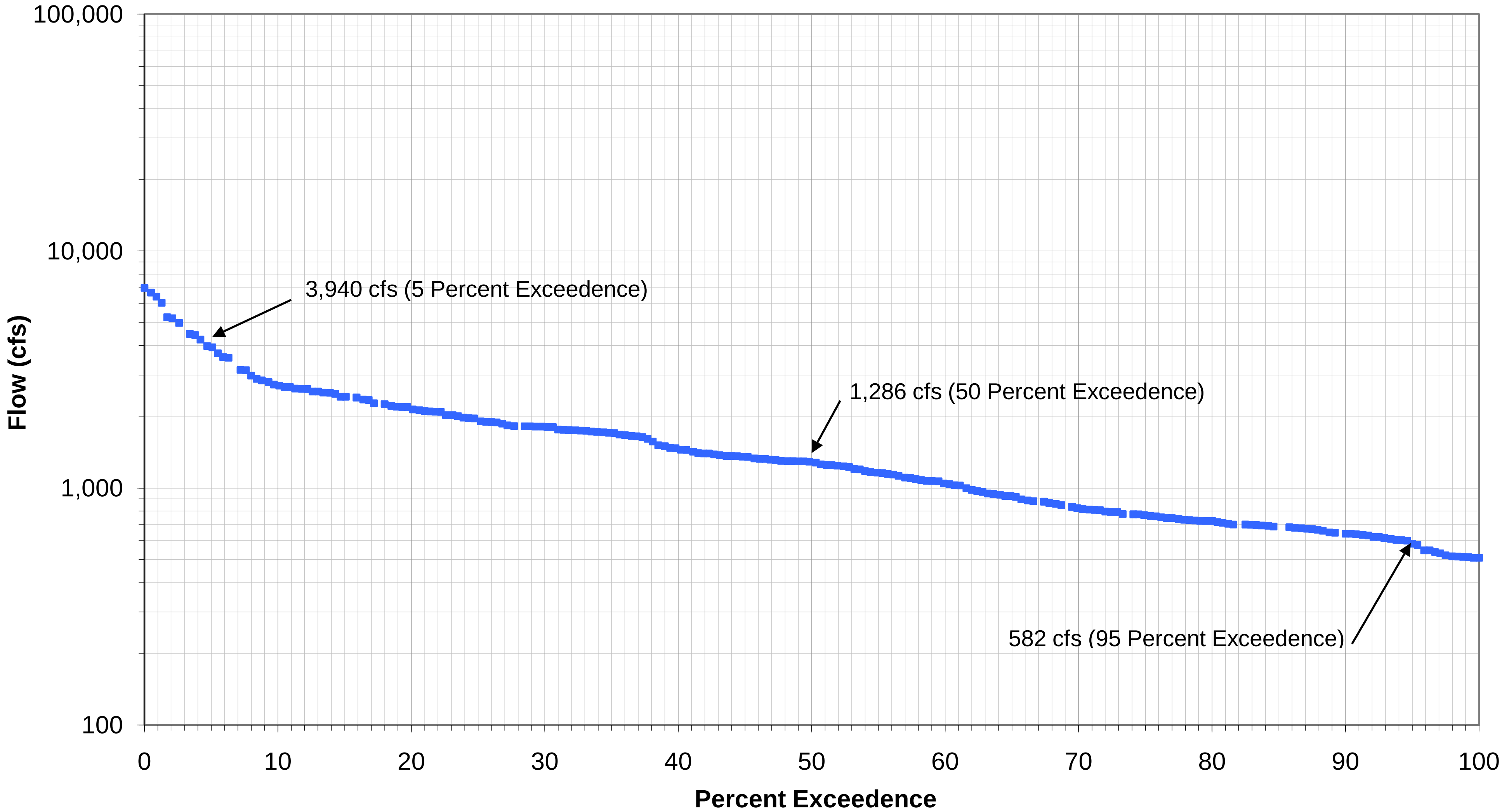
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
May Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

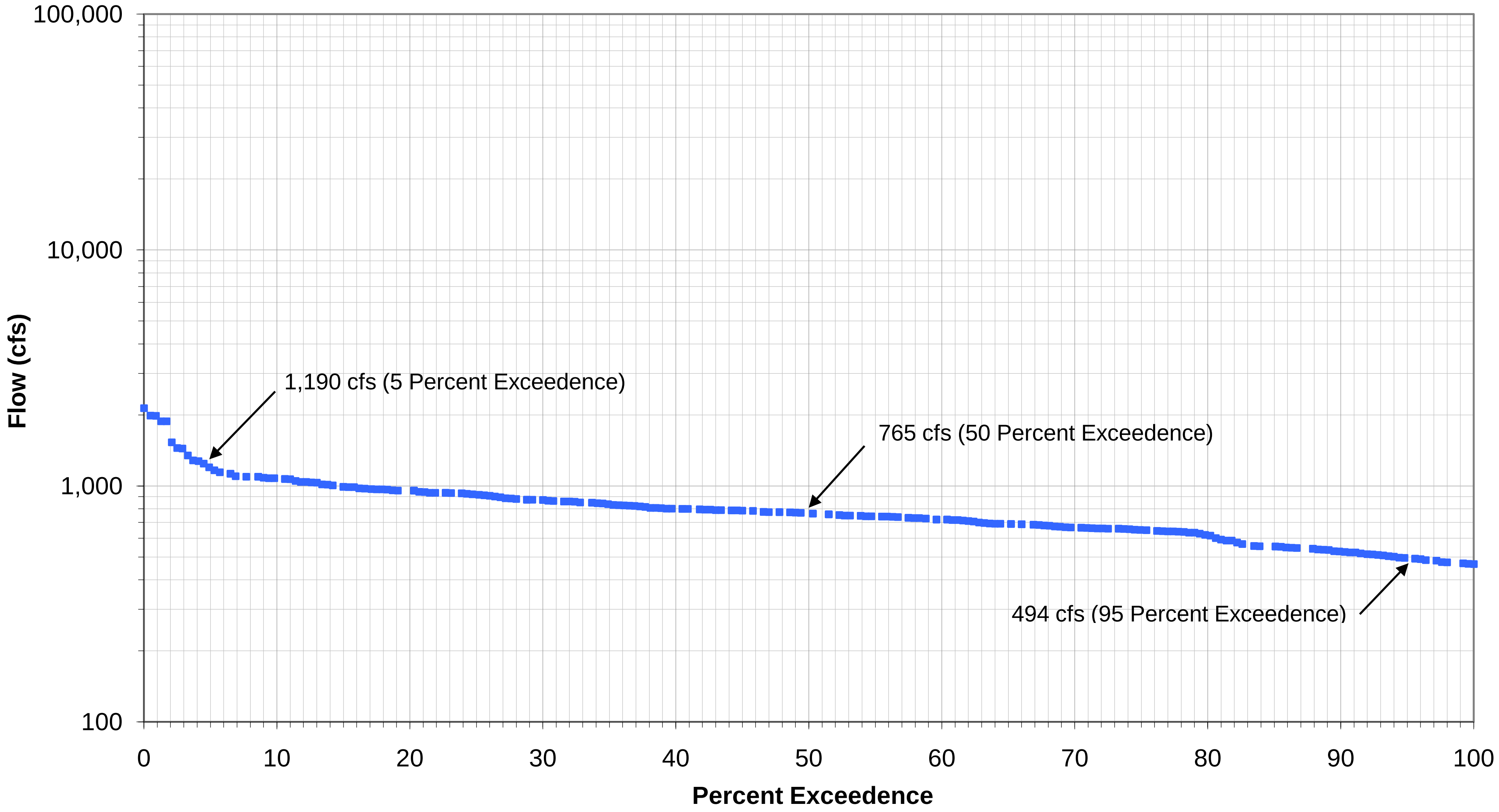
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
June Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

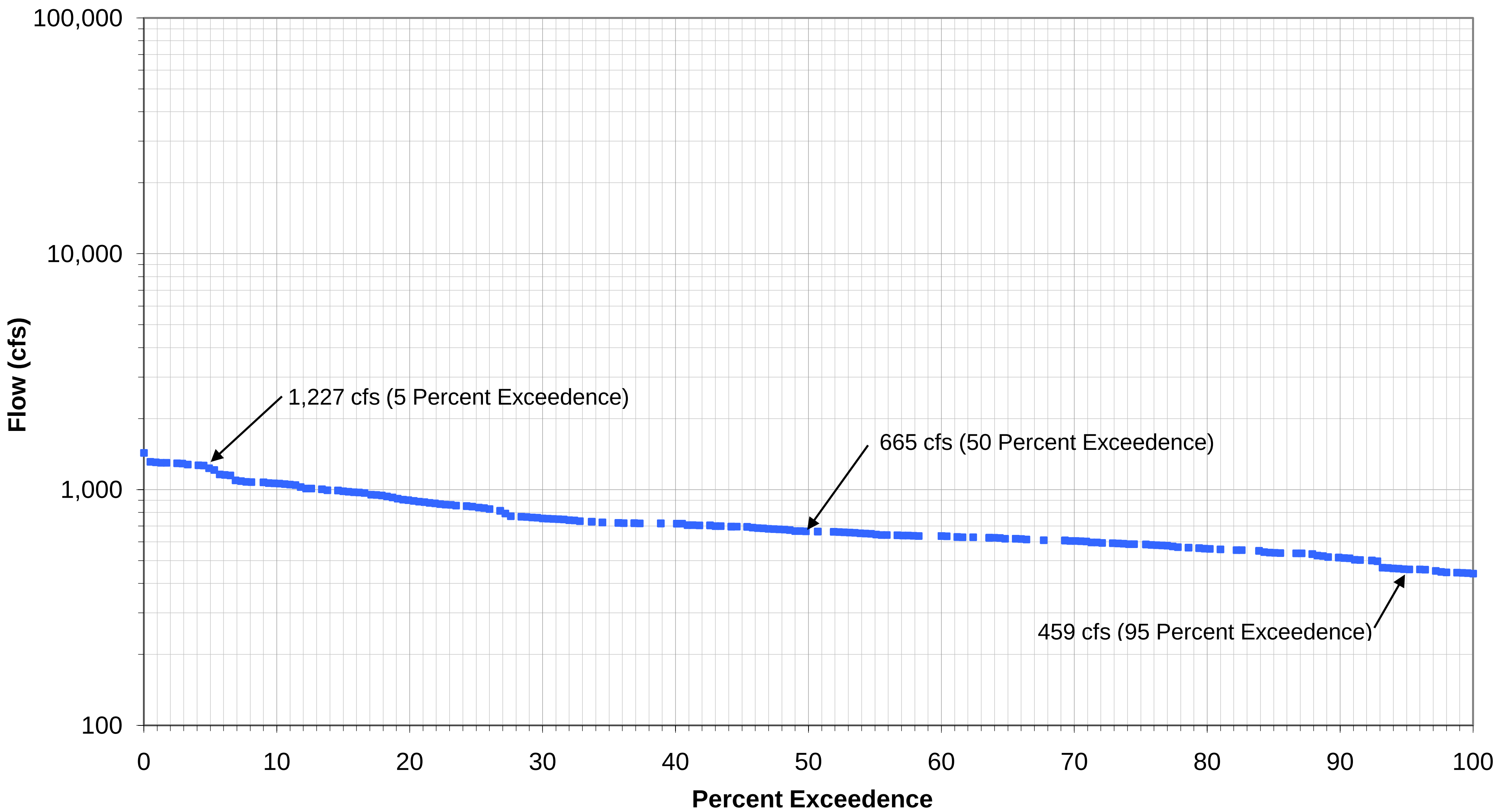
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
July Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

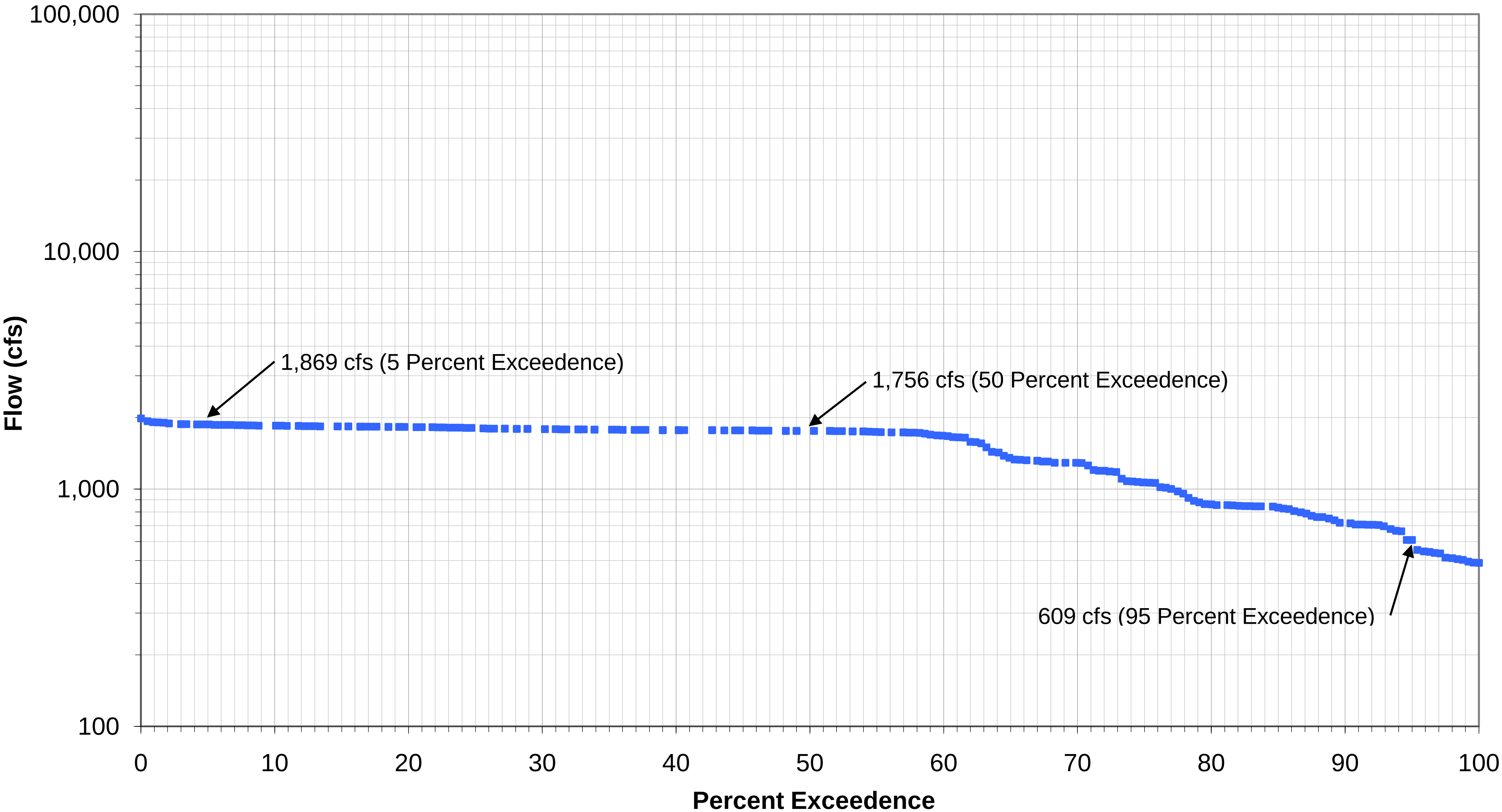
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
August Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

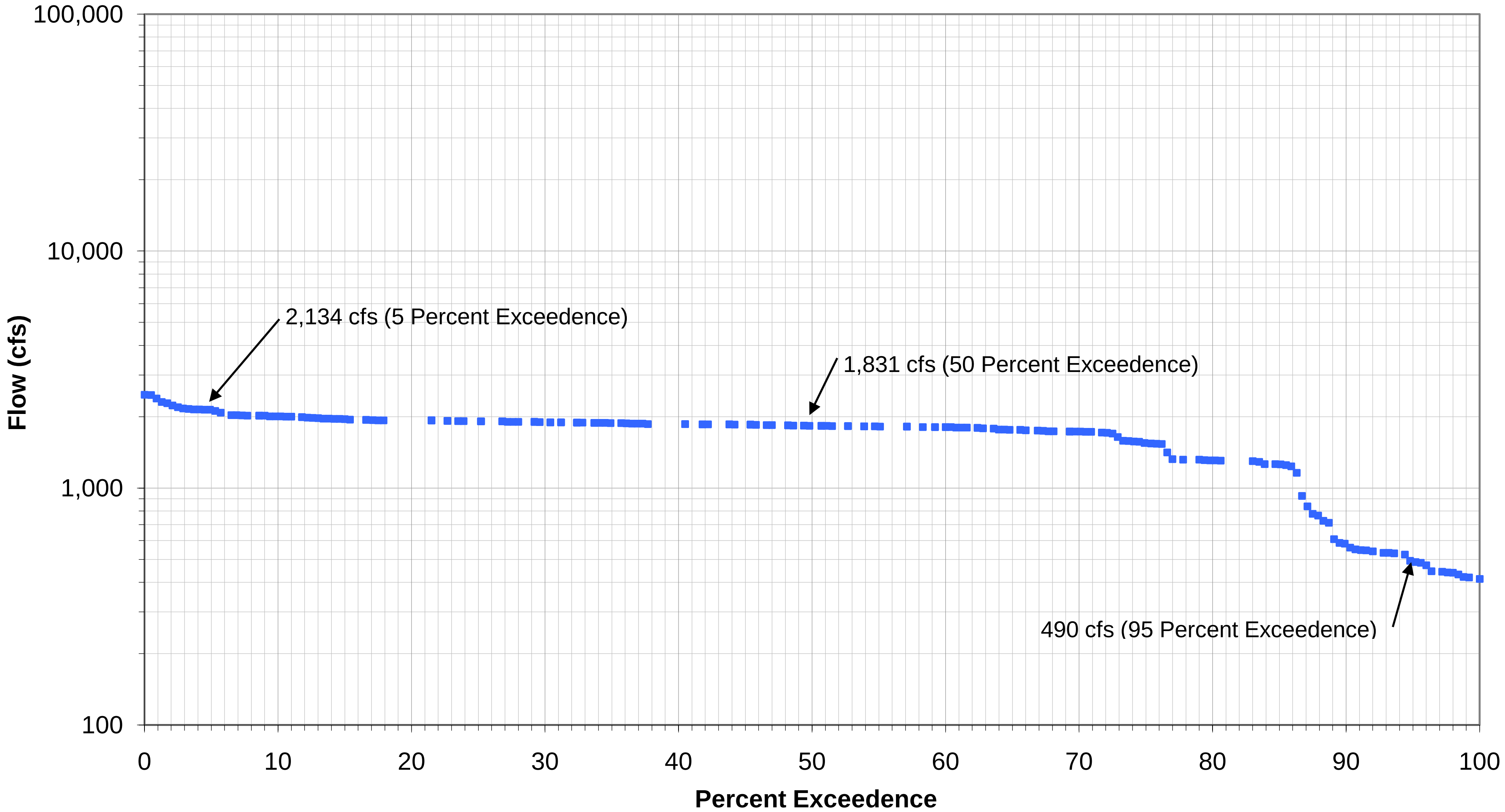
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
September Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

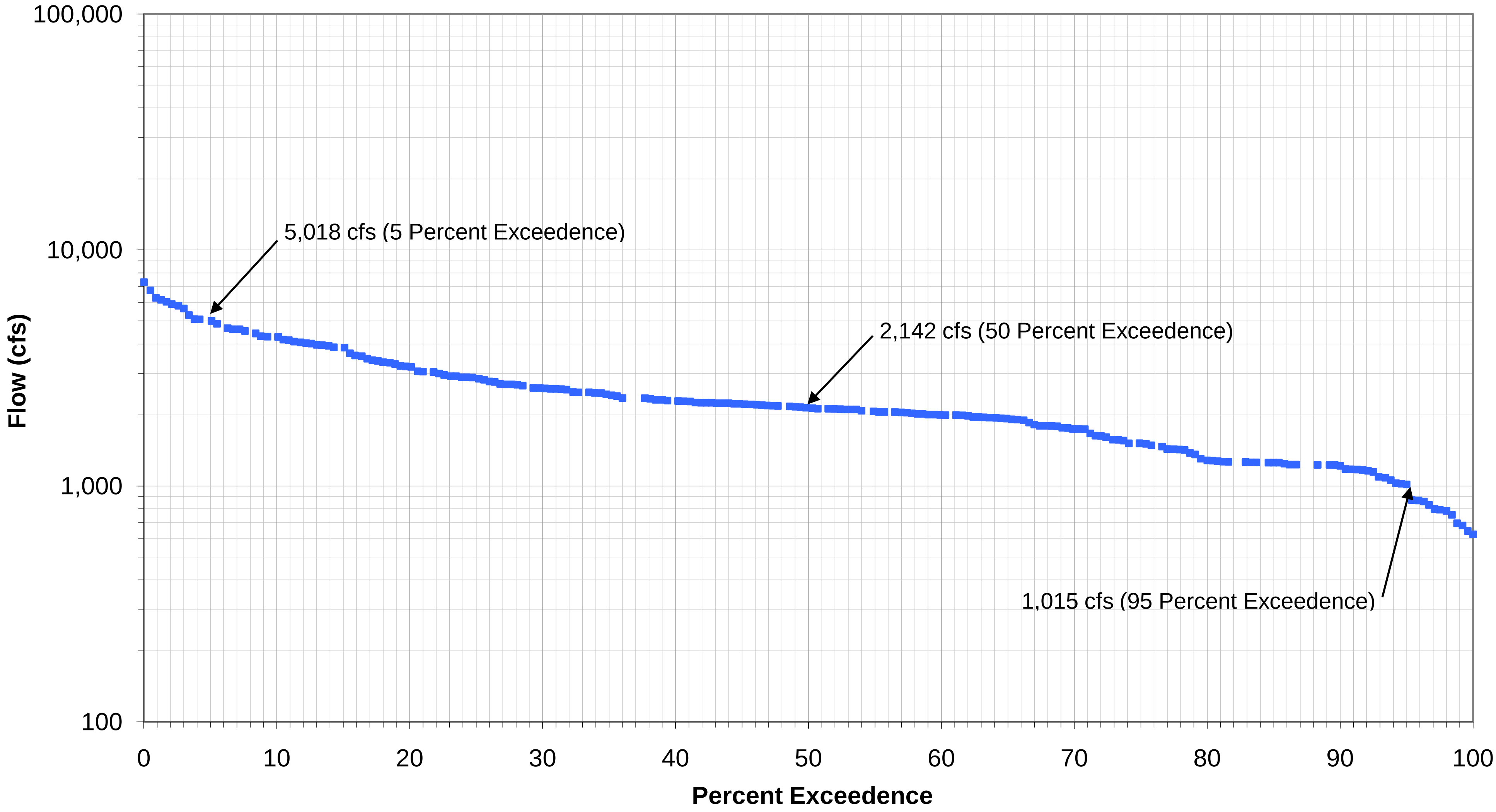
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
October Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

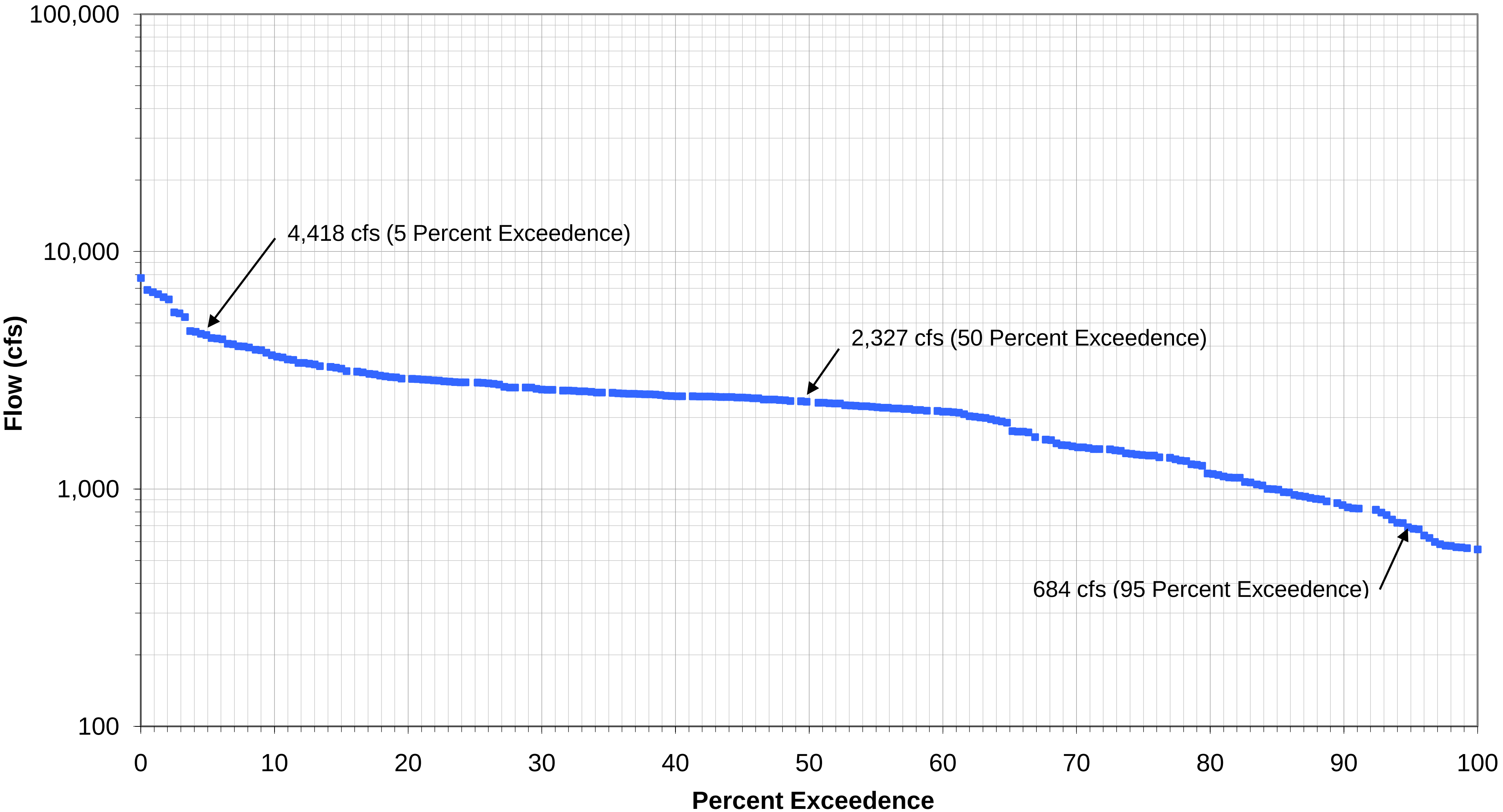
Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
November Flow-Duration Curve



(Average Daily Data from October 1986 - September 1994)

7/12/2010

Middle Fork Willamette River, Above North Fork, Near Oakridge, OR
December Flow-Duration Curve



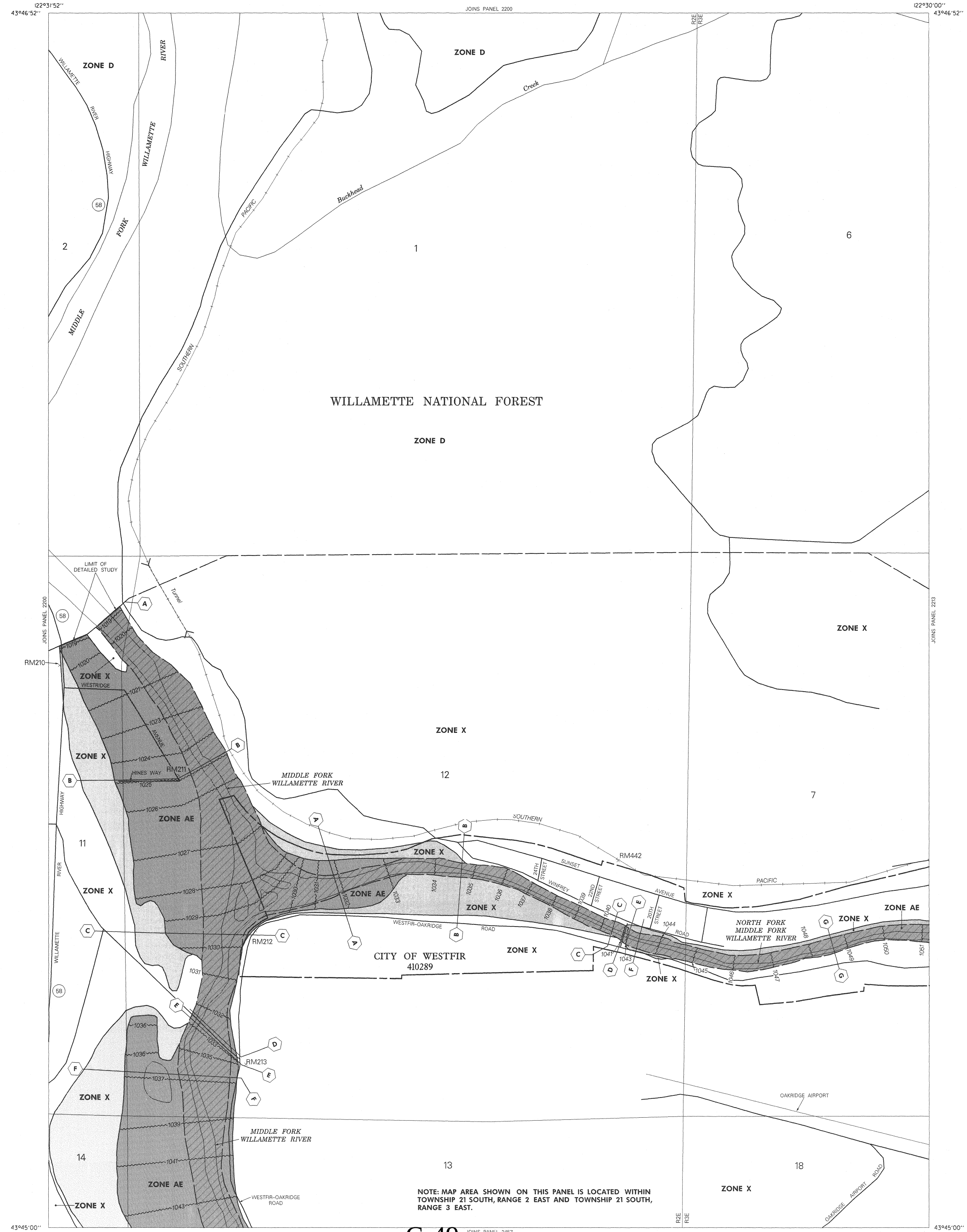
(Average Daily Data from October 1986 - September 1994)

7/12/2010

This page was intentionally left blank.

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM210	1015.88	A railroad spike in west face of power pole V75/L4, located approximately 300 feet northwest of the intersection of State Route 58 and Westridge Avenue, and 65 feet east of highway centerline. Set by CH2M HILL Inc. (MFW 303).
RM211	1113.88	U.S. Coast and Geodetic Survey disk stamped J 94 1934 located approximately 500 feet east of Southern Pacific Railroad station at Westfir, southwest corner of railroad bridge over North Fork Middle Fork Willamette River, top of abutment.
RM212	1055.56	A railroad spike in west face of power pole No. V57, located approximately 0.25 mile northwest of east end of bridge between Westfir and Oakridge on forestry road, 21 feet west of centerline of road. Set by CH2M HILL Inc. (MFW 301).
RM213	1051.63	A disk in top of guardrail, stamped V 362 1942, located approximately 3.4 miles northwest of Oakridge, at southeast corner of bridge between Westfir and Oakridge. Set by U.S. Bureau of Public Roads.
RM442	1074.75	U.S. Geological Survey track spike located approximately 250 feet west of station sign, northwest corner of Southern Pacific Railroad double track ballast deck culvert 583.49, top of abutment.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction ; no base flood elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year floodplain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983 — Identified 1990 — Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

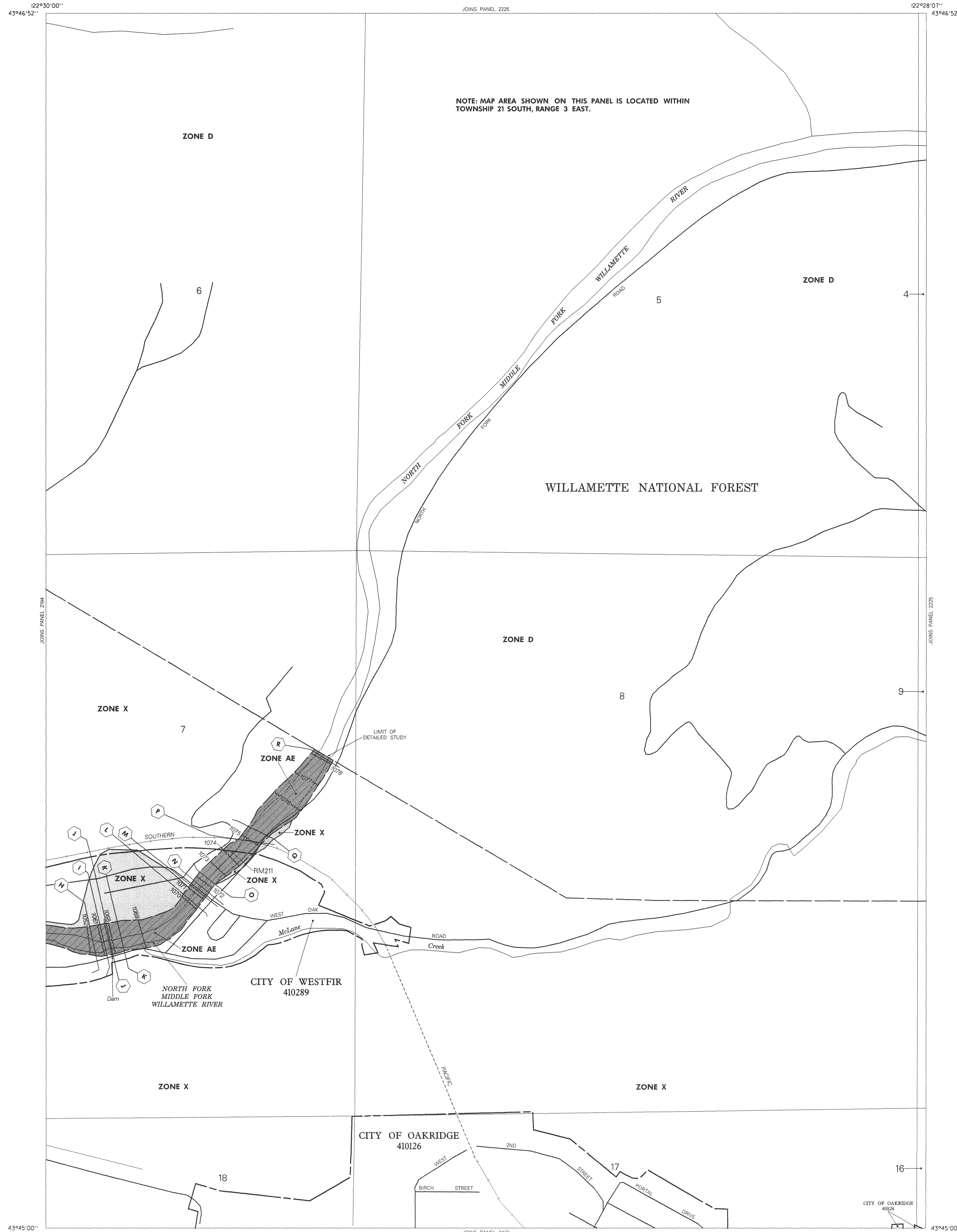
Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

~~~513~~~ Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

(D)——(D) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

RM7 × Elevation Reference Mark

• M2 River Mile

97°07'30", 32°22'30" Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on BFE's, and for any information on floodway delineations, prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, A1-A30, AH, AO, A99, V, VE and V1-V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 1/20 inch.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and /or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
JUNE 2, 1999

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

LANE COUNTY, OREGON AND INCORPORATED AREAS

PANEL 2194 OF 2975
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
WESTFIR, CITY OF	410289	2194	F

MAP NUMBER
41039C2194 F

EFFECTIVE DATE:
JUNE 2, 1999

Federal Emergency Management Agency
~~~

ELEVATION REFERENCE MARKS

REFERENCE MARK	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM211	1113.88	U.S. Coast and Geodetic Survey disk stamped J 94 1934 located approximately 500 feet east of Southern Pacific Railroad station at Westfir, southwest corner of railroad bridge over North Fork Middle Fork Willamette River, top of abutment.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction ; no base flood elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year floodplain.
ZONE D	Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983 | Identified 1990 | Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

513 — Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

D — D Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

RM7 × Elevation Reference Mark

• M2 River Mile

97°07'30'', 32°22'30'' Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas. The community map repository should be consulted for more detailed data on BFE's, and for any information on floodway delineations, prior to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, A1-A30, AH, AO, A99, V, VE and V1-V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown at 1/20 inch.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and /or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (PL 101-591).

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
JUNE 2, 1999

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map to determine when actuarial rates apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

LANE COUNTY, OREGON AND INCORPORATED AREAS

PANEL 2213 OF 2975
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
OAKRIDGE, CITY OF	410126	2213	F
WESTFIR, CITY OF	410289	2213	F
LANE COUNTY, UNINCORPORATED AREAS	415591	2213	F

MAP NUMBER 41039C2213 F

EFFECTIVE DATE: JUNE 2, 1999

Federal Emergency Management Agency

Executive Order 11988 -- Floodplain Management

Executive Order 11990 - Protection of Wetland (Writer's Note: this EO would be included by the Enviromental office staff. Recommend linking to it from floodplainment page.)

SOURCE: The provisions of Executive Order 11988 of May 24, 1977, appear at 42 FR 26971, 3 CFR, 1977 Comp., p. 117, unless otherwise noted.

By virtue of the authority vested in me by the Constitution and statutes of the United States of America, and as President of the United States of America, in furtherance of the National Environmental Policy Act of 1969, as amended (42 U.S.C. 4321 et seq.), the National Flood Insurance Act of 1968, as amended (42 U.S.C. 40011 et seq.), and the Flood Disaster Protection Act of 1973 (Public Law 93-234, 87 Stat. 975), in order to avoid to the extent possible the long and short term adverse impacts associated with the occupancy and modification of floodplain development wherever there is a practicable alternative, it is hereby ordered as follows:

Section 1. Each agency shall provide leadership and shall take action to reduce the risk of flood loss, to minimize the impact of floods on human safety, health and welfare, and to restore and preserve the natural and beneficial values served by floodplains in carrying out its responsibilities for (1) acquiring, managing, and disposing of Federal lands, and facilities; (2) providing Federally undertaken, financed, or assisted construction and improvements; and (3) conducting Federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulating, and licensing activities.

SEC. 2. In carrying out the activities described in Section 1 of this Order, each agency has a responsibility to evaluate the potential effects of any actions it may take in a floodplain; to ensure that its planning programs and budget request reflect consideration of flood hazards and floodplain management; and to prescribe procedures to implement the policies and requirements of this Order, as follows:

1. Before taking an action, each agency shall determine whether the proposed action will occur in a floodplain--for major Federal actions significantly affecting the quality of the human environment, the evaluation required below will be included in any statement prepared under Section 102(2)(C) of the National Environmental Policy Act. This Determination shall be made according to a Department of Housing and Urban Development (HUD) floodplain map or a more detailed map of an area, if available. If such maps are not available, the agency shall make a determination of the location of the floodplain based on the best available information. The Water Resources Council shall issue guidance on this information not later than October 1, 1977.

2. If an agency has determined to, or proposes to, conduct, support, or allow an action to be located in a floodplain, the agency shall consider alternatives to avoid adverse effects and incompatible development in the floodplains. If the head of the agency finds that the only practicable alternative

consistent with the law and with the policy set forth in this Order requires sitting in a floodplain, the agency shall, prior to taking action, (i) design or modify its action in order to minimize potential harm to or within the floodplain, consistent with regulations issued in accord with Section 2(d) of this Order, and (ii) prepare and circulate a notice containing an explanation of why the action is proposed to be located in the floodplain.

3. For programs subject to the Office of Management and Budget Circular A-95, the agency shall send the notice, not to exceed three pages in length including a location map, to the state and areawide A-95 clearinghouses for the geographic areas affected. The notice shall include (i) the reasons why the action is proposed to be located in a floodplain; (ii) a statement indicating whether the action conforms to applicable state or local floodplain protection standards and (iii) a list of the alternatives consid-ered. Agencies shall endeavor to allow a brief comment period prior to taking any action.

4. Each agency shall also provide opportunity for early public review of any plans or proposals for actions in floodplains, in accordance with Section 2(b) of Executive Order No. 11514, as amended, including the development of procedures to accomplish this objective for Federal actions whose impact is not significant enough to require the preparation of an environmental impact statement under section 102(2)(C) of the National Environmental Policy Act of 1969, as amended.

b. Any requests for new authorization or appropriations transmitted to the Office of Management and Budget shall indicate, if an action to be proposed will be located in a floodplain, whether the proposed action is in accord with this Order.

c. Each agency shall take floodplain management into account when formulating or evaluating any water and land use plans and shall require land and water resources use appropriate to the degree of hazard involved. Agencies shall include adequate provision for the evaluation and consideration of flood hazards in the regulations and operating procedures for the licenses, permits, loan or grants-in-aid programs that they administer. Agencies shall also encourage and provide appropriate guidance to applicants to evaluate the effects of their proposals in floodplains prior to submitting applications for Federal licenses, permits, loans or grants.

d. As allowed by law, each agency shall issue or amend existing regulation and procedures within one year to comply with this Order. These procedures shall incorporate the Unified National Program for Floodplain Management of the Water Resources Council, and shall explain the means that the agency will employ to pursue the nonhazardous use of riverine, coastal and other floodplains in connection with the activities under its authority. To the extent possible, existing processes, such as those of the Council on Environmental Quality and the Water Resources Council , shall be utilized to fulfill the requirements of this Order. Agencies shall prepare their proce-dures in consultation with the Water Resources Council, the Director of the Federal Emergency Management Agency, and the Council on Environmental Quality, and shall update such procedures as necessary.

[Sec. 2 amended by EO 12148 of July 20, 1979, 44 FR 43239, 3 CFR, 1979 Comp., p. 412]

SEC. 3. In addition to the requirements of Section 2, agencies with responsibilities for Federal real property and facilities shall take the following measures:

a. The regulations and procedures established under Section 2(d) of this Order shall, at a minimum, require the construction of Federal structures and facilities to be in accordance with the standards and criteria and to be consistent with the intent of those promulgated under the National Flood Insurance Program. They shall deviate only to the extent that the standards of the Flood Insurance Program are demonstrably inappropriate for a given type of structure or facility.

b. If, after compliance with the requirements of this Order, new construction of structures or facilities are to be located in a floodplain, accepted floodproofing and other flood protection measures shall be applied to new construction or rehabilitation. To achieve flood protection, agencies shall, wherever practicable, elevate structures above the base flood level rather than filling in land.

c. If property used by the general public has suffered flood damage or is located in an identified flood hazard area, the responsible agency shall provide on structures, and other places where appropriate, conspicuous delineation of past and probable flood height in order to enhance public awareness of a knowledge about flood hazards.

d. When property in floodplains is proposed for lease, easement, right-of-way, or disposal to non-Federal public or private parties, the Federal agency shall (1) reference in the conveyance those uses that are restricted under identified Federal, State or local floodplain regulations; and (2) attach other appropriate restrictions to the uses of properties by the grantee or purchaser and any successors, except where prohibited by law; or (3) withhold such properties from conveyance.

SEC. 4. In addition to any responsibilities under this Order and Sections 202 and 205 of the Flood Disaster Protection Act of 1973, as amended (42 U.S.C. 4106 and 4128), agencies which guarantee, approve, regulate, or insure any financial transaction which is related to an area located in a floodplain shall, prior to completing action on such transaction, inform any private parties participating in the transaction of the hazards of locating structures in the floodplain.

SEC. 5. The head of each agency shall submit a report to the Council on Environmental Quality and to the Water Resources Council on June 30, 1978, regarding the status of their procedures and the impact of this Order on the agency's operations. Thereafter, the Water Resources Council shall periodically evaluate agency procedures and their effectiveness.

SEC. 6. As used in this Order:

a. The term "agency" shall have the same meaning as the term "Executive agency" in Section 105 of Title 5 of the United States Code and shall include the military departments; the directives contained in this Order, however, are meant to apply only to those agencies which perform the activities described in Section 1 which are located in or affecting floodplains.

b. The term "base flood" shall mean that flood which has a one percent or greater chance of occurrence in any given year.

c. The term "floodplain" shall mean the lowland and relative-ly flat areas adjoining inland and coastal waters including floodprone areas of offshore islands, including at a minimum, that area subject to a one percent or greater chance of flooding in any given year.

SEC. 7. Executive Order No. 11296 of August 10, 1966, is hereby revoked. All actions, procedures, and issuances taken under that Order and still in effect shall remain in effect until modified by appropriate authority under the terms of this Order.

SEC. 8. Nothing in this Order shall apply to assistance provided for emergency work essential to save lives and protect property and public health and safety, performed pursuant to section 305 and 306 of the Disaster Relief Act of 1974 (88 Stat. 148, 42 U.S.C. 5145 and 5146).

SEC. 9. To the extent the provisions of section 2(a) of this Order are applicable to projects covered by Section 104(h) of the Housing and Community Development Act of 1974, as amended (88 Stat. 640), 42 U.S.C. 5304(h)), the responsibilities under those provisions may be assumed by the appropriate applicant, if the applicant has also assumed, with respect to such projects, all of the responsibilities for environmental review, decisionmaking, and action pursuant to the National Environmental Policy Act of 1969, as amended.

APPENDIX D

BIOLOGICAL DATA

Appendix D includes the following:

1. Lookout Point Fish Migration Timing
2. North Fork of the Middle Fork Willamette Juvenile Run Size Estimates. Griffith, David W. 2010.
3. Northern Spotted Owl Habitat Information
4. Recovery Ponds Volume

This page was intentionally left blank.

SUBJECT:	USACE Lookout Point	**BY:**	K. Malone **CHK'D BY:** J. Kapla
	Fish Migration Timing	**DATE:**	14-June
		PROJECT NO.:	402429.01.02

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Species of Concern												
Spring Chinook												
Juveniles[1]												
All Juvenile Size Classes Combined (NFMFW)*												
Juveniles < 60 mm												
Juveniles 60-79 mm												
Juveniles 80-99 mm												
Juveniles 100+ mm												
Adult[2]												
Bull Trout (Generic)[3]												
Juvenile												
Adult												
Pacific Lamprey (Bonneville Dam)[4]												
Juvenile												
Adult												
Mountain Whitefish (Generic)[5]												
Juvenile												
Adult												
Reservoir Operations												
Lookout Point Reservoir	Evacuated	Filling				Full			Evacuating			Evacuated
High Flow Periods												
Middle Fork												
North Fork												

* North Fork of the Middle Fork Willamette River

1- Juvenile run-timing from Greg Taylor April, 2010 Powerpoint presentation. Migration timing varies by size of fish.
2- Adult run-timing from streamnet (www.streamnet.org).
3- Bull trout run-timing included as this species may be present in the area.
4- Pacific Lamprey may be reintroduced to the Project area in the future. Run-timing is for Bonnevile Dam, Columbia River.
5- Mountain whitefish abundance run-timing included as this species may produce large numbers of migrating juveniles.

Legend for Species of Concern

Expected Juvenile Migration Timing
Peak Migration Period

This page was intentionally left blank.

North Fork of the Middle Fork Willamette (NFMF) Juvenile Run Size Estimates

Compiled By David Griffith (CENWP-PM-E) david.w.griffith@usace.army.mil

Fry Estimate based on Recovery Plan

Basin	IP	A/P	Fry Estimate
MF Basin	100%	5820	
Fall Crk	17%	989	593640
NFMF	29%	1688	1012680
Above HCR	20%	1164	698400
Below LOP	33%	1921	1152360

Fry Estimate based on feedback from L. Kruzic (i.e. the assumption of 33% production below LOP/Dexter seemed overly optimistic)

Basin	IP	A/P	Fry Estimate
MF Basin	100%	5820	
Fall Crk	20%	1164	698400
NFMF	35%	2037	1222200
Above HCR	25%	1455	873000
Below LOP	20%	1164	698400

IP = Intrinsic potential (table 6-4 in NMFS Draft Recovery Plan)

A/P = Abundance Productivity (table 4-9 in NMFS Draft Recovery Plan)

"*Further, the A/P conservation gaps estimated for some populations are very large relative to the current size of the population. It is likely that some of these estimates are too large and may be an artifact of the gap estimation methodology, which assumes a linear population response at all population densities and conservation states. For the nearly extinct populations, this linear assumption is probably incorrect and has likely led to the generation of some exceptionally large A/P conservation gaps*." – (NMFS Draft Recovery Plan pp. 69)

SR = Sex ratio ~60/40 M/F (Dan Peck, ODFW pers. Com)

F = 5,000 eggs per female from Groot Margolis*

EF = 30% Egg to fry from Groot Margolis*

Fry Estimate = SP*SR*F*EF

Recovery plan based NFMF Fry Estimate = 1688 X .4 X 5,000 X .3 = 1,012,800

Revised NFMF Fry Estimate based on NMFS feedback = 1,222,200

NOTE: Assumes 0% pre-spawn mortality and no density dependence.

*conservative estimate reflecting best case scenario (more fish).

NFMF Smolt “ESTIMATE” = 30,000

Based on ~ 15,000 smolt estimate 2007 & 2008 X factor of 2

It appears, based on extremely limited data from the NFMF, that the number of smolts has a density dependent response where there is less of one for migrant fry, based on years with large differences in redd counts(see table below). This is consistent with studies by Lister & Walker (1966), and Major & Mighell (1969). This makes intuitive sense since the resource needs of individuals at the fry stage are much less than at the yearling stage. Also all in tributary juveniles must survive the winter months, a time of limited resources and high flows to, make it to the yearling migrant life stage.

	2005 Spawner	2006 Spawner	2007 Spawner
Outplants	798	827	555
# of Redds	42	363	118
Peak of fry migration	Spring 2006	Spring 2007	Spring 2008
Fry caught	???	1050	283
Fry migrant estimates*	???	152,173	41,014
Peak of Yearling out migration	Spring 2007	Spring 2008	Spring 2009
Smolts caught in trap	102	110	???
Estimate of yearling out migrants*	14,782	15,942	???

*based on lowest trap efficiency observed (0.69%)

ABOVE TO BE UPDATED WHEN UofI DATA ANALYSIS IS COMPLETE AND ADITIONAL INFORMATION IS AVAILABLE FROM 2010 STUDIES!! ROUGH ESTIMATE!

INFORMATION ON 2009 ODFW LOP LIBERATION

LOP release

June 18th

311,600 fish

Mean size 70mm

Tailrace Recapture

Most fish recaptured in late fall early winter (NOV-DEC)

Fish were 100-120 mm at recapture

1328 Captured Live fish

.72-1.9 % trap efficiency

Using above range **70,000-184,000** marked fish passed LOP = **23-59%** of release

Minimum estimate based on live fish recaptures and likely predation in trap by otters

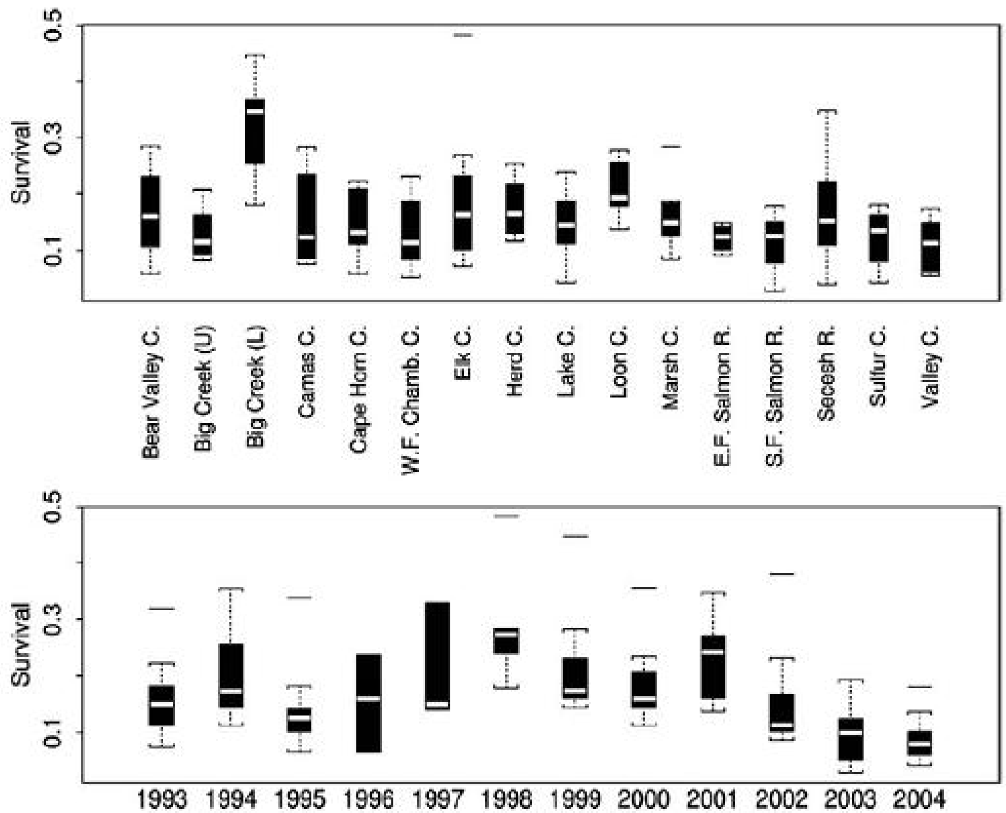


FIGURE 2.—Box plots (Cleveland 1993) of estimated parr-to-smolt survival to Lower Granite Dam (Snake River) for wild spring–summer Chinook salmon tagged in the Salmon River basin, Idaho, by tagging site (upper panel) and migration year (lower panel). Medians (unshaded portions of bars), upper and lower quartiles (dark areas within bars), upper and lower adjacent values (capped vertical lines), and outliers (isolated horizontal lines) are presented. (Reproduced from Achord 2007, *Migration Timing, Growth, and Estimated Parr-to-Smolt Survival Rates of Wild Snake River Spring–Summer Chinook Salmon from the Salmon River Basin, Idaho, to the Lower Snake River*)

"Fry to parr survival 15% for Idaho streams"

Scully, R.J., Leitzinger, E.J., and Petrosky, C.E. 1990. Idaho habitat evaluation for off-site mitigation record. Annual report 1988. Idaho Department of Fish and Game. Prepared for U.S. Department of Energy, Bonneville Power Administration, Division of Fish and Wildlife. Project 83-7. Contract No. DE-AI79-84BP13381. StreamNet Library, Columbia River Inter-Tribal Fish Commission, 729 Oregon St., Suite 190, Portland, OR 97232 <www.fishlib.org>.

OTHER IMPORTANT REFERENCES

Mattson, C.R. 1962. Early life history of Willamette River spring Chinook salmon. Oregon Fish Commission, Portland, Oregon.

Mattson, C.R. 1963. An investigation of adult spring Chinook salmon for the Willamette River system, 1946-51. Oregon Fish Commission, Portland.

"*The Corps installed a semipermanent evaluator in the fishway approach channel designed to capture all emigrants passing through the transport system. Collection of marked juvenile fish released into the reservoir never exceeded 15.6% for spring chinook, and passage efficiencies of steelhead smolts were even lower. We ascribed these poor passage efficienciesto improper placement of the fish collection horns and low attraction flows to the horn entrances during much of the migration period.*"

"*We generally concluded that the transport system was ineffective in collecting adequate numbers of downstream migrants and that most of the juvenile salmon and steelhead passing through the facility were injured.*

We ascribed most of the successful emigration of juvenile salmonids from the reservoir to passage through the regulating outlet. Because of limited direct information, most of our knowledge of emigration via the outlet is inferential. We could not estimate mortalities sustained during emigration via the outlet."

"We set large-mesh and small-mesh nets in the reservoir monthly to obtain data on depth distribution, species composition, growth and age of fish populations. Juvenile chinook grew well, attaining emigration size in 7or 8 months of reservoir rearing."

Smith, E. M. and L. Korn. 1970. Evaluation of fish facilities and passage at Fall Creek Dam on Big Fall Creek in Oregon. Final report. Fish Commission of Oregon, Research Division, Portland.

Fall Creek_Smith and Korn 1970.pdf

"In 1990 ODFW released one million size (mean weight= 245 fish/lb, S.D.= 75.0) fingerlings into the reservoir in mid-April. In 1991 ODFW released 950,000 slightly larger but more uniformly-sized fingerlings (mean weight= 205 fish/lb, st. dev.=53.1) into the reservoir in late May.

"Study results indicated 28.5% of the 950,000 fingerlings stocked in the reservoir in late May 1991 survived to smolt. This is an increase in survival over 1990 , when one million fingerlings stocked in the reservoir in mid-April survived at a 19.7% rate. Smolts leaving the reservoir in 1991, although much more abundant, were correspondingly smaller."

Downey, T. W. and E. M. Smith. 1992. Evaluation of spring Chinook salmon passage at Fall Creek Dam, 1991. Draft report. Fish Research and Development Section, Oregon Department of Fish and Wildlife.

DowneySmith1992.doc

"Above Reservoir

► *High numbers of fry migrating out of tributaries and into the reservoirs in Feb.-June.*

► *Low numbers of juveniles migrating out of tributaries and into reservoirs in July-Jan.*

□ *Below Dam*

► *Species Composition –Fall Creek, LOP have high numbers of warm water fish. Cougar has lowest number.*

► *Can estimate numbers of live fish migrating downstream using fish captured in screw traps and efficiency tests for live fish.*

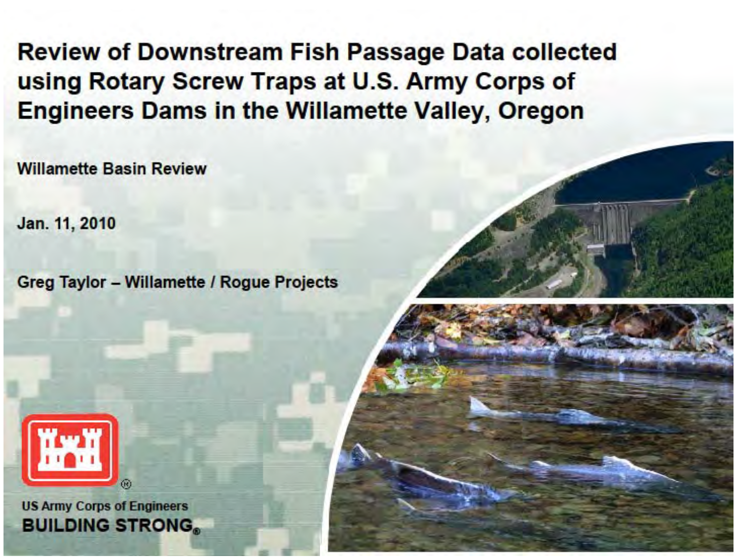
► *Mortality estimates are unreliable at (LOP at FC) due to inability to generate dead fish efficiency tests.*

► *Length frequency histograms indicate two "size classes" of fish passing downstream. Likely different life histories*

► *Reservoir elevation is primary variable affecting juvenile migration timing (flow also important)*

► *Migration timing changed dramatically at Cougar following completion of new water temperature control tower."*

Taylor, G. T.. 2010 *Review of Downstream Fish Passage Data collected using Rotary Screw Traps at U.S. Army Corps of Engineers Dams in the Willamette Valley, Oregon.* Presentation at the 2009 Willamette Fisheries Science Review. Grand Ronde, OR.



(double Click to open)

“ 43% of outplanted adult Chinook survive to Spawn

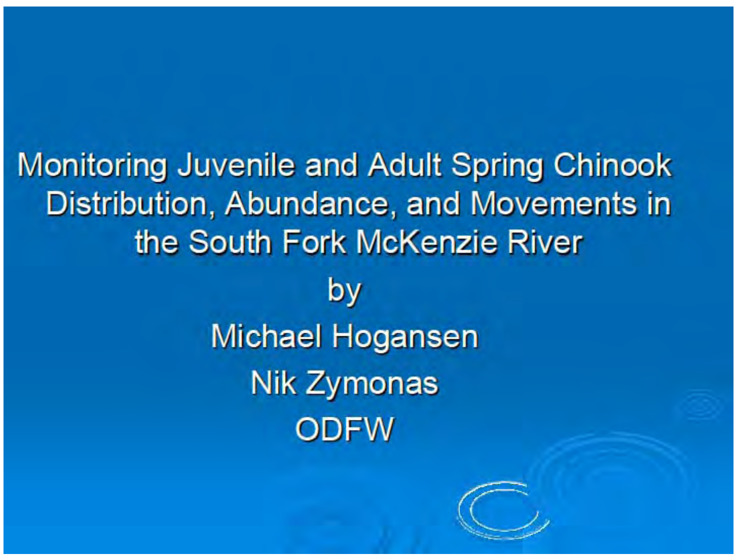
* Large number of fry move down stream in April and May to Res. Don’t see fry in tail race or RO*

* Most fish passing through dam are age 1 or older*

* Mortality can be high through RO*

* Tail race mortality is related to size and many other variables”*

Hogansen, M. & N. Zymonas. 2010 *Monitoring Juvenile and Adult Spring Chinook Distribution, Abundance, and Movements in the South Fork McKenzie River. .* Presentation at the 2009 Willamette Fisheries Science Review. Grand Ronde, OR.



(double Click to open)

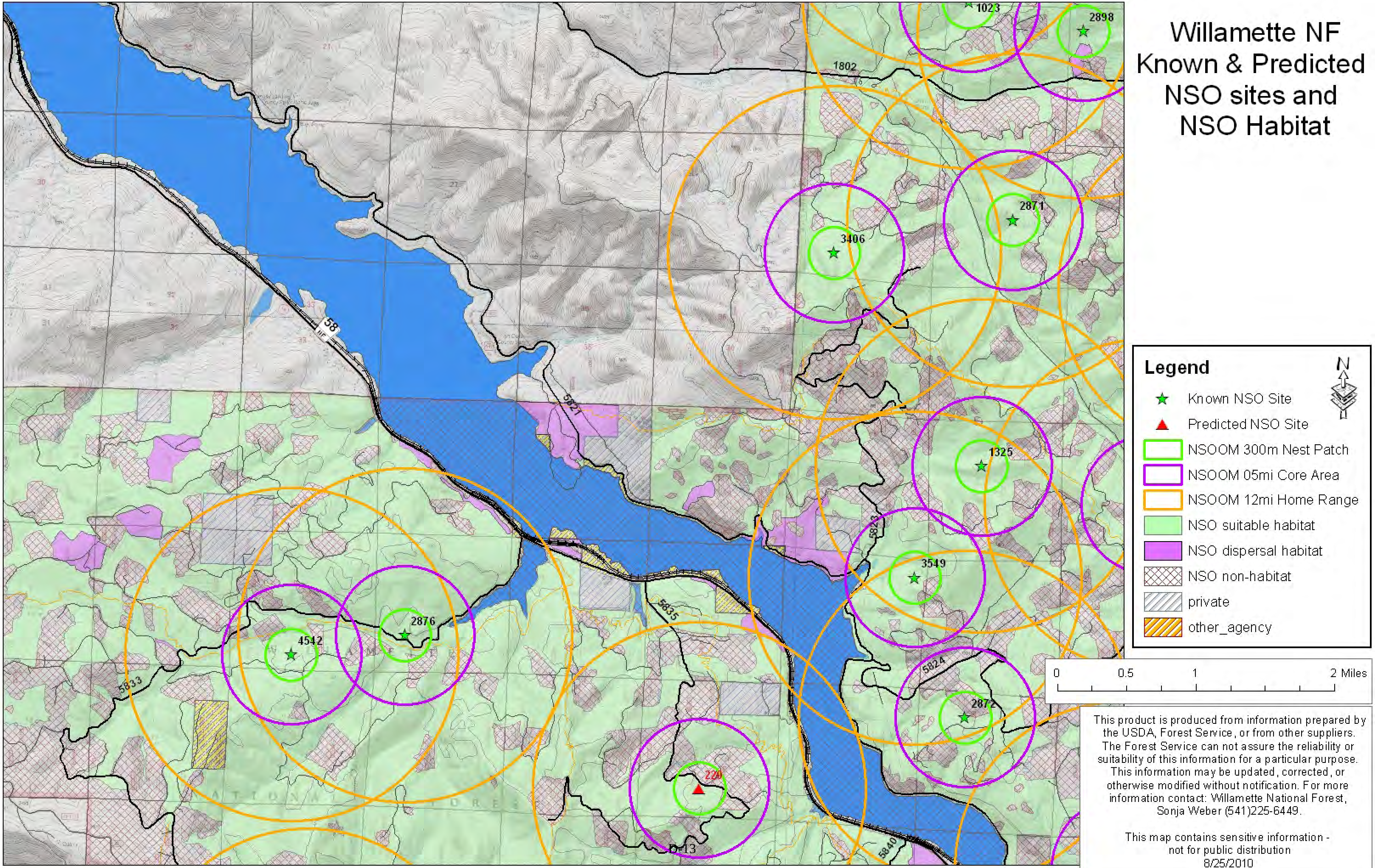
Major, R.L., and Mighell, J.L. 1969. Egg-to-migrant survival of spring chinook salmon (Oncorhynchus tshawytscha) in the Yakima River, Washington. Fish. Bull. U.S. 67: 347–359.

“*Historical impacts of humans have greatly reduced population sizes of salmon, and the density dependence we report may stem from a shortage of nutrients normally derived from decomposing salmon carcasses. Cohorts of juvenile salmon may experience density-dependent mortality at population sizes far below historical levels and recovery of imperiled populations may be much slower than currently expected.*”

Achord, S., Levin, P.S., and Zabel, R.W. 2003*. Density-dependent mortality in Pacific salmon: the ghost of impacts past?* Ecol. Lett. 6: 335–342.

Lister, D. B., and C. E. Walker. 1966. *The effect of flow control on freshwater survival of chum, coho, and chinook salmon in the Big Qualicum River*. Canadian Fish Culturist 37:3-25.

This page was intentionally left blank.

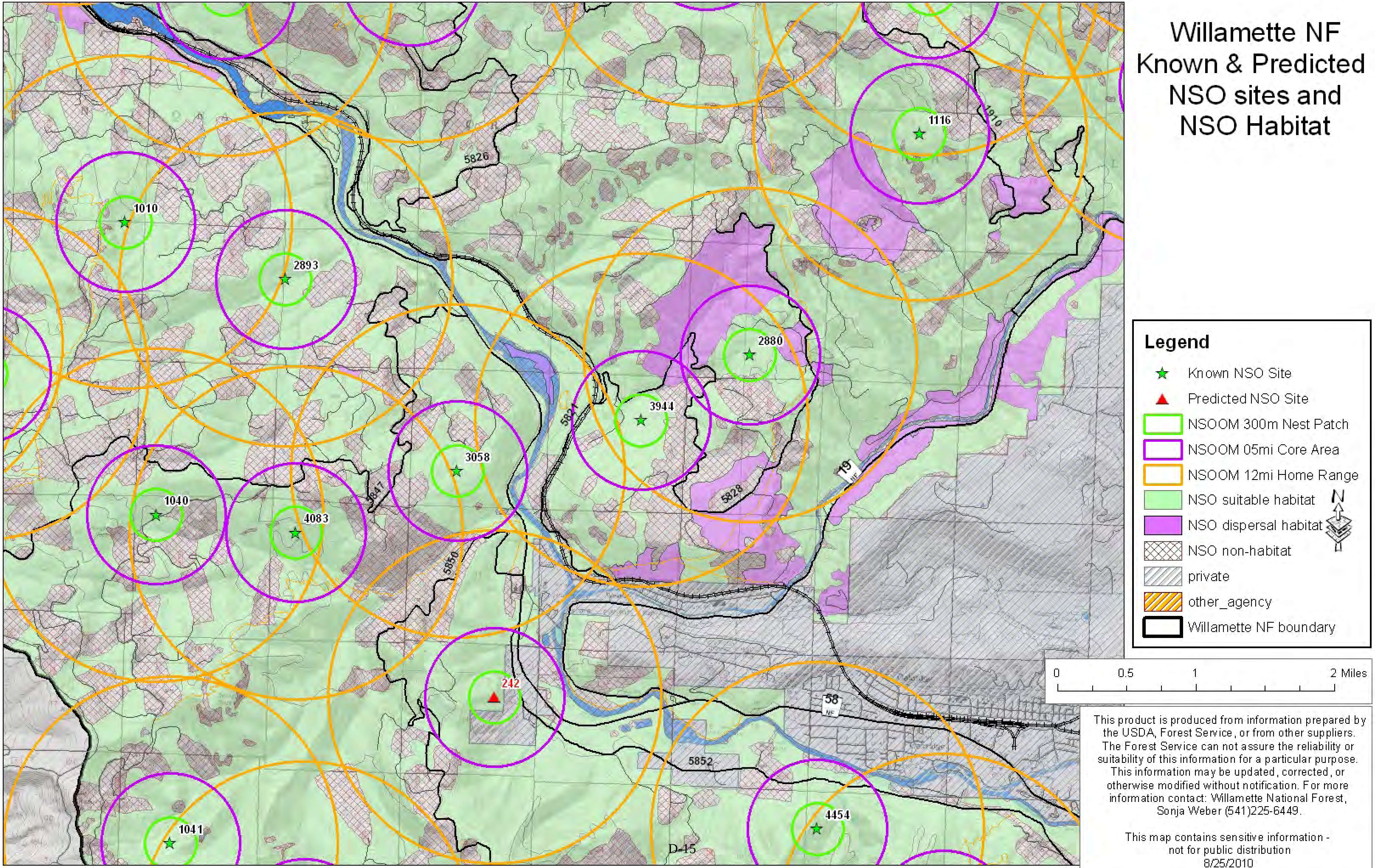


This product is produced from information prepared by the USDA, Forest Service, or from other suppliers. The Forest Service can not assure the reliability or suitability of this information for a particular purpose. This information may be updated, corrected, or otherwise modified without notification. For more information contact: Willamette National Forest, Sonja Weber (541)225-6449.

This map contains sensitive information - not for public distribution
8/25/2010

This page was intentionally left blank.

Willamette NF Known & Predicted NSO sites and NSO Habitat

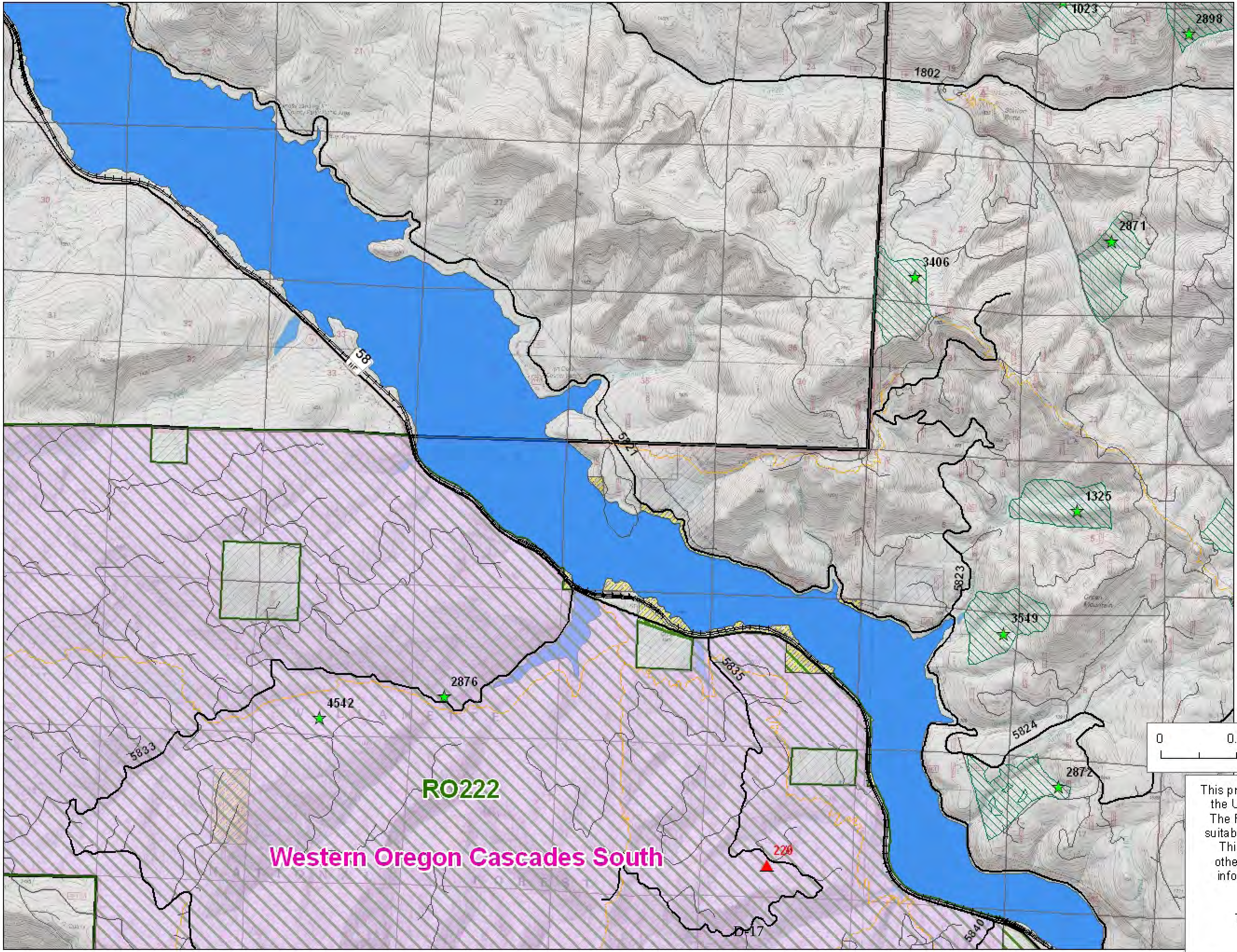


This product is produced from information prepared by the USDA, Forest Service, or from other suppliers. The Forest Service can not assure the reliability or suitability of this information for a particular purpose. This information may be updated, corrected, or otherwise modified without notification. For more information contact: Willamette National Forest, Sonja Weber (541)225-6449.

This map contains sensitive information - not for public distribution
8/25/2010

This page was intentionally left blank.

Willamette NF Known & Predicted NSO sites and NSO Protected Land Use Allocations



Legend

- Known NSO Site
- Predicted NSO Site
- NSO Critical Habitat Unit
- Late Succsssional Reserve
- Willamette NF boundary

N

0 0.5 1 2 Miles

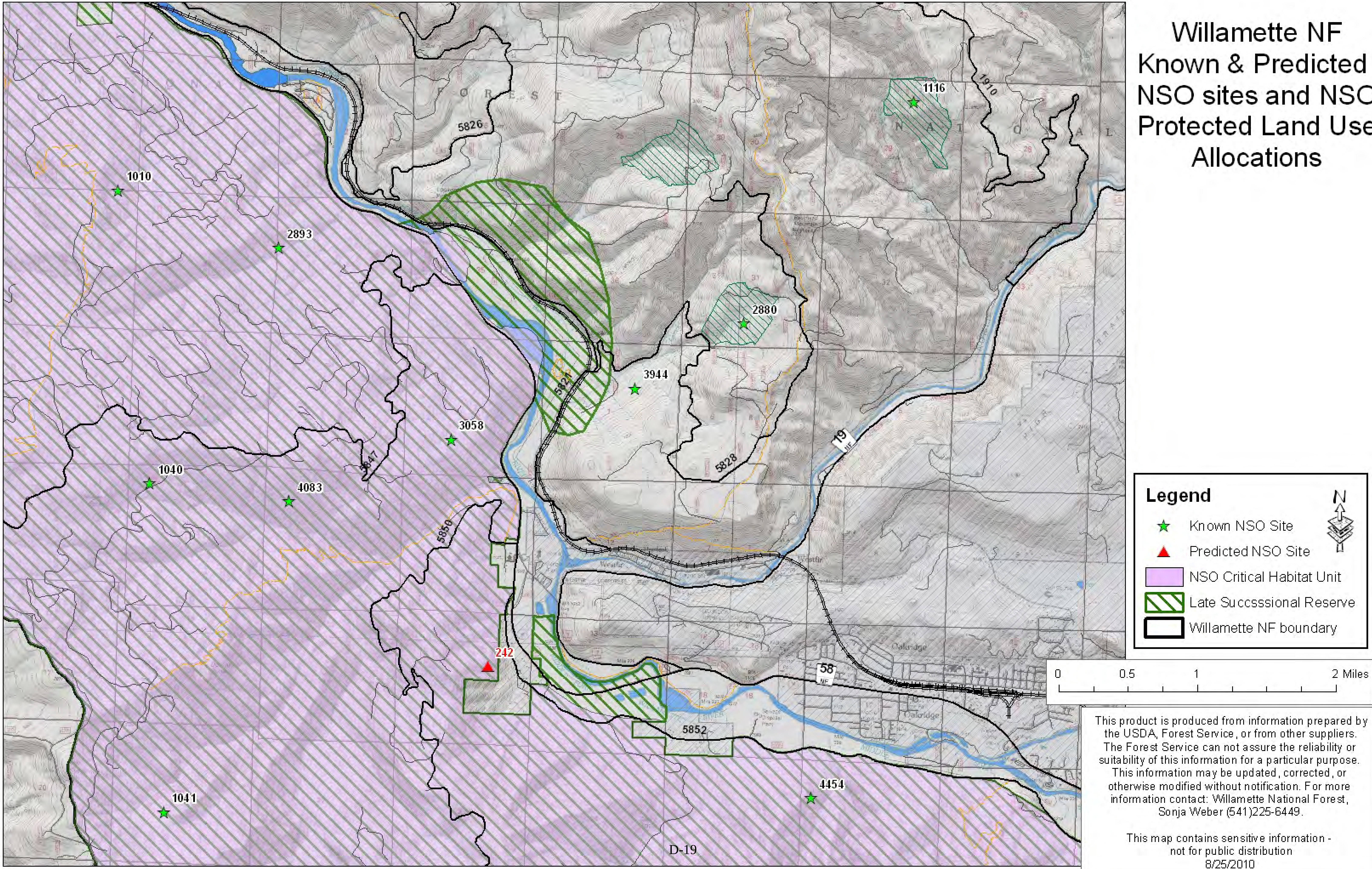
This product is produced from information prepared by the USDA, Forest Service, or from other suppliers. The Forest Service can not assure the reliability or suitability of this information for a particular purpose. This information may be updated, corrected, or otherwise modified without notification. For more information contact: Willamette National Forest, Sonja Weber (541)225-6449.

This map contains sensitive information - not for public distribution

8/25/2010

This page was intentionally left blank.

Willamette NF Known & Predicted NSO sites and NSO Protected Land Use Allocations



This product is produced from information prepared by the USDA, Forest Service, or from other suppliers. The Forest Service can not assure the reliability or suitability of this information for a particular purpose. This information may be updated, corrected, or otherwise modified without notification. For more information contact: Willamette National Forest, Sonja Weber (541)225-6449.

This map contains sensitive information - not for public distribution
8/25/2010

This page was intentionally left blank.

CH2MHILL

SUBJECT:	USACE Lookout Point Recovery/Release Vessel Design Criteria and Sizing In-Reservoir: FSC at Upper Reservoir 1000 cfs w/ net	**BY:**	V. Autier **CHECKED BY:** J. Kapla
		DATE:	07 December 2010
		PROJECT NO.:	402429

Vessel Volume and Flow Criteria*

Parameter	Value	Unit
Flow index	1.0	lbs/gpm-inch
Density Index	0.2	lbs/cf-inch

*per typical rearing/acclimation facility design criteria.

Species of Concern

Life Stage	Average Length		Average Weight		Fish/lbs	Peak Day (Maximum No. of Fish)	Total fish weight (lbs)	Holding Pond Volume (ft^3)	Flow Rate	
	(mm)	(inch)	(g)	(lb)					(gpm)	(cfs)
Fry	60	2.36	1.78	0.004	255	95,758	376	795	159	0.35
Smolt (average)	100	3.94	8.35	0.018	54					
Smolt (maximum)	200	7.87	69.78	0.154	6.5	2,290	352	224	45	0.10
								1,019		0.45

Recommended Vessel Size

Water Depth (ft)	Width (ft)	Length (ft)	Volume (ft^3)
5	10	25	1,250

CH2MHILL

SUBJECT: USACE Lookout Point
Recovery/Release Vessel Design Criteria and Sizing
In-Tributary: Off-Channel Collector at Lower
North Fork (Westfir)

BY: V. Autier **CHECKED BY:** J. Kapla
DATE: 07 December 2010
PROJECT NO.: 402429

Vessel Volume and Flow Criteria*

Parameter	Value	Unit
Flow index	1.0	lbs/gpm-inch
Density Index	0.2	lbs/cf-inch

*per typical rearing/acclimation facility design criteria.

Species of Concern

Life Stage	Average Length		Average Weight		Fish/lbs	Peak Day (Maximum No. of Fish)	Total fish weight (lbs)	Holding Pond Volume	Flow Rate	
	(mm)	(inch)	(g)	(lb)					(gpm)	(cfs)
Fry	60	2.36	1.78	0.004	255	109,570	430	910	182	0.41
Smolt (average)	100	3.94	8.35	0.018	54					
Smolt (maximum)	200	7.87	69.78	0.154	6.5	1,863	287	182	36	0.08
								1,092		0.49

Recommended Vessel Size

Water Depth (ft)	Width (ft)	Length (ft)	Volume (ft^3)
5	10	25	1,250

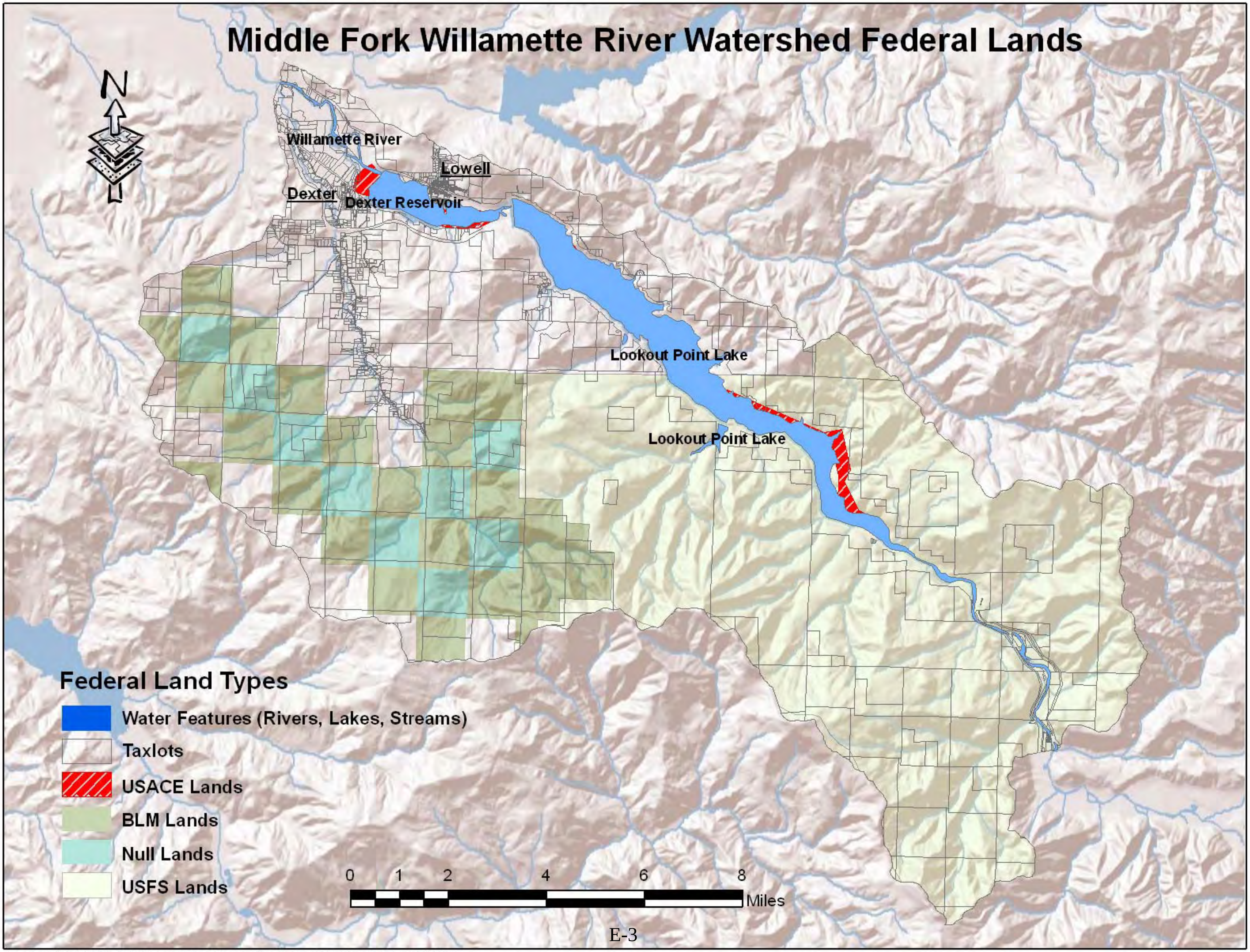
APPENDIX E

REFERENCE DRAWINGS

Appendix E includes the following:

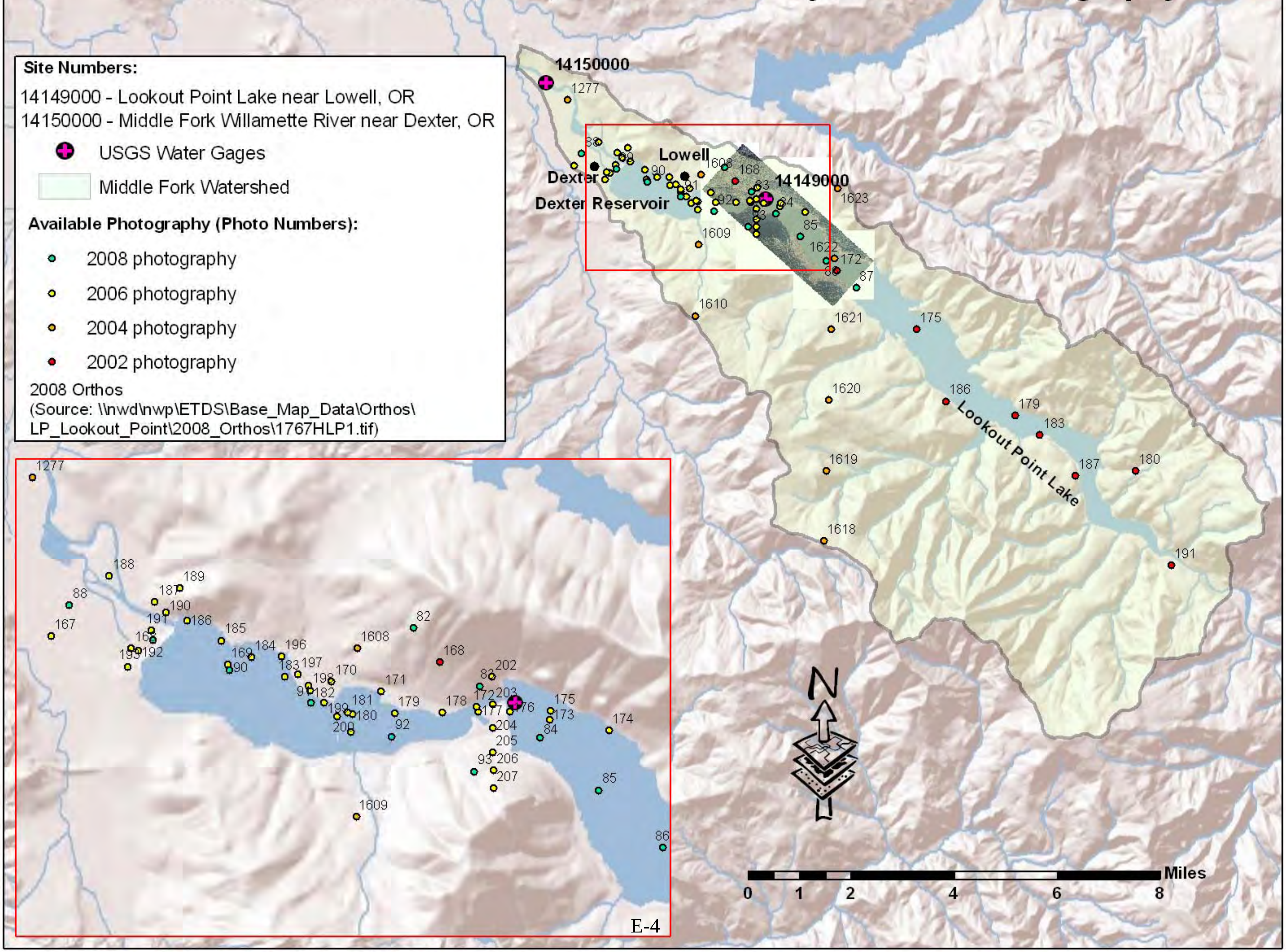
1. Middle Fork Willamette River Watershed Federal lands.
2. Middle Fork Watershed, Willamette Valley Available Photography.
3. City of Tacoma Mossyrock Project Downstream Migrant Fish Trap Drawings.
4. Lookout Point Dam and Reservoir Reference drawings (17 total).

This page was intentionally left blank.

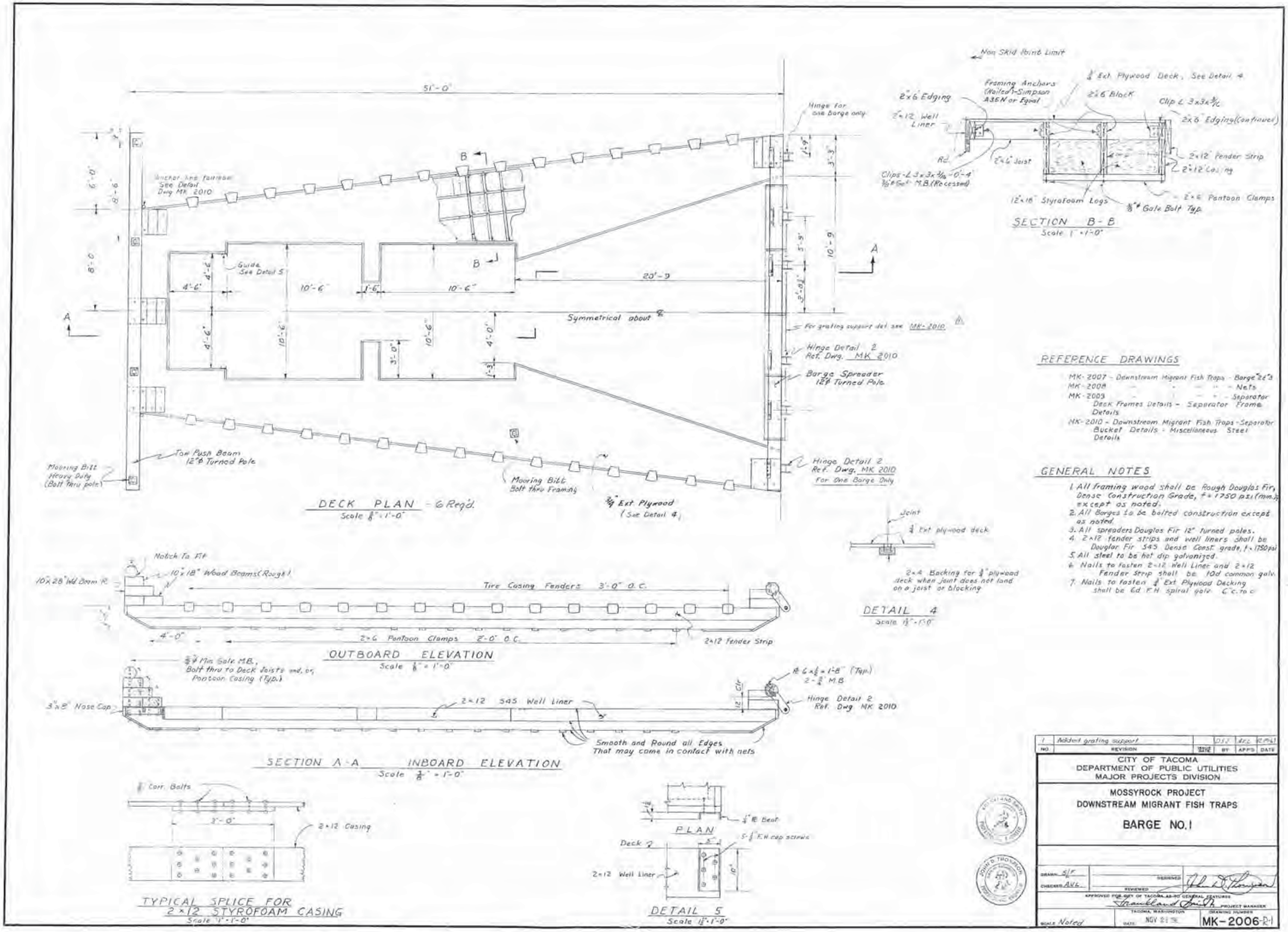


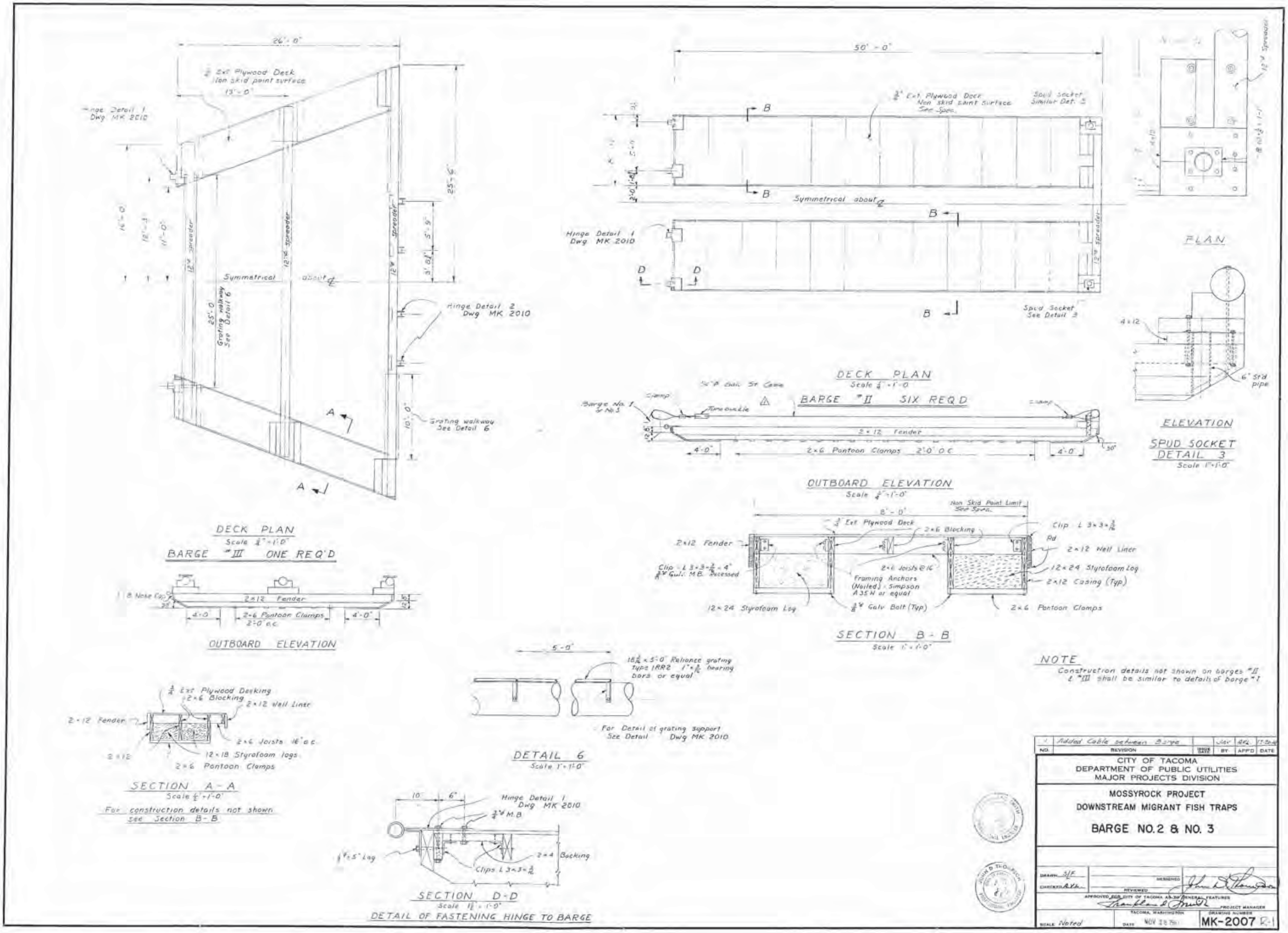
Created April 26th, 2010 by Larissa Butler; Source: USACE network data files.

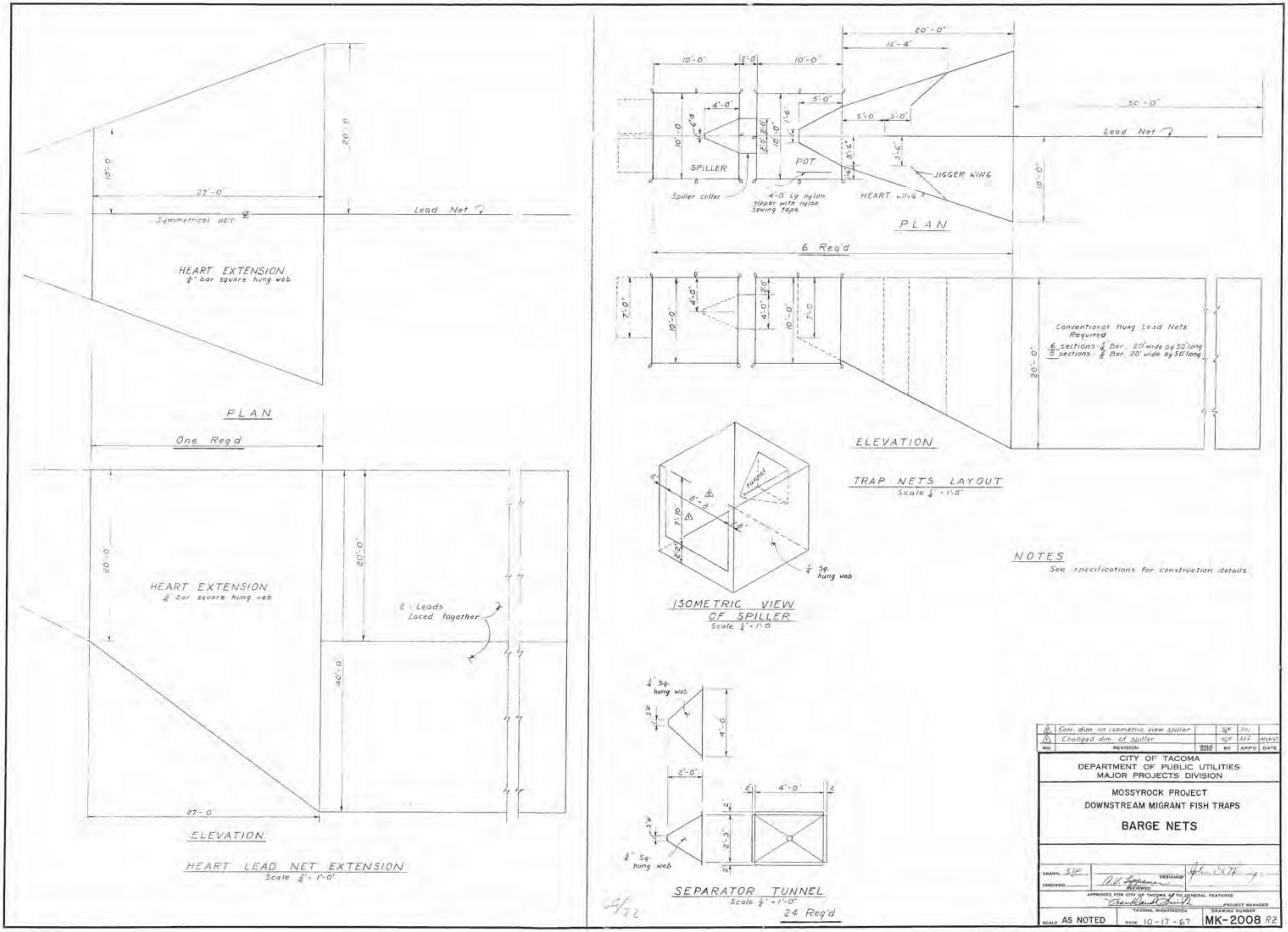
Middle Fork Watershed, Willamette Valley Available Photography

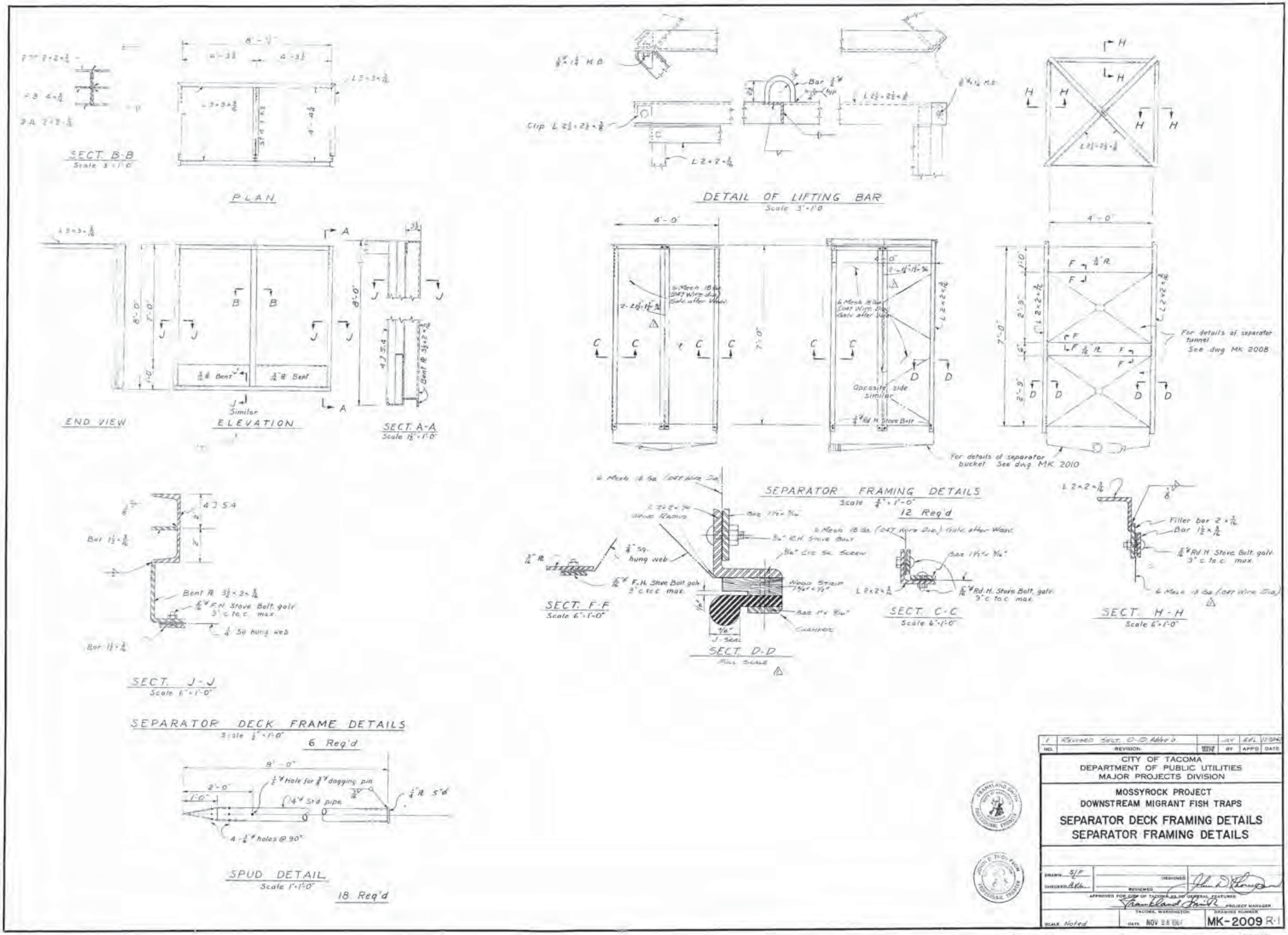


Created April 26th, 2010 by Larissa Butler; Sources: ArcGIS Resource Center, World Shaded Relief & USACE network data files.


51'-0"
20'-9
10'-9
10'-6"
1'-6"
4'-6"
Symmetrical about ℄
Anchor line fastener See Detail Dwg MK 2010
Guide See Detail 5
Hinge for one Barge only
Non Skid Paint Limit
For grating support det. see MK-2010
Hinge Detail 2 Ref. Dwg. MK 2010
Barge Spreader 12"ϕ Turned Pole
Hinge Detail 2 Ref. Dwg. MK 2010 For One Barge Only
Tow Push Beam 12"ϕ Turned Pole
Mooring Bitt Heavy Duty (Bolt thru pole)
Mooring Bitt Bolt thru Framing
3/4" Ext Plywood (See Detail 4)
DECK PLAN - 6 Req'd.
Scale 1/8" = 1'-0"
3/4" Ext Plywood Deck, See Detail 4
2x6 Edging
Framing Anchors (Nailed)-Simpson A35N or Equal
2x6 Block
Clip ∠ 3x3x5/16
2x6 Edging (continued)
2x12 Well Liner
2x6 Joist
2x12 Fender Strip
2x12 Casing
Clips-∠ 3x3x5/16 -0'-4" 1/2"ϕ Galv. M.B. (Recessed)
12"x18" Styrofoam Logs
5/8"ϕ Galv Bolt Typ.
2x6 Pontoon Clamps
SECTION B-B
Scale 1" = 1'-0"
REFERENCE DRAWINGS
MK-2007 - Downstream Migrant Fish Traps - Barge 2&3
MK-2008 - " - Nets
MK-2009 - " - Separator Deck Frames Details - Separator Frame Details
MK-2010 - Downstream Migrant Fish Traps - Separator Bucket Details - Miscellaneous Steel Details
GENERAL NOTES
1. All framing wood shall be Rough Douglas Fir, Dense Construction Grade, f = 1750 psi (min.), except as noted.
2. All Barges to be bolted construction except as noted.
3. All spreaders Douglas Fir 12" turned poles.
4. 2x12 fender strips and well liners shall be Douglas Fir S4S Dense Const. grade, f = 1750 psi
5. All steel to be hot dip galvanized.
6. Nails to fasten 2x12 Well Liner and 2x12 Fender Strip shall be 10d common galv.
7. Nails to fasten 3/4" Ext Plywood Decking shall be 6d F.H. spiral galv. 6" c. to c.
Joint
3/4" Ext plywood deck
2x4 Backing for 3/4" plywood deck when joint does not land on a joist or blocking
DETAIL 4
Scale 1 1/2" = 1'-0"
Notch To Fit
10"x18" Wood Beams (Rough)
10"x28" Wd Beam R.
Tire Casing Fenders 3'-0" O.C.
2x6 Pontoon Clamps 2'-0" O.C.
2x12 Fender Strip
OUTBOARD ELEVATION
Scale 1/8" = 1'-0"
5/8"ϕ Min Galv M.B. Bolt thru to Deck Joists and, or, Pontoon Casing (Typ.)
3"x8" Nose Cap
2x12 S4S Well Liner
Hinge Detail 2 Ref. Dwg MK 2010
Smooth and Round all Edges That may come in contact with nets
SECTION A-A INBOARD ELEVATION
Scale 1/8" = 1'-0"
3/4" Carr. Bolts
3'-0"
2x12 Casing
TYPICAL SPLICE FOR 2x12 STYROFOAM CASING
Scale 1/2" = 1'-0"
PLAN
1/4" ℞ Bent
5-1/2" F.H. cap screws
Deck
2x12 Well Liner
DETAIL 5
Scale 1 1/2" = 1'-0"
1 Added grating support
NO. REVISION ISSUE DATE BY APP'D DATE
CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
MAJOR PROJECTS DIVISION
MOSSYROCK PROJECT
DOWNSTREAM MIGRANT FISH TRAPS
BARGE NO. I
DRAWN
CHECKED AVL
DESIGNED
REVIEWED
APPROVED FOR CITY OF TACOMA AS TO GENERAL FEATURES
PROJECT MANAGER
TACOMA, WASHINGTON
DRAWING NUMBER
SCALE Noted
DATE NOV
MK-2006-R-1

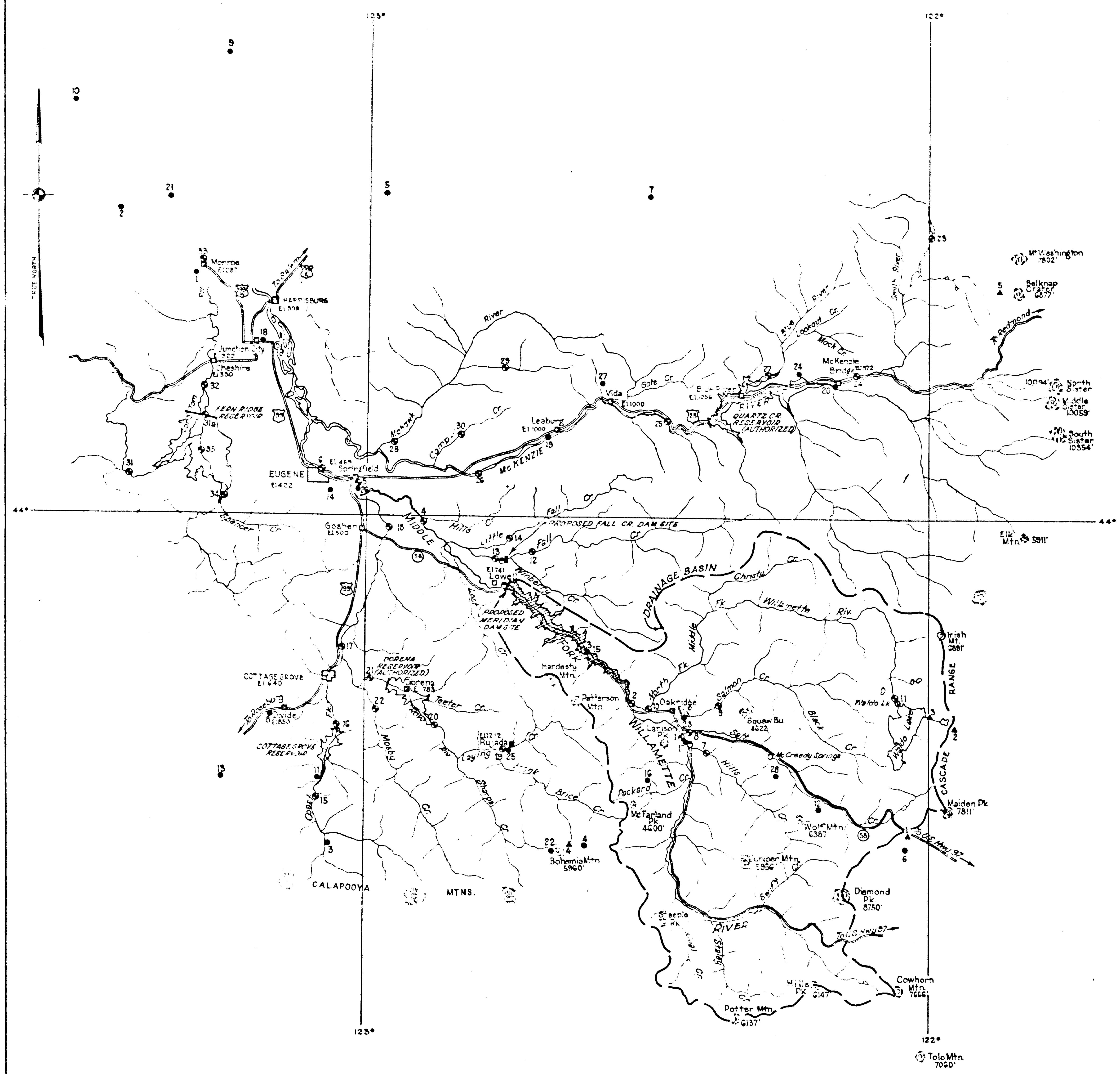

DECK PLAN
Scale 1/8" = 1'-0"
BARGE #III ONE REQ'D
OUTBOARD ELEVATION
SECTION A - A
Scale 1/2" = 1'-0"
For construction details not shown see Section B - B
DETAIL 6
Scale 1" = 1'-0"
SECTION D-D
DETAIL OF FASTENING HINGE TO BARGE
DECK PLAN
Scale 1/8" = 1'-0"
BARGE #II SIX REQ'D
OUTBOARD ELEVATION
SECTION B - B
Scale 1" = 1'-0"
PLAN
ELEVATION
SPUD SOCKET DETAIL 3
Scale 1" = 1'-0"
NOTE
Construction details not shown on barges #II & #III shall be similar to details of barge #I
Added Cable between Barge
CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
MAJOR PROJECTS DIVISION
MOSSYROCK PROJECT
DOWNSTREAM MIGRANT FISH TRAPS
BARGE NO. 2 & NO. 3
MK-2007

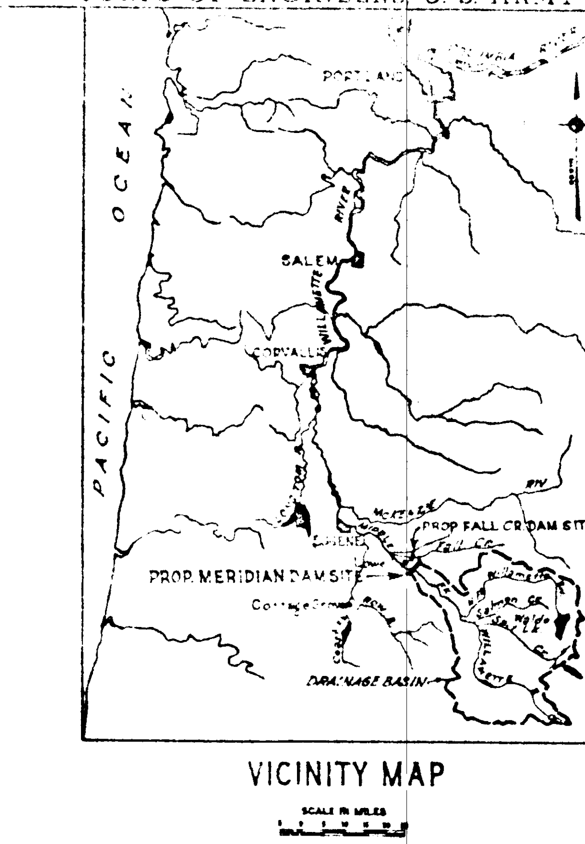

HEART EXTENSION
PLAN
One Req'd
Lead Net ℄
Symmetrical ab't ℄
ELEVATION
2 - Leads Laced together
HEART LEAD NET EXTENSION
SPILLER
POT
Spiller collar
HEART WING
JIGGER WING
6 Req'd
Conventional Hung Lead Nets Required
TRAP NETS LAYOUT
ISOMETRIC VIEW OF SPILLER
SEPARATOR TUNNEL
24 Req'd
NOTES
See specifications for construction details
Corr. dim. on isometric view spiller
Changed dim. of spiller
CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
MAJOR PROJECTS DIVISION
MOSSYROCK PROJECT
DOWNSTREAM MIGRANT FISH TRAPS
BARGE NETS
AS NOTED
10-17-67
MK-2008 R2


SECT. B-B
PLAN
END VIEW
ELEVATION
SECT. A-A
DETAIL OF LIFTING BAR
SEPARATOR FRAMING DETAILS
12 Req'd
SECT. F-F
SECT. D-D
SECT. C-C
SECT. H-H
SECT. J-J
SEPARATOR DECK FRAME DETAILS
6 Req'd
SPUD DETAIL
18 Req'd
For details of separator tunnel See dwg MK 2008
For details of separator bucket See dwg MK 2010
CITY OF TACOMA
DEPARTMENT OF PUBLIC UTILITIES
MAJOR PROJECTS DIVISION
MOSSYROCK PROJECT
DOWNSTREAM MIGRANT FISH TRAPS
SEPARATOR DECK FRAMING DETAILS
SEPARATOR FRAMING DETAILS
NOV 28 1967
MK-2009 R-1

WAR DEPARTMENT

CORPS OF ENGINEERS U. S. ARMY





VICINITY MAP

TO ACCOMPANY DEFINITE PROJECT REPORT, DATED 1 FEBRUARY 1945

WILLAMETTE BASIN PROJECT, OREGON

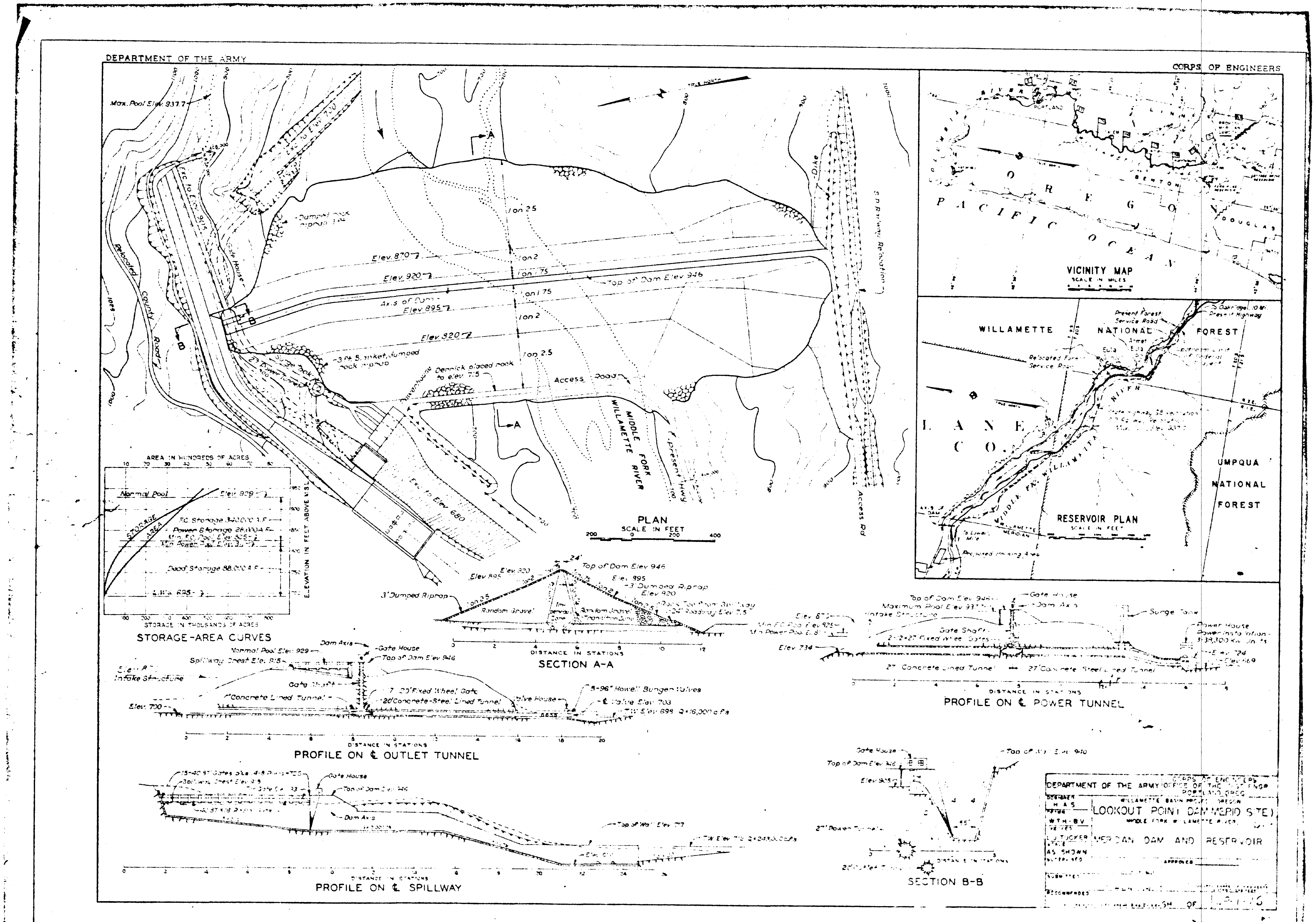
LOOKOUT POINT DAM (MERIDIAN SITE)

MIDDLE FORK WILLAMETTE RIVER

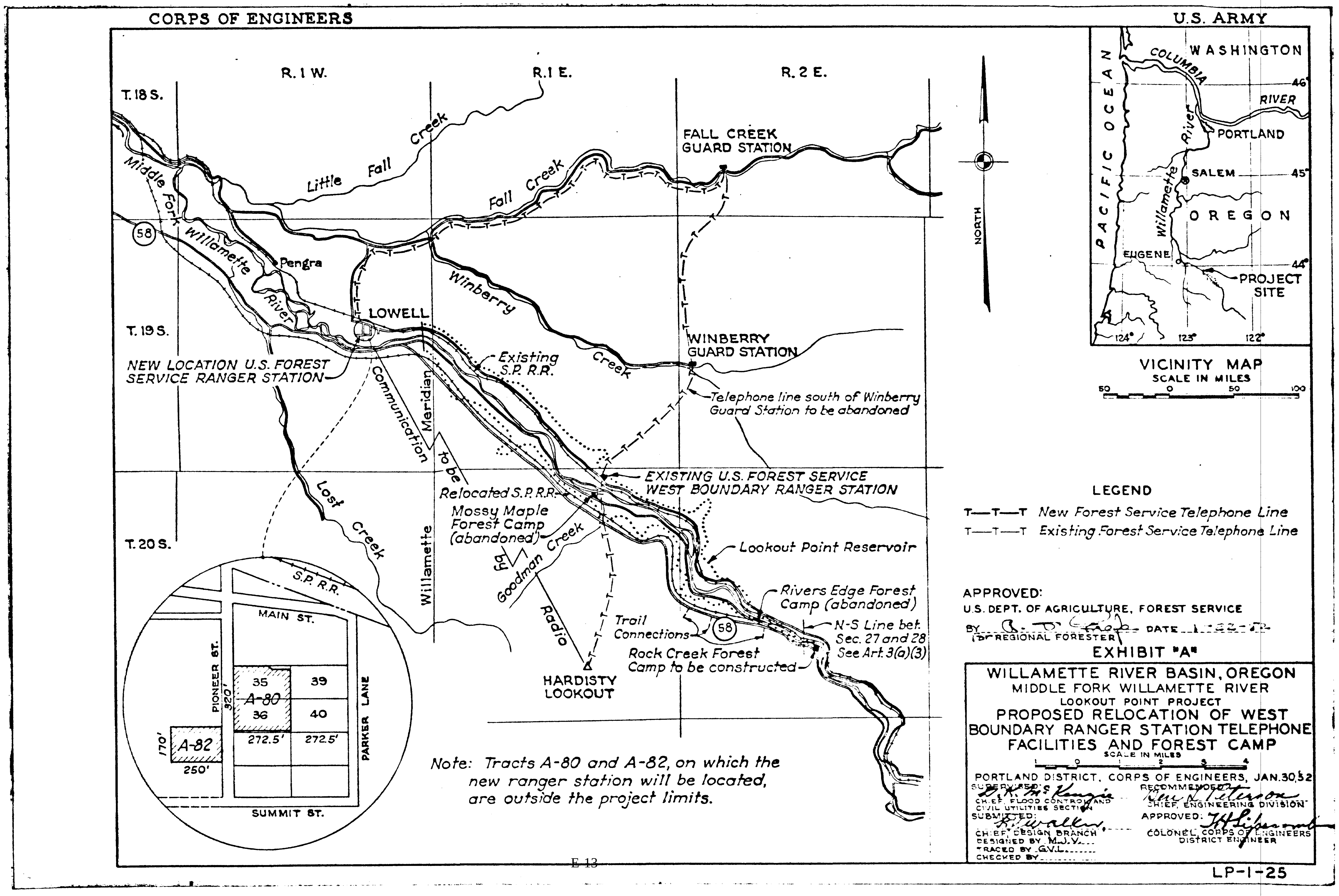
SCALE IN MILES

U. S. ENGINEER OFFICE, PORTLAND, OREGON, DISTRICT

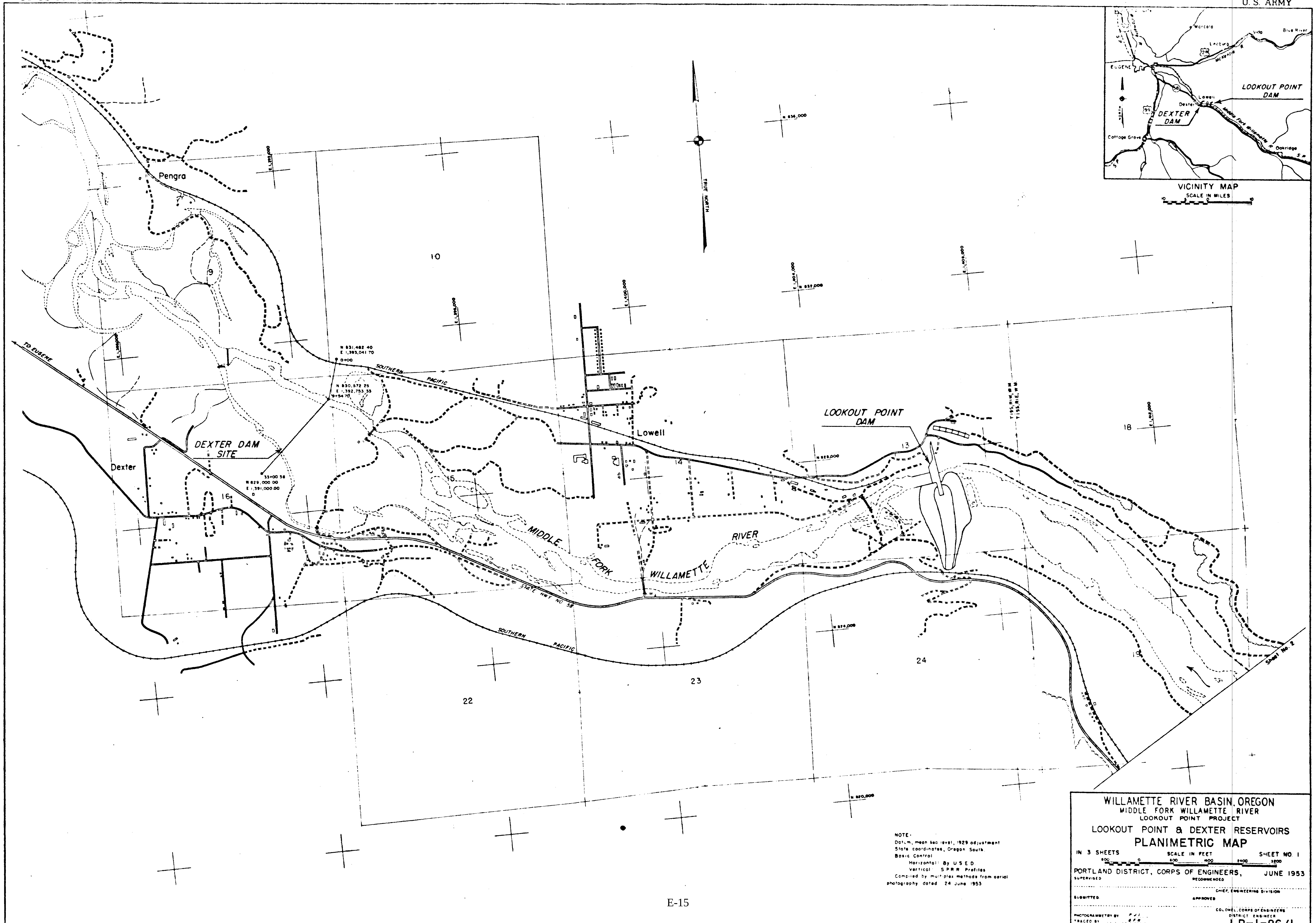
This page was intentionally left blank.


DEPARTMENT OF THE ARMY
CORPS OF ENGINEERS
PLAN
SCALE IN FEET
VICINITY MAP
PACIFIC OCEAN
OREGON
WILLAMETTE NATIONAL FOREST
LANE CO.
UMPQUA NATIONAL FOREST
RESERVOIR PLAN
STORAGE-AREA CURVES
SECTION A-A
PROFILE ON ℄ POWER TUNNEL
PROFILE ON ℄ OUTLET TUNNEL
PROFILE ON ℄ SPILLWAY
SECTION B-B
MIDDLE FORK WILLAMETTE RIVER
Top of Dam Elev 946
Max. Pool Elev 937.7
Normal Pool Elev 929
Access Road
County Road
DEPARTMENT OF THE ARMY
WILLAMETTE BASIN PROJECT, OREGON
LOOKOUT POINT DAM (MERID SITE)
MIDDLE FORK WILLAMETTE RIVER
MERIDAN DAM AND RESERVOIR
H A S
W T H - B V
L J TUCKER
AS SHOWN
APPROVED
SUBMITTED
RECOMMENDED

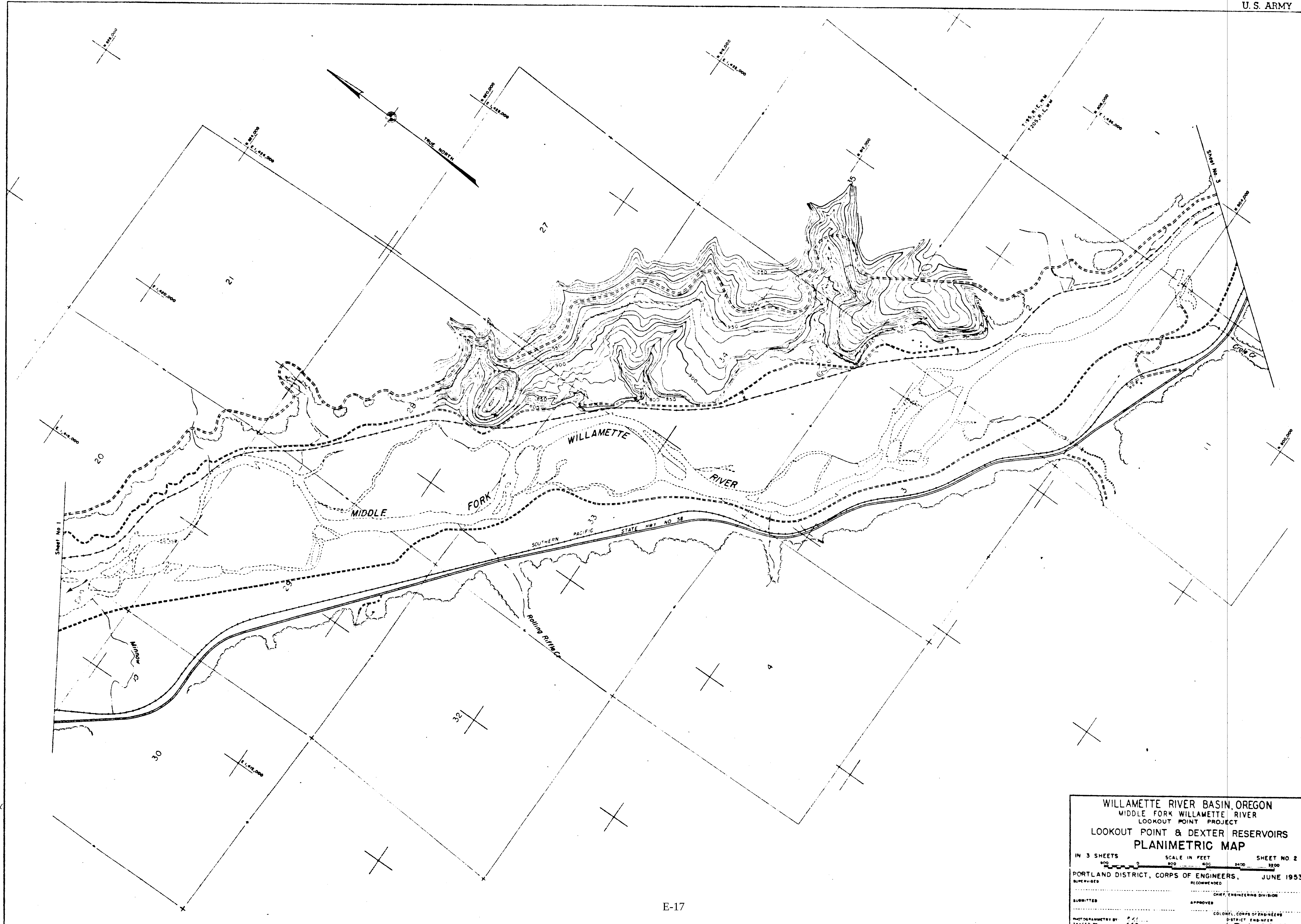
This page was intentionally left blank.


CORPS OF ENGINEERS
U.S. ARMY
R.1 W.
R.1 E.
R.2 E.
T. 18 S.
T. 19 S.
T. 20 S.
Little Fall Creek
Fall Creek
FALL CREEK GUARD STATION
Middle Fork Willamette River
58
Pengra
LOWELL
Winberry Creek
WINBERRY GUARD STATION
NEW LOCATION U.S. FOREST SERVICE RANGER STATION
Existing S.P. R.R.
Communication to be Relocated S.P. R.R.
Willamette Meridian
Telephone line south of Winberry Guard Station to be abandoned
EXISTING U.S. FOREST SERVICE WEST BOUNDARY RANGER STATION
Mossy Maple Forest Camp (abandoned)
Lost Creek
Goodman Creek
Radio
Lookout Point Reservoir
Rivers Edge Forest Camp (abandoned)
N-S Line bet. Sec. 27 and 28 See Art. 3(a)(3)
Trail Connections
Rock Creek Forest Camp to be constructed
HARDISTY LOOKOUT
NORTH
S.P. R.R.
MAIN ST.
PIONEER ST.
PARKER LANE
SUMMIT ST.
35
36
39
40
A-80
A-82
320'
272.5'
272.5'
170'
250'
Note: Tracts A-80 and A-82, on which the new ranger station will be located, are outside the project limits.
WASHINGTON
COLUMBIA RIVER
PACIFIC OCEAN
PORTLAND
SALEM
OREGON
Willamette River
EUGENE
PROJECT SITE
46°
45°
44°
124°
123°
122°
VICINITY MAP
SCALE IN MILES
50 0 50 100
LEGEND
T—T—T New Forest Service Telephone Line
T—T—T Existing Forest Service Telephone Line
APPROVED:
U.S. DEPT. OF AGRICULTURE, FOREST SERVICE
BY ... DATE ...
REGIONAL FORESTER
EXHIBIT "A"
WILLAMETTE RIVER BASIN, OREGON
MIDDLE FORK WILLAMETTE RIVER
LOOKOUT POINT PROJECT
PROPOSED RELOCATION OF WEST BOUNDARY RANGER STATION TELEPHONE FACILITIES AND FOREST CAMP
SCALE IN MILES
1 0 1 2 3 4
PORTLAND DISTRICT, CORPS OF ENGINEERS, JAN. 30, 52
SUPERVISED:
CHIEF, FLOOD CONTROL AND CIVIL UTILITIES SECTION
SUBMITTED:
CHIEF, DESIGN BRANCH
DESIGNED BY M.J.V.
TRACED BY G.V.L.
CHECKED BY
RECOMMENDED:
CHIEF, ENGINEERING DIVISION
APPROVED:
COLONEL, CORPS OF ENGINEERS DISTRICT ENGINEER
LP-1-25

This page was intentionally left blank.


Pengra
Dexter
Lowell
DEXTER DAM SITE
LOOKOUT POINT DAM
MIDDLE FORK WILLAMETTE RIVER
SOUTHERN PACIFIC
STATE HWY NO 58
TO EUGENE
TRUE NORTH
Sheet No. 2
10
9
16
15
14
13
18
19
22
23
24
N 831,482.40
E 1,393,041.70
0+00
N 830,572.25
E 1,392,753.35
9+54.70
33+00.38
N 829,000.00
E 1,391,000.00
N 836,000
N 832,000
N 828,000
N 824,000
N 820,000
E 1,396,000
E 1,400,000
E 1,404,000
E 1,408,000
E 1,412,000
T 19 S, R 1 W, W.M.
T 19 S, R 2 W, W.M.
EUGENE
Marcola
Leaburg
Vida
Blue River
Dexter
Lowell
Cottage Grove
Oakridge
LOOKOUT POINT DAM
DEXTER DAM
VICINITY MAP
SCALE IN MILES
NOTE:
Datum, mean sea level, 1929 adjustment
State coordinates, Oregon South.
Basic Control
Horizontal: By U S E D.
Vertical: S P R R Profiles
Compiled by multiplex methods from aerial photography dated 24 June 1953
WILLAMETTE RIVER BASIN, OREGON
MIDDLE FORK WILLAMETTE RIVER
LOOKOUT POINT PROJECT
LOOKOUT POINT & DEXTER RESERVOIRS
PLANIMETRIC MAP
IN 3 SHEETS
SCALE IN FEET
800 0 800 1600 2400 3200
SHEET NO. 1
PORTLAND DISTRICT, CORPS OF ENGINEERS, JUNE 1953
SUPERVISED
RECOMMENDED
CHIEF, ENGINEERING DIVISION
SUBMITTED
APPROVED
COLONEL, CORPS OF ENGINEERS
DISTRICT ENGINEER
PHOTOGRAMMETRY BY P J I
TRACED BY G F M
CHECKED BY C R O
LP-1-26/1

This page was intentionally left blank.



WILLAMETTE RIVER BASIN, OREGON
MIDDLE FORK WILLAMETTE RIVER
LOOKOUT POINT PROJECT

LOOKOUT POINT & DEXTER RESERVOIRS

PLANIMETRIC MAP

IN 3 SHEETS — SCALE IN FEET — SHEET NO. 2

800 0 800 1600 2400 3200

PORTLAND DISTRICT, CORPS OF ENGINEERS, JUNE 1953

SUPERVISED .... RECOMMENDED ....

CHIEF, ENGINEERING DIVISION

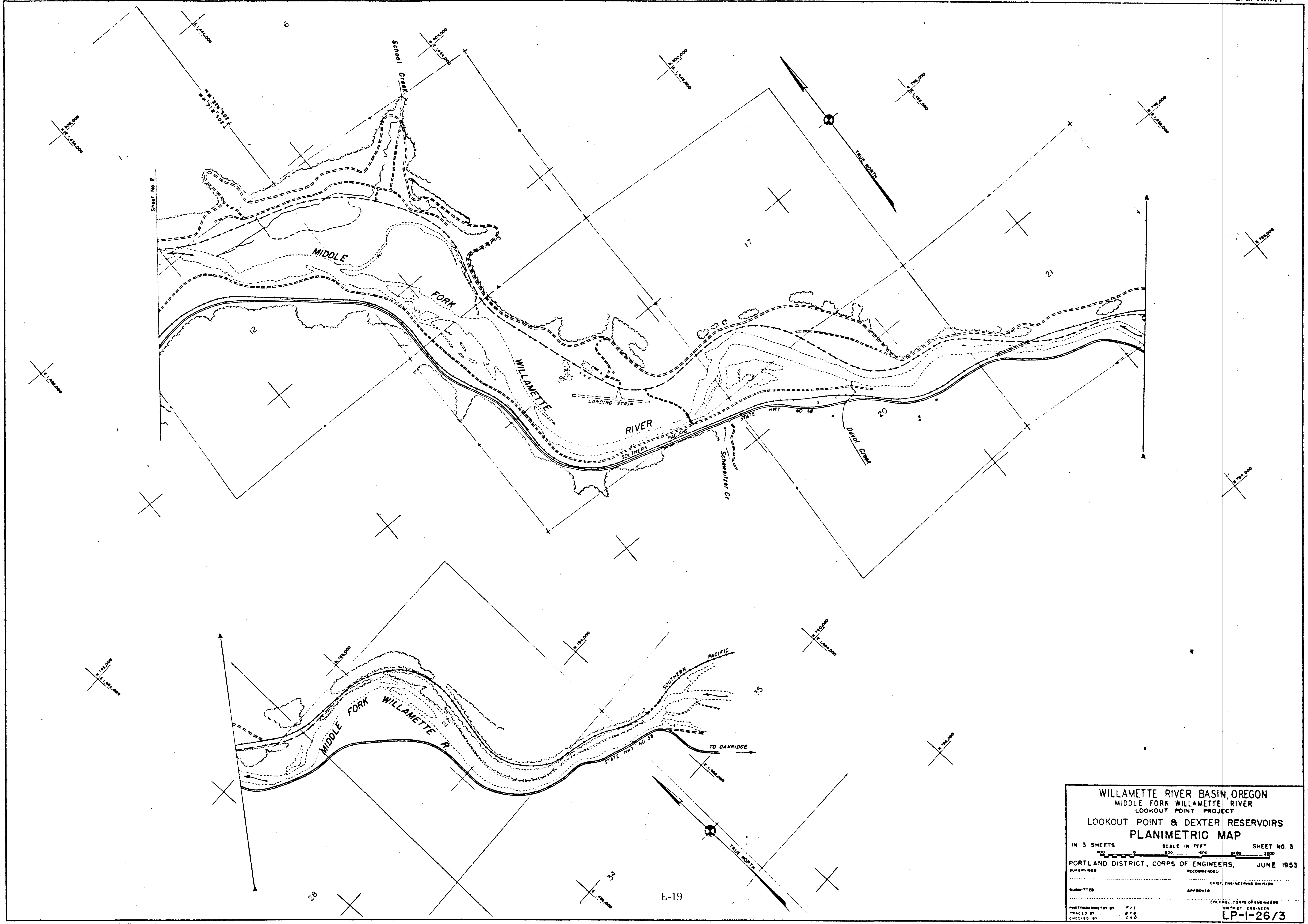
SUBMITTED .... APPROVED ....

COLONEL, CORPS OF ENGINEERS
DISTRICT ENGINEER

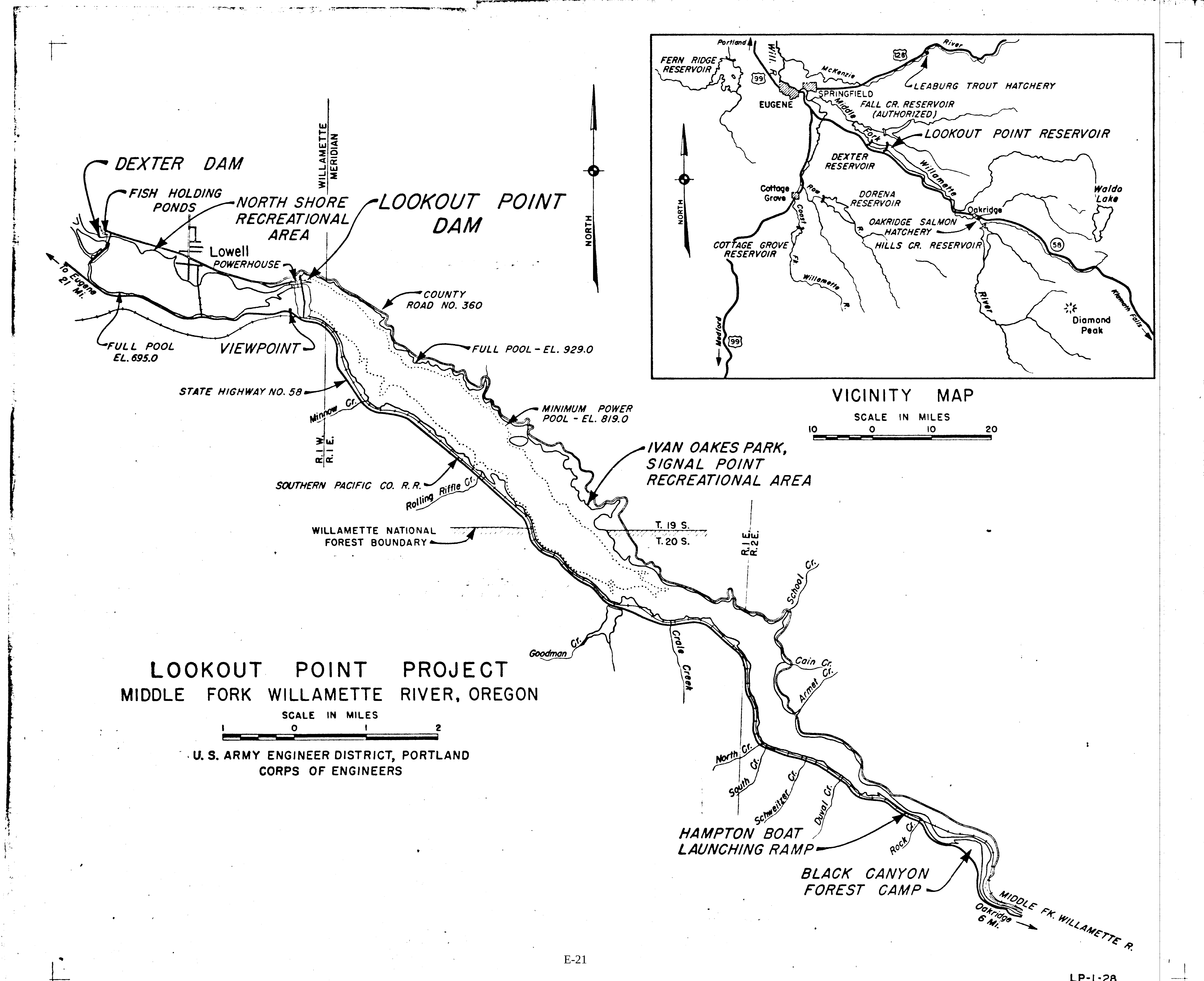
PHOTOGRAMMETRY BY P.J.I.
TRACED BY G.F.H.
CHECKED BY C.N.O.

LP-1-26/2

This page was intentionally left blank.


School Creek
Sheet No. 2
MIDDLE FORK WILLAMETTE RIVER
LANDING STRIP
SOUTHERN PACIFIC
STATE HWY NO 58
Schweitzer Cr.
Duvall Creek
TRUE NORTH
12
17
18
20
21
9
MIDDLE FORK WILLAMETTE R
SOUTHERN PACIFIC
STATE HWY NO 58
TO OAKRIDGE
TRUE NORTH
35
34
28
A
WILLAMETTE RIVER BASIN, OREGON
MIDDLE FORK WILLAMETTE RIVER
LOOKOUT POINT PROJECT
LOOKOUT POINT & DEXTER RESERVOIRS
PLANIMETRIC MAP
IN 3 SHEETS
SCALE IN FEET
SHEET NO. 3
800 0 800 1600 2400 3200
PORTLAND DISTRICT, CORPS OF ENGINEERS, JUNE 1953
SUPERVISED
RECOMMENDED
CHIEF, ENGINEERING DIVISION
SUBMITTED
APPROVED
COLONEL CORPS OF ENGINEERS
DISTRICT ENGINEER
PHOTOGRAMMETRY BY P.J.I.
TRACED BY B.F.B.
CHECKED BY C.H.D.
LP-1-26/3

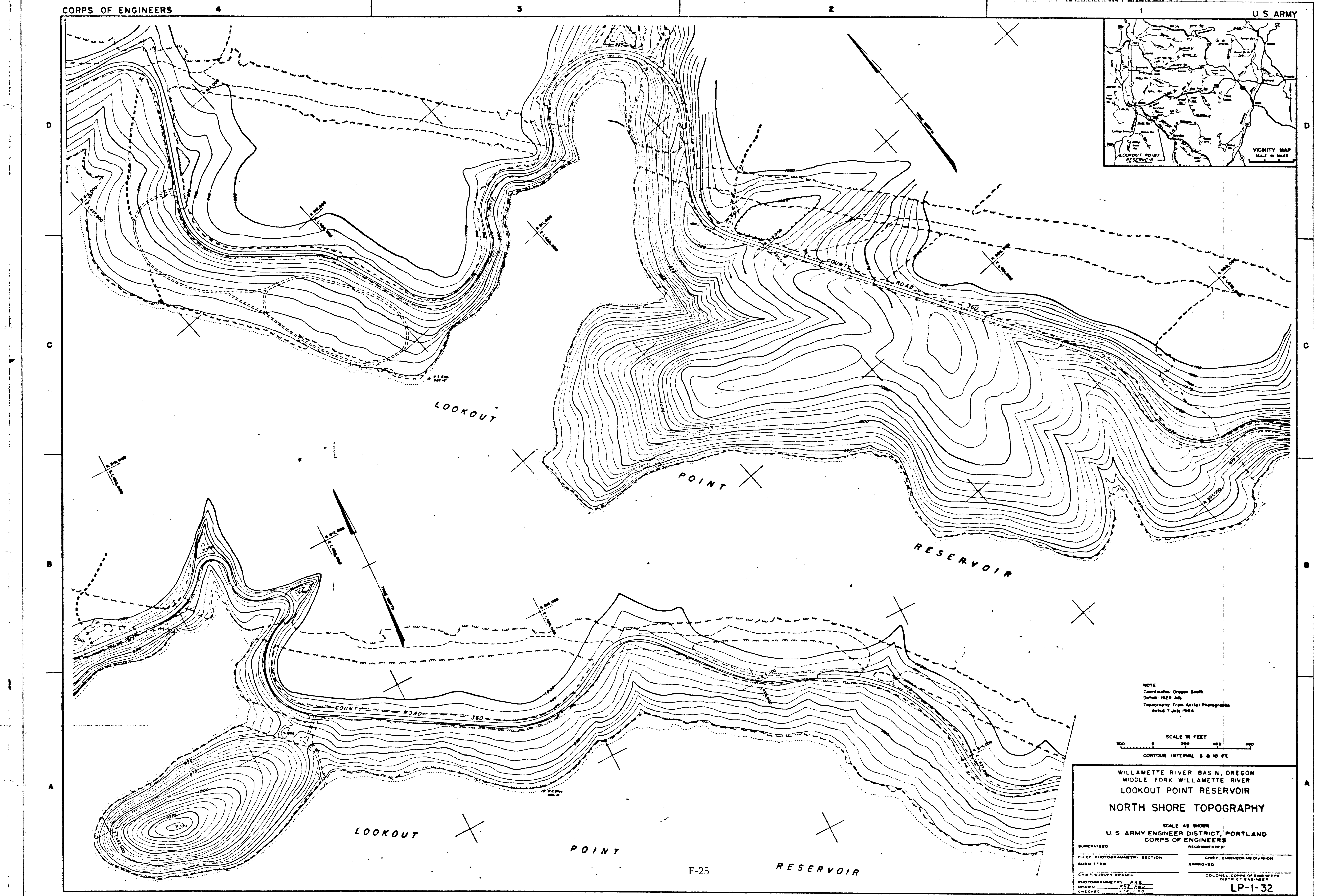
This page was intentionally left blank.


LOOKOUT POINT PROJECT
MIDDLE FORK WILLAMETTE RIVER, OREGON
SCALE IN MILES
U. S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS
DEXTER DAM
FISH HOLDING PONDS
NORTH SHORE RECREATIONAL AREA
LOOKOUT POINT DAM
WILLAMETTE MERIDIAN
NORTH
Lowell
POWERHOUSE
To Eugene 21 Mi.
FULL POOL EL. 695.0
VIEWPOINT
COUNTY ROAD NO. 360
FULL POOL - EL. 929.0
STATE HIGHWAY NO. 58
Minnow Cr.
R.1 W.
R.1 E.
MINIMUM POWER POOL - EL. 819.0
IVAN OAKES PARK, SIGNAL POINT RECREATIONAL AREA
SOUTHERN PACIFIC CO. R.R.
Rolling Riffle Cr.
WILLAMETTE NATIONAL FOREST BOUNDARY
T. 19 S.
T. 20 S.
R.1 E.
R.2 E.
School Cr.
Goodman Cr.
Crale Creek
Cain Cr.
Armet Cr.
North Cr.
South Cr.
Schweitzer Cr.
Duval Cr.
Rock Cr.
HAMPTON BOAT LAUNCHING RAMP
BLACK CANYON FOREST CAMP
MIDDLE FK. WILLAMETTE R.
Oakridge 6 Mi.
VICINITY MAP
SCALE IN MILES
10 0 10 20
Portland
FERN RIDGE RESERVOIR
Will. R.
McKenzie
River
LEABURG TROUT HATCHERY
SPRINGFIELD
EUGENE
FALL CR. RESERVOIR (AUTHORIZED)
LOOKOUT POINT RESERVOIR
Middle Fork
Willamette
DEXTER RESERVOIR
Cottage Grove
Row R.
Coast Fk.
DORENA RESERVOIR
OAKRIDGE SALMON HATCHERY
HILLS CR. RESERVOIR
Oakridge
Waldo Lake
COTTAGE GROVE RESERVOIR
Willamette R.
River
Diamond Peak
Klamath Falls
Medford
LP-1-28

This page was intentionally left blank.

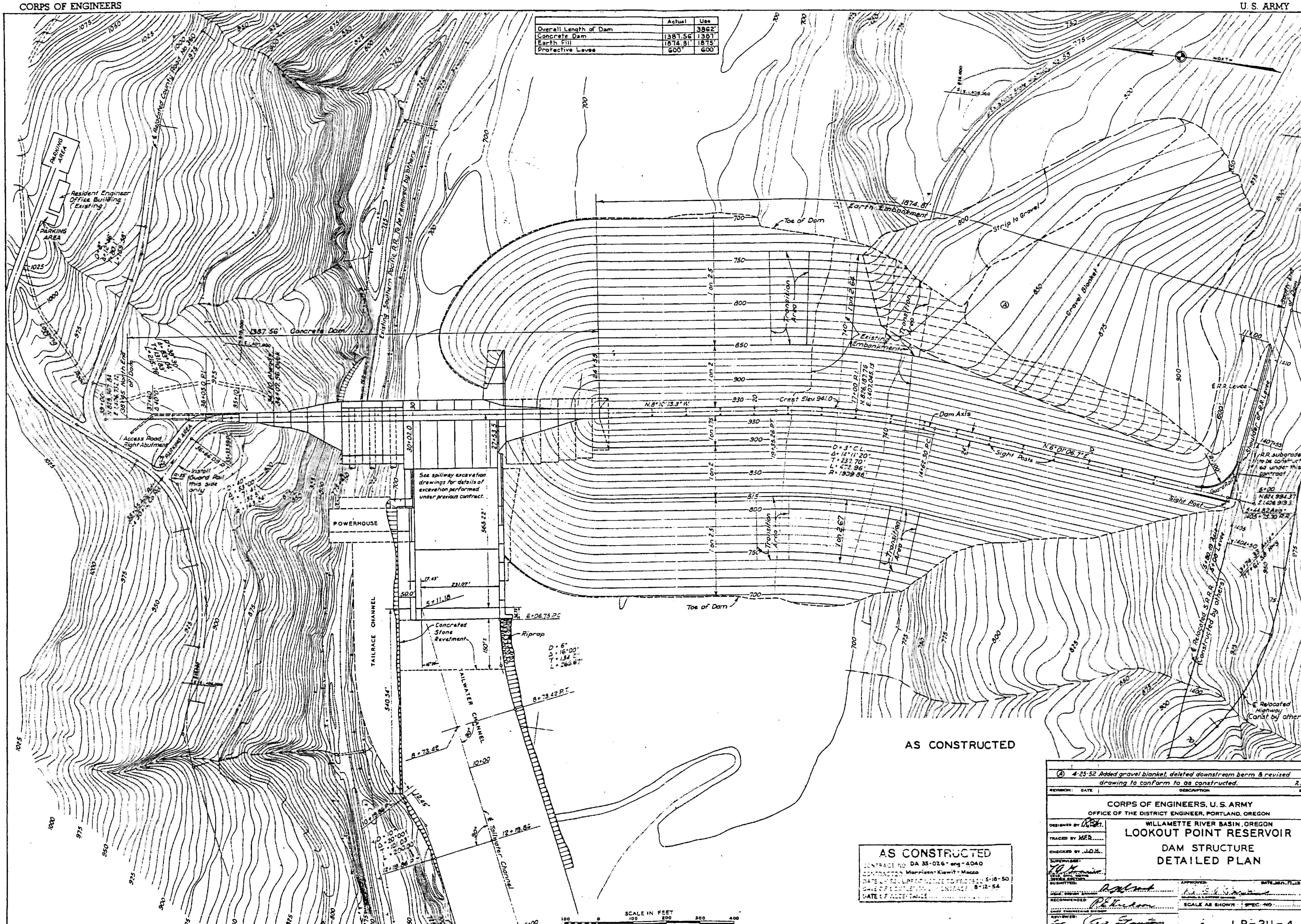
CORPS OF ENGINEERS
U.S. ARMY
LANE COUNTY
Landax Launching Area
Signal Point Recreation Area & Launching Ramp (Ivan Oakes Park)
Hospital Creek Forest Camp
Hampton Crossing & Launching Area (Public)
Black Canyon Forest Camp
U/S LIMIT OF FEDERAL PROJECT
MIDDLE FORK WILLAMETTE RIVER
WILLAMETTE NATIONAL FOREST
MINIMUM FLOOD CONTROL POOL EL. 825'
FULL POOL EL. 929'
GOVERNMENT PROPERTY LINE
Area of land included is 9,130 Acres. (Lookout Point)
Hermach Crossing
Vass Slide Area
T19S, R1E W.M.
T20S, R1E W.M.
BPA LINE
BPA Line To Alvey Substation
GOVERNMENT PROPERTY LINE
Area of land included is 1,070 Acres. (Dexter)
LOOKOUT POINT DAM
Carter Launching Area
Dexter North Shore Park
USABLE RESERVOIR CAPACITY AT FULL POOL 349,400 ACRE FT.
DEXTER FULL POOL EL. 695
USABLE RESERVOIR CAPACITY AT FULL POOL 4800 ACRE FT.
DEXTER DAM
Launching Ramps
Dexter
UNDERPASS SLIDE AREA
Eagle Rock
Minnow Station & Access Road to Reservoir Area
VICINITY MAP
FALL CREEK RES.
LOOKOUT POINT DAM
DEXTER DAM
OREGON
LEGEND
RANGE V SEDIMENTATION RANGE
SCALE IN FEET
1000 0 1000 2000 3000 4000
HATCHED AREAS NOT GOVERNMENT LAND
5-10-68 CHANGED PLATE NO. FROM L05/1 TO LP-1-30
REVISION DATE DESCRIPTION BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
WILLAMETTE RIVER BASIN, OREGON
MIDDLE FORK WILLAMETTE RIVER
LOOKOUT POINT PROJECT
PROJECT MAP
SCALE AS SHOWN
LP-1-30

This page was intentionally left blank.

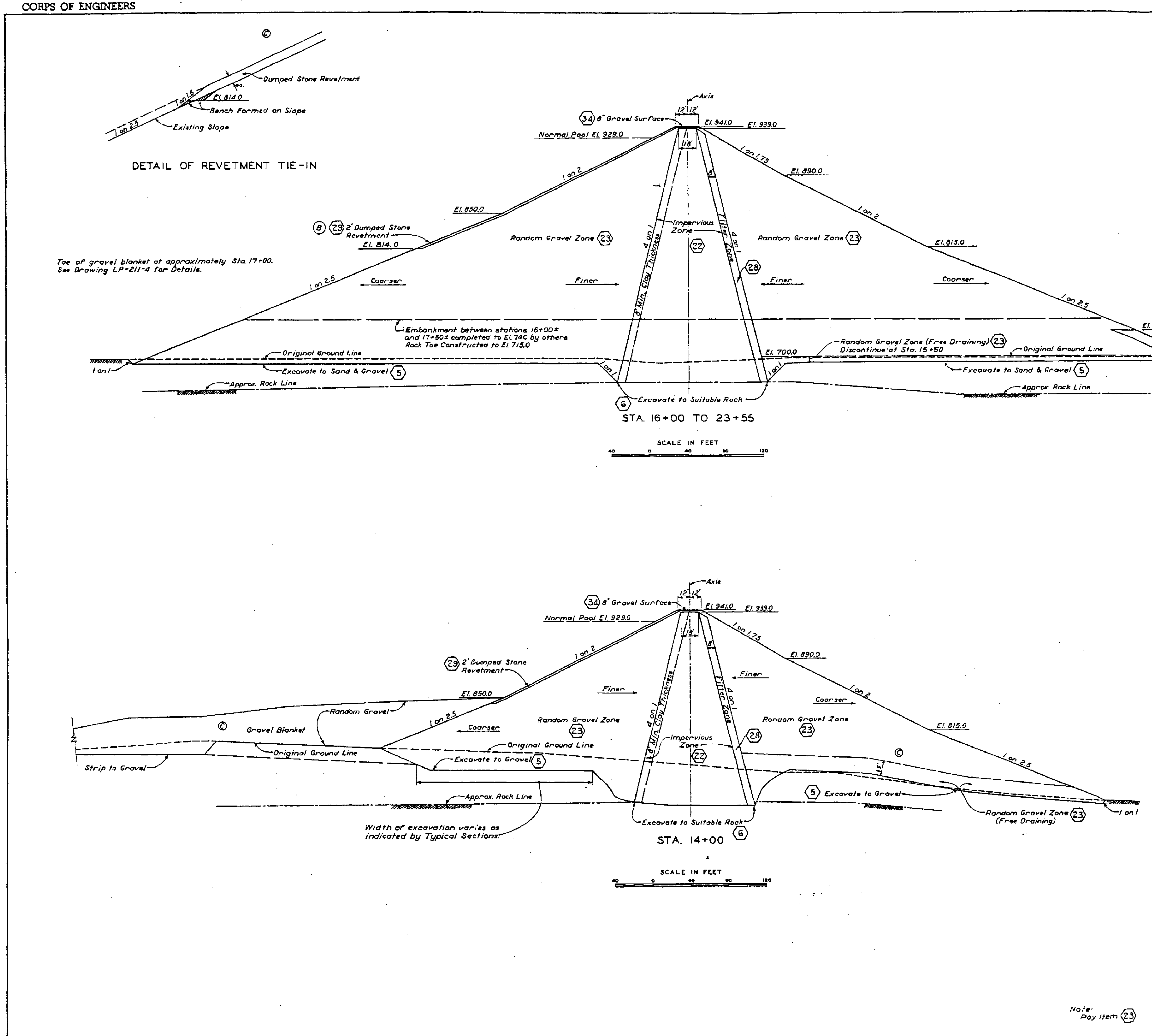


CORPS OF ENGINEERS
U. S. ARMY
VICINITY MAP
LOOKOUT POINT RESERVOIR
LOOKOUT POINT RESERVOIR
COUNTY ROAD 360
NOTE.
Coordinates: Oregon South.
Datum: 1929 Adj.
Topography: From Aerial Photographs dated 7 July 1964.
SCALE IN FEET
200 0 200 400 600
CONTOUR INTERVAL 5 & 10 FT.
WILLAMETTE RIVER BASIN, OREGON
MIDDLE FORK WILLAMETTE RIVER
LOOKOUT POINT RESERVOIR
NORTH SHORE TOPOGRAPHY
SCALE AS SHOWN
U. S. ARMY ENGINEER DISTRICT, PORTLAND
CORPS OF ENGINEERS
SUPERVISED
RECOMMENDED
CHIEF, PHOTOGRAMMETRY SECTION
CHIEF, ENGINEERING DIVISION
SUBMITTED
APPROVED
CHIEF, SURVEY BRANCH
COLONEL, CORPS OF ENGINEERS DISTRICT ENGINEER
PHOTOGRAMMETRY
DRAWN
CHECKED
LP-1-32

This page was intentionally left blank.


Overall Length of Dam | Actual | Use
Overall Length of Dam | | 3862'
Concrete Dam | 1387.56' | 1387'
Earth Fill | 1874.81' | 1875'
Protective Levee | 600' | 600'
PARKING AREA
Resident Engineer Office Building (Existing)
1387.56' Concrete Dam
1874.81' Earth Embankment
Toe of Dam
Strip to Gravel
Gravel Blanket
Transition Area
Existing Embankment
Crest Elev 941.0
Dam Axis
Sight Posts
Sight Post
Access Road Right Abutment
POWERHOUSE
TAILRACE CHANNEL
TAILWATER CHANNEL
Concreted Stone Revetment
Riprap
See spillway excavation drawings for details of excavation performed under previous contract.
Existing Southern Pacific R.R. To be removed by others
AS CONSTRUCTED
Relocated Highway (Const by others)
SCALE IN FEET
AS CONSTRUCTED
CONTRACT NO. DA 35-026-eng-4040
CONTRACTOR Morrison-Kiewit-Macco
A 4-25-52 Added gravel blanket, deleted downstream berm & revised drawing to conform to as constructed. R.J.P.
REVISION: DATE DESCRIPTION BY
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT RESERVOIR
DAM STRUCTURE
DETAILED PLAN
DESIGNED BY
TRACED BY MFB
CHECKED BY J.O.H.
SUPERVISED:
SUBMITTED:
APPROVED:
RECOMMENDED:
REVIEWED:
SCALE AS SHOWN
SPEC. NO.
SHEET 9 OF
LP-211-4

This page was intentionally left blank.



Revision	Date	Description
©	4-25-52	Revised excavation line, added gravel blanket & revetment item R.I.P.
®	10-4-51	Deleted dumped stone revetment below el. 814.0
Ⓐ	3-27-50	General Revision

CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON

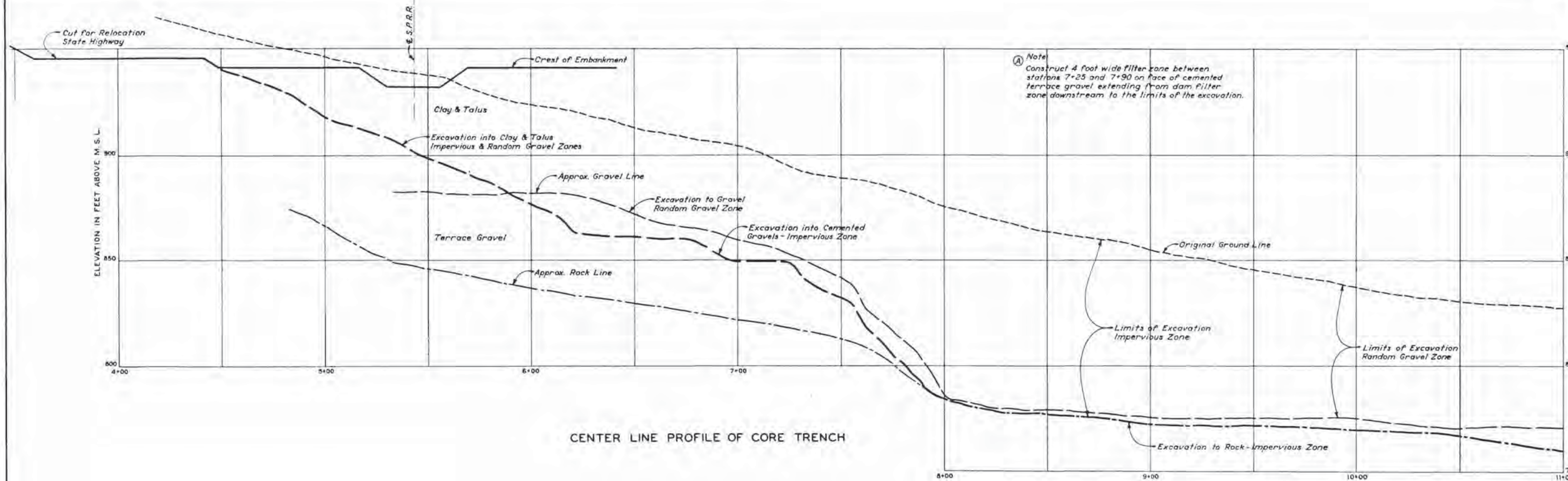
WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT RESERVOIR

MAIN EMBANKMENT
TYPICAL SECTIONS

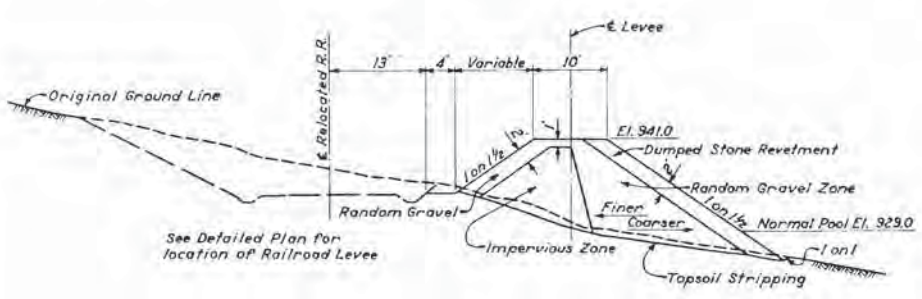
SCALE AS SHOWN

LP-211-6

This page was intentionally left blank.

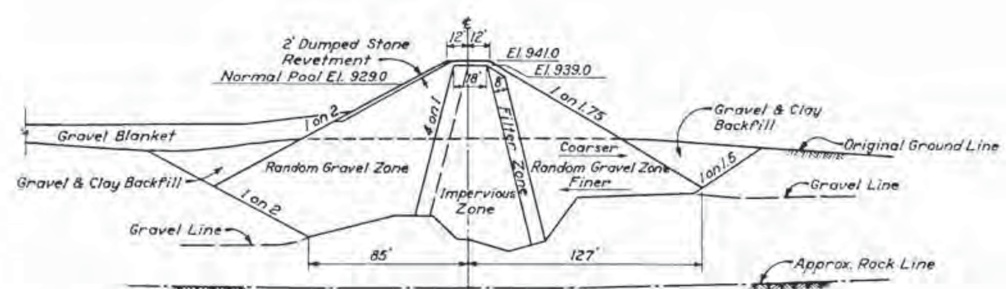


CENTER LINE PROFILE OF CORE TRENCH



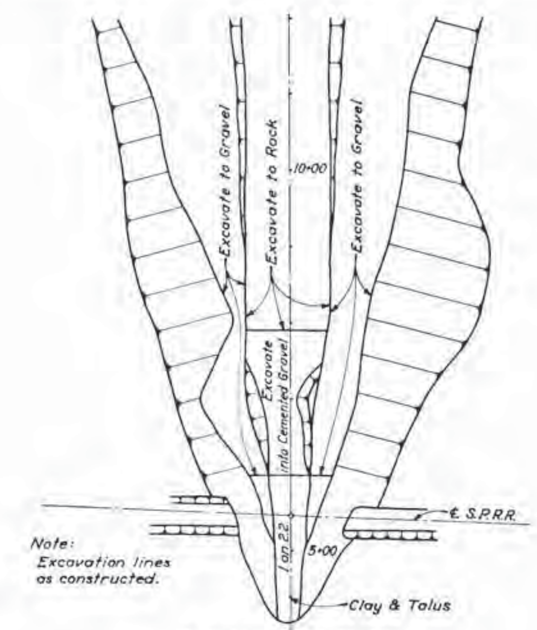
RAILROAD LEVEE LEFT ABUTMENT

SCALE IN FEET



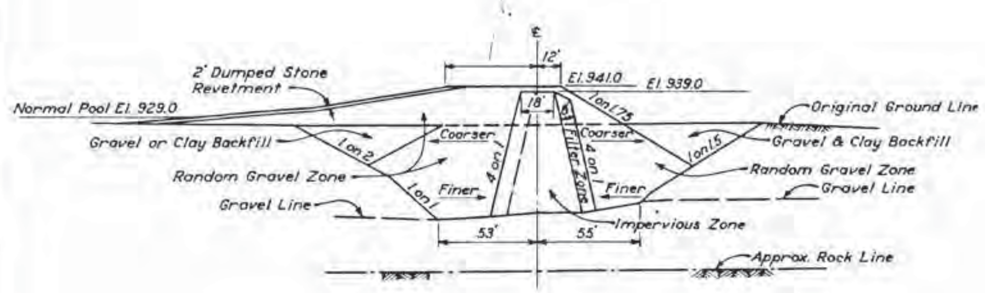
STA. 7+00

SCALE IN FEET



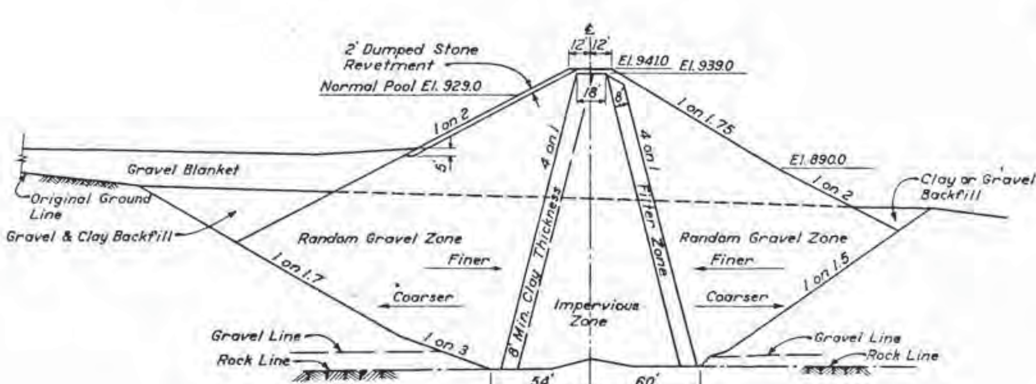
EXCAVATION PLAN

SCALE IN FEET



STA. 6+00

SCALE IN FEET



STA. 8+00

SCALE IN FEET

TYPICAL SECTIONS

THIS PRINT REDUCED TO ONE-HALF SCALE

AS CONSTRUCTED

REVISION	DATE	DESCRIPTION	BY
Ⓑ	4-25-52	As Constructed Drawings-Supersedes LP-211-5 & LP-211-12	R.J.P.
Ⓐ	8-16-51	Limits of excavation revised to conform to as constructed. Added notes.	P.C.

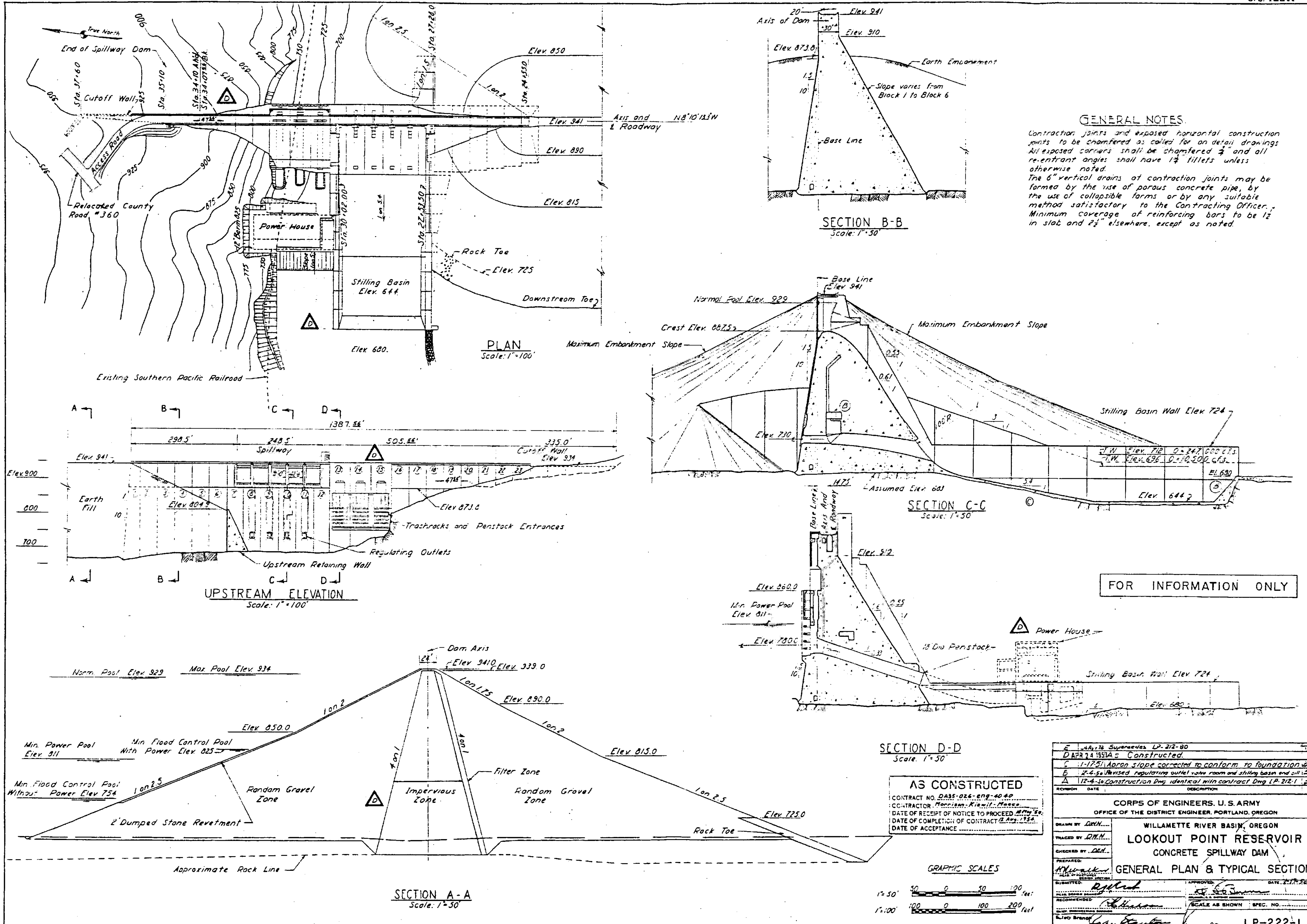
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON

WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT RESERVOIR
MERIDIAN SITE - MIDDLE FORK WILLAMETTE RIVER
TYPICAL SECTIONS AND
EXCAVATION PLAN FOR LEFT ABUTMENT
DETAILS FOR DEEPENED FOUNDATION

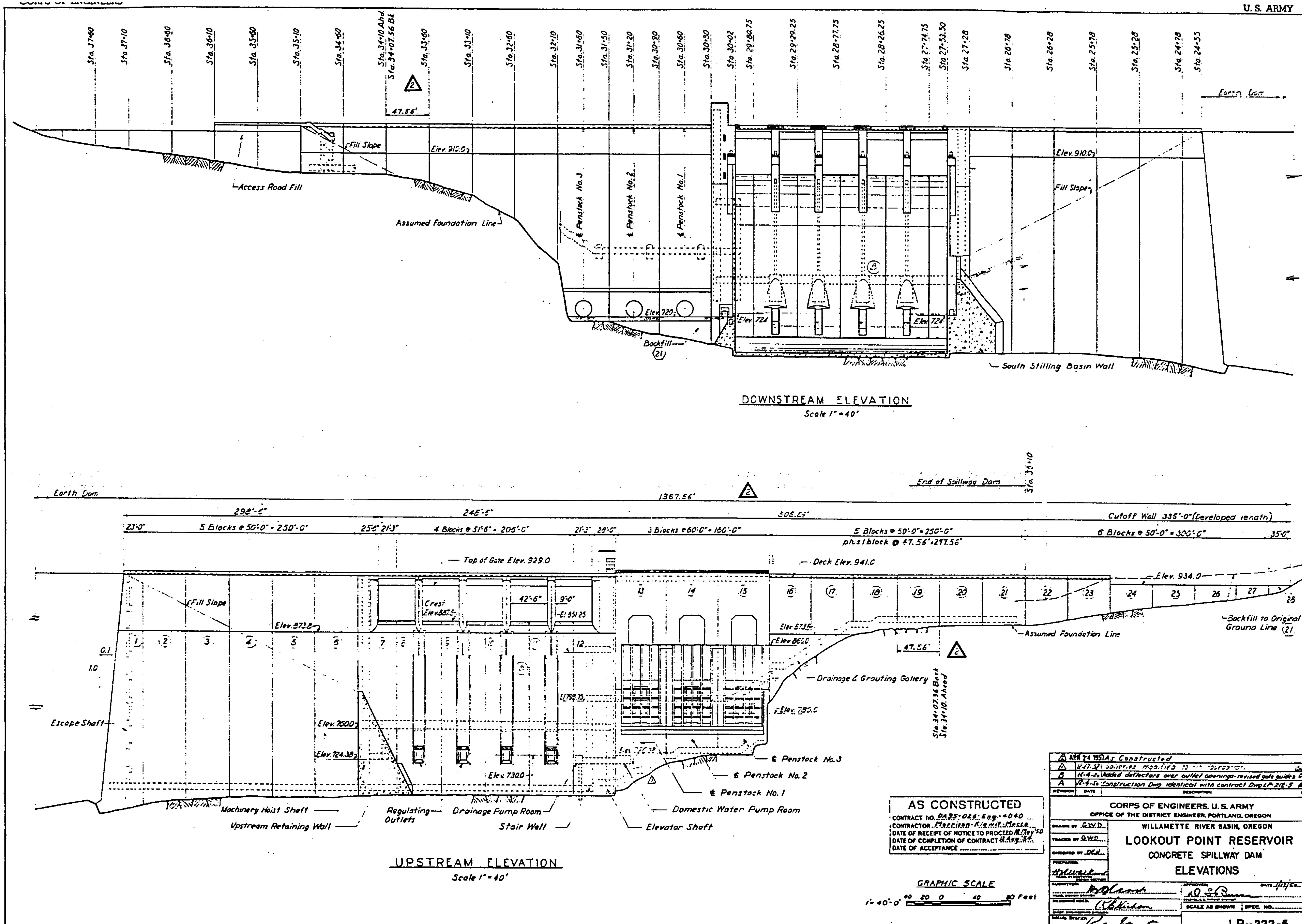
SCALE AS SHOWN | SPEC. NO.

SHEET 18 OF | LP-211-16

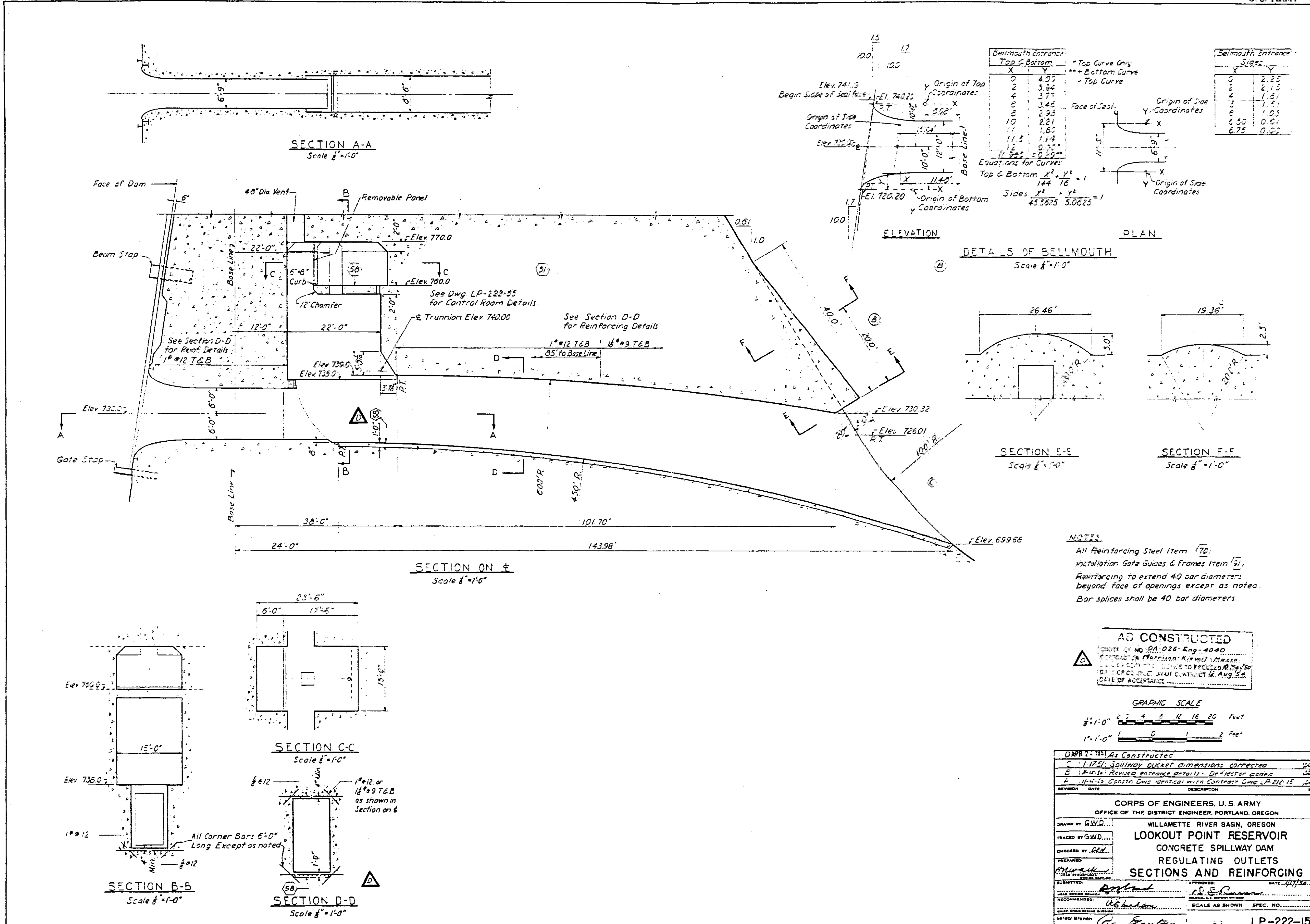
This page was intentionally left blank.


PLAN
Scale: 1" = 100'
True North
End of Spillway Dam
Cutoff Wall
Access Road
Relocated County Road #360
Power House
Stilling Basin Elev. 644
Rock Toe
Elev. 725
Downstream Toe
Axis and ℄ Roadway
N8°10'13"W
Elev. 941
Elev. 890
Elev. 850
Elev. 815
Elev. 680.
Existing Southern Pacific Railroad
UPSTREAM ELEVATION
Scale: 1" = 100'
1387.56'
298.5'
248.5' Spillway
505.56'
335.0'
Cutoff Wall Elev. 934
Elev. 941
Earth Fill
Elev. 804
Elev. 873.0
Trashracks and Penstock Entrances
Regulating Outlets
Upstream Retaining Wall
SECTION B-B
Scale: 1" = 50'
Axis of Dam
Elev. 941
Elev. 910
Elev. 873.0
Earth Embankment
Slope varies from Block 1 to Block 6
Base Line
GENERAL NOTES
Contraction joints and exposed horizontal construction joints to be chamfered as called for on detail drawings. All exposed corners shall be chamfered 3/4" and all re-entrant angles shall have 1 1/2" fillets unless otherwise noted.
The 6" vertical drains at contraction joints may be formed by the use of porous concrete pipe, by the use of collapsible forms or by any suitable method satisfactory to the Contracting Officer.
Minimum coverage of reinforcing bars to be 1 1/2" in slab and 2 1/2" elsewhere, except as noted.
SECTION C-C
Scale: 1" = 50'
Base Line
Elev. 941
Normal Pool Elev. 929
Crest Elev. 887.5
Maximum Embankment Slope
Stilling Basin Wall Elev. 724
Elev. 730
Assumed Elev. 683
Elev. 644
El. 680
SECTION D-D
Scale: 1" = 50'
Base Line
Axis and ℄ Roadway
Elev. 912
Elev. 860.0
Min. Power Pool Elev. 811
Elev. 780.0
18' Dia Penstock
Power House
Stilling Basin Wall Elev. 724
Elev. 680
FOR INFORMATION ONLY
SECTION A-A
Scale: 1" = 50'
Dam Axis
Norm. Pool Elev. 929
Max. Pool Elev. 934
Elev. 941.0
Elev. 939.0
Elev. 890.0
Elev. 850.0
Elev. 815.0
Elev. 725.0
Min. Power Pool Elev. 811
Min. Flood Control Pool With Power Elev. 825
Min. Flood Control Pool Without Power Elev. 754
Random Gravel Zone
Impervious Zone
Filter Zone
2' Dumped Stone Revetment
Rock Toe
Approximate Rock Line
AS CONSTRUCTED
CONTRACT NO. DA35-026-eng-4040
CONTRACTOR Morrison-Kiewit-Macco
GRAPHIC SCALES
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT RESERVOIR
CONCRETE SPILLWAY DAM
GENERAL PLAN & TYPICAL SECTIONS
SCALE AS SHOWN
LP-222-1

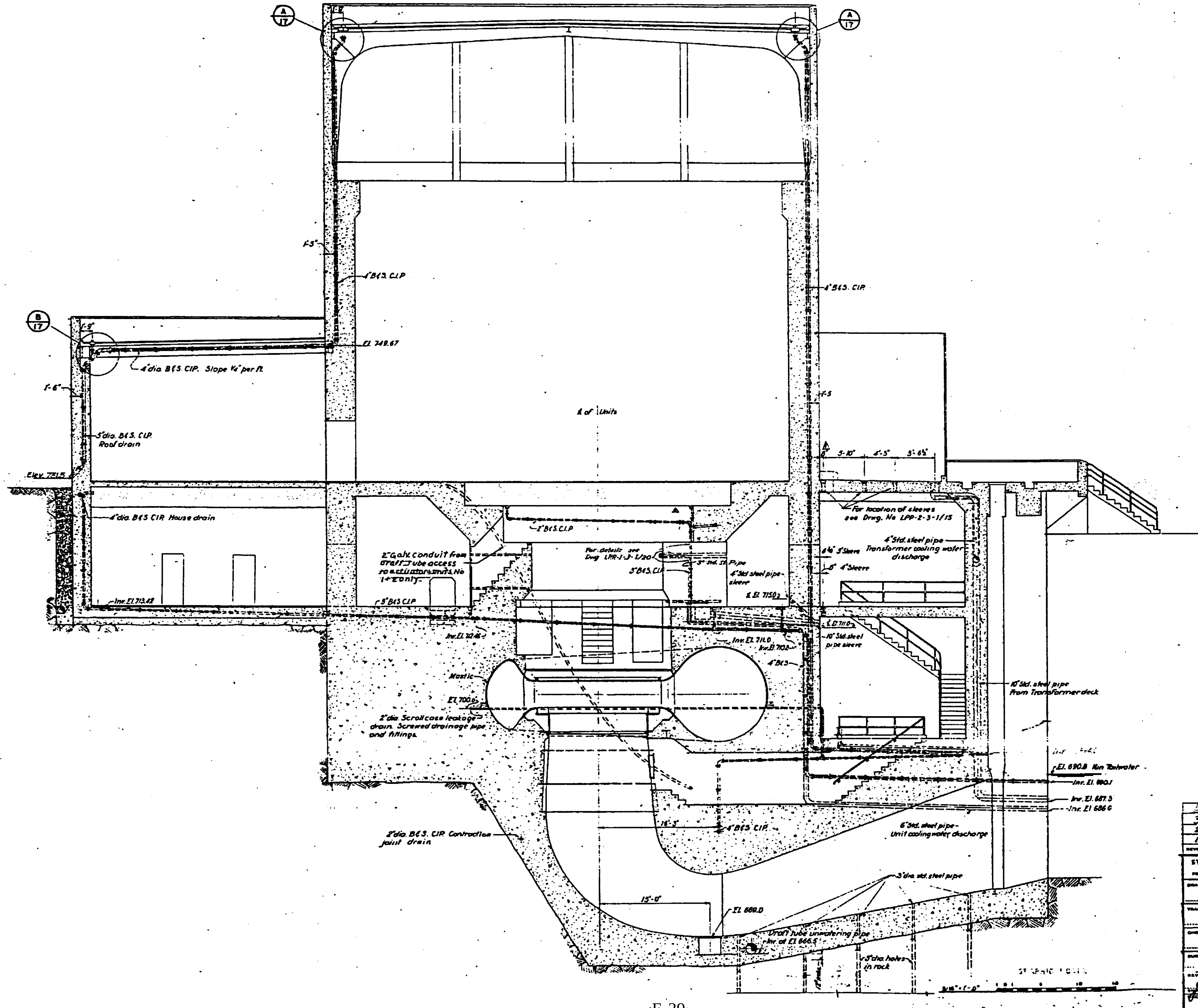
This page was intentionally left blank.

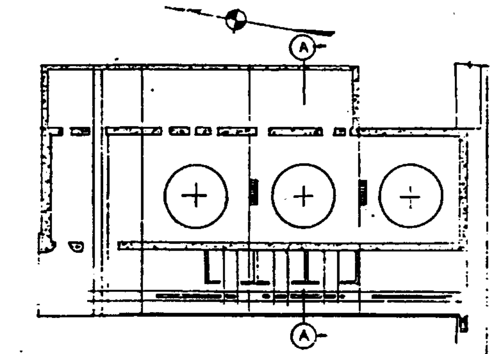

U. S. ARMY
DOWNSTREAM ELEVATION
Scale 1" = 40'
Access Road Fill
Assumed Foundation Line
Fill Slope
Elev. 910.0
Backfill
South Stilling Basin Wall
Earth Dam
¢ Penstock No. 3
¢ Penstock No. 2
¢ Penstock No. 1
47.56'
End of Spillway Dam
1367.56'
Cutoff Wall 335'-0" (Developed length)
5 Blocks @ 50'-0" = 250'-0"
4 Blocks @ 51'-6" = 205'-0"
3 Blocks @ 60'-0" = 180'-0"
5 Blocks @ 50'-0" = 250'-0"
plus 1 block @ 47.56' = 297.56'
6 Blocks @ 50'-0" = 300'-0"
Top of Gate Elev. 929.0
Deck Elev. 941.0
Elev. 934.0
Backfill to Original Ground Line
Drainage & Grouting Gallery
Escape Shaft
Machinery Hoist Shaft
Upstream Retaining Wall
Regulating Outlets
Drainage Pump Room
Stair Well
Elevator Shaft
Domestic Water Pump Room
¢ Penstock No. 3
¢ Penstock No. 2
¢ Penstock No. 1
UPSTREAM ELEVATION
Scale 1" = 40'
AS CONSTRUCTED
GRAPHIC SCALE
1" = 40'-0"
CORPS OF ENGINEERS, U. S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT RESERVOIR
CONCRETE SPILLWAY DAM
ELEVATIONS
LP-222-5

This page was intentionally left blank.


SECTION A-A
Scale 1/8"=1'-0"
DETAILS OF BELLMOUTH
Scale 1/8"=1'-0"
ELEVATION
PLAN
Equations for Curves
Top & Bottom $\frac{X^2}{144}+\frac{Y^2}{16}=1$
Sides $\frac{X^2}{45.5625}+\frac{Y^2}{5.0625}=1$
SECTION ON ℄
Scale 1/8"=1'-0"
SECTION E-E
SECTION F-F
Scale 1/8"=1'-0"
SECTION B-B
Scale 1/8"=1'-0"
SECTION C-C
Scale 1/8"=1'-0"
SECTION D-D
Scale 1/8"=1'-0"
NOTES
All Reinforcing Steel Item 70.
Installation Gate Guides & Frames Item 71.
Reinforcing to extend 40 bar diameters beyond face of openings except as noted.
Bar splices shall be 40 bar diameters.
AS CONSTRUCTED
GRAPHIC SCALE
CORPS OF ENGINEERS, U.S. ARMY
OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON
WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT RESERVOIR
CONCRETE SPILLWAY DAM
REGULATING OUTLETS
SECTIONS AND REINFORCING
SCALE AS SHOWN
LP-222-15

This page was intentionally left blank.





KEY PLAN

GENERAL NOTES

Final arrangement and dimensions of sleeves, blockouts in concrete and miscellaneous metal for pumps, valve stands, float gauges, etc. shall be verified from manufacturers details.

All soil pipe shall be extra heavy type. Pipe slope shall be 1/4" per foot minimum unless otherwise noted.

All embedded cast iron pipe and fittings will be paid for under contract item No. 27.

All embedded steel pipe and fittings will be paid for under contract item No. 28.

Revision	Date	Description	By
A		As constructed	
3	3-3-54	Added 2" galv. conduit from actuator to draft tube access	R.G.F.
2	5-12-53	Deleted gutter in generator pedestal	S.R.S.
1	1-2-53	Sleeve location Changed	F.H.

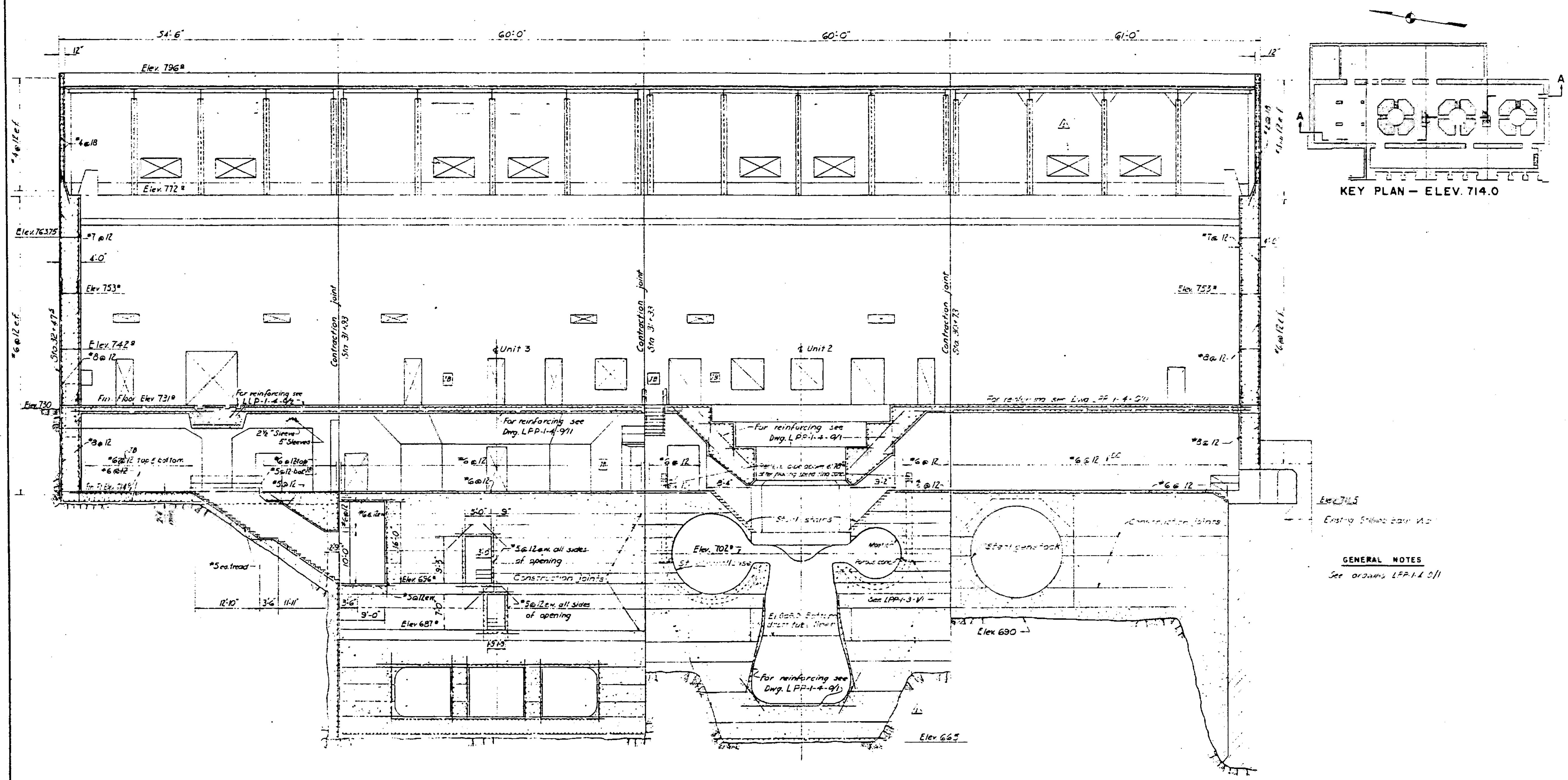
STEVENS & THOMPSON ENGINEERS, PORTLAND, OREGON

CORPS OF ENGINEERS, U. S. ARMY, PORTLAND, OREGON

WILLAMETTE RIVER BASIN, OREGON
LOOKOUT POINT RESERVOIR
POWERHOUSE
MECHANICAL
TRANSVERSE SECTION THROUGH ℄ UNIT NO.2

Drawn by F.F.H.
Traced by F.F.H.
Checked by F.C.K.
Submitted C.V.F.
Reviewed J.H. Chitwood
Recommended L. Fisher
Scale: AS SHOWN
LPP-1-3-1/18

This page was intentionally left blank.



LONGITUDINAL SECTION A-A

For location of section see key plan or drawing LPP 1-4-9/1

AS CONSTRUCTED

STEVENS & THOMPSON ENGINEERS, ARCHITECT-ENGINEERS, PORTLAND, OREGON

CORPS OF ENGINEERS, U. S. ARMY, OFFICE OF THE DISTRICT ENGINEER, PORTLAND, OREGON

Drawn by E.K.B. Traced by E.E.P. Checked by E.A.S.

WILLAMETTE RIVER BASIN, OREGON

LOOKOUT POINT RESERVOIR

POWERHOUSE

STRUCTURAL

LONGITUDINAL SECTION

GRAPHIC SCALE

Scale: 1/8" = 1'-0"

LPP-1-4-0/4

This page was intentionally left blank.

APPENDIX F

DE-PRIORITIZED ALTERNATIVES

Appendix F includes the following:

1. 10 Percent Alternatives Evaluation
2. Alternatives De-Prioritized at 10 Percent
3. 30 Percent Alternatives Evaluation
4. Alternatives De-Prioritized at 30 Percent
5. 30 Percent AR Plates
6. Alternatives Developed for 60 Percent
7. 60 Percent Alternatives Evaluation
8. Alternatives De-Prioritized at 60 Percent
9. 60 Percent AR Plates

This page was intentionally left blank.

1- 10 PERCENT ALTERNATIVES EVALUATION

The following provides a summary of the 10 Percent Alternatives Evaluation and Checkpoint Meeting No. 1, in which the initial list of alternatives (described in Section 4) was prioritized to identify ten alternatives for further evaluation. During the checkpoint meeting, Alternative 1a was added to the original list of 22 alternatives: Upper Reservoir, In-Reservoir FSC without nets and 500 cfs of attraction flow. The evaluation matrix was then used to identify ten alternatives for further evaluation. The following provides a brief summary of this process. Biological, technical, and economic impacts—as well as other factors—are considered. Detailed meeting notes are presented in Attachment 1

BIOLOGICAL EVALUATION

The seven major biological criteria were evaluated as follows:

a) **Fish Collection Potential.** This parameter is defined as the product of the following items: the proportion of population segment present at the facility location (P), the survival probability of juveniles en route to the collector (S), and the collection efficiency of the collector (CE).

   The quantity of fish present was estimated as the percentage of total habitat area located upstream of the specific site location. For example, it is assumed that 100 percent of the available spawning habitat is located upstream of the Black Canyon Campground and in-reservoir sites.

   The survival probability is assumed to be highest for the most upstream alternatives. In addition, passage through the reservoir is assumed to be moderately detrimental to juvenile survival.

   The collection efficiencies for in-tributary alternatives are assumed to be equivalent to the total hydraulic capacity of the collector. For example, a collector that has a capacity equivalent to the 5 percent exceedence streamflow (during the period of migration) is assumed to capture 95 percent of the available fish. This assumption is consistent with findings indicating that the juvenile outmigration in this area is evenly distributed across the range of streamflows and not necessarily weighted towards the upper end of the hydrograph (for instance, during the spring freshets). In addition, this assumption is assumed to be conservative because it is likely that some collection would continue to occur above the design capacity of the collector (although some fish arriving at the collector location would bypass the facility with spill).

   For the in-reservoir and mobile technology alternatives, collection efficiencies were estimated using data from existing operating facilities, where available.

   The total product of the three individual parameters was calculated to determine the total fish collection potentials. These percentages were then normalized over the scale of rankings from 1 to 5. Finally, this criterion was given a double weighting to reflect the importance of these biological parameters to the overall feasibility of the downstream passage concepts.

b) **Reservoir Conditions.** The alternatives were not ranked against this parameter because reservoir conditions were considered to be part of the quantity and survival components of the fish collection potential parameter, as described above. In addition, the lack of available data on reservoir conditions and potential impacts to juvenile migrants prohibits a more detailed evaluation at this time.

c) **Downstream Passage Conditions.** Similarly, it is assumed that this parameter was considered as part of the quantity and survival components of the fish collection potential parameter, as described above.

d) **Bypass Conditions.** It is assumed that all alternatives would require some degree of sorting and handling and that none of the alternatives would have the ability to provide full volitional bypass conditions. As such, this parameter was evaluated as follows:

- Fish pumping required with significant handling and transport time (that is, mobile technologies) = 1 or 2
- Fish pumping with minimal handling and transport time (that is, FSC) = 3
- Gravity bypass with minimal handling and transport time = 4

e) **Effects on Other ESA Fish.** This parameter was ranked identically to Bypass Conditions (above); that parameter is assumed to be roughly analogous given the conceptual nature of the alternatives at this time.

f) **Effects on Other Fish of Concern.** This parameter was not evaluated because sufficient detail did not exist at the time of the evaluation to distinguish other fish from ESA fish.

g) **Effects on Upstream Passage (All Species).** The in-reservoir alternatives with full exclusion are assumed to have the most impact to upstream fish passage. Mobile technologies are assumed to have minimal impact. This parameter was evaluated as follows:

- Full-exclusion, in-reservoir technologies = 3
- In-tributary technologies where a traditional fish ladder could be provided = 4
- Mobile technologies = 5

TECHNICAL EVALUATION

The three major technical criteria were evaluated as follows:

a) **Current Operations (Flows and Water Surface Elevations).** All alternatives are assumed at this time to have little or no impact to existing project operations and were therefore assigned a neutral ranking of 3.

b) **Operations and Maintenance.** The O&M parameter was not ranked because it is assumed that the subsequent O&M Cost parameter would sufficiently capture any considerations in this regard, given the early stage of the evaluation. This criterion was removed from the matrix for the 30 and 60 Percent evaluations.

c) **Design/Constructability.** Similarly, it is assumed that this parameter is considered part of the subsequent Design and Construction Cost parameter. This criterion was removed from the matrix for the 30 and 60 Percent evaluations.

ECONOMIC IMPACTS AND OTHER EVALUATION

The five major economic and other criteria were evaluated as follows:

a) **Design/Construction Cost.** The relative project costs of each alternative were ranked according to the PDT's collective knowledge of existing similar projects. No detailed cost estimates were prepared.

- 1,000-cfs FSC = 1
- 500-cfs FSC with net = 2
- FSC without a net and in-tributary technologies = 3
- Mobile technologies = 4

b) **O&M Cost.** It is anticipated that FSCs with nets would have significant O&M costs, particularly for debris removal, inspection, and repair.

1,000-cfs FSC with net = 1
500-cfs FSC and in-reservoir mobile technologies = 2
FSC without net = 3
In-tributary alternatives = 4

c) **Recreation.** Impacts to existing recreation were evaluated as follows:

- In-tributary facilities with significant impacts to river recreation (that is, requiring portages or other facilities) and impacts to campground recreation = 1
- In-reservoir FSCs with nets (requiring boat passes) and other in-tributary sites = 2
- Other mobile technologies = 3
- Other in-tributary sites = 4
- Remote mobile technology sites = 5

d) **Hydropower.** All alternatives are assumed at this time to have little or no impact to existing hydropower operations and were therefore assigned a neutral ranking of 3.

e) **Real Estate/Access/Utilities.** The alternatives were ranked primarily according to their proximity to existing roadways and utilities. Where known, impacts to private property were also considered.

- Sites with utility concerns and/or anticipated significant impacts = 1
- Sites on tributaries without good road and utility access = 2
- Upper Middle Fork sites with good road and utility access with moderate impacts = 3
- Remote Upper North Fork and in upper reservoir sites with minimal impacts = 4

DISCUSSION AND RECOMMENDATIONS

As a result of the 10 Percent Alternatives Evaluation and Checkpoint Meeting No. 1, the ten alternatives identified in Tables F-1 and F-2 were selected for further evaluation.

This page was intentionally left blank.

Table F-1

10 Percent AR Evaluation Matrix Following Checkpoint Meeting No. 1 (26 May 2010)

Comprehensive Alternative			Biological Evaluation Criteria												Technical Evaluation Criteria			Economic Impacts and Other Criteria						
	Site Location	Technology	Quantity of Fish Available (%)	Survival Probability (%)	Collection Efficiency (%)	Total Fish Collection Potential (%)	Fish Collection Potential (Double Weighted)		Reservoir Conditions	Downstream Passage Conditions	Bypass Conditions	Effects on Other ESA Fish	Effects on Other Fish of Concern	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface	Operations and Maintenance (O&M)	Design/ Constructibility	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100%	70%	70%	49%	5	5			3	3		3	3			2	2	2	3	4	34	6
1)a	Upper Reservoir	FSC w/o net	100%	70%	45%	32%	3	3			3	3		5	3			3	3	4	3	4	37	2
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100%	70%	80%	56%	5	5			3	3		3	3			1	1	2	3	4	33	7
3)	Upper Reservoir	Mobile: Merwin Trap	100%	70%	20%	14%	2	2			2	2		5	3			4	2	3	3	4	31	8
4)	Upper Reservoir	Mobile: Dipper Trap	100%	70%	25%	18%	2	2			2	2		5	3			4	2	3	3	4	31	8
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	100%	80%	50%	40%	4	4			4	4		4	3			3	4	1	3	3	36	4
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100%	80%	50%	40%	4	4			4	4		4	3			3	4	1	3	3	36	4
7)	USFS Black Canyon Campground	Mobile: Screw Trap	100%	80%	20%	16%	2	2			1	1		5	3			4	2	3	3	3	28	15
8)	USFS Black Canyon Campground	Mobile: Scoop Trap	100%	80%	10%	8%	1	1			1	1		5	3			4	2	3	3	3	27	18
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	84%	95%	50%	40%	4	4			4	4		4	3			3	4	2	3	4	38	1
10)	Lower North Fork (Westfir)	Mobile: Screw Trap	84%	95%	20%	16%	2	2			1	1		5	3			4	2	3	3	4	29	14
11)	Lower North Fork (Westfir)	Mobile: Scoop Trap	84%	95%	10%	8%	1	1			1	1		5	3			4	2	3	3	4	28	15
12)	Upper North Fork	In-Tributary: In-Channel Collector	80%	100%	50%	40%	4	4			4	4		4	3			3	4	4	3	1	37	2
13)	Upper North Fork	Mobile: Screw Trap	80%	100%	20%	16%	2	2			1	1		5	3			4	2	5	3	1	28	15
14)	Upper North Fork	Mobile: Scoop Trap	80%	100%	10%	8%	1	1			1	1		5	3			4	2	5	3	1	27	18
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	16%	85%	50%	7%	1	1			4	4		4	3			3	4	1	3	3	31	8
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	16%	85%	50%	7%	1	1			4	4		4	3			3	4	1	3	3	31	8
17)	Lower Middle Fork (Island)	Mobile: Screw Trap	16%	85%	20%	3%	1	1			1	1		5	3			4	2	3	3	3	27	18
18)	Lower Middle Fork (Island)	Mobile: Scoop Trap	16%	85%	10%	1%	1	1			1	1		5	3			4	2	3	3	3	27	18
19)	Upper Middle Fork	In-Tributary: In-Channel Collector	15%	95%	50%	7%	1	1			4	4		4	3			3	4	1	3	2	30	12
20)	Upper Middle Fork	In-Tributary: Off-Channel Collector	15%	95%	50%	7%	1	1			4	4		4	3			3	4	1	3	2	30	12
21)	Upper Middle Fork	Mobile: Screw Trap	15%	95%	20%	3%	1	1			1	1		5	3			4	2	3	3	2	26	22
22)	Upper Middle Fork	Mobile: Scoop Trap	15%	95%	10%	1%	1	1			1	1		5	3			4	2	3	3	2	26	22

Shading denotes alternatives that were prioritized for further evaluation.

Table F-2

10 Percent AR Evaluation Matrix Sorted by Rank (26 May 2010)

Comprehensive Alternative			Biological Evaluation Criteria									nical Evaluation Cri	Economic Impacts and Other Criteria						
	Site Location	Technology	Quantity of Fish Available (%)	Survival Probability (%)	Collection Efficiency (%)	Total Fish Collection Potential (%)	Fish Collection Potential (Double Weighted)		Bypass Conditions	Effects on Other ESA Fish	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	84%	95%	50%	40%	4	4	4	4	4	3	3	4	2	3	4	38	1
1)a	Upper Reservoir	In-Reservoir: Gulper/FSC w/o net	100%	70%	45%	32%	3	3	3	3	5	3	3	3	4	3	4	37	2
12)	Upper North Fork	In-Tributary: In-Channel Collector	80%	100%	50%	40%	4	4	4	4	4	3	3	4	4	3	1	37	2
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	100%	80%	50%	40%	4	4	4	4	4	3	3	4	1	3	3	36	4
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100%	80%	50%	40%	4	4	4	4	4	3	3	4	1	3	3	36	4
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100%	70%	70%	49%	5	5	3	3	3	3	2	2	2	3	4	34	6
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100%	70%	80%	56%	5	5	3	3	3	3	1	1	2	3	4	33	7
3)	Upper Reservoir	Mobile: Merwin Trap	100%	70%	20%	14%	2	2	2	2	5	3	4	2	3	3	4	31	8
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	16%	85%	50%	7%	1	1	4	4	4	3	3	4	1	3	3	31	8
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	16%	85%	50%	7%	1	1	4	4	4	3	3	4	1	3	3	31	8

This page was intentionally left blank.

2- ALTERNATIVES DE-PRIORITIZED AT 10 PERCENT

The shaded alternatives in Table F-3 were prioritized following Checkpoint Meeting No. 1. A summary of the meeting is provided in Attachment 1.

TABLE F-3. ALTERNATIVES PRIORITIZED AT 10 PERCENT

Site Location		Collection Technology	Notes
1 a	Upper Reservoir	In-Reservoir: FSC w/o Nets	500-cfs attraction flow
1	Upper Reservoir	In-Reservoir: FSC with Nets	500 cfs attraction flow
2	Upper Reservoir	In-Reservoir: FSC with Nets	1,000 cfs attraction flow
3	Upper Reservoir	Mobile: Merwin Trap	
4	Upper Reservoir	Mobile: Dipper Trap	
5	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	Adjustable crest diversion
6	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	Adjustable crest diversion
7	USFS Black Canyon Campground	Mobile: Screw Trap	One or multiple traps
8	USFS Black Canyon Campground	Mobile: Scoop Trap	One or multiple traps
9	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	Adjustable crest diversion
10	Lower North Fork (Westfir)	Mobile: Screw Trap	One or multiple traps
11	Lower North Fork (Westfir)	Mobile: Scoop Trap	One or multiple traps
12	Upper North Fork	In-Tributary: In-Channel Collector	Fixed or adjustable crest
13	Upper North Fork	Mobile: Screw Trap	One or multiple traps
14	Upper North Fork	Mobile: Scoop Trap	One or multiple traps
15	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	Adjustable crest diversion
16	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	Adjustable crest diversion
17	Lower Middle Fork (Island)	Mobile: Screw Trap	One or multiple traps
18	Lower Middle Fork (Island)	Mobile: Scoop Trap	One or multiple traps
19	Upper Middle Fork (Island)	In-Tributary: In-Channel Collector	Adjustable crest diversion
20	Upper Middle Fork (Island)	In-Tributary: Off-Channel Collector	Adjustable crest diversion
21	Upper Middle Fork (Island)	Mobile: Screw Trap	One or multiple traps
22	Upper Middle Fork (Island)	Mobile: Scoop Trap	One or multiple traps

NOTE: Shading denotes alternatives that were prioritized for further evaluation.

3- 30 PERCENT ALTERNATIVES EVALUATION

The following provides a summary of the 30 Percent Alternatives Evaluation and Checkpoint Meeting No. 2, in which the list of ten alternatives was evaluated and prioritized to identify four alternatives for further evaluation. Biological, technical, and economic impacts—as well as other factors—are considered. A summary of Checkpoint Meeting No. 2 is provided in Appendix A.

BIOLOGICAL EVALUATION

The fish collection potential (FCP) of each system was calculated as the product of three parameters:

1. Proportion of the entire spring Chinook population (POP) emanating from the Middle Fork Willamette River that passes the proposed collector site
2. The survival probability of juveniles en route to the collector (S) from spawning grounds
3. The collection efficiency (CE) of juveniles, or the probability of being collected conditional on surviving to the collector site

The methods and assumptions used in estimating each parameter are described below:

b) **Proportion of Population Intercepted.** This parameter was estimated based on the spring Chinook juvenile production analysis presented in Section 2.3.3 – Enumeration (Table 2-6). Total spring Chinook production was estimated at approximately 2.3 million. This number was reduced to approximately 1.8 million to account for juvenile losses associated with passage past Hills Creek Dam.

c) **Juvenile Migration Survival.** The number of juveniles arriving at each possible collection site will be influenced by their survival rate from spawning and rearing areas to the collection site. However, data on both fry and smolt survival rates to proposed collection locations are not available, and for fry the required data would be difficult to collect. Juvenile spring Chinook survival rates to each collector for fish production below the Hills Creek Dam were based on professional opinion, as data were not available for this parameter. It is assumed that juvenile survival rates to a collector decreased the farther downstream the collector was located.

   Because fish migrating from the Upper Middle Fork Basin must pass through the Hills Creek Dam, survival rates have been set at 40 percent. This value is based on work conducted by Willis (2008) that showed a direct juvenile (smolt) mortality rate of 60 percent for fish passing through the turbines at Hills Creek Dam. This estimate does not include mortality associated with juvenile passage through the reservoir, which is currently unknown. Not accounting for reservoir mortality biases upward the estimate of juvenile production originating above Hills Creek Dam.[1] Additional juvenile fish passage survival data through Hills Creek Dam will be collected as part of RPA 4.10 (NMFS, 2008b), but they will not be available in time for the completion of this report.

[1] The total number of juvenile salmonids entering the stream reach below Hills Creek Dam would need to be revisited if juvenile fish passage facilities were implemented at this facility.

d) **Collection Efficiency.** The fish collection efficiency for the in-tributary collectors was developed based on the proportion of total river discharge (by month) passing into the system (Table F-4).[2]

For the in-reservoir systems, it is assumed that fish collection efficiency is higher for a collector with full exclusionary netting. The collection efficiency values used for the 500- and 1,000-cfs systems (both with netting) were 70 and 80 percent, respectively. These values covered the general range in collection efficiency values reported for the Upper Baker River in-reservoir surface collector[3] (Puget Sound Energy, 2009). Collection efficiency of either system was reduced to 20 percent if exclusionary nets were not incorporated into the design (Table F-4).

For the Merwin trap alternative, collection efficiency for a single trap was set at 6 percent, based on spring Chinook work done on the Cowlitz River (Serl and Morrill, 2004). The alternative calls for testing two traps at the head of Lookout Point Reservoir.

The FCP values for the 10 alternatives are presented in Table F-5. The collection systems located at the Black Canyon Campground performed the best, with an estimated FCP of 76 percent. The high FCP value results from these systems being built at a location that has the potential to collect 100 percent of the population with high efficiency. However, to achieve this level of FCP, collector capacity at this location needs to be quite large (6,530 cfs).

The in-reservoir systems with full exclusionary netting had FCP values ranging from 14 to 56 percent (Table F-5). The in-reservoir system without netting had an estimated FCP of only 14 percent because it is assumed that without netting, migrants would be able to migrate pass the collector.

The NFMF collector at Westfir had a higher FCP (64 percent) than the Upper NFMF system (60 percent) (Table F-5). The difference in FCP was caused by the loss in spring Chinook habitat for the Upper NFMF system, which would be located farther upstream (river mile 2.4) compared with the Westfir system located at river mile 1.3. According to the USACE habitat database, there is approximately 36 miles of stream habitat in the NFMF system; therefore, the proportion of the population intercepted by the Upper NFMF system was reduced by 7 percent (2.4/36 = 7 percent). However, the USACE database also shows that only 0.3 percent of the Chinook usable spawning area is located below river mile 2.4.

[2] It is assumed that 1 percent of the water contains 1 percent of this fish. There are no data to support or refute this assumption at this time.

[3] The collection efficiency values were based on fish released in the reservoir; therefore, the loss includes some reservoir mortality.

This page was intentionally left blank.

TABLE F-4. ESTIMATED COLLECTOR CAPACITY AND ESTIMATED SPRING CHINOOK FISH COLLECTION EFFICIENCY (PERCENT) BY REACH/LOCATION*

Reach	Collector Capacity	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Jan - Sept Average
In-Tributary Systems[a]														
Lookout Point Reservoir to NFMF Confluence	6,530	79	92	95	96	95	99	100	100	100	100	92	83	95
NFMF Confluence to Hills Creek Dam (includes Salt Creek)	3,750	90	99	92	93	88	95	100	100	100	100	84	91	95
North Fork Middle Fork (NFMF)	2,000	86	87	91	95	97	99	100	100	100	99	91	83	95
In-Reservoir Systems[b]														
In-reservoir (full netting and 1,000 cfs)	1,000	80	80	80	80	80	80	80	80	80	80	80	80	80
In-reservoir (full netting and 500 cfs)	500	70	70	70	70	70	70	70	70	70	70	70	70	70
In-reservoir (no netting)	500	20	20	20	20	20	20	20	20	20	20	20	20	20

* Because the Merwin trap is a mobile system that will sample in a range of locations, the amount of flow entering the system will also vary and, therefore, cannot be estimated.

[a] To illustrate, in January 79 percent of the stream discharge in this month would pass through a collector with a capacity of 6,530 cfs. It is assumed that fish collection efficiency is directly related to the percent flow entering the system; therefore, collection efficiency is estimated at 79 percent.

[b] Fish collection efficiency for the in-reservoir systems with full exclusionary netting are based on data collected at the Upper Baker floating surface collector (FSC). Fish collection efficiency values for the no-netting systems were reduced (based on professional opinion) to account for the ability of fish to swim past the system.

TABLE F-5. FISH COLLECTION POTENTIAL FOR THE 30 PERCENT ALTERNATIVES EVALUATION AT LOOKOUT POINT

Comprehensive Alternative			Biological Criteria				
Site Location		Technology	Proportion of Population Intercepted (POP)	Survival Probability, (S)	Collection Efficiency (CE)	Total Fish Collection Potential, (FCP)	Estimated Total Fish Collected
1a	Upper Reservoir	In-Reservoir: Gulper/FSC without net	100% [a,b,c]	70%	20%	14%	239,395
1	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100% [a,b,c]	70%	70%	49%	837,883
2	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100% [a,b,c]	70%	80%	56%	957,581
3	Upper Reservoir	Mobile: Merwin Trap	100% [a,b,c]	70%	12%	8%	143,637
5	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	100% [a,b,c]	80%	95%	76%	1,299,574
6	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100% [a,b,c]	80%	95%	76%	1,299,574
9	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	71%	95%	95%	64%	1,095,703
12	Upper North Fork	In-Tributary: In-Channel Collector	66%	95%	95%	60%	1,018,541
15	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	25%[b]	85%	95%	20%	345,199
16	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	25% [b]	85%	95%	20%	345,199

[a] No reduction in survival or habitat loss due to facility location was assigned to this site.
[b] Survival rates for fish passing through Hills Creek Dam were set at 40 percent to determine total population production for all facilities that would collect these juveniles.
[c] Total fish production potential for the upper basin is 2.3 million.
cfs = cubic feet per second
FSC = floating surface collector

If this number (0.3 percent) is correct, then the difference in FCP between the two sites is negligible because little fish production would occur downstream of either site. These numbers will be confirmed once the spawning habitat report is submitted (and finalized) to USACE.[4]

The FCP values for the Lower Middle Fork systems were estimated at 20 percent. The low value was influenced primarily by the small proportion of the population available for capture (25 percent).

The Merwin FCP was estimated at 8 percent for the two traps that would be tested as part of this collection system. More traps could be added if initial testing results were favorable. The success of the system will likely improve over time as biologists become more proficient at fishing (locating and operating) this portable system.

TECHNICAL EVALUATION

The Current Operations evaluation criteria were unchanged from the 10 Percent Alternatives Evaluation, and a rating of 3 or neutral was assigned to all alternatives.

ECONOMIC IMPACTS AND OTHER EVALUATION

The various economic impacts and other evaluation criteria were unchanged from the 10 Percent Alternatives Evaluation.

DISCUSSION AND RECOMMENDATIONS

As a result of the 30 Percent Alternatives Evaluation and Checkpoint Meeting No. 2, the four alternatives identified in Tables F-6 and F-7 were selected for further evaluation. The FSC alternatives, alternatives 1a, 1, and 2, were considered to be a single alternative with a phased implementation approach.

[4] Adult spring Chinook were released above the proposed collection sites in 2009. Redd surveys showed that all redds were observed above the release point (Mann et al., 2010). It is not clear how many adults would spawn below the collection sites if they were released at the mouth of the NFMF.

This page was intentionally left blank.

Table F-6
30 Percent AR Evaluation Matrix Following Checkpoint Meeting No. 2 (22 July 2010)

Comprehensive Alternative			Biological Evaluation Criteria									Technical Evaluation Criteria	Economic Impacts and Other Criteria						
Site Location		Technology	Proportion of Population Intercepted, P (%)	Survival Probability, S (%)	Collection Efficiency, CE (%)	Total Fish Collection Potential, FCP (%)	Fish Collection Potential (Double Weighted)		Bypass Conditions	Effects on Other ESA Fish	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100%	70%	70%	49%	4	4	3	3	3	3	2	2	2	3	4	32	6
1)a	Upper Reservoir	In-Reservoir: Gulper/FSC w/o net	100%	70%	40%	28%	2	2	3	3	5	3	3	3	4	3	4	35	5
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100%	70%	80%	56%	4	4	3	3	3	3	1	1	2	3	4	30	9
3)	Upper Reservoir	Mobile: Merwin Trap	100%	70%	12%	8%	1	1	2	2	5	3	4	2	3	3	4	30	9
5)	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	100%	80%	94%	75%	5	5	4	4	4	3	3	4	1	3	3	39	1
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100%	80%	94%	75%	5	5	4	4	4	3	3	4	1	3	3	39	1
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	71%	95%	94%	63%	4	4	4	4	4	3	3	4	2	3	4	39	1
12)	Upper North Fork	In-Tributary: In-Channel Collector	66%	100%	94%	62%	4	4	4	4	4	3	3	4	4	3	1	38	4
15)	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	25%	85%	94%	20%	2	2	4	4	4	3	3	4	1	3	3	32	6
16)	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	25%	85%	94%	20%	2	2	4	4	4	3	3	4	1	3	3	32	6

Shading denotes alternatives that were prioritized for further evaluation.

Table F-7
30 Percent AR Evaluation Matrix Sorted by Rank (22 July 2010)

Comprehensive Alternative			Biological Evaluation Criteria									Technical Evaluation Criteria	Economic Impacts and Other Criteria						
Site Location		Technology	Proportion of Population Intercepted, P (%)	Survival Probability, S (%)	Collection Efficiency, CE (%)	Total Fish Collection Potential, FCP (%)	Fish Collection Potential (Double Weighted)		Bypass Conditions	Effects on Other ESA Fish	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100%	80%	94%	75%	5	5	4	4	4	3	3	4	1	3	3	39	1
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	71%	95%	94%	63%	4	4	4	4	4	3	3	4	2	3	4	39	1
1)a	Upper Reservoir	In-Reservoir: Gulper/FSC w/o net	100%	70%	40%	28%	2	2	3	3	5	3	3	3	4	3	4	35	5
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100%	70%	70%	49%	4	4	3	3	3	3	2	2	2	3	4	32	6
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100%	70%	80%	56%	4	4	3	3	3	3	1	1	2	3	4	30	9
3)	Upper Reservoir	Mobile: Merwin Trap	100%	70%	12%	8%	1	1	2	2	5	3	4	2	3	3	4	30	9

This page was intentionally left blank.

4- ALTERNATIVES DE-PRIORITIZED AT 30 PERCENT

The shaded alternatives in Table F-8 were prioritized for further evaluation following Checkpoint Meeting No. 2. A summary of the meeting is provided in Attachment 1 and further discussion is provided below.

TABLE F-8. ALTERNATIVES PRIORITIZED AT 30 PERCENT

Site Location		Collection Technology	Notes
1a	Upper Reservoir	In-Reservoir: FSC without Nets	500-cfs attraction flow
1	Upper Reservoir	In-Reservoir: FSC with Nets	500-cfs attraction flow
2	Upper Reservoir	In-Reservoir: FSC with Nets	1,000-cfs attraction flow
3	Upper Reservoir	Mobile: Merwin Trap	
5	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	Adjustable crest diversion
6	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	Adjustable crest diversion
9	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	Adjustable crest diversion
12	Upper North Fork	In-Tributary: In-Channel Collector	Fixed or adjustable crest
15	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	Adjustable crest diversion
16	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	Adjustable crest diversion

NOTE: Shading denotes alternatives that were prioritized for further evaluation.

IN-RESERVOIR ALTERNATIVES

All in-reservoir alternatives were prioritized for further evaluation during the 30 Percent Alternatives Evaluation. Numerous transport-to-shore options for the in-reservoir alternatives were also presented in the 30 Percent AR report. A boat transport-to-dam option was selected as the most feasible option. The options not selected are presented below; they were not selected based on feasibility, precedence, and required infrastructure. For all of the options, it is assumed that the collected fish would be placed in a hopper once ready for transport. A self-sufficient pod that would be loaded directly onto a truck for transport is also an option and would eliminate the water-to-water transfer to a truck.

a) **Amphibious Vehicle:** The hopper would be loaded onto an amphibious vehicle for transport to a boat ramp for access out of the reservoir. The amphibious vehicle would then be driven to the release location. This system would reduce the number of times the fish would have to be transferred but would require USACE or an operating partner to own and maintain a fleet of amphibious vehicles. It also would require a long boat ramp with a moderate slope to be constructed and kept free of mud and debris.

b) **Shoreline Rail System:** The hopper would be loaded onto a barge for transport to the shore, at which point the entire barge or just the hopper would be loaded onto a specially designed platform or trailer attached to the rail system. The platform and the barge/hopper would be hauled up to the required elevation by a winch and transferred to a truck. This system would require ensuring that the railway remained free of mud and debris.

c) **Helicopter Transport:** A helicopter would lift the hopper from the FSC and haul it directly to the release location. This option would require the services of a large lifting helicopter. Weather conditions such as high winds or poor visibility may limit helicopter operation, and the frequency of such events would need to be investigated for this area.

d) **Barge to Shoreline Tower/Bridge:** The hopper would be loaded onto a barge for transport to a shoreline tower. The hopper would then be lifted by the crane up to the bridge deck elevation for a water-to-water transfer to a truck. The tower and bridge could potentially be replaced by a tower crane, depending on shore topography and wind conditions. Depending on the distance from shore to the FSC, the tower could potentially be used as the anchor for the FSC and would not require any barge transport. The crane could pick up the hopper directly from the FSC. While keeping transport-to-shore times low, this system would require the construction of a large tower and bridge (or tower crane).

e) **Barge to Shoreline Channel:** The hopper would be loaded onto a barge for transport to the shoreline channel. The channel would be excavated into the shoreline far enough that at minimum pool, a crane at the end of the channel could directly lift the hopper to the required elevation. This system would require stable rock to make excavation of a shoreline channel feasible. Sedimentation of the channel could be an issue and may require maintenance dredging.

f) **Crane to Aerial Tram:** The FSC would be anchored to a support column for an aerial tram. The hopper would be lifted by crane to the top of the column and attached to the tram for transport to shore. Once on shore, a water-to-water transfer to a truck would occur. While this system would double as the anchoring system for the FSC, it would require the construction and maintenance of a significant amount of new infrastructure.

g) **Adjustable Aerial Tram**: The FSC would be anchored to a support column for an aerial tram. To follow reservoir elevation variations, the support elevation (as well as the length of cable used) would need to be adjustable. Once on shore, a water-to-water transfer to truck would occur. There are no known precedents for an adjustable aerial tram.

MOBILE ALTERNATIVES

Additional biological data for the Merwin trap alternative were developed for the 30 Percent Alternatives Evaluation. It was determined that this alternative warrants further evaluation because of the low cost and flexibility of deployment.

IN-TRIBUTARY ALTERNATIVES

All of the in-tributary, in-channel alternatives were removed from further consideration based on the difficulty of complying with Executive Order 11988, which stipulates a no net rise in the 100-year flood profile when building in the floodplain. As such, a fish collection facility located in the channel would require extensive excavation elsewhere for a bypass channel, which would make it very difficult to meet these requirements.

In addition, the Lower Middle Fork off-channel alternative was removed from further consideration because of the proportionally lower number of fish present in this reach.

Descriptions of the de-prioritized in-tributary alternatives are provided below:

a) **USFS Black Canyon Campground: In-Channel Collector –** This alternative is presented on Plate 11. The Black Canyon Campground site is located within the zone of influence of the Lookout Point Reservoir and, consequently, could be viewed as in-reservoir. The USGS gage No. 14148000 is located just upstream of the site. The FEMA flood insurance study identifies a 100-year peak discharge of 57,000 cfs. The river gradient is about 0.046 percent as estimated from the FEMA flood profile; therefore, the pool created by a 12-foot diversion dam would extend upstream for approximately 5 miles. As can be seen on Plate 11, a large part of the forest would need to be removed to provide a flood channel, which makes this alternative not attractive.

b) **Upper North Fork: In-Channel Collector –** This alternative is presented on Plate 14. The USGS gage No. 14147500 is located about 2 miles west of the site. The 1999 FEMA flood insurance study identifies a 100-year peak discharge of 24,300 cfs at this site. The river gradient is about 0.6 percent as estimated from the FEMA flood profile; therefore, the pool created by a 12-foot diversion dam would extend upstream for approximately 0.4 mile. As can be seen on Plate 14, a large part of the forest would need to be removed to provide a flood channel, which makes this alternative not attractive.

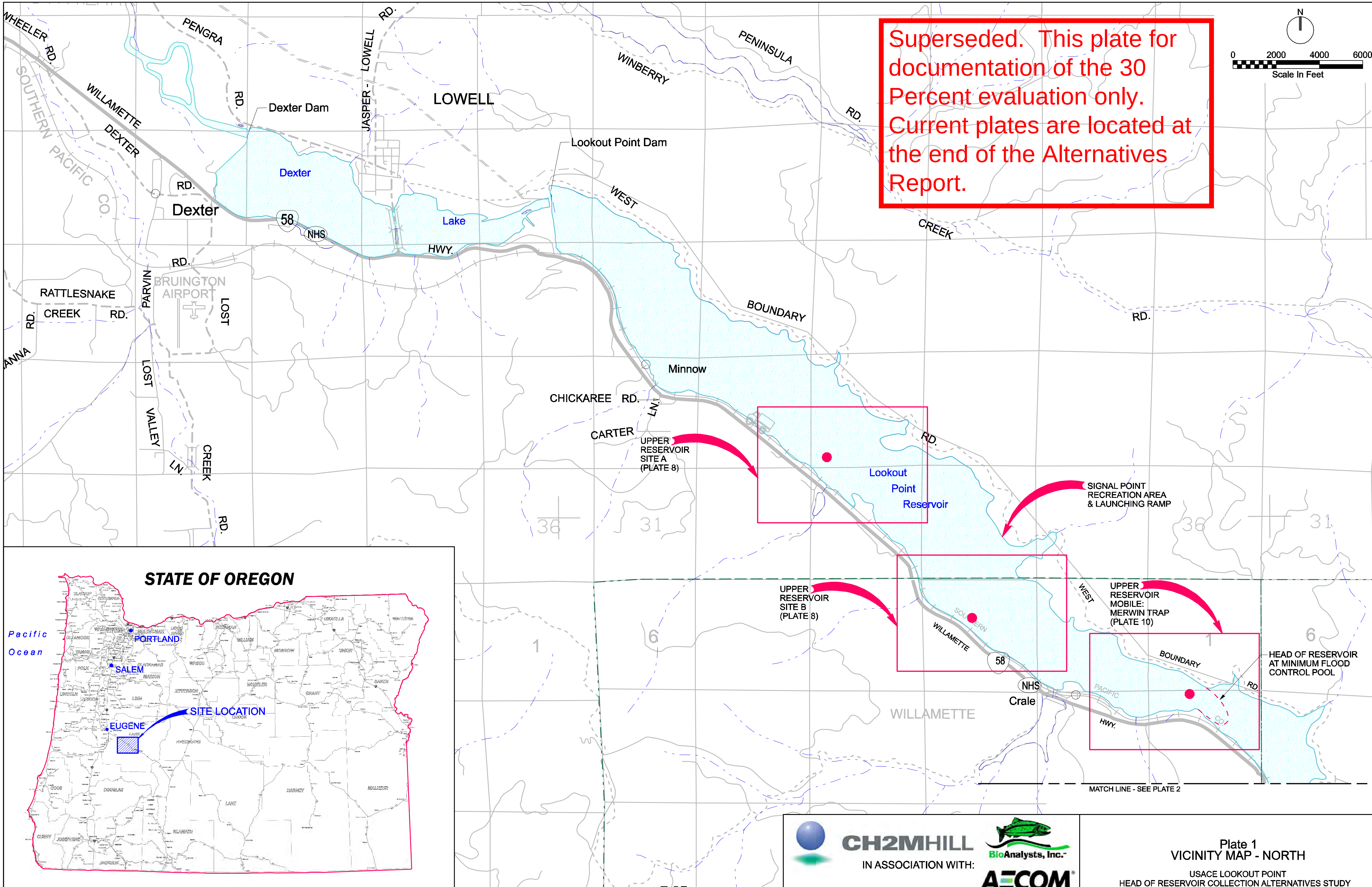
c) **Lower Middle Fork (Island): In-Channel Collector –** This alternative is presented on Plate 15. Because there is no USGS gage on this reach, the 100-year peak discharge was not available; however, it is approximated as the Middle Fork minus the NFMF 100-year discharge, which would be approximately 32,700 cfs. The river gradient is about 0.5 percent as estimated from the FEMA flood profile; therefore, the pool created by a 12-foot diversion dam would extend upstream for approximately 0.45 mile. For this alternative to work using the island, the rubber dam would be approximately 220 feet long and the radial gate would be approximately 30 feet long. Because the available channel width for the diversion dam is only 100 feet, excavation of a secondary flood channel would be required, which makes this alternative not attractive.

d) **Lower Middle Fork (Island), Off-Channel Collector –** This alternative is presented on Plate 16. The location of this alternative is the same as the Lower Middle Fork (Island): In-Channel Collector discussed above; therefore, the flows, river gradient, and diversion pool influence are the same. In this alternative, the diversion dam was placed directly in the river with the collector being located off-channel. The collector, channel, and facility would be built in the floodplain; thus, a lot of imported material would need to be brought to the site to elevate the structures.

This page was intentionally left blank.

5- 30 PERCENT AR PLATES

This page was intentionally left blank.

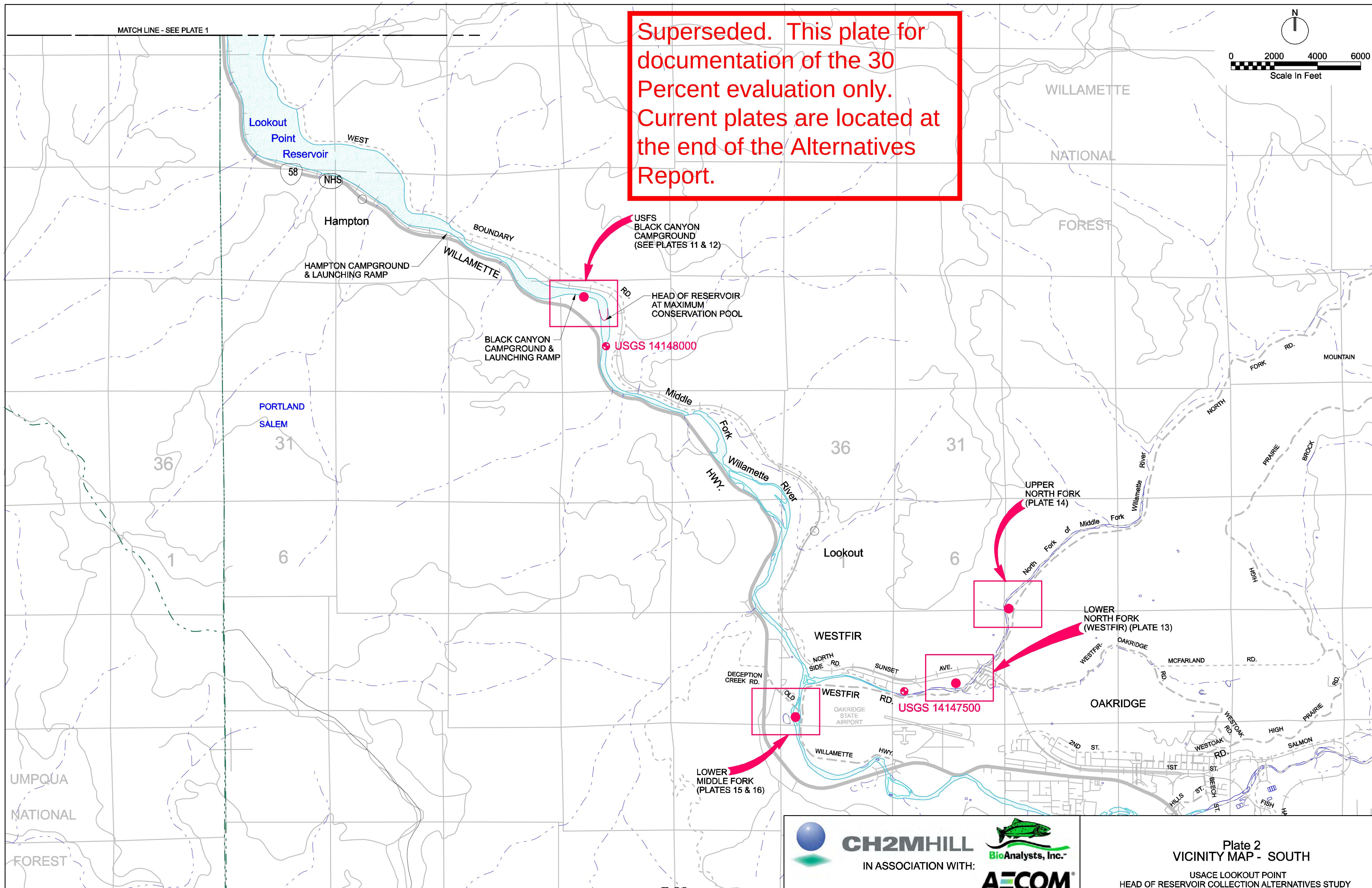


CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

Plate 1
VICINITY MAP - NORTH
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

E-27

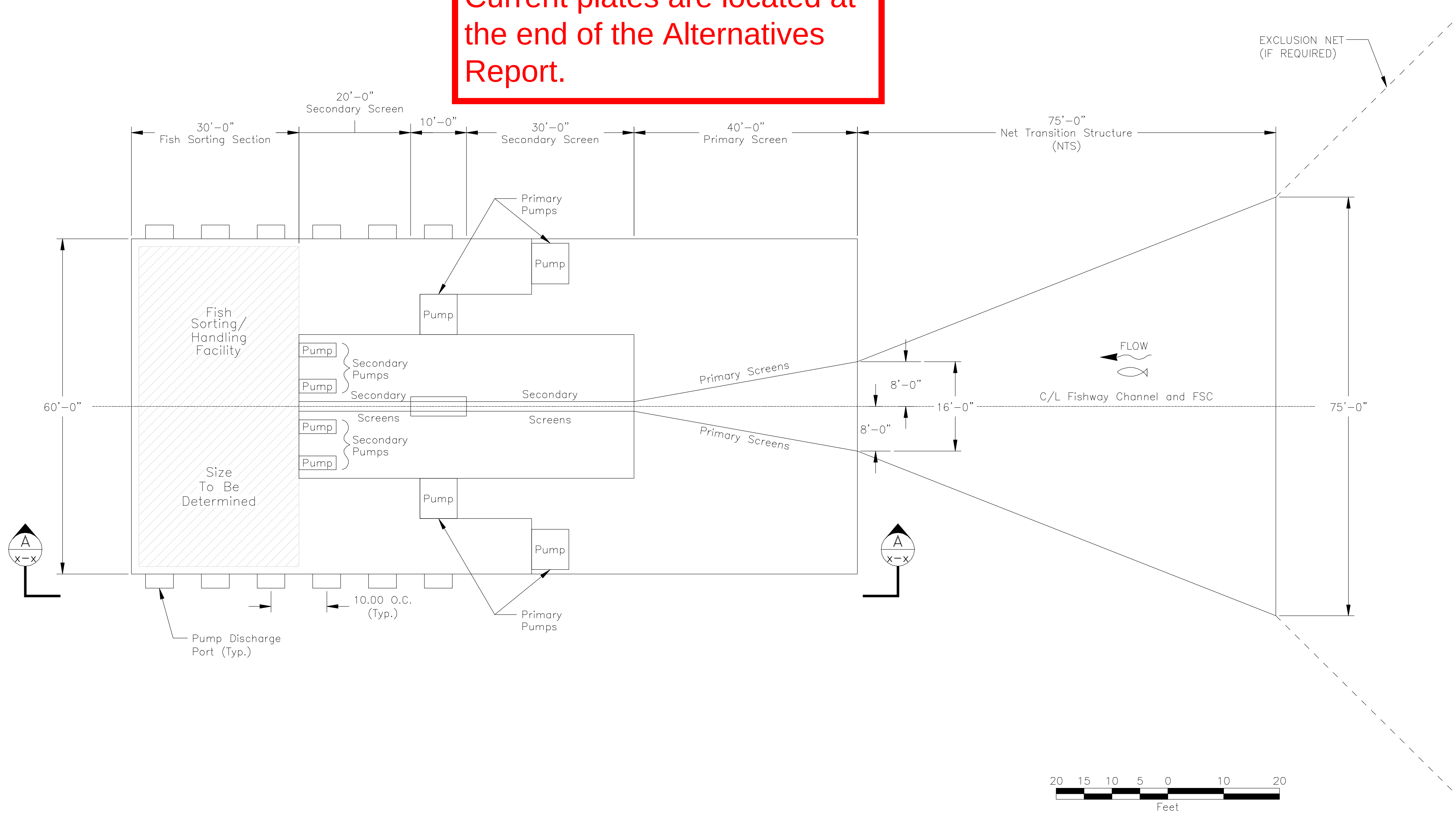
402429. FILENAME: 402429-Plate1.dgn PLOT DATE: 7/9/2010 PLOT TIME: 1:07:35 PM



F-28

402429. FILENAME: 402429-Plate1.dgn PLOT DATE: 7/9/2010 PLOT TIME: 12:33:20 PM

Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.



Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-050, 03/15/08

CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

Plate 3

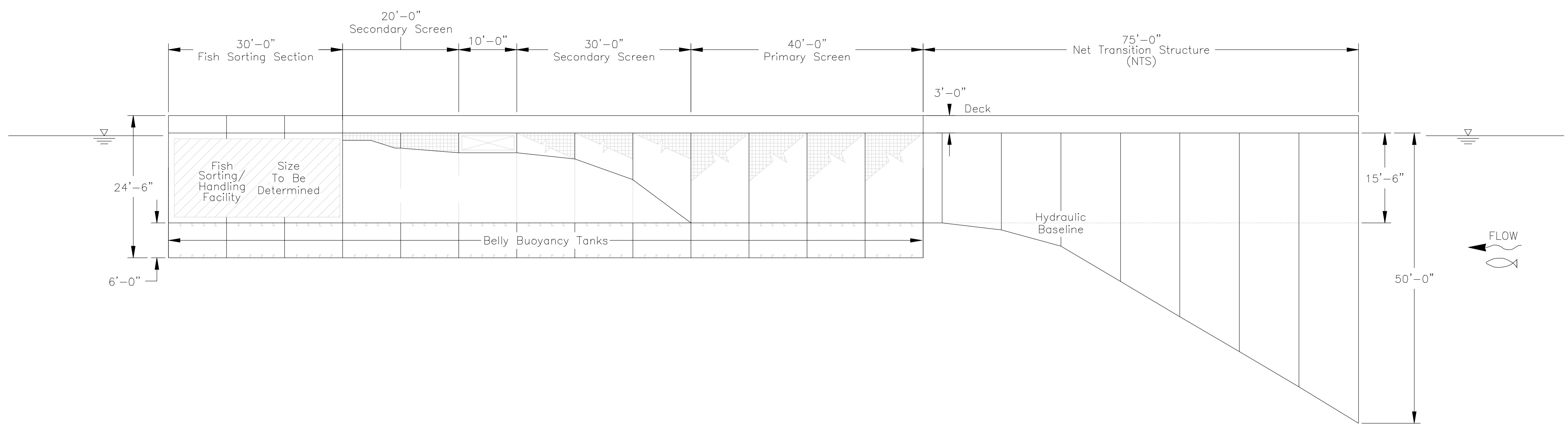
UPPER RESERVOIR, IN-RESERVOIR: GULPER / FSC (500 CFS) PLAN

USACE - LOOKOUT POINT

HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: 500 CFS FSC.dwg PLOT DATE: 07/08/10 PLOT TIME: 12:44 pm

Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.



Section A x–x

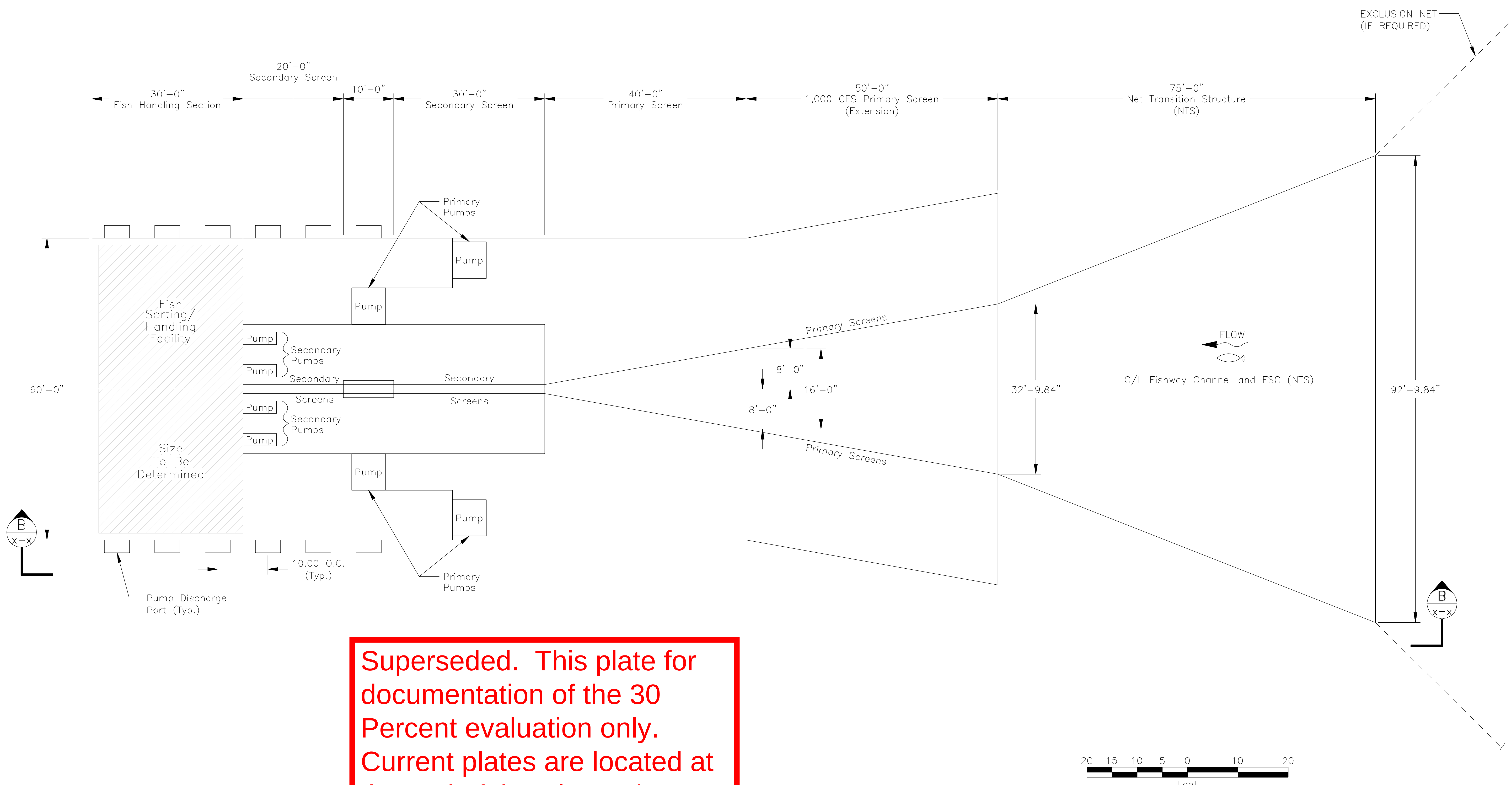
20 15 10 5 0 10 20
Feet

Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA–050, 03/15/08

CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 4
UPPER RESERVOIR, IN-RESERVOIR: GULPER / FSC (500 CFS) SECTION
USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: 500 CFS FSC-Sec.dwg PLOT DATE: 07/08/10 PLOT TIME: 01:36 pm



Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.

Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-051, 03/15/08

CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

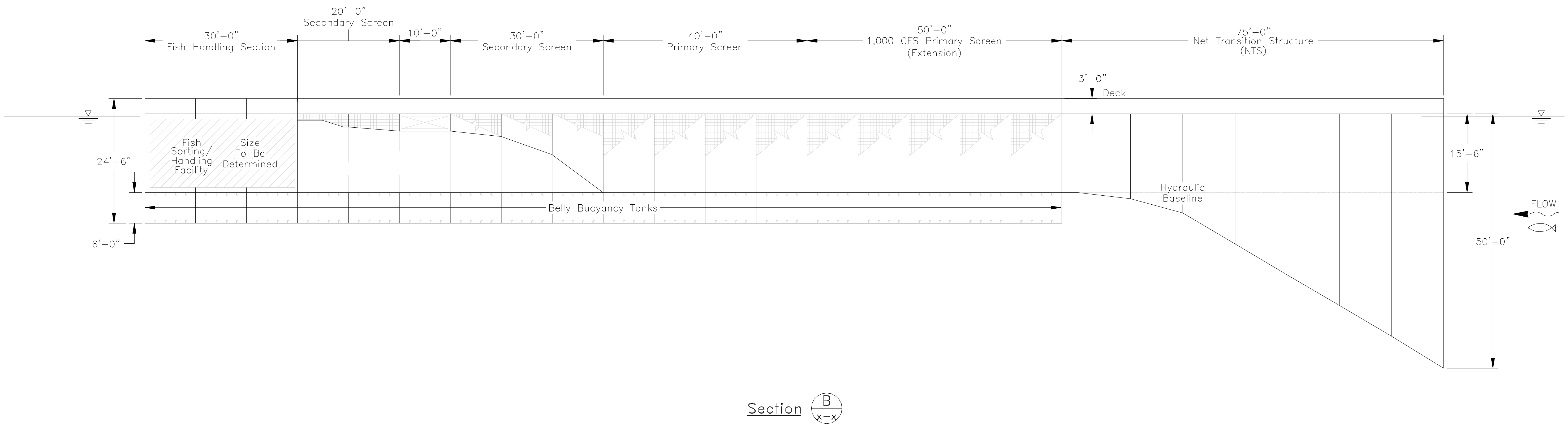
Plate 5

UPPER RESERVOIR, IN-RESERVOIR: GULPER / FSC (1,000 CFS) PLAN

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: 1,000 CFS FSC.dwg PLOT DATE: 07/08/10 PLOT TIME: 10:00 am

Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.



Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA–050, 03/15/08

CH2MHILL BioAnalysts, Inc. AECOM

Plate 6

UPPER RESERVOIR, IN-RESERVOIR: GULPER / FSC (1,000 CFS) SECTION

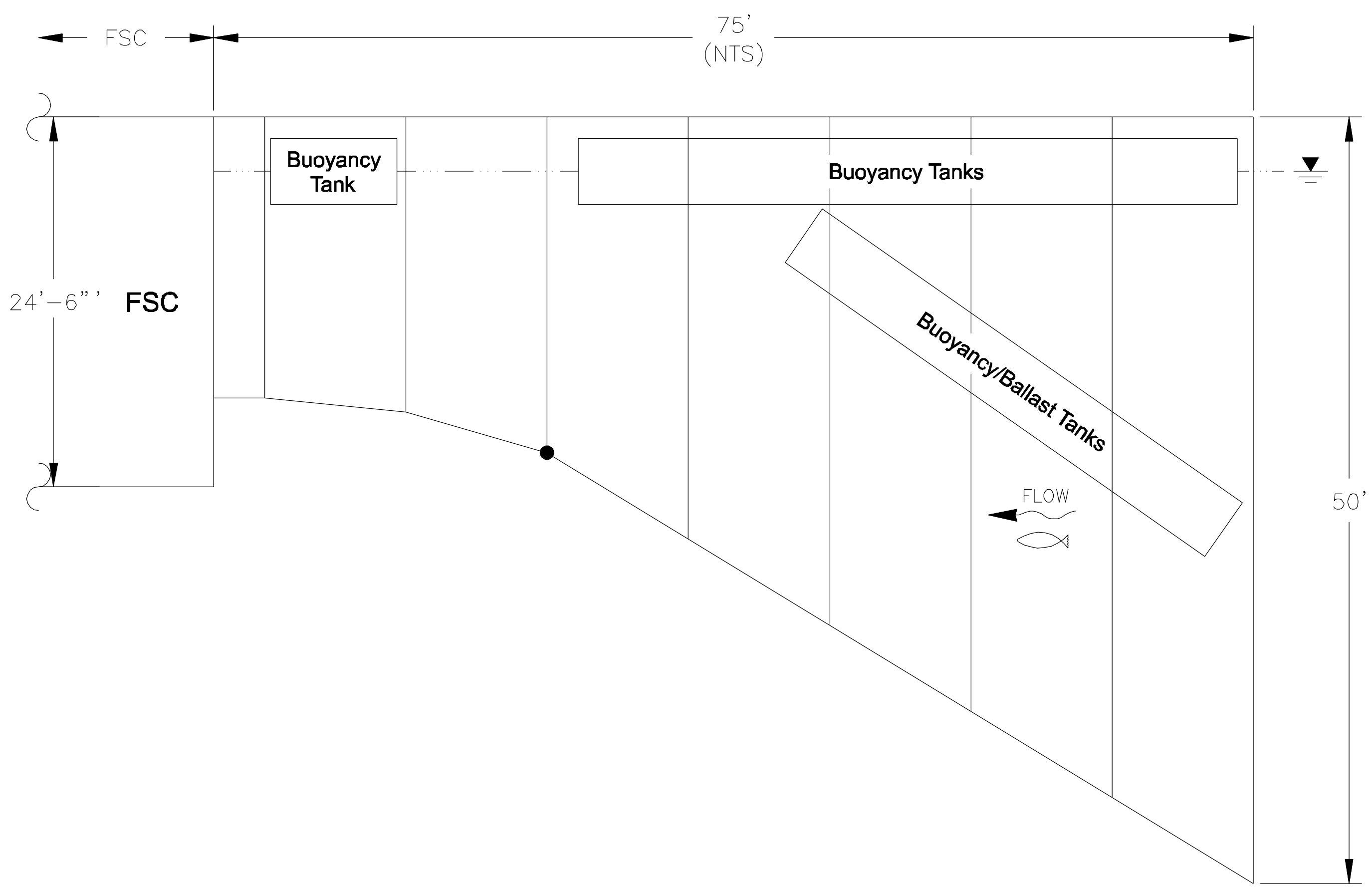
USACE - LOOKOUT POINT

HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

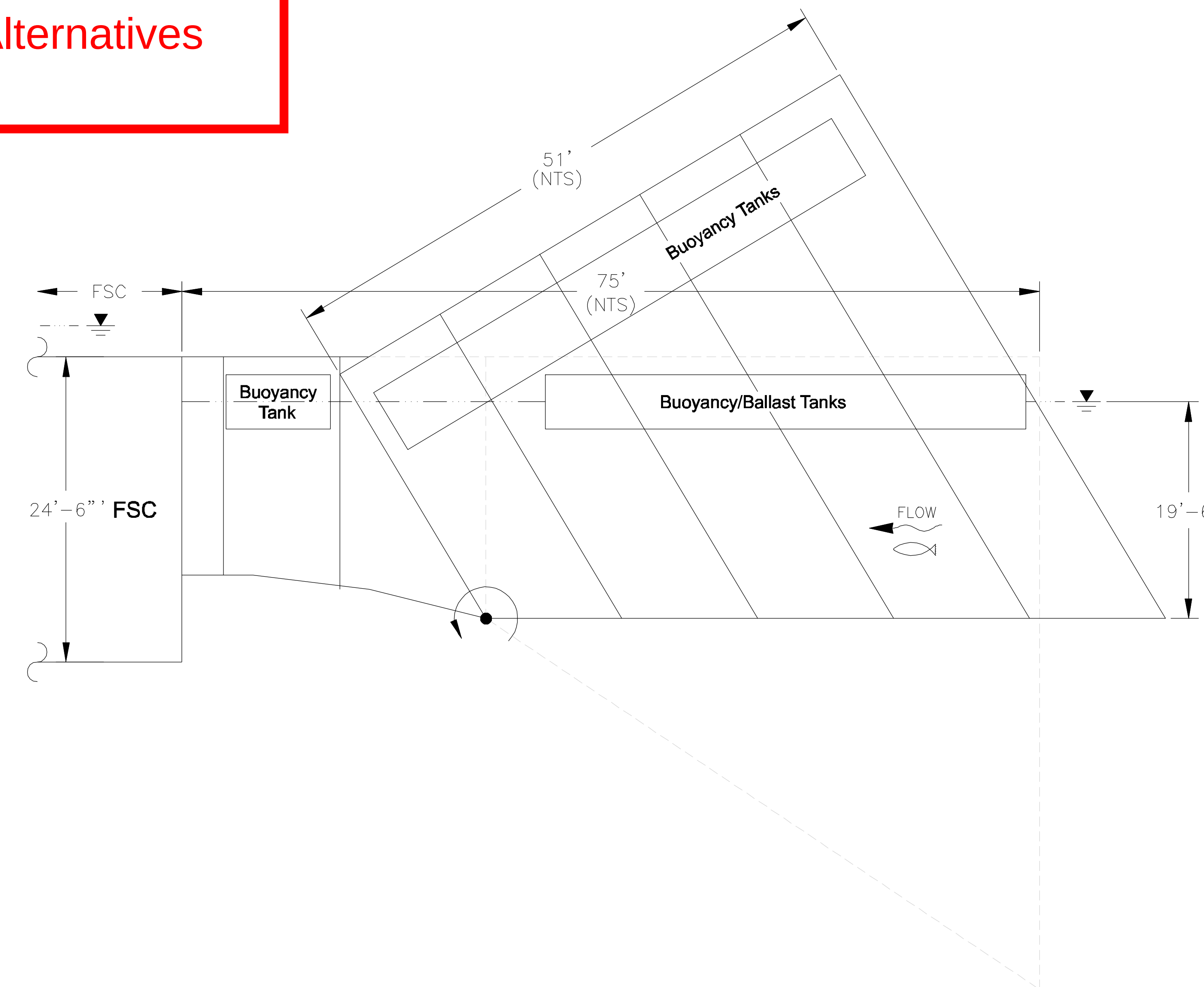
FILENAME: 1,000 CFS FSC-Sec.dwg PLOT DATE: 07/08/10 PLOT TIME: 01:01 pm

Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.

Full Draft Position



Minimum Draft Position



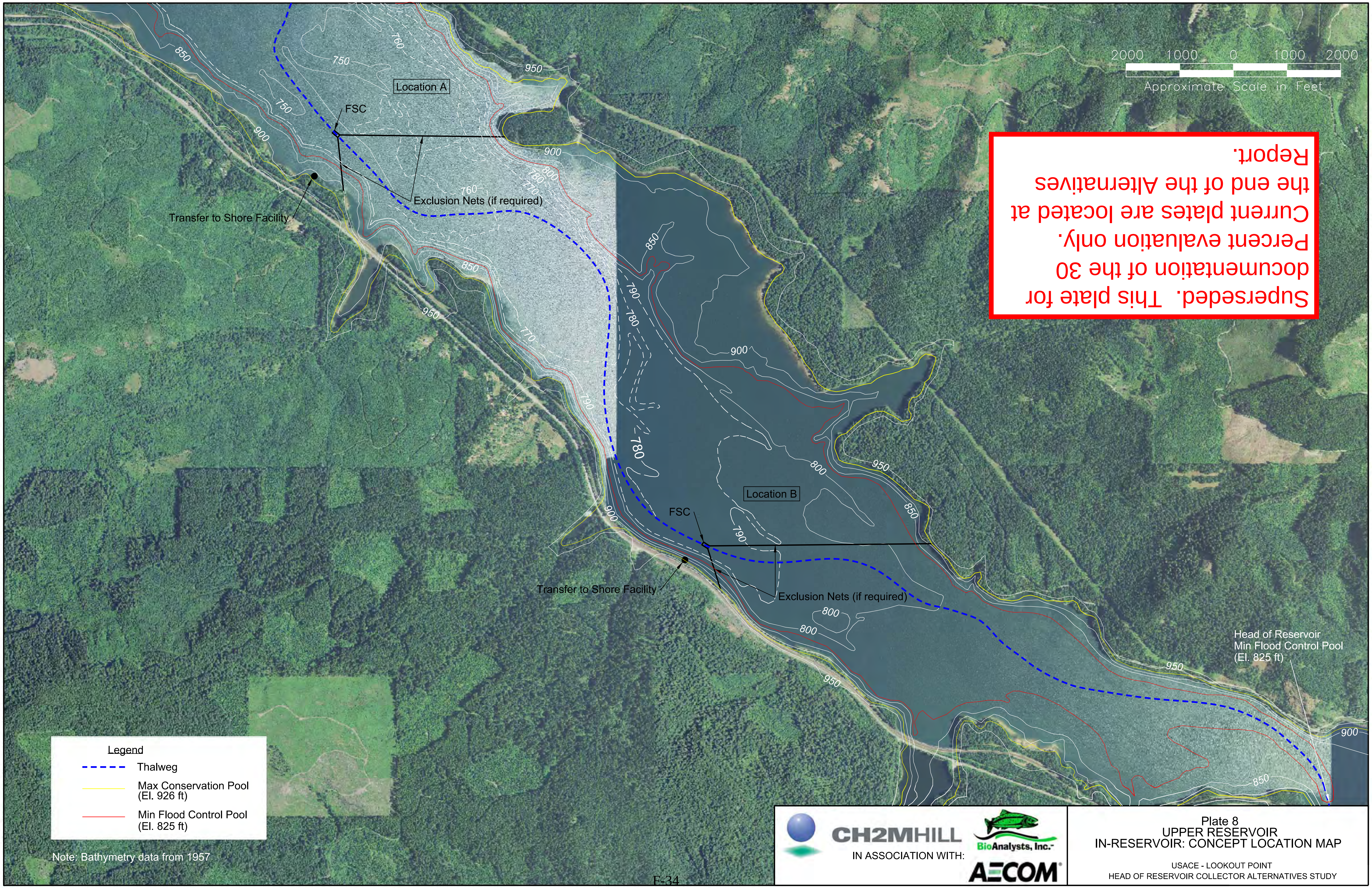
CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 7

UPPER RESERVOIR, IN-RESERVOIR:
ADJUSTABLE NTS SCHEMATIC

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: NTS - Plan View.dwg PLOT DATE: 07/08/10 PLOT TIME: 1:41 pm



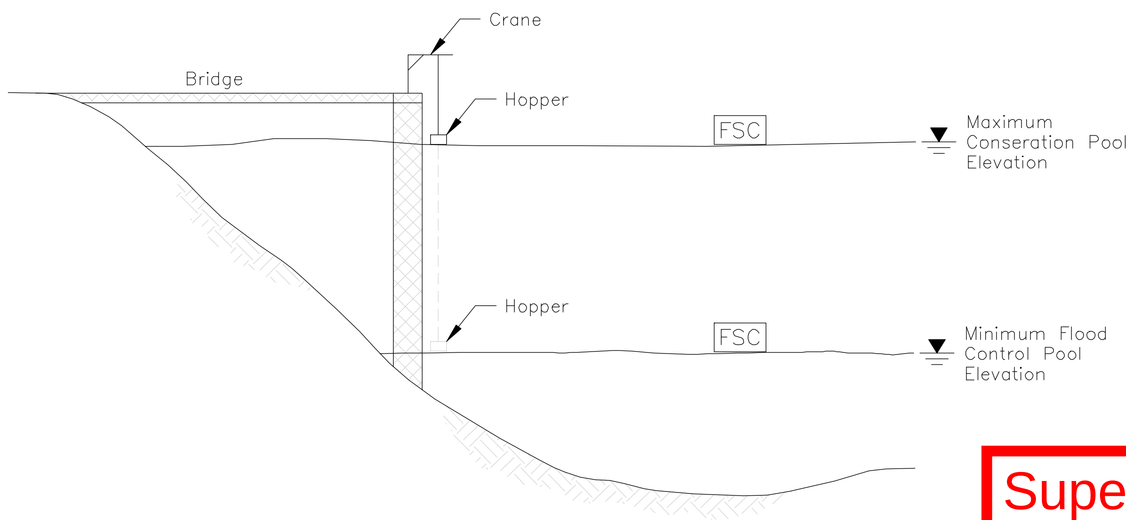
Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.

Plate 8
UPPER RESERVOIR
IN-RESERVOIR: CONCEPT LOCATION MAP

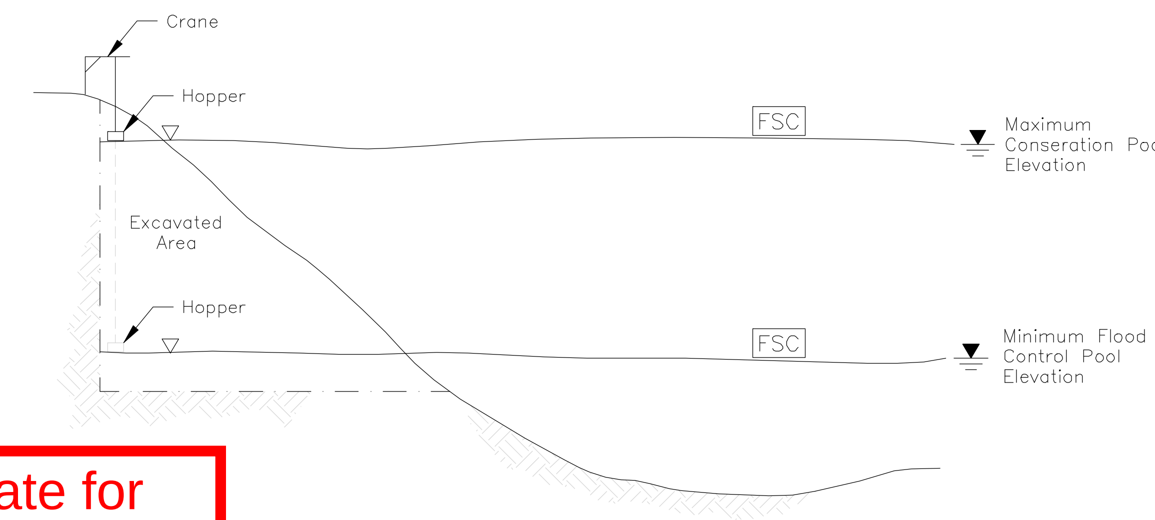
USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTOR ALTERNATIVES STUDY

Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.

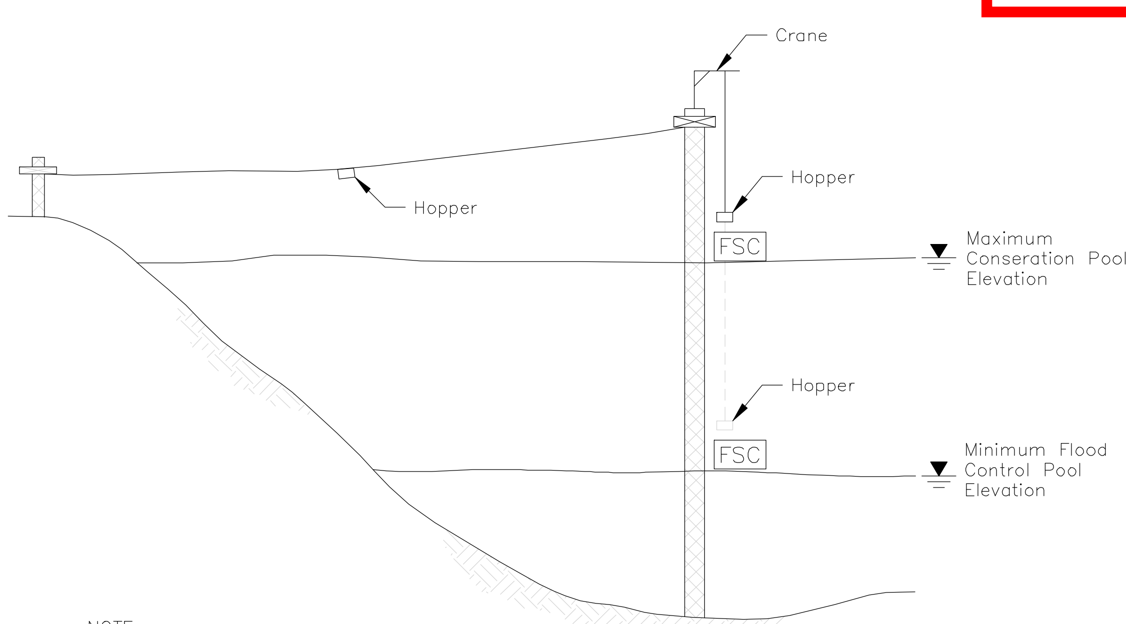
Barge to Tower/Bridge



Barge to Shoreline Channel/Crane

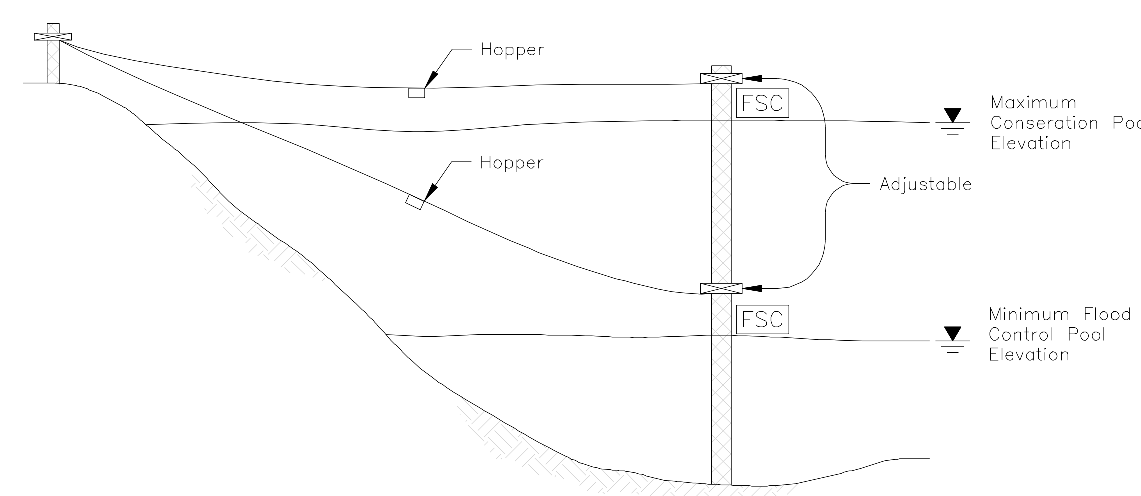


Crane to Aerial Tram



NOTE
THESE FOLLOWING OPTIONS ARE NOT SHOWN:
- BARDGE TO DAM
- AMPHIBEOUS VEHICLE
- SHORELINE RAIL SYSTEM
- HELICOPTER TRANSPORT

Adjustable Aerial Tram



CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

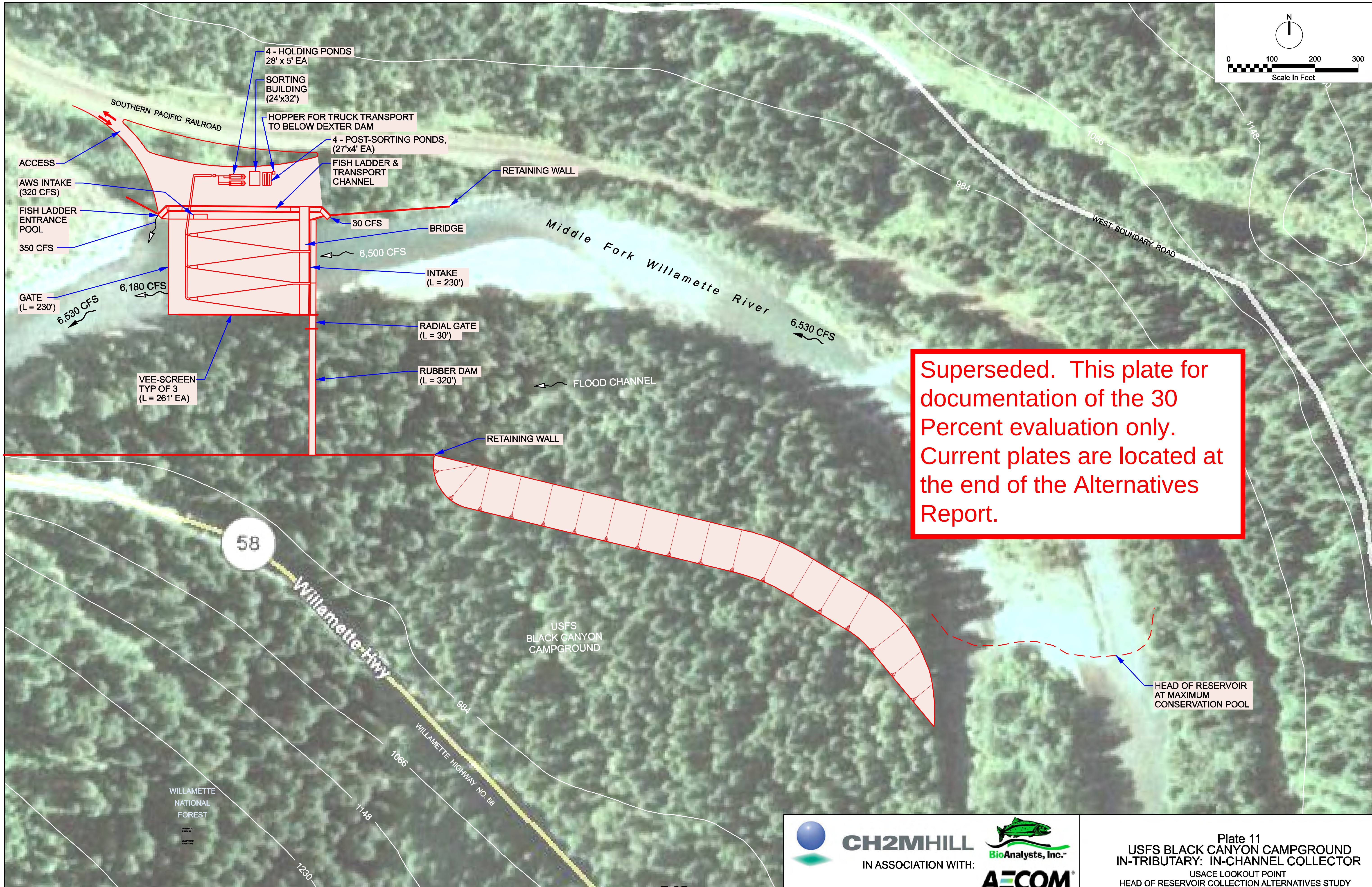
Plate 9

UPPER RESERVOIR, IN-RESERVOIR: TRANSPORT TO SHORE OPTIONS

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: Trans to Shore.dwg PLOT DATE: 07/08/10 PLOT TIME: 9:58 am

402429. FILENAME: 402429-Plate10.dgn PLOT DATE: 7/10/2010 PLOT TIME: 3:11:07 PM

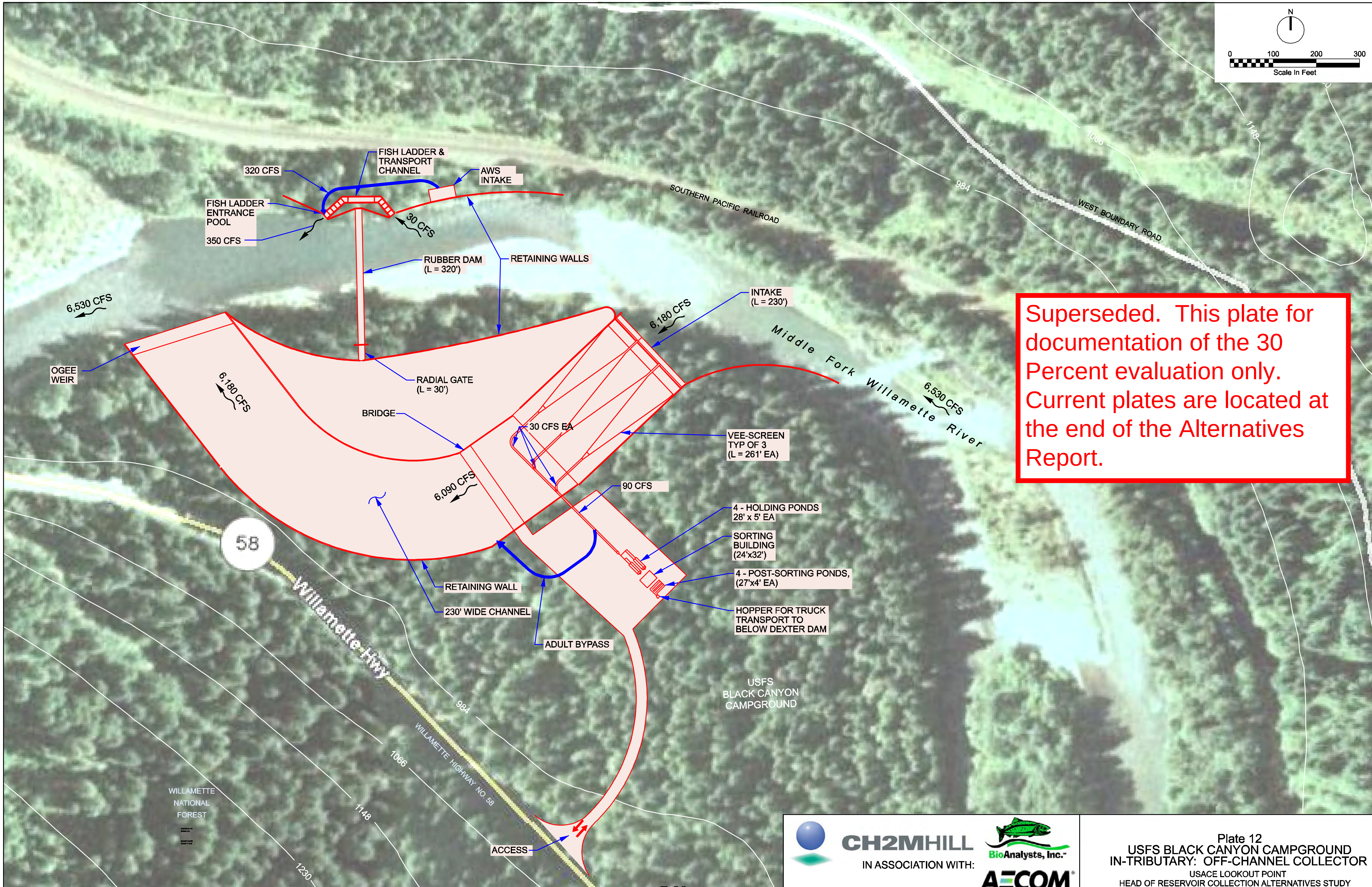


Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.

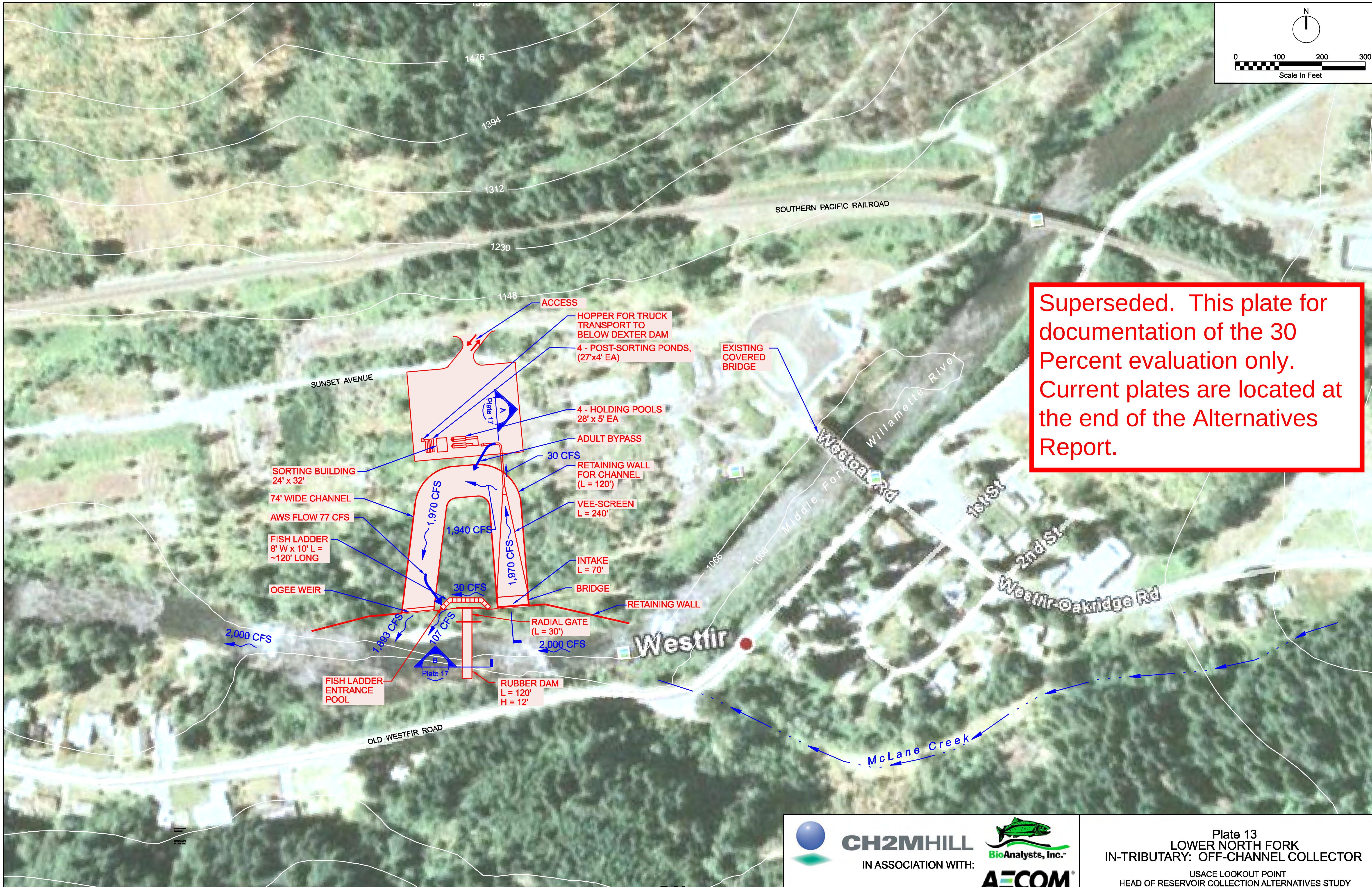
CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

Plate 11
USFS BLACK CANYON CAMPGROUND
IN-TRIBUTARY: IN-CHANNEL COLLECTOR
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

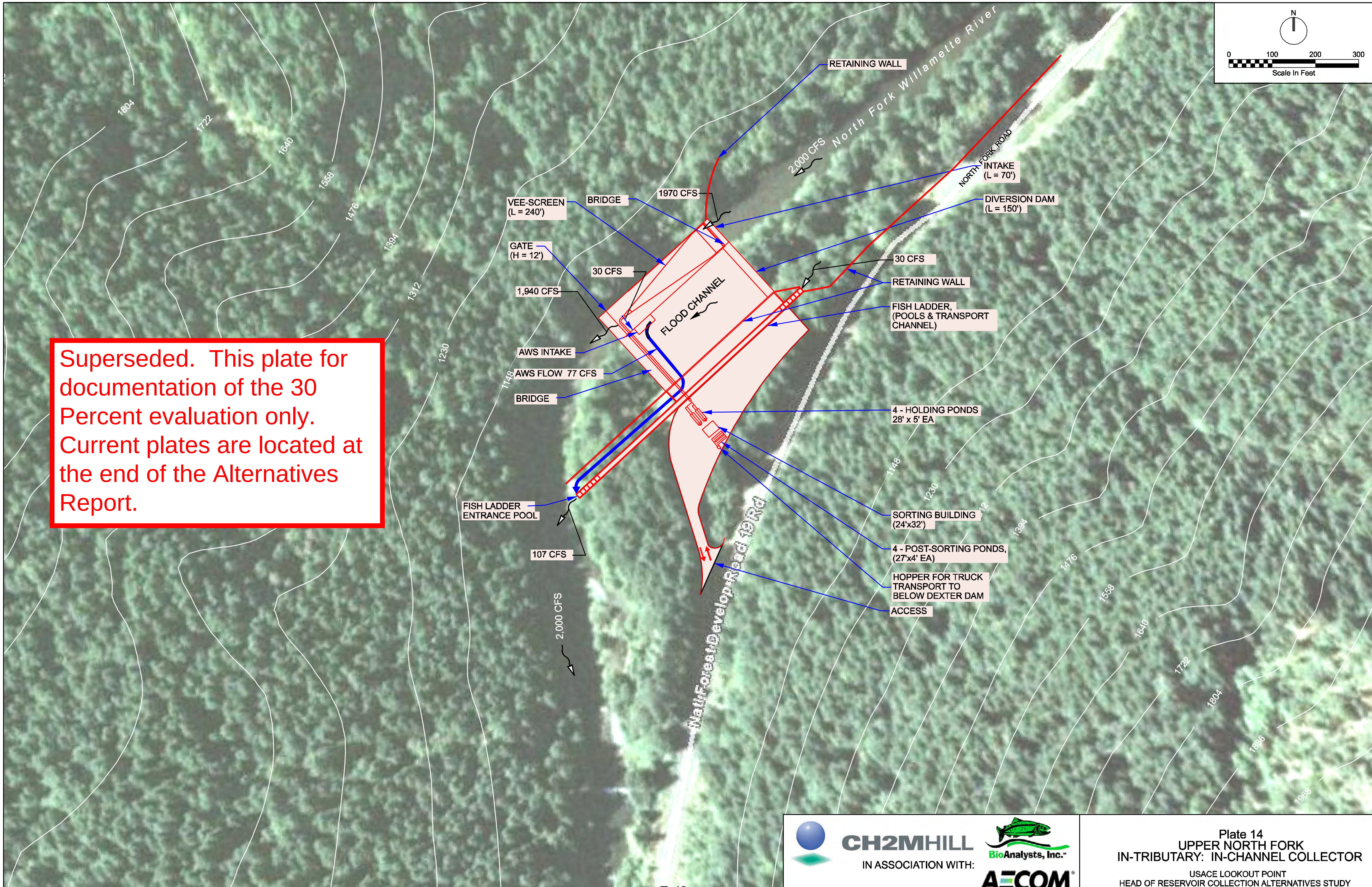
402429. FILENAME: 402429-Plate11.dgn PLOT DATE: 7/10/2010 PLOT TIME: 3:20:49 PM



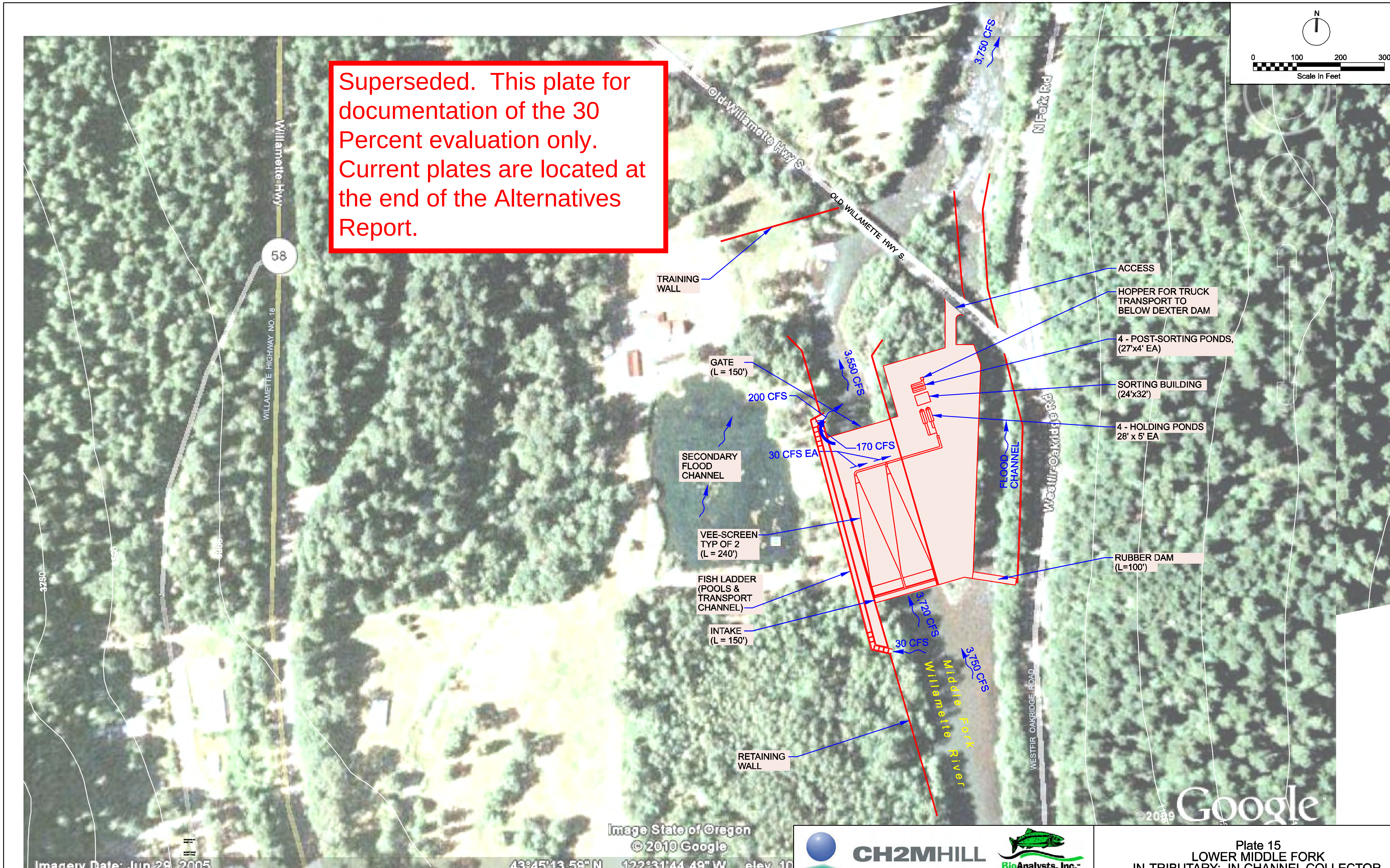
402429. FILENAME: 402429-Plate12.dgn PLOT DATE: 7/10/2010 PLOT TIME: 3:24:45 PM



402429. FILENAME: 402429-Plate13.dgn PLOT DATE: 7/10/2010 PLOT TIME: 3:33:12 PM



402429. FILENAME: 402429-Plate14.dgn PLOT DATE: 7/10/2010 PLOT TIME: 3:37:35 PM



CH2MHILL

IN ASSOCIATION WITH:

BioAnalysts, Inc.

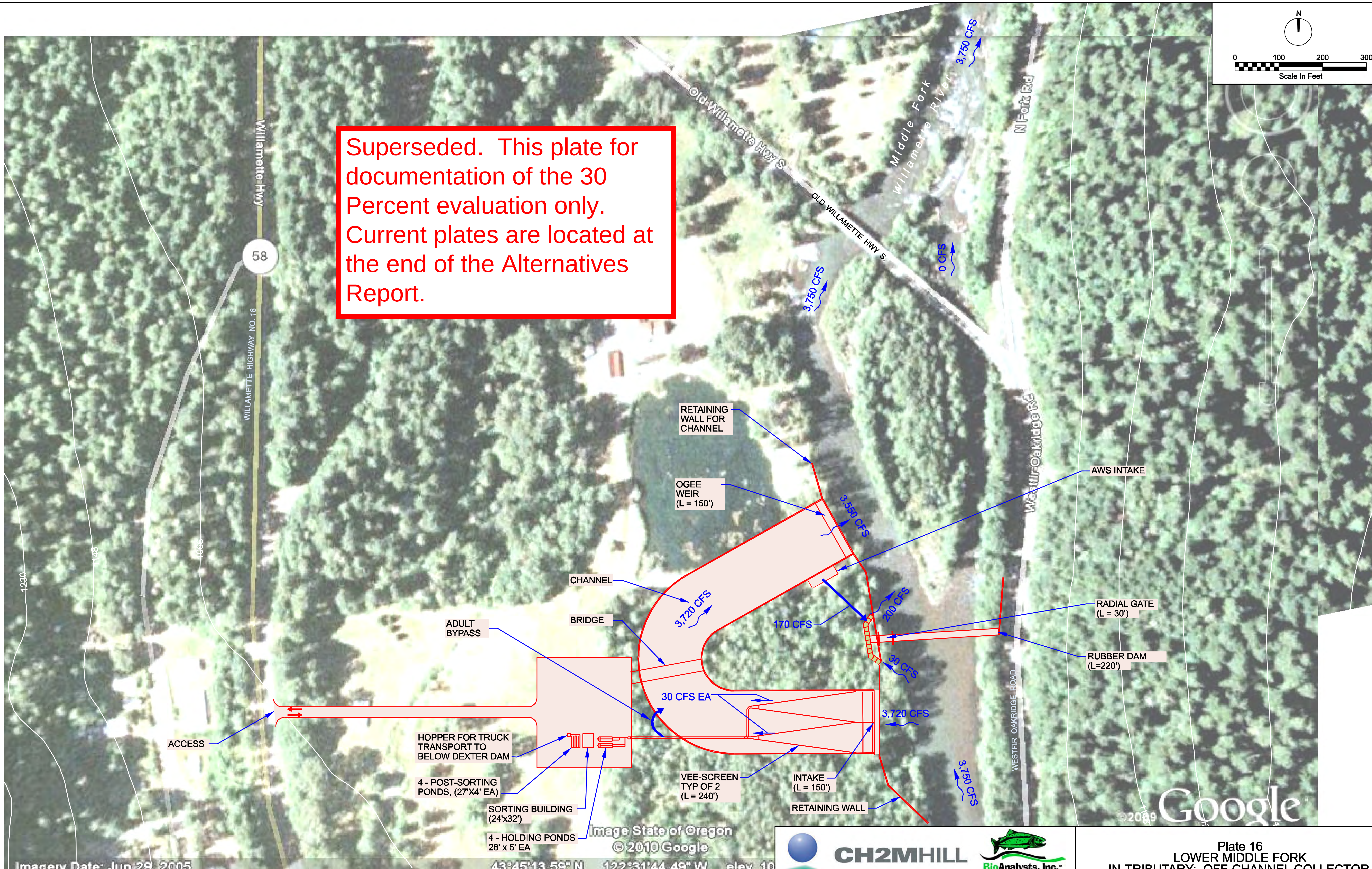
AECOM

Plate 15
LOWER MIDDLE FORK
IN-TRIBUTARY: IN-CHANNEL COLLECTOR

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate15.dgn PLOT DATE: 7/12/2010 PLOT TIME: 8:52:12 AM

Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.

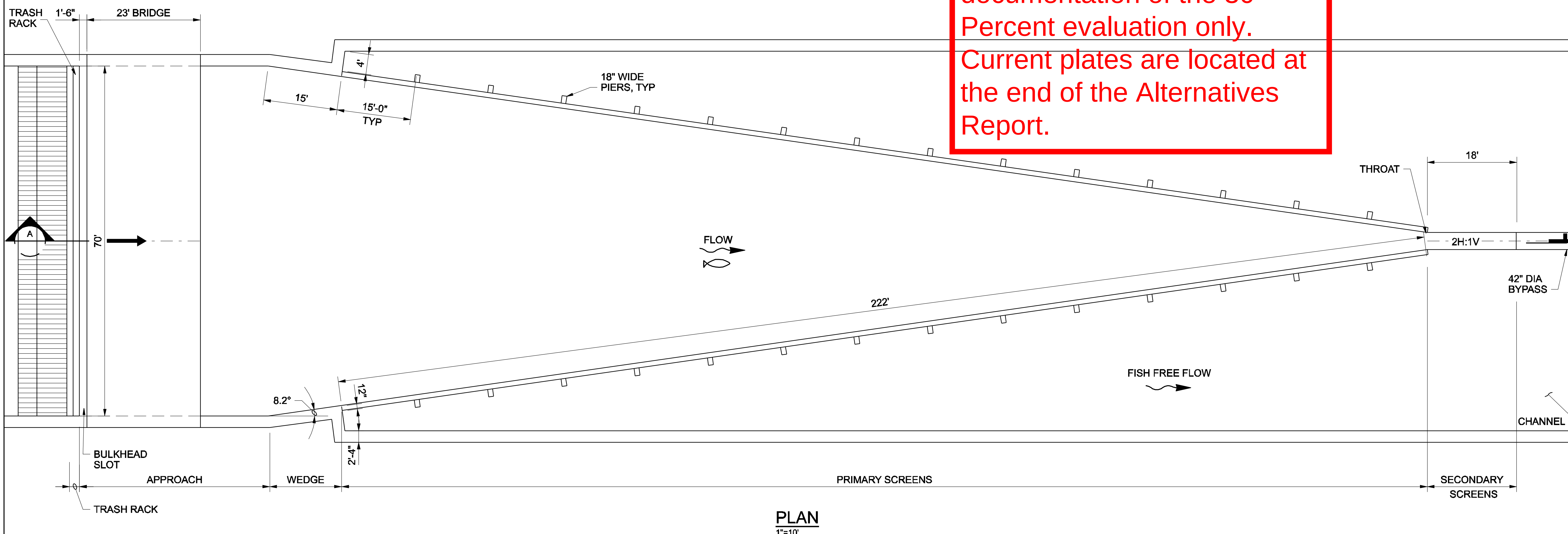


CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

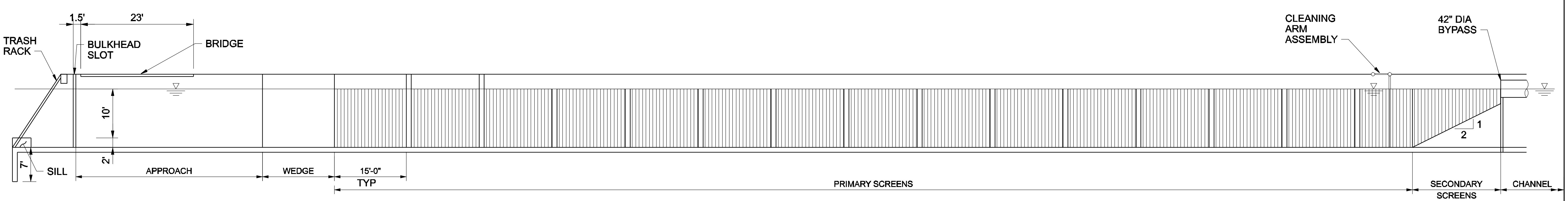
Plate 16
LOWER MIDDLE FORK
IN-TRIBUTARY: OFF-CHANNEL COLLECTOR
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate16.dgn PLOT DATE: 7/12/2010 PLOT TIME: 8:53:22 AM

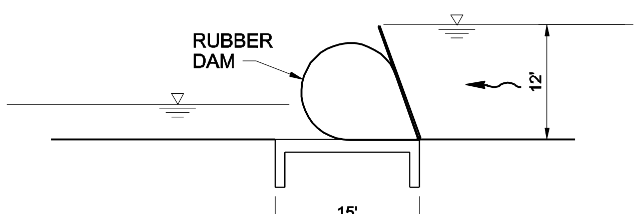
Superseded. This plate for documentation of the 30 Percent evaluation only. Current plates are located at the end of the Alternatives Report.



PLAN
1"=10'



A SECTION
1"=10'
PLATE 13



B SECTION
NTS
PLATE 13

CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 17
VEE-SCREEN
TYPICAL PLAN AND SECTION
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate17.dgn PLOT DATE: 7/9/2010 PLOT TIME: 7:16:19 AM

This page was intentionally left blank.

6. ALTERNATIVES DEVELOPED FOR 60 PERCENT

The following describes the alternatives developed for the 60 Percent Alternatives Evaluation, which are listed in Table F-9.

TABLE F-9 LIST OF 60 PERCENT ALTERNATIVES

Site Location		Collection Technology	Notes
1a	Upper Reservoir	In-Reservoir: FSC without Nets	500-cfs attraction flow
1	Upper Reservoir	In-Reservoir: FSC with Nets	500-cfs attraction flow
2	Upper Reservoir	In-Reservoir: FSC with Nets	1,000-cfs attraction flow
3	Upper Reservoir	Mobile: Merwin Trap	
6	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	Adjustable crest diversion
9	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	Adjustable crest diversion

cfs = cubic feet per second
FSC = floating surface collector
USFS = U.S. Forest Service

SELECTED IN-RESERVOIR ALTERNATIVES

The in-reservoir alternatives prioritized for further consideration during the 60 Percent Alternatives Evaluation are as follows:

- In-Reservoir: FSC without Nets (500-cfs attraction flow)
- In-Reservoir: FSC with Nets (500-cfs attraction flow)
- In-Reservoir: FSC with Nets (1,000-cfs attraction flow)

Adaptive Management Approach

Other than the Upper Reservoir Mobile: Merwin Trap, which would be more appropriate as a prototype or RM&E facility, the remaining in-reservoir alternatives are all based on FSC technology at the same location, the Upper Reservoir. These common features lead to consideration of an adaptive management or phased approach to facility development in order to answer two critical questions:

a) Is a full-exclusionary net system required in order to meet biological performance goals? At Upper Baker (AECOM and BioAnalysts, 2010), partial-depth nets were used initially but were extended to full-depth to improve performance. The design of full-exclusionary nets for an FSC that must operate over a 100-foot range in reservoir WSELs is extremely challenging. The net system either must be actively managed with a cable-winch system to deploy the necessary amount of net to match the water depth, or the excess net must be allowed to fold and drape on the reservoir bottom. The reservoir bottom must be cleared of debris to prevent snagging and tearing of the net. A billowing net may also form pockets that could trap or delay fish heading for the FSC entrance. If a partial-depth net or no net could be successful, these problems could be eliminated.

b) What collection flow is required? A flow range of 500 to 1,000 cfs has been selected, again based on the Upper Baker precedent. Testing would be required to identify the most effective and feasible flow rate. This issue could be reassessed with a CFD study during the design phase if this alternative moves forward.

The FSC alternative could be implemented without nets at a location that could accommodate the addition of partial- or full-exclusionary nets at a future date if biological performance warranted it. However, it is anticipated that the fish collection potential would be low (14 percent) for this approach.

Another concern associated with this approach is the ability of the FSC to collect juveniles that migrate along the shallow shoreline. The large draft of the facility prevents locating the facility near the shore, and extending the entrance signature into these areas would be difficult. Mobile Merwin traps would be better suited for these locations.

Again similarly to Upper Baker, the FSC could be designed with a 500-cfs flow, but with pump capacity installed (or provisions for installation) that could allow testing at 1,000 cfs, with a temporary test facility exemption on the fry approach velocity criterion of 0.4 fps. The design could incorporate the potential to increase the screen area to accommodate the higher flow at the criterion approach velocity if biological test results warranted both the increased flow rate and screen area.

It is recommended that the 500-cfs FSC with nets alternative be considered, as well as the 1,000-cfs FSC with nets alternative (in that order), as a way of phasing the collection system development. A system that does not require nets may be feasible but would need to be located at the dam, thereby using the dam and abutments for partial guidance.

While many of the design details for the FSC are based on the Upper Baker structure, the technical challenges presented by the Lookout Point Reservoir's 101-foot fluctuation and the focus on the head of reservoir are unprecedented. It is not a straightforward matter to design a structure in the middle of the reservoir with the capability to move up and down 101 feet while maintaining the same horizontal location. Complicating this issue is the potential need for a full-exclusion net that also needs to rise and fall 101 feet. These difficulties are further complicated by not being located near the dam. These design barriers do exist but are not insurmountable.

In-Reservoir FSC System Components

The three FSC-based collection facility alternatives will consist of the following components, each of which may be considered individually as a building block that influences other aspects of the facility:

a) **FSC –** The design capacity of the FSC may be 500 cfs, 1,000 cfs, or adaptable from 500 to 1,000 cfs for the alternatives currently under consideration.

b) **Net Transition Structure –** The NTS establishes the entrance velocity to the FSC and connects the exclusion net, if employed. The NTS may have either a fixed or an adjustable draft to accommodate reservoir level changes.

c) **Site Location –** The FSC must be located so that sufficient water depth is available and so that the FSC and NTS do not ground at the minimum flood control pool. This location is driven by pool elevation, bathymetry, exclusion net requirements, and the draft of the FSC and NTS.

d) **Exclusion Nets –** The need for exclusion nets, whether they are partial- or full-exclusion nets, is associated with site location and will dictate the need for special adult and resident fish passage considerations as well as O&M requirements.

e) **Fish Transfer –** Transfer of fish from the FSC to transport trucks in a manner to accommodate the reservoir pool range may be accommodated in a number of different ways. Transportation by boat to a transfer facility located at the dam was selected as the potential option with which to proceed forward.

The following sections describe the development of conceptual designs of each of these components.

Floating Surface Collector

The existing Upper Baker FSC design is being used as the basis for these alternatives. The design consists of a floating barge containing a large vee-screen with onboard pumps to drive the flow through the system. A fish transfer facility is located at the rear of the FSC. A large NTS is attached to the front of the FSC and is used to help extend the flow field in a controlled manner into the reservoir. The standard design is for a 500-cfs collector. Plan and section views of the design are presented in Plates 3 and 4.

Only two of the proposed four primary pumps are needed to provide 500 cfs of collector flow. The other two pumps are redundant for the 500-cfs scenario but can be used in tandem with the two main pumps to provide a collection flow of 1,000 cfs. As the design stands currently, if the facility is operated at 1,000 cfs there is no backup primary pump and there are two backup primary pumps for the 500-cfs operating point. The facility is designed such that an additional section of screens can be added to the front of the vee-screen to bring the facility into screen approach velocity criteria (0.4 fps) at this higher flow rate, if deemed necessary. Plan and section views of the 1,000-cfs facility are presented in Plates 5 and 6. The only differences between the 1,000-cfs facility and the 500-cfs facility are the 50-foot extension of screens and a wider NTS structure by approximately 17 feet. The rest of the structure is exactly the same for both configurations.

While a FSC flow rate of 500 or 1,000 cfs is being presented for this Alternatives Study, if an FSC alternative were selected to proceed to detailed design, the flow rate would need to be optimized for the given conditions.

A water surface profile and velocity data from the field startup of the Upper Baker FSC are presented in Figure F-1 (AECOM, 2009). The data were collected at 10-foot intervals along the centerline of the screens. Velocities gradually increase across the primary screens and peak in the secondary channel, where a capture velocity is obtained. If the screen capacity were expanded to meet approach criteria for 1,000 cfs by adding additional screen area upstream of the existing primary screens, the velocity profile would look the same as the one presented in Figure F-1—with an added length of velocities in the 2- to 3-foot range covering the additional primary screen area.

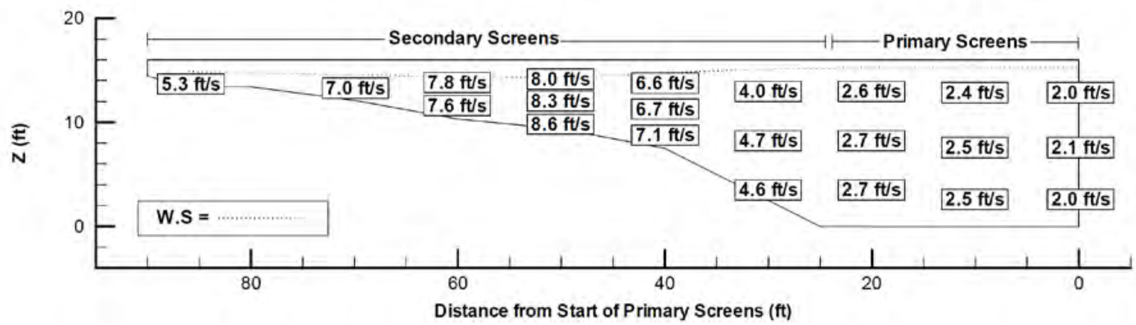


Figure F-1. Screen Outline, Water Surface Profile, and Velocities for 500-cfs FSC

The mooring system for the FSC will need special consideration. The normal operating range from the minimum flood control pool of 825.0 to the maximum conservation pool of 926.0 creates a swing of 101 ft. Given the historical maximum and minimum, this swing could be even greater. The mooring system will need to allow for a minimum swing of 101 ft in the forebay while maintaining a relatively constant horizontal location. This points towards an actively managed system, with winches on the FSC to take in and let out cable as needed to maintain the same horizontal location. The moorings may need to be detachable to allow the structure to be moved during extreme events. It will also need to allow for boat passage, thus eliminating shore-based anchors with cables near the water surface as used at the Upper Baker facility. This would suggest anchors on the bottom of the reservoir, with cables to the structure where adjustable winches would be used to control the location. A mooring tower could also be constructed in the reservoir to which the FSC would be attached and allowed to follow the changing reservoir elevation. Other potential solutions may be found by looking at oil drilling platforms and the methods they use for maintaining position.

If this FSC design is constructed during the off-season, the belly ballast tanks can be filled with air, resulting in the whole structure (except the belly ballast tanks) being out of the water. This ability facilitates O&M tasks during the off-season as all components are dewatered, as well as allowing for reduced exposure of the components.

Net Transition Structure

Following the Upper Baker precedent, a 50-foot-deep by 75-foot-wide NTS is attached to the front of the collector. This 50-foot draft is a significant increase over the 25-foot draft of the facility alone and forces the collector location downstream in the reservoir to avoid potential grounding of the facility at the minimum flood control pool (El. 825 feet). A potential solution to allow for a full NTS, as well as allowing a shallower draft, is presented in the form of an adjustable NTS. The concept structure would have a pivot point in the floor and dual sets of buoyancy/ballast tanks that would allow the lower portion to pivot up to minimize draft during periods of low reservoir levels. A schematic of the concept is presented on Plate 7. A removable spacer or other method would be required as part of the adjustable NTS design to close off the gap in the sidewall created when rotating the front section upwards. If exclusion nets are used, some of the netting would be out of the water as the nets are attached to the front of the structure. This also would create billowing of the net in the immediate vicinity of the entrance and may cause guidance delay. While technically possible, an adjustable NTS would add complexity to the design and operation of the facility but may allow the facility to be located farther upstream in the reservoir.

The NTS controls the projection of the entrance signature as well as allows for control of the flow acceleration into the collector. Velocities at the entrance of the NTS are presented in Table 4-2. The table includes values at flows of 500 and 1,000 cfs for the 500-cfs FSC design, with a full 50-foot depth NTS as well as an NTS in the shallow draft position. Also included are values for a flow of 1,000 cfs but with the added screen capacity necessary to meet screen criteria for the greater attraction flow. This widens the NTS and thus increases the NTS entrance area. For comparison, average ambient reservoir velocities for the minimum flood control pool and maximum conservation pool are included in Table 4-2 for the proposed locations A and B (described below). These values were calculated using the reservoir cross-sectional area at the stated pool elevation for the reservoir design discharge.

While the NTS does assist in projecting the entrance signature into the forebay, the extent is relatively small compared with the size of the reservoir. This is evident when comparing the cross-sectional area at the end of the NTS (3,750 sq ft) with the cross-sectional area of the reservoir at that location (377,000 sq ft for the maximum conservation pool at location B). As such, without guide nets, the FSC may have difficulty collecting juveniles that are located along the shallow shorelines of the reservoir.

Head-of-Reservoir Site

Potential locations for the FSC are driven by the draft of the facility. Because this Alternatives Study is investigating head-of-reservoir collection, the focus is on the farthest upstream location that will allow for the draft of the facility at minimum pool without grounding. Given this criterion, the facility will be located in the historical thalweg, that is, the deepest portion of the reservoir at a given cross-section. The only bathymetric data for the reservoir at present are from 1957 and were collected before the reservoir was filled. Potential locations were sited assuming a minimum of 5 feet of clearance for the facility. As stated before, 5 feet was also added to the historical bathymetry data to account for any potential sedimentation or movement of the thalweg in the 50 years since the data were collected.

Two locations are presented on Plate 8. Location A allows for the full 50-foot draft (sited as a 60-foot draft) of an NTS and location B requires the adjustable NTS so that the structure can be raised to minimize the facility draft at 25 feet (sited as a 35-foot draft). Location A is approximately 3 miles upstream of Lookout Point Dam and location B is approximately 5 miles upstream of the dam. In selecting these two locations, care was taken to allow the required draft as well as to minimize the distance to shore while still being located near the historical river thalweg. Potential FSC location between the presented locations A and B is limited because of the meandering thalweg and shoreline conditions.

Forested land designated as a northern spotted owl CHU and LSR extends to the west bank of the Middle Fork Willamette River, less than 1/8 mile west of the proposed FSC facility. The 12-mile home range circle for Known NSO Site 2876 extends to the west bank of the river. The proposed FSC facility is just beyond the NSO circle.

Exclusion Nets

Given the recommended adaptive management approach for the in-reservoir alternatives, it is proposed that the initial facility not have exclusionary nets but be sited in a location where nets could be added. Both proposed locations provide adequate net area to meet approach velocity criteria. Assuming that the nets are placed at an angle of 45 degrees to the prevailing current, the nets would meet the 0.1-fps approach velocity criteria if ambient velocities were 0.14 fps or below. As shown in Table F-10, ambient velocities at both locations are below this threshold for the full range of pool elevations.

TABLE F-10. NET TRANSITION STRUCTURE ENTRANCE VELOCITIES

	NTS in Normal Position			NTS in Raised Position		
Discharge (cfs)	500	1,000	1,000	500	1,000	1,000
NTS width (ft)	75	75	92.75*	75	75	92.75*
NTS depth (ft)	50	50	50	20.67	20.67	20.67
Area (sq ft)	3,750	3,750	4,637.5	1,550	1,550	1,916.8
Entrance velocity (fps)	0.13	0.27	0.22	0.32	0.65	0.52
Location A ambient velocity at minimum flood pool (825 ft)	0.044			Not applicable		
Location A ambient velocity at maximum conservation pool (926 ft)	0.015			Not applicable		
Location B ambient velocity at minimum flood pool (825 ft)	Not applicable			0.120		
Location B ambient velocity at maximum conservation pool (926 ft)	0.022			Not applicable		

NOTES:
*NTS width expanded to allow for additional primary screens to meet criteria at 1,000 cfs
cfs = cubic feet per second
fps = feet per second
ft = feet
NTS = net transition structure
sq ft = square feet

If collection performance were found to be inadequate, nets could be added to the facility. Log booms would be required to protect the nets from floating debris and – depending on prevailing wind direction – may be required on both sides of the facility.

If full-exclusion nets were used, given the large fluctuations in reservoir elevation, special attention would need to be given to the design of the net system to ensure minimal reduction of guidance efficiency and to reduce potential for snagging of the net on the reservoir bottom during periods of low pool. This could be accomplished by having an active vertical winch system installed along the floating support booms connected to a programmable logic control on the FSC. As the reservoir elevation changed, the winches would reel in or release cable appropriately, creating an effect similar to Venetian blinds. If adjusted from the top, the net near the NTS could not be adjusted over the first 50 ft as it is attached to the structure. It would have to be bunched below the invert of the NTS. Other potential options include a two-net system that uses a series of floats and weights to fold the net at low pool to control where slack sections occur as the reservoir drafts or fills. Any method used would need to take care in ensuring that tangles in the net did not occur when dealing with the extra net. The commercial fishing industry's experience with nets may hold some potential insight into the challenges presented with full-exclusion nets and solutions to those challenges.

Partial-depth nets rather than full-exclusion nets may also be an option for the FSC alternatives. A partial-depth net removes the need to actively adjust the nets with forebay changes but may not produce the required collection efficiency. This approach could significantly reduce capital and O&M costs with potentially only minor impacts to overall performance. Partial-depth nets on the order of 30 to 50 feet in depth are currently being tested on the Columbia River. Hydro-acoustical fish guidance data from 2010 are available. Partial-depth nets were used at first at the Upper Baker FSC before low collection numbers prompted a full-exclusion system.

Shallow shoreline areas will also prove to be an area of difficulty for exclusion nets. It is suggested that solid curtains be used in these areas, potentially separated from the net section by an anchor tower that would be placed at the water surface for the low design pool. The solid curtain would prove to be more durable than the netting and provide less chance for snagging. The tower would help with anchoring the netting over the long distance it needs to cover. It would also mean that the length of the top cable of the porous net section would not need to be adjusted because it would not need to be draped over dewatered shoreline. The shorter run of solid curtain would only have to deal with this issue. The shallow shoreline areas could also be blocked off by a solid guide wall or a rock dike. All of these options would decrease the net cross-sectional area and thus increase the approach velocity, but only for reservoir levels above minimum design pool where values are well below the criteria. Selecting a location and net alignment that involves steep banks on the shoreline will minimize issues presented by the shallow areas.

Resident fish passage would need to be considered if full-exclusionary nets were employed. Solutions for this issue could be as simple as having one or several open areas in the net to allow passage. Or they could be as complex as using the pump discharge flow as attraction water and providing a fish trap, complete with ladder, that terminates at a false weir leading to the upstream side of the net. Management decisions with regard to the handling of resident fish should dictate level of complexity to allow passage. Boat passage through the nets and log boom(s) would also need to be provided; this could be accomplished by having an open portion in the net and log booms to allow passage. Any gaps in the netting used for resident fish passage or boat passage would also allow for potential juvenile passage and allow the migrants to bypass the FSC, resulting in decreased capture efficiency. To reduce potential for migrating juveniles to pass through any potential openings for boat passage, it is suggested that an active boat passage route be incorporated. This would entail a short section of net that could be lowered to allow a boat to pass over it and then could be raised back into place. This design would require a floating control box upstream and downstream of the passage location to allow boaters to raise and lower the net when they need passage. The boat passage could be incorporated into the anchor tower if the solid curtain option were used. This would allow the design to include tying into a solid structure, which may facilitate its operation and design.

Location A would require roughly 610,000 sq ft of netting for full exclusion at the maximum conservation pool. Location B would require 591,000 sq. ft

Fish Transfer

Collected fish would be held in a raceway on the FSC until ready for transport, they will be crowded into a hopper to be loaded onto a boat for transport to the dam. Estimated transport time to the dam from location A and B are 20 minutes and 30 minutes, respectively. Once the boat arrives at the dam it will dock at a floating mooring located adjacent (north side) to the powerhouse intakes. This location is presented in Plate 9. The floating mooring will be anchored to guide rails that will allow for it to follow the complete 101 foot reservoir fluctuation. Once docked, a jib crane located at the top of the dam will lift the hopper and position it for a water to water transfer to a waiting transport truck on the dam road deck. It is planned that the fish transfer process will occur a maximum of twice a day. A schematic of the truck transfer facility is presented in Plate 10.

While transport times to the dam are longer than would be to a shore based facility located near the FSC, following fish loading criteria and providing life support systems on the boat (oxygen, water circulation) minimizes stress on the fish during the trip. As the maximum number of trips per day would be two based on the maximum expected daily number of fish, there are no concerns regarding the length of cycle times. The minimal amount of new infrastructure needed for the dam based truck loading facility steered the selection of it as the fish transfer option. Several unselected systems for the transport of collected fish are described in Section 4.8 below for documentation purposes. Fish transport common to all the 60 percent alternatives is described below.

SELECTED MOBILE TECHNOLOGY (MERWIN TRAPS)

In this concept, portable floating Merwin traps would be operated near the changing head of the reservoir, which moves over time as the pool is filled during the spring and emptied during the fall (Plates 11 and 12). Merwin traps were selected as a portable technology for use in reservoir environments, consistent with the intent of their original design and in which they have successfully operated.

A single trap would be fished in low water velocity areas (< 0.2 fps) on each shoreline to capture fish entering the reservoir. The exact locations where the traps would be operated will depend on reservoir surface elevation, shoreline configuration, and the success of trapping operations to collect juveniles. With experience, biologists operating the traps will learn where the best fishing locations are under what conditions.

The Merwin traps would consist of the following components:

a) **Merwin Trap(s) –** Each trap would consist of two wing nets, a pot and a spiller (Plate 12). The pot and spiller are basically two net pens that trap and hold the juvenile fish. Both structures would have a dimension of 16 by 16 by 12 ft. The 12-foot depth of the pot and spiller could be adjusted manually to allow fishing in shallower water. The pot and spiller are connected by a 7-foot tunnel that tapers as it enters the spiller to a width of 1 foot.

b) **Lead Nets –** Long lead nets would extend from the shoreline to the Merwin traps. The length of these nets would vary (depending on site location) but is expected to be at least 50 ft. The nets would extend from the surface of the reservoir to the bottom (this may require tapering). Nets would be assembled in panels so that net length could be adjusted according to the physical conditions present at each fishing site. Lead net fishing angle may also be adjusted to improve fishing success. For example, rather than being set perpendicular to flow, the lead could be set at an angle to guide fish to the heart (Plate 12). Additional leads may be added to form a "vee" shape leading fish to the pot and spiller. This configuration would be similar to that used for an FSC and may allow the traps to be fished in higher velocity areas.

c) **Site Locations –** The traps would be moved among different locations, basically following reservoir fluctuations throughout the year. Initial sites would be identified by examining shoreline conditions at various reservoir elevations. Any vegetation, tree stumps, or structures that might interfere with trapping operations would be removed. The head of reservoir (as shown on Plate 11) is outside the boundary of an NSO 12-mile home range circle. The majority of the land located on the east bank is designated as NSO dispersal habitat and NSO non-habitat. Habitat on the west bank is designated LSR and is within a CHU.

d) **Fish Transfer –** Boats would be used to transfer fish from the Merwin trap to trucks located at boat ramps or other easily accessible locations on the shore. The transfer would be done by hand. In initial years, the same boats used to ferry crews to the traps would be used as the transfer vessels. If the system proved to be successful, a larger boat – equipped with larger holding tanks, a small crane for tank transfer, and a redundant aeration system – would be used.

e) **Fish Sorting –** Fish would be removed from the spiller by hand, using dip nets. This would provide an opportunity to sort fish to size and species, especially when catch numbers are low.

SELECTED IN-TRIBUTARY ALTERNATIVES

Two in-tributary alternatives were prioritized for further consideration during the 60 Percent Alternatives Evaluation:

- USFS Black Canyon Campground: Off-Channel Collector
- Lower North Fork (Westfir): Off-Channel Collector

In-Tributary System Components

To capture and transport a significant proportion of the downstream juvenile migrants, a large in-channel or off-channel tributary trap would be required. The basic components of the tributary trap are as follows:

a. Diversion dam (with provisions for conveyance of flood flows)
b. Fish ladder (for adult salmonids and resident fish)

c. Facility intake (including the AWS intake)
d. Fish screen
e. Bypass and fish sorting/handling and transfer facility
f. Canal and outfall (with adult barrier)

Each of these components is described below. Regardless of the site selected, these common components need to be arranged to facilitate upstream and downstream movement of all life stages of fish. With the exception of the canal and outfall, these facilities are not appreciably different than any of several large irrigation or hydropower diversion schemes throughout the Pacific Northwest.

The installed capacity of the screen is a variable that will be optimized during design. From a practical perspective, the screen and diversion cannot be sized for all flows and, therefore, the installed capacity will have a direct impact on collection efficiency. Flows greater than the screen capacity will have to be spilled. For the preliminary layout, the collector facilities were sized to match the January through September 5 percent exceedance flow at each site. The diversion capacities are as follows:

- Lower Middle Fork Willamette River – 6,530 cfs
- North Fork of the Middle Fork Willamette River – 2,000 cfs

It should be noted that the 5 percent exceedence value is a design parameter for the purposes of this initial study only and is not intended to be a performance criterion.

a) **Diversion Dam –** The diversion dam would be designed to check up the river when trapping is required and not be an impediment to fish migration, flood flows, or movement of bed load during periods when trapping is suspended. These functions are normally accomplished by a gated diversion dam similar to the Red Bluff Diversion Dam in Red Bluff, California. One radial gate was selected because the gate sill can be suppressed to ensure adequate passage of fish and bed load when the gate is up. Bascule, Obermeyer, or rubber dam gates can be used for the remainder of the diversion dam. It is assumed that the diversion dam would cause no net rise in the 100-year flood profile at the site. It is also assumed that the diversion dam would check up the water level in the tributary to a point approximately 12 feet above the existing stream bed. All of these assumptions will need to be verified during subsequent design phases.

b) Fish Ladder – A fish ladder will be required to provide upstream passage during periods when the gates are in place. The diversion dam would be operated to maintain a constant upstream pool. Depending on the location of the canal outfall and the gradient of the tributary, either the fish ladder would operate according to the normal tailwater or a short bypass reach would be required. It is assumed that a single fish ladder would be provided at each site. A vertical slot ladder with 6-inch steps between pools is assumed. AWS water would be provided by gravity from the diversion pool. The AWS system would be sized so that the attraction flow from the fish ladder entrance is a minimum of 5 percent of the fish passage design high flow.

c) **Intake –** The intake is designed to screen out large debris and facilitate shutdown of the fish collector for maintenance. Because most of the streamflow would pass through this intake, trashracks would be required to protect the facility. The trashracks would have 2-inch-thick bars, 10 inches on center, to allow the passage of large fish. The intake would have a 2-foot-high sill and a water depth of approximately 10 feet. The approach velocity would be approximately 3 fps. Consequently, the intake length is approximately 70 feet long for a flow of 2,000 cfs (North Fork site), and approximately 220 feet long for a flow of 6,530 cfs (Black Canyon Campground site). A trashrack cleaning mechanism would be provided. Bulkhead gates would be provided to allow dewatering of the canal and trap facility.

d) **Fish Screen –** The fish screen would be a standard vee-screen designed to meet fry criteria (that is, approach velocity of 0.4 fps and slot size of 0.069 inch). A 30-cfs bypass flow per vee-screen would be provided to transfer all the fish into the fish sorting, handling, and transfer facility. Each vee-screen would be designed for approximately 2,000 cfs. In locations where the streamflow is greater, additional vee-screens would be added in parallel.

e) **Bypass and Fish Transfer Facility –** A 42-inch-diameter fish bypass pipe would be provided to convey 30 cfs flowing half-full to the fish transfer facility. When more than one vee-screen is used, additional pipes and/or dewatering would be required. The velocity in the pipe would be approximately 7 fps. At the fish transfer facility, fish would be separated by size and then routed to holding raceways to await truck transport or placed in a direct return to the river below the diversion dam.

f) **Canal and Outfall –** A rectangular canal would convey the screened water from the fish screen back to the river below the diversion dam. The canal width would be approximately equal to the width of the intake. The water depth would be approximately 12 feet minus any head losses associated with the trashrack and fish screen. The freeboard would be approximately 3 feet. The outfall at the end of the canal would have to be carefully designed to also serve as an adult fish barrier. A vertical drop barrier or an ogee-type spillway should be considered for each site. Picket barriers and velocity barriers would not be adequate for this size of structure. Depending on the distance from the diversion dam to the outfall, the fish ladder entrance may need to be incorporated as part of the outfall structure. Adjustable crest gates could also be used for the outfall.

Site-Specific Discussion

Each of the tributary sites has different physical characteristics and flow conditions. The following briefly describes the differences between the selected in-tributary alternative sites:

a) **USFS Black Canyon Campground: Off-Channel Collector –** This alternative is presented on Plate 13; it was relocated about 1.7 miles upstream to preserve the campground site. The USGS gage No. 14148000 is located just downstream of the site. The FEMA flood insurance study identifies a 100-year peak discharge of 57,000 cfs. The river gradient is about 0.046 percent as estimated from the FEMA flood profile; therefore, the pool created by a 12-foot diversion dam would extend upstream for approximately 3.5 miles to the confluence with the North Fork. In this alternative, the diversion dam was placed directly in the river with the collector being off-channel. The sheer size of the screens, diversion dam, intake, and canal would require the removal of a large part of the forest. The river geomorphology downstream of the diversion channel outfall is anticipated to change near the canal and outfall. A stilling basin may be required. Access to the site would be through Westfir, driving west and north on the old military road. In addition, the site is situated just outside the 12-mile home range boundary for Known NSO Site 2893. The facility location is within a

CHU and an LSR. These two designated habitat types restrict development and management activities, including tree removal and habitat disturbances.

b) **Lower North Fork (Westfir): Off-Channel Collector –** This alternative is presented on Plate 14. The USGS gage No. 14147500 is located just downstream of the site. The FEMA flood insurance study identifies a 100-year peak discharge of 24,300 cfs at this location. The river gradient is about 1.1 percent per the FEMA flood profile; therefore, the pool created by a 12-foot diversion dam would extend upstream for approximately 0.2 mile. In contrast to the other sites, the WestFir site is likely on private land. The site is bordered to the north by a railroad track. NSO habitat to the north of the railroad track is designated as NSO dispersal habitat and NSO non-habitat.

Field Reconnaissance

On October 19, 2010, the A&E team met with USFS. The purpose of this meeting was to brief USFS personnel on the Lookout Point Head of Reservoir Collection Alternatives Study and to solicit feedback on the 60 percent alternatives, especially with regard to land ownership, land use, and habitat issues. Consequently, the four remaining alternatives (that is, two in-reservoir alternatives, FSC and Merwin traps, and two in-tributary alternatives, Black Canyon and Westfir) were discussed and sites visited.

Because USFS expressed some concerns related to the in-tributary sites, additional potential sites were visited and are discussed below. In general, good in-tributary facility locations are characterized by a narrow defined channel upstream with stable banks for siting the diversion structure and intake screens, and a wide, low overbank area downstream with good access for the fish sorting and handling facilities.

c) **Hampton Site –** The Hampton site is located on the left (southerly) bank downstream from the Black Canyon Campground and is an existing boat ramp and picnic area, as shown on Plate 2. The site is located directly across from Hospital Creek and includes a narrow channel with several rock outcroppings, as shown in Section 4, Figure 4-2. A large benched area is located just downstream; however, it is unknown to what extent this area would be inundated at the maximum conservation pool.

A collection facility at this site would be influenced by both the river and the reservoir over the annual period of operation. As such, a diversion weir elevation set approximately 3 ft above the maximum conservation pool WSEL would be necessary. This would require a structure that is able to handle partial submergence on the downstream side, and it may require a weir significantly higher than the 12-ft weir proposed for the other in-tributary alternatives. The resulting pool will increase the time when the Hospital pond will be connected to the Willamette River. The connection is be biologically accepted. For the purposes of this study, it is assumed that no modifications to operation of the reservoir or powerhouse would be permissible. However, a reduction in the maximum reservoir WSEL could enhance the feasibility of an in-tributary collector at this location by reducing the required height of the diversion weir. It is anticipated that such an approach would require a wing dam or levee section.

A design flow rate of 6,530 cfs is assumed for a collector at the Hampton site, similar to the Black Canyon alternatives. However, because of the high ambient velocities, it is anticipated that the site would be too constrained for an FSC alternative with an exclusion net. The construction cost would be greater to that of the Black Canyon alternative due to the larger dam and wing dam required, for the same collection potential.

It was noted that Hospital Creek and an adjacent pond are Oregon Chub habitat. The existing N. Boundary Road culvert connecting the pond to the creek is crushed, which limits connectivity to the reservoir. When operating, a fish facility at the Hampton site would likely maintain higher water surface elevations immediately upstream, which could provide some benefit to Oregon Chub populations in this area.

d) **Upper North Fork Site –** The Upper North Fork Site was visited during the initial site visit in April 2010 and was included in the full list of alternatives considered at Checkpoint Meeting No. 1. The alternative was de-prioritized because of concerns related to the right bank slope stability, lack of existing utilities, existing tree cover, and presence of a comparable yet slightly higher ranked site located downstream (the Westfir alternative). The Upper North Fork site appears to remain feasible from a technical engineering perspective; however, it is believed to be located within the Wild and Scenic River area.

The following four sites were visited during a follow-up site visit in October 2010. Their locations are presented on Plate 2.

e) **1910 Road and 1912 Road Bridge Sites –** Two bridges were visited that provide access to roads on the west side of the river – the 1910 road and the 1912 road. Both sites appeared to be too narrow, with steep slopes unsuitable for siting the facility.

f) **Roadside Pullout –** A site in the vicinity of Leapfrog Creek was accessed via a roadside pullout. This site seemed technically feasible; however, much less overbank area is available at this location compared with the Upper North Fork and Westfir alternatives.

g) **North Fork Road Bridge –** This site was the upstream limit of the reconnaissance. The river channel is relatively narrow, with exposed rock banks near the bridge; however, suitable areas immediately downstream for siting of the facility appeared to be limited. This section of the NFMF offers one of the most outstanding sections of whitewater in Oregon and is one of the nation's most valued Wild and Scenic Rivers for whitewater paddlers. The reach immediately upstream of the North Fork Road Bridge contains the “Miracle Mile,” a very steep, very technical section on which numerous professional kayakers have trained. The run is actually 4 miles long and starts just upstream of the Forest Road 1926 Bridge and ends just downstream of the

Forest Road 19 Bridge. The USFS has noted the recreation value of this entire reach and therefore recommends that it not be considered further.

FACILITIES COMMON TO 60 PERCENT ALTERNATIVES

The following discussion provides a summary of facilities that likely would be common to all of the 60 Percent alternatives. While these facilities may not necessarily influence the prioritization of alternatives, they do assist in identifying the total scope of the project.

Fish Transport

It is anticipated that while transport distances will vary between alternatives, all fish would be transported downstream with trucks to recovery ponds or a direct-release site. The trucks are assumed to be the standard ODFW tandem-axel trucks with a 2,000-gallon tank capacity.

Fish would be crowded from holding ponds directly into a hopper at the collection facility. The hopper would be hoisted over the truck and drained to transfer the fish. Supplemental oxygen would be provided on the truck.

In some cases, it may be desirable to place fish directly from the short-term holding ponds into a mobile hopper or tank. This tank would then be placed onto a barge and/or a flatbed truck for transportation downstream.

Recovery Ponds

Fish collected and transported downstream would either be released directly downstream or placed into recovery ponds or stress-relief raceways located below Dexter Dam. The purpose of this facility would be to allow the fish to recover from the trip downstream, to observe latent mortalities, and to acclimate fish to the release location. It is assumed that the facility would include a pumped water supply, holding ponds or raceways, and a drain suitable for volitional release of the fish.

While there may be opportunities to use existing infrastructure at the Dexter Hatchery, construction of a separate facility is assumed for the purposes of this study.

7. 60 PERCENT ALTERNATIVES EVALUATION

The following provides a summary of the 60 Percent Alternatives Evaluation. Four alternatives were evaluated and two were selected for further evaluation. Biological, technical, and economic Impacts – as well as other factors – are considered. A summary of Checkpoint Meeting No. 3 is provided in Attachment 1.

BIOLOGICAL EVALUATION

a) **Risks and Uncertainties:** There are multiple risks and uncertainties associated with the development of a fish collection system upstream of Lookout Point Dam that may affect program success or hinder system design and implementation. These risks and uncertainties are discussed below.

b) **Lack of Performance Criteria:** While the overall goal of the program is to restore a viable spring Chinook population to the area upstream of Lookout Point Dam, the level of FCP required from proposed collectors to achieve this goal has not been clearly defined. In this Alternatives Study, it is assumed that systems with higher FCP are preferred. However, even the highest ranked systems may fall short of what is required to achieve fish population objectives. Fish population modeling may be one approach that could be used to determine the minimum FCP required for a collection system.

c) **Target Life Stage:** Collection systems located closer to spring Chinook spawning grounds likely would collect more fry than smolt-sized fish. This is because fry disperse quickly after emergence from the gravel to downstream areas, where they then seed available rearing habitat. They then rear for an extended period in these locations, becoming larger over time and eventually leaving the system as smolts the next year. The closer the collector is to spawning grounds, the greater the probability of collecting more fry in early-fry stages. Because of natural mortality associated with rearing, smolt production is substantially less than fry production. Data presented in Tables F-11 and F-12 show that smolt numbers are expected to be less than 3 percent of the number of fry produced. However, smolts may have a survival rate to adult that is an order of magnitude greater than that of fry (see below). Because each collection location has a different potential to collect different numbers (and percentages) of the two life stages, the survival rate to adult for the two life stages can have a dramatic impact on the number of adults produced and, thus, on program success. Table F-13 presents the estimated total number of juvenile Spring Chinook produced and expected per day at each collection system.

d) **Juvenile to Adult Survival Rates:** Data presented in Figure 2-3 indicate that in the early spring, fry are expected to have lengths ranging from 35 to 50 mm. Thus, many of the fish expected to be collected can be considered emergent fry. A query of RMIS for spring Chinook released from hatcheries on the West Coast (including Alaska and Canada) indicated that fry (or fed fry) had a total survival rate that averaged 0.09 percent[5] (http://www.rmpc.org/). If this survival rate for primarily hatchery fish held for wild fish, then for every 1 million fry collected, a total of 900 adults would be produced. Estimated adult returns for each of the alternatives under an assumption of

0.09 percent fry survival are shown in Table F-11. The effect that collection, handling, and release may have on fry survival rate is unknown. However, if such activities reduce fry survival rate, then the ability of the collection system to achieve management objectives becomes less likely.

In contrast to fry, for spring Chinook smolts released from the Dexter Ponds, the survival rate (smolt-to-adult) has averaged 0.86 percent for the 1986 to 2003 brood years, an order-of-magnitude increase over fry releases (http://www.rmpc.org/).[6] Estimated adult returns for each system based on hatchery SAR, smolt production, and FCP are shown in Table F-12. Total adult production in this scenario is about 23 percent of the fry collection scenario. The lower adult production value results from the assumption that smolt production potential of habitat above Lookout Point Dam is relatively low.

TABLE F-11. ESTIMATED NUMBER OF ADULTS PRODUCED FOR EACH ALTERNATIVE IF ALL JUVENILE FISH COLLECTED ARE OF FRY SIZE

Site Location		Technology	Estimated Total Fry Collected	Estimated Number of Adults*
1a	Upper Reservoir	In-Reservoir: Gulper/FSC without net	239,395	215
1	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	837,883	754
2	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	957,581	862
3	Upper Reservoir	Mobile: Merwin Trap	143,637	129
5	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	1,299,574	1,170
6	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	1,299,574	1,170
9	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	1,095,703	986
12	Upper North Fork	In-Tributary: In-Channel Collector	1,018,541	917
15	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	345,199	311
16	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	345,199	311

NOTES:
Shading denotes alternatives that were prioritized at 30 percent.
*-The total number of adults produced in fisheries and returning to the basin
cfs = cubic feet per second
FSC = floating surface collector

The smolt and fry adult production analysis indicates that the success of the systems to achieve management objectives is uncertain because information on fry and smolt production potential, collection efficiency, and post-release survival rates is theoretical at this time. To reduce uncertainty around these assumptions would require several years of studies to collect needed data.

e) **Juvenile Survival Rates to Collectors:** Juvenile migration survival rates to each collector in this analysis are based on professional opinion. Uncertainties surrounding these estimates may be quite large. This is especially true for fry because it is difficult to conduct survival studies on fish this small (< 60 mm). In addition, except for a short period of dispersal after emerging from the gravel, fry will select an area in the stream channel to rear for extended periods of time. Thus, estimates of migration survival rates are confounded with natural mortality as these fish age over time.

TABLE F-12. ESTIMATED NUMBER OF ADULTS PRODUCED FOR EACH ALTERNATIVE BASED ON SMOLT PRODUCTION COLLECTION ESTIMATES FOR EACH ALTERNATIVE

Site Location		Technology	Estimated Number of Total Smolts Collected	Estimated Number of Returning Adults
1a	Upper Reservoir	In-Reservoir: Gulper/FSC without net	5,726	51
1	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	20,041	178
2	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	22,904	203
3	Upper Reservoir	Mobile: Merwin Trap	3,436	30
5	USFS Black Canyon Campground	In-Tributary: In-Channel Collector	31,083	273
6	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	31,083	273
9	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	18,627	164
12	Upper North Fork	In-Tributary: In-Channel Collector	16,103	141
15	Lower Middle Fork (Island)	In-Tributary: In-Channel Collector	2,053	18
16	Lower Middle Fork (Island)	In-Tributary: Off-Channel Collector	2,053	18

NOTES:
Shading denotes alternatives that were prioritized at 30 percent.
cfs = cubic feet per second
FSC = floating surface collector

TABLE F-13. ESTIMATED TOTAL NUMBER OF JUVENILE SPRING CHINOOK PRODUCED AND EXPECTED PER DAY AT EACH COLLECTION SYSTEM

Number	Site Location	Technology	Estimated Total Fish Collected	Estimated Maximum Number per Day*
1a	Upper Reservoir	In-reservoir: FSC (500 cfs without net)	245,121	24,512
1	Upper Reservoir	In-reservoir: FSC (500 cfs)	857,924	85,792
2	Upper Reservoir	In-reservoir: FSC (1,000 cfs)	980,485	98,049
3	Upper Reservoir	Mobile: Merwin trap	147,073	14,707
5	USFS Black Canyon Campground	In-tributary: in-channel collector	1,330,657	133,066
6	USFS Black Canyon Campground	In-tributary: off-channel collector	1,330,657	133,066
9	Lower North Fork (Westfir)	In-tributary: off-channel collector	1,114,330	111,433
12	Upper North Fork	In-tributary: in-channel collector	1,034,644	103,464
15	Lower Middle Fork (Island)	In-tributary: in-channel collector	347,252	34,725
16	Lower Middle Fork (Island)	In-tributary: off-channel collector	347,252	34,725

NOTES:
*Assumes that a maximum of 10 percent of the estimated total fish collected arrive at the collector in a single day.
cfs = cubic feet per second
FSC = floating surface collector
USFS = U.S. Forest Service

For the in-reservoir systems, native and non-native fish species may prey upon a substantial proportion of the juvenile spring Chinook entering the reservoir. Mortality rates from predation will be dependent on many factors, including the number and size of predators, predator species, water turbidity, water temperature and depth, and life stage (that is, fry or smolt). The farther down-reservoir the collector is located, the higher the probability that predation may occur.

f) **Reservoir Effects on Juvenile Fish:** Reservoir operations may also affect juvenile spring Chinook behavior and survival. Reservoir fluctuations (for flood control) may constantly water and dewater shallow-water habitat that fry are expected to use for rearing, once they enter the reservoir. If fluctuations are great enough, fry may become stranded in reservoir margins, resulting in decreased survival. In addition, reservoirs provide excellent habitat for predators (such as bass, trout, and crappie) that may feed on juvenile spring Chinook. The collection of data on fry stranding and predation rates for fish migrating to the in-reservoir collector system would help reduce uncertainty on the expected success of collecting fish in-reservoir.

g) **Effects on Other Species of Concern:** ESA-listed Oregon chub and bull trout are present in this river system. It is possible that some may be injured or killed as a result of collection, handling, and sorting at the collectors, or through encounters with guide-nets (for example, small juvenile Oregon chub). In addition, if the fish entering the system are not sorted to species, then they would be transported and released downstream of Dexter Dam. The effect this action would have on these two populations is unknown. If sorting is required to remove these species, then mortality rates for captured spring Chinook could increase, potentially affecting program success.

   Resident rainbow trout and cutthroat trout may also be collected at the collection facility. Data collected in the NFMF in 2007 indicated that rainbow trout (103 to 180 mm) were collected primarily from April through July (N = 12). Cutthroat trout (N = 5) ranging in size from 53 to 170 mm were also captured in the NFMF, with the smallest cutthroat trout being observed from August through December (Taylor, 2010). The same points made for the ESA-listed species apply to these species as well.

   If Pacific lamprey is reintroduced to stream reaches above Lookout Point, additional design criteria may need to be considered. In this Alternatives Study, it is assumed that design criteria used for salmon fry are sufficient to protect lamprey juveniles from experiencing high mortality rates due to exposure to screens and guidance nets. However, currently there are no formal collection criteria published that support this assumption.

Given this suite of uncertainties and risks, factors other than FCP must be considered in the final selection of the preferred alternative. That assessment will involve resource agencies and fisheries managers, not only the PDT. Toward this end, fisheries managers need to clearly define management objectives and actions for each of the sensitive species before final facility design and development. This will prevent costly retrofits to constructed facilities in the future.

TECHNICAL EVALUATION

The Current Operations evaluation criteria were unchanged from the 30 Percent Alternatives Evaluation, and a rating of 3 or neutral was assigned to all alternatives.

ECONOMIC IMPACTS AND OTHER EVALUATION

Capital and O&M costs were developed as part of the 60 Percent Alternatives Evaluation and are presented in Table F-14. In addition, minor updates to the Recreation and Real Estate/Access/Utilities criteria were made.

Project costs are provided in year 2010 dollars and include escalation to the time of construction. The costs include allowances for contingency (30 percent); lands and damages; a feasibility study; planning, engineering, and design; and construction management. The Davis Bacon Wages were not applied to the unit price for this evaluation, but should be applied when moving to preliminary design.

The total net present value of the O&M cost for the screens was calculated for a 50-year period, assuming a 4.125 percent federal discount rate for the 2011 fiscal year. Net operating energy and routine labor and maintenance costs were calculated as lump sum values for the cost estimate. Supporting calculations are provided in Appendix G.

In addition, the Real Estate/Access/Utilities criteria were updated for the in-tributary alternatives to better represent their relationship to the remaining alternatives.

DISCUSSION AND RECOMMENDATIONS

As a result of the 60 Percent Alternatives Evaluation and Checkpoint Meeting No. 3, the two alternatives identified in Table F-16 were selected for further evaluation.

The FSC without a net (alternative 1a) was not considered further because of its low FCP. The remaining FSC alternatives, 1 and 2, were considered to be a single alternative with a phased implementation approach. The behavioral response of Chinook to the nets is currently unknown. The extent of predation in the reservoir (that is, from pikeminnow) is also unknown. It is anticipated that the fry and smolts will be oriented towards the shoreline. The current FSC alternatives, which are located at the thalweg, may be out of phase with the life history that the project is trying to intercept.

The Merwin trap alternative (alternative 3) is not a full-production alternative but, rather, a candidate for prototype facilities and more appropriate for filling in data gaps as part of an RM&E program.

The Black Canyon Campground alternative (alternative 6) was not considered further because of its high capital and O&M costs relative to the FCP.

The Westfir alternative (alternative 9) would be located at the former lumber mill site or farther upstream if required because of property ownership constraints.

Both in-tributary alternatives, alternatives 6 and 9, will have to consider the additional constraints and limitations identified during the meeting with USFS.

Given this suite of uncertainties and risks, factors other than FCP must be considered in the final selection of the preferred alternative. That assessment will involve resource agencies and fisheries managers, not only the PDT. Toward this end, fisheries managers need to clearly define management objectives and actions for each of the sensitive species before final facility design and development. This will prevent costly retrofits to constructed facilities in the future.

TABLE F-14. TOTAL PROJECT COSTS

Alternative		Fish and Wildlife Facilities Cost ($)	Lands and Damages Cost ($)	Feasibility Study (DDR) Cost ($)	Planning, Engineering, and Design Cost ($)	Construction Management Cost ($)	Total Capital Project Cost ($)	Total Annual O&M Cost ($)	Present Value of Total Annual O&M Cost ($)	Total Project Cost ($)
Upper Reservoir, In-Reservoir										
1a	FSC - 500 cfs, without nets	47,164,000	50,000	-	11,130,000	6,839,000	65,184,000	966,000	29,553,000	94,737,000
1	FSC - 500 cfs, with exclusion nets	53,726,000	50,000	-	12,679,000	7,790,000	74,246,000	997,000	30,209,000	104,455,000
2	FSC - 1000 cfs, with exclusion nets	64,526,000	50,000	-	15,227,000	9,356,000	89,160,000	1,133,000	33,060,000	122,220,000
3	Merwin traps	8,483,000	20,000	-	2,002,000	1,230,000	11,735,000	869,000	26,485,000	38,220,000
In-Tributary, Off-Channel										
6	USFS Black Canyon Campground	217,310,000	221,000	-	51,282,000	31,510,000	300,323,000	1,619,000	42,249,000	342,572,000
9	Lower North Fork (Westfir)	72,977,000	70,000	-	17,222,000	10,582,000	100,850,000	919,000	27,528,000	128,378,000

NOTES:
cfs = cubic feet per second
DDR = design document report
FSC = floating surface collector
O&M = operations and maintenance
USFS = U.S. Forest Service

This page was intentionally left blank.

Table F-15
60 Percent AR Evaluation Matrix Following Checkpoint Meeting No. 3

Comprehensive Alternative			Biological Evaluation Criteria									Technical Evaluation Criteria	Economic Impacts and Other Criteria						
	Site Location	Technology	Proportion of Population Available for Collection, POP (%)	Survival Probability, S (%)	Collection Efficiency, CE (%)	Total Fish Collection Potential, FCP (%)	Fish Collection Potential (Double Weighted)		Bypass Conditions	Effects on Other ESA Fish	Effects on Upstream Passage (All Species)	Current Operations (Flow and Water Surface Elevations	Design/ Construction Cost	O&M Costs	Recreation	Hydropower	Real Estate/ Access/ Utilities	Total Rating	Rank
1)	Upper Reservoir	In-Reservoir: Gulper/FSC (500 cfs)	100%	70%	70%	49%	3	3	3	3	3	3	3	3	2	3	4	33	2
1)a	Upper Reservoir	In-Reservoir: Gulper/FSC w/o net	100%	70%	20%	14%	1	1	3	3	5	3	3	3	4	3	4	33	2
2)	Upper Reservoir	In-Reservoir: Gulper/FSC (1,000 cfs)	100%	70%	80%	56%	4	4	3	3	3	3	2	2	2	3	4	32	5
3)	Upper Reservoir	Mobile: Merwin Trap (2 traps)	100%	70%	12%	8%	1	1	2	2	5	3	5	4	3	3	4	33	2
6)	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	100%	80%	95%	76%	5	5	4	4	4	3	1	1	1	3	1	32	5
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	71%	95%	95%	64%	4	4	4	4	4	3	2	4	2	3	3	37	1

Shading denotes alternatives that were prioritized for further consideration.

Table F-16
Alternatives in Rank Order (21 September 2010)

Comprehensive Alternative				
	Site Location	Technology	Notes	Rank
9)	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	This site location may be moved upstream if property ownership becomes a concern.	1
1)	Upper Reservoir	In-Reservoir: FSC (500 cfs with net and 1,000 cfs with net)	Two FSC alternatives combined into a single, phased implementation alternative.	2 and 5

This page was intentionally left blank.

8. ALTERNATIVES DE-PRIORITIZED AT 60 PERCENT

The shaded alternatives in Table F-17 were prioritized following Checkpoint Meeting No. 3. A summary of the meeting is provided in Appendix A.

The two remaining alternatives are the FSC and the Lower North Fork off-channel alternatives. The FSC alternatives 1 and 2 are considered to be a single alternative with a phased implementation approach. The 500-cfs FSC with nets alternative and the 1,000-cfs FSC with nets alternative should be considered, in that order, as a way of phasing the collection system development. A system that does not require nets may be feasible, but it would need to be located at the dam in order to use the dam and abutments for partial guidance.

TABLE F-17. ALTERNATIVES PRIORITIZED AT 60 PERCENT

Site Location		Collection Technology	Notes
1a	Upper Reservoir	In-Reservoir: FSC without Nets	500-cfs attraction flow
1	Upper Reservoir	In-Reservoir: FSC with Nets	500-cfs attraction flow
2	Upper Reservoir	In-Reservoir: FSC with Nets	1,000-cfs attraction flow
3	Upper Reservoir	Mobile: Merwin Trap	
6	USFS Black Canyon Campground	In-Tributary: Off-Channel Collector	Adjustable crest diversion
9	Lower North Fork (Westfir)	In-Tributary: Off-Channel Collector	Adjustable crest diversion

NOTES:
Shading denotes alternatives that were prioritized at 60 percent.
cfs = cubic feet per second
FSC = floating surface collector
USFS = U.S. Forest Service

The basic purpose of the Alternatives Report is to evaluate the feasibility of a head-of-reservoir or in-tributary collection system. Three primary parameters were considered: technology, site location, and cost. With that in mind, the advantages and disadvantages associated with each alternative were evaluated, and it was determined that the FSC and Westfir alternatives should continue to be evaluated for the 90 Percent Alternatives Report. Given the behavioral guidance limitations of the FSCs described above, there may be an opportunity for a hybrid FSC/Merwin trap alternative that would allow fish collection nearer to the head of reservoir or, alternatively, at the reservoir shoreline.

This page was intentionally left blank.

9- 60 PERCENT AR PLATES

This page was intentionally left blank.

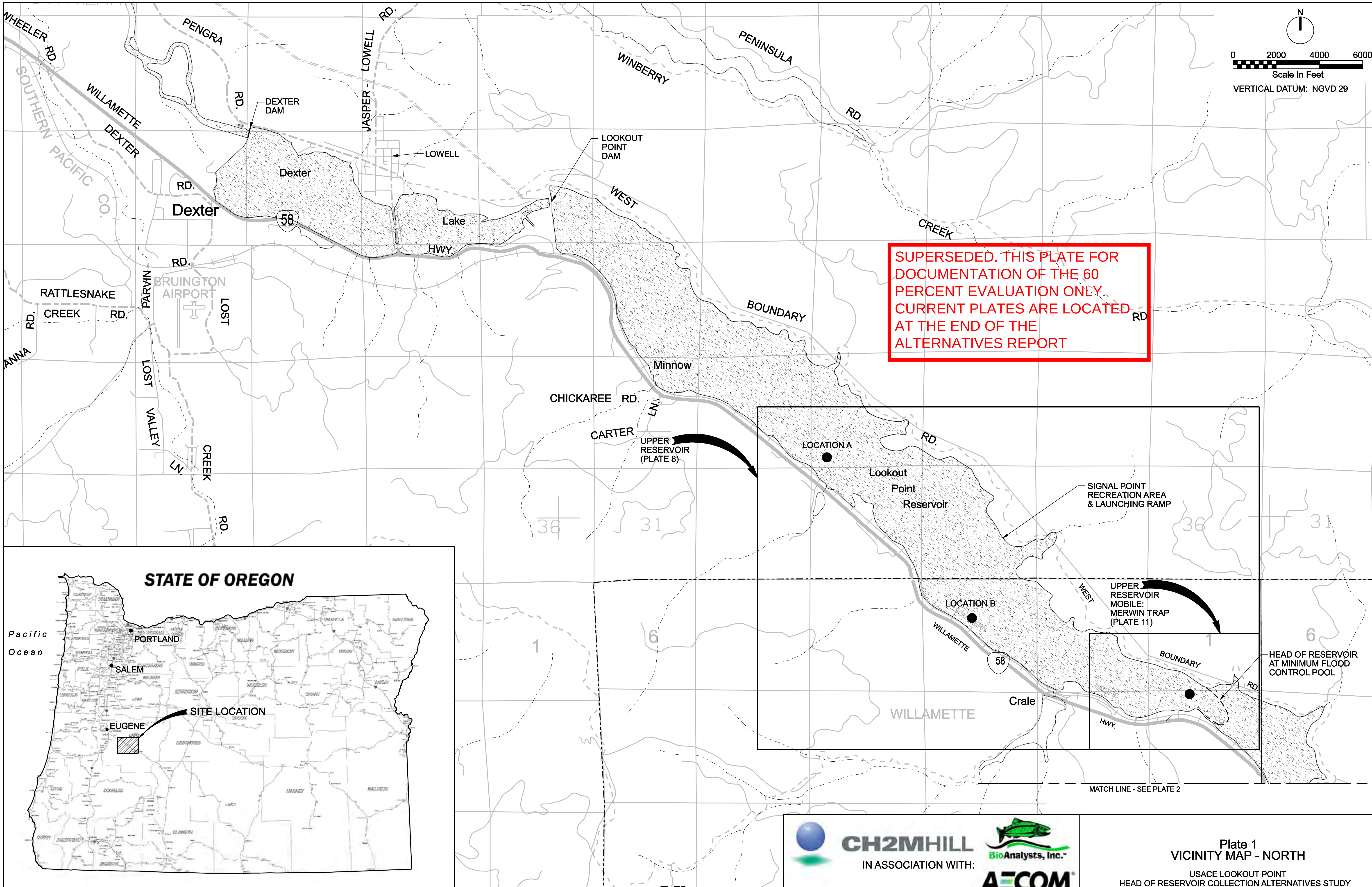
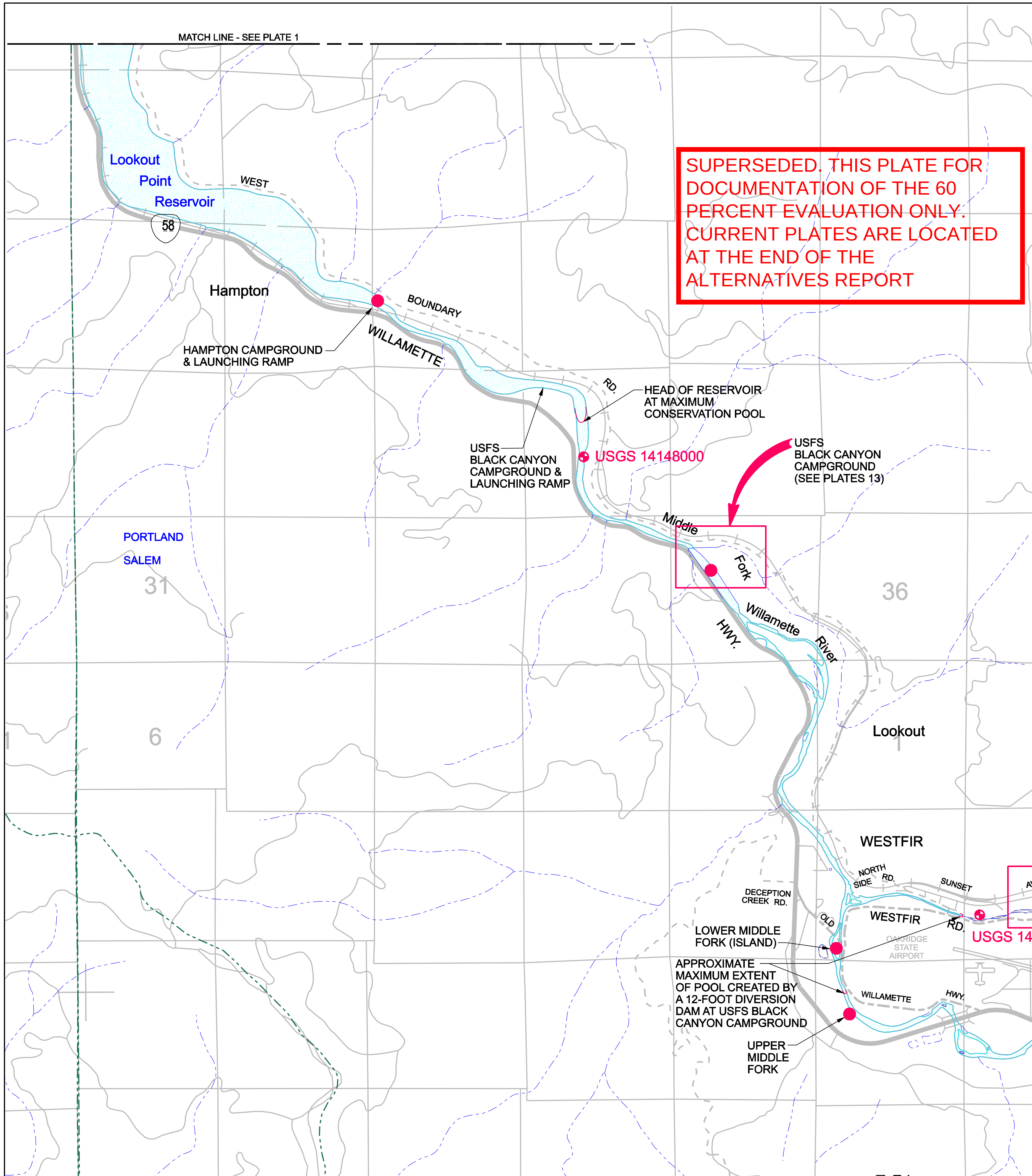


Plate 1
VICINITY MAP - NORTH

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate1.dgn PLOT DATE: 11/19/2010 PLOT TIME: 3:01:23 PM

...\402429-Plate1.dgn 11/19/2010 3:01:25 PM



CH2MHILL

IN ASSOCIATION WITH:

BioAnalysts, Inc.

AECOM

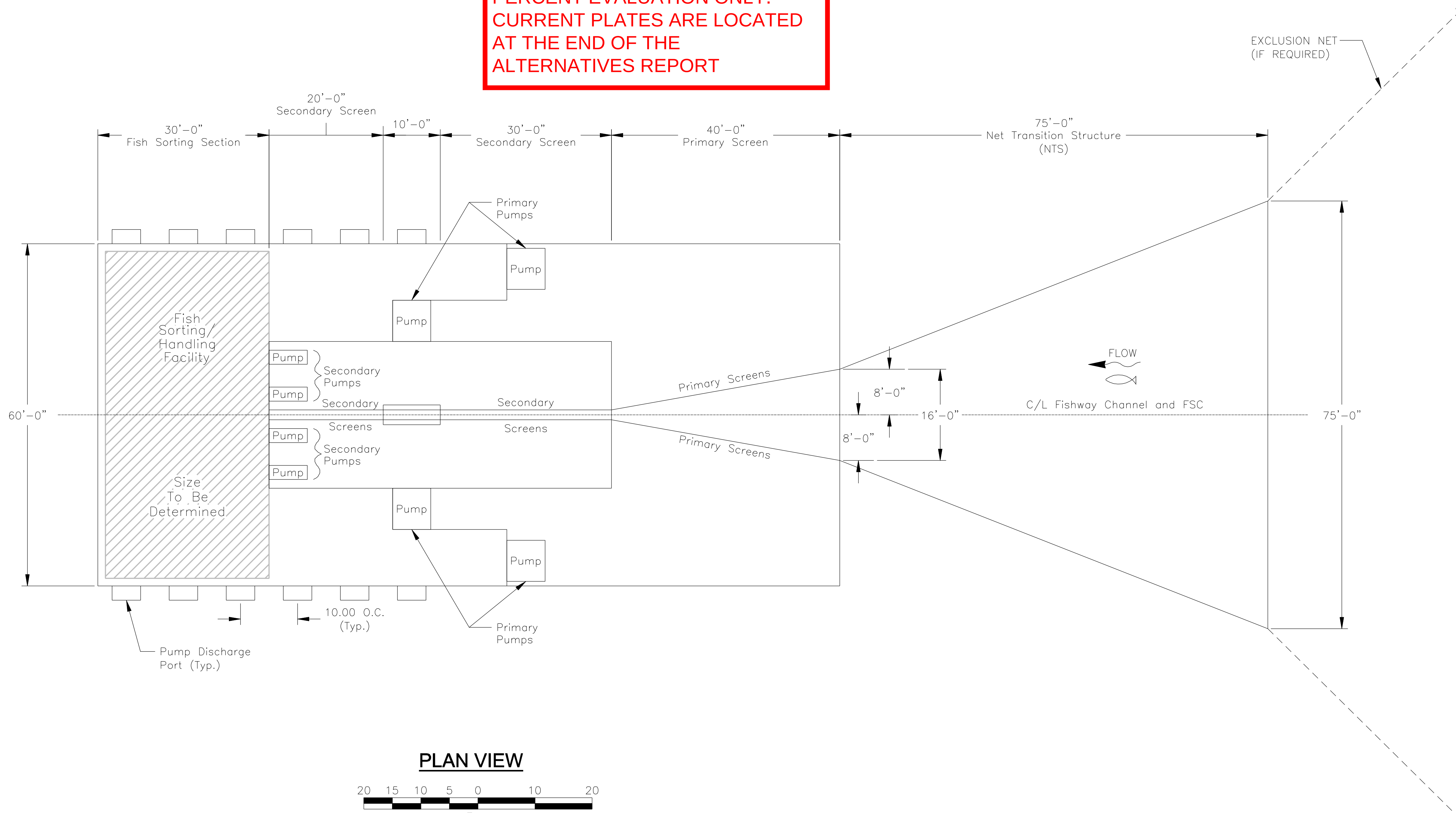
Plate 2
VICINITY MAP - SOUTH

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate2.dgn PLOT DATE: 11/23/2010 PLOT TIME: 12:04:21 PM

...\402429-Plate2.dgn 11/23/2010 12:04:22 PM

SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT



PLAN VIEW

Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-050, 03/15/08

CH2MHILL
BioAnalysts, Inc.
AECOM

Plate 3

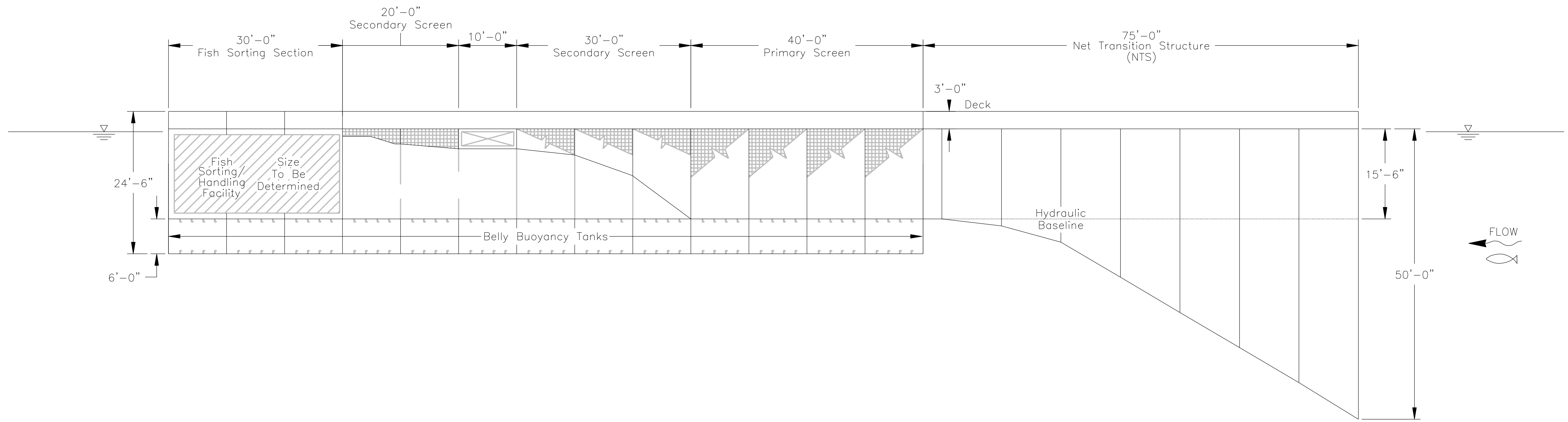
UPPER RESERVOIR, IN-RESERVOIR: GULPER / FSC (500 CFS) PLAN

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: 500 CFS FSC.dwg PLOT DATE: 07/08/10 PLOT TIME: 12:44 pm

...\402429-Plate3.dgn 11/19/2010 3:06:21 PM

SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT



CENTERLINE ELEVATION

20 15 10 5 0 10 20
Feet

Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-050, 03/15/08

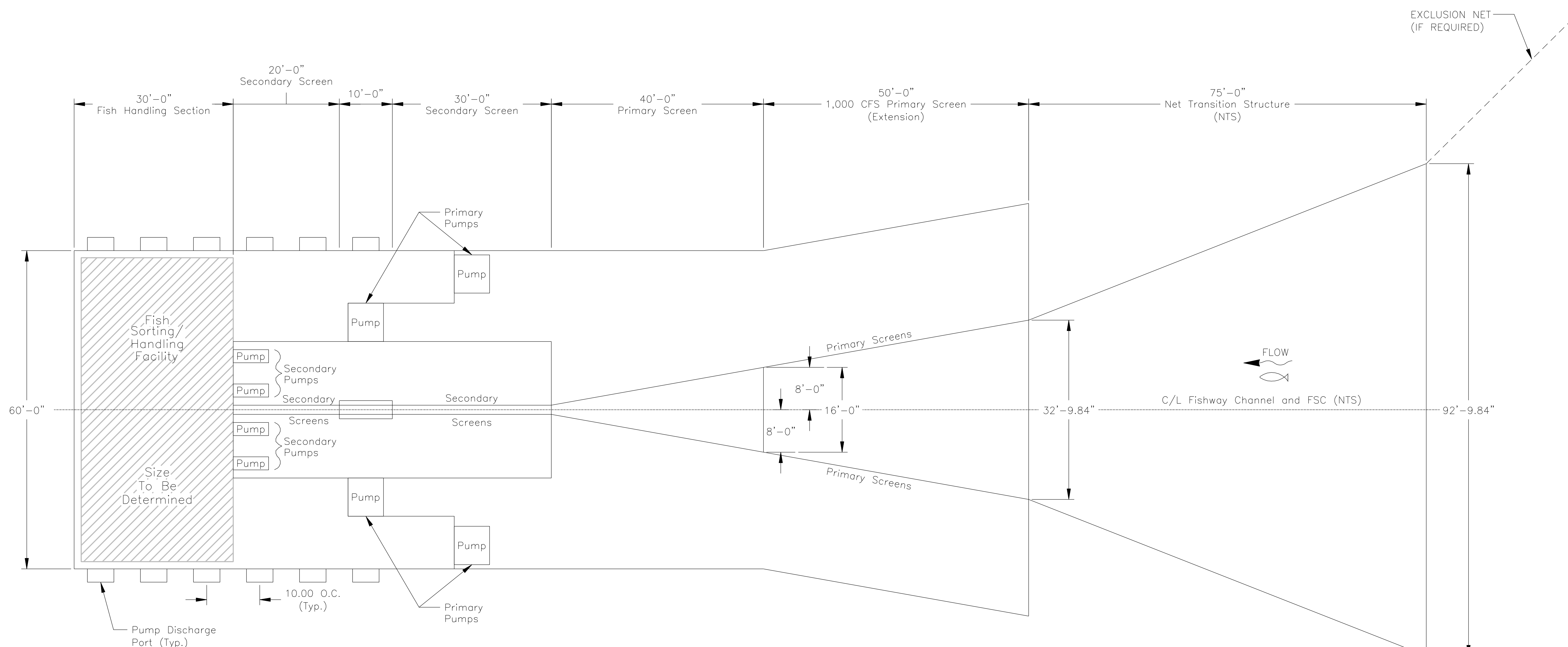
CH2MHILL BioAnalysts, Inc. AECOM

Plate 4

UPPER RESERVOIR, IN-RESERVOIR: GULPER / FSC (500 CFS) SECTION

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: 500 CFS FSC-Sec.dwg PLOT DATE: 07/08/10 PLOT TIME: 01:36 pm



SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT

PLAN VIEW

20 15 10 5 0 10 20
Feet

Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA–051, 03/15/08

CH2MHILL | BioAnalysts, Inc. | AECOM

Plate 5

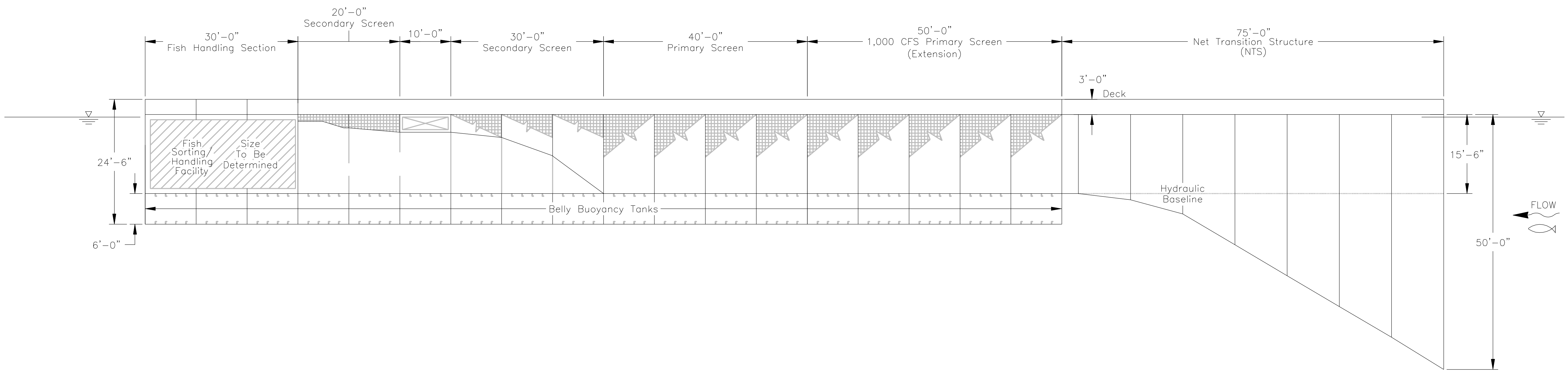
UPPER RESERVOIR, IN-RESERVOIR:
GULPER / FSC (1,000 CFS) PLAN

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: 1,000 CFS FSC.dwg PLOT DATE: 07/08/10 PLOT TIME: 10:00 am

...\402429-Plate5.dgn 11/19/2010 3:14:44 PM

SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT



CENTERLINE ELEVATION

20 15 10 5 0 10 20
Feet

Source: Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-050, 03/15/08

CH2MHILL
BioAnalysts, Inc.
AECOM

Plate 6

UPPER RESERVOIR, IN-RESERVOIR: GULPER / FSC (1,000 CFS) SECTION

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

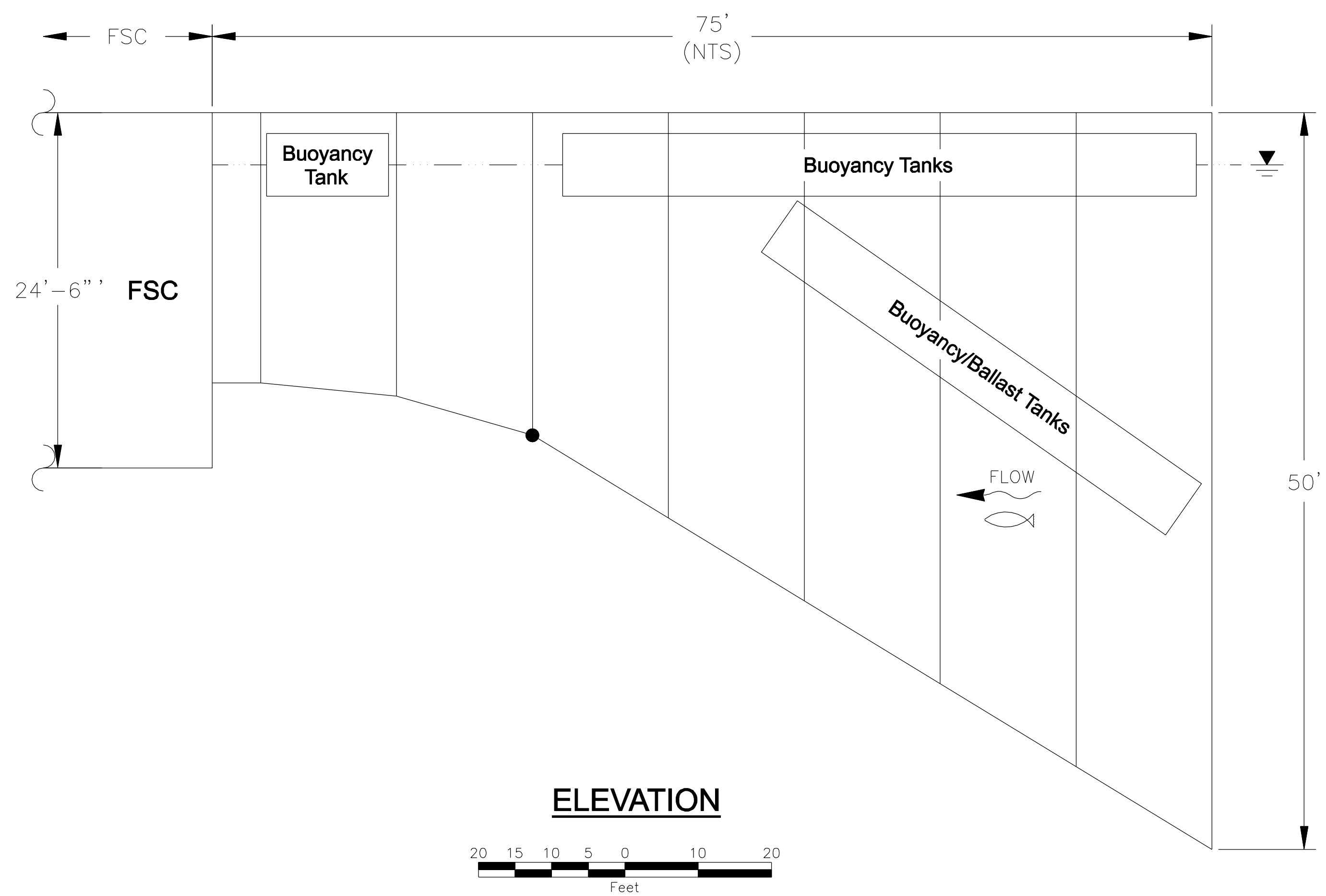
FILENAME: 1,000 CFS FSC-Sec.dwg PLOT DATE: 07/08/10 PLOT TIME: 01:01 pm

...\402429-Plate6.dgn 11/19/2010 3:26:39 PM

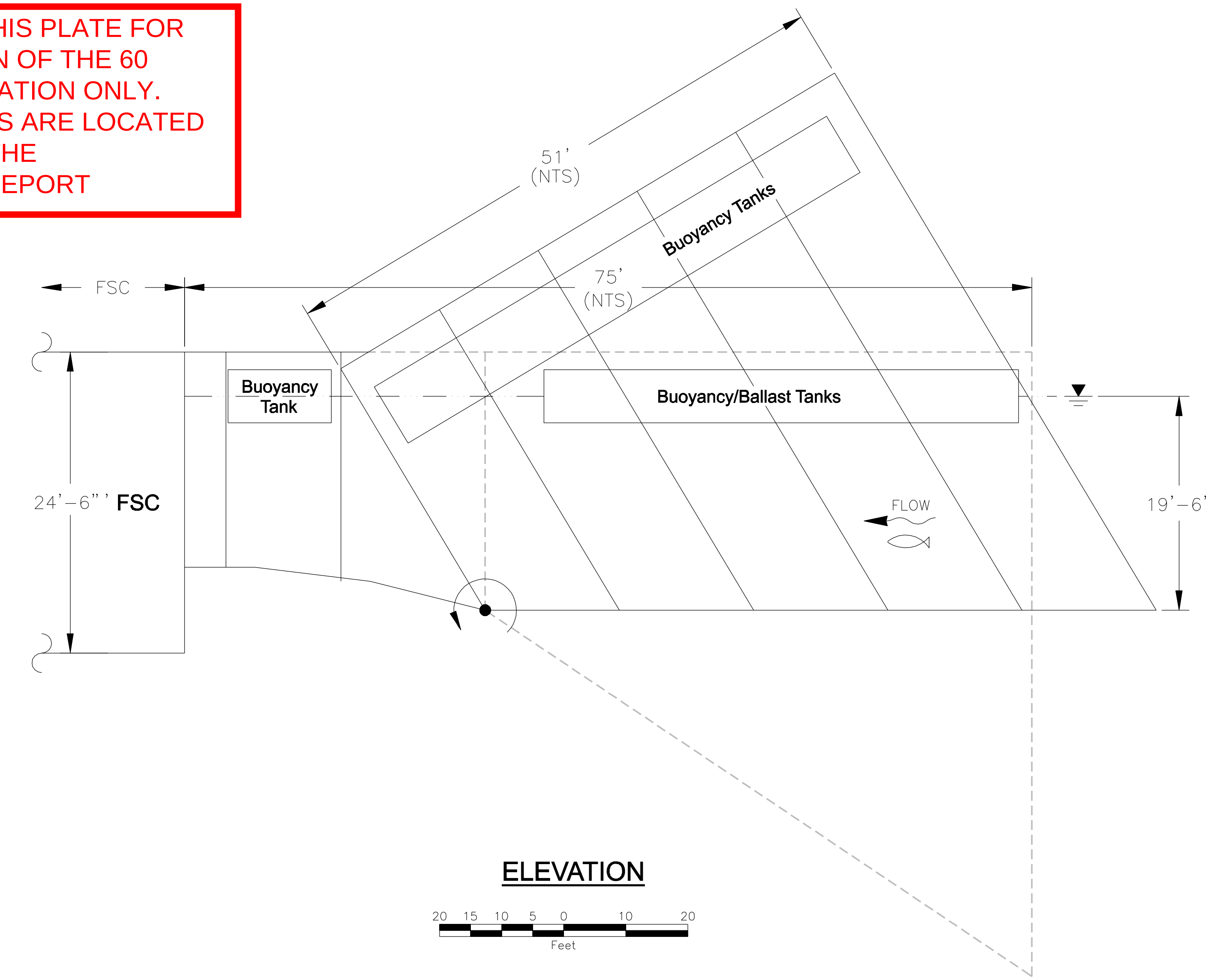
Full Draft Position

Minimum Draft Position

SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT



ELEVATION



ELEVATION

CH2MHILL | BioAnalysts, Inc. | AECOM

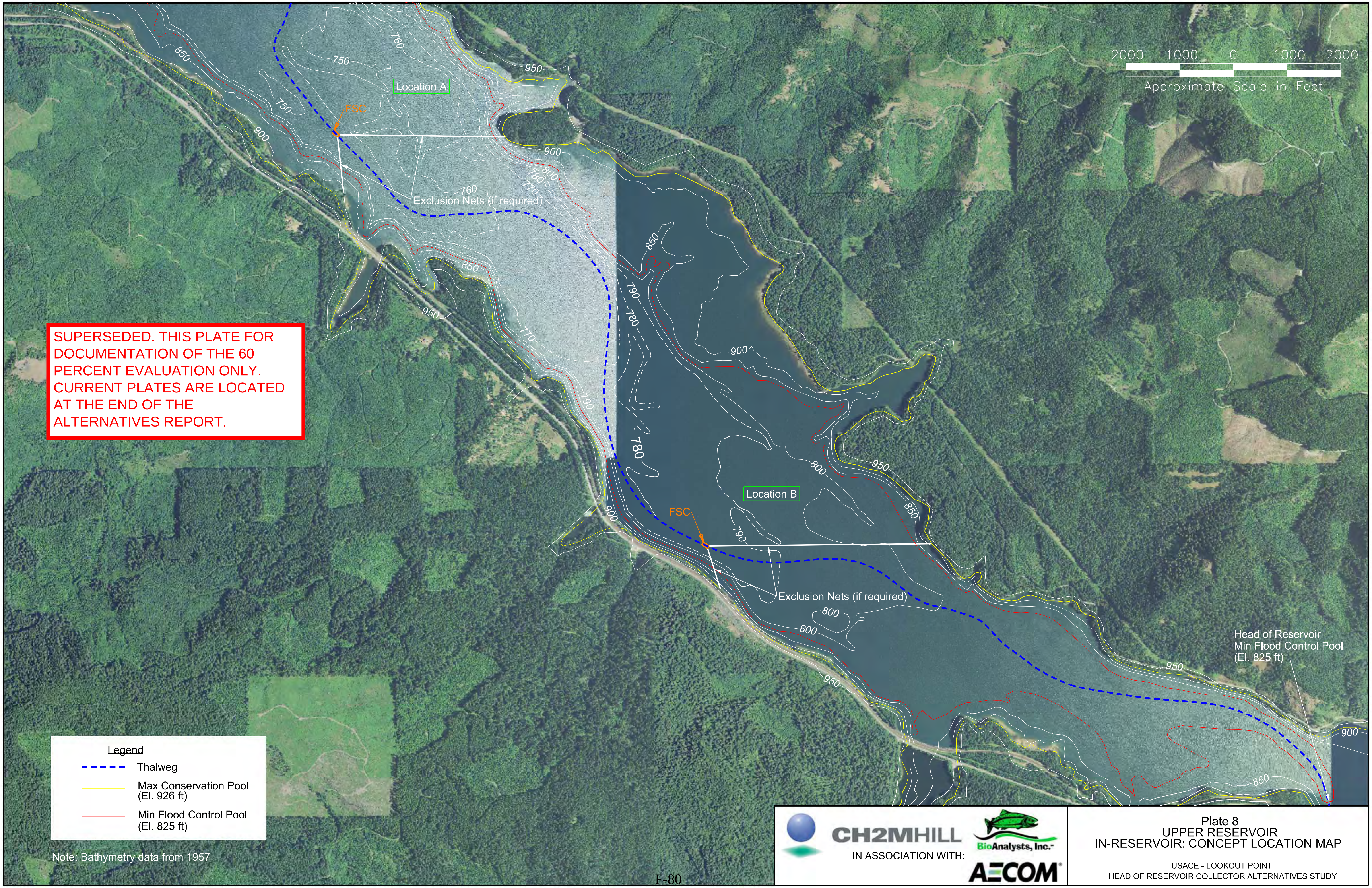
Plate 7

UPPER RESERVOIR, IN-RESERVOIR: ADJUSTABLE NTS SCHEMATIC

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

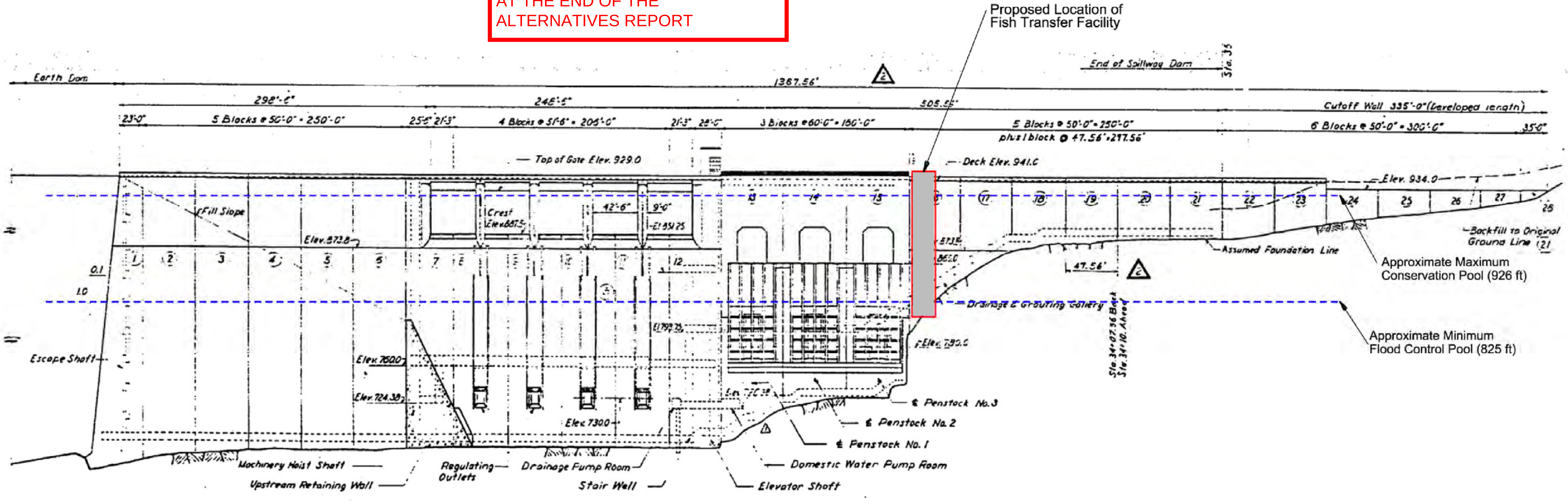
FILENAME: NTS - Plan View.dwg PLOT DATE: 07/08/10 PLOT TIME: 1:41 pm

...\402429-Plate7.dgn 11/19/2010 3:41:54 PM



402429. FILENAME: $FILENAME PLOT DATE: $PLOTDATE PLOT TIME: $PLOTTIME

SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT



Upstream Elevation of Lookout Point Dam

NTS

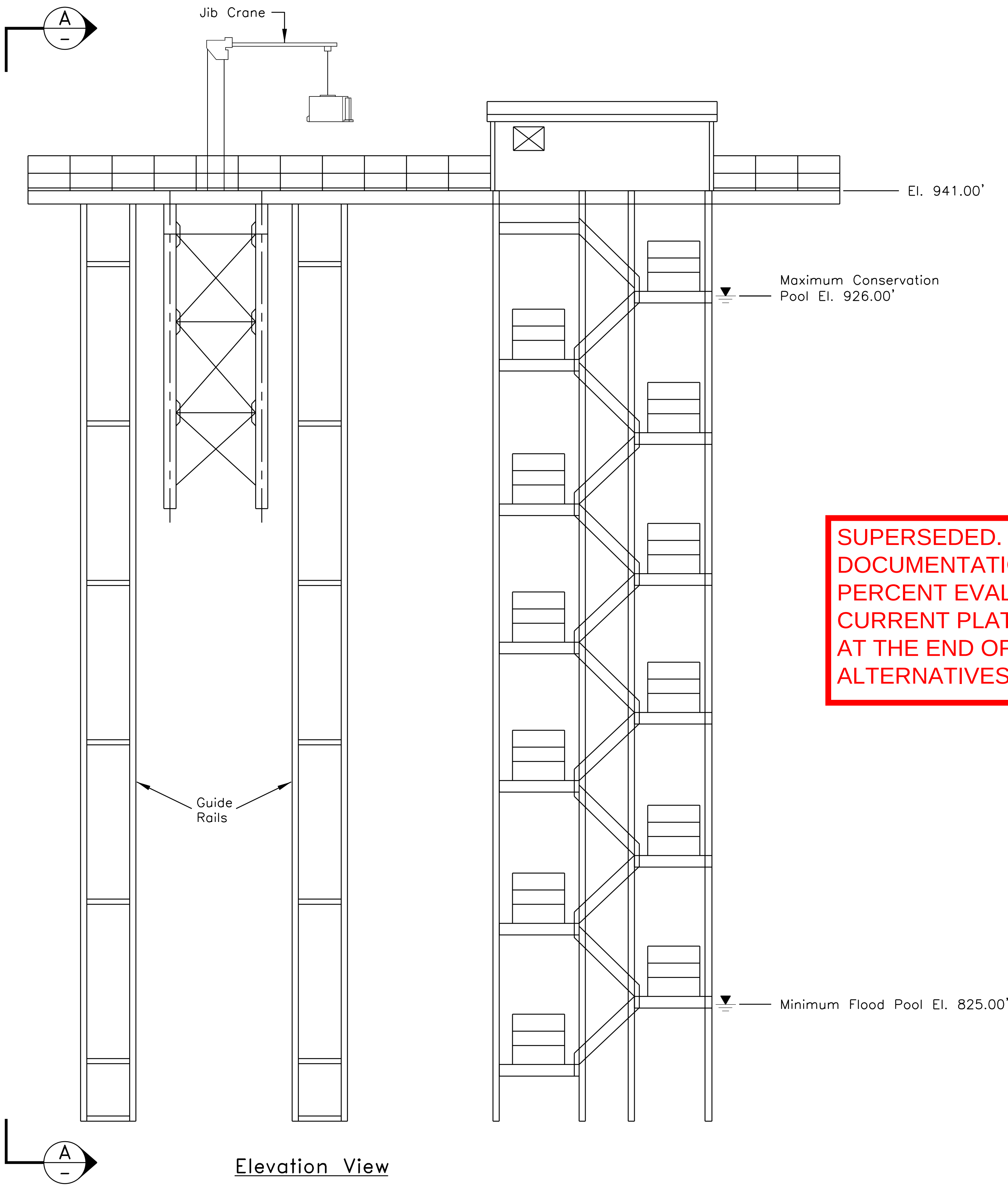
Source: Corps of Engineers
Lookout Point Drawing LP-222-5

CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 9
UPPER RESERVOIR
IN-RESERVOIR: DAME ELEVATION VIEW
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

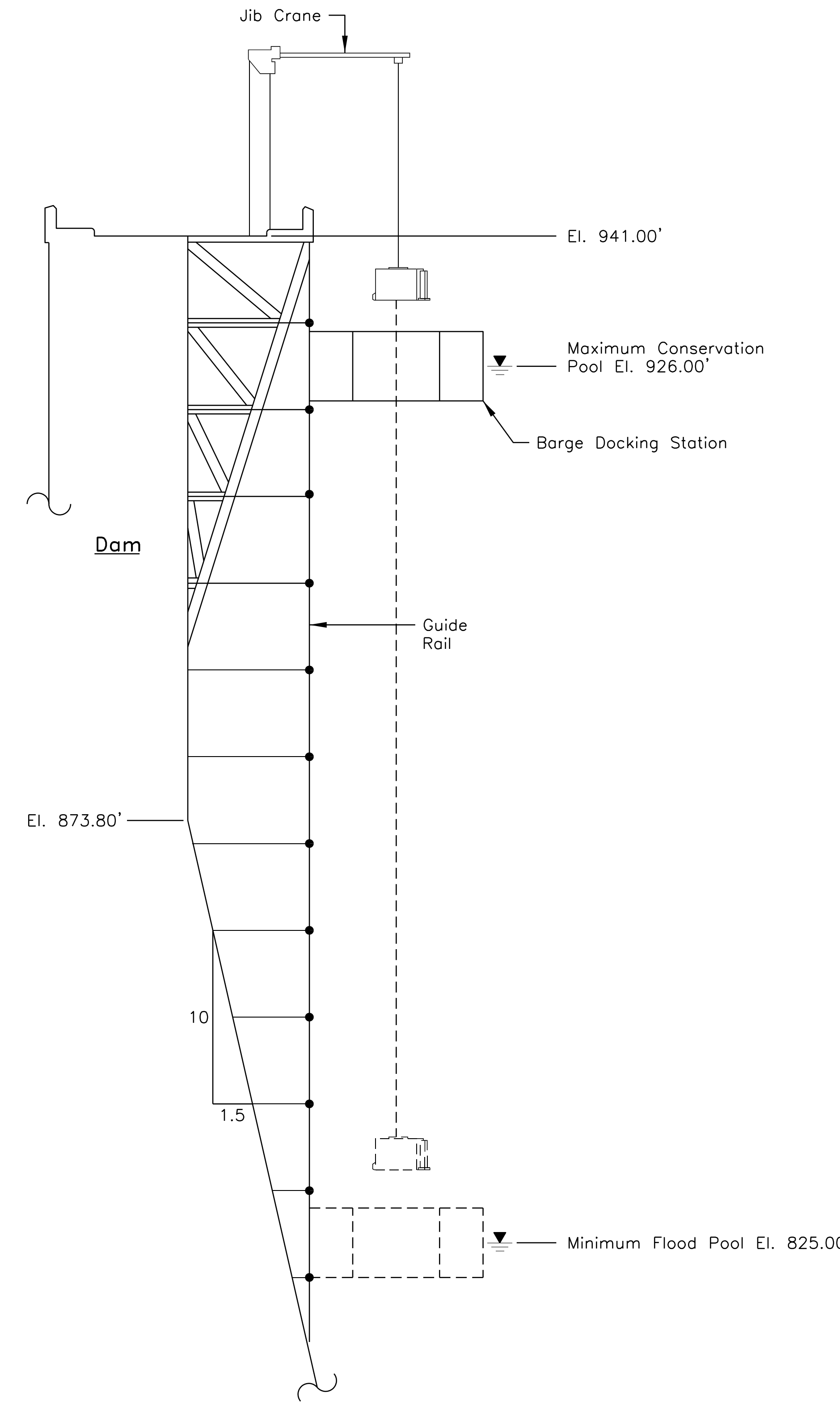
402429. FILENAME: 402429-USACE-Plate9.dgn PLOT DATE: 11/20/2010 PLOT TIME: 7:53:16 AM

...\402429-USACE-Plate9.dgn 11/20/2010 7:53:16 AM



Elevation View

SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT



Section A

10 0 5 10 15 20
Feet

CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 10
UPPER RESERVOIR
IN-RESERVOIR: DAM FISH TRANSFER FACILITY

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTOR ALTERNATIVES STUDY

FILENAME: Plate-10.dwg PLOT DATE: 08/27/10 PLOT TIME: 10:15 am

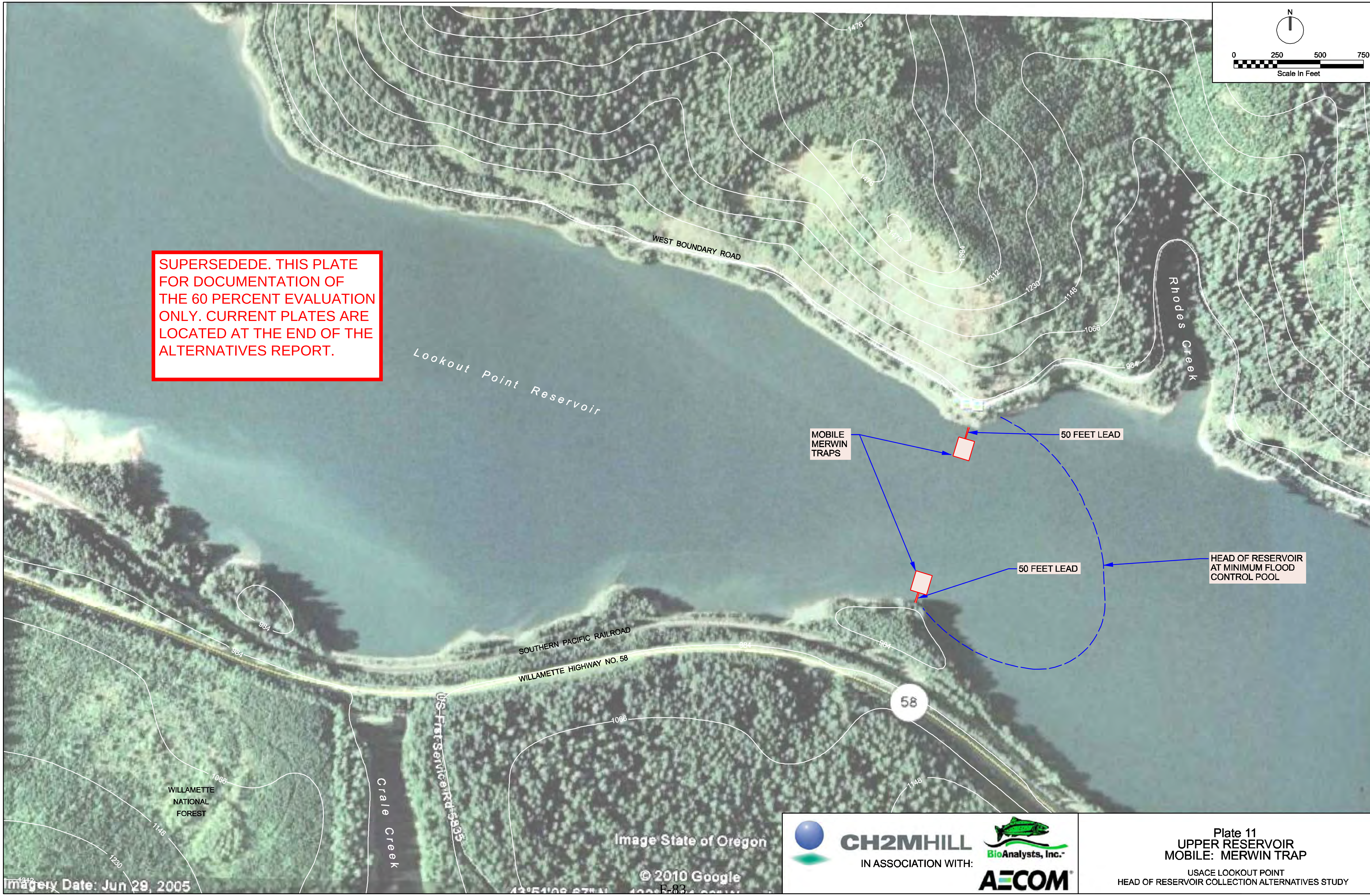
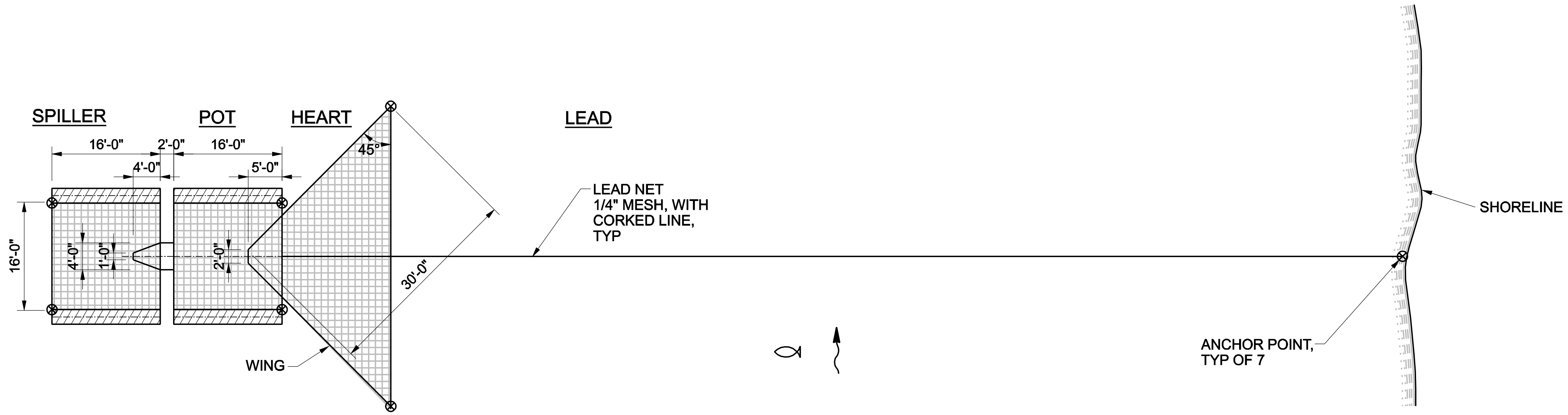
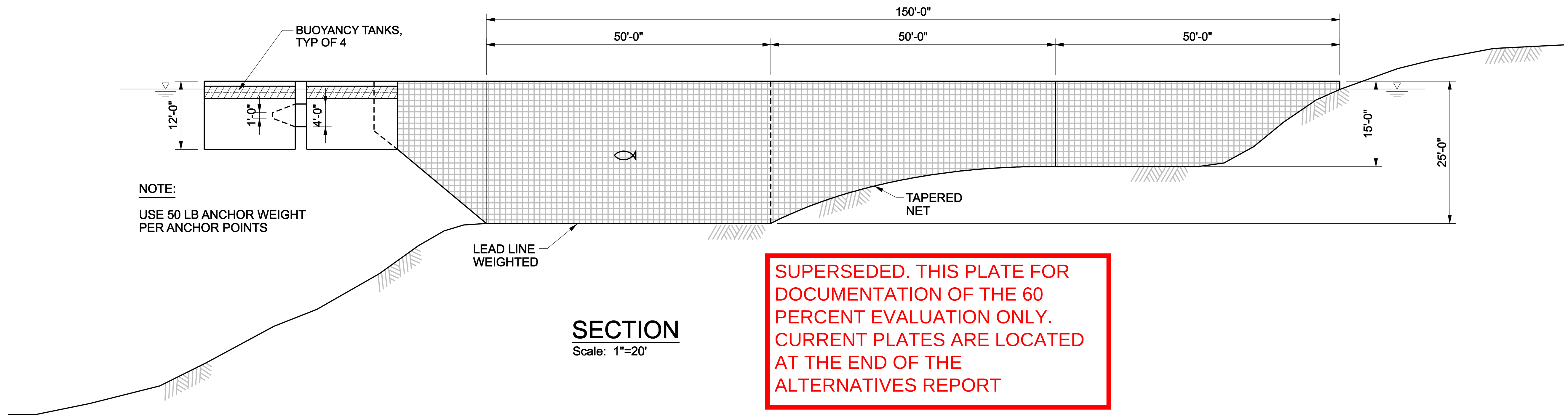


Plate 11
UPPER RESERVOIR
MOBILE: MERWIN TRAP
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate11.dgn PLOT DATE: 8/25/2010 PLOT TIME: 0:50:24 AM



PLAN
Scale: 1"=20'



NOTE:

USE 50 LB ANCHOR WEIGHT
PER ANCHOR POINTS

SECTION
Scale: 1"=20'

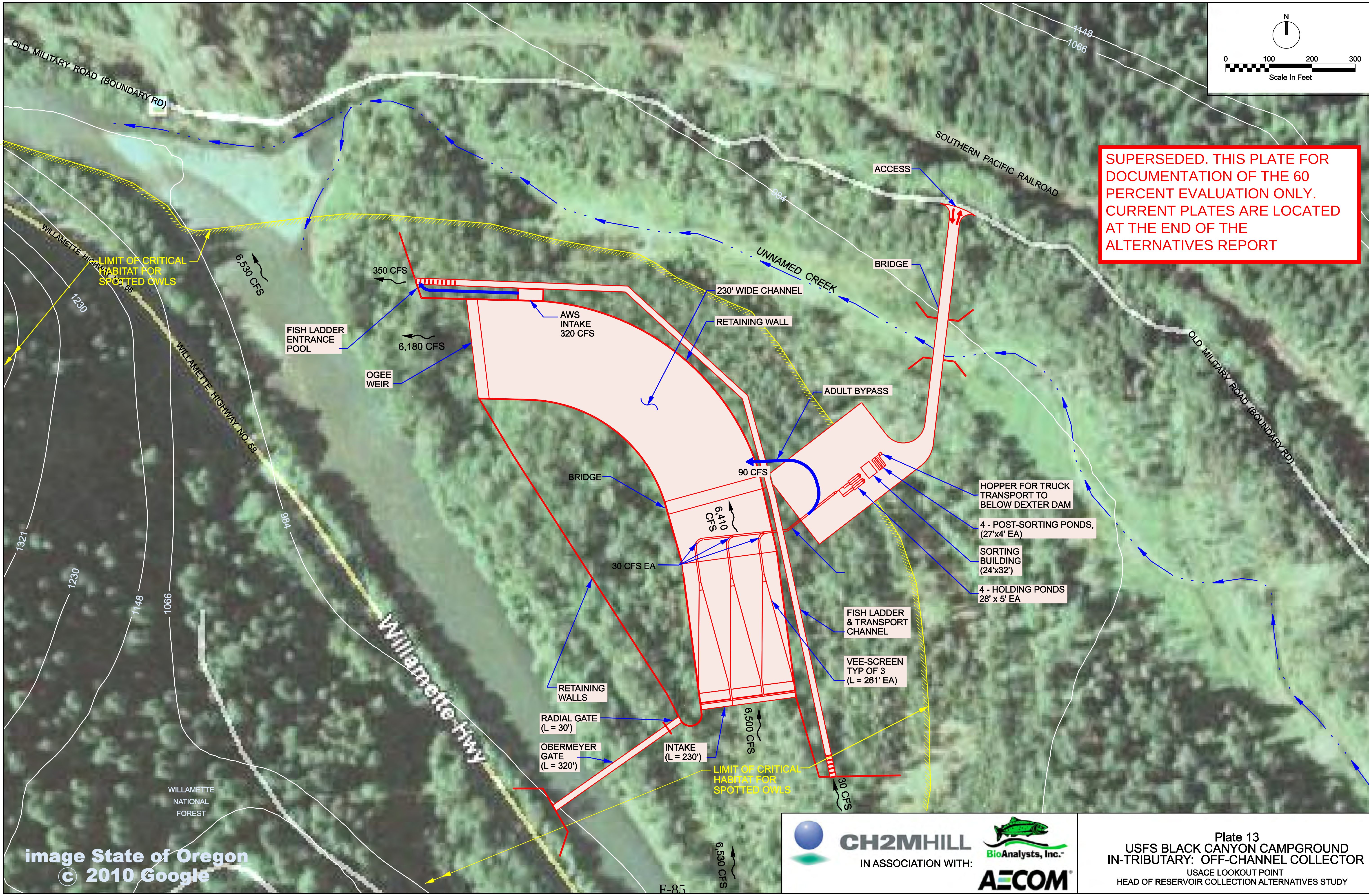
SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT

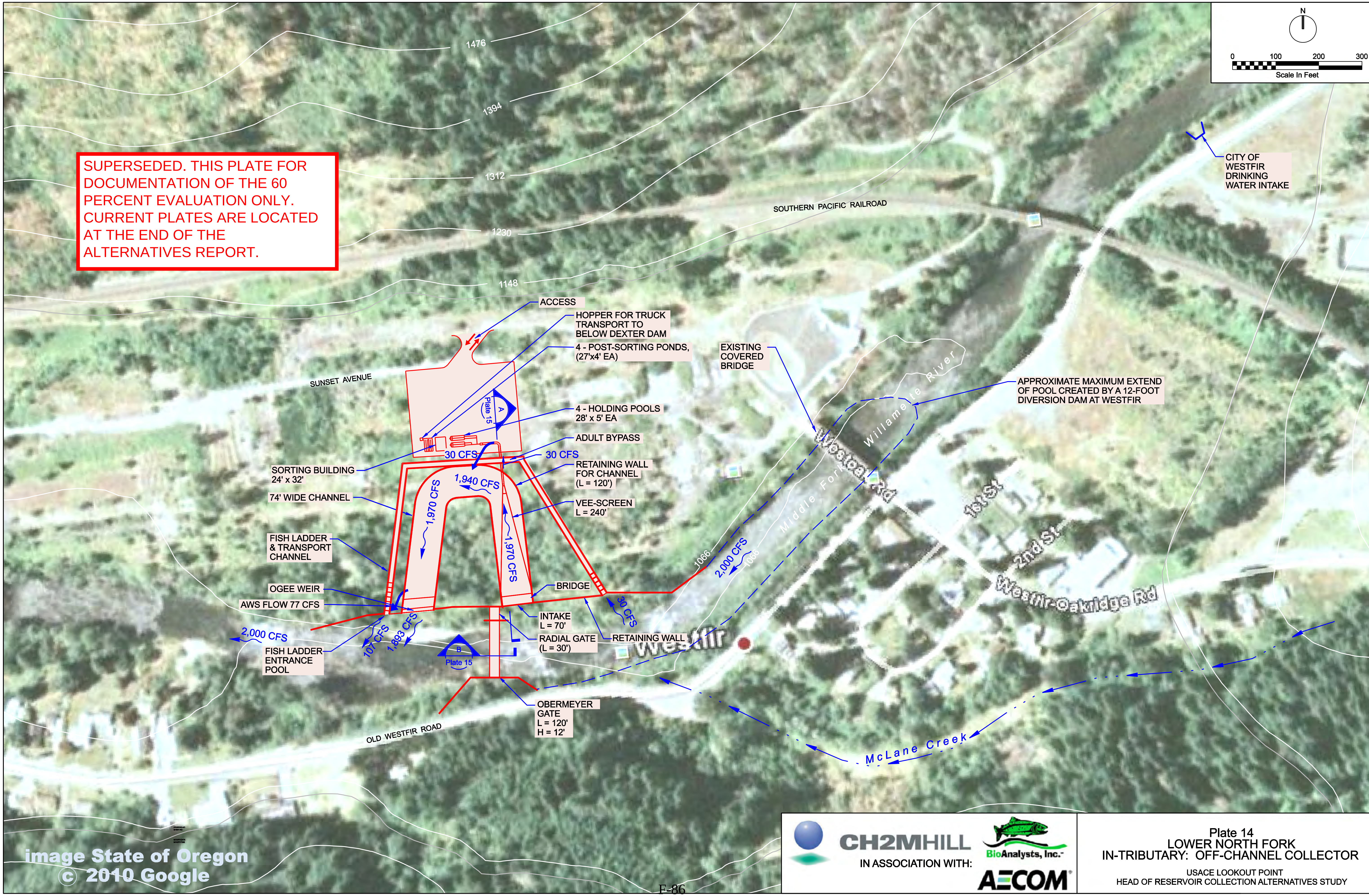
CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 12
UPPER RESERVOIR, MOBILE: MERWIN TRAP
PLAN & SECTION
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate12.dgn PLOT DATE: 11/20/2010 PLOT TIME: 8:45:39 AM

...\402429-Plate12.dgn 11/20/2010 8:45:39 AM

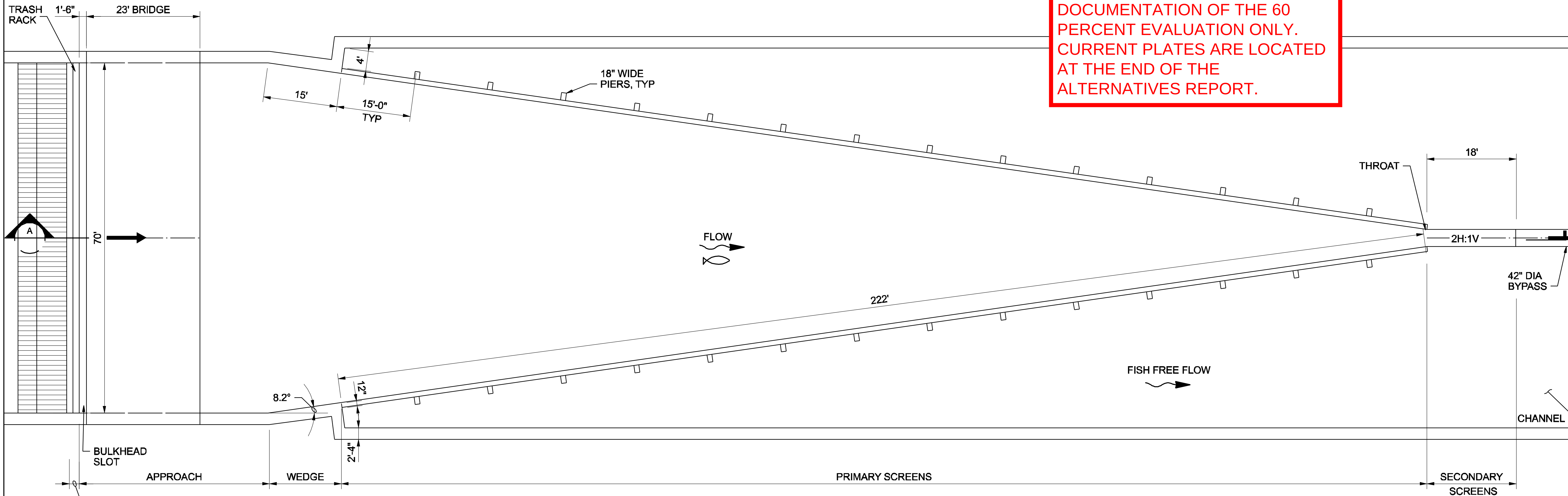

N
0 100 200 300
Scale In Feet
OLD MILITARY ROAD (BOUNDARY RD)
SOUTHERN PACIFIC RAILROAD
SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT
ACCESS
BRIDGE
UNNAMED CREEK
OLD MILITARY ROAD (BOUNDARY RD)
WILLAMETTE HIGHWAY NO. 58
LIMIT OF CRITICAL HABITAT FOR SPOTTED OWLS
6,530 CFS
350 CFS
230' WIDE CHANNEL
RETAINING WALL
AWS INTAKE 320 CFS
FISH LADDER ENTRANCE POOL
6,180 CFS
OGEE WEIR
ADULT BYPASS
90 CFS
BRIDGE
6,410 CFS
HOPPER FOR TRUCK TRANSPORT TO BELOW DEXTER DAM
4 - POST-SORTING PONDS, (27'x4' EA)
SORTING BUILDING (24'x32')
4 - HOLDING PONDS 28' x 5' EA
30 CFS EA
FISH LADDER & TRANSPORT CHANNEL
VEE-SCREEN TYP OF 3 (L = 261' EA)
RETAINING WALLS
RADIAL GATE (L = 30')
OBERMEYER GATE (L = 320')
INTAKE (L = 230')
6,500 CFS
LIMIT OF CRITICAL HABITAT FOR SPOTTED OWLS
30 CFS
6,530 CFS
Willamette Hwy
WILLAMETTE NATIONAL FOREST
image State of Oregon © 2010 Google
1148
1066
984
1230
1321
CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM
Plate 13
USFS BLACK CANYON CAMPGROUND
IN-TRIBUTARY: OFF-CHANNEL COLLECTOR
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY



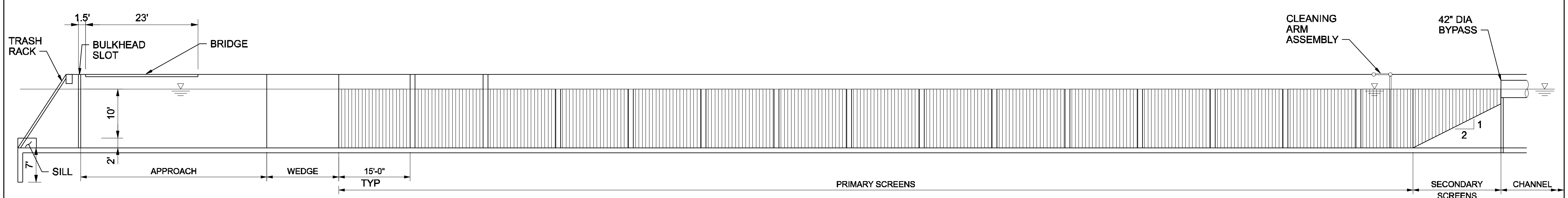
402429. FILENAME: 402429-Plate14.dgn PLOT DATE: 11/20/2010 PLOT TIME: 6:55:50 AM

...\402429-Plate14.dgn 11/20/2010 6:55:51 AM

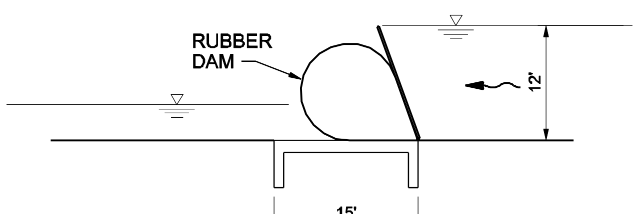
SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT.



PLAN
1"=10'



A SECTION
1"=10'
PLATE 14

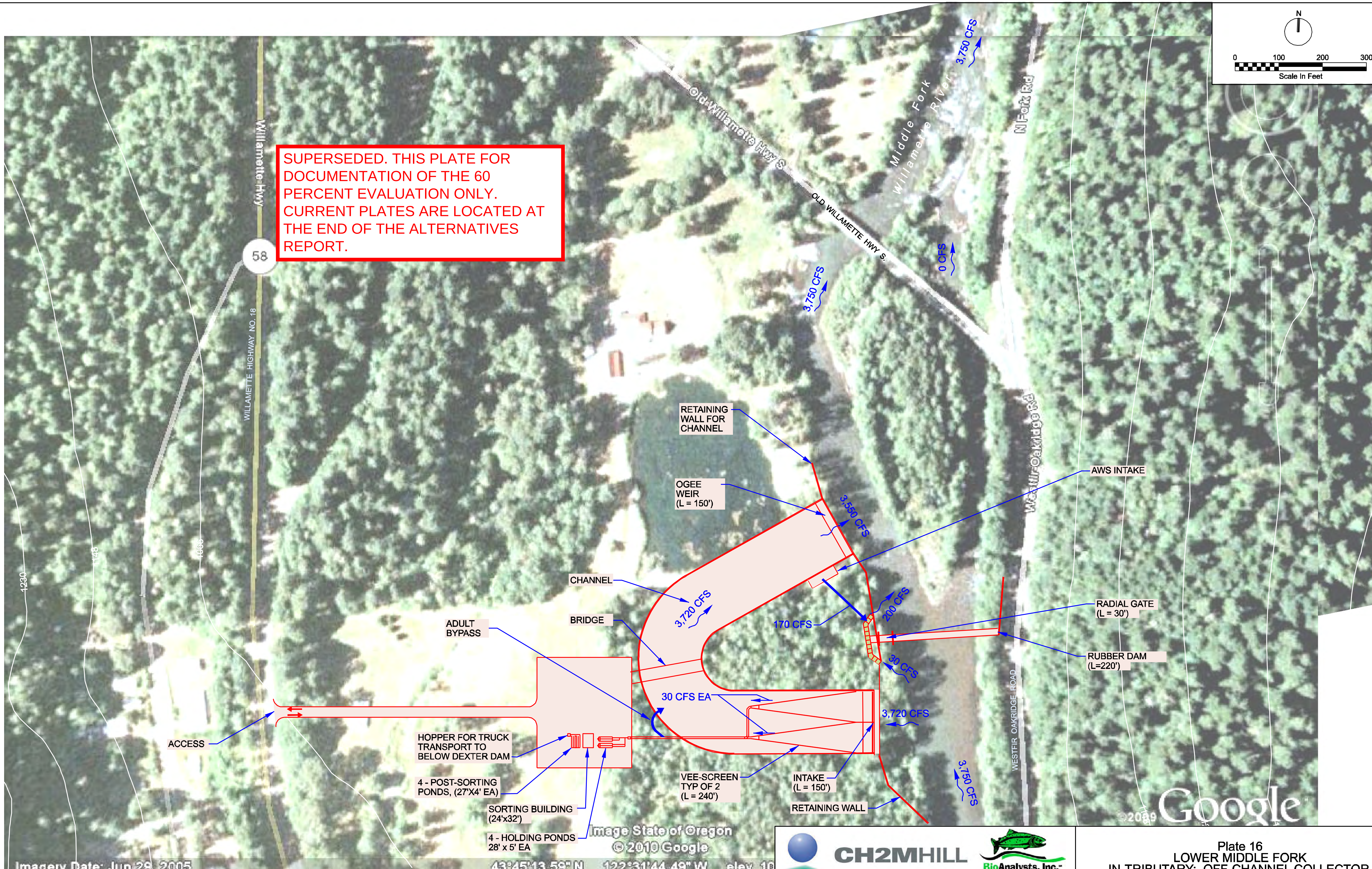


B SECTION
NTS
PLATE 13

CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 15
VEE-SCREEN
TYPICAL PLAN AND SECTION
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate15.dgn PLOT DATE: 8/25/2010 PLOT TIME: 7:12:44 AM

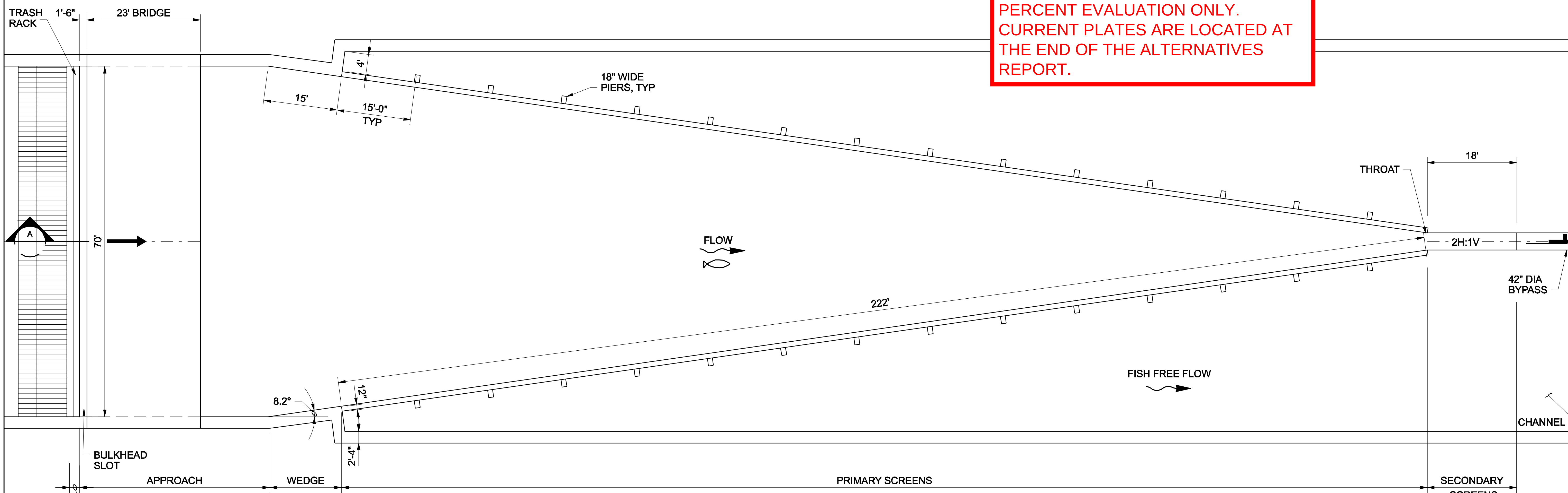


CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

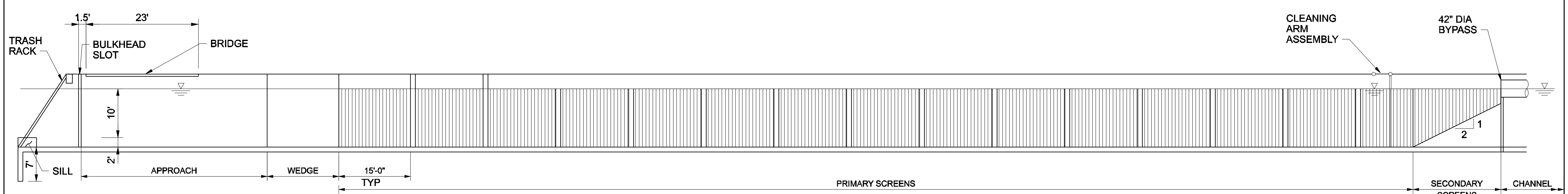
Plate 16
LOWER MIDDLE FORK
IN-TRIBUTARY: OFF-CHANNEL COLLECTOR
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate16.dgn PLOT DATE: 7/12/2010 PLOT TIME: 8:53:22 AM

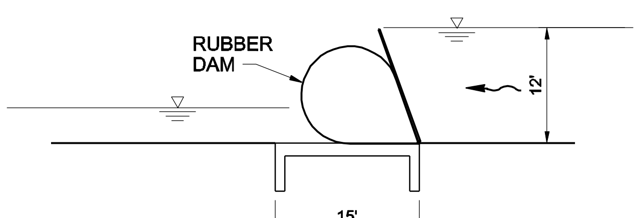
SUPERSEDED. THIS PLATE FOR DOCUMENTATION OF THE 60 PERCENT EVALUATION ONLY. CURRENT PLATES ARE LOCATED AT THE END OF THE ALTERNATIVES REPORT.



PLAN
1"=10'



A SECTION
1"=10'
PLATE 13



B SECTION
NTS
PLATE 13

CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 17
VEE-SCREEN
TYPICAL PLAN AND SECTION

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate17.dgn PLOT DATE: 7/9/2010 PLOT TIME: 7:16:19 AM

APPENDIX G

COST ESTIMATES

Appendix G includes the following:

1. Example Program Schedule

Cost estimates for the following alternatives:

2. In-Reservoir, Upper Reservoir: FSC
    a. 500 cfs without net
    b. 500 cfs with net
    c. 1,000 cfs with net
3. In-Reservoir, Upper Reservoir: Merwin Traps
4. In-Tributary, Off-Channel: USFS Black Canyon Campground (Revised Upstream Location)
5. In-Tributary, Off-Channel: Lower North Fork (Westfir)

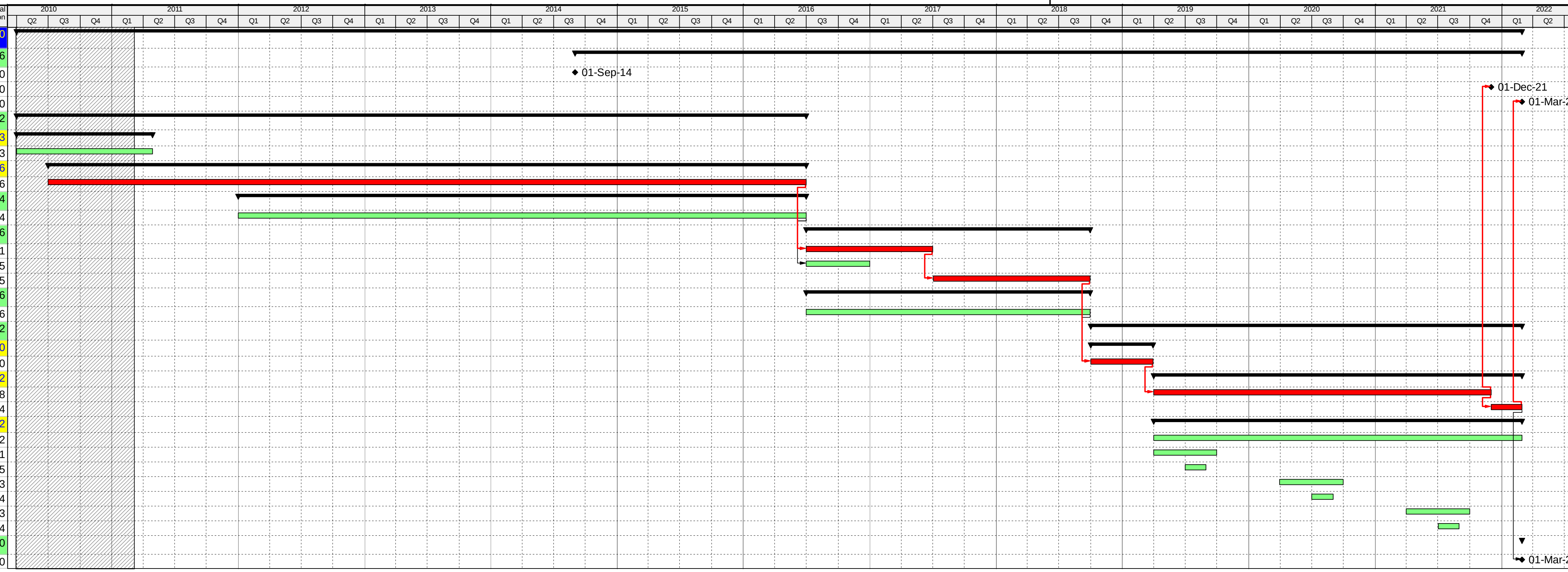
This page was intentionally left blank.

USACE Lookout Point Head of Reservoir Collection Alternatives Study

402429

Example Program Schedule (8 March 2011)

Activity Name	Start	Finish	Original Duration
USACE - Lookout Point Downstream Collection	31-Mar-10	01-Mar-22	3110
Biological Opinion (BiOP) Requirements	01-Sep-14	01-Mar-22	1956
Prototype Construction Complete		01-Sep-14	0
Full-Scale Production Facility Construction Complete		01-Dec-21	0
Full-Scale Production Facility Operational		01-Mar-22	0
Feasibility Phase	31-Mar-10	30-Jun-16	1632
Head of Reservoir Collection Alternatives Study	31-Mar-10	29-Apr-11	283
Head of Reservoir Collection Alternatives Study	31-Mar-10	29-Apr-11	283
Research, Monitoring and Evaluation (RM&E) Activities	01-Jul-10	30-Jun-16	1566
RM&E Activities (Ongoing and Planned)	01-Jul-10	30-Jun-16	1566
Prototype Testing	02-Jan-12	30-Jun-16	1174
Prototype Design and Testing (If Required)	02-Jan-12	30-Jun-16	1174
Pre-Authorization Engineering and Design (PED) Phase	01-Jul-16	28-Sep-18	586
Design Documentation Report (DDR)	01-Jul-16	30-Jun-17	261
Physical and Biological Investigations	01-Jul-16	30-Dec-16	5
Final Plans and Specifications	03-Jul-17	28-Sep-18	325
Authorization and Appropriation	01-Jul-16	28-Sep-18	586
Authorization and Appropriation	01-Jul-16	28-Sep-18	586
Construction Phase	01-Oct-18	01-Mar-22	892
Procurement	01-Oct-18	29-Mar-19	130
Procurement	01-Oct-18	29-Mar-19	130
Construction	01-Apr-19	01-Mar-22	762
Facility Construction	01-Apr-19	01-Dec-21	698
Facility Testing, Startup and Commissioning	02-Dec-21	01-Mar-22	64
Schedule Constraints	01-Apr-19	01-Mar-22	762
Powerhouse Outages (If Required)	01-Apr-19	01-Mar-22	762
Northern Spotted Owl (NSO) Breeding Season No. 1	01-Apr-19	30-Sep-19	131
In-Water Work (IWW) Period No. 1	01-Jul-19	30-Aug-19	45
NSO Breeding Season No. 2	30-Mar-20	30-Sep-20	133
IWW Period No. 2	01-Jul-20	31-Aug-20	44
NSO Breeding Season No. 3	30-Mar-21	30-Sep-21	133
IWW Period No. 3	01-Jul-21	31-Aug-21	44
Post-Construction Monitoring and Evaluation	01-Mar-22	01-Mar-22	0
Begin Post-Construction Monitoring and Evaluation		01-Mar-22	0



Actual Work
Critical Remaining Work
Summary
Remaining Work
Milestone

TASK filter: All Activities

This page was intentionally left blank.

CH2MHILL.

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Project Cost Estimate
Summary of Costs by Alternative

Date: 3/8/2011
By: V. Autier, I. Willig
Checked By: J. Kapla

Alternative	Fish and Wildlife Facilities Cost ($)	Lands and Damages Cost ($)	Planning, Engineering, and Design Cost ($)	Construction Management Cost ($)	Total Capital Project Cost ($)	Total Annual O&M Cost ($)	Present Value of Total Annual O&M Cost ($)	Total Project Cost ($)
Upper Reservoir, In-Reservoir:								
FSC - 500 cfs, without nets	$ 73,349,000	$ 480,000	$ 13,314,000	$ 8,435,000	$ 95,577,000	$ 2,083,000	$43,797,000	$ 139,374,000
FSC - 500 cfs, with exclusion nets	$ 125,261,000	$ 480,000	$ 22,738,000	$ 14,405,000	$ 162,884,000	$ 3,218,000	$67,664,000	$ 230,548,000
FSC - 1000 cfs, with exclusion nets	$ 139,211,000	$ 480,000	$ 25,269,000	$ 16,008,000	$ 180,968,000	$ 3,353,000	$70,507,000	$ 251,475,000
Upper Reservoir, In-Reservoir: Merwin Traps	$ 11,098,000	$ 442,000	$ 2,016,000	$ 1,277,000	$ 14,832,000	$ 2,383,000	$50,113,000	$ 64,945,000
In-Tributary, Off-Channel: USFS Black Canyon Campground	$ 257,898,000	$ 691,000	$ 46,824,000	$ 29,659,000	$ 335,073,000	$ 2,557,000	$53,774,000	$ 388,847,000
In-Tributary, Off-Channel: Lower North Fork (Westfir)	$ 94,689,000	$ 505,000	$ 17,189,000	$ 10,889,000	$ 123,273,000	$ 1,942,000	$40,840,000	$ 164,113,000

Contingency Level and Estimate Range for Class 5 Estimate

Alternative	Contingency	Low Range: -30 Percent	Fish and Wildlife Facilities Cost ($)	High Range: + 50 Percent
Upper Reservoir, In-Reservoir:				
FSC - 500 cfs, without nets	50%	$ 51,344,000	$ 73,349,000	$ 110,024,000
FSC - 500 cfs, with exclusion nets	50%	$ 87,683,000	$ 125,261,000	$ 187,892,000
FSC - 1000 cfs, with exclusion nets	50%	$ 97,448,000	$ 139,211,000	$ 208,817,000
Upper Reservoir, In-Reservoir: Merwin Traps	50%	$ 7,769,000	$ 11,098,000	$ 16,647,000
In-Tributary, Off-Channel: USFS Black Canyon Campground	50%	$ 180,529,000	$ 257,898,000	$ 386,847,000
In-Tributary, Off-Channel: Lower North Fork (Westfir)	50%	$ 66,282,000	$ 94,689,000	$ 142,034,000

Notes:
All costs are order-of-magnitude costs for comparative purposes only.
An allowance for prototype testing of exclusion net systems is included.
Costs for biological research, monitoring and evaluation (RM&E) activities are not included.

CH2MHILL.

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Project Cost Estimate
Upper Reservoir, In-Reservoir: FSC - 500 cfs, without Exclusion Nets

Date: 2/28/2011
By: I. Willig, V. Autier
Checked By: J. Kapla

Fish and Wildlife Facilities

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	500 cfs FSC	1	EA	$ 27,300,000	$ 27,300,000	Per PSE Upper Baker construction cost of $32M and total project cost of $52M (Escalated from 2007). It is anticipated that Davis-Bacon wages will be required for Lookout Point; however, no adjustment has been made to the PSE costs. Assumes 2-step sort process (3 fish size classifications) and an allowance for M&E equipment.
2	NTS	1	EA	$ 660,000	$ 660,000	The Upper Baker NTS estimated construction cost was $2 to $3M. The proposed NTS for this project is 1/4 of the size as the Upper Baker NTS thus adjust cost by factor of 1/4. This value was then escalated from 2007.
3	FSC Mooring Tower and Dolphins	1	LS	$ 9,000,000	$ 9,000,000	
4	Transfer Facility at Dam	1	EA	$ 2,100,000	$ 2,100,000	
5	Transport Boat	1	EA	$ 150,000	$ 150,000	Quote from SeaArk Marine; Transporter Model 3512B.
6	Fish Truck	1	EA	$ 250,000	$ 250,000	
7	Acclimation and Release Facility	1	LS	$ 2,080,000	$ 2,080,000	Per Chelan PUD Chelan Falls at $5.2M for 600,000 fish. Say 40% for 200,000 fish.
8						
9						
10						
				Fish and Wildlife Facilities Subtotal:	**$ 41,540,000**	

Lands and Damages Cost

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Land Costs	5	Acre	$ 7,500	$ 37,500	Access to net and winch anchorages, acclimation and release facility.
2	Administrative Costs for Land Acquisition	1	LS	$ 250,000	$ 250,000	Per USACE.
3						
4						
5						
				Lands and Damages Subtotal:	**$ 288,000**	

Annual Operations and Maintenance Costs

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	FSC Maintenance	1	LS	$ 207,700	$ 207,700	0.5% of construction cost. PSE has spent roughly $1M over 3 years at Baker but this includes numerous one-time expenses.
2	Monitoring and Evaluation	1	LS	$ 300,000	$ 300,000	Allowance.
3	FSC Operators	16200	Hrs	$ 50	$ 810,000	5 people,12 hrs per day, 9 months per year.
4	Pump Energy	2,073,600	kW-h	$ 0.05	$ 103,680	2 primary pumps (100 kW-hr) and 4 secondary pumps (30 kW-hr), 24 hrs day, 9 months per year.
5	Truck Transport	2,484	Miles	$ 5	$ 12,420	From the Dam to Dexter; 2-way trip, 4.6 miles per trip, 1 trip per day, 9 months per year.
6	Truck Operator	810	Hrs	$ 50	$ 40,500	1 person, 3 hrs per day, 9 months per year.
7	Boat Transport	3,024	Miles	$ 3	$ 9,072	From the FSC to the Dam; 2-way trip, 5.6 miles per trip, 1 trip per day, 9 months per year.
8	Boat Operator	1620	Hrs	$ 50	$ 81,000	1 person, 6 hrs per day, 9 months per year.
9	Crane Operator	540	Hrs	$ 70	$ 37,800	1 person, 2 hrs per day, 9 months per year.
10						
				Subtotal:	$ 1,602,000	
				Contingency (30%)	$ 480,600	
				Total Annual O&M:	**$ 2,082,600**	
				Present Value of Annual O&M:	**$43,797,195**	4.125 percent real discount rate over a period of 50 years.

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: FSC - 500 cfs without Exclusion Nets
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP PREPARED: 3/8/2011
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

						Program Year (Budget EC): 2012				FULLY FUNDED PROJECT ESTIMATE				
						Effective Price Level Date: 1 OCT 11				Spent Thru:				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	1-Oct-09 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
06	FISH & WILDLIFE FACILITIES	41,540	20,770	50%	62,310	1.2%	42,024	21,012	63,035			48,899	24,450	73,349
	CONSTRUCTION ESTIMATE TOTALS:	41,540	20,770		**62,310**	1.2%	42,024	21,012	63,035	0		48,899	24,450	73,349
01	LANDS AND DAMAGES	288	144	50%	432	1.2%	291	146	437	0		320	160	480
30	PLANNING, ENGINEERING & DESIGN	7,891	3,946	50%	11,837	1.2%	7,983	3,991	11,974	0		8,876	4,438	13,314
31	CONSTRUCTION MANAGEMENT	4,777	2,389	50%	7,166	1.2%	4,833	2,416	7,249	0		5,623	2,812	8,435
	PROJECT COST TOTALS:	54,496	27,248	50%	**81,744**	1.2%	55,130	27,565	82,696	0		63,718	31,859	95,577

CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

CHIEF, PLANNING, PROGRAM and PROJECT MANAGEMENT DIVISION

CHIEF, COST ENGINEERING SECTION

ESTIMATED FEDERAL COST: **95,577**
ESTIMATED NON-FEDERAL COST: **0**

ESTIMATED TOTAL PROJECT COST: **95,577**

**** CONTRACT COST SUMMARY ****

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: FSC - 500 cfs without Exclusion Nets | DISTRICT: NWP | PREPARED: 3/8/2011
LOCATION: Lookout Point Dam, OR | POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

	Estimate Prepared:	8-Mar-10						Program Year (Budget EC):	2012					
	Effective Price Level:	1 OCT 11						Effective Price Level Date:	1 OCT 11	FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***P***	***L***	***M***	***N***	***O***
	PHASE 1													
06	FISH & WILDLIFE FACILITIES	$ 41,540	$ 20,770	50%	$ 62,310	1.2%	42,024	21,012	63,035	2020Q4	16.4%	48,899	24,450	73,349
04	DAMS	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
05	LOCKS		$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
06	FISH & WILDLIFE FACILITIES		$ -	30%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
07	POWER PLANT	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
							0							
	CONSTRUCTION ESTIMATE TOTALS:	41,540	20,770	50%	**62,310**		42,024	21,012	63,035			48,899	24,450	73,349
01	LANDS AND DAMAGES	$ 288	$ 144	50%	$ 432	1.2%	291	146	437	2017Q3	9.8%	320	160	480
						0.0%								
30	PLANNING, ENGINEERING & DESIGN					0.0%					0.0%			
2.5%	Project Management	1,039	$ 520	50%	1,559	1.2%	1,051	526	1,577	2017Q3	9.8%	1,154	577	1,731
1.0%	Planning & Environmental Compliance	415	$ 208	50%	623	1.2%	420	210	630	2017Q3	9.8%	461	230	691
8.5%	Engineering & Design	3,531	$ 1,766	50%	5,297	1.2%	3,572	1,786	5,358	2017Q3	9.8%	3,922	1,961	5,883
1.0%	Engineering Tech Review ITR & VE	415	$ 208	50%	623	1.2%	420	210	630	2017Q3	9.8%	461	230	691
1.0%	Contracting & Reprographics	415	$ 208	50%	623	1.2%	420	210	630	2017Q3	9.8%	461	230	691
3.0%	Engineering During Construction	1,246	$ 623	50%	1,869	1.2%	1,261	630	1,891	2020Q4	16.4%	1,467	733	2,200
1.0%	Planning During Construction	415	$ 208	50%	623	1.2%	420	210	630	2020Q4	16.4%	489	244	733
1.0%	Project Operations	415	$ 208	50%	623	1.2%	420	210	630	2017Q3	9.8%	461	230	691
		0				0.0%	0	0			0.0%	0	0	
31	CONSTRUCTION MANAGEMENT					0.0%	0	0			0.0%	0	0	
8.0%	Construction Management	3,323	$ 1,662	50%	4,985	1.2%	3,362	1,681	5,043	2020Q4	16.4%	3,912	1,956	5,868
1.0%	Project Operation:	415	$ 208	50%	623	1.2%	420	210	630	2020Q4	16.4%	489	244	733
2.5%	Project Management	1,039	$ 520	50%	1,559	1.2%	1,051	526	1,577	2020Q4	16.4%	1,223	612	1,835
	CONTRACT COST TOTALS:	54,496	27,248		**81,744**		55,130	27,565	82,696			63,718	31,859	**95,577**

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Project Cost Estimate
Upper Reservoir, In-Reservoir: FSC - 500 cfs with Exclusion Nets

Date: 2/28/2011
By: I. Willig, V. Autier
Checked By: J. Kapla

Fish and Wildlife Facilities

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	500 cfs FSC	1	EA	$ 27,300,000	$ 27,300,000	Per PSE Upper Baker facility it was estimated that the FSC cost $26M of the total construction cost for the project of $32M. This value was then escalated from 2007. It is anticipated that Davis-Bacon wages will be required for Lookout Point; however, no adjustment has been made to the PSE costs. Assumes 2-step sort process (3 fish size classifications) and an allowance for M&E equipment.
2	NTS	1	EA	$ 660,000	$ 660,000	The Upper Baker NTS estimated construction cost was $2 to $3M. The proposed NTS for this project is 1/4 of the size as the Upper Baker NTS thus adjust cost by factor of 1/4. This value was then escalated from 2007.
3	FSC Mooring Tower and Dolphins	1	LS	$ 13,000,000	$ 13,000,000	
4	Exclusion Nets	1	LS	$ 8,000,000	$ 8,000,000	Per PSE Upper Baker estimated net construction cost of $1-2M for a net area of approximately 200,000 sq. ft equates to $7.5/sq. ft. As the proposed full exclusion 2-net system is much more complicated than the system implemented at Upper Baker and will require more hardware, netting, etc., the Upper Baker cost per sq. ft has been increased by a factor of 1.7 resulting in $12.75/sq. ft. The selected location requires 592,000 sq. ft of netting or solid curtain. This value was then escalated from 2007.
5	Net Prototyping Costs	1	LS	$ 16,800,000	$ 16,800,000	Assumed at 80% of the exclusion net and tower costs.
6	Transfer Facility at Dam	1	EA	$ 2,100,000	$ 2,100,000	The Upper Baker Facility access and transfer structure was estimated to cost $2M. This value was then escalated from 2007.
7	Transport Boat	1	EA	$ 150,000	$ 150,000	Quote from SeaArk Marine; Transporter Model 3512B.
8	Fish Truck	1	EA	$ 250,000	$ 250,000	
9	Upstream fish passage and boat passage	1	LS	$ 500,000	$ 500,000	Allowance.
10	Shore-based sitework	1	LS	$ 100,000	$ 100,000	Allowance.
11	Acclimation and Release Facility	1	LS	$ 2,080,000	$ 2,080,000	Per Chelan PUD Chelan Falls at $5.2M for 600,000 fish. Say 40% for 200,000 fish.
				Fish and Wildlife Facilities Subtotal:	**$ 70,940,000**	

Lands and Damages Cost

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Land Costs	5	Acre	$ 7,500	$ 37,500	Access to net and winch anchorages, acclimation and release facility.
2	Administrative Costs for Land Acquisition	1	LS	$ 250,000	$ 250,000	Per USACE.
3						
4						
5						
				Lands and Damages Subtotal:	**$ 288,000**	

Annual Operations and Maintenance Costs

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	FSC Maintenance	1	LS	$ 354,700	$ 354,700	0.5% of construction cost. PSE has spent roughly $1M over 3 years at Baker but this includes numerous one-time expenses.
2	Monitoring and Evaluation	1	LS	$ 300,000	$ 300,000	Allowance.
3	FSC Operators	16200	Hrs	$ 50	$ 810,000	5 people, 12 hrs per day, 9 months per year.
4	Pump Energy	2,073,600	kW-h	$ 0.05	$ 103,680	2 primary pumps (100 kW-hr) and 4 secondary pumps (30 kW-hr), 24 hrs day, 9 months per year.
5	Truck Transport	2,484	Miles	$ 5	$ 12,420	From the Dam to Dexter; 2-way trip, 4.6 miles per trip, 1 trip per day, 9 months per year.
6	Truck Operator	810	Hrs	$ 50	$ 40,500	1 person, 3 hrs per day, 9 months per year.
7	Boat Transport	3,024	Miles	$ 3	$ 9,072	From the FSC to the Dam; 2-way trip, 5.6 miles per trip, 1 trip per day, 9 months per year.
8	Boat Operator	1620	Hrs	$ 50	$ 81,000	1 person, 6 hrs per day, 9 months per year.
9	Crane Operator	540	Hrs	$ 70	$ 37,800	1 person, 2 hrs per day, 9 months per year.
10	Replacement Exclusion Nets	1	LS	$ 726,000	$ 726,000	Assume exclusion net life of approximately 15 years.
				Subtotal:	$ 2,475,000	
				Contingency (30%)	$ 742,500	
				Total Annual O&M:	**$ 3,217,500**	
				Present Value of Annual O&M:	**$67,664,205**	4.125 percent real discount rate over a period of 50 years.

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: FSC - 500 cfs with Exclusion Nets
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION
PREPARED: 3/8/2011

Program Year (Budget EC): 2012
Effective Price Level Date: 1 OCT 11

FULLY FUNDED PROJECT ESTIMATE

WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru: 1-Oct-09 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
06	FISH & WILDLIFE FACILITIES	70,940	35,470	50%	106,410	1.2%	71,766	35,883	107,649			83,508	41,754	125,261
	CONSTRUCTION ESTIMATE TOTALS:	70,940	35,470		**106,410**	1.2%	71,766	35,883	107,649	0		83,508	41,754	125,261
01	LANDS AND DAMAGES	288	144	50%	432	1.2%	291	146	437	0		320	160	480
30	PLANNING, ENGINEERING & DESIGN	13,477	6,739	50%	20,216	1.2%	13,634	6,817	20,451	0		15,159	7,579	22,738
31	CONSTRUCTION MANAGEMENT	8,158	4,079	50%	12,237	1.2%	8,253	4,126	12,379	0		9,603	4,802	14,405
	PROJECT COST TOTALS:	92,863	46,432	50%	**139,295**	1.2%	93,944	46,972	140,916	0		108,589	54,295	162,884

CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

CHIEF, PLANNING, PROGRAM and PROJECT MANAGEMENT DIVISION

CHIEF, COST ENGINEERING SECTION

ESTIMATED FEDERAL COST: **162,884**
ESTIMATED NON-FEDERAL COST: **0**

ESTIMATED TOTAL PROJECT COST: **162,884**

****** CONTRACT COST SUMMARY ******

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: FSC - 500 cfs with Exclusion Nets
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP PREPARED: 3/8/2011
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

	Estimate Prepared:	8-Mar-10					Program Year (Budget EC):		2012					
	Effective Price Level:	1 OCT 11					Effective Price Level Date:		1 OCT 11	FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***P***	***L***	***M***	***N***	***O***
	PHASE 1													
06	FISH & WILDLIFE FACILITIES	$ 70,940	$ 35,470	50%	$ 106,410	1.2%	71,766	35,883	107,649	2020Q4	16.4%	83,508	41,754	125,261
04	DAMS	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
05	LOCKS		$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
06	FISH & WILDLIFE FACILITIES		$ -	30%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
07	POWER PLANT	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
							0							
	CONSTRUCTION ESTIMATE TOTALS:	70,940	35,470	50%	**106,410**		71,766	35,883	107,649			83,508	41,754	125,261
01	LANDS AND DAMAGES	$ 288	$ 144	50%	$ 432	1.2%	291	146	437	2017Q3	9.8%	320	160	480
						0.0%								
30	PLANNING, ENGINEERING & DESIGN					0.0%					0.0%			
2.5%	Project Management	1,774	$ 887	50%	2,661	1.2%	1,795	897	2,692	2017Q3	9.8%	1,971	985	2,956
1.0%	Planning & Environmental Compliance	709	$ 355	50%	1,064	1.2%	717	359	1,076	2017Q3	9.8%	788	394	1,181
8.5%	Engineering & Design	6,030	$ 3,015	50%	9,045	1.2%	6,100	3,050	9,150	2017Q3	9.8%	6,698	3,349	10,047
1.0%	Engineering Tech Review ITR & VE	709	$ 355	50%	1,064	1.2%	717	359	1,076	2017Q3	9.8%	788	394	1,181
1.0%	Contracting & Reprographics	709	$ 355	50%	1,064	1.2%	717	359	1,076	2017Q3	9.8%	788	394	1,181
3.0%	Engineering During Construction	2,128	$ 1,064	50%	3,192	1.2%	2,153	1,076	3,229	2020Q4	16.4%	2,505	1,252	3,757
1.0%	Planning During Construction	709	$ 355	50%	1,064	1.2%	717	359	1,076	2020Q4	16.4%	835	417	1,252
1.0%	Project Operations	709	$ 355	50%	1,064	1.2%	717	359	1,076	2017Q3	9.8%	788	394	1,181
		0				0.0%	0	0			0.0%	0	0	
31	CONSTRUCTION MANAGEMENT					0.0%	0	0			0.0%	0	0	
8.0%	Construction Management	5,675	$ 2,838	50%	8,513	1.2%	5,741	2,871	8,612	2020Q4	16.4%	6,680	3,340	10,021
1.0%	Project Operation:	709	$ 355	50%	1,064	1.2%	717	359	1,076	2020Q4	16.4%	835	417	1,252
2.5%	Project Management	1,774	$ 887	50%	2,661	1.2%	1,795	897	2,692	2020Q4	16.4%	2,088	1,044	3,132
	CONTRACT COST TOTALS:	92,863	46,432		**139,295**		93,944	46,972	140,916			108,589	54,295	**162,884**

CH2MHILL.

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Project Cost Estimate
Upper Reservoir, In-Reservoir: FSC - 1,000 cfs with Exclusion Nets

Date: 2/28/2011
By: I. Willig, V. Autier
Checked By: J. Kapla

Fish and Wildlife Facilities

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	500 cfs FSC	1	EA	$ 27,300,000	$ 27,300,000	Per PSE Upper Baker facility it was estimated that the FSC cost $26M of the total construction cost for the project of $32M. This value was then escalated from 2007. It is anticipated that Davis-Bacon wages will be required for Lookout Point; however, no adjustment has been made to the PSE costs. Assumes 2-step sort process (3 fish size classifications) and an allowance for M&E equipment.
2	Expansion to 1,000 cfs	1	LS	$ 7,900,000	$ 7,900,000	The Upper Baker Design estimated a range of 5 to 10 million for the expansion. This value was then escalated from 2007.
3	NTS	1	EA	$ 660,000	$ 660,000	The Upper Baker NTS estimated construction cost was $2 to $3M. The proposed NTS for this project is 1/4 of the size as the Upper Baker NTS thus adjust cost by factor of 1/4. This value was then escalated from 2007.
4	FSC Mooring Tower and Dolphins	1	LS	$ 13,000,000	$ 13,000,000	
5	Exclusion Nets	1	LS	$ 8,000,000	$ 8,000,000	Per PSE Upper Baker estimated net construction cost of $1-2M for a net area of approximately 200,000 sq. ft equates to $7.5/sq. ft. As the proposed full exclusion 2-net system is more complicated than the system implemented at Upper Baker and will require more hardware, netting, etc., the Upper Baker cost per sq. ft has been increased by a factor of 1.7 resulting in $12.75/sq. ft. The selected location requires 592,000 sq. ft of netting or solid curtain. This value was then escalated from 2007.
6	Net Prototyping Costs	1	LS	$ 16,800,000	$ 16,800,000	Assumed at 80% of the exclusion net and tower costs.
7	Transfer Facility at Dam	1	EA	$ 2,100,000	$ 2,100,000	The Upper Baker Facility access and transfer structure was estimated to cost $2M. This value was then escalated from 2007.
8	Transport Boat	1	EA	$ 150,000	$ 150,000	Quote from SeaArk Marine; Transporter Model 3512B.
9	Fish Truck	1	EA	$ 250,000	$ 250,000	
	Upstream fish passage and boat passage	1	EA	$ 500,000	$ 500,000	Allowance.
10	Shore-based sitework	1	LS	$ 100,000	$ 100,000	Allowance.
11	Acclimation and Release Facility	1	LS	$ 2,080,000	$ 2,080,000	Per Chelan PUD Chelan Falls at $5.2M for 600,000 fish. Say 40% for 200,000 fish.
				Fish and Wildlife Facilities Subtotal:	**$ 78,840,000**	

Lands and Damages Cost

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Land Costs	5	Acre	$ 7,500	$ 37,500	Access to net and winch anchorages, acclimation and release facility.
2	Administrative Costs for Land Acquisition	1	LS	$ 250,000	$ 250,000	Per USACE.
3						
4						
5						
				Lands and Damages Subtotal:	**$ 288,000**	

Annual Operations and Maintenance Costs

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	FSC Maintenance	1	LS	$ 394,200	$ 394,200	0.5% of construction cost. PSE has spent roughly $1M over 3 years at Baker but this includes numerous one-time expenses.
2	Monitoring and Evaluation	1	LS	$ 300,000	$ 300,000	Allowance.
3	FSC Operators	16200	Hrs	$ 50	$ 810,000	5 people, 12 hrs per day, 9 months per year.
4	Pump Energy	3,369,600	kW-h	$ 0.05	$ 168,480	4 primary pumps (100kW-hr) and 4 secondary pumps (30kW-hr), 24 hrs per day, 9 months per year.
5	Truck Transport	2,484	Miles	$ 5	$ 12,420	From the Dam to Dexter; 2-way trip, 4.6 miles per trip, 1 trip per day, 9 months per year.
6	Truck Operator	810	Hrs	$ 50	$ 40,500	1 person, 3 hrs per day, 9 months per year.
7	Boat Transport	3,024	Miles	$ 3	$ 9,072	From the FSC to the Dam; 2-way trip, 5.6 miles per trip, 1 trip per day, 9 months per year.
8	Boat Operator	1620	Hrs	$ 50	$ 81,000	1 person, 6 hrs per day, 9 months per year.
9	Crane Operator	540	Hrs	$ 70	$ 37,800	1 person, 2 hrs per day, 9 months per year.
10	Replacement Exclusion Nets	1	LS	$ 726,000	$ 726,000	Assume exclusion net life of approximately 15 years.
				Subtotal:	$ 2,579,000	
				Contingency (30%)	$ 773,700	
				Total Annual O&M:	**$ 3,352,700**	
				Present Value of Annual O&M:	**$70,507,469**	4.125 percent real discount rate over a period of 50 years.

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: FSC - 1,000 cfs with Exclusion Nets
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION
PREPARED: 3/8/2011

							Program Year (Budget EC):		2012			FULLY FUNDED PROJECT ESTIMATE		
							Effective Price Level Date:		1 OCT 11	Spent Thru:				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	1-Oct-09 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
06	FISH & WILDLIFE FACILITIES	78,840	39,420	50%	118,260	1.2%	79,758	39,879	119,637			92,807	46,404	139,211
	CONSTRUCTION ESTIMATE TOTALS:	78,840	39,420		**118,260**	1.2%	79,758	39,879	119,637	0		92,807	46,404	139,211
01	LANDS AND DAMAGES	288	144	50%	432	1.2%	291	146	437	0		320	160	480
30	PLANNING, ENGINEERING & DESIGN	14,977	7,489	50%	22,466	1.2%	15,151	7,576	22,727	0		16,846	8,423	25,269
31	CONSTRUCTION MANAGEMENT	9,066	4,533	50%	13,599	1.2%	9,172	4,586	13,757	0		10,672	5,336	16,008
	PROJECT COST TOTALS:	103,171	51,586	50%	**154,757**	1.2%	104,372	52,186	156,558	0		120,645	60,323	180,968

____________________ CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

____________________ CHIEF, PLANNING, PROGRAM and PROJECT MANAGEMENT DIVISION

____________________ CHIEF, COST ENGINEERING SECTION

ESTIMATED FEDERAL COST:	**180,968**
ESTIMATED NON-FEDERAL COST:	**0**
ESTIMATED TOTAL PROJECT COST:	**180,968**

**** CONTRACT COST SUMMARY ****

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: FSC - 1,000 cfs with Exclusion Nets
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION
PREPARED: 3/8/2011

	Estimate Prepared:	8-Mar-10					Program Year (Budget EC):			2012				
	Effective Price Level:	1 OCT 11					Effective Price Level Date:			1 OCT 11	FULLY FUNDED PROJECT ESTIMATE			
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***P***	***L***	***M***	***N***	***O***
	PHASE 1													
06	FISH & WILDLIFE FACILITIES	$ 78,840	$ 39,420	50%	$ 118,260	1.2%	79,758	39,879	119,637	2020Q4	16.4%	92,807	46,404	139,211
04	DAMS	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
05	LOCKS		$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
06	FISH & WILDLIFE FACILITIES		$ -	30%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
07	POWER PLANT	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
							0							
	CONSTRUCTION ESTIMATE TOTALS:	78,840	39,420	50%	**118,260**		79,758	39,879	119,637			92,807	46,404	139,211
01	LANDS AND DAMAGES	$ 288	$ 144	50%	$ 432	1.2%	291	146	437	2017Q3	9.8%	320	160	480
						0.0%								
30	PLANNING, ENGINEERING & DESIGN					0.0%					0.0%			
2.5%	Project Management	1,971	$ 986	50%	2,957	1.2%	1,994	997	2,991	2017Q3	9.8%	2,189	1,095	3,284
1.0%	Planning & Environmental Compliance	788	$ 394	50%	1,182	1.2%	797	399	1,196	2017Q3	9.8%	875	438	1,313
8.5%	Engineering & Design	6,701	$ 3,351	50%	10,052	1.2%	6,779	3,390	10,169	2017Q3	9.8%	7,444	3,722	11,165
1.0%	Engineering Tech Review ITR & VE	788	$ 394	50%	1,182	1.2%	797	399	1,196	2017Q3	9.8%	875	438	1,313
1.0%	Contracting & Reprographics	788	$ 394	50%	1,182	1.2%	797	399	1,196	2017Q3	9.8%	875	438	1,313
3.0%	Engineering During Construction	2,365	$ 1,183	50%	3,548	1.2%	2,393	1,196	3,589	2020Q4	16.4%	2,784	1,392	4,176
1.0%	Planning During Construction	788	$ 394	50%	1,182	1.2%	797	399	1,196	2020Q4	16.4%	928	464	1,391
1.0%	Project Operations	788	$ 394	50%	1,182	1.2%	797	399	1,196	2017Q3	9.8%	875	438	1,313
		0				0.0%	0	0			0.0%	0	0	
31	CONSTRUCTION MANAGEMENT					0.0%	0	0			0.0%	0	0	
8.0%	Construction Management	6,307	$ 3,154	50%	9,461	1.2%	6,380	3,190	9,571	2020Q4	16.4%	7,424	3,712	11,136
1.0%	Project Operation:	788	$ 394	50%	1,182	1.2%	797	399	1,196	2020Q4	16.4%	928	464	1,391
2.5%	Project Management	1,971	$ 986	50%	2,957	1.2%	1,994	997	2,991	2020Q4	16.4%	2,320	1,160	3,480
	CONTRACT COST TOTALS:	103,171	51,586		**154,757**		104,372	52,186	156,558			120,645	60,323	**180,968**

CH2MHILL

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Project Cost Estimate
Upper Reservoir, In-Reservoir: Merwin Traps

Date: 2/28/2011
By: V. Autier
Checked By: J. Kapla

Fish and Wildlife Facilities

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Merwin Trap	34	EA	$ 50,000	$ 1,700,000	Assumes 2 traps with 3-year life cycle for a period of 50 years.
2	Transport Boat	1	1	$ 150,000	$ 150,000	Quote from SeaArk Marine; Transporter Model 3512B.
3	Fish Truck	1	EA	$ 250,000	$ 250,000	
4	Release Site	1	LS	$ 2,000,000	$ 2,000,000	Allowance.
5	Fish Pump	1	EA	$ 5,000	$ 5,000	
6	Boat Ramp Improvement	1	LS	$ 100,000	$ 100,000	Allowance.
7	Acclimation and Release Facility	1	LS	$ 2,080,000	$ 2,080,000	Per Chelan PUD Chelan Falls at $5.2M for 600,000 fish. Say 40% for 200,000 fish.
8						
9						
10						
				Fish and Wildlife Facilities Subtotal:	**$ 6,285,000**	

Lands and Damages Cost

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Land Acquisition	2	Acre	$ 7,500	$ 15,000	Acclimation and release facility.
2	Administrative Costs for Land Acquisition	1	LS	$ 250,000	$ 250,000	Per USACE.
3						
4						
5						
				Lands and Damages Subtotal:	**$ 265,000**	

Annual Operations and Maintenance Costs

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Merwin Operators	25920	Hrs	$ 50	$ 1,296,000	6 people, 16 hrs per day, 9 months per year.
2	Monitoring and Evaluation	1	LS	$ 300,000	$ 300,000	Allowance.
3	Truck Operator	1080	Hrs	$ 50	$ 54,000	1 person, 4 hrs per day, 9 months per year.
4	Truck Transport	5,940	Miles	$ 5	$ 29,700	From the Facility to Dexter; 2-way trip, 11 miles per trip, 1 trip per day, 9 months per year.
5	Crane Operator	540	Hrs	$ 70	$ 37,800	1 person, 2 hrs per day, 9 months per year.
6	Boat Transport	1,080	Miles	$ 3	$ 3,240	From the facility to shore; 2-way trip, 2 miles per trip, 1 trip per day, 9 months per year.
7	Boat Operator	1620	Hrs	$ 50	$ 81,000	1 person, 6 hrs per day, 9 months per year.
8	Merwin Maintenance	1	LS	$ 31,425	$ 31,425	0.5% of construction cost.
9						
10						
				Subtotal:	$ 1,833,000	
				Contingency (30%)	$ 549,900	
				Total Annual O&M:	**$ 2,382,900**	

Present Value of Annual O&M: **$50,112,520** — 4.125 percent real discount rate over a period of 50 years.

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: Merwin Traps
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP PREPARED: 3/8/2011
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

						Program Year (Budget EC): 2012				FULLY FUNDED PROJECT ESTIMATE				
						Effective Price Level Date: 1 OCT 11				Spent Thru: 1-Oct-09				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***K***	***L***	***M***	***N***	***O***
06	FISH & WILDLIFE FACILITIES	6,285	3,143	50%	9,428	1.2%	6,358	3,179	9,537			7,398	3,699	11,098
	CONSTRUCTION ESTIMATE TOTALS:	6,285	3,143		**9,428**	1.2%	6,358	3,179	9,537	0		7,398	3,699	11,098
01	LANDS AND DAMAGES	265	133	50%	398	1.2%	268	134	402	0		294	147	442
30	PLANNING, ENGINEERING & DESIGN	1,195	598	50%	1,793	1.2%	1,209	604	1,813	0		1,344	672	2,016
31	CONSTRUCTION MANAGEMENT	723	362	50%	1,085	1.2%	731	366	1,097	0		851	426	1,277
	PROJECT COST TOTALS:	8,468	4,234	50%	**12,702**	1.2%	8,567	4,283	12,850	0		9,888	4,944	14,832

______________________ CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

______________________ CHIEF, PLANNING, PROGRAM and PROJECT MANAGEMENT DIVISION

______________________ CHIEF, COST ENGINEERING SECTION

ESTIMATED FEDERAL COST: **14,832**
ESTIMATED NON-FEDERAL COST: **0**
ESTIMATED TOTAL PROJECT COST: **14,832**

****** CONTRACT COST SUMMARY ******

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - Upper Reservoir: In-Reservoir: Merwin Traps
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP PREPARED: 3/8/2011
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

	Estimate Prepared:	8-Mar-10					Program Year (Budget EC):		2012					
	Effective Price Level:	1 OCT 11					Effective Price Level Date:		1 OCT 11	FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***P***	***L***	***M***	***N***	***O***
	PHASE 1													
06	FISH & WILDLIFE FACILITIES	$ 6,285	$ 3,143	50%	$ 9,428	1.2%	6,358	3,179	9,537	2020Q4	16.4%	7,398	3,699	11,098
04	DAMS	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
05	LOCKS		$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
06	FISH & WILDLIFE FACILITIES		$ -	30%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
07	POWER PLANT	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
							0							
	CONSTRUCTION ESTIMATE TOTALS:	6,285	3,143	50%	**9,428**		6,358	3,179	9,537			7,398	3,699	11,098
01	LANDS AND DAMAGES	$ 265	$ 133	50%	$ 398	1.2%	268	134	402	2017Q3	9.8%	294	147	442
						0.0%								
30	PLANNING, ENGINEERING & DESIGN					0.0%					0.0%			
2.5%	Project Management	157	$ 79	50%	236	1.2%	159	79	238	2017Q3	9.8%	174	87	262
1.0%	Planning & Environmental Compliance	63	$ 32	50%	95	1.2%	64	32	96	2017Q3	9.8%	70	35	105
8.5%	Engineering & Design	534	$ 267	50%	801	1.2%	540	270	810	2017Q3	9.8%	593	297	890
1.0%	Engineering Tech Review ITR & VE	63	$ 32	50%	95	1.2%	64	32	96	2017Q3	9.8%	70	35	105
1.0%	Contracting & Reprographics	63	$ 32	50%	95	1.2%	64	32	96	2017Q3	9.8%	70	35	105
3.0%	Engineering During Construction	189	$ 95	50%	284	1.2%	191	96	287	2020Q4	16.4%	222	111	334
1.0%	Planning During Construction	63	$ 32	50%	95	1.2%	64	32	96	2020Q4	16.4%	74	37	111
1.0%	Project Operations	63	$ 32	50%	95	1.2%	64	32	96	2017Q3	9.8%	70	35	105
		0				0.0%	0	0			0.0%	0	0	
31	CONSTRUCTION MANAGEMENT					0.0%	0	0			0.0%	0	0	
8.0%	Construction Management	503	$ 252	50%	755	1.2%	509	254	763	2020Q4	16.4%	592	296	888
1.0%	Project Operation:	63	$ 32	50%	95	1.2%	64	32	96	2020Q4	16.4%	74	37	111
2.5%	Project Management	157	$ 79	50%	236	1.2%	159	79	238	2020Q4	16.4%	185	92	277
	CONTRACT COST TOTALS:	8,468	4,234		**12,702**		8,567	4,283	12,850			9,888	4,944	**14,832**

CH2MHILL.

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Project Cost Estimate
In-Tributary, Off-Channel: USFS Black Canyon Campground (Revised Upstream Location)

Date: 2/28/2011
By: A. KC, V. Autier
Checked By: J. Kapla

Capital Construction Costs

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	3- 2,167cfs Vee-screens (6,500cfs)	1	LS	$ 108,993,000	$ 108,993,000	Per USBR Klamath A-Canal (Escalated from 2003).
2	Channel	1	LS	$ 5,636,000	$ 5,636,000	Cast-in-place concrete.
3	Ogee Weir	1	LS	$ 218,000	$ 218,000	Cost reflects construction challenges.
4	14H x 30W Radial Gate	1	LS	$ 2,207,000	$ 2,207,000	Scaled from Mendota Dam.
5	12H x 320W Obermeyer Gate	1	LS	$ 11,088,000	$ 11,088,000	Includes cofferdam and equipment quote from Obermeyer.
6	Sorting Facility	1	LS	$ 3,000,000	$ 3,000,000	Assumes 2-step sort process (3 fish size classifications) and an allowance for M&E equipment.
7	Fish Ladder and Transport Channel	1	LS	$ 9,900,000	$ 9,900,000	$150,000/pool plus transport channel
8	Retaining Walls with Tie-back Anchors	1	LS	$ 848,000	$ 848,000	L=2120', W=1.5', H=12' (Estimated)
9	Riparian Clearing	42	Acre	$ 4,000	$ 168,000	Estimated impact length = 3.5 miles
10	Site Clearing and Grubbing	25	Acre	$ 4,000	$ 100,000	
11	Fish Truck	1	EA	$ 250,000	$ 250,000	One truck.
12	Acclimation and Release Facility	1	LS	$ 2,080,000	$ 2,080,000	Per Chelan PUD Chelan Falls at $5.2M for 600,000 fish. Say 40% for 200,000 fish.
13	Excavation and Site Grading	156,878	CY	$ 10	$ 1,569,000	20% additional added to channel excavation given poor topographic information.
				Fish and Wildlife Facilities Subtotal:	**$ 146,057,000**	

Lands and Damages Cost

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Land Acquisition	22	Acre	$ 7,500	$ 165,000	Collection facility and acclimation and release facility.
2	Administrative Costs for Land Acquisition	1	LS	$ 250,000	$ 250,000	Per USACE.
3						
4						
5						
				Lands and Damages Subtotal:	**$ 415,000**	

Annual Operations and Maintenance Costs

No.	Item Description	Quantity	Unit	Unit Cost (2010)	Total Cost	Notes
1	Truck Transport Distance	14,580	Miles	$ 5	$ 72,900	From the Facility to Dexter; 2-way trip, 27 miles per trip, 9 months per year.
2	Monitoring and Evaluation	1	LS	$ 300,000	$ 300,000	Allowance.
3	Facility Labor	16,200	Hrs	$ 50	$ 810,000	5 people, 12 hrs per day, 9 months per year.
4	Truck Transport labor	1,080	Hrs	$ 50	$ 54,000	1 person, 4 hrs per day, 9 months per year.
5	Maintenance	1	LS	$ 730,285	$ 730,000	0.5% of construction cost.
6						
				Subtotal:	$ 1,967,000	
				Contingency (30%)	$ 590,100	
				Total Annual O&M:	**$ 2,557,000**	
				Present Value of Annual O&M:	**$53,773,853**	4.125 percent real discount rate over a period of 50 years.

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - In-Tributary, Off-Channel: USFS Black Canyon Campground
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP PREPARED: 3/8/2011
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

						Program Year (Budget EC): 2012				FULLY FUNDED PROJECT ESTIMATE				
						Effective Price Level Date: 1 OCT 11				Spent Thru:				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	1-Oct-09 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***K***	***L***	***M***	***N***	***O***
06	FISH & WILDLIFE FACILITIES	146,057	73,029	50%	219,086	1.2%	147,757	73,879	221,636			171,932	85,966	257,898
	CONSTRUCTION ESTIMATE TOTALS:	146,057	73,029		**219,086**	1.2%	147,757	73,879	221,636	0		171,932	85,966	257,898
01	LANDS AND DAMAGES	415	208	50%	623	1.2%	420	210	630	0		461	230	691
30	PLANNING, ENGINEERING & DESIGN	27,753	13,877	50%	41,630	1.2%	28,076	14,038	42,114	0		31,216	15,608	46,824
31	CONSTRUCTION MANAGEMENT	16,797	8,399	50%	25,196	1.2%	16,993	8,496	25,489	0		19,773	9,886	29,659
	PROJECT COST TOTALS:	191,022	95,511	50%	**286,533**	1.2%	193,246	96,623	289,869	0		223,382	111,691	335,073

CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

CHIEF, PLANNING, PROGRAM and PROJECT MANAGEMENT DIVISION

CHIEF, COST ENGINEERING SECTION

ESTIMATED FEDERAL COST: **335,073**
ESTIMATED NON-FEDERAL COST: **0**
ESTIMATED TOTAL PROJECT COST: **335,073**

**** CONTRACT COST SUMMARY ****

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - In-Tributary, Off-Channel: USFS Black Canyon Campground
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP PREPARED: 3/8/2011
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

	Estimate Prepared:	8-Mar-10					Program Year (Budget EC):		2012					
	Effective Price Level:	1 OCT 11					Effective Price Level Date:		1 OCT 11	FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	***B***	***C***	***D***	***E***	***F***	***G***	***H***	***I***	***J***	***P***	***L***	***M***	***N***	***O***
	PHASE 1													
06	FISH & WILDLIFE FACILITIES	$ 146,057	$ 73,029	50%	$ 219,086	1.2%	147,757	73,879	221,636	2020Q4	16.4%	171,932	85,966	257,898
04	DAMS	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
05	LOCKS		$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
06	FISH & WILDLIFE FACILITIES		$ -	30%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
07	POWER PLANT	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
							0							
	CONSTRUCTION ESTIMATE TOTALS:	146,057	73,029	50%	**219,086**		147,757	73,879	221,636			171,932	85,966	257,898
01	LANDS AND DAMAGES	$ 415	$ 208	50%	$ 623	1.2%	420	210	630	2017Q3	9.8%	461	230	691
						0.0%								
30	PLANNING, ENGINEERING & DESIGN					0.0%					0.0%			
2.5%	Project Management	3,651	$ 1,826	50%	5,477	1.2%	3,694	1,847	5,540	2017Q3	9.8%	4,056	2,028	6,083
1.0%	Planning & Environmental Compliance	1,461	$ 731	50%	2,192	1.2%	1,478	739	2,217	2017Q3	9.8%	1,623	811	2,434
8.5%	Engineering & Design	12,415	$ 6,208	50%	18,623	1.2%	12,560	6,280	18,839	2017Q3	9.8%	13,791	6,895	20,686
1.0%	Engineering Tech Review ITR & VE	1,461	$ 731	50%	2,192	1.2%	1,478	739	2,217	2017Q3	9.8%	1,623	811	2,434
1.0%	Contracting & Reprographics	1,461	$ 731	50%	2,192	1.2%	1,478	739	2,217	2017Q3	9.8%	1,623	811	2,434
3.0%	Engineering During Construction	4,382	$ 2,191	50%	6,573	1.2%	4,433	2,217	6,650	2020Q4	16.4%	5,158	2,579	7,737
1.0%	Planning During Construction	1,461	$ 731	50%	2,192	1.2%	1,478	739	2,217	2020Q4	16.4%	1,720	860	2,580
1.0%	Project Operations	1,461	$ 731	50%	2,192	1.2%	1,478	739	2,217	2017Q3	9.8%	1,623	811	2,434
		0				0.0%	0	0			0.0%	0	0	
31	CONSTRUCTION MANAGEMENT					0.0%	0	0			0.0%	0	0	
8.0%	Construction Management	11,685	$ 5,843	50%	17,528	1.2%	11,821	5,911	17,732	2020Q4	16.4%	13,755	6,878	20,633
1.0%	Project Operation:	1,461	$ 731	50%	2,192	1.2%	1,478	739	2,217	2020Q4	16.4%	1,720	860	2,580
2.5%	Project Management	3,651	$ 1,826	50%	5,477	1.2%	3,694	1,847	5,540	2020Q4	16.4%	4,298	2,149	6,447
	CONTRACT COST TOTALS:	191,022	95,511		**286,533**		193,246	96,623	289,869			223,382	111,691	**335,073**

CH2MHILL.

USACE Lookout Point Head of Reservoir Collection Alternatives Study
Project Cost Estimate
In-Tributary, Off-Channel: Lower North Fork (Westfir)

Date: 2/28/2011
By: A. KC, V. Autier
Checked By: J. Kapla

Capital Construction Costs

No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Notes
1	1- 2,000cfs Vee-screen	1	LS	$ 33,536,000	$ 33,536,000	Per USBR Klamath A-Canal (Escalated from 2003).
2	Channel	1	LS	$ 1,399,000	$ 1,399,000	Cast in-place concrete.
3	Ogee Weir	1	LS	$ 70,000	$ 70,000	Cost reflects construction challenges.
4	14H x 30W Radial Gate	1	LS	$ 2,207,000	$ 2,207,000	Scaled from Mendota Dam.
5	12H x 120W Obermeyer Gate	1	LS	$ 4,108,000	$ 4,108,000	Includes cofferdam and equipment quote from Obermeyer.
6	Sorting Facility	1	LS	$ 3,000,000	$ 3,000,000	Assumes 2-step sort process (3 fish size classifications) and an allowance for M&E equipment.
7	Fish Ladder and Transport Channel	1	LS	$ 6,100,000	$ 6,100,000	Channel length = 860'
8	Retaining Walls with Tie-back Anchors	1	LS	$ 518,000	$ 518,000	L=970', W=2', H=12'
9	Riparian Clearing	0.5	Acre	$ 4,000	$ 2,000	Estimated impact length = 1,150 feet
10	Site Clearing and Grubbing	5.4	Acre	$ 6,000	$ 32,000	
11	Fish Truck	1	EA	$ 250,000	$ 250,000	
12	Acclimation and Release Facility	1	LS	$ 2,080,000	$ 2,080,000	Per Chelan PUD Chelan Falls at $5.2M for 600,000 fish. Say 40% for 200,000 fish.
13	Excavation and Site Grading	32,376	CY	$ 10	$ 324,000	20% additional added to channel excavation given poor topographic information.
				Fish and Wildlife Facilities Subtotal:	**$ 53,626,000**	

Lands and Damages Costs

No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Notes
1	Land Acquisition	7	Acre	$ 7,500	$ 53,000	Collection facility and acclimation and release facility.
2	Administrative Costs for Land Acquisition	1	LS	$ 250,000	$ 250,000	Per USACE.
3						
4						
5						
				Lands and Damages Subtotal:	**$ 303,000**	

Annual Operations and Maintenance Costs

No.	Item Description	Quantity	Unit	Unit Cost	Total Cost	Notes
1	Truck Transport Distance	12,420	Miles	$ 5	$ 62,100	From the Facility to Dexter; 2-way trip; 23 miles per trip, 9 months per year.
2	Monitoring and Evaluation	1	LS	$ 300,000	$ 300,000	Allowance.
3	Facility Labor	16,200	Hrs	$ 50	$ 810,000	5 people, 12 hrs per day, 9 months per year.
4	Truck Transport labor	1,080	Hrs	$ 50	$ 54,000	1 person, 4 hrs per day, 9 months per year.
5	Maintenance	1	LS	$ 268,130	$ 268,130	0.5% of construction cost.
6						
				Subtotal:	$ 1,494,000	
				Contingency (30%)	$ 448,000	
				Total Annual O&M:	**$ 1,942,000**	
				Present Value of Annual O&M:	**$40,840,369**	4.125 percent real discount rate over a period of 50 years.

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - In-Tributary, Off-Channel: Lower North Fork (Westfir)
LOCATION: Lookout Point Dam, OR
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

DISTRICT: NWP
POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION
PREPARED: 3/8/2011

Program Year (Budget EC): 2012
Effective Price Level Date: 1 OCT 11

FULLY FUNDED PROJECT ESTIMATE

WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Spent Thru: 1-Oct-09 ($K)		COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*K*	*L*	*M*	*N*	*O*
06	FISH & WILDLIFE FACILITIES	53,626	26,813	50%	80,439	1.2%	54,250	27,125	81,376			63,126	31,563	94,689
	CONSTRUCTION ESTIMATE TOTALS:	53,626	26,813		**80,439**	1.2%	54,250	27,125	81,376	0		63,126	31,563	94,689
01	LANDS AND DAMAGES	303	152	50%	455	1.2%	307	153	460	0		337	168	505
30	PLANNING, ENGINEERING & DESIGN	10,188	5,094	50%	15,282	1.2%	10,307	5,153	15,460	0		11,459	5,730	17,189
31	CONSTRUCTION MANAGEMENT	6,167	3,084	50%	9,251	1.2%	6,239	3,119	9,358	0		7,260	3,630	10,889
	PROJECT COST TOTALS:	70,284	35,142	50%	**105,426**	1.2%	71,102	35,551	106,653	0		82,182	41,091	123,273

CHIEF, ENGINEERING AND CONSTRUCTION DIVISION

CHIEF, PLANNING, PROGRAM and PROJECT MANAGEMENT DIVISION

CHIEF, COST ENGINEERING SECTION

ESTIMATED FEDERAL COST:	**123,273**
ESTIMATED NON-FEDERAL COST:	**0**
ESTIMATED TOTAL PROJECT COST:	**123,273**

****** CONTRACT COST SUMMARY ******

PROJECT: Lookout Point Head of Reservoir Collection Alternatives Study - In-Tributary, Off-Channel: Lower North Fork (Westfir) DISTRICT: NWP PREPARED: 3/8/2011
LOCATION: Lookout Point Dam, OR POC: CHIEF, ENGINEERING AND CONSTRUCTION DIVISION
This Estimate reflects the scope and schedule in report; Lookout Point Head of Reservoir Collection Alternatives Study

	Estimate Prepared:	8-Mar-10						Program Year (Budget EC):	2012					
	Effective Price Level:	1 OCT 11						Effective Price Level Date:	1 OCT 11	FULLY FUNDED PROJECT ESTIMATE				
WBS NUMBER	Civil Works Feature & Sub-Feature Description	COST ($K)	CNTG ($K)	CNTG (%)	TOTAL ($K)	ESC (%)	COST ($K)	CNTG ($K)	TOTAL ($K)	Mid-Point Date	ESC (%)	COST ($K)	CNTG ($K)	FULL ($K)
A	*B*	*C*	*D*	*E*	*F*	*G*	*H*	*I*	*J*	*P*	*L*	*M*	*N*	*O*
	PHASE 1													
06	FISH & WILDLIFE FACILITIES	$ 53,626	$ 26,813	50%	$ 80,439	1.2%	54,250	27,125	81,376	2020Q4	16.4%	63,126	31,563	94,689
04	DAMS	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
05	LOCKS		$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
06	FISH & WILDLIFE FACILITIES		$ -	30%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
07	POWER PLANT	$ -	$ -	24%	$ -	0.0%	0	0	0	0	0.0%	0	0	0
							0							
	CONSTRUCTION ESTIMATE TOTALS:	53,626	26,813	50%	**80,439**		54,250	27,125	81,376			63,126	31,563	94,689
01	LANDS AND DAMAGES	$ 303	$ 152	50%	$ 455	1.2%	307	153	460	2017Q3	9.8%	337	168	505
						0.0%								
30	PLANNING, ENGINEERING & DESIGN					0.0%					0.0%			
2.5%	Project Management	1,341	$ 671	50%	2,012	1.2%	1,357	678	2,035	2017Q3	9.8%	1,490	745	2,234
1.0%	Planning & Environmental Compliance	536	$ 268	50%	804	1.2%	542	271	813	2017Q3	9.8%	595	298	893
8.5%	Engineering & Design	4,558	$ 2,279	50%	6,837	1.2%	4,611	2,306	6,917	2017Q3	9.8%	5,063	2,532	7,595
1.0%	Engineering Tech Review ITR & VE	536	$ 268	50%	804	1.2%	542	271	813	2017Q3	9.8%	595	298	893
1.0%	Contracting & Reprographics	536	$ 268	50%	804	1.2%	542	271	813	2017Q3	9.8%	595	298	893
3.0%	Engineering During Construction	1,609	$ 805	50%	2,414	1.2%	1,628	814	2,442	2020Q4	16.4%	1,894	947	2,841
1.0%	Planning During Construction	536	$ 268	50%	804	1.2%	542	271	813	2020Q4	16.4%	631	315	946
1.0%	Project Operations	536	$ 268	50%	804	1.2%	542	271	813	2017Q3	9.8%	595	298	893
		0				0.0%	0	0			0.0%	0	0	
31	CONSTRUCTION MANAGEMENT					0.0%	0	0			0.0%	0	0	
8.0%	Construction Management	4,290	$ 2,145	50%	6,435	1.2%	4,340	2,170	6,510	2020Q4	16.4%	5,050	2,525	7,575
1.0%	Project Operation:	536	$ 268	50%	804	1.2%	542	271	813	2020Q4	16.4%	631	315	946
2.5%	Project Management	1,341	$ 671	50%	2,012	1.2%	1,357	678	2,035	2020Q4	16.4%	1,579	789	2,368
	CONTRACT COST TOTALS:	70,284	35,142		**105,426**		71,102	35,551	106,653			82,182	41,091	**123,273**

APPENDIX H

REVIEW DOCUMENTATION

Appendix H includes the following:

1. Quality Control Plan
2. 10 Percent AR Dr. Checks Comments and Responses
3. 30 Percent AR Dr. Checks Comments and Responses
4. A-E Contractor Statements of Technical Review and 60 Percent AR ITR Review Comments
5. 60 Percent AR Dr. Checks Comments and Responses
6. 60 Percent AR Dr. Checks ATR Comments and Responses
7. USACE Responses to Agency 60-Percent Comments
8. A-E Contractor Statements of Technical Review and 90 Percent AR ITR Review Comments
9. 90 Percent AR Dr. Checks Comments and Responses
10. 90 Percent PDT Dr. Checks Comments and Responses
11. USACE Responses to Agency 90-Percent Comments

This page was intentionally left blank.

1. Quality Control Plan

This page was intentionally left blank.

USACE Lookout Point Dam Head of Reservoir Collection Alternatives Report – Quality Control Plan

PREPARED FOR: Project Delivery Team

PREPARED BY: CH2M HILL

USACE CONTRACT NO.: W9127N-09-D-0004, Task Order No. 26

DATE: 17 May 2010

Introduction

The purpose of the Lookout Point Dam Head of Reservoir Collection Alternatives Report is to provide an assessment of the technical feasibility of providing downstream passage for juvenile salmon at Lookout Point Dam via head-of-reservoir and/or in-tributary collection and transportation facilities. The report is related to specific actions as described in the National Marine Fisheries Service's (NMFS) 2008 Biological Opinion for the Willamette Valley.

This Quality Control Plan (QCP) defines how quality control will be implemented during the project and was prepared in accordance with Engineer Regulation (ER) 1110-1-12 dated 30 September 2006. The QCP will be updated as required throughout the duration of the project.

Purpose

This project will be managed in the spirit of partnering and collaboration, with a particular focus on good communication. All architect-engineer (A-E) work products will be prepared in accordance with the Statement of Work with the overall objective of preparing a complete and technically competent Alternatives Report (AR).

Additional objectives of this QCP include the following:

- Identify project-specific quality requirements.
- Define the roles and responsibilities of the A-E project delivery team (PDT) members including the following:
  - Project Manager (PM).
  - Project Quality Manager (PQM).
  - Independent Technical Review (ITR) Team.
  - Quality Assurance / Quality Control (QA/QC) Reviewers.
  - Discipline Leads.
  - Individual PDT members.
- Identify PDT members and organization.
- Identify required quality management tools, processes and resources.

- Provide a schedule for milestone reviews and related activities.

The QCP will also accomplish the following:

- Serve as the primary means for implementing the continuous QA/QC process and the ITR process.
- Ensure U.S. Army Corps of Engineers (USACE) Northwest Region, Portland District (CENWP) requirements and preferences are incorporated into the AR.
- Ensure that the selected conceptual alternative is feasible and will be safe, functional, constructible, environmentally sustainable and cost-effective.
- Ensure that all deliverables and other information that affect the outcome of the project (i.e., design criteria, calculations, drawings, and design concepts) are developed, checked, reviewed and documented in conformance with the overall project objectives.

The objectives of the QCP will be accomplished by emphasizing the application of continuous QA/QC procedures throughout the project. As such, individual accountability for the quality of work performed by the design team will be the primary approach for providing quality service and work products. This approach will be supplemented with ITR Team reviews, CENWP milestone reviews, and Agency Technical Reviews (ATRs).

Project-Specific Requirements

In addition to the practice of good engineering judgment and adherence to applicable principles, criteria, regulations, laws and codes, quality requirements specific to the Lookout Point Head of Reservoir Collection Alternatives Report include the following:

- All PDT members should be aware of the personal safety and facility security requirements associated with working at and visiting a large dam and hydroelectric facility.
- Design alternatives should minimize operational impacts to hydroelectric generation at Lookout Point Dam.
- Design alternatives shall conform to all applicable USACE, NMFS, Oregon Department of Fish and Wildlife (ODFW) and U.S Fish and Wildlife (FWS) design standards and criteria, including specific requirements for the handling of Endangered Species Act (ESA) –listed species.

Roles and Responsibilities

Project Manager

The PM, James Kapla, will be responsible for the overall quality of all work products. He will be the primary point of contact with USACE and responsible for coordinating the review process with USACE and project stakeholders. He will also be responsible for confirming the quality of subcontractor work products. As PM, he will work in partnership with the PQM to implement the QCP and to resolve quality issues as they may arise.

Project Quality Manager

The PQM**,** Bob Gatton, will be responsible for the QA/QC and ITR processes. He will monitor day-to-day continuous QA/QC reviews and ensure that design input provided by QC Reviewers and ITR Team is consistent. He also has the primary responsibility to ensure that reviews are planned, conducted and documented properly. This includes written certification of QA/QC and ITR reviews.

ITR Team

The ITR Team is responsible for providing senior independent technical review in their areas of responsibility during the scheduled review periods. By definition, the ITR Team members will not be involved in the day-to-day project activities. The ITR Team will confirm proper application of clearly-established criteria, regulations, laws, codes, principles and professional practices. The ITR Team will also provide written certification of their review.

QA/QC Reviewers

QA/QC Reviewers are responsible for providing continuous technical guidance and for performing scheduled reviews in their area of responsibility. QC Reviewers are also responsible for ensuring that the PDT conscientiously implements engineering design best practices. It is the QA/QC Reviewer’s responsibility to work with the discipline leads to review and verify all engineering design concepts and approaches. They are also required to certify that reviews of all engineering calculations, supporting information and deliverables have been performed by a qualified individual.

Discipline Leads

Discipline Leads are responsible for producing a high quality design in accordance with the QCP and engineering design best practices. This includes use of discipline checklists, calculation templates and other approved tools. Discipline Leads are expected to initiate frequent communication with the QA/QC reviewers and to coordinate their activities with all other affected disciplines.

Individual Responsibilities

Each team member is responsible for the quality of his or her own work products. Reliance on others to catch mistakes or omissions is not acceptable. Before a work product is submitted for review, the individual shall confirm to the best of their ability that it meets the project quality standards.

Team Organization

Members of the A-E PDT, their organizational roles and contact information are presented in Table 1 below.

Table 1
PDT Members and Organization

PDT Member	Role	Telephone	Email
Project Management			
James Kapla	Project Manager	(425) 233-3239	James.Kapla@ch2m.com
Bob Gatton	Project Quality Manager	(425) 233-3183	Linda.Korbus@ch2m.com
Wally Hickerson	Principal-in-Charge	(509) 375-0683	Wally.Hickerson@ch2m.com
Juli Ewings	Administrative	(425) 233-3133	Julianne.Ewings@ch2m.com
ITR Team			
Wally Bennett	Structural	(425) 233-3122	Wally.Bennett@ch2m.com
Forrest Olson	Fisheries Biology	(425) 233-3274	Forrest.Olson@ch2m.com
QA/QC Reviewers			
James Kapla	Civil	(425) 233-3239	James.Kapla@ch2m.com
Chick Sweeney	Hydraulics	(425) 881-7700	Chick.Sweeney@aecom.com
Al Giorgi	Fisheries Biology	(425) 883-8295	Al.Giorgi@bioanalysts.net
Vince Rybel	Geotechnical	(541) 768-3564	Vince.Rybel@ch2m.com
John Crowe	Mechanical	(530) 243-5886	John.Crowe@ch2m.com
Linda Korbus	Structural	(425) 233-3183	Linda.Korbus@ch2m.com
Don Wagner	Electrical	(425) 233-3428	Donald.Wagner@ch2m.com
Gary Erb	I&C	(425) 233-3237	Gary.Erb@ch2m.com
Dave Hedglin	Cost Estimating	(425) 233-3245	Dave.Hedglin@ch2m.com
Doug Sunseri	CADD	(425) 233-3250	Doug.Sunseri@ch2m.com
Discipline Leads			
Vincent Autier	Civil	(425) 233-3352	Vincent.Autier@ch2m.com
Isaac Willig	Hydraulics	(425) 881-7700	Isaac.Willig@aecom.com
Kevin Malone	Fisheries	(425) 753-0011	Kmmalone@wavecable.com
Paul Davis	Geotechnical	(541) 768-3584	Paul.Davis@ch2m.com
Bill Farmer	Mechanical	(425) 233-3551	Bill.Farmer@ch2m.com
Shinji Goto	Structural	(425) 233-3057	Shinji.Goto@ch2m.com
Alex Cross	Electrical	(425) 233-3117	Alex.cross@ch2m.com
Steve Bakken	I&C	(425) 233-3134	Steven.Bakken@ch2m.com
Craig Moore	Cost Estimating	(425) 233-3243	Craig.Moore@ch2m.com
Ken Weigum	Civil CADD	(435) 233-3504	Ken.Weigum@ch2m.com

Tools, Processes and Resources

Quality activities will be focused at the beginning of the project to establish design criteria, to focus the evaluation of design alternatives, and then to freeze design decisions to minimize the potential for significant changes later in the project.

Quality control will be provided primarily through implementation of this QCP including continuous QA/QC reviews, ITR Team reviews, CENWP milestone reviews and ATR Team reviews. Specific tools and supporting resources will be utilized as described below. In addition, a final review and closeout process will be implemented.

Continuous QA/QC Reviews

Close and continuous communication between the PDT, Discipline Leads and the QA/QC Reviewers will be one of the primary means used for attaining quality standards. The Discipline Leads will provide the QA/QC Reviewers all pertinent documentation (calculations, drawings, memos, etc.). The QA/QC Reviewers, in turn, will provide timely responses and guidance. This approach facilitates continuous improvement in the design and minimizes changes during the formal scheduled reviews.

Discipline Leads are responsible for completing the tasks outlined in their discipline-specific design checklists, and having their QA/QC Reviewer sign-off before submitting a signed copy of the checklist to the PQM. QA/QC Reviewer comments at the 10, 30, 60 and 90 percent delivery milestones will be documented using the CH2M HILL Quality Review Form (QRF) tool. Discipline Leads will be responsible for adjudicating comments received from the QA/QC Reviewers. Each Discipline Lead shall provide a written response to comments for which he/she takes exception or that need further clarification or discussion before a decision can be finalized.

Discipline Leads are responsible for notifying the PM of any accepted comments that significantly impact design concepts or cost. Similarly, Discipline Leads and QA/QC reviewers, in conjunction with the PM and PQM, are expected to communicate critical design issues, concepts and risks with the ITR Team.

ITR Team Reviews

ITR Team reviews will be performed prior to the 60 and 90 percent AR submittals. The ITR Team will confirm proper application of clearly-established criteria, regulations, laws, codes, principles and professional practices. In addition, the ITR Team will confirm that the recommended alternative is feasible and will be safe, functional, constructible, environmentally sustainable and cost-effective. Review comments and PDT responses will be documented in the USACE Document Review and Checking System (DrChecks^{sm}). ITR statements of review will be prepared following each review and submitted to the PQM.

CENWP Reviews

CENWP reviews will be performed following the 10, 60 and 90 percent AR submittals. A formal review of the 30 percent AR will not be conducted. Comments will instead be provided at Checkpoint Meeting No. 2. CENWP staff will collect and review comments from NMFS, ODFW, FWS, the Confederated Tribes of the Grand Ronde and other stakeholders, and adjudicate as required. CENWP review comments and PDT responses will be documented in the DrChecks^{sm} system.

Resources

Additional quality management resources for this project include the following:

- USACE Planning Guidance Notebook (ER 1105-2-100)
- USACE Engineering and Design for Civil Works Projects (ER 1110-2-1150)
- USACE Quality Management (ER 1110-1-12)
- USACE Health & Safety Requirements Manual (EM 385-1-1)
- USACE Construction Cost Estimating Guide for Civil Works (ETL 1110-2-573)
- USACE Dr Checks (ER 1110-1-8159)
- USACE A/E/C CADD Standard Release 3.0
- CH2M HILL Project Delivery System (PDS) Manual
- CH2M HILL WBG 4-Phase Design Delivery Manual
- CH2M HILL USACE Lookout Point Project Instructions
- CH2M HILL USACE Lookout Point Health and Safety Instructions

Final Review and Closeout

A review of the final deliverables will be performed by the PM, PQM and the PDT members prior to printing and transmittal.

Project records will be organized and archived to maintain project integrity and security, and to ensure future access if required. Project lessons learned and best practices will be documented as necessary.

Schedule

Major milestone review dates and activities are identified in Table 2 below.

Table 2
Review Schedule

Review Activity	Review Period	Submittal Date
QA / QC Reviews	Continuous throughout project	-
10% AR QC Review	3 to 7 May 2010	10 May 2010
CENWP Review	11 to 25 May 2010	-
Checkpoint Meeting No. 1	26 May 2010	-
30% AR QC Review	28 June to July 2 2010	13 July 2010
Checkpoint Meeting No. 2	22 July 2010	-
60% AR QC and ITR Review	30 August to 3 September 2010	21 September 2010
CENWP Review	22 September to 11 October 2010	
Checkpoint Meeting No. 3	12 October 2010	-
90% AR QC and ITR Review	15 to 19 November 2010	14 December 2010
CENWP Review	15 December 2010 to 10 January 2011	-
Checkpoint Meeting No. 4	11 January 2011	-
Final AR QC Review	17 to 21 January 2011	1 February 2011

Attachments

CH2M HILL Quality Review Form

A-E Contractor Statement of Technical Review

This page was intentionally left blank.

WBG Quality Review Form (QRF)

Client/Project:	USACE Lookout Point Head of Reservoir Collection	
Project No.:	402429	
Phase:	Feasibility Study	
Work Product:	60 Percent Alternatives Report	
Date:		
	Reviewer:	
	Return to: Bob Gatton/SEA	**File Name:**
	Review Comment Due Date:	**Response Due Date:** / **Final Adjudication Due Date:**

Category 1: Comment intended to identify significant system deficiencies for phase of review or major design flaws. Reviewers shall only use this category to include comments that truly are considered serious flaws or life safety issues. If continuous QC review is performed correctly there should be little or no need for this category.

Category 2: Comment to identify incorrect information found in the review. Comment may also be focused on lowering risk, or improving the quality of the work product and/or the ultimate application of the work product consistent with the contracted scope and quality management plan.

Category 3: Comment is editorial or otherwise minor in nature with little effort to implement. Intent of this category is not to spend time discussing these comments during final review discussions. Comment is non-controversial in nature and easily incorporated or may be discretionary with the Task Lead and/or PM.

Comment Number	Reference Page or Sheet No.	QA/QC Reviewer	Review Comment	Category No.	Responsible Responder	Response	Final Adjudication: "Done" if resolved, "ITF" if passed to Issue Tracking Form
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							
19							
20							
21							
22							
23							
24							
25							

This page was intentionally left blank.

A-E CONTRACTOR STATEMENT OF TECHNICAL REVIEW

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

The A-E Contractor (CH2M HILL) and its subconsultants (AECOM and BioAnalysts) have completed the 60 Percent Alternatives Report for the USACE Lookout Point Head of Reservoir Collection Project. Notice is hereby given that an independent technical review, appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The independent technical review was completed by CH2M HILL and its subcontractors. All comments resulting from ITR have been resolved.

______________________	____________
Technical Review Team Leader`	Date
______________________	____________
Project Manager, A-E Contractor	Date

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

See WBG Quality Review Forms

As noted above, all concerns resulting from independent technical review of the project been fully resolved .

______________________	____________
Principal, A-E Contractor	Date

This page was intentionally left blank.

2. 10 Percent AR Dr. Checks Comments and Responses

This page was intentionally left blank.

Comment Report: All Comments
Project: Lookout Point Alternatives Report
Review: 10 Percent
Displaying 31 comments for the criteria specified in this report.

921 ms to run this page

Id	Discipline	Section/Figure	Page Number	Line Number
3264284	Electrical	n/a'	n/a	n/a
No Comment Submitted By: Joseph Brackin ((503) 808-4922). Submitted On: 13-May-10				
1-0	Evaluation **For Information Only** Noted. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10			
	Backcheck not conducted			
	Current Comment Status: **Comment Open**			
3271525	Project Management	n/a'	vii	Abbreviations and Acroynms
Realizing more acronyms may be used in furture versions of the reports, to keep the list reasonable in length and easier to reference, would recommend only listing abbreviations and acronyms used in the report. Some acronyms are used in the report but not appear in the list (Configuration and Operations Plan = COP) Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 17-May-10				
1-0	Evaluation **Concurred** The list of acronyms has been reduced and updated to include current acronyms. It is anticipated that many of the acronyms will be used in the 60 percent deliverable and as such a more thorough review will be made at that time. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10			
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Sean Askelson ((503) 808-4882) Submitted On: 20-Jul-10			
	Current Comment Status: **Comment Closed**			
3271533	Project Management	1.2.2 History	1-2	n/a
It may be handy to provide current average species survivability information (per passage route, if available) here for comparison to expected alternatives passage survivability. Without baseline information, there may be no basis for the alternative comparison nor for the need/justification of the project(s). (Posted for Mike Moran) Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 17-May-10				
1-0	Evaluation **Concurred** Giorgi/Malone: We will add data on survival rate via different passage routes to the report if they are likely to affect the passage alternatives. At this time, only an estimate of survival through the Hills Creek Project has been included. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10			
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Sean Askelson ((503) 808-4882) Submitted On: 20-Jul-10			

	Current Comment Status: **Comment Closed**

3271551	Project Management	Description of Alternatives	4-1	n/a

It seems that the channel alternatives are not actually alternatives as such as each is independent of the others and impact different drainage areas. Does not appear to me that there is a choice of types so much as a selection of which drainage. It appears that each drainage could have a collection system and that the type of each site/system would be the only true alternative selection process. (Posted for Mike Moran)

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 17-May-10

1-0	Evaluation **Concurred** Agreed; the list of alternatives was prepared to provide a variety of site location and technology options for consideration. It may be possible that the recommended alternative actually turns out to be several discrete alternatives combined into a single comprehensive solution. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Sean Askelson ((503) 808-4882) Submitted On: 20-Jul-10
	Current Comment Status: **Comment Closed**

3271562	Project Management	4.2 Site Locations	4-1	n/a

Should add the additional river spawn length/area added for each alternative site investigated. (Posted for Mike Moran) Along the same lines, could add length/area of predator habitat avoided for each alternative. This may help establish a "hazard index" for fish remaining in each area in the reservoir.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 17-May-10

1-0	Evaluation **Concurred** Giorgi/Malone: We have requested this information from the USACE and will include it in the 30% submittal. The habitat area is considered as part of the fish collection potential parameter and specifically as the proportion of the subpopulation present at the collector location. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Sean Askelson ((503) 808-4882) Submitted On: 20-Jul-10
	Current Comment Status: **Comment Closed**

3274880	Structural	n/a'	n/a	n/a

No Comment on the 10% report.

Submitted By: Kristy Fortuny (503-808-4940). Submitted On: 18-May-10

1-0	Evaluation **For Information Only** Noted. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Kristy Fortuny (503-808-4940) Submitted On: 14-Jul-10
	Current Comment Status: **Comment Closed**

3283681	General	n/a'	v	Section 3. Dam
The Water Control Manual list the crest length as 3,262 ft. Submitted By: Jim Burton (503-808-4852). Submitted On: 21-May-10				
1-0	Evaluation **Concurred** This has been updated. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10			
1-1	Backcheck Recommendation **Close Comment** Submitted By: Jim Burton (503-808-4852) Submitted On: 22-Jul-10			
	Current Comment Status: **Comment Closed**			
3289335	Hydraulics	Synopsis Section 6.	i.	n/a
It should be indicated for clarity that cost estimates will be provided for production system alternatives, rather than prototype for comparison purposes. Additional info on ballpark costs for prototype may be provided as available or applicable. Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10				
1-0	Evaluation **Concurred** Section 1 and Section 6 have been modified. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10			
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10			
	Current Comment Status: **Comment Closed**			
3289372	Hydraulics	Pertinent Data table	v.	n/a
Please include units for all items in the table for consistency (max cons. pool, crest el., freeboard, etc.) Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10				
1-0	Evaluation **Concurred** Table has been updated. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10			
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10			
	Current Comment Status: **Comment Closed**			
3289400	Hydraulics	1.2.1	n/a	n/a
A description of more of the area near the head of reservoir location and relevant tributaries would be expected in this section. Also the location of Hills Creek Dam upstream. The second paragraph about the conceptual collection facility seems out of place in the Location section and may be more suited to a separate section. Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10				

1-0	Evaluation **Concurred** Sweeney/Willig: Concur - Paragraph 1.2.1 has been updated. The existing information is out of place in the Introduction and does not need to be introduced until Section 4.3. This information will be moved to the second paragraph of Section 4.3 and redundancies deleted. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289408	Hydraulics	1.2.2 History	1-2	n/a

Third sentence, "USACE tested a floating artificial outlet that consisted..." might be helpful to readers to say where in the reservoir the outlet was tested and provide reference if available.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Giorgi/Malone: The location of the collector will be included in the 30% submittal. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289434	Hydraulics	2.0 Background	n/a	n/a

It will be necessary for us to have some of the background information obtained to date summarized for the PDT for the 10% Checkpoint meeting if not in the 10% Report, such as rough flow ranges and water surface elevation ranges expected at each site, a summary of available biological info (species, timing, size, etc). Detailed information was not expected in the 10% report, but rough background with an indicated plan (at 30%, 60%, etc) for filling out the information would have been helpful.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** This information has been added to the report and that is anticipated that it will be updated and expanded for future submittals as more information becomes available. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289445	Hydraulics	Section 4.2.1	4-1	n/a

Last line in 1st para of 4.2.1, "A facility at this location would also have to accommodate the full reservoir pool condition"... or be mobile??

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Sweeney/Willig: Concur - The information in this paragraph is incomplete. It will be clarified that

	the reason for definition of "head of reservoir" by the low pool elevation is so the location does not have to move with change in reservoir elevation and an FSC can be accommodated at this location throughout the reservoir range, per Section 4.2.5 of AECOM. 2010. Willamette Downstream Fish Passage Design Requirements Report. prepared for USACE Portland District. Contract No. W9127N-10-D-0002, T.O. 003. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289485	Hydraulics	Section 4.2	4-1	n/a

Site location descriptions general comment. The site descriptions provide good information, but please be sure to provide consitient information from site to site (even if not available at this time or major issue) such as channel width, flows, pool/wse range, recreation uses, channel stability, staging areas, utilities, etc. These items are mentioned in some descriptions, but not all, and reader must assume there are not issues if item is not mentioned.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Sweeney/Willig: Concur - The site descriptions will be made consistent in the detail provided and the parameters used to describe each. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289489	Hydraulics	Section 4.3.1	4-4	n/a

Is there are reference available for the Upper Baker sockeye collection efficiencies?

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Sweeney/Willig: Concur - Reference will be added: Puget Sound Energy 2009. Powerpoint presentation of 2008-2009 Baker FSC Evaluation. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289517	Hydraulics	Section 4.3	4-4	n/a

Might consider working this section so that it refers to the AECOM/BioAnalysts Willamette Design Requirements Report rather than rehashing some of the same subject matter and for consistency.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Sweeney/Willig: Concur - The entire section will be revisited in light of AECOM (2010)

	referenced under response to comment # 3289445. the AECOM (2010) report was not available for reference at the time of the 10 % submittal. The most pertinent information will be repeated here so the uninformed reader can understand it without reference to the AECOM (2010) report. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289532	Hydraulics	Section 5.2.1	5-1	n/a

C) Bypass conditions. I don't recall any volitional bypass alternatives identified in the report so far, but it is included as a rating qualifier. Might want to at least mention volitional bypass in the earlier discussion of bypass/transport options and its unlikely relevancy with the long reservoir/high head situation.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Concur. This section has been updated accordingly. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289542	Hydraulics	Section 5.2.2	5-2	n/a

current operations should include the ability of in-trib alternatives to operate within desired design flow range and to withstand/allow flood flows passing.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Concur. This section has been updated to include in-tributary design considerations. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** Closed without comment. Submitted By: Elizabeth Roy (503-808-4849) Submitted On: 21-Jul-10
	Current Comment Status: **Comment Closed**

3289616	General	2 purpose	i	n/a

Insert the PDT's process for assessing "feasibility". First looking at a production scale facility and then looking at how to prototype...

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

Revised 24-May-10.

1-0	Evaluation **Concurred** Concur - The PDT's definition of "prototype feasibility" will be added to the end of this section.

	Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** ok Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289620	General	n/a'	V	n/a

LOP Proj. Pertinent Data Table: 5. Should read "regulating Outlet" also insert information about invert elevation and gate size.

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** This information has been updated to read "Outlet works" per the water control manual and includes a description of the gates. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** thx Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289623	General	n/a'	V	n/a

6. Power Plant Change to MW. Add invert elevation of Penstocks

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** This information has been updated and expanded consistent with the water control manual. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** thx Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289624	General	1.1.1	1-1	n/a

Insert the PDT's process for assessing "feasibility". First looking at a production scale facility and then looking at how to prototype...

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Seeney/Willig: Concur - The PDT's definition of "prototype feasibility" will be added to the end of the first paragraph of this section. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** thx Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289631	General	4.3.2 b)	4-8	n/a

Add "Trap" to sectiojn title to read "Screw Trap". Also efficency is not linear to flow. There is a curve with the trap being easily avoided during the day and lower flows. Many things effect efficency and flow s just one. I would just change to note that efficencies can be highly variable.

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** Giorgi/Malone: Will add a comment stating that trap efficiency is highly variable. Will also add "trap" to the sentence. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** cool Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289634	General	4.3.2 d)	4-11	n/a

Change to "on Eagle Creek, Idaho." The endo fo the paragraph is confusing "(mostly greater than 53mm/)". Is that fish size or louvre gap size? Reword to eliminate parantheses.

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

Revised 24-May-10.

1-0	Evaluation **Concurred** Giorgi/Malone: Will clarify text to show that the value refers to smolts, and change to Eagle Creek, Idaho. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** nice Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289649	General	5.2.1 a) and b)	5-1	n/a

I find these criteria to be redundant and confusing, most of Reservior conditions and Downstream Passage conditions both seem to be covered by the Fish Collection Potential proposed in the evaluation matrix. All other criteria discussed in these two sections are physical rather than biological in nature.

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** This section has been updated consistent with the evaluation that took place during Checkpoint Meeting No. 1 and should now address these concerns. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** great! Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289651	General	5.2.1	5-1	n/a

Ratings to be removed until the group agrees upon them. By having them in the report now you encourage bias and possibly disagreement. They can stay in if clearly identified as examples or AE's opinion. Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10	
1-0	Evaluation **Concurred** The original ratings were intended as suggestions prior to the Checkpoint Meeting No. 1 evaluation. The ratings have been updated following the group's decisions at that meeting. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** ok Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289652	General	5.2.1	5-1	n/a

Add FCP from matrix

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** FCP has been added. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** o Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289653	General	5.2.1 e)	5-2	n/a

Reword to include other native fish.

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** This has been updated. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** will inspect %60 Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289662	General	5.2.2 a)	5-2	n/a

Would this criteria unfairly weight the in-trib alts high?

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** At this time all alternatives (including both in-reservoir and in-tributary alternatives) are assumed to have little to no impact to existing operations and were given a neutral rating for

	this parameter. As such, it does not impact the overall ratings at this time. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** ok Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289664	General	5.2.2 b)	5-2	n/a

Again need to remove these weightings or identify them as examples. It is unclear based on the text presented how the ratings were developed. I see many O&M nightmares with off-channel facilities as well.

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** This parameter was not ranked at Checkpoint Meeting No. 1 and was considered analogous to the O&M cost parameter. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** ok Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3289665	General	5.2.2 c)	5-2	n/a

Given the relative importance of recreation this should be a secondary or tertiary rating criteria.

Submitted By: David Griffith (503-808-4773). Submitted On: 24-May-10

1-0	Evaluation **Concurred** The recreation parameter was evaluated with full weighting similar to the other parameters. However, FCP was given a double-weighting to highlight it's relative importance. Submitted By: James Kapla (4252333239) Submitted On: 11-Jul-10
1-1	Backcheck Recommendation **Close Comment** reasonable Submitted By: David Griffith (503-808-4773) Submitted On: 16-Jul-10
	Current Comment Status: **Comment Closed**

3. 30 Percent AR Dr. Checks Comments and Responses

This page was intentionally left blank.

Comment Report: All Comments
Project: Lookout Point Alternatives Report
Review: 30%
Displaying 34 comments for the criteria specified in this report.

1297 ms to run this page

Id	Discipline	DocType	Spec	Sheet	Detail
3395787	Biology-Ecology	Technical Report	n/a'	n/a	n/a
Coordinating Discipline(s): Biology-Ecology Black crappie needs to be added to the species list. Also it should be noted that anadromous Pacific lamprey have been extripated from above LOP, however they are still a species of concern for the design since reintroduction is possible. Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10					
1-0	Evaluation **Concurred** Giorgi/Malone: Edits will be made in text. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10				
	Backcheck not conducted				
	Current Comment Status: **Comment Open**				
3395824	Biology-Ecology	Technical Report	2.3.1	n/a	n/a
Coordinating Discipline(s): Biology-Ecology It should be noted that the trends in size at migration and timing are similar to those seen in other UWR Chinook. Specifically in FCR (taylor 2010), above on the McKenzie at Leaburg (and above CGR (Hogansen 2010) and historically (BOCF 1960). Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10					
1-0	Evaluation **Concurred** Giorgi/Malone: Information on size and timing will be added to text. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10				
	Backcheck not conducted				
	Current Comment Status: **Comment Open**				
3395827	Biology-Ecology	Technical Report	2.3.2 & Apndx D	n/a	n/a
Coordinating Discipline(s): Biology-Ecology This might need some updating based on feedback from regional experts and priliminary field data Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10					
1-0	Evaluation **Concurred** Giorgi/Malone: These edits will be made if field data are available prior to report submission. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10				
	Backcheck not conducted				
	Current Comment Status: **Comment Open**				
3395841	Biology-Ecology	Technical Report	3.3	n/a	n/a

Coordinating Discipline(s): Biology-Ecology

It should be noted that allthough it is the Corps intent to meet NMFS 2008 fish passage criteria this may not be possible. Principally the concern is that this is a unique engineering challenge that has not been attempted before. The team should not persue any design that violates criteria unless there is reasonable confidence that the alternative will meet the biological objectives of a HOR collector, and there is no other viable aleternatives.

Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10

1-0	Evaluation **Concurred** Noted. The proposed collector technologies have largely been proven at other sites and adhere to current NMFS criteria and established design practices. The technical challenges are principally associated with the FSC net systems. NMFS has little, it any, formal criteria for this type of system. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3395864	Biology-Ecology	Technical Report	Plates	n/a	n/a

Coordinating Discipline(s): Biology-Ecology

All off channel collection options have site layouts to optimize the siting of the collection facility and minimize grading. This is important however one must also consider the distribution and behavior of the fish within the stream. The fish will tend to concentrate on the outside edge of bends which is opposite the screen in many of these alternatives. Plate 12 in particular might create conditions where there is a large pool of slow or stagnant water that might accumulate fish. As we get further along in the alternative development the engineers should examine site configurations that maximize collection efficiency.

Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone/Kapla: This issue is now discussed in the text. The design drawings are based on very limited topographic information but will be altered to show reduced slow water habitat as necessary. Operational procedures, such as reducing the height of the diversion dam during low-flow periods may also help here. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3395874	Biology-Ecology	Technical Report	Plate 12	n/a	n/a

Coordinating Discipline(s): Biology-Ecology

The adult ladder entrance and exit appear to be in poor locations. The entrance should be located as close as possibleto the outfall from the screen/ogee weir, and the exit should be positioned to minimize fallback through the screen or over the inflatable dam.

Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10

1-0	Evaluation **Concurred** Autier: The fishway entrance was relocated closer to the outfall and the exit was positioned to minimize fall back. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted

	Current Comment Status: **Comment Open**

3395887	Biology-Ecology	Technical Report	Plate 13	n/a	n/a

Coordinating Discipline(s): Biology-Ecology

The ladder exit is in a bad location. As configured, fish might easily fallback through the screen system or over the rubber dam. Best configuration would be to place the entrance immediately downstream of the ogee crest and the exit upstream of the screen channel.

Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10

1-0	Evaluation **Concurred** Autier: The fishway entrance was relocated to be adjacent and downgradient of the outfall. The fishway exit was relocated to be 100 feet upgradient of the intake to minimize fallback. It should be noted that no water will pass over the rubber dam or radial gate during normal operations (from the 5 to 95% exceedence flows). Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3395918	Biology-Ecology	Technical Report	Plates for in channel and off channel collector	n/a	n/a

Coordinating Discipline(s): Biology-Ecology

This is a general comment to the in tributary concepts as a whole. None of the plates include trash sluice-ways or large trash rack structures. This is likely going to be an important feature. Special consideration should be given to their orientation in relation to anticipated flow patterns.

Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10

1-0	Evaluation **Concurred** Autier: Each of the vee-screen intakes have a trash rack (see the vee-screen plan and section). Since the in tributary in-channel collector has been removed from consideration, the sluiceway is not necessary as it is already provided by the radial gate structure with the off-channel option. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3395929	Biology-Ecology	Technical Report	Plate 10	n/a	n/a

Coordinating Discipline(s): Biology-Ecology

One trap alternative could include lead (guidance) nets oriented both towards shore and towards open water. Could the orientation (angle) of this net also be changed to optimize collection efficiency?

Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone: The Merwin Trap lead nets can be fished in any direction. The effectiveness of the lead net angle will have to be examined, via testing in the field. We have provided more discussion on this topic in the 60 Percent AR. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10

	Backcheck not conducted
	Current Comment Status: **Comment Open**

3395938	Biology-Ecology	Technical Report	General comment RE: FSC concepts	n/a	n/a

Coordinating Discipline(s): Biology-Ecology

Most of the alternatives have the collector in the middle of the reservoir. Preliminary site specific data from 2010 and information from the literature suggest that many of the fry will seek out the shallow low gradient flats with fine substrate. The FSC, which drafts 50+ft, might not efficiently collect these fry as they utilize and migrate along the reservoir margins.

Submitted By: David Griffith (503-808-4773). Submitted On: 16-Jul-10

1-0	Evaluation **Concurred** Giorigi/Malone and Sweeney/Willig: Collection of fry in the shallow low gradient flats may be better achieved using a shallow draft mobile trap that can be easily moved to accommodate reservoir elevation changes. The Merwin Trap alternative is designed to test fish collection effectiveness on the reservoir and stream margins. At the Checkpoint Meeting No. 2, it was noted by USACE staff that 2010 data would not be available in time for inclusion in this report. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401187	Project Management	Planning Report	n/a'	n/a	n/a

(Document Reference: page xi)

Acronyms CENPD and CENPP are outdated. USACE Northwest Division = CENWD USACE Portland District = CENWP

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** Autier: This has been updated. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401231	Project Management	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 1.2.3 page 1-2)

Project authorization is different than project purpose. The description in the report details the purpose of the alternative report. USACE can only work within our authorized purposes (flood control, hydropower, irrigation, etc). If the BiOp asks for something outside of those authorizations, we would need receive additional authorization from Congress before proceeding.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** This section has been updated accordingly.

	Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401318	Hydrology	Planning Report	n/a'	n/a	n/a

(Document Reference: Table 2.2 page 2-2)

While the 95% and 5% exceedance values are representative of most design efforts and are probably appropriate for this level of detail, when overlaying the fish passage timing, we may find that a different range is required. The design flow rates should be tied to the fish migration timing first, then exceedance values adjusted to meet the number of fish collected for a sustainable fish population. This would require fish passage timing and life cycle modeling, which may not be completed until after the report is done, but may be worth pointing out.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone and Kapla/Autier: We note that performance criteria for defining a self-sustaining fish population has not been put forth by the Agencies, but is in development. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401341	Hydrology	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.2 page 3-1)

River Design Flows, same comment as Table 2.2

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone and Sweeney/Willg: We will note that performance criteria for defining a self-sustaining fish population has not been put forth by the Agencies, but is in development. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401466	Environmental	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 4.2)

For each site location, possibly provide the percent of the population (upstream of LOP dam) that would be available for collection. At a minimum, the sites upstream of the confluence of the north and middle forks should point out that a certain percentage of the population would not be screened and would have to survive the reservoir, Lookout Point Dam, and Dexter Dam.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone: A table (as presented at Checkpoint Meeting No. 1) will be added to the 60 Percent AR. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted

	Current Comment Status: **Comment Open**

3401478	Program Management	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 1.2.3 Project Authorization)

While discussing RPA 4.9, it could be noted that we are intentionally ignoring at dam solutions, focusing exclusively on feasibility of head of res. systems. RM&E efforts, combined with WATER, COP, and lifecycle modeling will be required to determine where the best place to collect fish at Lookout Point, which is outside of our current scope for this effort. We have intentionally set those questions aside for this alternative report.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** Noted. Sections have been updated accordingly. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401522	Environmental	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 4.3.3 Mobile Traps #2 - Screw and Scoop Traps)

It is noted that the screw traps require flow velocities >1.5 ft/sec to turn, would this velocity be achievable in the backwater pool, or would the traps need to be moved to the top of the pool throughout the season? Same question for scoop traps, with a required velocity of 3 ft/sec to function properly.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

Revised 20-Jul-10.

1-0	Evaluation **Concurred** Giorgi/Malone: With the exception of Merwin traps, we have eliminated all other portable traps from the analysis...so additional detail on their operation will not be provided. If screw traps were fished they would need to be located to the head of the reservoir where velocities are greater than 1.5 fps. This may require that the screw trap will need to be moved on a daily basis. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401594	Environmental	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 4.4.2)

FCS flow rates - using Upper Baker as a reference, what is the attraction flow rate compared to ambient flow conditions for that project? Does 500 cfs equate to a percentage of river flow? Instead of matching the the same flow rate, perhaps the same hydraulic signature could result in a different flow rate required/desired.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** Sweeney/Willig: We will compare Baker at 500 cfs as a % of powerhouse capacity to the same flow at LOP and comment on this in the text. Ultimately, to get the same hydraulic signature though, would require similar CFD modeling be performed for LOP as was done for Baker and examination of the resulting flow fields and zones of influence. This is a matter to be investigated for detailed

	design, not for an alternatives study. This will be described in the recommendations for design studies to be included in the 60 Percent AR submittal. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3401644	Environmental	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 5.2.1 Biological Evaluation Criteria)

Reservoir Conditions states: the in-tributary alternatives may not be applicable. Could there be a detriment of passing very small fish (collected high in the tributary) downstream of Dexter. This may be outside of the project scope, but should it be noted as a potential issue and/or data gap?

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 20-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone: There is a free-flowing condition between Lookout and Hills Creek. The analysis accounts for fish production and passage survival for fish migrating above Hills Creek Dam to Lookout Point. Examination of a collector upstream of Hills Creek is outside the scope of our work. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402912	Project Management	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 5.4.3 - Real Estate/Access/Utilities)

The general rankings have been 1=worst conditions, 5=best conditions. When summed together, the highest total of rankings have floated to the top. Section d) appears to have reversed those rankings. The matrix tables 5.1 and 5.2 may not reflect that. Should confirm ranking order for real estate and make sure those values are applied appropriately in the matrix when ranking.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone: The closer to the spawning grounds the trapping facilities are located the more likely large numbers of newly emerged fry will enter the system. Collection, sorting, transport and release activities may result in high delayed mortality rates. Measuring these mortality rates are problematic due to fish size (< 40mm). Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402921	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 1.1.1)

Please refer to Plates 1 and 2 in this section for clarity. Also the last sentence of the section, is missing an "is" and is unclear whether Hills Ck Dam or the City of Oakridge is intended to be noted as located near river mile 46. (Same text is in first para of Section 2.2.2).

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

Revised 21-Jul-10.

1-0	Evaluation **Concurred** This section has been updated. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402924	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 2.2.1)

second para, suggest removing reference to the locations for the FSC, since the FSCs have not been mentioned yet.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** This section has been updated. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402936	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 2.2.2)

Middle Fork of the WR (Upper): p. 2-2: Was the upper MF streamflow estimated on a daily basis as the difference between the two gages? If so, please add that it was done for each day during the period of record to synthesize a comparable record for the Upper MF. I assume this synthesized record was then used to calculated frequency duration curves.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** This section has been updated. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402958	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 2.3.3)

1st para, last sentence. If the abundance estimates we have to date are "high optimistic" they may result in over-design of facilities. If we have provided a high end for the estimate, we should be able to bound it on the low end as well to get a range and use the range to identify facility components that will be especially sensitive to # fish, possibilities for facility expansion/contraction, etc.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** Giorgi/Malone: Although the estimates may be optimistic based on our current understanding of basin spring Chinook production, they may also underestimate the total number of fish of all species that may enter the collector. For an alternatives report, we are of the opinion that the numbers provided are sufficient to contrast and select between alternatives. We will look at fish

	loading densities in the 60 Percent AR to see if designs are sensitive to expected run sizes. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402969	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.2)

5-95% exceedance flows during the migration period have been used as preliminary design flows for all sites. We should look into adding fish timing in conjunction with flow timing to see what the effective collection efficiency is for a given design flow. When performance standards are defined we can confirm that the design flows will meet needs.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** A graph has been developed to evaluate this issue. See 26-August-2010 Team Coordination Meeting minutes. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402975	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 4.4)

Request language for discussion of alternatives be changed to refer to "prioritization of alternatives for further study" or similar to make it sound less like we have "eliminated" them forever.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** This has been updated throughout the report. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3402990	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 4.4.2)

FSC alternative: I understand the precedence of the Baker flow, but would like to see a discussion of the flow being set based on our specific project needs, rather than what worked at Baker. Baker FSC is near-dam with the influence of the turbine unit competing. The HOR site is different... perhaps with different ambient velocities. I see a discussion of this in a later section. Also, position/location of the FSC obviously has some limitations based on the structure, but it seems it should be largely based on the potential for attracting the largest number of fish, especially if we are considering no/partial depth nets. Will we have more fish along the shore in the HOR? If no nets, will we miss them?

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** Sweeney/Willig: See response to 3401594 concerning response to the flow question. Text will be added commenting on the potential effectiveness of the FSC without nets in capturing shore oriented fish. Also see response to 3395938 concerning the ability to collect fish in the shallow, near-shore flats.

Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10

Backcheck not conducted

Current Comment Status: **Comment Open**

3403069	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Table 3-1)

Might want to add (here or somewhere else) the need to consider the effects of the discharge from the FSC.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0 Evaluation **Concurred**
Sweeney/Willig: Consideration of the effects of FSC pump discharge on guidance velocity along nets, approach velocity, and hydraulic conditions will be added as a footnote to the table and in the description of additional design study requirements that will be included in the 60 % submittal.

Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10

Backcheck not conducted

Current Comment Status: **Comment Open**

3403080	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 4.4.3)

Re: Design flows: A collector on a single trib collecting the 5% exceedance flow won't collect as a large a proportion of subbasin fish as a collector on the main channel MF sized to 5% exceedance flow. Conversely, a collector on the MF would need to collect significantly less than the 5% exceedance flow to be as effective as one trib collector designed for the 5% exceedance flow. Until we know our actual performance goals we need to make sure we are at least comparing apples to apples (i.e. show trib alts paired together or show smaller version of the main MF alternative compared to a single trib alt).

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0 Evaluation **Concurred**
The fish collection potential is dependent not only on flow (collection efficiency), but also on survival probability and the proportion of the fish subpopulation available at that specific location. The graphic included with the 26-August-2010 Team Coordination Meeting minutes provides a good summary of this data by site.

Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10

Backcheck not conducted

Current Comment Status: **Comment Open**

3403094	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: Section 4.4.3)

p. 4-20 Black Canyon Camprground site... slope for the site is noted and seems to be a limiting factor... is this slope consistent along the entire 5 mi reach or are there steeper sections that will either eliminate the backwater or provide a better location for the collector?

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0 Evaluation **Concurred**
Autier: Available topographic information is limited. The slope used to calculate the length of backwater was derived from FEMA maps available for the City of Westfir. It is believed that the

	black Canyon Campground is located on a pretty flat river reach. The Black Canyon site was moved upgradient to minimize impacts to the campground. While the river gradient is the same at this new location, the backwater will be reduced to approximately 3.5 miles due to higher gradients upstream. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3403101	Hydraulics	Planning Report	n/a'	n/a	n/a

(Document Reference: NA)

Editorial comments will be transmitted to AE PM under separate cover.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 21-Jul-10

1-0	Evaluation **Concurred** James and Liza discussed the edits and they have been addressed. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3407338	General	Planning Report	n/a'	n/a	n/a

No comments

Submitted By: Jim Burton (503-808-4852). Submitted On: 22-Jul-10

1-0	Evaluation **Concurred** Noted. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3415477	Cost Engineering	Feasibility Study	n/a'	n/a	n/a

At this time I am a member of four D/S passage PDT's, two to build new fish passage facilities, and two to demolish failed fish passage facilities (Green Peter Fingerling Facility & Bonneville PH1 JBS). Knowing that the success rate for these types of facilities is not good and that the cost of most of the proposed alternatives is over $10 million, I'm not comfortable with the number of assumptions and estimates in this report. The PDT should focus on flexible and adaptable alternatives that will provide biological data and then allow the facility to be adapted to the new data. Or, focus on the collection of data and then discuss what type of facility to build. It seems very risky at this time to acquire land and build a permanent facility out of steel and cast-in-place concrete.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 27-Jul-10

1-0	Evaluation **Concurred** Noted. It is anticipated that additional data will be collected and evaluated prior to selecting a final alternative and proceeding with the Preconstruction Engineering and Design phase. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3421584	Cost Engineering	Feasibility Study	n/a'	n/a	n/a

(Document Reference: Evaluation Matrix)

The economic impacts of the Merwin Trap alternative should be revisited. The capital and O&M costs are significantly lower than other alternatives moving forward and should therefore receive a 5 in both categories.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 29-Jul-10

1-0	Evaluation **Concurred** The latest evaluation matrix has been updated per the cost information provided in Appendix G. Submitted By: James Kapla (4252333239) Submitted On: 17-Sep-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

n/a	Hydraulics	Feasibility Study	n/a'	n/a	Giorgi/Malone	There is a free-flowing condition between Lookout and Hills Creek. The analysis accounts for fish production and passage survival for fish migrating above Hills Creek Dam to Lookout Point. Examination of a collector upstream of Hills Creek is outside the scope of our work.
(Document Reference: Synopsis - Section 3) Should have some mention of Hills Creek. Is there a free flow condition between Hills Creek and Lookout Point? Also would suggest that anything built on the Middle Fork might need to be upstream of Hills Creek. They most likely are having trouble at Hills Creek and I am unaware of much hatchery/rearing from the tailrace of Hills Creek to the head of reservoir at Lookout Point. Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Kapla	This section has been updated but further information from USACE regarding policies and procedures may be required.
(Document Reference: Section 1.2.3) So is the BiOp sufficient justification for COE to expend dollars. We don't have to have a decision document that justifies the work? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Kapla	This has been added to the list of acronyms and abbreviations.
(Document Reference: Section 2.2.1) FSC is used without being spelled out. Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Autier	Appendix B 4 includes the regulated Lookout Point flood frequency curves. The sentence in section 2.2.3 was changed to remove "unregulated".
(Document Reference: Section 2.2.3) I didn't see the unregulated flood frequency information in Appendix B. Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Autier	Done.
(Document Reference: General) When specific plots or figures are reference in the main body to an appendix they need to be reference by full name. For example the regulated and unregulated flood frequency information is found in figure B-x through B-y in Appendix B. Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Autier	NFMF stands for North Fork of the Middle Fork of the Willamette River. The Acronym is presented in the acronym table page xiii, and also defined on page 2-2 of this section.
(Document Reference: Figure 2-1) Do the timing match up to high flow events? What is NFMF? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Kapla	The facility will be designed to handle the peak fish migration day; however, it is anticipated that staffing will vary throughout the year as required to handle the incoming fish.
(Document Reference: Section 2.3.3) If you design for a conservative high estimate can you deal with very low numbers. Will the facility take too much staff to run if the numbers are very small? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Kapla	It is anticipated that the facility would be operated by USACE; however this should be confirmed with USACE staff.
(Document Reference: General) Who is going to operate the project when complete? If another group is going to operate need to involve them now in the process. Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Sweeney/Willig	The reservoir will be limited to a maximum elevation of 915 until spillway gates are repaired. This will not pose an issue as the design elevations for the FSC and nets span from 825 ft to 926 ft.
(Document Reference: Section 2.4) Pool won't be up to 926 for some time? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Giorgi/Malone	A portion of the fish passing in flood events will not be collected in any of in-tributary collectors when flows exceed design flow levels. The percentage of the fish run not collected under these conditions is unknown.
(Document Reference: Section 3.2.2) What if the juveniles move during the major flood events which are larger than the 95%? Submitted By: Laurie Ebner via Sean Askelson						

n/a	Hydraulics	Feasibility Study	n/a'	n/a	Sweeney/Willig	Yes, this would increase the design flow for the nets. However, adequate net area is available at location A to accommodate considerable increase in the net design flow. An increase may impact location B. An evacuation rate over 3,000 cfs would require moving location B downstream until the required net area is obtained to meet criteria. Waiting to hear back from Corps on official number to check compliance with net criteria for this location.
(Document Reference: Section 3.2.3) Because of the gate issues we may need to draft reservoir faster than we have been doing would that impact Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Giorgi/Malone	Whether facilities are needed on both north and middle fork or on middle fork below the confluence (or head-of-reservoir) can only be answered by establishing biological performance goals and comparing to them. This is a resource management question and outside the scope of our work.
(Document Reference: Section 4) If you site the facility on the north fork will you also need one on the middle fork? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Sweeney/Willig	In-tributary collectors can be designed for whatever flow is chosen - this is a cost question. The design flow selected for this study is the 5 % exceedance flow, Section 3.2.2, with corresponding flow values, Section 2.2.2, and the resulting designs, can handle approximately these flows.
(Document Reference: Section 4.3.2) How do these correspond to the 95%? What is the maximum range of Qs they can be designed for? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Sweeney/Willig	See response to 3401594.
(Document Reference: Section 4.4.2) How do the reservoirs at Upper Baker and Lookout compare? Does it make sense to use the same range? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Giorgi/Malone	The FSCs were located in the thalweg to accommodate the reservoir level change in a location as far upstream in the reservoir as possible, since the scope of this study was to examine "head-of-reservoir" collection. As noted in response to 3395938, shallow draft mobile trap technology may be more able to accommodate fish collection in the shallow, low-gradient, near-shore flats.
(Document Reference: Section 4.4.2) Text in section "Head-of-Reservoir" suggest that the fish are in the thalweg? Why do we think that? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Kapla	These numbers were selected based on discussions that took place at the Checkpoint Meetings. The weighting of all evaluation criteria is equal with the exception of FCP which received a double weighting.
(Document Reference: Tables 5-1 and 5-2) How were the numbers computed? Judgment - if yes how and how were different individuals ideas weighted? Submitted By: Laurie Ebner via Sean Askelson						
n/a	Hydraulics	Feasibility Study	n/a'	n/a	Giorgi/Malone	The citation is a memo from Griffith as included in Appendix D.
(Document Reference: Section 8.2) Is the information from Griffith a phone call or a report? It needs additional clarification. Even if it is an email the form of the communication or reference needs to be provided. Submitted By: Laurie Ebner via Sean Askelson						

4. A-E Contractor Statements of Technical Review and 60 Percent AR ITR Review Comments

This page was intentionally left blank.

A-E CONTRACTOR STATEMENT OF TECHNICAL REVIEW

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

The A-E Contractor (CH2M HILL) and its subconsultants (AECOM and BioAnalysts) have completed the 60 Percent Alternatives Report for the USACE Lookout Point Head of Reservoir Collection Project. Notice is hereby given that an independent technical review, appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The independent technical review was completed by CH2M HILL and its subcontractors. All comments resulting from ITR have been resolved.

Walter N. Bennett — 9/17/2010

Technical Review Team Leader` — Date

James A. Kupla — 9/17/2010

Project Manager, A-E Contractor — Date

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

See WBG Quality Review Forms

As noted above, all concerns resulting from independent technical review of the project been fully resolved .

9/17/10

Principal, A-E Contractor — Date

WBG Quality Review Form (QRF)

Client/Project:	USACE Lookout Point Head of Reservoir Collection
Project No.:	402429
Phase:	Feasibility Study
Work Product:	60 Percent Alternatives Report
Date:	
Reviewer:	Walter Bennett
Return to:	Bob Gatton/SEA
Review Comment Due Date:	

Category 1: Comment intended to identify significant system deficiencies for phase of review or major design flaws. Reviewers shall only use this category to include comments that truly are considered serious flaws or life safety issues. If continuous QC review is performed correctly there should be little or no need for this category.

Category 2: Comment to identify incorrect information found in the review. Comment may also be focused on lowering risk, or improving the quality of the work product and/or the ultimate application of the work product consistent with the contracted scope and quality management plan.

Category 3: Comment is editorial or otherwise minor in nature with little effort to implement. Intent of this category is not to spend time discussing these comments during final review discussions. Comment is non-controversial in nature and easily incorporated or may be discretionary with the Task Lead and/or PM.

File Name:

Response Due Date: 9/15/2010 **Final Adjudication Due Date:** 9/17/2010

Comment Number	Reference Page or Sheet No.	QA/QC Reviewer	Review Comment	Category No.	Responsible Responder	Response	Final Adjudication: "Done" if resolved, "ITF" if passed to Issue
1	General Observations on the FSC Options	WNB	The two options that include an FSC have some significant challenges including but not limited to the following:	1	Kapla	Noted.	Done.
2			The mooring system for an FSC will be problematic and needs careful consideration. The combination of a wide river at the selected location and the 100 ft swing in the forebay will make it difficult to hold the structure on location. The distances to the shore are very long, especially on the back anchors. This would suggest marine anchors. Because they have a vertical component and the large swing of the forebay, the anchor lengths will need to be managed to hold the position of the FSC.		Sweeney/Willig with Kapla	Agreed. Added text to highlight this issue in Section 4.5.1.1 under Floating Surface Collection sub-section.	Done.
3			The nets system will be quite complex. The forebay swing causes problems with the net billowing and large lengths of nets and floats will be exposed on dry shoreline during the low forebay months. This will lead to difficulty controlling the geometry of the nets and high wear and tear. It also means the top cables will either need variable length or they will need the FSC to move as the forebay moves. There are significant geometry problems with this, some of these issues have been addressed at Baker but not all of them.		Sweeney/Willig with Kapla	Agreed. Added text to highlight this issue in Section 4.5.1.1 under Exclusion Nets sub-section.	Done.
4			To prevent billowing, the net height needs to be adjusted but it can not be managed at the top since it needs to tie into the NTS. This means the extra net needs to go to the bottom with either weights or lines that pull the net tight from the bottom. It might be possible to bunch the net at mid height. This is not a problem that has been solved before to my knowledge.		Sweeney/Willig with Kapla	Nets could be managed from top if bunched below NTS invert in area around NTS. Added text to highlight this issue and the fact that it hasn't been done before will be added in Section 4.5.1.1 under Exclusion Nets sub-section.	Done.
5			If the phased approach to the FSC deployment is selected, it means that in order to increase the capture rate from the base with no nets and 500 cfs would first mean adding nets. Once you do this, you face many new issues. The point is that you should not select the FSC option unless you assume it will entail nets and all the problems associated with nets are resolved ahead of time. This might even suggest a direction for the prototype effort that is allowed for. Deploy some nets in some configuration and test the methods of supporting the net and the collection of trash. You can also test at this time a partial depth net to see what % of fish it guides.		Sweeney/Willig	It is likely that the no-net FSC option will be dropped at the 60 Percent Evaluation (Checkpoint Meeting No. 3) and was originally included at the request of the USACE. Text was added to stress the difficulties associated with a full exclusion net with this range of forebay elevations.	Done.
6			The other problem the nets create is a barrier to upstream migration of fish. This was discussed in the report so I just mention it as one more obstacle to overcome.		Sweeney/Willig	This will only be relevent to resident fish as migrating salmonids will be placed upstream of facility. Depending on the management decision, this may not need to be addressed.	Done.

7	**General Observations on the Merwin Trap Option**	WNB	The one opportunity I see is to use the Merwin Trap system as a prototype to evaluate a number of issues. These include performance of the nets in a fluctuating forebay, accuracy of capture predictions, and compare juveniles trapped at the upper reservoir to those at the lower reservoir locations to determine the benefit of reservoir rearing. A number of the recommended studies might be accomplished with a net and trap system that would also help gain a better understanding about performance of certain systems and materials.	2	Sweeney/Willig with Kapla	The short length (150 ft) and depth (25 ft) of the lead nets for the Merwin traps would make it difficult to replicate the issues that will be faced with the full exclusion nets. In addition, the location of the Merwin traps in the shallow areas near shore will mean they must be moved when the reservoir is drawn down. However, it is anticipated that Merwin traps may be beneficial to RM&E studies.	Done.
8	**General Observations on the Off-Channel Collector Options**	WNB	The technology required to implement one of these options is sound and repeatable. The challenges will primarily be finding a suitable site that will support this function with least impact on the surroundings. The performance of such a system can be accurately predicted and the technical challenges are few. This was not one of the criteria used to evaluate different facilities and I think it should be, call it technical predictability.	2	Kapla	Agreed. We considered the risk and/or precedence for particular technologies as part of the design/constructibility evaluation criteria. This criteria may have more influence during the 60 percent evaluation (Checkpoint Meeting No. 3) given the difficulties associated with net systems as described above.	Done.
9	**7-2 Recommended Studies**	WNB	I don't see value in the recommended forebay CFD. I would not recommend pursuing the FSC unless you are fully prepared to add the net. The results in the field will be the indicator, not the model results and I don't see doing anything different as a result of modeling. The pump discharge can be diffused, this is not worth trying to model. Additionally, debris is an issue and potentially a major differentiator. I don't know what sort of CFD model will help with understanding debris. This is where a prototype net would tell you much more about the nature of the debris.	1	Sweeney/Willig	We removed reference for forebay CFD. See FSC CFD study. The FSC CFD study is recommended to assist in determining net alignment and ensuring net criteria are met. Also given the low ambient in-reservoir velocities, the study will be used to design and direct the pump discharge such that it helps set up beneficial circulation patterns through and along nets. It is likely we will not want to diffuse the discharge.	Done.
10	**4.3.1**	WNB	You meniton RBSWW in this list but say nothing about it. I think the generalities really just pertain to Baker. Where else have they built full exclusionary nets? I would prefer a decription of each completed installation and the associated characteristics to all these generalities that are I think misleading.	2	Sweeney/Willig	We removed reference to RBSWW. We did not add description of complete Upper Baker facility but did add text on differences between designs and problems not addressed by that design that are found at Lookout Point.	Done.
11	**5-11 Table 5-3**	WNB	3 I don't understand why you don't have an efficiency estimate for traps. They are no different than the FSC without nets for which you do have an estimate. Then on the next page you estimate it will be 12 %	3	Giorgi/Malone with Kapla.	The purpose of this table is to describe the relationship between flow capacities and collection efficiencies. The Merwin traps are unique in that they do not have a set flow rate and instead rely on ambient velocities and flows within the reservoir. The Merwin trap collection efficiencies were developed elsewhere in the report based on different methods.	Done.
12	**5-12 Table 5-4**	WNB	You have assigned the same survival to an FSC with and w/o nets. This does not seem to be realistic, the nets will necessarily cause increased mortality.	3	Giorgi/Malone	We did not assign any mortality to nets as mesh size is too small to gill fish >35 mm. There may be some mortality but it will not be measurable.	Done.
13	**5-14 para 4**	WNB	This paragraphs says you recommend 1) and 2) but then later you talk about starting without nets. I was confused by this.	3	Sweeney/Willig	The text will be moved to end of Section 4.9.	Done.
14	**5-16 para 6**	WNB	references table 4-2, there is no such table.	3	Sweeney/Willig	The reference will be fixed.	Done.

15	**5-17**	WNB	Table 5-5 is hard to understand. Maybe it would help if the Q row was the heading row.	3	Sweeney/Willig	The suggested change will be made. This table is now Table 4-2	Done.
16	**Plate 7**	WNB	I feel this concept is far more complicated that what it is represented as. For one thing, the net is fit to the structure and if the structure changes shape, the net has to accommodate. The other problem is bypassing the stationary section with the rotating section at the hinge and remaining fish tight. These is not a simple modification.	3	Sweeney/Willig with Kapla	Part of the net would be out of the water and there will be billowing in the vicinity of the entrance. This has been added to the text. I think the hinge is easy to keep fish tight, it is the vertical gap in the side that develops that will need some engineering but this is not insurmountable. Text has been added to stress these complications.	Done.

A-E CONTRACTOR STATEMENT OF TECHNICAL REVIEW

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

The A-E Contractor (CH2M HILL) and its subconsultants (AECOM and BioAnalysts) have completed the 60 Percent Alternatives Report for the USACE Lookout Point Head of Reservoir Collection Project. Notice is hereby given that an independent technical review, appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The independent technical review was completed by CH2M HILL and its subcontractors. All comments resulting from ITR have been resolved.

Forest Olson 9/17/2010
Technical Review Team Leader` Date

James A. Kupla 9/17/2010
Project Manager, A-E Contractor Date

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

See WBG Quality Review Forms

As noted above, all concerns resulting from independent technical review of the project been fully resolved .

Robert C Botthof 9/17/10
Principal, A-E Contractor Date

WBG Quality Review Form (QRF)

Client/Project: USACE Lookout Point Head of Reservoir Collection
Project No.: 402429
Phase: Feasibility Study
Work Product: 60 Percent Alternatives Report (ITR Draft August 2010)
Date: 8-Sep-10

Category 1: Comment intended to identify significant system deficiencies for phase of review or major design flaws. Reviewers shall only use this category to include comments that truly are considered serious flaws or life safety issues. If continuous QC review is performed correctly there should be little or no need for this category.

Category 2: Comment to identify incorrect information found in the review. Comment may also be focused on lowering risk, or improving the quality of the work product and/or the ultimate application of the work product consistent with the contracted scope and quality management plan.

Category 3: Comment is editorial or otherwise minor in nature with little effort to implement. Intent of this category is not to spend time discussing these comments during final review discussions. Comment is non-controversial in nature and easily incorporated or may be discretionary with the Task Lead and/or PM.

Reviewer: Forrest Olson/SEA

Return to: Bob Gatton/SEA

File Name:

Review Comment Due Date: September 8, 2010

Response Due Date: 9/15/2010

Final Adjudication Due Date: 9/17/2010

Comment Number	Reference Page or Sheet No.	QA/QC Reviewer	Review Comment	Category No.	Responsible Responder	Response	Final Adjudication: "Done" if resolved, "ITF" if passed to Issue Tracking Form
1	**p2-4 (Fig 2-1)**	F. Olson	The juvenile run timing depicted in Fig 2-1 seems to be based on in-river migrations. The references reviewed by Dave Griffith (USACE) indicate migration timing out of reservoirs occurs in Nov-Dec during flood control drawdown and again in spring (yearlings). So use of this timing graph to assess in-reservoir trapping efficiency would be incorrect. Also, one should assume that once the fry enter the reservoir they would not be in a migratory mode and thus would be less likely to enter an in-reservoir trap (until drawdown or following spring).	2	Giorgi/Malone	Correct. The document notes where the data were collected and that information on fish timing in reservoir etc. is not currently available. We also note that fry may not migrate through the reservoir.	Will confirm that these points are made in the document. Done.
2	**p 2-6**	F.Olson	Use of spawning habitat area to estimate Chinook production potential has been shown to be an invalid approach in most cases because what we 'people" see as suitable spawning area is much more than what the fish sees as suitable. Tends to way overestimate production potential. That fact that this approach came from the BiOp probably makes this a moot issue at this stage of the process, but at least should be acknowledged as conservative.	2	Giorgi/Malone	Comment noted.	Done.
3	**p 3-1 (Table 3-1)**	F. Olson	2nd column. What was basis for using the sum of inflow and outflow to get maximum flow through nets? Not logical. It's the outflow that dictates the flow rate (and thus velocities) through the reservoir at any given point. When inflow exceeds outflow the inflow simply becomes a turbulent plume affecting just the very top end of reservoir. If this flow criteria is corrected will it significantly change the design and size of the in-reservoir trap system?	2	Sweeney/Willig	Evacuation rate is the rate at which outflow exceeds inflow in order to lower reservoir level. Therefore, the outflow does equal the inflow plus evacuation rate. No change is required in the table.	Done.
4	**p 3-2 (Table 3-1)**	F. Olson	Peak migration period. Figure 2-1 shows ~90% migrating March-June. Jan-Sept seems to cover essential all the migration. If the true peak (90%) was assumed to be the acceptable criteria, what would be its effect on the design and size of the in-tributary screen/collection systems?	2	Giorgi/Malone	This depends on the percentage of fish that need to be collected to meet objectives. The data presented in the report show that FCE is about 95% under current design flow assumptions for the period March-June.	Done.
5	**p 6-4**	F. Olson	I would think that the potential for Chinook smolts to prey on their fry would be small (studies?). The additional handling of fry associated with their separation would probably cause more mortality than would predation.	2	Giorgi/Malone	Comment noted and agree.	Done.
6	**p 5-13**	F. Olson	Net billowing has been noted as a significant problem at other sites especially for deep nets. Increased mortality due to net billowing could exceed what is gained in collection efficiency by using a deep net (vs. a partial-depth net).	2	Sweeney/Willig	This is why an adaptive management approach is proposed. The final sentence on the page indicates the "alternative could be implemented without nets at a location that could accommodate the addition of partial- or full-exclusionary nets at a future date." I believe no change to text is warranted.	Done.

7	**p 5-16**	F. Olson	Near bottom of page references Table 4-2, which doesn't exist (should be 5-5?). Incorrect table numbers occur in many locations throughout report. Do global check/correction.	3	Autier	Tables have been updated.	Done.
8	**Start p 5-13 (Sec 5.4.2.1)**	F. Olson	The Technical Evaluation section provides a long list of uncertainties (operational, biological, cost) and red flags associated with the in-reservoir alternatives and offers potential solutions with even more uncertainties, in my opinion. Would be nice to see these cons (and pros) in a table for direct comparison with the in-tributary alternatives.	2	Kapla	This type of information is typically discussed during the Checkpoint Meetings and is reflected in the evaluation matrix. This type of table will be considered for the 90 Percent and Final deliverables.	Done.
9	**P 5-24 near bottom**	F. Olson	Table 1?? Doesn't seem to fit Table 5-6 that follows, so where is the correct table (and no.)?	3	Giorgi/Malone	Tables have been updated.	Done.
10	**p 5-24 bottom**	F. Olson	States that reduced fry survival (in collection system) reduces ability to achieve management objectives. If objective is to get sustainable adult returns then the loss of fry is a much lesser concern that say a loss of smolts because of compensatory mortality, which is more operative on fry. It would be good to have a brief discussion of density-dependent mortality and how it should be considered in the evaluation of alternatives and facility sizing/design (i.e. a loss of fry, up to a point, may be inconsequential to the adult production potential).	2	Giorgi/Malone	The SAR analysis makes the same point about how the collection of fry versus smolts may impact the analysis.	Done.
11	**p 5-27**	F. Olson	Reference to table 5-2 should be table 5-9.	3	Autier	Table has been updated.	Done.
12	**p 5-27 Tb 5-8**	F. Olson	Last Column. Footnote whether returns are to MF Willamette or if includes harvest + escapement.	2	Giorgi/Malone	Footnote updated.	Done
13	**p 5-30**	F. Olson	Sec 5.5.4 needs to include a reference to Table 5-10. The section describes how costs were computed but says nothing about the results of the analysis, which are presented in table 5-10.	2	Autier	Reference has been added.	Done.

This page was intentionally left blank.

5. 60 Percent AR Dr. Checks Comments and Responses

This page was intentionally left blank.

Comment Report: All Comments
Project: Lookout Point Alternatives Report
Review: 60%
Displaying 41 comments for the criteria specified in this report.

562 ms to run this page

Id	Discipline	DocType	Spec	Sheet	Detail
3544172	Economics	Reconnaissance Report	n/a'	n/a	n/a

For the 60% report, a 6.6% rate was used to capture the time value of money (PV and Annual). That does not need to be revised for the 60%, because it's used simply to show comparisons between various alternatives. However, please use the FY11 Federal discount rate for those calculations for the 90% report, since those costs should be in similar terms to costs from other ongoing studies. (FY10 discount rate is 4.375%, and FY11 should be announced in October.)

Submitted By: Pat (Dorothy) McCrae ((503) 808-4758). Submitted On: 29-Sep-10

1-0 Evaluation **Concurred**
The FY11 federal discount rate is 4.125% and was used to update the costs for the 90% report.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3548125	Electrical	Planning Report	n/a'	n/a	n/a

Coordinating Discipline(s): Electrical

No comment

Submitted By: Joseph Brackin ((503) 808-4922). Submitted On: 01-Oct-10

1-0 Evaluation **Concurred**
Noted.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3551070	Hydrology	Feasibility Study	n/a'	n/a	n/a

(Document Reference: Table 3-1 and Section 2.2.2)

5% and 95% flow rates listed in Table 3.1 do not match values in section 2.2.2 Perhaps this is a difference attibuted to full year exceedance compared to peak migration exceedance?

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 04-Oct-10

1-0 Evaluation **Concurred**
The flowrates in Table 3.1 are for the period of peak fish migration (i.e. January through September), while the flowrates in Section 2.2.2 are based on annual data (January through December). Additional text was added in both Sections to clarify

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3551090	Biology-Ecology	Feasibility Study	n/a'	n/a	n/a

(Document Reference: Section 3.3.2.2 FIsh Holding)

Sizing of holding tanks are dependant on peak day migration estimates. Logic used for peak day numbers should be consistent between the projects. Cougar design also allows for a 3-day holding window, potentially to allow for unstaffed weekends.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 04-Oct-10

1-0	Evaluation **Concurred** Additional information has been provided here and in some cases is different than that proposed for Cougar. The peak day is assumed to be 10 percent of the annual fish run. Existing published IHOT and NMFS criteria (holding density and flow) is intended for adults and therefore considered to be too conservative for this application. Flow and density indexes typically used for rearing/acclimation facilities are used as an alternative. Standard water quality requirements are also identified. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3551109	Engineering Management	Feasibility Study	n/a'	n/a	n/a

(Document Reference: Section 4.2.1 Upper Reservoir)

while facilities should be optimized to function between maximum conservation pool and minimum flood control pool, the equipment must be able to accommodate (read as not break) reservoir fluctuations up to maximum pool (934 ft) and minimum power pool.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 04-Oct-10

1-0	Evaluation **Concurred** The statement has been expanded to address functional range and accommodated range without damage to the facility as suggested. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3551132	Environmental	Feasibility Study	n/a'	4-19	n/a

(Document Reference: Section 4.5.1 Selected In-Reservoir Alternatives)

reference made to Upper Baker FCS and low collection numbers requiring a full exclusion net. While that is accurate, would the placement of the collector (head of reservoir at Lookout vs. at dam at Baker) and bathymetry (potentially shallow and placed near shoreline) help the collection potential for partial nets at Lookout Point? Most likely would not know without some type of study, but would not want to rule it out without further consideration.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 04-Oct-10

1-0	Evaluation **Concurred** The use of partial depth nets, regardless of location, may result in decreased collection efficiency at the facility. We agree that studies would have to be undertaken to determine efficacy of such a system to collect juveniles. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3551136	Environmental	Feasibility Study	n/a'	4-22	n/a

(Document Reference: Section 4.5.3 Selected In-Trib Alternatives)

how was 30 cfs bypass flow arrived at? Is that comprable to other projects of similar size?

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 04-Oct-10

1-0	Evaluation **Concurred** The 30 cfs bypass flow is an initial estimate and is comparable to other downstream collector facilities of similar size. Both primary and secondary dewatering screens are assumed. The selected design flowrate will be somewhat dependent on the extent of sorting/handling required. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3551142	Engineering Management	Feasibility Study	n/a'	n/a	n/a

(Document Reference: Section 4.7, 4.8 Alternatives Eliminated)

Please refrain from using term "eliminated" for the alternative analysis. A more acceptable term would be "de-prioritized" since any option could be added/reexamined at a later date.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 04-Oct-10

1-0	Evaluation **Concurred** Noted. This terminology has been updated throughout the document. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3554706	Environmental	Feasibility Study	3.7 Environmental and Cultural Resource Criterea	n/a	n/a

Please use the following definitions for Table 3.6 Northern Spotted Owl Habitat Definitions: Suitable habitat: Consists of stands with sufficient structure (large trees, snags, and downed wood) to provide opportunities for owl nesting, roosting, and foraging. Generally, these conditions are associated with conifer-dominated stands, 80 years old or older, multi-storied in structure, have trees greater than or equal to 18 inches mean diameter at breast height (dbh) and the canopy closure generally exceeds 60 percent. Stands are defined at a larger scale (i.e. province) as suitable based just on age or siz e (i.e. 80 years, >18") alone. Dispersal Only habitat: Dispersal Only habitat will refer to the subset of habitat used by dispersing spotted owls that does not contain suitable habitat. These stands provide protection from avian predators and at least minimal foraging opportunities during dispersal. At a minimum, dispersal habitat is comprised of conifer and mixed mature conifer-hardwood habitats with a canopy cover greater than or equal to 40 percent and conifer trees greater than or equal to 11 inches average dbh but less than the habitat characteristics described for suitable habitat above. Generally, spotted owls use younger stands to move between blocks of suitable habitat, roost, forage and survive until they can establish a nest territory. Juvenile owls also use dispersal habitat to move from natal areas. Known owl site: A site that was or is occupied by a pair or resident single (1990 to present) as defined by the survey protocol. The specific site location is determined based on the best and/or most recent information. A known site may be determined to be inactive only in accordance with the survey protocol (USFWS 2010). Predicted spotted owl site: An area able to support resident spotted owls (i.e. a potential breeding pair) as determined by the interagency occupancy template (USFWS et al. 2008). This is used for determining potential effects to spotted owls where survey data are insufficient. Nest Patch (or stand): 300 meter radius circle around a point (known or predicted owl site), where a spotted owl would be likely to select a nesting tree (USFWS et al. 2008). Core area: 0.5 mile radius circle around a known or predicted owl site, which delineates the area most heavily used during the nesting season (USFWS et al. 2008). Home Range: An estimated area for habitat use of a spotted owl pair. For the Oregon Cascades Physiographic Province , this estimate is a 1.2 mile radius circle around a known or predicted owl site (Thomas et al. 1990 and USFWS et al. 2008).

Breeding Period: the breeding period for northern spotted owls in the Oregon Cascades Physiographic Province is March 1 through September 30. The critical breeding period is March 1 through July 15.

Submitted By: Greg Smith (503-808-4783). Submitted On: 06-Oct-10

1-0	Evaluation **Concurred** These changes have been made to Table 3-6. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3554710	Environmental	Feasibility Study	3.7 Environmental and Cultural Resource Criterea	n/a	n/a

Table 3-6 definitions continued... Late-Successional Reserves: The Northwest Forest Plan designated Late-Successional Reserves (LSR) on some Federal lands in Oregon, Washington, and California. These Federal lands are managed to protect and enhance old-growth forests and habitat conditions for species dependent upon old-growth, such as northern spotted owl (Strix occidentalis caurina) and other species associated with older late seral forests, within a system of well-distributed large blocks of forest (USDA and USDI 1994). Some limited land management activities, including timber harvest and salvage logging, are allowed for stands <80 years old in order to enhance late-successional and old growth characteristics.

Submitted By: Greg Smith (503-808-4783). Submitted On: 06-Oct-10

1-0	Evaluation **Concurred** These changes have been made to Table 3-6. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3554765	Environmental	Feasibility Study	3.7 Environmental and Cultural Resource Criterea	n/a	n/a

The final paragraph in this section should be changed to read: "Noise, smoke and human presence in the canopy can result in a significant disruption of breeding, feeding, or sheltering behavior of the spotted owl such that it creates the potential for injury to the individuals (i.e., incidental take in the form of harass). Therefore, the Fish and Wildlife Service has determined effects to spotted owls from disturbance associated with habitat modification activities near an active nest site based the source of disturbance, distance from nest patch, and time period."

Submitted By: Greg Smith (503-808-4783). Submitted On: 06-Oct-10

1-0	Evaluation **Concurred** This information has been added. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3558116	Cost Engineering	Reconnaissance Report	Cost Appendix	n/a	n/a

Delete the 22 account from the TPCS and summary sheet. The percentages used in the 30 account for Planning, Engineering, and Design were intended to capture the cost of a DDR.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 08-Oct-10

1-0	Evaluation **Concurred** The 22 account costs have been removed from the estimates. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3558122	Cost Engineering	Reconnaissance Report	Cost Appendix	n/a	n/a

TPCS: Update the percentages for in house government labor in the 30 and 31 account per the attached TPCS.

(Attachment: TPCS_for_D-S_Passage_NWW.pdf)

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 08-Oct-10

1-0	Evaluation **Concurred** The 30 and 31 account percentages have been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3558123	Cost Engineering	Reconnaissance Report	Cost Appendix	n/a	n/a

Contingency should be based on risk. For the Cougar study I used the attached risk matrix to develop a weighted average contingency for each alternative. At the DDR stage a formal Cost and Schedule Risk Analysis will be required.

(Attachment: 7_-_Contingency_Development_less_than_CSRA_$_Threshold_-_2010_08_10.xlsx)

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 08-Oct-10

1-0	Evaluation **Concurred** A placeholder contingency of 50 percent has been included for all alternatives until sufficient design detail is available to weigh cost risks and uncertainties between alternatives. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3558126	Cost Engineering	Reconnaissance Report	Cost Appendix	n/a	n/a

Lands and Damages: The estimate is currently using $7,500/acre to acquire land for all alternatives. We need to consult the Portland Districts Real Estate office for more accurate (from the Corps perspective) unit prices. The federal government has a lengthy process to acquire real estate and on the Minto team we spent more than $50k on in house labor to purchase 5 acres of listed property from a willing seller.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 08-Oct-10

1-0	Evaluation **Concurred** The Lands and Damages costs have been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3558128	Cost Engineering	Reconnaissance Report	Cost Appendix	n/a	n/a

Add net maintenance and net replacement O&M costs to the alternatives that include exclusion nets.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 08-Oct-10

1-0	Evaluation **Concurred** Exclusion net replacement costs have been added. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3558131	Cost Engineering	Reconnaissance Report	Cost Appendix	n/a	n/a

Include annual monitoring and evaluation costs of $300k for each alternative. This will not change the order-of-magnitude for comparative purposes but it will show a more realistic annual O&M cost to prepare upper management for future budgeting.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 08-Oct-10

1-0	Evaluation **Concurred** An allowance of $300K for monitoring and evaluation has been added to each alternative. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3558132	Cost Engineering	Reconnaissance Report	Cost Appendix	n/a	n/a

On the Cougar study the team decided to present construction costs with a high and low range. I think this would be helpful for LOP as well.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 08-Oct-10

1-0	Evaluation **Concurred** A cost range has been added to the project cost summary sheet. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559441	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Synopsis p. i)
Coordinating Discipline(s): Design Team Leader

The synopsis may be more helpful for USACE management if it contained a list or brief description of our key design considerations/challenges at LOP HOR, alternatives developed to date (even a list), and brief recommendations and conclusions.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred**

	The synopsis has been updated with this information. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559442	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Abbrev and Acronyms)
Coordinating Discipline(s): Design Team Leader

List of Abbreviations and Acronyms still does not appear to be specific to this report. I could be wrong.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** The abbreviations and acronyms list has been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559444	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 2.2.3, last para.)
Coordinating Discipline(s): Design Team Leader

The last sentence describing the 1 and 99 percent exceedance values may be clearer with a wording change to describe the 1% exceedance rate of reservoir rise and 2% rate of reservoir drop.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** The wording has been changed to clarify this statement as suggested. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559446	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.3, last para.)
Coordinating Discipline(s): Design Team Leader

Design pool ranges are discussed, but we may want to make note that some provision will need to be made in design in case the reservoir elevation goes above or below the min/max design el. (detach moorings, allow for extra movements, etc.)

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** The text has been modified to acknowledge the need for the design of mooring systems and nets to cover the maximum possible range of elevations. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559447	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.3 FSC Design Flow)
Coordinating Discipline(s): Design Team Leader

2nd para, CFD is mentioned before definition in next paragraph.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** The abbreviation of CFD is now placed at the correct location. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559448	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.3 FSC Design Flow)
Coordinating Discipline(s): Design Team Leader

Table 4-2 reference in third para is not correct. Check all table call outs...Section 5.5 has some that look incorrect as well.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** This issue has been corrected. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559449	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.7)
Coordinating Discipline(s): Design Team Leader

Is there a sound level threshold associated with the 0.25 mi circle around the noise source?

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** It is understood that the State of Oregon has restrictions related to selected timber operation activities, not specific sound level thresholds. This information has been added to the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559451	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1 Adaptive Management Approach)
Coordinating Discipline(s): Design Team Leader

1. Consider moving the Adaptive Management Approach description to follow the basic description of the FSC alternatives. If not, it seems like it could be shortened to describe the recommended adaptive management approach with supporting information and advantages and disadvantages. As written, the description seems to jump back and

forth between positives and negatives. 2. The mention at the top of page 4-15 of the FCP for the FSC without nets seems premature, since FCP has not been discussed yet in the report.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** The report has been modified to match the suggested change. The phased implementation description can now be found in Section 5.2.3 after the description of the FSC components. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559453	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1 Net Transition Structure)
Coordinating Discipline(s): Design Team Leader

The first sentence of para 2 and 3 of this section seem to contradict eachother as written. "The NTS extends the reach of the entrance signature..." "... entrance signature from the NTS will not extend very far from the structure..." The first sentence may mislead readers into thinking the NTS will significantly extend a higher velocity zone of influence upstream.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** The referenced sentences have been re-worded to remove the contradiction and clarify the role of the NTS (now located in Section 5.2.2). Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559454	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1 Exclusion Nets)
Coordinating Discipline(s): Design Team Leader

In the description of the exclusion nets, it is not clear whether the alternative suggested is to implement with no net, then a partial depth net, then a full-depth net or first with no net, then a full-depth net. It seems we should be considering partial depth nets along with design for full-depth nets, especially with the site limitations we have for full-depth nets. If this is what the alt is proposing, consider making the adaptive management portion of the alternative more clear.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** This section has been updated and clarified. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559456	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.3 5. Bypass and Fish Transfer Facility)
Coordinating Discipline(s): Design Team Leader

A 42-in bypass pipe with 30 cfs seems like a lot of flow for the bypass. This also seems like more bypass flow than other facilities I can think of offhand... if there is a reason such a high flow is recommended can you include it? If it is a placeholder for further design, that's fine, too.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** The 30 cfs bypass flow is an initial estimate and is comparable to other downstream collector projects of similar size. Both primary and secondary dewatering screens are assumed. The selected design flowrate will be somewhat dependent on the extent of sorting/handling required. It is anticipated that the size of the bypass pipe and the flow requirement will be evaluated further during preparation of the DDR. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559458	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.7 Alts Eliminated at 10 Percent)
Coordinating Discipline(s): Design Team Leader

1. Suggest referring to an appendix containing the initial list of alternatives. 2. The appendix could also contain the alternatives described in the 30% report that were not prioritized to the 60% analysis, along with the screening matrix and ranking info from the checkpoint meeting.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** Appendix F has been updated to include the descriptions, evaluations, matrices and plates associated with the de-prioritized alternatives. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559460	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 5.1 General)
Coordinating Discipline(s): Design Team Leader

Last bullet: "A preferred alternative will be selected for implementation..." Recommend removing "for implementation"

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** Completed. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559467	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 5.2 Evaluation Criteria)
Coordinating Discipline(s): Design Team Leader

If the alternative descriptions and evaluation information for the earlier phases are moved to an appendix per previous comment, I would suggest referring to the appendix in Section 5 and keeping only the evaluation for the current phase of alternatives in the Section 5 text.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** Agreed, this has been change has been made. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559468	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 5.5.1.3.5 Conclusion)
Coordinating Discipline(s): Design Team Leader

Having a "Conclusion" section in the middle of another section is confusing. Perhaps this information should just be moved to Section 7.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** As noted previously, this discussion has been moved to Appendix F. This paragraph was a conclusion of the biological evaluation only; however, organization of the section has been updated to reduce confusion. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559469	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 5.5.4)
Coordinating Discipline(s): Design Team Leader

1. Typo in "The FSC with a net alternative was..." should be "The FSC without a net..." 2. Suggest inserting "high capital and O&M costs relative to the FCP." for the Black Canyon alternative sentence.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** This has been corrected. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559470	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 7)
Coordinating Discipline(s): Design Team Leader

Supplemental Topographic Survey - ? Missing a description.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 10-Oct-10

1-0	Evaluation **Concurred** A description has now been added. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3559476	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 7)
Coordinating Discipline(s): Design Team Leader

Section 7 and the alternatives descriptions do not appear to directly address the secondary issue of prototyping. There is some discussion of phased approaches to permanent facilities, but we will need basic information on whether any of the production level facilities will benefit in design, location, or biological effectiveness by prototype testing or not. If proven technology is being recommended, stating so is good information.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 11-Oct-10

1-0	Evaluation **Concurred** A section has been added to specifically discuss prototyping for each of the remaining alternatives. See Sections 5.2.3 and 5.3.5. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3590476	Bioenvironmental	Other	n/a'	n/a	n/a

On page 1-2 the report states that "approximately 12 named creeks do dishcarge in the reservoir." Approximately how much spawning occurs in these creeks?

Submitted By: Daniel Spear (503-230-3124). Submitted On: 29-Oct-10

1-0	Evaluation **Concurred** There is currently no spawning in these streams. This is now stated in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3590487	Bioenvironmental	Other	2.3.2	n/a	n/a

This section notes that most fish outmigrating at a time that they would be collected are "generally less that 40 mm in length." Given the best available information, and lessons learned from other similar efforts is it, generally, beneficial to transport salmonids that are this small?

Submitted By: Daniel Spear (503-230-3124). Submitted On: 29-Oct-10

Revised 18-Nov-10.

1-0	Evaluation **Concurred** No significant data currently exists related to the collection and transport of fry. It is anticipated that RM&E studies would be carried out prior to preliminary design to evaluate this issue. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3590563	Bioenvironmental	Other	3.3.2.4	n/a	n/a

This section describes two possibilities for discharging smolts. One option is a direct release below the dam; the second is a 24 hour holding and then a release. The section also descibes a spread the risk strategy in which some fish may be held at the Dexter hatchery ponds while others are directly released. Finally, this section says that this decision will be a "management decision of the resource agencies." While the resource agencies will certainly provide important input, a final decision on the holding and release strategy should be based on an estimation of the potetnial biological gains of a given approach and its cost and be agreed to be all participants.

Submitted By: Daniel Spear (503-230-3124). Submitted On: 29-Oct-10

1-0	Evaluation **Concurred** Agreed. The agencies responsible for managing the resource will need to determine the best approach for handling and holding juveniles. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3590575	Bioenvironmental	Other	4.3.3	n/a	n/a

The collection efficiency for the Merwin traps is based on old data. Have the traps improved in design or use since the 1970s?

Submitted By: Daniel Spear (503-230-3124). Submitted On: 29-Oct-10

1-0	Evaluation **Concurred** The material used for the Merwin traps has improved, making the trap more durable; however the basic design has not changed. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3590637	General	Other	Overall	n/a	n/a

[**This item is flagged as a critical issue.**]

Ch2MHILL, AECOM and BioAnalysts have done a remarkable job demonstrating the sort of structures it would take to collect most or all of the fry at either the head of the reservoir or in the Middle Fork Willamette river above the influence of the reservoir. All of the "in-tributary" solutions face substantial difficulties based on building what is essentially a small dam to collect fish in what is a free flowing stretch of river and are very expensive. The in-reservoir alternatives are based on extant technology; however, they would necessitate a novel technology to accomodate reservoir fluctuations and to transport collected fish from the FSC to the shoreline or dam. The null hypothesis behind exploring head of reservoir collection is that any fish collected and transported around the dam will benefit from not having to contend with the preators (many of which are exotic) in the reservoir and difficult passage at LOP. It is unknown, however, if it is beneficially beneficial to transport fry, regardless of the negative interactions they will avoid via transport. Given this unknown and the high cost of all of the options, it may be more worthwhile to consider an alternative approach. For instance, screw traps or a Merwin trap could be used to capture fry. The fry could then be release beneath LOP and tracked to see if they survive to the confluence with the mainstem Willamette, and then the confluence with the Columbia. If fry survive to this point the question of whether or not transport is good for them will be answered to some degree. This initial collection and transport effort should not be all that is examined to help fish in LOP. The COE and the region could examine alternative reservoir operations through the COP process. Additional study could be done on in-reservoir predation to ascertain how deleterious it is and to provide a rationale for possibly changing management strategies. Even if there is not sufficient interest in changing management strategies for exotic fish species, understanding the preation effects that they have on endagered salmon would still be worthwhile information for decision makers. Given the uncertainty in the biological effectiveness for the alternatives identified in the 60% report, the associated technological challenges (especailly for the FSC options), and their high cost (including O&M) performing a simpler operation that helps examine uncertainties about reservoir effects and the benefits of transport while examining a larger range of options to aid endagered fish at LOP may be the best path forward.

Submitted By: Daniel Spear (503-230-3124). Submitted On: 29-Oct-10

1-0	Evaluation **Concurred** Agreed. It is anticipated that a robust RM&E program would be undertaken prior to further evaluation and preliminary design of a head-of-reservoir alternative. The results of the studies would be used to quantify current unknowns, including the ability to collect and transport fry, the effect of reservoir conditions on juveniles (benefit or detriment), and the ability to achieve to-be-determined biological performance goals. The studies would also likely influence the decision as whether or not to pursue an at-dam alternative. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

6. 60 Percent AR Dr. Checks ATR Comments and Responses

This page was intentionally left blank.

Comment Report: All Comments
Project: Lookout Point Alternatives Report
Review: ATR
Displaying 80 comments for the criteria specified in this report.

1360 ms to run this page

Id	Discipline	DocType	Spec	Sheet	Detail
3598570	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

1. This is a review of costs for the project at the 60% development of an Alternative Report. For perspective of the cost review it will from the guidelines of the development of an alternative formulation and selection level product (AFB). The final use of the report as stated is do support a go/no-go decision regarding the feasibility of a prototype downstream passage facility at Lookout Point Dam.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0 Evaluation **Concurred**
Noted and agreed.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3598571	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

2. The Document provided for review is the Lookout Point Head of Reservoir Collection Alternatives Study. The study is presented in 3 separate files LOP-60_Percent_AR.pdf, LOP-60_Percent_AR_Appendcies.pdf, and LOP-60_Percent_AR_Plates.pdf. Within the Cost appendix there are estimates for 2 alternatives each for In-Reservoir and In-Tributary Off channel collection options. Review of the report and screening process utilized to narrow potential alternatives appears to follow a reasonable approach.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

Revised 04-Nov-10.

1-0 Evaluation **Concurred**
Noted.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3598573	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

(Document Reference: TPCS in Cost Appendix)

3. TPCS –All alternatives- usually the TPCS is presented in thousands of dollars vice dollars. The headers at the top of the column indicate $k

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0 Evaluation **Concurred**
The TPCS spreadsheets have been updated accordingly.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

3598576	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

4. Estimates are based on high level scope and generally based on L.S amounts based on recent similar projects. A high level summary of scope is presented in the alternative estimates. The level of development of cost for comparison of alternatives appears adequate; however, the overall scope and cost data presented is not in sufficient detail or quality to support any validation of actual construction cost.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0	Evaluation **Concurred** Agreed. These are order-of-magnitude cost estimates for comparative purposes only. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3598578	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

5. Recommend that prior to the finalization of the alternatives report; the estimates should be developed based on the actual engineering developed to finalize each alternative analysis vice the L.S. amounts currently presented. Additionally, some analysis and documentation on the incomplete items of scope should be performed for investigation during the development of the selected alternatives feasibility report. REFRENCE: For the final AFB from the Planning Guidance Notebook Appendix G Amendment #1 Exhibit G-5, Items to be addressed in Alternative Formulation Briefing Documentation: "8. Status of engineering activities. In general, sufficient engineering analysis should be complete to have a reasonably certain estimate of project scope, benefits, and costs. Identify any incomplete items of work that could have a significant effect on project scope, benefits, or costs and an assessment of the likely effect."

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0	Evaluation **Concurred** Cost estimates are based on the best information available at this point in the study. It is anticipated that additional cost estimate detail will be provided once an alternative has been selected for further evaluation and the project moves into the preliminary design stage. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3598579	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

6. The follow on product for feasibility or a funding decision document will require estimates in M2 developed to to an adequate level to determine if construction costs are valid.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

Revised 04-Nov-10.

1-0	Evaluation **Concurred** Noted. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3598580	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

7. Estimates-Upper Reservoir Floating Surface Collector- All 3 alternative estimates- Estimates are based primarily on recent construction costs from Puget Sound Electric's Upper Baker Dam. This does lend an order of magnitude level of confidence regarding the feature construction cost.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0	Evaluation **Concurred** Noted and agreed. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3598581	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

8. Alternative Estimates-Upper Reservoir Floating Surface Collector- All 3 alternative estimates-The notes do not indicate how the costs from Upper Baker's construction costs were distributed within the presented prices of the proposed alternative. Recommend when using escalated data to include in the notes; the price level of the original price, original price of item, and escalation factor used to determine the current estimated price.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0	Evaluation **Concurred** Additional information has been provided here. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3598582	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

9. Estimates Upper Reservoir Floating Surface Collector- All 3 alternative estimates. For costs for items such as nets- where a reasonable estimate of square footage exists recommend that costs are presented in SF vice lump sum. Netting costs may vary significantly, it is unclear what the makeup of net is i.e. spectra vs. knotless nylon, vs. monofilament. This could affect the net cost by a factor of 3 or more.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0	Evaluation **Concurred** Additional information has been provided here. It is anticipated that additional design and prototype testing will be required to determine the general arrangement and material for the nets. As such an allowance is currently provided Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3598583	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

10. O&M Estimates-Upper Reservoir Floating Surface Collector- All 3 alternative estimates. Should periodic net replacement costs be considered in the O&M estimate over the economic evaluation period in addition to the .5% allowance?

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0	Evaluation **Concurred** Exclusion net replacement costs have been added to the annual O&M calculation. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3598584	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

11. Estimates Upper Reservoir Floating Surface Collector- All 3 alternative estimates. Since the PUD is not a federal agency and not required to pay Davis Bacon wages, was any analysis done based on the actual wage rates paid by the PUD vs. current Davis Bacon Wage for the proposed construction area that may require an adjustment to the "unit price" ? The concern is that the labor for a federal project may cost significantly more. If applicable this may understate the costs for this alternative.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0 Evaluation **Concurred**
No adjustment has been made to the costs to account for Davis-Bacon wages. This has been noted on the cost summaries as well as in the report text. It is anticipated that this approach will not impact the order of magnitude of the costs nor the comparisons between alternatives. Davis-Bacon wages should be considered upon selection of a preferred alternative and during preliminary design.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

3598586	Cost Engineering	Cost Estimate	n/a'	n/a	n/a

12. Estimates Upper Reservoir Floating Surface Collector- 1000CFS estimate. Line Item 0002 expansion to 1000cfs. The notes indicate a range of 2-3 million escalated from 2007 however the estimate price is 7.9 million. From the development of the other alternatives presented this appears to be an error in the notes.

Submitted By: Michael Jacobs (509-527-7516). Submitted On: 04-Nov-10

1-0 Evaluation **Concurred**
This has been corrected. Escalation is included.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

3606570	Structural	Technical Report	n/a'	n/a	n/a

Page 3-10 Structural Criteria. Should we include the applicable EM's. Such as 1110-2-2100, 1110-2-2000, 1110-2-6050 or 6051 or 6053 (whichever is applicable). 1110-2-2104 and 1110-2-2105 are also relevant. At lease should check these EM's against IBC 2006 make sure all the ACE requirements are covered. Please refer to Section 3.6 on pages 52 to 55 of "Cougar DS AR 60% Report" for a complete "Structural Criteria and Considerations".

Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10

Revised 12-Nov-10.

1-0 Evaluation **Concurred**
It is anticipated that applicable EMs will be identified once a preferred alternative has been selected and the preliminary design commences.

Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

Backcheck not conducted

Current Comment Status: **Comment Open**

3606590	Structural	Technical Report	n/a'	n/a	n/a

Organiztion Each of the Alternatives (from 10% to the end) should be identified with a either numerical or alpha id's. This report is very hard to follow by location description alone. All Attachments should include Alternative id's. Tables 5-

1, 5-2, 5-5 and 5-6 show numerical id assignments for each of the alternatives as suggested with this comment. Why not carry the scheme throughout this report? Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10 Revised 10-Nov-10.					
1-0	Evaluation **Concurred** The de-prioritized alternatives have been moved to Appendix F to provide additional clarity regarding the remaining alternatives in the body of the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10				
	Backcheck not conducted				
	Current Comment Status: **Comment Open**				
3606634	Structural	Technical Report	n/a'	n/a	n/a
Plate 1, Vicinity Map - North Please id all pertinent features such as the Dexter dam and Lookout Point Dam. Make sure Alternatives id is consistent. Due to unfamiliarity and varied plate scales they are very hard to follow without these notations. Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10					
1-0	Evaluation **Concurred** A north arrow and pertinent features have been added. Plates 1 and 2 now present all site locations considered. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10				
	Backcheck not conducted				
	Current Comment Status: **Comment Open**				
3607361	Structural	Technical Report	n/a'	n/a	n/a
Page 5-6, 5.3.3 e) Score 4 is not included and all the chosen alternatives has a score of 4 for Real Estate/Access/Utilities category. Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10					
1-0	Evaluation **Concurred** This Section has been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10				
	Backcheck not conducted				
	Current Comment Status: **Comment Open**				
3607402	Structural	Technical Report	n/a'	n/a	n/a
Page 5-9 & 10; 5-15& 16; 5-22 &23 How does the ranking work? Heightest score take first place (1) and then? Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10					
1-0	Evaluation **Concurred** This has been clarified. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10				
	Backcheck not conducted				

	Current Comment Status: **Comment Open**

3607405	Structural	Technical Report	n/a'	n/a	n/a

Page 6-1 Section 6 to be completed?

Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10

1-0	Evaluation **Concurred** This Section has been completed for the 90 Percent AR. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3607430	Structural	Technical Report	n/a'	n/a	n/a

Page 7-1 1. Need to be completed? 2. Will any of the results of the recommended studies influence the evaluation of the alternatives and render the alternative choice at 60% invalid?

Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10

Revised 10-Nov-10.

1-0	Evaluation **Concurred** This Section has been completed for the 90 Percent AR. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3607473	Structural	Technical Report	n/a'	n/a	n/a

Page 4-12 Table 4-1 Basically there are 7 alternative categories based on locations and sub-alternative based on collection technologies. May be report complexity could be further reduced by assign alpha id to categories and numerical id to sub-alternatives, such as A1, B4, and so on.

Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10

1-0	Evaluation **Concurred** The alternatives are numbered. The numbers were added to Table 4-1. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3607541	Structural	Technical Report	n/a'	n/a	n/a

Page 4-29 Table 4-6 Two out of the three alternatives picked at 60% are FSC with nets. Based on info on Page 5-6, nets are bad for design and construction cost, O&M and recreation. Does this result make sense? Table 5-4 All three finalists have low efficiency for fish collector spite of the importance of this issue by doubling the score.

Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10

Revised 10-Nov-10.

1-0	Evaluation **Concurred**

	The advantage of the in-reservoir alternatives is that they avoid the environmental and most of the recreational issues associated with the in-tributary alternatives. It is anticipated that exclusion net systems could be optimized during prototype testing. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3607626	Structural	Technical Report	n/a'	n/a	n/a

Please check tables 5-3, 5-4, 5-7 and 5-8 to make sure the alternatives are corolated to table 5-5.

Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10

1-0	Evaluation **Concurred** These tables have been updated in the 90 Percent AR. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3607636	Structural	Technical Report	n/a'	n/a	n/a

Page 5-19 Paragraph 5.5.1.3.5 Base on this conclusion, it reflects also our concerns expressed in our comment #3607541. These issues should be addressed and weighted differently for arriving the prefered alternative at the 90% stage.

Submitted By: David Wong (206-764-4463). Submitted On: 10-Nov-10

Revised 10-Nov-10.

1-0	Evaluation **Concurred** Noted. A management decision regarding facility production goals and disposition of resident fish species is required prior to selecting a preferred alternative for further evaluation. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609686	Mechanical	Technical Report	n/a'	n/a	n/a

(Document Reference: Page ix)

Description of outlet works: presumably this is separate from the spillway, is it also separate from the penstocks that feed the turbines? What is the discharge capacity of the outlet works? Also, what is a Walker valve? This is not a valve name I have heard before.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** Evaluation of an at-dam facility is beyond the scope of this work and will likely follow this evaluation of head-of-reservoir alternatives. This has been clarified in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609719	General	Technical Report	n/a'	n/a	n/a

(Document Reference: abbreviations and acronyms)

Recommend reducing the list of abbreviations and acronyms to only those which are actually used in the report. I checked four (TM, UL, UPC, UPS) and the only hits were in the abbreviation list itself.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** This has been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609730	Civil	Plans	n/a'	General	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

General comment on the plates, it would probably be good to state NGVD 1929, I assume Google and other topo images are NGVD29 or NAVD88?

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** This has been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609731	Civil	Plans	n/a'	General	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

Missing index of plates

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** Plate indexes are located in the table of contents and also immediately preceding the plates themselves. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609732	Civil	Plans	n/a'	Plate 8	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

Should this follow plate 2?

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** This has been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609733	Civil	Plans	n/a'	Plate 1	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

Where is lookout Point Dam? What is NHS?

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** This plate has been updated accordingly. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609734	Civil	Plans	n/a'	Plate 7	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

No Scale

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** Map scales have been added where missing. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609735	Civil	Plans	n/a'	Plate 8	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

Should FSC be spelled out or in legend?

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** The definition of FSC appears in the list of abbreviations and acronyms. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609736	Civil	Plans	n/a'	Plate 8	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

North direction, check scale

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** The North arrow was added. The scale is correct. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609737	Civil	Plans	n/a'	Plate 9	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

No Scale

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** A not-to-scale (NTS) note was added below "Upstream Elevation of Lookout Point Dam". Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609740	Civil	Plans	n/a'	Plate 10	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

No Scale

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** A scale has been added to the plate. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
2-0	Evaluation **Concurred** A scale has been added to the plate. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609744	Civil	Plans	n/a'	Plate 13	n/a

(Document Reference: 60% Plate Set)
Coordinating Discipline(s): Design Team Leader

Difficult to see topo relief at the facitly, it appears elevations on both sides (EW) of the proposed facility is about 984'

MSL NGVD29 NAVD88

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

Revised 15-Nov-10.

1-0	Evaluation **Concurred** Available contour information is very limited and in many cases based on USGS quad maps with 40 foot contours. Survey information required for preliminary design has been identified in Section 7. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609751	Civil	Plans	n/a'	Plate E-4	n/a

(Document Reference: Appendix E)
Coordinating Discipline(s): Design Team Leader

Appendix E Available photography E-4, add and contact for photo numbers, or include photos in appendix?

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** This information is available from the Portland District and it is anticipated that photos would be consulted if required for preliminar design. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609760	Other	Planning Report	n/a'	n/a	n/a

(Document Reference: All documents)
Coordinating Discipline(s): Design Team Leader

Generally the documents would be easier to review if they were formatted with bookmarks and the landscape pages were rotated.

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** These changes have been made to the electronic version of the 90 Percent AR. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609762	Other	Planning Report	n/a'	n/a	n/a

(Document Reference: Main Document and Plates)
Coordinating Discipline(s): Design Team Leader

The locations of the sites are difficult to understand

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** Additional references were added to Section 4.2 Site Locations, and Plates 1 and 2 have been updated. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609765	Biology-Ecology	Planning Report	n/a'	n/a	n/a

(Document Reference: Main Document)
Coordinating Discipline(s): Design Team Leader

Looks like the facility is patterned after Puget Powers Baker facilty. Was the 50' inlet depth refined? My understanding is the 50' depth was somewhat arbitrarily set and seems to work. Would a 25' depth suffice?

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** Data from a from a comparable facility with a draft of 25 feet is not available. Data related to the vertical distribution of fish in the reservoir, plus the lateral distribution in the thalweg versus shallows would help inform development of this design parameter. It is anticipated that this information will be obtained as part of the RM&E program. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609768	Biology-Ecology	Planning Report	n/a'	n/a	n/a

(Document Reference: Main Document)
Coordinating Discipline(s): Design Team Leader

Page 4-16 reference to 500 and 1000 cfs and plan dimensions, note recent visit to the baker facility indicated 75x 75 x 50 deep and utilizing 1000 cfs with good/acceptable results, may not need the additional volume. They however have full depth nets (I think)...

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

Revised 15-Nov-10.

1-0	Evaluation **Concurred** The Baker facility was designed with provisions to expand the initial screening area to meet NMFS screening criteria if long-term operation at the higher flow rate was required. NMFS is only allowing this operation with screen approach velocities exceeding their criterion as an experimental facility. It is anticipated that NMFS would not agree to a new facility design without similar accommodations. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609772	Civil	Planning Report	n/a'	n/a	n/a

(Document Reference: Appendix F)
Coordinating Discipline(s): Design Team Leader

Suggest recompiling appendix F to include current plates or provide as background superceeded as separate document.

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** Appendix F now presents background information from the 10, 30 and 60 percent evaluations, as well as previous plates that have been superseded by the current plates. The current plates are located at the back of the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609775	Civil	Planning Report	n/a'	n/a	n/a

(Document Reference: Appendix F)
Coordinating Discipline(s): Design Team Leader

Page 4-2 Reference to plate 1 Black canyon campground not found on plate 1.... Shown on plate

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** This has been corrected. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609776	Civil	Planning Report	n/a'	n/a	n/a

(Document Reference: Appendix F)
Coordinating Discipline(s): Design Team Leader

Page 4-3 reference to plat 2 lower middle fork (island not found)

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** Due to the scale of Plate 2, it is hard to see that the island is under the red dot. However, the notes says to refer to Plates 15 and 16, where the scale is larger and the island clearly visible. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609783	Biology-Ecology	Planning Report	n/a'	n/a	n/a

(Document Reference: Main Body)
Coordinating Discipline(s): Design Team Leader

I could not find where the at-Dam Facility was discussed or dismissed. Possibly in was in the para about NMFS, is so consider moving up to prominent assumption. Actually found it in Para 1.1.1 but again in para 4.9. Since the at-dam is discussed along with nets in para 4.9. A short discussion of the at-dam requirements my be useful.

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

Revised 15-Nov-10.

1-0	Evaluation **Concurred** Evaluation of the at-dam facility is beyond the scope of this work and will likely follow this evaluation of head-of-reservoir alternatives. This has been clarified in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3609786	Design Team Leader	Planning Report	n/a'	n/a	n/a

(Document Reference: Main Body)
Coordinating Discipline(s): Design Team Leader

Numerous references to checkpoint meetings, may want to explain what these milestones are. I think I found them and a schedule in the team minues apnedices. Which seem to have good information whcih I assume made it into the body of the report.

Submitted By: Glenn Kato (206-764-3459). Submitted On: 12-Nov-10

1-0	Evaluation **Concurred** These meetings have been identified. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610524	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Synopsis, page i)

Paragraph 5: It is not likely that a prototype facility of the complexity described in this report could be built by 2014. Such a near term deadline might cause undue pressure to rush into a conceptual design too quickly. Spending more time up front with a full team of engineers, biologists, and cost experts evaluating more diverse alternatives will pay dividends down the road to make sure that the most effective and economical alternative for this specific location is chosen to move forward. It is unclear how many other types of fish passage alternatives were evaluated prior to the several types that were discussed in this report, but there are other types of facilities which could work here.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Agreed. Additional information has been provided here, including a process and timeline for RM&E studies, further evaluation, prototyping and design of a full-production facility. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610525	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Paragraph 1.1.1)

Please explain why near or at-dam collection/passage facilities have been intentionally excluded from this study. It would help to understand why only two types of fish facilities were considered. Without that background, it seems like potential set up for having to revisit other alternatives in future studies.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Evaluation of the at-dam facility is beyond the scope of this work and will likely follow this evaluation of head-of-reservoir alternatives. This has been clarified in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610526	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Paragraph 1.2.2)

It says that USACE tested a floating collector upstream of the dam in 1957 and 1958 but that it had poor performance. Please describe this in more detail and explain the reasoning for the poor performance, and how the head of reservoir collector should be expected to perform better.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

Revised 15-Nov-10.

1-0	Evaluation **Concurred** Information on the historical collector is limited, but it is anticipated that it would be investigated further if/when the at-dam alternatives are considered. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610527	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Paragraph 1.2.2)

What is the survival rate of juvenile salmon downstream passage via the spillway and turbines?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** This spillway and turbine passage survival rate at Lookout Point is unknown but studies are currently underway to quantify this information. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610528	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Paragraph 1.2.3)

Paragraph states that an authorized purpose of the dam includes navigation. Is this accurate?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** This is correct per the Portland District. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610529	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Paragraph 2.3.2)

The graphs of juvenile fish sizes are somewhat confusing and it is not clear if Figure 2-2 and Figure 2-3 are for the same fish species, but the design of the fish facility seems to require design for fry regardless since fry-sized fish will be present in some numbers at all.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Both figures refer to Chinook fry. The figures have been updated to clarify this point. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610530	Operations	Technical Report	n/a'	n/a	n/a

(Document Reference: Paragraph 2.4)

Lookout Point Project Operations: The last paragraph describes the three different types of outflow devices (turbines, regulating outlets, spillway gates) but does not describe how they are typically operated. It would help to know which outflow devices are used and in what flow ratios throughout the year. Are the spillway gates ever used?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The spillway gates are rarely used. Additional information regarding historical outflows has been developed. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610531	Biology-Ecology	Technical Report	n/a'	n/a	n/a

(Document Reference: Table 3-1)

Table 3-1 Peak migration period: Table says January through September, which isn't consistent with Figure 2-1 which shows almost no migration after the month of June. Same thing for Section 3.2.2.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The table has been updated to say Design Migration Period. The same change has been made to section 3.2.2 Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610532	Operations	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.3)

Section 3.2.3 In-Reservoir Collectors: 2nd paragraph says that the reservoir does go below 825 and above 926. How much lower/higher than these design elevations does the reservoir fluctuate?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Text has been added to identify the full range of pool elevations. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610533	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.3)

Section 3.2.3 FSC Design Flow: recommend that if further study of a FSC is pursued for Lookout Point Dam, that the selection of the FSC flow rate be evaluated for site specific conditions. Additionally, simply attempting to match a "hydraulic signature" for the Baker FSC wouldn't necessarily be recommended because the Baker project has different fish species as well as its own history of why the facility was sized the way that it was, which does not necessarily translate elsewhere. If a FSC with exclusion nets is pursued further, it is recommended to minimize the design flow rate to provide a more economical facility that takes advantage of the fact that all inflows (and downstream moving fish) pass through the structure.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Agreed. The FSC flow rate will be further evaluated during detailed design if this alternative is selected. Additional text has been provided to clarify. The identified CFD and fish movement studies would be used to help identify the optimal flow rate. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610534	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.3.2.1)

Section 3.3.2.1 Fish Sorting: how will fish counting be done to determine when fish densities are too high, etc.?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The proposed facility does not currently provide means to determine the number of fish entering the collector. The potential need for such a system has been added to the text on page 3-6. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610535	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.3.2.2)

Section 3.3.2.2 Fish Holding: What is the source of the requirement to hold 10% of the total year's run in any given day? Related to this question, why is it a problem to assume that transport of fish could take place more frequently than once per day?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The 10 percent value is simply a rule of thumb value used in design based on experience gained from other projects. For efficiency sake, and to reduce cost, fish transport was assumed to be one trip per day. Multiple trips could be completed in a day if required. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610536	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Table 3-3)

Table 3-3: How are the fish collection estimates obtained?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** See Section 2. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610537	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Table 3-3)

Table 3-3: It doesn't make sense that the in-tributary collectors in the table would collect so many more fish than the upper reservoir collectors, which are located downstream.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** See Section 2 for a discussion as to the how and why this occurs. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610538	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Table 3-4)

Table 3-4: what does fpp in the size column mean? What does the right hand column signify?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Fish per pound (fpp). The column to the far right shows how much the water surface in the truck will rise as fish are added to the tank. This tells the operator how high to fill the tank prior to loading. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted

	Current Comment Status: **Comment Open**				
3610539	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Table 3-4 and 3-5)

It would have been helpful to instead show a table that identified how many fish fit in one tank and how many transport trips are required to keep up with the fish run.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Comment noted. However the number of trips required per day will depend on daily fish counts, fish size, allowable holding times etc. This analysis assumes that only a single truck trip is needed daily. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610540	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.2)

Site Locations. It would be helpful if a single map was provided at the beginning that showed all of the locations of the alternatives in one place.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** All of the site locations considered are now shown on Plates 1 and 2. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610541	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1: FSC alternatives should not be assigned flow rates at this level of study. There is no basis for selecting a 500 cfs or 1000 cfs alternative without further study, so why have these two flow rates as separate alternatives? To an outside observer, they are one and the same. If an FSC is evaluated further, then the design should come up with the minimum acceptable flow rate for the project based on the site specific conditions.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The facility flow rates dictate the overall size and cost of the FSC facilities, including screening and pumping systems. Lacking specific information at Lookout Point, the PSE Upper Baker facility was used as a proxy to estimate the size and order-of-magnitude cost of an FSC facility. If the FSC alternative is selected for further evaluation and preliminary design, site-specific design information would be developed. Relevant future studies are identified in Section 7. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610542	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1: FSC alternatives with no nets of any kind do not have any way of capturing fish that do not swim directly into the path of the FSC, so there is not much justification in designing an FSC without nets.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Agreed. The no net alternative was removed from further consideration. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610543	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1 difficulty of FSC design: it is understood that the FSC will be floating and move with the reservoir approximately 100 feet up and down. However, why is it stated that the FSC must maintain the same horizontal location? With nets it seems that there is some play possible in the near shore to near shore direction, and depending on the siting, there may be a lot of movement allowable in the upstream-downstream direction. Also, why does it say that the design if further complicated by not being located near the dam? And finally, why isn't a location near the dam being considered?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The slack produced in mooring lines from the 101 ft elevation change would result in the FSC being at the mercy of the wind and currents when the reservoir elevation was lower than the maximum conservation pool. This would open the possibility for the FSC to run aground. This amount of movement would also be detrimental to the layout of the nets as the configuration would change depending on the location of the FSC. See response to comment 3610547 for the at-dam location. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610544	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1 Net transition structure: It may not be necessary to duplicate the dimensions of the Baker NTS. A new NTS could be smaller and still be effective as long as nets are used. A FSC with a lower flow rate or different reservoir/river geometry could be justified in having a smaller NTS, which would give the facility more flexibility in siting options.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Even with a smaller NTS, the draft of the facility dictates potential siting locations. Location B (the selected location) represents the furthest upstream location that the FSC can be sited given the current draft (25 ft). The large NTS has been removed from consideration. Decisions related to the need for an NTS and the overall facility dimensions will take place during the preliminary design phase when a CFD model can be utilized to refine these parameters. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10

	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610545	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1 Net transition structure with pivoting section for shallower drafts: instead of designing a complicated hinged NTS with additional machinery, seals, and other complications, why not use an impermeable material (rubber) for the portions of the net closest to the NTS entrance. A flexible material if kept under moderate tension would serve the same purpose as the NTS and would allow for more options with NTS geometry at shallow water levels.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The adjustable NTS has been removed from the FSC Alternative. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610546	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1, page 4-19, second sentence. Wouldn't log booms be required also to protect the FSC itself? Also, there is a lack of information about debris loading in this river. How does it compare to the Baker project, which has very clean water?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** FSC added to sentence in question. There currently is no debris information available for this project location. A debris study is recommended in Section 7. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610547	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1, page 4-19. The resident fish passage issue would not present itself if the FSC was located just upstream of the dam.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The focus of this alternatives study is the head-of-reservoir and as such, at-dam alternatives were not considered. This has been clarified in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610548	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.1)

Section 4.5.1, page 4-19. Boat passage: what kinds of boats will be required to pass through the exclusion net? If there is serious boat traffic, it might make sense to design a boat passage structure hard-built into the side of the reservoir, similar to the solid curtain idea as it pertains to the nets.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Private recreational boats would be the majority of boat traffic on the reservoir. Text has been added that a boat passage option could be included with the solid curtain idea if implemented with the nets. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610549	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.5.2)

Section 4.5.2, page 4-21: Fish transfer with the Merwin Traps seems oversimplified when described as "boats... transfer fish from the Merwin Trap to trucks located at boat ramps..." Is this fish transfer a manual process?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** Yes, it is anticipated that the fish transfer will be a manual process, perhaps assisted with fish pumps. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610550	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.8.1)

Section 4.8.1 Number 4. Having a fish transfer tower located closer to the FSC would prevent potential problems caused by conducting operations at the upstream face of the dam. Also depending on the location this feature could serve other purposes as well, so why was it taken out of consideration?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The tower was removed from consideration due to the significant cost of constructing such a facility. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610551	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 5.3.3)

Section 5.3.3 O&M costs: Recommend checking the latest results at Baker project regarding O&M costs. Net maintenance may be negligible.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** It is anticipated that net maintenance also includes replacement of the nets on a regular schedule, say once every 15 years. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610552	Biology-Ecology	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 5.5.1.3.2)

Section 5.5.1.3.2. States that the further down-reservoir the collector is located the higher the probability that predation will occur. Previously the report stated that reservoir mortality is unknown, yet this paragraph paints a very harsh picture for juvenile salmon in the reservoir. There appears to be bias against siting a facility close to the dam without data to back it up.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** It is correct that there is not conclusive data to support this assumption. However, it seems likely that the longer the fish is in the reservoir the higher the probability predation may occur. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610553	Biology-Ecology	Technical Report	n/a'	n/a	n/a

(Document Reference: Table 5-9)

Table 5-9 Total Project Costs. I checked the breakout of O&M costs in Appendix G and it seems like the staffing costs were broken out too finely. Recommend getting operations mangers input on actual staffing needs and compare to Baker project for the actual number of full time employees required for FSC alternatives.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The O&M costs are an order-of-magnitude estimate and include a 30 percent contingency. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610555	Operations	Technical Report	n/a'	n/a	n/a

It would help to get more information about the operations at the dam. The river flow is given as 6960 cfs at 5% exceedence flows yet the turbine capacity at the dam is 9300 cfs and another 12,088 cfs capacity from other regulating outlets. How are the turbines and regulating outlets (and the spillway) used typically?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The focus of this alternatives study is the head-of-reservoir and as such, at-dam alternatives were

	not considered. This has been clarified in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610556	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Alternative FSC flow source)

Could an FSC be located upstream of the dam and connected to one of the regulating outlets with a flexible pipe so that the FSC could be operated with gravity flow instead of requring pumps?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The focus of this alternatives study is the head-of-reservoir and as such, at-dam alternatives were not considered. This has been clarified in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610560	General	Technical Report	n/a'	n/a	n/a

(Document Reference: Alternative screening structure)

Has a vertical travelling band screen (example: Bracket Green) been considered for screening and collecting fish upstream of the turbine intakes?

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The focus of this alternatives study is the head-of-reservoir and as such, at-dam alternatives were not considered. This has been clarified in the report. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

3610832	Design Team Leader	Planning Report	n/a'	n/a	n/a

(Document Reference: 60% AR text 5.5.4) [**This item is flagged as a critical issue.**]
Coordinating Discipline(s): Design Team Leader

5.5.4 The FSC with a net alternative was not considered further due to the low fish collection potential. The remaining FSC alternatives, alternatives 1 and 2, were considered to be a single alternative with a phased implementation approach should be w/o net?, if so probably want to refer to as alternative 1a

Submitted By: Glenn Kato (206-764-3459). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The typo has been corrected and the suggested text added. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted

	Current Comment Status: **Comment Open**

3610838	Design Team Leader	Planning Report	n/a'	n/a	n/a

(Document Reference: 60% AR text Table 5-9)
Coordinating Discipline(s): Design Team Leader

Noticed the Alternatives do not containg the alternatvie numbers 1 1a. 2, 3, etc. Consider adding alternative numberes throughout documets for consistency and QC tracking of alternatives

Submitted By: Glenn Kato (206-764-3459). Submitted On: 15-Nov-10

1-0	Evaluation **Concurred** The typo has been corrected and the suggested text added. Submitted By: James Kapla (4252333239) Submitted On: 12-Dec-10
	Backcheck not conducted
	Current Comment Status: **Comment Open**

1. Section 1.2.4. Construction Authorization. Should be flood control, hydropower, navigation, irrigation. And fish & wildlife, recreation, water quality, M&I water.
2. Table 2.1 Hydrologic Data. - This appears to be a mixed flow record; need to separate regulated and unregulated and re-do statistics; pre-dam and post-dam information.
3. Table 2.2 Hydrologic Data. - This appears to be a mixed flow record; need to separate regulated and unregulated and re-do statistics; pre-dam and post-dam information
4. Table 2.3 Hydrologic Data. - This appears to be a mixed flow record; need to separate regulated and unregulated and re-do statistics; pre-dam and post-dam information
5. Section 2.2.3 This probably would be more accurately be titled “Reservoir Hydrology.”
6. Section 2.2.3 Para 2 – Reword paragraph. This paragraph purports to describe actual lake levels by its wording. BUT, in actuality it is describing only the Flood Control Rule Curve. We are not typically on this curve.
7. Section 2.2.3 Para 3 – This paragraph is probably superfluous. These also describe the limits on the FCRC, but do not cover the actual operations.
8. Section 2.2.3 Para 4 – Delete. Or describe intent for this paragraph.
9. Section 2.4 - LOOKOUT POINT PROJECT OPERATIONS. – Description of purposes, para 1, do not match Section 1.2.3. The purposes in 2.4 are not correct.
10. Section 2.4, Para 2. – The “line” on the water control diagram does not represent *target pool elevation*. It is the FCRC.
11. Section 2.4, Para 3 - ~345,900 AF for total winter flood control storage. Probably could use a better description of the FC operation here.
12. Section 2.4, Para 4 – Pool is not held at elevation 926.0

13. Appendix C. Not sure but title probably should be “Reservoir Hydrologic Information.”
14. Appendix C. C-3 should have an enlargement for 0 -~5% range.
15. Appendix C. C-5 has been revised, need a new one.
16. Appendix C. Not much else here to review.

Bruce Duffe
12oct2010

USACE Lookout Point - 60 Percent AR Review Comments
18 October 2010

Id	Discipline	Document Type	Spec	Sheet	Detail	A-E Team Responder(s)	A-E Team Response
CENWP-001		Technical Report	n/a'	n/a	n/a	Kapla	This paragraph has been updated.
Section 1.2.4.							
Coordinating Discipline(s): Design Team Leader							
1. Construction Authorization. Should be flood control, hydropower, navigation, irrigation. And fish & wildlife, recreation, water quality, M&I water.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-002		Technical Report	n/a'	n/a	n/a	Kapla/Autier	Flow data for the Middle Fork Willamette River is from 1985 to present, and is assumed to include regulated data only (the Hills Creek Reservoir is located upstream). Flow data from the North Fork does include data from when a small
Table 2.1 Hydrologic Data.							
Coordinating Discipline(s): Design Team Leader							
2. This appears to be a mixed flow record; need to separate regulated and unregulated and re-do statistics; pre-dam and post-dam information.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-003		Technical Report	n/a'	n/a	n/a	Kapla/Autier	See previous comment response.
Table 2.2 Hydrologic Data.							
Coordinating Discipline(s): Design Team Leader							
3. This appears to be a mixed flow record; need to separate regulated and unregulated and re-do statistics; pre-dam and post-dam information							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-004		Technical Report	n/a'	n/a	n/a	Kapla/Autier	See previous comment response.
Table 2.3 Hydrologic Data.							
Coordinating Discipline(s): Design Team Leader							
4. This appears to be a mixed flow record; need to separate regulated and unregulated and re-do statistics; pre-dam and post-dam information							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-005		Technical Report	n/a'	n/a	n/a	.	This update has been made.
Section 2.2.3							
Coordinating Discipline(s): Design Team Leader							
5. This probably would be more accurately be titled “Reservoir Hydrology.”							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-006		Technical Report	n/a'	n/a	n/a	Sweeney/Willig	This paragraph has been reworded to clarify that it is describing the FCRC and that operations are typically below this curve.
Section 2.2.3 Para 2							
Coordinating Discipline(s): Design Team Leader							
6. Reword paragraph. This paragraph purports to describe actual lake levels by its wording. BUT, in actuality it is describing only the Flood Control Rule Curve. We are not typically on this curve.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							

Id	Discipline	Document Type	Spec	Sheet	Detail	A-E Team Responder(s)	A-E Team Response
CENWP-007		Technical Report	n/a'	n/a	n/a	Sweeney/Willig	This paragraph is included to provide information used later on in the report to derive the exclusion net design discharge.
Section 2.2.3 Para 3							
Coordinating Discipline(s): Design Team Leader							
7. This paragraph is probably superfluous. These also describe the limits on the FCRC, but do not cover the actual operations.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-008		Technical Report	n/a'	n/a	n/a	Sweeney/Willig	A description of the intent of this information was added.
Section 2.2.3 Para 4							
Coordinating Discipline(s): Design Team Leader							
8. Delete. Or describe intent for this paragraph.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-009		Technical Report	n/a'	n/a	n/a	Autier	Paragraph 1 of section 2.4 was updated to be consistent with Section 1.2.3.
Section 2.4 - LOOKOUT POINT PROJECT OPERATIONS.							
Coordinating Discipline(s): Design Team Leader							
9. Description of purposes, para 1, do not match Section 1.2.3. The purposes in 2.4 are not correct.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-010		Technical Report	n/a'	n/a	n/a	Sweeney/Willig	Text has been added to clarify this point.
Section 2.4, Para 2.							
Coordinating Discipline(s): Design Team Leader							
10. The "line" on the water control diagram does not represent target pool elevation. It is the FCRC.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-011		Technical Report	n/a'	n/a	n/a	Sweeney/Willig	Actual storage volumes do not affect design details of alternatives. As such the storage volume reference was removed.
Section 2.4, Para 3							
Coordinating Discipline(s): Design Team Leader							
11. ~345,900 AF for total winter flood control storage. Probably could use a better description of the FC operation here.							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-012		Technical Report	n/a'	n/a	n/a	Sweeney/Willig	The text was edited to reflect this.
Section 2.4, Para 4							
Coordinating Discipline(s): Design Team Leader							
12. Pool is not held at elevation 926.0							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-013		Technical Report	n/a'	n/a	n/a	Autier	This has been updated.
Appendix C.							
Coordinating Discipline(s): Design Team Leader							
13. Not sure but title probably should be "Reservoir Hydrologic Information."							
Submitted By: Bruce Duffe. Submitted On: 12-Oct-10							
CENWP-014		Technical Report	n/a'	n/a	n/a	Kapla/Autier	It is anticipated that this information would be provided if the FSC alternative
Appendix C.							

7. 60 Percent Agency Comment Letters

This page was intentionally left blank.

From:	Kapla, James/SEA
To:	Autier, Vincent/SEA
Subject:	FW: Comment Lookout Point PDT 60% Report
Date:	Wednesday, March 16, 2011 10:54:12 AM

From: Lawrence Schwabe [mailto:Lawrence.Schwabe@grandronde.org]
Sent: Tuesday, November 02, 2010 2:55 PM
To: Kapla, James/SEA; Askelson, Sean K NWP
Subject: RE: Comment Lookout Point PDT 60% Report

I do not have a Dr. Checks account. I would just like to forward a few comments on Lookout Point PDT 60% Report.

1) In regards to all collection alternatives, all fish preferably should be transported to downstream release site. The Dexter Project shall be equipped with both upstream and downsteam capabilities. If keeping adult bull trout is absolutely necessary, it is acceptable to have a sorter that separates fish >200mm. Sorting smaller fish, cutthroat and/or rainbow, is not recommended. Handling all fish would be expensive and may harm Chinook fry which will jeopardize the success of fish collection and re-introduction collectively.

2) Fish collected in a collection facility should not be held for over 24 hours. Adjust OM accordingly.

3) Please characterize the upstream pool or hydraulic influences upstream that are created due to the development of in-tributary collection facilities.

4) Floating Surface Collectors in the mid-reservoir will more likely require year round OM. Adjust OM accordingly

To Liza Roy, Sean Askelson (USACE)
From Ann Gray (USFWS)

Sent via email on November 3, 2010.

Subject: FWS comments on the 60% Review Alternatives Report (AR) for:
1) Lookout Point (LOP) Head of Reservoir Collection Alternatives Study, September 2010, and
2) Cougar Dam Downstream Passage Alternatives Study, September 2010.

FWS had limited staff time available for the review of these documents, and focused our review on the biological criteria sections of each report, which was highlighted by Corps staff as the most important sections for our review. We appreciate the opportunity to comment. If you require a formal letter on FWS letterhead, please let me know and I will send one in the following week, but please accept these as our timely comments on the above 2 ARs.

For LOP AR, the FWS has the following comments:
Section 3.3.2.1 Fish Sorting:
1) For fish that may be held for several hours (i.e. the <200 mm fish), the holding area may need to include dividers (and possibly additional holding area) to allow smaller fish (60-80 mm) to separate/escape from larger fish to reduce predation prior to transfer. Similar separation of life stages may also need to occur for transport, depending on the variation in size and numbers of fish.

2) The FWS appreciates the flexibility presented in the report with the two options for fish sorting (minimal and the "alternative strategy" that would be guided by fish management agencies). With limited information on the size of downstream migrating bull trout that would be collected by a LOP facility, the FWS is reluctant to make recommendations on the disposition of bull trout. In the initial years of operation, some sampling of all fish sizes at or near the facility may be needed to collect information to determine the appropriate management for bull trout and other resident fish species. In the long term, FWS recommends minimization of fish handling and sorting, but recognizes that it is likely that some sampling (whether on or off-site) will be necessary for some monitoring.

For Cougar Dam AR, the Service has the following comments:
Section 3.3- Target species abundance
1) This section is a little confusing, and possibly could be updated with the 2010 information once that is available. As written, it's unclear what fish numbers are relevant to the design of the facility. FWS expected to find the maximum estimated numbers of migrants/day, which in turn would be used estimate necessary holding area (assuming non-volitional passage), but there is no clear presentation of what this estimate may be based on the numbers presented.

2) There are some questions about the data presented- such as a) why use 274 redds, when the maximum number of historical adult returns was 2,000-4,000? FWS would anticipate that an established native population could likely approach 2,000 adult fish in the future once passage is established. The use of reservoir habitat capacity may not be appropriate, as outmigrant fish may quickly pass through the reservoir. Thus large numbers of outmigrants may not be limited by rearing capacity within the reservoir itself.

Section 6.2.
1) While there is large variation in the size (cfs) of the several fish passage collection facilities, the recommendations for additional biological studies do not seem target additional study to determine (or narrow the range of flow-net through a facility to effectively attract outmigrants (see second bullet in Section 3.3.6). From our experience at other hydroelectric projects in the Willamette, and as discussed in the fish passage and RM&E WATER teams, adequate attraction flow is important information to determine the likely effectiveness of, and aid in the ultimate selection of a fish passage facility for construction. The FWS anticipates that differing operations will be targeted during the 2011 active tag study to help define sufficient attraction flow for the collection facility. However, because outmigrant fish often follow flow patterns, we are open to CFD modeling to fill in gaps where data from the 2011 active tag studies is insufficient to determine adequate flow net in the larger forebay area (outside of the cul-de-sac) to attract fish.

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232-1274

November 8, 2010

Joyce Casey, Chief
Environmental Resources Branch
Department of the Army
Corps of Engineers, Portland District
P.O. Box 2946
Portland, Oregon 97208-2946

RE: Review of the 60% Alternatives Report Lookout Point Head of Reservoir Collection Alternatives Study, dated September 2010

Dear Ms. Casey:

National Marine Fisheries Service (NMFS) appreciates the opportunity to review the subject document and provides the following comments.

General Comments

The U.S. Army Corps of Engineers (USACE) and its contractors (CH2M-Hill, AECOM, and BioAnalysts) have done a thorough job of developing alternatives, identifying information gaps, and detailing the alternatives. The alternatives that have risen to the top are similar to those constructed and operated in other locations, and, thus, it is clear that these alternatives are technically feasible. In general, we support the alternatives selected for further analysis. The two alternatives are:

1. Upper Reservoir Floating Surface Collector with Nets – This site is located at the head of the reservoir at the minimum flood control pool Water Service Elevation 825.0. This alternative includes a floating surface collector with nets, proposed as phase 1 for 500 cfs and phase 2 for 1000 cfs. This alternative has the potential to collect about 50% of the downstream moving juvenile fish.

2. Lower North Fork (Westfir) – The Westfir site is located about 1.3 river miles upstream from the Middle Fork confluence (near the town of Westfir). A concrete dam and lumber mill were previously located at the site; thus, the site was previously disturbed. The river is already channelized in this area, and the previous dam abutments remain largely intact. This alternative is an off-channel collector. This alternative is estimated to collect about 64% of the downstream moving juvenile fish.

The design team included representatives from the USACE, Bonneville Power Administration, Oregon Department of Fish and Wildlife, and the Confederated Tribes of the Grand Ronde. These engineers and biologists worked collaboratively to evaluate a long list of alternatives and to identify these two remaining alternatives as having the most likelihood of success. While the cost of these alternatives is high, the conceptual design has focused on what it would take to have a complete downstream passage facility installed rather than a smaller, prototype version.

Additionally, given the size of Lookout Point dam and reservoir, and the degree to which the reservoir fluctuates, the top alternatives, their scale, costs and configurations are commensurate with similarly sized facilities.

NMFS recognizes there is biological uncertainty regarding the relative survival of Chinook salmon fry collected and transported from the head of Lookout Point reservoir to those that migrate through a reservoir and pass at the dam. Our intent in the 2008 Willamette Project Biological Opinion with this head-of-reservoir prototype concept was to design and build a small version of a full facility and test it to assess whether the concept could be used to increase juvenile fish survival passing a large reservoir and dam. As noted above, the top alternatives are similar to facilities that successfully divert fish in other locations, and thus, from an engineering perspective, we know they can be constructed and collect fish. The remaining, biological uncertainty needs to be evaluated for each reservoir where this method is contemplated in order to assess Chinook fry use of and passage through the reservoir, and compare that to immediate and delayed mortality of fry transported around the reservoir and dam. We support the USACE's initiative to identify and carry out intensive studies in the next few years to address this biological uncertainty.

Specific Comments

Section 1.2.2 HISTORY – We request more information on the original fish collection facility at Lookout Point. Specifically, as we move through design development, it would be helpful to have a detailed analysis of what did not work and the research conducted.

Section 4.3.1 IN-RESERVOIR (second paragraph) – The second sentence refers to the floating surface collector as a proven technology. This sentence should be modified to read "...are an acceptable technology when implemented with a robust survival standard and research and monitoring program,..."

Section 7.3 RECOMMENDATIONS FOR FURTHER STUDIES
Bullet 1 - Fish life cycle modeling is a low priority. The model input thus far is not robust enough to answer the essential question: Do small Chinook fry survive better if passed from head of reservoir to below Dexter or if they pass through the reservoirs?

Bullet 2 – Juvenile to adult survival is a lower priority than juvenile studies listed in bullets three and four.

Bullet 3 – Juvenile Migration Timing, Size, and Abundance at Head of Reservoir – This is a high priority.

Bullet 4 – Juvenile Chinook Migratory Behavior and Survival Rate through Reservoir – This is a high priority and this should be studied under different reservoir operations.

New bullet/new study – Please add a stranding study to this list. This study could be completed in conjunction with the reservoir rearing study.

Conclusion

NMFS understands that the USACE and others are reluctant to move forward with design and construction of one of these alternatives given the high cost and biological uncertainty. As next steps, we suggest the USACE focus in the near term on biological studies and hydraulic modeling to better understand how juvenile fish use and pass the reservoir and dam under the full range of reservoir operations. We are willing to proceed to test a temporary facility (e.g., mobile traps, etc) before moving ahead with the Upper Reservoir or Westfir alternatives. This will require substantially increased research effort in the next few years and will require looking at downstream fish passage alternatives at the dam and under different reservoir operations.

If you have any questions or concerns about the comments, please feel free to contact Stephanie Burchfield (503-736-4720 or Stephanie.Burchfield@noaa.gov) or Melissa Jundt (503-231-2187 or melissa.jundt@noaa.gov).

Sincerely,

Keith Kirkendall

Keith Kirkendall, Chief
FERC and Water Diversions Branch
Hydropower Division

cc: (Sent electronically, unless noted as "hard copy")
Chris Budai, Corps–NPP (hard copy)
Mindy Simmons, Corps-NPP
Dan Spear, BPA
Steve Marx, ODFW – Corvallis
Clay Penhollow, CTWSR – Warm Springs
Mike Karnosh, CTGR – Grand Ronde
Tom Friesen, ODFW – Corvallis Research Lab
Ann Gray, USFWS

Oregon
Theodore R. Kulongoski, Governor

Department of Fish and Wildlife
SPRINGFIELD DISTRICT OFFICE
3150 East Main Street
Springfield, OR 97478
(541) 726-3515
FAX (541) 726-2505
www.dfw.state.or.us/swwd.html

OREGON Fish & Wildlife

November 3, 2010

Joyce Casey
Project Management Division
Corps of Engineers, Portland District
PO Box 2946
Portland, Oregon 97208-2946

RE: Comments – Lookout Point Head of Reservoir Collection Alternatives Study; 60 Percent Review

Dear Ms. Casey:

The Oregon Department of Fish and Wildlife (ODFW) has reviewed the Draft 60% Alternatives Report for the Lookout Point Head of Reservoir Collection Alternatives Study. This study is the Corps of Engineers response to Reasonable and Prudent Alternative (RPA) 4.9 in Chapter 9 of the National Marine Fisheries Service's Willamette Project Biological Opinion. This RPA calls for the completion of a feasibility study "near the end of 2010". Providing effective downstream passage to below the Lookout Point and Dexter projects is essential to recovery of spring Chinook in the upper Willamette subbasin.

In ODFW's review of the Lookout Point Head of Reservoir Collection Alternatives Study (LOPHRS), we have found little evidence that an effective and feasible alternative has been developed. ODFW generally supports the concept of testing a temporary facility designed to evaluate the concept of moving Chinook fry around the two reservoirs. However, ODFW does not believe it is prudent to move forward with alternatives that are expensive and permanent until results of the tested concept are available.

It is essential that passage objectives for the Lookout Point and Dexter projects support broad recovery goals for spring Chinook identified in the Upper Willamette Conservation and Recovery Plan for Chinook Salmon and Steelhead (RP). Recovery relies on reducing those threats that represent the underlying cause for the species decline. Within the Middle Fork Willamette River subbasin, hydropower and flood control projects constitute one of the primary threats that impede population viability. The specific delisting goal for spring Chinook in the Middle Fork Willamette River subbasin is to achieve a "low" risk of extinction defined as a probability of extinction less than 0.05. The RP calculates that meeting this goal will require a Wild spawner Minimum Abundance Threshold of 800 adults. The RP also identifies "conservation gaps" which represent the magnitude of recovery needed to improve the population's current condition, and address extinction risk for each threat category. The conservation gap for abundance/productivity in the Middle Fork Willamette River subbasin is estimated at 5,820 adult Chinook. Target population objectives for Lookout Point and Dexter project passage should be based on closing the "conservation gap" by restoring historic populations to the extent possible with adjustments for unrecoverable habitats inundated by the reservoir. The alternatives presented in the LOPHRS provide estimated returns of adults between about 3 and 25 percent of the modeled conservation gap.

Recovery of Chinook salmon populations in the Middle Fork Willamette above the Lookout Point and Dexter projects involve at least four considerations: production of juveniles above the reservoirs, production within the reservoirs, effective passage past the projects and habitat availability below the projects. It is apparent from various methods of calculating Chinook fry and smolt production that nearly all of the former Chinook salmon habitats above the Lookout Point and Dexter project s will be necessary to achieve recovery. While capturing juveniles prior to entering the reservoirs may avoid some potential predation mortality, the reservoirs can also provide important rearing areas with some changes to operational practices. ODFW favors providing passage at the dam, making use of the rearing potential in the reservoir and reducing or eliminating impacts to resident fish species and recreation.

The following information identifies and summarizes the ODFW goals and objectives for the USACE 60 % Alternatives Study for the Cougar Dam Downstream Passage Study:

> The ODFW administers Oregon Fish Passage Statutes (ORS 509.580 through 509.901) and corresponding Oregon Administrative Rules (OAR 635-412-0005 through 0040), both are attached. It is a law in the State of Oregon to provide upstream and downstream passage for all native migratory fish[1]. For the purpose of the implementation of the USACE's Willamette River Biological Opinion (BiOp), issued by NOAA Fisheries in July 2008, the following fish passage performance criteria apply to both the Cougar Dam and Lookout Point Dam proposed downstream fish passage facilities.
>
> **Downstream Fish Passage Performance Criteria:**
> - Downstream passage shall be provided to all native migratory fish collected, trapped, hauled and transported.
> - Downstream passage facilities shall provide fish passage to all native migratory fish at all flows within the design stream flow range of 95% and 5% exceedence.
> - Downstream survival of all native migratory fish shall meet or exceed 95% at Cougar and Lookout Point Dams.
> - State of Oregon fish passage design criteria *Oregon Administrative Rules* (OAR) 635-412-0035 (1-*general requirements*, 2-*requirement for dams*, 6- *requirement for fish traps* & 7c-*requirements for Lampetra species*) apply and shall be met prior to ODFW design approval and construction.

We do not believe the concepts outlined in the LOPHRS meet these criteria for fish passage.

Finally, juvenile Chinook production potential below Dexter Dam is an unknown quantity and warrants evaluation. ODFW believes developing this evaluation should be a prerequisite to moving forward with any head of the reservoir prototype.

[1] "**Native Migratory Fish**" species are defined in OAR 635-412-0005(32).

Specific comments:

Purpose
To address the RPA 4.9 requirement, the USACE Project Delivery Team (PDT) has initiated this alternatives study with initial consideration given to full-scale production facilities consistent with the long-term objectives of the BiOp. Assessments are then made concerning the feasibility of prototype testing and/or a phased implementation of the selected facilities.
NMFS Guidance: *For this measure, NMFS defines "prototype" to refer to temporary facilities intended for concept evaluation, not long-term operations. Further, "prototype" does not necessarily refer to a single concept; multiple concepts may be experimented with simultaneously. (RPA 4.9)*
It is apparent in the report that the definition of "temporary facilities" has been expanded to include large permanent facilities. ODFW would encourage re-writing the purpose statement to include smaller, less invasive facilities that can be used to test the feasibility of head of the reservoir collection.

1.1 SCOPE AND PURPOSE
1.1.1 General
The purpose of this Alternatives Report (AR) is to provide an assessment of the technical feasibility of providing downstream passage for juvenile salmon at Lookout Point Dam via head-of-reservoir and/or in-tributary collection and transportation facilities. Near or at-dam collection facilities have intentionally been excluded from this study. The primary focus of the alternatives development is on production-scale facilities, with consideration given to the feasibility of prototype testing and/or a phased implementation of the selected facilities. The primary species of concern is spring Chinook salmon. This evaluation will also include consideration of bull trout, Oregon chub, Pacific lamprey and mountain whitefish.
The evaluation should also include management considerations for rainbow and cutthroat trout populations. Other fish species that may affect collection operations include largescale suckers, northern pikeminnow, three-spined stickleback, redside shiner, largemouth and smallmouth bass, white and black crappie, walleye, bluegill and pumpkinseed sunfish.

1.1.2 Reports and Studies Used in the Alternatives Report
For general information on ODFW resident fish management:
Oregon Department of Fish and Wildlife. 1992. Middle Fork Willamette Subbasin Fish Management Plan

Table 3-1. General Design Criteria
Peak migration period for spring Chinook should be October through June.

Fish Sorting.	*Separation into two size classes: fry and smolts (<200 mm) and adults (>200mm)*	*All fry and smolts (including resident fish) will be passed downstream. All adults will be returned to the water body.*	*Section 3.3.2.1*

Many (probably most) cutthroat and rainbow trout downstream migrants will be between 100 and 200 mm. These fish contribute to wild trout populations and fisheries in the Middle Fork Willamette and Lookout Point Reservoir. At this time, ODFW prefers these fluvial and adfluvial fish are separated from the Chinook and released immediately below the fish collection facility. It may be possible to collect all fish <60 mm including Chinook fry for transportation while allowing larger fish to pass volitionally to below the collection facility. Information collected during initial prototype operation may reveal the need for alternative fish disposition strategies.

The collector design should be flexible to accommodate additional species separation as determined necessary by ODFW.

4.2 SITE LOCATIONS

Six site locations were initially considered, including one site in the Lookout Point Reservoir, three sites on the Middle Fork Willamette River, and two sites on the North Fork of the Middle Fork Willamette River.

Another site consideration should be the drawdown zone of the reservoir downstream from Black Canyon Campground and upstream from the railroad trestle. This site would be less likely to interfere with boating and other recreation on the Middle Fork Willamette River and is conducive to mobile trapping.

4.5.1 Selected In-Reservoir Alternatives

The in-reservoir alternatives prioritized for further consideration during the 60 Percent evaluation are as follows:

1. In-Reservoir: FSC without Nets (500 cfs attraction flow)
2. In-Reservoir: FSC with Nets (500 cfs attraction flow)
3. In-Reservoir: FSC with Nets (1000 cfs attraction flow)

ODFW is generally opposed to fish collection devices that include a large permanent net component. These types of devices can alter fish movement in the reservoir, kill smaller fish (mainly by capture in the gill area), increase potential predation (by concentrating prey sized fish), and affect angling and other recreation. Although we are less opposed to nets designed to entrain fish that are located at existing passage barriers including USACE dams; we strongly encourage developing both at-dam and head of the reservoir alternatives that do not rely on netting to guide fish.

4.5.2 Selected Mobile Technology (Merwin Traps)

With this concept, portable floating Merwin Traps would be operated near the changing head of the reservoir, which moves over time as the pool is filled during the spring and emptied during the fall (Plates 11 and 12). Merwin Traps were selected as a portable technology for use in reservoir environments, consistent with the intent of their original design and in which they have successfully operated.

The discussion on Merwin trap nets should include a section on how juvenile fish will be isolated from larger predators. It is our experience that juvenile fish captured in these types of traps suffer high mortality because of their inability to escape predation from larger fish captured and held in the same net.

4.5.3 Selected In-Tributary Alternatives

Two in-tributary alternatives were prioritized for further consideration during the 60 Percent evaluation as follows:

1. USFS Black Canyon Campground: Off-Channel Collector
2. Lower North Fork (Westfir): Off-Channel Collector

These two alternatives include building a 12 foot high diversion dam to guide water into an off channel collection facility. The concept of building a dam in a free flowing stream for the purpose of fish collection is unlikely to obtain support from either ODFW or the recreation community. Both the Middle Fork Willamette and the North Fork Middle Fork Willamette are managed for wild trout production and impeding both upstream and downstream migration of these fish is not consistent with ODFW's wild fish management objectives. The site on the North Fork Middle Fork Willamette has been the subject of several heated environmental conflicts in the past 30 years. ODFW and Lane County removed the previous dam in 1994 restoring the river to free-flowing after 70 years of obstruction.

5.5 60 Percent Alternatives Evaluation
The following provides a summary of the 60 Percent alternatives evaluation. Four alternatives were evaluated and two alternatives were selected for further evaluation (to be confirmed during Checkpoint Meeting No. 3).
Given the potential of obtaining adult survival from the transportation of Chinook fry to below Dexter Dam has a high level of uncertainty, it appears prudent to test the concept before investing a large amount of funding into a fixed facility. ODFW strongly recommends inclusion of a smaller mobile prototype into the 90% design that is capable of capturing sufficient numbers of fry to quantify survival. We would recommend an in-river floating screw or scoop trap (with a fish guiding device, if deemed necessary) located downstream from Black Canyon Campground.

The 60% Report for the LOPHRS presents a large volume of good reconnaissance and evaluation of alternatives selected for study. ODFW encourages the design team to develop additional temporary collection alternatives that have a higher likelihood of being used to address research needed before development of permanent passage structures. Because ODFW does not believe this study has produced a feasible alternative for a larger head of the reservoir collection facility, we recommend that the USACE redirect their resources to:

1) Investigate operational or management alternatives for improving juvenile Chinook habitat and reducing predation in Lookout Point and Dexter reservoirs.
2) Develop alternatives for providing passage at Lookout Point and Dexter dams.

If you have questions or concerns about these comments, I can be reached at 541-726-3515 x26 or by email at Jeffrey.S.Ziller@state.or.us.

Sincerely,

Jeff Ziller
District Fish Biologist
South Willamette Watershed District

cc: Mindy Simmons, Corps
Stephanie Burchfield, NOAA
Lance Kruzic, NOAA
Melissa Jundt, NOAA
Ann Gray, USFWS
David Griffith, USACE
Ian Chane, USACE
Dan Spear, BPA
Tom Friesen, ODFW – Corvallis
Kelly Moore, ODFW – Corvallis
Steve Marx, ODFW – Corvallis
Ron Boyce, ODFW - Clackamas
Greg Apke, ODFW – Salem
Mike Lambert, ODFW - Salem

United States Department of Agriculture | Forest Service | Willamette National Forest Supervisor's Office | 3106 Pierce Parkway, Suite D Springfield, OR 97477

File Code: 2500/2600
Date: October 29, 2010

Joyce Casey
CENWP-PM-E
USACE
333 SW First Ave
Portland, OR 97204

Dear Ms. Casey:

Thank you for the opportunity to review the "60% Lookout Point Head of Reservoir Collection Alternatives Study (September 2010)". The Willamette National Forest is managed for multiple uses such as fisheries, recreation, wildlife, and timber. We share the common goal of the recovery of threatened spring Chinook salmon and bull trout. With help from our partners we have invested significant resources to achieve this goal and plan to continue to do our part in recovery.

Conceptually, we are supportive of increasing survival of outmigrating spring Chinook salmon. However, there is uncertainty regarding the benefits and risks associated with collecting and transporting fry. We do not agree with a solution that is essentially experimental in nature and involves construction of a dam on a free flowing river with outstanding resource values. We also have concerns about timeliness of notification from the USACE about potential facility locations and related activities on the Willamette National Forest. The Forest Service is responsible for authorizing uses on National Forest System lands, including activities proposed by the Army Corps of Engineers. Our early involvement is essential so that proposed actions can be designed to meet the missions of both of our agencies before large investments of time or energy are made. We have significant concerns with several of the proposed and recently modified site selections.

Wild and Scenic Portion of the North Fork Middle Fork Willamette River

The Forest Service would like to see this site dropped from consideration for the following reasons:

- The North Fork of the Middle Fork of the Willamette River was designated a national Wild and Scenic River (WSR) in 1988. A required river corridor management plan was created and approved in 1992. The WSR designation created three distinct river segments (Wild, Scenic, and Recreation) encompassing the length of the North Fork within the Willamette National Forest from Waldo Lake to Westfir, Oregon. The WSR Act precludes us from authorizing any project that diminishes Outstandingly Remarkable Values (ORV's), free-flowing character, or water quality for a WSR. **We would not concur with a project that would change the free flowing nature of this river.** Eight resources (Recreation, Vegetation, Scenic, Water Quality, Fish, Wildlife, Geologic/Hydrologic, and Historic) were identified as ORV's for this river. The management plan directs agency efforts to protect and enhance these ORV's. The management plan also defines a river corridor, roughly ¼ mile each side of the river channel and averaging 320 acres per river mile, within which ORV's would be managed. **This proposal would diminish several of the ORV's.** Please see Wild and Scenic direction in Attachment 1 for more information.
- This project will cause an upwelling of public concern from residents of the local community as well as the numerous groups who are very interested in maintaining the quality and character of this river. **We have no interest in engaging in environmental analysis for a project that is so out of**

alignment with the known public values for this area and would put our relationships with partners at risk.

- Energy dissipation of screened flows may impact river geomorphology. We do not believe that we will be able to attain Forest Plan Aquatic Conservation Strategy objectives with the implementation of this alternative.
- Potential impacts from upstream fish passage include false attraction and delay. This is especially concerning given the wild trout only management of this river. Creating a genetic block or genetically isolated population is highly undesirable.
- There is uncertainty regarding the benefits and risks associated with collecting and transporting spring Chinook fry.
- This site is not the best alternative to maximize capture of smolts. It is estimated that in this location 66% of outmigrating smolts would be captured (as compared to the 100% estimated capture of smolts if the facility was placed on the Mainstem Middle Fork Willamette River).
- An outmigrant trap in this location would not have the added capability of capturing migrating bull trout. The population of bull trout above Hills Creek is important for the recovery of threatened bull trout. This is one of the only successful reintroduced populations in the United States. Solutions for spring Chinook should not preclude attainment of bull trout recovery goals. The North Fork site is unlikely to capture bull trout and if it did, the numbers would be much lower.
- There needs to be analysis to demonstrate the juvenile collection facility will not adversely affect emigrating salmonids and other native fishes on the MF/NF river system. We have not been provided data or study material that demonstrates trapping emigrating juveniles at a collection facility is the best method to return NF salmon to the sea. In addition, the numbers of emigrating salmon smolts from the NF appear to be overestimated. The estimated 2.4 million smolts that would be captured do not appear consistent with data the Forest Service has collected on similar rivers over the years in this area. In addition, trapping operations are known to be problematic (Columbia River Dams) in that they can create environments where juvenile fish are more susceptible to predation and other environmental factors. Lookout Point Reservoir harbors several species of warm water fish that are known to prey heavily on salmonids, especially in slack water environments.
- There are other potential sites that would meet project objectives without precluding attainment of the desired future condition for the North Fork. We share the objective of recovery for listed species, and would like an to be able to support an alternative that is not detrimental to fish, aquatic and other resource values
- If the USACOE decides to initiate NEPA analysis that includes this site, the Forest Service would be charged with completing a Determination Report of project effects on WSR values. It is likely that our report would conclude that this project unreasonably diminishes at least one ORV for the North Fork.
- Our Forest Plan states that water supply dams and major diversions shall be prohibited, except for the existing diversion utilized by the City of Westfir (MA_6e-28). Modification of the plan through a Forest Plan amendment would be a major undertaking. We would first need to make a determination as to whether we would be willing to accept a proposal for an amendment, based in part on our preliminary assessment of effects, public support, and the likelihood of the proposal getting through the NEPA process.
- There are at least seven previously recorded cultural resources in the Buckhead area, comprised of prehistoric sites and isolates, as well as historic railroad features, that could be impacted by the project depending on where exactly it is to occur and the level of inundation. Because the sites have

not been evaluated for their eligibility for listing in the National Register of Historic Places, they must be treated as though they were until proven otherwise--constructing anything on top of a site or inundating them without taking mitigative action would certainly be considered an adverse effect. Known historic sites occur in the vicinity of the other project locations as well, and as previously stated, the same concerns would apply to those ("Wild and Scenic Portion of the North Fork Middle Fork Willamette River", "Below Hampton Campground"; location of the "Westfir Site" unclear). Again, since we do not know the precise project locations and level of inundation proposed for each area, it's difficult to say what the exact issues are relating to specific cultural sites, only that impacting them is a serious problem.

- The Forest Service road (Road 19) adjacent to the NFMF is a nationally designated State Scenic Byway. The proposed five to ten acre facility on the NFMF would not be in compliance with the objectives of the Scenic Byways designation. There are currently no structures (excluding campground facilities) upstream of Westfir and this facility would detract from the Wild and Scenic nature of this corridor. A Visual Quality Objective of Retention Foreground applies to lands between Road 19 and the North Fork within the WSR corridor. Our Forest Plan restricts roadside created openings within Foreground Retention areas to 2 acres if placed next to major travel corridors; otherwise such openings are restricted to 5 acres (p IV-214, USDA 1990).
- This alternative would negatively impact recreation. The North Fork is managed as a wild trout stream and is renowned throughout the fly-fishing community. It is unique in that it is one of the few fly-fishing only streams on the Willamette National Forest. A diversion dam on this section of river would not be beneficial for the native populations of non-anadromous salmonids.
- The NFMF is a unique and popular run for “extreme” kayakers. It contains a section termed the “Miracle Mile” and is a very popular recreation destination. A portage at the diversion dam site would be a major detraction to this otherwise pristine boating resource.
- We understand that this is the least expensive land-based facility option, however it also would have the least public support and would be considerably more likely to experience controversy and litigation that could potentially slow down implementation timelines.

<u>Westfir Site – North Fork of the Middle Fork of the Willamette River (Private Ownership)</u>

The Forest Service would like to see this site dropped from consideration for the following reasons:

- Although this location is not on FS lands, the recreational and scenic impacts of a facility in this location would adversely affect FS interests.
- Potential impacts to upstream fish passage including false attraction and delay. This is especially concerning given the “wild trout only” management of this river. Creating a genetic block or genetically isolated population is highly undesirable (considered to be a high class trophy trout fly-fishing only stream).
- There is uncertainty regarding the benefits and risks associated with collecting and transporting fry.
- If the area of inundation extends onto the National Forest, it would impact Wild and Scenic and State Scenic values. An alternative that does not impact a Wild and Scenic River is preferred for reasons outlined in our response to the previous alternative.
- Known historic sites occur in the vicinity this location. The same concerns stated in the Wild and Scenic North Fork proposal would apply. Since we do not know the precise project locations and level of inundation proposed for each area, it's difficult to say what the exact issues are relating to

specific cultural sites, only that impacting them is a serious problem.

- Placing a dam at a site where a previous dam was removed would be expected to cause an upwelling of public concern from residents of the local community as well as the numerous groups who are very interested in maintaining the quality and character of this river. The community of Westfir worked very hard to have the previous dam removed and there will be difficulty finding support from the local residents with the proposed project.
- The North Fork is managed as a wild trout stream and is renowned through the fly-fishing community.

<u>Mainstem Middle Fork Willamette River – Upstream of Black Canyon Campground</u>

The Forest Service would like to see this site dropped from consideration for the following reasons:

- The installation of a collection facility in this location would create a 12 foot dam that would inundate the floodplain of the Buckhead Natural Area where there are several ponds containing Endangered Oregon Chub. These ponds and adjacent riparian/floodplain habitat also support a significant population of Western pond turtles (State and Federal sensitive species) in the upper portion of the Willamette Basin. The Buckhead wildlife area (MA-9d) also serves as a key calving area for the local elk population, and is an area emphasized for overall wildlife habitat restoration, enhancement, and environmental education opportunities. The Forest Service has worked extensively with partners on weed control and restoration. This area is enjoyed by many due to its close proximity to Oakridge. There are all-accessible nature trails and interpretive sites throughout this area. Significant investments and partnerships have made this a key area to connect community with nature. **Inundation would have unacceptable negative effects on this area and associated uses.**
- The diversion dam would create an impoundment pool extending 5 miles upstream. This degrades the character of the river, habitat, scenic values, and recreational opportunities. Ponds are not conducive to juvenile salmonid migrations or emigrations.
- Energy dissipation of screened flows may impact river morphology making it difficult for us to come to a determination that this project would meet Aquatic Conservation Strategy Objectives.
- Known historic sites occur in the vicinity of this location. The same concerns stated in the Wild and Scenic North Fork proposal would apply. Since we do not know the precise project locations and level of inundation proposed for each area, it's difficult to say what the exact issues are relating to specific cultural sites, only that impacting them is a serious problem.
- The area between Oakridge and Black Canyon Campground is a popular drift boat float. Outfitters and guides, operating under special use permits, use this river segment. There would be no boat passage during the period of operation (January through September). A portage is impractical for drift boats.
- The proposed facility would be very large and would have significant impacts to existing recreational facilities.

<u>Alternate Mainstem Middle Fork Willamette River – Below Hampton Campground</u>

The Forest Service supports further consideration of this site although some concerns would need to be resolved:

- Of the dam alternatives, this site appears to be the best alternative to maximize capture of smolts. It is estimated in this location 100% of outmigrating smolts would be captured (as compared to the 66% estimated capture of smolts if the facility was placed on the North Fork Middle Fork Willamette River). If the estimate of 100% capture is true, then that likely means all fish would be captured, possibly multiple times over the course of their life span. When the Forest conducted some of the same types of radio tag studies in 1999-2002 on migrating/emigrating Chinook salmon in the Middle Fork, North Fork, Fall Creek, Salt, and Salmon Creek, we observed a large numbers of pre-spawned adults move downstream to the reservoir environment until mid-late September. These fish, as well as all other species, such as rainbow and cutthroat trout, would also be trapped in a collection facility and have to be released somewhere back to the river system. There are many other concerns that have not been addressed on how a collection facility could/would affect all fish life cycles in the area.
- An outmigrant trap in this location would have the capability of capturing migrating bull trout. The population of bull trout above Hills Creek is important for the recovery of threatened bull trout. This is one of the only successful reintroduced populations in the United States. Solutions for spring Chinook should not preclude attainment of bull trout recovery goals. The North Fork site is unlikely to capture bull trout and if it did, the numbers would be much lower. This site is below the popular boating run and would have the least impact to recreation values.
- This site could be located in an already altered location, thus decreasing the impacts on the riparian area.
- Known historic sites occur in the vicinity. The same concerns stated in the Wild and Scenic North Fork proposal would apply. Since we do not know the precise project locations and level of inundation proposed for each area, it's difficult to say what the exact issues are relating to specific cultural sites, only that impacting them is a serious problem.
- We believe this alternative would have the most public support and would not be as likely to experience controversy and litigation that could potentially slow down implementation timelines. We understand that this is the most expensive option.
- Our concern with this site is the amount of inundated area upstream has not been disclosed. If the area of inundation would reach the Buckhead Natural Area we would have the same concerns listed for the site upstream of Black Canyon Campground. We may also have concerns if the area of inundation includes Black Canyon Campground and boat ramp.

<u>Within Reservoir Sites (All Collection Strategies)</u>

The Forest Service supports further consideration of these sites for the following reasons:

- Within reservoir collection sites would have limited impacts on recreational values.
- There would be little to no disturbance to riparian habitat or channel geomorphology.
- Merwin traps have a relatively low cost, a low impact to recreation and riparian areas, and a proven technology. The success of the other options is uncertain and most would result in unacceptable impacts.
- This site is likely to be the least controversial with far fewer adverse effects. The environmental analysis would be less complex and therefore less costly and time consuming

<u>Additional Alternative to Consider</u>

Rotary Screw Traps along the mainstem Middle Fork Willamette River

- A series of rotary screw traps would not have the negative impacts on recreation, resident fish, and Wild and Scenic values that many of the other proposed alternatives have. This option would have a relatively low cost and a low impact to recreation and riparian areas. We especially like that it is a proven technology. It is challenging for us to be supportive of the other options with large impacts especially given the uncertainty of their ultimate success. In other areas (Middle Fork Willamette River above Hills Creek Reservoir) screw traps and weirs are used routinely and effectively to capture a large portion of the bull trout that return to Hills Creek Reservoir after spawning in the Middle Fork River. These traps have often been used to successfully sample percentages of spring Chinook salmon below Hills Creek Dam and in the mainstem Middle Fork, Fall Creek and many others. You will not get anywhere near 100% capture with any single trap but if the goal is to capture a certain percentage then a series of screw traps could be highly successful. It is possible that mainstem Middle Fork screw traps could capture 2/3 of the population which is the estimated capture for the North Fork sites. It is also possible that design modifications to existing screw trap technology could occur that would increase trapping efficiency at considerably less expensive cost.

I appreciate your consideration of our comments. If you have any questions, please contact Nikki Swanson, Forest Aquatics Program Leader, at (541) 225-6439.

Sincerely,

/s/ Meg Mitchell
MEG MITCHELL
Willamette Forest Supervisor

cc: Sean.K.Askelson
Elizabeth.W.Roy
David.W.Griffith
Mindy M Simmons
Christine.M.Budai
Debbie A Hollen

Attachment 1:
Relevant Program Goals for Wild and Scenic Rivers Program

I. Protect and enhance the values for which the river was designated including ORV's, free-flowing nature, and water quality. (*Free flowing* is defined as "existing or *flowing in natural condition without impoundment, diversion, straightening, rip-rapping, or other modification of the waterway".)* **We are not supportive of any project that would change the free flowing nature of this river.**

II. Prohibit assistance for water resources projects by other federal agencies if the project would have a direct or adverse effect; or would invade or unreasonably diminish scenic, recreational, fish and wildlife values present at the date of designation. (*Water resources projects* are defined as *" any hydroelectric facilities licensed under the Federal Power Act or other federally assisted projects which would affect the free-flowing characteristics of a WSR".)* **This proposal would diminish recreational and scenic values.**

III. Preclude federal assistance to projects below/above a designated river that have been determined to "*invade the area or unreasonably diminish the scenic, recreational, fish and wildlife values present as of the date of designation*."

IV. Protect rivers in light of other policies which may be contrary to the Act...; directs river-administering agencies to cooperate with EPA and appropriate state water pollution control agencies to eliminate or diminish the pollution of waters.

- The State of Oregon designated the North Fork a State Scenic Waterway in 1988 covering the same river course from Waldo Lake to one mile upstream of Westfir, Oregon. This designation also includes Waldo Lake. The State of Oregon river system uses different river designations than the WSR system, but its goals are consistent with the national WSR program and generally tier to national forest management direction whenever the river designation occurs on a National Forest or Grassland.

Relevant program goals of for State Scenic Waterways program include:

I. Protecting the free-flowing character of a designated river for fish, wildlife and recreation resources.

II. Prohibition of dams, reservoirs, impoundments, or placer mining activities.

III. Protecting and enhancing scenic, aesthetic, natural, recreation, scientific, fish and wildlife values.

IV. Protect private property rights. The act discourages unsightly structures or inappropriate development that could be a nuisance to neighboring landowners or even depreciate property values.

V. To encourage other local, state, and federal agencies to act consistently with the goals of the program.

This page was intentionally left blank.

8. USACE Responses to Agency 60 Percent Comments

(TO BE PROVIDED)

This page was intentionally left blank.

9. A-E Contractor Statements of Technical Review and 90 Percent AR ITR Review Comments

This page was intentionally left blank.

A-E CONTRACTOR STATEMENT OF TECHNICAL REVIEW

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

The A-E Contractor (CH2M HILL) and its subconsultants (AECOM and BioAnalysts) have completed the 90 Percent Alternatives Report for the USACE Lookout Point Head of Reservoir Collection Project. Notice is hereby given that an independent technical review, appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The independent technical review was completed by CH2M HILL and its subcontractors. All comments resulting from ITR have been resolved.

Fant Olsen — 3/3/2011

Technical Review Team Leader` — Date

James G. Kaylor — 3/3/2011

Project Manager, A-E Contractor — Date

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

See WBG Quality Review Forms

As noted above, all concerns resulting from independent technical review of the project been fully resolved .

Richard C. Dutton — 3/3/2011

Principal, A-E Contractor — Date

WBG Quality Review Form (QRF)

Category 1: Comment intended to identify significant system deficiencies for phase of review or major design flaws. Reviewers shall only use this category to include comments that truly are considered serious flaws or life safety issues. If continuous QC review is performed correctly there should be little or no need for this category.

Category 2: Comment to identify incorrect information found in the review. Comment may also be focused on lowering risk, or improving the quality of the work product and/or the ultimate application of the work product consistent with the contracted scope and quality management plan.

Category 3: Comment is editorial or otherwise minor in nature with little effort to implement. Intent of this category is not to spend time discussing these comments during final review discussions. Comment is non-controversial in nature and easily incorporated or may be discretionary with the Task Lead and/or PM.

Client/Project:	USACE Lookout Point Head of Reservoir Collection
Project No.:	402429
Phase:	Feasibility Study
Work Product:	90 Percent Alternatives Report
Date:	**14-Jan-11**
Reviewer:	Forrest Olson
Return to:	James Kapla/SEA
Review Comme	14-Jan-11

File Name:

Response Due Date: **Final Adjudication Due Date:**

Comment Number	Reference Page or Sheet No.	QA/QC Reviewer	Review Comment	Category No.	Responsible Responder	Response	Final Adjudication: "Done" if resolved, "ITF" if passed to Issue Tracking Form
1	**General comments**	F. Olson	The report at this stage focuses on the two selected alternatives, the in-river (NFNF) system and the in-reservoir (FSC) system. However, it is clearly noted late in the report (Page 6-12) that the in-river alternative at Westfir would not likely be acceptable to the public, Forest Service, ODFW, and perhaps others. I would suggest that this conclusion be highlighted more and placed earlier in the report, and especially included in the synopsis.	2	V. Autier	The synopsis now includes a summary of report conclusions and recommendations. In addition, during Checkpoint Meeting No. 4 it was decided that the final alternatives should be prioritized solely based on technical issues and not on identified social, environmental or political	Done.
2	**General comments**	F. Olson	I agree with the report that the in-reservoir FSC is the best alternative despite the considerable uncertainties. The need for studies, phasing, and monitoring to address these uncertainties is handled well in the report but should be highlighted more up front. It would be helpful if NMFS would be more committal to this approach (which their comment letter suggests they would be), especially regarding the likelihood of an expanded schedule.	2	V. Autier	Additional information has been provided in the synopsis and elsewhere to highlight these issues, including the need for RM&E studies and the willingness of the resource agencies to be flexible with the BiOp dates given certain conditions.	Done.
3	**Page 5-6 and 5-7**	F. Olson	This section does a good job discussing the need for prototyping and phased implementation. However, I suggest that a smolt-only phase be added to the FSC, i.e. do not attempt to collect fry until and unless studies show that fry would be better off collected and transported downstream versus left to rear in the reservoir. Much of the uncertainties and anticipated problems of the FSC system involve the fry collection (small mesh net subject to fouling, questionable guidance, handling/transport mortalities). If fry left in the reservoir had only a 10% survival before they exited (including turbine mortality) it would be comparable to releasing the fry in the river below the Dexter (based on past fry and smolt survival-to-adult studies at Dexter). So I would suggest that reservoir fry survival studies (with related behavior and predator studies) be conducted in concert with a smolt-only collection phase of the FSC.	2	J. Kapla	These studies have been added to the list of required studies in Section 7.	Done.
4	**Page 7-1**	F.Olson	The first bullet notes lack of clearly defined biological goals. I disagree because goals by definition tend to be general, and this project clearly is intended to support the goal of helping recover the Willamette spring Chinook ESU. Perhaps the statement refers to lack of quantified 'objectives" or performance criteria. If so, I still do not see a need for more clear definition given the acknowledged uncertainties and prototyping/phasing	2	V. Autier	This sentence has been updated to reference "quantifiable biological objectives."	Done.
5	**Page 7-1 4th bullet**	F.Olson	It would be more correct to state that the survival rates are heavily dependent on the "fate" of fry (reservoir vs. in-river) than on their collection. Must wait for studies to determine if fry collection is worthwhile.	2	V. Autier	This bullet has been updated.	Done.

A-E CONTRACTOR STATEMENT OF TECHNICAL REVIEW

COMPLETION OF INDEPENDENT TECHNICAL REVIEW

The A-E Contractor (CH2M HILL) and its subconsultants (AECOM and BioAnalysts) have completed the 90 Percent Alternatives Report for the USACE Lookout Point Head of Reservoir Collection Project. Notice is hereby given that an independent technical review, appropriate to the level of risk and complexity inherent in the project, has been conducted as defined in the Quality Control Plan. During the independent technical review, compliance with established policy principles and procedures, utilizing justified and valid assumptions, was verified. This included review of: assumptions; methods, procedures, and material used in analyses; alternatives evaluated; the appropriateness of data used and level obtained; and reasonableness of the result, including whether the product meets the customer's needs consistent with law and existing Corps policy. The independent technical review was completed by CH2M HILL and its subcontractors. All comments resulting from ITR have been resolved.

Walter N. Bennett — 3-3-11

Technical Review Team Leader — Date

James H. Vaughn — 3/3/2011

Project Manager, A-E Contractor — Date

CERTIFICATION OF INDEPENDENT TECHNICAL REVIEW

Significant concerns and the explanation of the resolution are as follows:

See WBG Quality Review Forms

As noted above, all concerns resulting from independent technical review of the project been fully resolved .

Robert E. Dalton — 3/3/2011

Principal, A-E Contractor — Date

WBG Quality Review Form (QRF)

Client/Project:	USACE Lookout Point Head of Reservoir Collection
Project No.:	402429
Phase:	Feasibility Study
Work Product:	90 Percent Alternatives Report
Date:	
Reviewer:	Walter Bennett/SEA
Return to:	James Kapla/SEA
Review Comment Due Date:	

Category 1: Comment intended to identify significant system deficiencies for phase of review or major design flaws. Reviewers shall only use this category to include comments that truly are considered serious flaws or life safety issues. If continuous QC review is performed correctly there should be little or no need for this category.

Category 2: Comment to identify incorrect information found in the review. Comment may also be focused on lowering risk, or improving the quality of the work product and/or the ultimate application of the work product consistent with the contracted scope and quality management plan.

Category 3: Comment is editorial or otherwise minor in nature with little effort to implement. Intent of this category is not to spend time discussing these comments during final review discussions. Comment is non-controversial in nature and easily incorporated or may be discretionary with the Task Lead and/or PM.

File Name:

Response Due Date:

Final Adjudication Due Date:

Comment Number	Reference Page or Sheet No.	QA/QC Reviewer	Review Comment	Category No.	Responsible Responder	Response	Final Adjudication: "Done" if resolved, "ITF" if passed to Issue Tracking Form
1	**5-3, par 1**	WNB	The slack net condition may also damage the nets.	2	V. Autier	This sentence has been updated.	Done.
2	**5-3, par 2**	WNB	The horizontal anchors with cables near the water surface are not practical mainly because the water surface is too variable. The tower approach is the only viable approach in my mind.	2	V. Autier	Additional discussion has been provided based on this concept.	Done.
3	**5-4, par 2**	WNB	the FSC *<u>will most likely</u>* have difficulty	1	V. Autier	This sentence has been updated.	Done.
4	**5-4, par 3**	WNB	Swift has a fluctuation of 100 feet + and the nets are full exclusion. Do you mean no one has attempted this because Swift is not yet built. Seems better to say there is no experience with the performance.	2	V. Autier	This has been clarified.	Done.
5	**5-6, par 4**	WNB	I think it should be stated that the fish will be classified by size prior to being sent to the raceway. My understanding is >200mm go back to the reservoir and we only collect < 200m. It also seems like this makes fry vulnerable to be in with much larger fish, is this correct?	2	V. Autier	This is correct. Sorting and handling is discussed in Section 3.3.1. While a single sort is proposed, smaller and greater than 200 mm, it is possible that the resource agenices may request another sort at 60 mm. This is discussed as an alternative strategy.	Done.
6	**5-6, par 5**	WNB	Seems it is worth saying that getting a truck and the boat to meet at the dam is much easier than meeting on shore up reservoir and for that reason, the transfer at the dam is being proposed.	1	V. Autier	The paragraph was modified; reference evaluation in Appendix F.	Done.
7	**5-7, point 4**	WNB	You will also be testing the debris load and durability of the nets. This is an important part of the prototype.	2	V. Autier	This issue has been added.	Done.
8	**5-10, par 2**	WNB	*this does not represent the anticipated performance of the actual facility* . This leaves me wondering why and what does. Needs more explanation or delete the statement.	1	V. Autier	This statement has been clarified. It is anticipated that accurate performance data could only be obtained through actual operation of the facility.	Done.
9	**5-10, par4**	WNB	Pacific Northwest *and California.* Seems like this is necessary since we reference California projects. Also in 5-12, par 1.	1	V. Autier	The entire western U.S. has been referenced here.	Done.
10	**6.3.2**	WNB	You inticate both have high O&M and you give them the same annual cost figure but I don't see an explanation for it. You don't back this up for the Westfir site. Why are costs as high for Westfir. A discussion on public opposition does not belong in the O&M section.	2	V. Autier	This information has been updated. Detailed cost information is provided in Appendix G.	Done.
11	**6.3.3**	WNB	You imply the study costs are comparable but I don't think they are. I don't think you would do many of the studies called for in chapter 7 if you made the decision to pursue Westfir unless you did the studies to prove it was better than the FSC. Also, there are no prototype costs if Westfir is selected. I think you are working to hard to make these options comparable.	1	V. Autier	The costs of prototyping have been added to the FSC alternative. It is assumed that the cost of RM&E studies, which are already underway, will be comparable for both alternatives.	Done.
12	**6.5**	WNB	The way I read the conclusion is that you can not differentiate between the two in terms of potential for success and default to making the decision based on the social and environmental impact of the Westfir option. I think we should take a stronger stand. I personally feel Wsetfir option is more positive and the issues associated with that option can be resolved over time.	3	V. Autier	During Checkpoint Meeting No. 4 it was decided that the final alternatives should be prioritized solely based on technical issues and not on identified social, environmental or political issues. As such, both remaining alternatives are recommended for further evaluation.	Done.
13	**Table 6-4**	WNB	the high operational risk is associated with what components, can we be specific? Pumps and nets? This is not in the paragraphs either.	2	V. Autier	The bullet and table 6-4 was updated to describe which components, and text was added in Section 6.3.2.	Done.
14	**7.2.1**	WNB	Is the uncertainty about the signature of a small entrance with 500 to 1000 cfs considered a biological risk?	1	V. Autier	Yes, this has been updated.	Done.
15	**General**	WNB	You keep saying there is no precedence but Swift accomodates a 100 foot swing. Clarify, the concept has not been proven, only designed.	2	V. Autier	Clarificiations have been provided throughout the report.	Done.

10. 90 Percent AR Dr. Checks Comments and Responses

This page was intentionally left blank.

Comment Report: All Comments
Project: Lookout Point Alternatives Report
Review: 90%
Displaying 4 comments for the criteria specified in this report.

Id	Discipline	DocType	Spec	Sheet	Detail
3725444	Cost Engineering	Technical Report	n/a'	n/a	n/a

The cost estimate in Appendix G had higher cost figures than most of the values listed in the body of the report, in the Synopsis (page ii) and in Section 5.2.5 and Section 5.3.5, and also in Table 6-2 and Table 6-4. Appendix G values for capital construction cost and project cost were higher than those listed in the body of the report. Also, the annual O&M cost for the preferred option was reported differently in the Synopsis (page ii) and Section 5.2.5.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 18-Jan-11

Revised 18-Jan-11.

1-0 Evaluation **Concurred**

Autier: This issue has been corrected and the costs have been updated for the final submittal.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3725445	General	Technical Report	n/a'	n/a	n/a

Formatting comment. The extra spaces between letters in words, apparently added for creating an even right hand margin, makes reading the pdf difficult in the Synopsis and in Section 6.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Autier: This issue has been resolved.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3725447	General	Technical Report	n/a'	n/a	n/a

Please see open 60% comments, especially the request to add brief text that answers why at-dam alternatives were not evaluated as part of this study.

Submitted By: Elias Chiriac (206-764-6858). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

As noted in the synopsis and introduction, the evaluation of an at-dam alternative was specifically excluded from this study.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3734481	General	Plans	n/a'	n/a	n/a

Coordinating Discipline(s): Other

As BPA stated in its 60% Review, CH2MHILL, AECOM and BioAnalysts have done a commendable job ascertaining the technological feasibility of in-tributary head of reservoir collectors and in reservoir floating surface collectors at LOP and examining how these structures could be "prototyped". For the in-tributary systems in particular this effort will be very valuable as the same essential concepts that AECOM et al developed for LOP may be applicable to other reservoirs and tributaries at less cost. At this point, BPA cannot support any of the alternatives that have been produced. The cost-effectiveness is not currently knowable without understanding if it is biologically beneficial to transport fry past the LOP reservoir and into the River below. BPA would like to see RME directed towards this, perhaps by collecting a subset of fishwith screw traps of a Merwin trap and studying their ability to survive. A relatively inexpensive experimental effort like this (with the null hypothesis that it will provide some biological benefit) is in keeping with how BPA envisioned the Prototype Head of Reservoir Collector RPA. Finally, BPA suggests that all parties note that a head of reservoir collector was never an end into and of itself, rather, it was a means to the end of mitigating for LOP. Before any fullscale head of reservoir structure (at a cost of nearly $100 million to over $300 million) is selected for construction the Region should consider all viable means to mitigate for LOP including a voluntary effort by resource managers to rid the reservoir of exotic predators, changes to reservoir operation to facilitate passage, and operational at dam passage alternatives.

Submitted By: Daniel Spear (503-230-3124). Submitted On: 21-Jan-11

1-0 Evaluation **Concurred**

Autier: Noted. It is anticpated that ongoing and future RM&E studies will be helpful in characterizing the identified risks and uncertainties. In addition, it is anticipated that this work will assist in guiding future study and/or and design efforts, including for example the proposal to evaluate at-dam alternatives or other mitigation measures.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

This page was intentionally left blank.

11. 90 Percent PDT Dr. Checks Comments and Responses

This page was intentionally left blank.

Comment Report: All Comments
Project: Lookout Point Alternatives Report
Review: PDT 90%
Displaying 40 comments for the criteria specified in this report.

Id	Discipline	DocType	Spec	Sheet	Detail
3682286	Other	Other	n/a'	n/a	n/a

[**This item is flagged as a critical issue.**]
Coordinating Discipline(s): Planning - Plan Formulation

In the Synopsis, p. ii, last sentence indicates an annual O&M cost of $1.6 M, as does page 6-9. However, in the Table 6-4. comparison, under disadvantages, the higher annual O&M cost is $2.5M, a it is in Appendix G (cost estimates). It appears the $2.5M is the right number.

Submitted By: Pat (Dorothy) McCrae ((503) 808-4758). Submitted On: 29-Dec-10

Revised 29-Dec-10.

1-0 Evaluation **Concurred**
Autier: This cost information has been corrected and updated throughout the report.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

Id	Discipline	DocType	Spec	Sheet	Detail
3685444	Planning - Plan Formulation	Other	n/a'	n/a	n/a

[**This item is flagged as a critical issue.**]

Sec 6.5 It appears premature to narrow the alternatives to a single preferred alternative. The purpose o this study was to provide data to inform a "go-no go" decision on the technical feasibility of a head of reservoir plan. It served that purpose, and could now be seen as Phase I of the study, with a follow-on Phase II that provides greater detail on the alternatives that rose to the top of the list. At this point, the biological data is an estimate, and some of the technical issues are also best professional judgment, so doesn't appear that there is sufficient information to select a preferred alternative without further study It would be prudent to prepare a Phase II study that carries forward both of the alternatives summarize in the comparison Table 6-4.

Submitted By: Pat (Dorothy) McCrae ((503) 808-4758). Submitted On: 03-Jan-11

Revised 03-Jan-11.

1-0 Evaluation **Concurred**
Autier: During Checkpoint Meeting No 4 the decision was made to not de-priorit: an alternative solely based on social or environmental issues. As such, both remaining alternatives will be recommended for further evaluation.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3690209	Structural	Design Memorandum or Report	n/a'	n/a	n/a

No structural comments on the 90% report.

Submitted By: Kristy Fortuny (503-808-4940). Submitted On: 05-Jan-11

1-0 Evaluation **Concurred**
Autier: Noted.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3702562	Design Team Leader	Technical Report	n/a'	n/a	n/a

(Document Reference: Synopsis - 1)
Coordinating Discipline(s): Hydraulics

Last sentence reads: The evaluation of at-dam alternatives, if determined to be necessary upon completion of this report, will be provided as part of a separate study. We should acknowledge it is no included, but cannot commit to a separate study. Considered changing to: Operational and/or at-dam alternatives have not been evaluated or compared to the head-of-reservoir systems documented in this report.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 10-Jan-11

1-0 Evaluation **Concurred**
Autier: This sentence has been updated.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3702574	Design Team Leader	Technical Report	n/a'	n/a	n/a

(Document Reference: Synopsis - 5 and Section 5.2.4 Schedule)
Coordinating Discipline(s): Hydraulics

I would not focus so much on the BiOp timelines, would rather give an estimate as to how long DDR, Plans and Specs, and Construction would take for a production level facility of this magnitude. Other timelines to design and construct passage systems have been documented in the Downstream Requirements Report. Current RM&E basin estimates: DDR and P&S take approximately 18 months each, Construction may take up to two years. After biological questions have been sufficiently researched (we decide it is a good thing to do), an approximate total of 5 years from the decision to move forward with a head-of-reservoir collector until facility is operational.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 10-Jan-11

1-0 Evaluation **Concurred**

Autier: This section has been updated and an example program schedule has been provided in Appendix G.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3702583	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.2 FSC Design Flow)
Coordinating Discipline(s): Hydraulics

The flow rates selected are consistent with the FSC at Upper Baker, but that assumes that fry and smolt behave alike with equivalent flow fields. If smolt are actively migrating downstream while fry are more passive, would it point us to a larger flow field required to collect fry?

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 10-Jan-11

1-0 Evaluation **Concurred**

Autier: This is a possibility; however, the current concept is that fry will guide along the nets until they encounter the FSC flow field. Given the long distance that fry must travel along the nets (1,000s of feet), extending the flow field further out from the FSC entrance may not substantially increase collection efficiencies.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3702584	Hydraulics	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 3.2.2 Exclusion Net Design Flow)
Coordinating Discipline(s): Hydraulics

The flow rate chosen to calculate the exclusion net design flow appears reasonable, however the 5-yea recurrence flood (natural) is 44,500 cfs (Table 2-3 in the Water Control Manual). While it is not practical to design nets large enough to meet fish criteria under those conditions, the nets and associat equipment should be able to withstand forces to accommodate much larger flow rates passing through the reservoir.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 10-Jan-11

1-0 Evaluation **Concurred**

Willig: Updated information has been provided in Section 3.2.2 and Section 5.2.2

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3702590	Biology-Ecology	Technical Report	n/a'	n/a	n/a

(Document Reference: Section 4.3.3 Mobile Technologies)
Coordinating Discipline(s): Hydraulics

It appears the Merwin and Screw Trap information is listed together. My understanding is Merwin Traps may work in low velocity areas (>1.5 ft/sec). Very low velocities are typical for general forebay hydraulics, while screw traps need higher velocities to drive the wheel. Perhaps the screw trap information should have a separate subheading to distinguish the capabilities/limitations of the two systems.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 10-Jan-11

1-0 Evaluation **Concurred**

Malone: The two systems do have different attributes as noted but were describec in the same section because they are both considered mobile technologies.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3702825	Biology-Ecology	Technical Report	n/a'	n/a	n/a

(Document Reference: Table 6-1: effects on upstream passage)
Coordinating Discipline(s): Hydraulics

While adults are expected to be released higher in the watershed, some consideration should be given resident fish passage at each site. I would assume the FSC would need some type of upstream passage structure as well.

Submitted By: Sean Askelson ((503) 808-4882). Submitted On: 10-Jan-11

1-0 Evaluation **Concurred**

Willig: Yes, a description of this issue is provided in Section 5.2.2. A section has been added to Table 6-1 with this information.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704042	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: General)

Can spotted owl habitat be shown in a document for public release? A very long time ago I worked on study that involved bald eagle habitat and we couldn't publish that information in a public document.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: The NSO mapping information will be removed from public versions of the document.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704046	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Synopsis)

purpose. Is the intent of this document to make a decision on what to prototype or this document will b used as input into another document that will actually be the decision document? It is unclear and it should be clear.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: As noted, the purpose of this alternatives report is to provide an assessme of the technical feasibility of providing downstream passage for juvenile salmoni at Lookout Point Dam via head-of-reservoir and/or in tributary collection and transportation facilities.The report will be used by USACE and the WATER grou to inform decision making processes related to the overall coordination and implementation of the Willamette Valley BiOp. It is anticipated that further evaluations would be conducted to identify a suitable alternative to prototype if th decision was made to pursue head-of-reservoir collection at Lookout Point.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704048	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Synopsis)

Section 4 - they actually have biological results for Round Butte? I didn't think it had been installed lo enough to have data that a researcher/company would publish.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: Preliminary biological results are available for the PGE Round Butte FSC which has been operating since late 2009.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704050	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 1-1)

Page 1-1, section 1.1.1 second paragraph. You actually have design criteria for these other species? I find it odd that you say these other species will be incorporated into the design her but later you state you don't have enough data/criteria on them. See page 2-6.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: The list of other species is provided primarily to document their presence the reservoir and/or tributaries. Additional RM&E data may become available in the future, and this information could be incorporated into the preliminary design

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704053	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 1-3)

Page 1-3 top line, additional authorization from Congress? What does this mean? We can't build a hea of reservoir without authorization or we won't have dollars without additional authorization. What Congress has to authorize is not clear. If we need additional authorization do we have authority to do prototype testing?

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: It is anticipated that additional authorization and appropriations from Congress would be required for construction of the full-production facility but no necessarily the prototype facility (if required). Section has been updated.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704055	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 2-4)

Page 2-4 section 2.3.2. This is the first time I see NFMF used and it should be spelled out.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: This has been corrected.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704058	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 2-7)

Page 2-7 last line - our opinion? Who is "our"?

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: This sentence has been modified.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704059	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 4-10)

Page 4-10, top paragraph - last sentence needs some formatting help.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: This formatting has been modified.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704061	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 5-2)

Page 5-2, How do you optimize the flow rate? It says it should be done but what are you optimizing it for?

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Willig: Text has been added here to clarify this statement.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704063	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 5-3)

Page 5-3, Does the facility need to be manned 24/7 to deal with changing pool levels? If the facility is on the water is manning two people because of the buddy system for over water? Will you have safety boat requirements which could increase the manning requirements?

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: It is anticipated that the FSC, mooring and net systems would be fully automated to handle changing pool levels during periods when the facility was un-staffed. A total of 5 FSC operators are assumed, working 12 hours per day (se Appendix G). A boat operator and crane operator are also assumed. A second boa likely a small runabout work boat, would be located at the FSC for routine O&M tasks and personnel safety purposes.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704066	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 5-5)

Page 5-5, if the net folds or drapes could that trap juveniles in the seams? Is that a problem? So do you need the net to always be smooth in the vertical direction?

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Willig: The exclusion net system will be designed to minimize folds or gaps that could trap juveniles. The main net will include a lower section that is always taught. As the reservoir WSEL drops, the upper section will fold on the downstream site of the lower section as shown on Plate 8. The shoreline nets will include weights along their full length to minimize gaps. Additional descriptive text has been added to this section.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704069	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 6-1)

Page 6-1 - should add that the Cougar Dam study is face of dam alternatives evaluation.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: This has been added.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704071	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 6-5)

Page 6-5 - if you do the full reservoir which allows for a full use of the gene pool will the off channel system limit the gene pool? I didn't see this discussed in the biological section and it may not be an issue but thought it would have been mentioned in some form.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Malone: The collection potentials of the two systems are similar; however, the in-tributary system would only collect a portion of the overall basin population. Information related to this issue has been added to Tabl 6-4.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704073	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 6-8)

Page 6-8 - what if you over predicted your requirements. Have we designed something so expensive w can't build it or we can't build it at delaying significantly other projects?

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: Biological performance goals have not yet been established. Lacking this information, a fairly conservative approach was taken regarding required fish collection potentials to establish a sustainable population. It is anticipated that ongoing and future RM&E studies will address these questions and that the desig criteria will be refined as appropriate during preliminary design.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704075	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 6-10)

Page 6-10. Top paragraph the word seed is used and I think it should be seek.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: This has been corrected.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704077	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 6-10)

Page 6-10 and 6-11. This issue with in reservoir rearing, fry versus smolts is starting to articulate a criteria for head of reservoir/face of dam decision and I think that should be addressed a bit more in th section versus the third bullet on page 7-3.

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: Additional information has been provided in Section 7.2.3.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704078	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Page 6-12)

Page 6-12. Has the check point meeting 4 taken place? How does this sentence get modified in the fin

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: Checkpoint Meeting No. 4 took place on 19 January 2011 and this sectior has been modified to recommend further evaluation of both remaining alternative

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3704090	Hydraulics	Design Memorandum or Report	n/a'	n/a	n/a

(Document Reference: Schedule)

Schedule. "Some leeway" may be available for the 2014 date. Besides the technical aspects for maybe needing to defer or to at least prototype pieces of design isn't funding along going to have to be factore into "leeway".

Submitted By: Laurie Ebner ((503) 808-4880). Submitted On: 11-Jan-11

1-0 Evaluation **Concurred**

Autier: Additional text was added to paragraph 5 of the Synopsis and Section 1. A example program schedule is also included in Appendix G.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3708999	Cost Engineering	Feasibility Study	n/a'	n/a	n/a

Looks good. Thanks for adding the note about Davis-Bacon wage rates. My only comment is that som text is cut off on the notes regarding the Exclusion Nets in the cost estimate appendix.

Submitted By: Jeffrey Allen Sedey (503-808-4423). Submitted On: 12-Jan-11

1-0 Evaluation **Concurred**
Autier: Noted. The margins have been adjusted.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3725612	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 1. Scope and Purpose. The Synopsis is much clearer and complete than in the 60% Report and the Scope and Purpose Section 1. could benefit from addition of some of the explanation in the synopsis. Suggest adding the Purpose section from the Synopsis (or similar) to Section 1.1.1 to fully explain the study purpose.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**
Autier: Section 1.1.1 has been updated.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3725620	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 1.2.3, second para, last sentence. Suggest inserting "head of reservoir" after prototype to make clear that RPA described HOR systems.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**
Autier: This change has been completed.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3725628	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 3.1, Table 3-1. It may be helpful to include the design migration operating period in the summary table.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**
Autier: This information has been added to the table.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3725632	Hydraulics	Technical Report	n/a'	n/a	n/a

Table 4-1. Note at the end says that the shading indicates alts that have been deprioritzed, but it seems the shading is just indicating alternating rows. Update format or delete note.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**
Autier: This issue has been resolved.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3725650	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 5. and App G. I see that additional cost is included for the added complexity of the FSC net system over the Baker system. Is the cost adequate to cover the cost of construction of the towers expected to support the net at the shoreline as described? This seems like a significant addition over th system at Baker... just checking.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**
Autier: These costs have been further refined and are included as separate line items on the cost detail sheets.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11
Backcheck not conducted
Current Comment Status: **Comment Open**

3725652	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 5.2.2 This goes with the previous comment about the net costs for the FSC alts. Are the costs the resident fish passage and recreational boat passage needs described in Section 5.2.2 accounted for the cost estimate?

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Autier: Yes, these costs are now included as separate line items on the cost detail sheets.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3725653	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 5.2.3. Item 1. It might be good to note that we are concerned not only with the fish guiding lor distances along the net, but potentially from shallower areas to the FSC location in the thalweg.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Malone: This observation has been added.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3725658	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 5.2.3 Item 3. Questions the feasibility. This report is supposed to be helping us determine the feasibility, so I would suggest rewording this item to something similar to "Technical and cost risks have been identified in this alternatives study for the FSC with net alternative. Are there additional cos or technical issues associated with deployment of a full-depth net system at LOP that can be identified during a prototype phase?"

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Autier: Yes, this item has been updated.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3725662	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 5.2.3 Phased Implementation. Item 1. A deeper draft adjustable NTS is described in the phased implementation section, but it is not clear whether this adjustable NTS is included in the costs. Also, th adjustable NTS does not seem to be described as a particularly feasible structure. It should either be included as a fully described structure or left out of the phasing. If it is something we might have to move to in the phased implementation, it seems it should be included in the costs. (Maybe it is and I missed it!)

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Autier: References to to an adjustable NTS system have been removed from the report.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3725673	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 5.3.1 3rd para, 1st sentence: Suggest, "The in-tributary off-channel collector alternative is presented..." Second sentence, the gage No. has a typo, should be No., not N0. Section 5.3.2. References to "trapping" seem out of place, might flow better with earlier references to collector is changed to "collection". 1st sentence, it might be helpful to note the design migration period when collection is required, even in parenthesis to remind the reader that the weir will not be in operation all year. 5.3.5: Second para: The Westfir... something missing here.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Autier: Noted; these corrections have been made.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3725683	Hydraulics	Technical Report	n/a'	n/a	n/a

Section 6: Need to confirm the selection of preferred alternative at our checkpoint meeting per your bullet on page 6-1. This needs some discussion. Section 6.3.1 1st para notes seven performance criteri used for evaluation, but Table 6-1 only has six. It seems to be missing Effects on other Fish of Concer Tables: The tables in section 6 offer a great summary of the evaluation criteria for each alternative, bu it is not clear how they were used to come to the preferred alternative. I think we need to discuss this i the checkpoint meeting and make sure our approach at this stage is consistent with our process to date and for the future.

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Autier: The paragraph and table have been updated. With the decision made at Checkpoint Meeting No. 4 to recommend both alternatives for further evaluation, the discussion focuses on risks and uncertainties rather than a comparision betwe alternatives.

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

3725685	Hydraulics	Technical Report	n/a'	n/a	n/a

Overall: Report is much clearer with the formatting changes since the 60% Report. Thank you for all your effort!

Submitted By: Elizabeth Roy (503-808-4849). Submitted On: 18-Jan-11

1-0 Evaluation **Concurred**

Autier: Noted; thank you!

Submitted By: James Kapla (4252333239) Submitted On: 15-Mar-11

Backcheck not conducted

Current Comment Status: **Comment Open**

This page was intentionally left blank.

12. 90 Percent Agency Comment Letters

This page was intentionally left blank.

The Confederated Tribes of the Grand Ronde Community of Oregon

Natural Resources Division
Phone: (503) 879-2424
Fax: (503) 879-5622

47010 S.W. Hebo Road
P.O. Box 10
Grand Ronde, Oregon 97347

January 26, 2011

David W. Griffith
USACE Portland District
333 S.W. First Ave.
Portland, OR 97204

RE: Review of **LOOKOUT POINT HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY,** 90 Percent Review AR December 2010

Mr. David W. Griffith;
The Confederated Tribes of the Grand Ronde Natural Resources Department (CTGR) acknowledges that the United States Army Corps of Engineers (USACE) is accepting technical comment on the 90% checkpoint document for **LOOKOUT POINT HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY.** The CTGR would like to thank the USACE for this opportunity to comment.

Comment – 5.2.2 – **Fish Sorting and Handling** – The CTGR support the less intrusive handling methods to minimize fish stress levels and mortalities. A basic sorting design should have a large fish / small fish sorter or > 200mm and <200mm sorting tanks. The CTGR identify no significant biological impact to small resident fish that may be transported with juvenile spring Chinook downstream below Dexter Dam. It is anticipated that collection facilities at the Willamette Valley Projects will be updated with the best and latest upstream fish collection technologies, providing both year round upstream and downstream migration for native fish. Resource managers need to collaborate on the disposition of resident fish as the passage facilities and capabilities develop.

Comment - 6.5 - **RATIONALE FOR SELECTION OF THE PREFERRED ALTERNATIVE.** Social impacts should not be weighted in the selection of a preferred alternative at this time. If future RME efforts suggest an in tributary collector is the best technical and biological alternative, the CTGR believe many groups may be very supportive. If an in-tributary collector is deemed highly biologically and technically feasible, the CTGR recommends that a significant public scoping effort and necessary government-to-government consultations occur prior to any final decision.

Comment 7.2 – **Selection of the preferred alternative must be based on technical and biological feasibility.** According to the data presented in this report, a selection of one preferred alternative is not warranted due to the lack of biological and technical data and information. Therefore, the CTGR recommends that the final report is NOT to identify a single alternative as a preferred alternative but to reflect the top two alternatives as both having the highest potential of success but further assessment of both alternatives is needed.

Comment 7.2.1 **Lack of clearly defined biological objectives** – The biological objective should be clear and this is the hydro-system should have no net negative impact to native anadromous fish populations. Therefore, it should be assumed that the development of a collection facility will collect 100% of migrating juveniles and will have no associated mortality to transported fish. The inability of the project to meet these standards, therefore, has a defined impact to the population and a responsibility to mitigation these associated losses due to the construction and operation of the project. At this point, it is to the policy members of the resource agencies to collaborate and develop an implementation plan that shall meet the needs of the resources.

Comment 7.3.2 – **Physical Characterization** - What is the difference between a mid-reservoir FSC versus an at dam FSC? As described, a fixed FSC will need to operate below minimum pool elevation. To have sufficient depth to operate, a fixed FSC would need to be constructed mid-reservoir. A mid reservoir collector mimics an at dam collector more then head of reservoir. A mid reservoir is just a smaller dam with a smaller conservation pool. If predation or stranding is not a significant limiting factor, an RME need that may need to be investigated is what quantifiable difference between at dam collection versus mid reservoir collection?

If you have any questions please contact at me at 5403-879-2395 or email at lawrence.schwabe@grandronde.org

Thank You,

Lawrence Schwabe
Hydro-system Compliance Specialist
Confederated Tribes of Grand Ronde

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
1201 NE Lloyd Boulevard, Suite 1100
PORTLAND, OREGON 97232-1274

February 11, 2011

Joyce Casey, Chief
Environmental Resources Branch
Department of the Army
Corps of Engineers, Portland District
P.O. Box 2946
Portland, Oregon 97208-2946

RE: Review of the 90% Alternatives Report Lookout Point Head of Reservoir Collection Alternatives Study, dated December 2010

Dear Ms. Casey:

National Marine Fisheries Service (NMFS) appreciates the opportunity to review the subject document and provides the following comments. The U.S. Army Corps of Engineers (Corps) and its contractors (CH2M-Hill, AECOM, and BioAnalysts) have done a thorough job of developing alternatives, identifying information gaps, and detailing the alternatives.

General Comments

We found review of this report difficult and time-consuming. First, numerous organizational changes were made to the report since our last review, which was of the 60% Review Alternatives Study. This led to a significant amount of effort to re-orient to the text and try to denote changes. Second, full justification of the text within the report made much of the text unreadable. Our staff invested a significant amount of time trying to decipher the text. Third, the author chose to handle the complexity of the report by organizing much of the supporting documentation into appendices. This is a logical way of organizing the information, however, the report was provided to us in electronic form. When printed, this yielded a report with multiple appendices in excess of 550 pages. This meant that we had to take a considerable amount of time, sorting through this large pile of paper and deciphering how the report should be segregated, taking time to place tabs denoting the appendices, and then binding the document. We request in the future, for large reports like this one, the Corps send at least one hard-copy of the report for our staff to review.

The RPA (Reasonable and Prudent Alternative) required Bonneville Power Administration and the U.S. Army Corps of Engineers (Action Agencies) to conduct an alternatives study, specifically targeted at developing concepts for head of reservoir collection, at Lookout Point. National Marine Fisheries Service intended this as a technical assessment of possible alternatives for collection of juvenile fish. Therefore, we do not support elimination of the Westfir alternative based upon a social issue related to the site. Two alternatives should be maintained and deemed feasible; these alternatives are Upper Reservoir Floating Surface Collector, with nets, and the Westfir, in-tributary diversion and screen, alternatives. As was discussed at the

January 19, 2011, Checkpoint Number 4 meeting, both NMFS and Corps recommended that the Westfir alternative as a feasible option and that the report conclusion is modified to include Westfir.

As we stated in our last set of comments (conveyed by letter dated November 8, 2010, regarding Review of the 60% Alternatives Report Lookout Point Head of Reservoir Collection Alternatives Study, dated September 2010) NMFS understands that the Corps and others are reluctant to move forward with design and construction of any of these alternatives, given the high cost and biological uncertainty. As next steps, we suggest the Corps intensify efforts in the near term on comprehensive biological studies and hydraulic modeling. Therefore, we propose collaborative development of a suitable study program with which the Action Agencies will aggressively work toward gathering adequate information and facilitate a decision. Delay of actions expressly required by the RPA, is not something that NMFS can allow without good rationale and exchange for equivalent biological benefit. As a possible idea, the Action Agencies could commit to fund a three to four year intensive study of the issues, realizing that the RPA prototype would not be constructed by the 2014 deadline. Instead, the research, monitoring & evaluation (RM&E) results would lead to a clear picture of the appropriate path forward on the design and operation of the facilities to pass downstream migrants through or around Lookout Point and Dexter dams. The Corps should construct the permanent fix prior to the 2022 RPA deadline, which would satisfy the need to provide an exchange of the biological benefit.

In addition, and consistent with research results presented at the recent Willamette Fisheries Science Review, the high risk of predation and elevated temperatures found in the Lookout Point Reservoir may convince the region that without drawdown of the reservoir, juveniles not collected upstream and left in the reservoir may perish. This would help focus study efforts and centralize questions around the in-tributary alternative.

Specific Comments

Page 3-2. The Corps should evaluate potential cost savings that could be achieved by reducing the period over which the design flow is calculated. National Marine Fisheries Service proposes that the Corps estimate cost savings and fish collection potential for a design flow window of March 1 through June 1.

Page 3-13. The Corps should reconsider the operational criteria premise that design of the downstream collection facility is not allowed to impact any of the authorized purposes of Lookout Point reservoir and dam (hydropower, flood control, irrigation, navigation). Given the high cost of the facilities, the Corps should investigate the biological benefits of reservoir drawdown.

Page 5-6 and 5-7. With respect to the Floating Surface Collector (FSC), NMFS is concerned that guidance of fry to the collector is questionable. Successful passage would require fry sized (rearing) fish to move away from typical habitat in the shallows near shore and violate normal rearing behavior by moving into deep reservoir waters. Previously built FSC's relied upon smolt migratory behavior to locate and pass through the structure. Any assumption that fry would exhibit this same behavior is uncertain. One additional complication for fry is that the net is

File Code: 2500/2600
Date: January 12, 2010

Joyce Casey
CENWP-PM-E
USACE
333 SW First Ave
Portland, OR 97204

Dear Ms. Casey,

Thank you for the opportunity to review the "90% Lookout Point Head of Reservoir Collection Alternatives Study (December 2010)". We appreciate the work that you have done since the 60% review. It is obvious that you took time to understand and address our concerns and to continue to involve us in the process. We support your decision to remove the alternative on the Wild and Scenic portion of the North Fork and the alternatives on the main-stem Middle Fork Willamette. Elimination of these sites addresses our concerns about impacts to the ecological, cultural, and recreational values. We support the in-reservior site as the preferred alternative to advance through the process. As indicated in our review of the 60% Alternatives Study (September 2010) we have concerns about the Westfir site and would like to see it dropped from consideration.

We support your preferred alternative (FSC) for the following reasons:

- Within reservoir collection sites would have limited impacts on recreational values.
- There would be little to no disturbance to riparian habitat or channel geomorphology.
- FSC Nets have a low impact to recreation and riparian areas.
- This site is likely to be the least controversial with far fewer adverse effects. The environmental analysis would be less complex and therefore less costly and time consuming.

The Forest Service (FS) would like to see the Westfir Site (North Fork of the Middle Fork of the Willamette River - Private Ownership) site dropped from consideration for the following reasons:

- Although this location is not on National Forest lands, the recreational and scenic impacts of a facility in this location would adversely affect FS interests. The North Fork is managed as a wild trout stream and is renowned throughout the fly-fishing community.
- Potential impacts to upstream fish passage including false attraction and delay. This is especially of concern given the "wild trout only" management of this river as a high class trophy trout fly-fishing only stream. Creating a genetic block or genetically isolated population is highly undesirable. There needs to be analysis to demonstrate the juvenile collection facility will not adversely affect emigrating salmonids and other native fishes on the MF/NF river system.
- If the area of inundation extends onto the National Forest, it would impact Wild and Scenic and State Scenic values. An alternative that does not impact a Wild and Scenic River is preferred for reasons outlined in our response to the 60% Alternative Study.
- Placing a dam at a site where a previous dam was removed would be expected to cause an upwelling of public concern from residents of the local community as well as the numerous groups who are very interested in maintaining the quality and character of this river. The community of Westfir worked

very hard to have the previous dam removed and there is likely to be difficulty finding support for this alternative from the local residents.

- We understand that this is the least expensive land-based facility option; however it is also likely to have the least public support and would be considerably more likely to experience controversy and litigation, potentially slowing down implementation timelines.

In Appendix F, page 46, not all of the Forest Service comments from the 60% review were captured for all of the alternatives. It would be helpful to have the comments documented so that if any of these alternatives were re-considered in the future, the Forest Service issues and interests are clear.

I appreciate your consideration of our comments. If you have any questions, please contact Nikki Swanson, Forest Aquatics Program Leader, at (541) 225-6439.

Sincerely,

/s/ Kathy Bulchis for
MEG MITCHELL
Willamette Forest Supervisor

cc: Sean.K.Askelson, Elizabeth.W.Roy, David.W.Griffith, Mindy M Simmons, Christine.M.Budai, Joyce.e.casey, Debbie A Hollen imperfect in its' vertical face. The vertical face will have unavoidable irregularities and small pockets, which may confuse fry sized fish and provide additional habitat for predators.

If you have any questions or concerns about the comments, please feel free to contact Stephanie Burchfield (503-736-4720 (Stephanie.Burchfield@noaa.gov) or Melissa Jundt (503-231-2187 (melissa.jundt@noaa.gov).

Sincerely,

Keith Kirkendall, Chief
FERC and Water Diversions Branch
Hydropower Division

cc: (Sent electronically, unless noted as "hard copy")
Chris Budai, Corps–NPP (hard copy)
Mindy Simmons, Corps-NPP
Dan Spear, BPA
Steve Marx, ODFW – Corvallis
Clay Penhollow, CTWSR – Warm Springs
Mike Karnosh, CTGR – Grand Ronde
Tom Friesen, ODFW – Corvallis Research Lab
Ann Gray, USFWS

This page was intentionally left blank.

13. USACE Responses to Agency 90 Percent Comments

(TO BE PROVIDED)

This page was intentionally left blank.

PLATES

The following plates are included:

1. Vicinity Map – North
2. Vicinity Map – South
3. Upper Reservoir, In-Reservoir: Concept Location Map
4. Upper Reservoir, In-Reservoir: FSC (500 cfs) – Pan
5. Upper Reservoir, In-Reservoir: FSC (500 cfs) - Section
6. Upper Reservoir, In-Reservoir: FSC (1,000 cfs) – Pan
7. Upper Reservoir, In-Reservoir: FSC (1,000 cfs) - Section
8. Upper Reservoir, In-Reservoir: 2 Net System
9. Upper Reservoir, In-Reservoir: Selected Location net Profile
10. Upper Reservoir, In-Reservoir: Dam Elevation View
11. Upper Reservoir, In-Reservoir: Dam Fish Transfer Facility
12. Lower North Fork, In-Tributary: Off-Channel Collector
13. Vee-Screen, Typical Plan and section
14. Recovery and Release Facility Site Plan

This page was intentionally left blank.

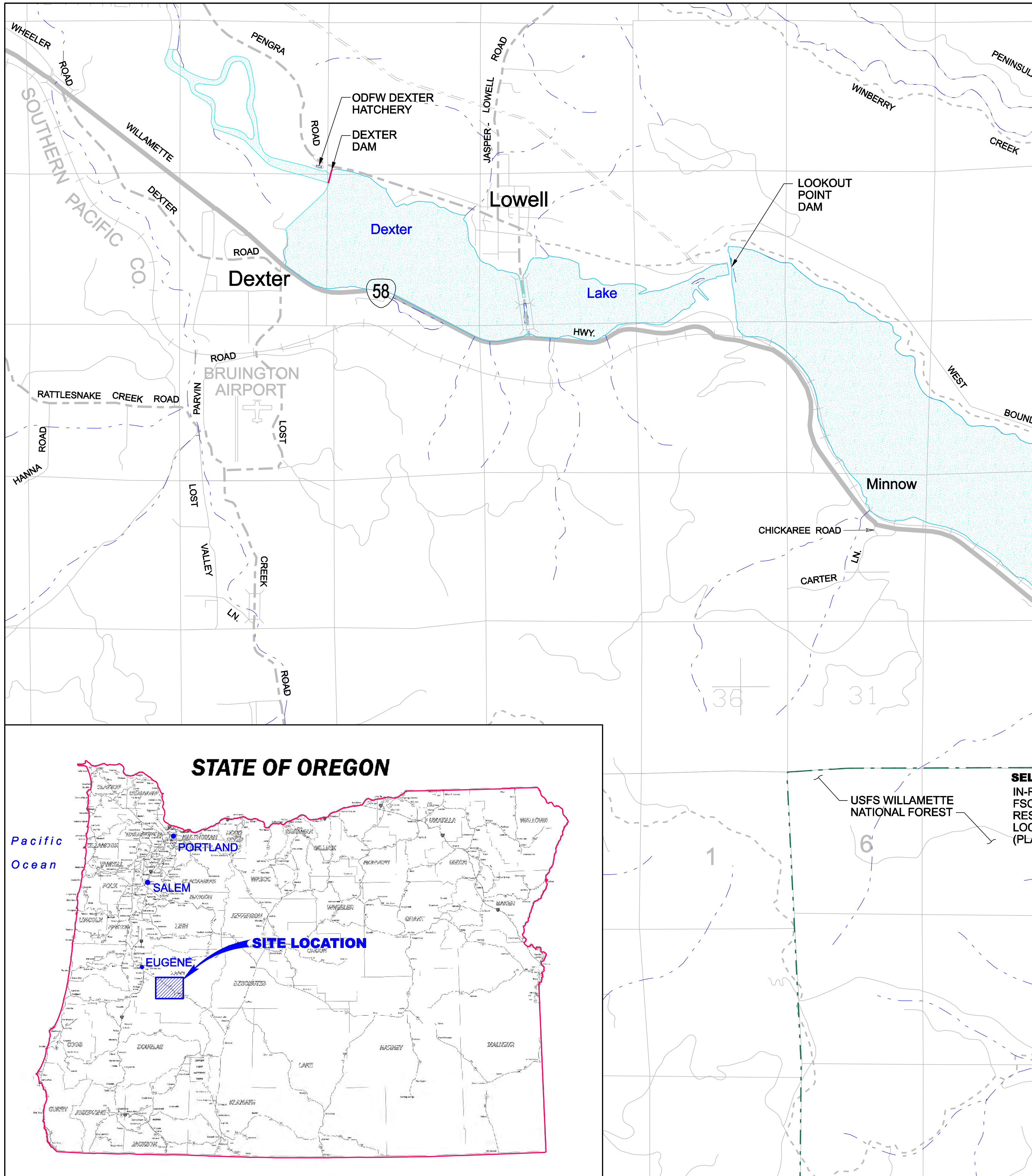
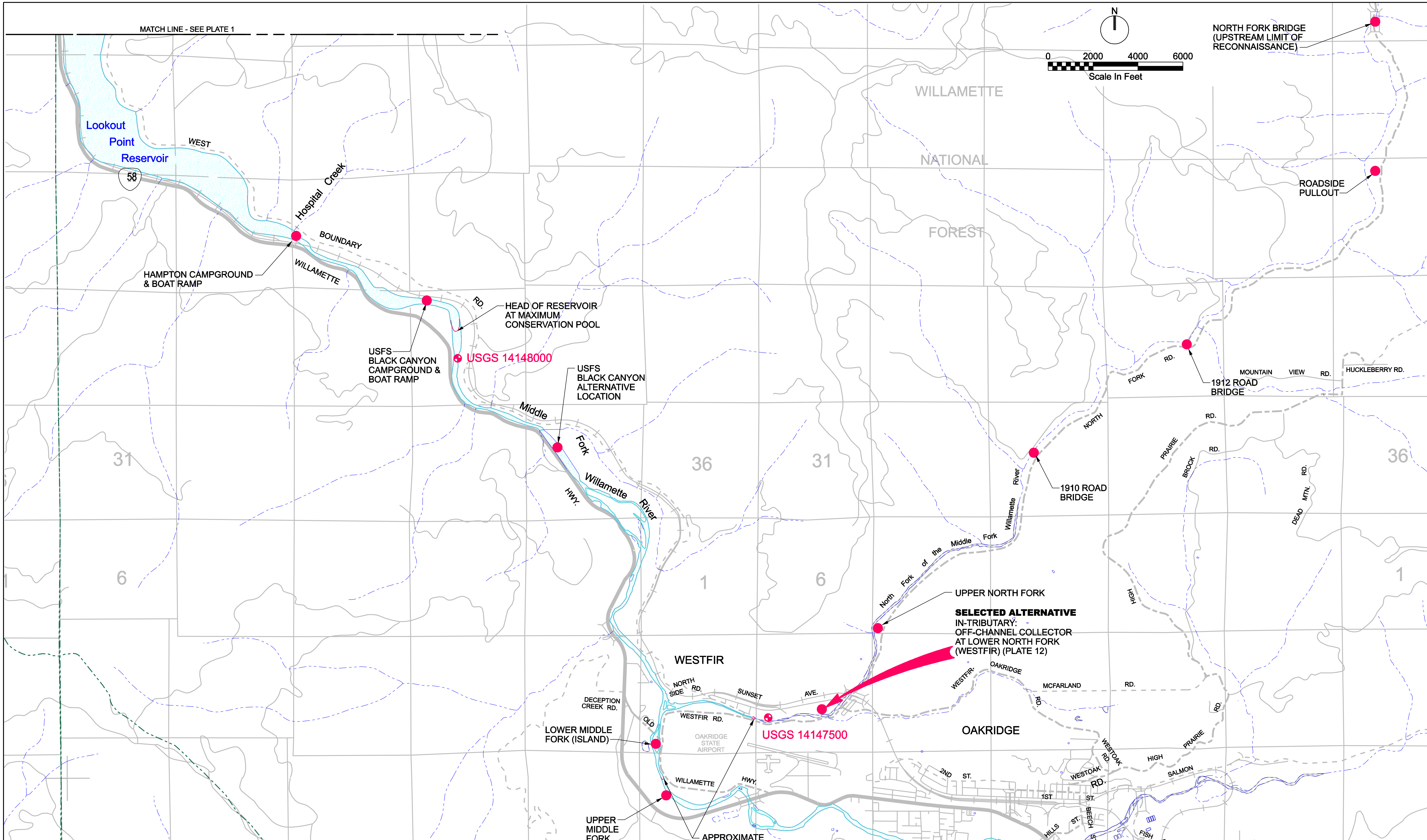


Plate 1
VICINITY MAP - NORTH

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate-1.dgn PLOT DATE: 3/3/2011 PLOT TIME: 2:36:12 PM

This page was intentionally left blank.



CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 2
VICINITY MAP - SOUTH

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate-2.dgn PLOT DATE: 3/3/2011 PLOT TIME: 11:37:16 AM

...\402429-Plate-2.dgn 3/3/2011 11:37:16 AM

This page was intentionally left blank.

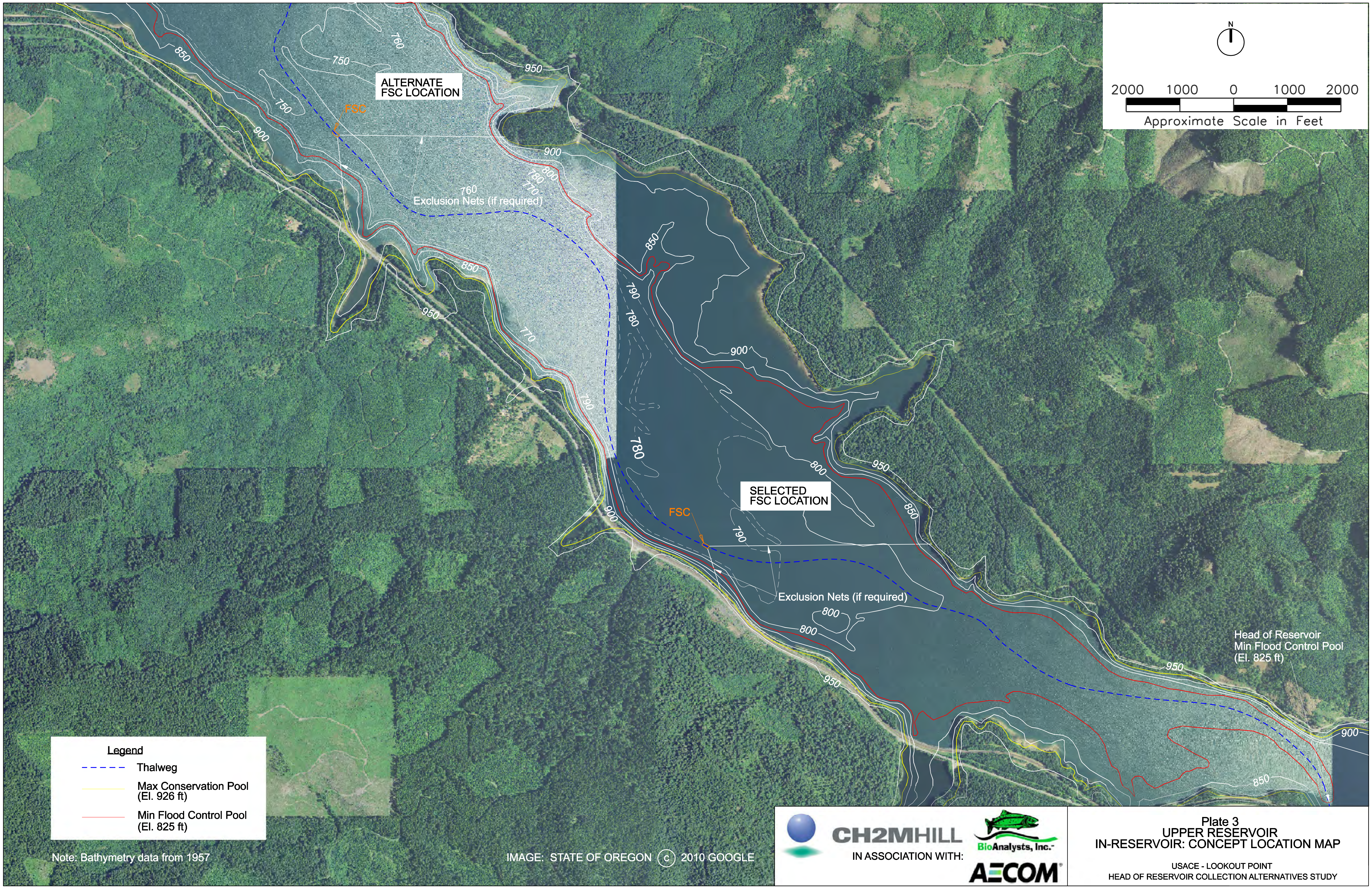


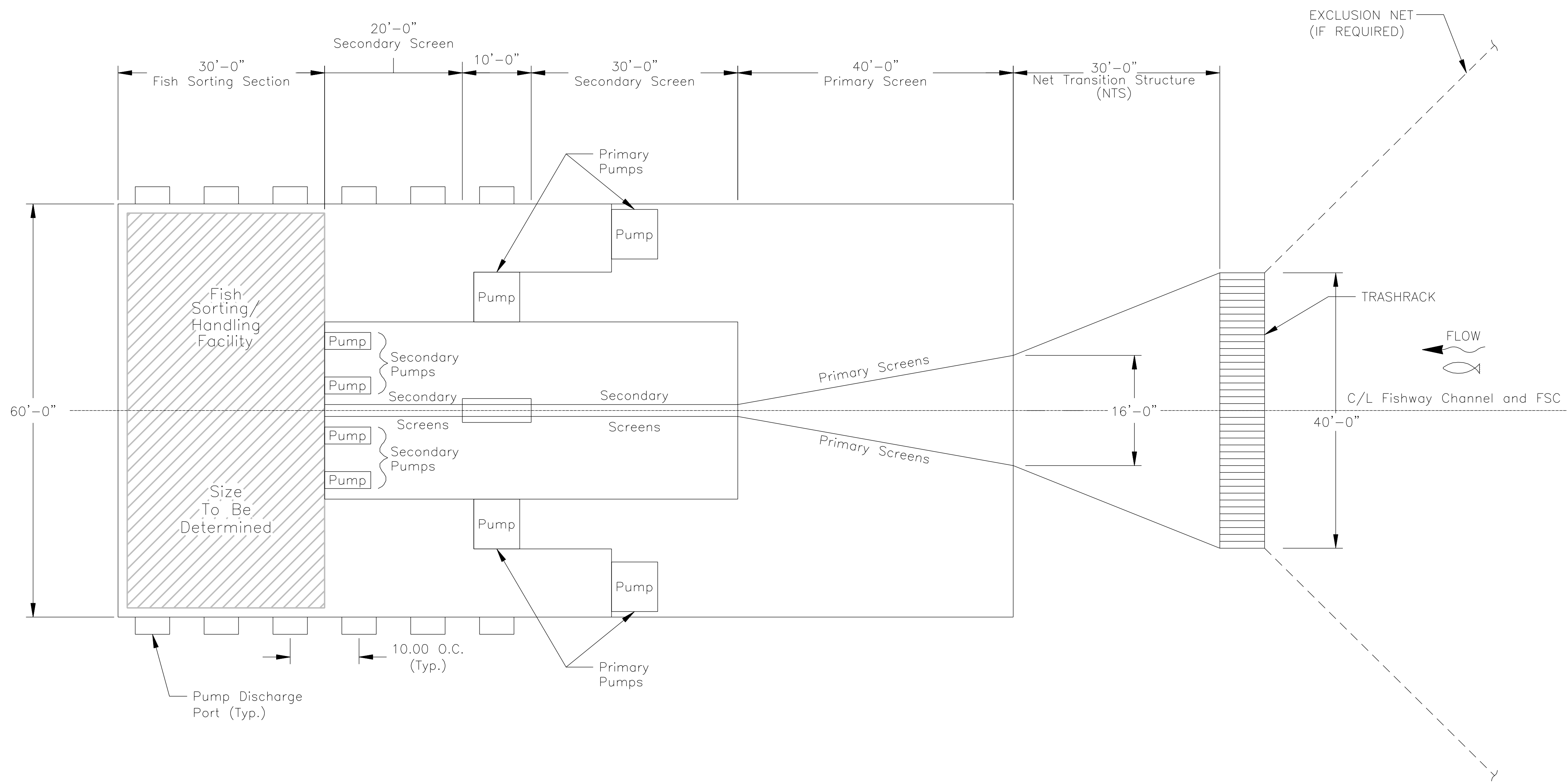
Plate 3
UPPER RESERVOIR
IN-RESERVOIR: CONCEPT LOCATION MAP

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: $FILENAME PLOT DATE: $PLOTDATE PLOT TIME: $PLOTTIME

...\402429-Plate-3.dgn 3/3/2011 11:55:15 AM

This page was intentionally left blank.



PLAN VIEW

Modified from Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-050, 03/15/08

CH2MHILL BioAnalysts, Inc. AECOM

Plate 4

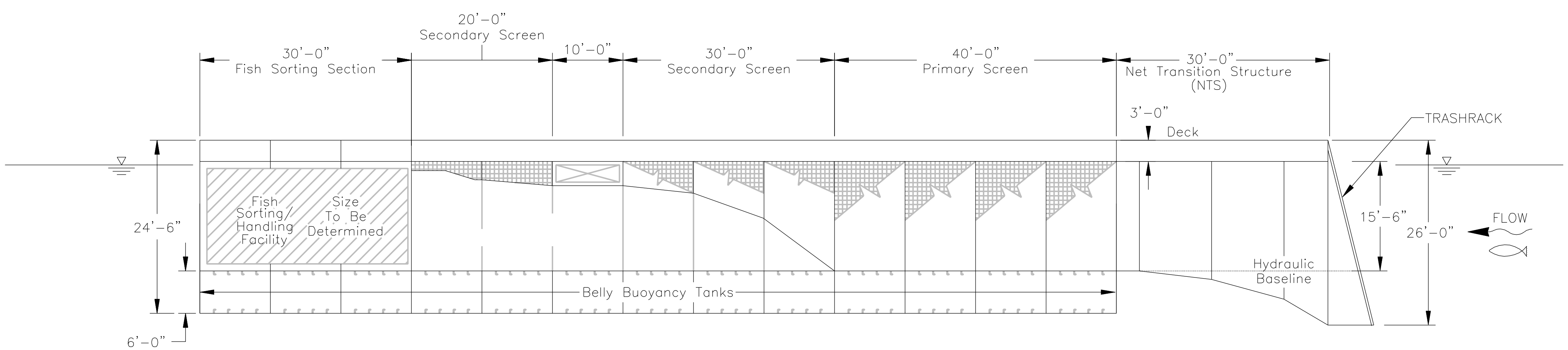
UPPER RESERVOIR, IN-RESERVOIR:
FSC (500 CFS) PLAN

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

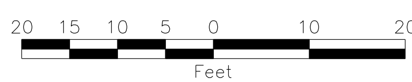
FILENAME: 500 CFS FSC.dwg PLOT DATE: 07/08/10 PLOT TIME: 12:44 pm

...\402429-Plate-4.dgn 3/3/2011 12:40:43 PM

This page was intentionally left blank.



CENTERLINE ELEVATION



Modified from Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-050, 03/15/08

CH2MHILL
BioAnalysts, Inc.
AECOM

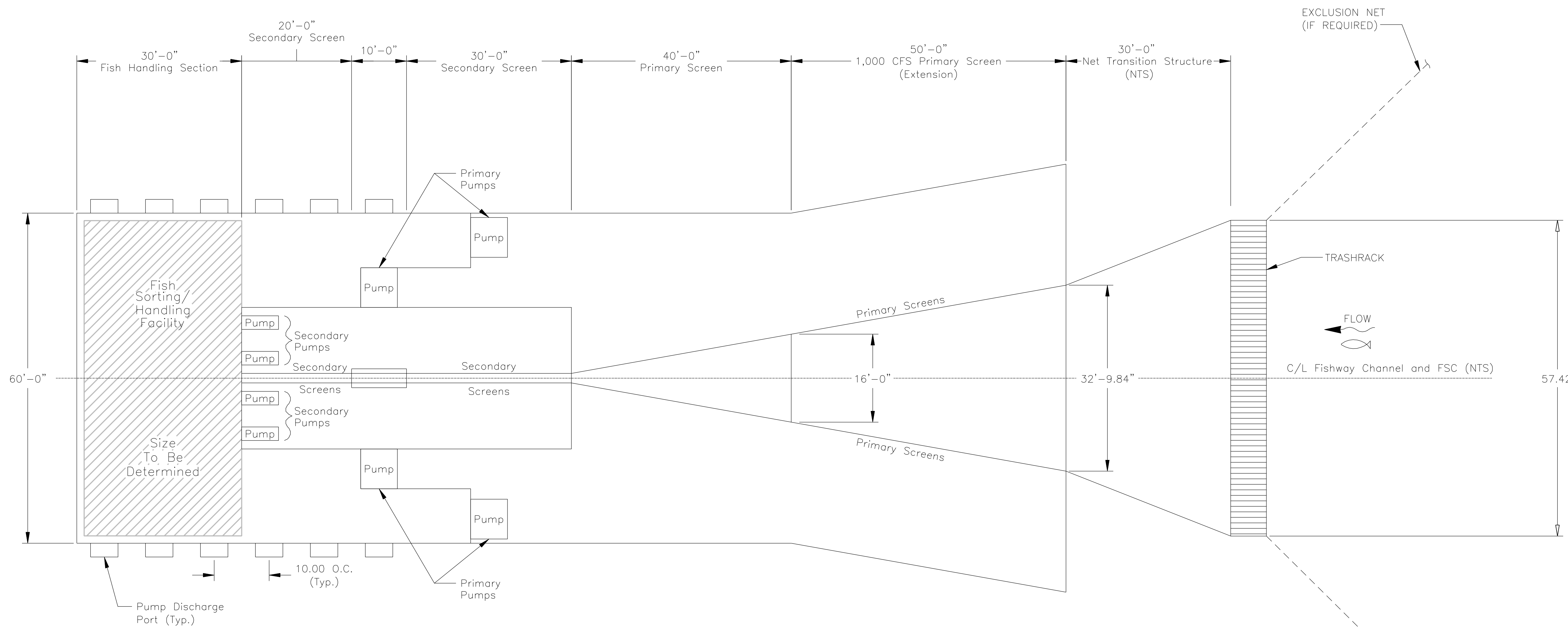
Plate 5

UPPER RESERVOIR, IN-RESERVOIR:
FSC (500 CFS) SECTION

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 500 CFS FSC-Sec.dwg PLOT DATE: 07/08/10 PLOT TIME: 01:36 pm

This page was intentionally left blank.



PLAN VIEW

20 15 10 5 0 10 20

Feet

Modified from Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-051, 03/15/08

CH2MHILL

BioAnalysts, Inc.

AECOM

Plate 6

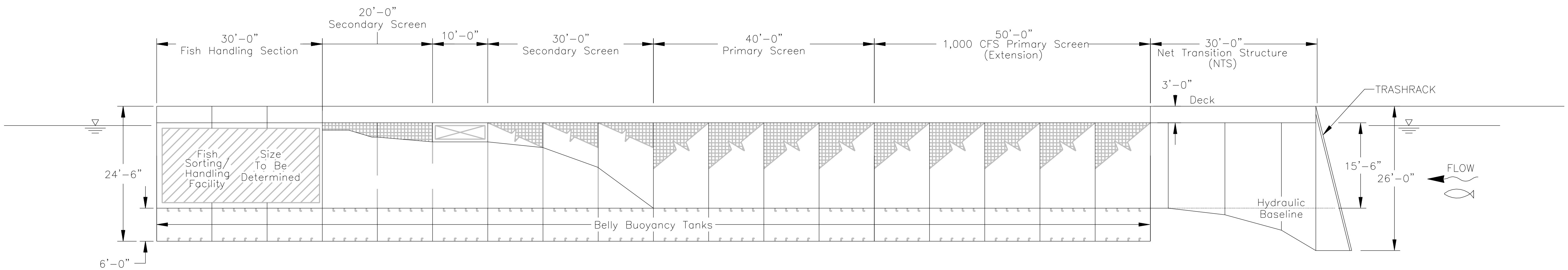
UPPER RESERVOIR, IN-RESERVOIR:
FSC (1,000 CFS) PLAN

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: 1,000 CFS FSC.dwg PLOT DATE: 07/08/10 PLOT TIME: 10:00 am

...\402429-Plate-6.dgn 3/3/2011 1:11:28 PM

This page was intentionally left blank.



CENTERLINE ELEVATION

20 15 10 5 0 10 20
Feet

Modified from Washington Group International and Puget Sound Energy, "500 CFS FSC Layout", Filename: GA-050, 03/15/08

CH2MHILL
BioAnalysts, Inc.
AECOM

Plate 7

UPPER RESERVOIR, IN-RESERVOIR:
FSC (1,000 CFS) SECTION

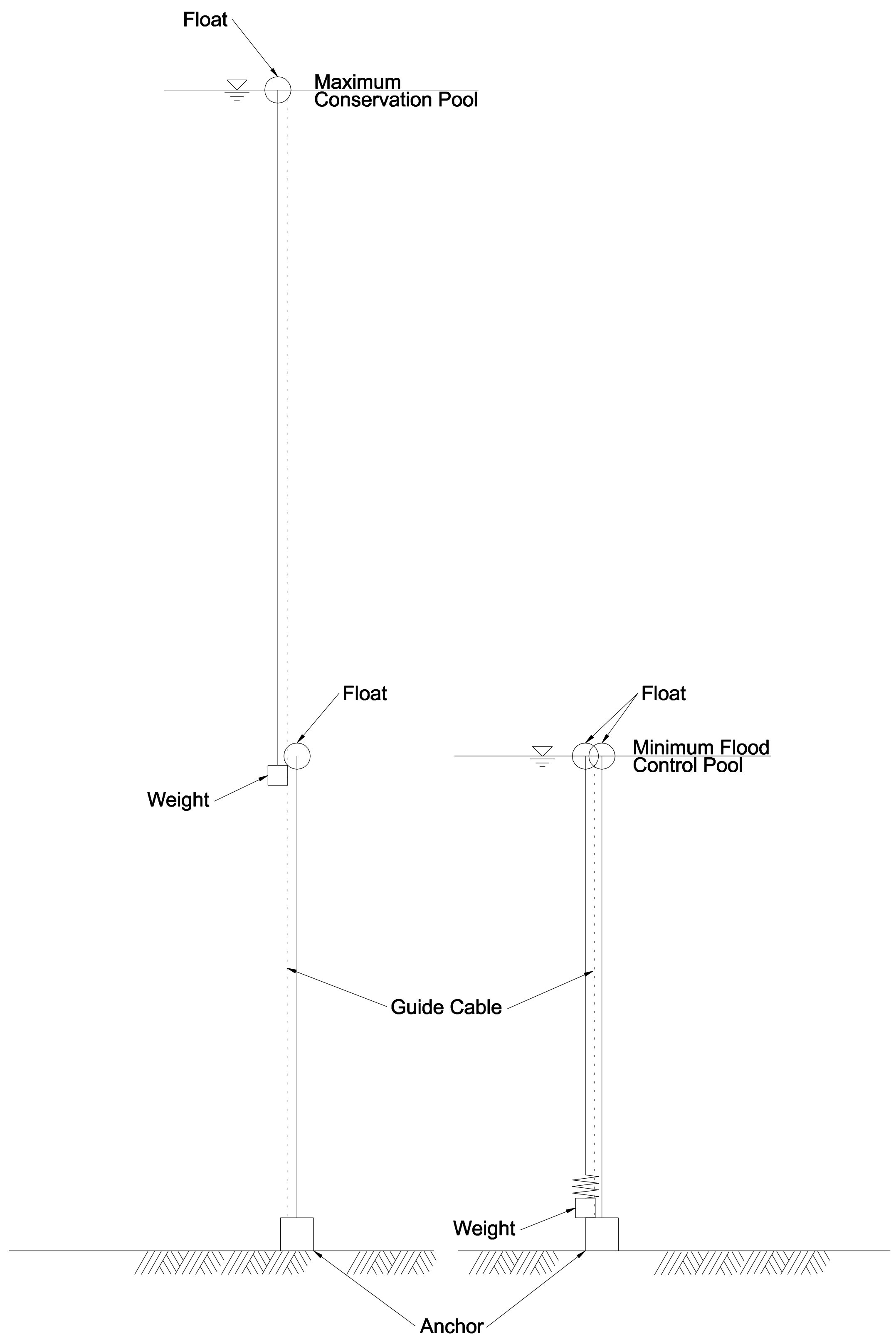
USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

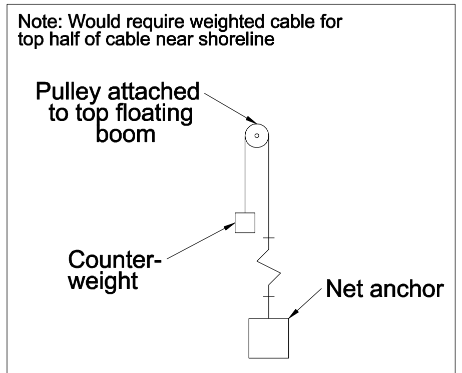
FILENAME: 1,000 CFS FSC-Sec.dwg PLOT DATE: 07/08/10 PLOT TIME: 01:01 pm

...\402429-Plate-7.dgn 3/3/2011 2:56:34 PM

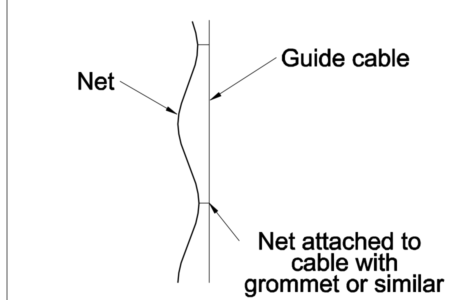
This page was intentionally left blank.

Working Concept for a Two-Net System - Section





Detail of Net
Cable System



Detail of Net
Attached to Cable

CH2MHILL

IN ASSOCIATION WITH:

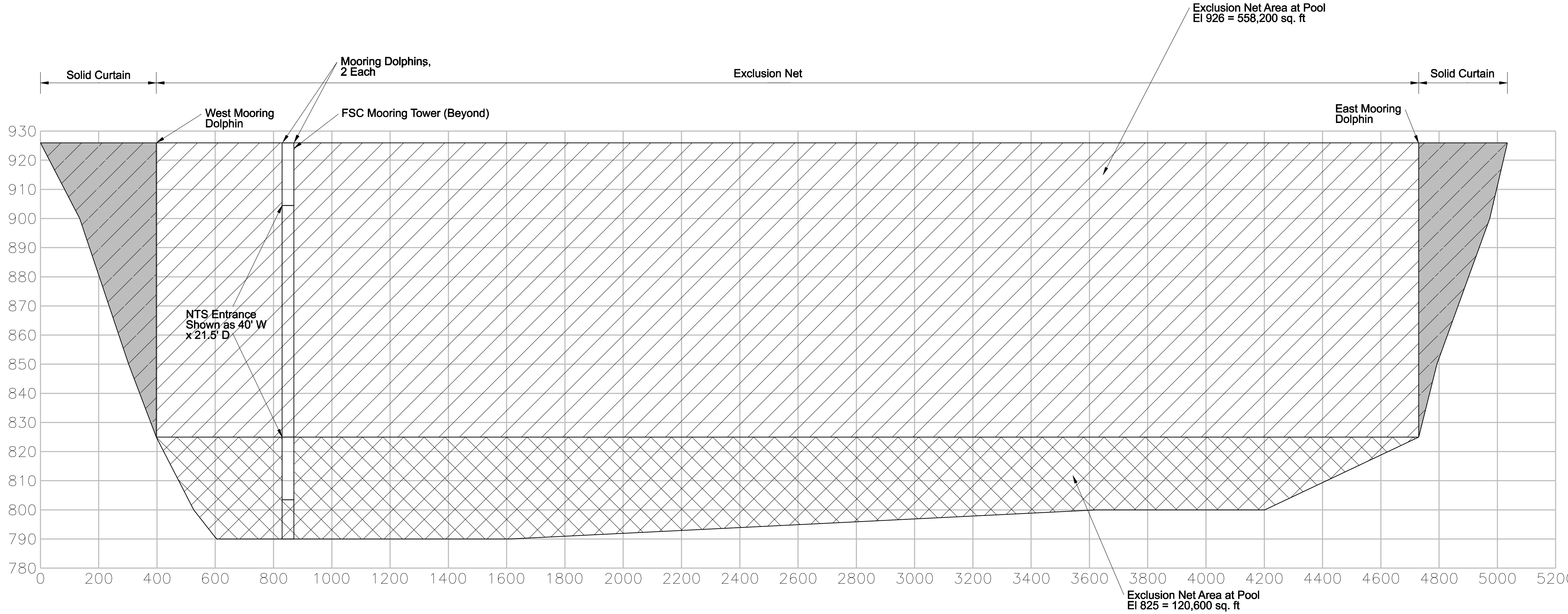
BioAnalysts, Inc.

AECOM

Plate 8
UPPER RESERVOIR
IN-RESERVOIR: 2 NET SYSTEM

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

This page was intentionally left blank.



Working Concept For A Two-Net System - Transverse Section

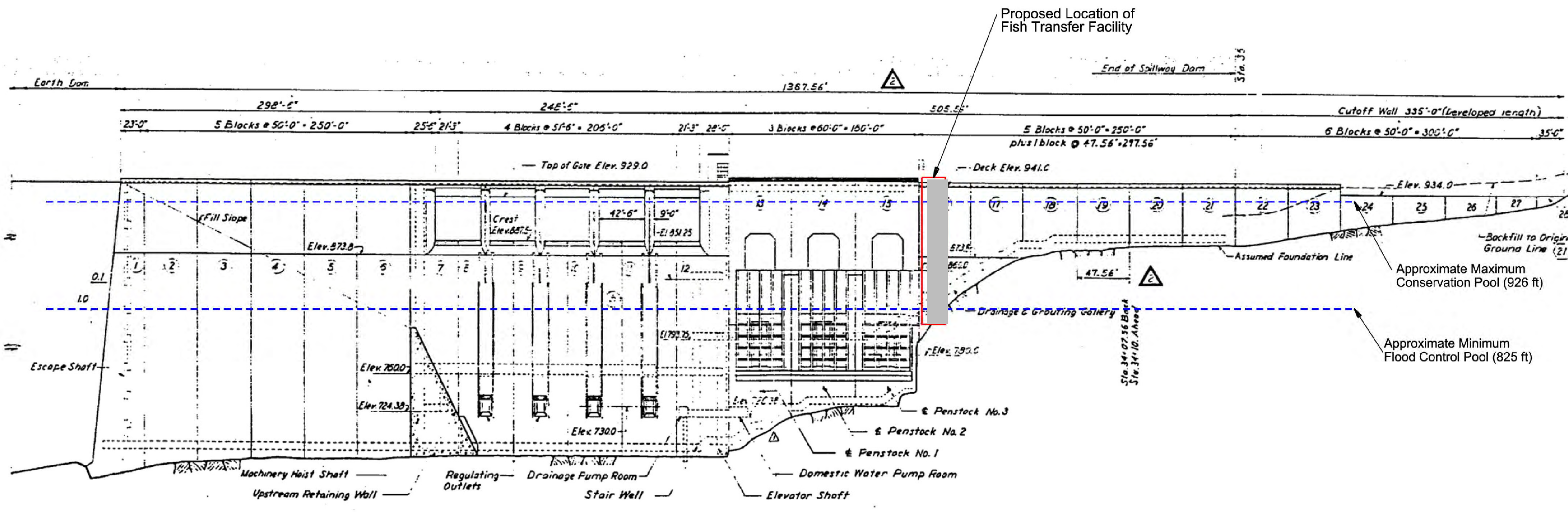
(Exaggerated Vertical Scale)

CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

Plate 9
UPPER RESERVOIR
IN-RESERVOIR: SELECTED LOCATION
NET PROFILE

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

This page was intentionally left blank.



Upstream Elevation of Lookout Point Dam

NTS

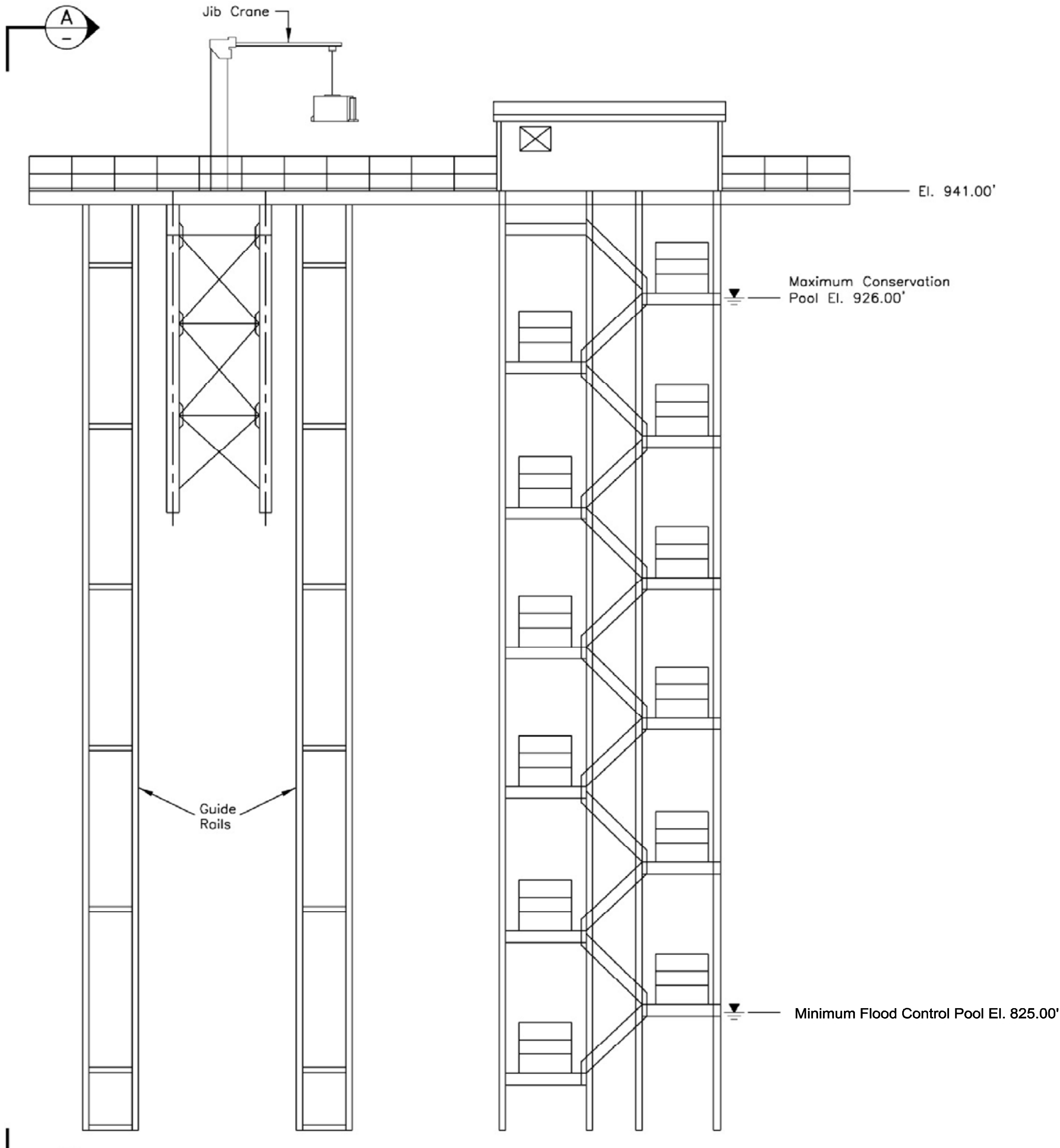
Source: Corps of Engineers
Lookout Point Drawing LP-222-5

CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

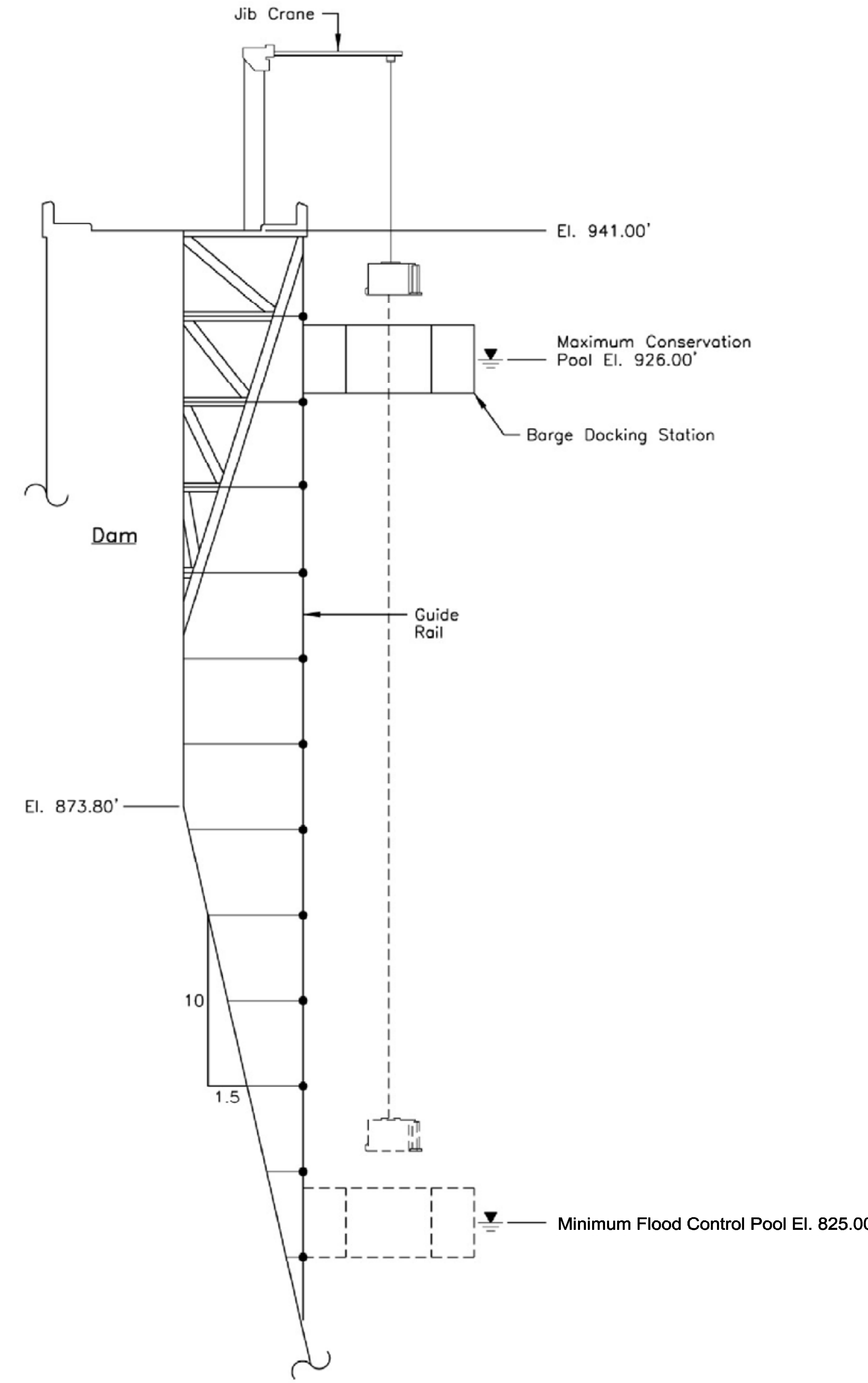
Plate 10
UPPER RESERVOIR
IN-RESERVOIR: DAM ELEVATION VIEW

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

This page was intentionally left blank.



Elevation View



Section A

CH2MHILL

IN ASSOCIATION WITH:

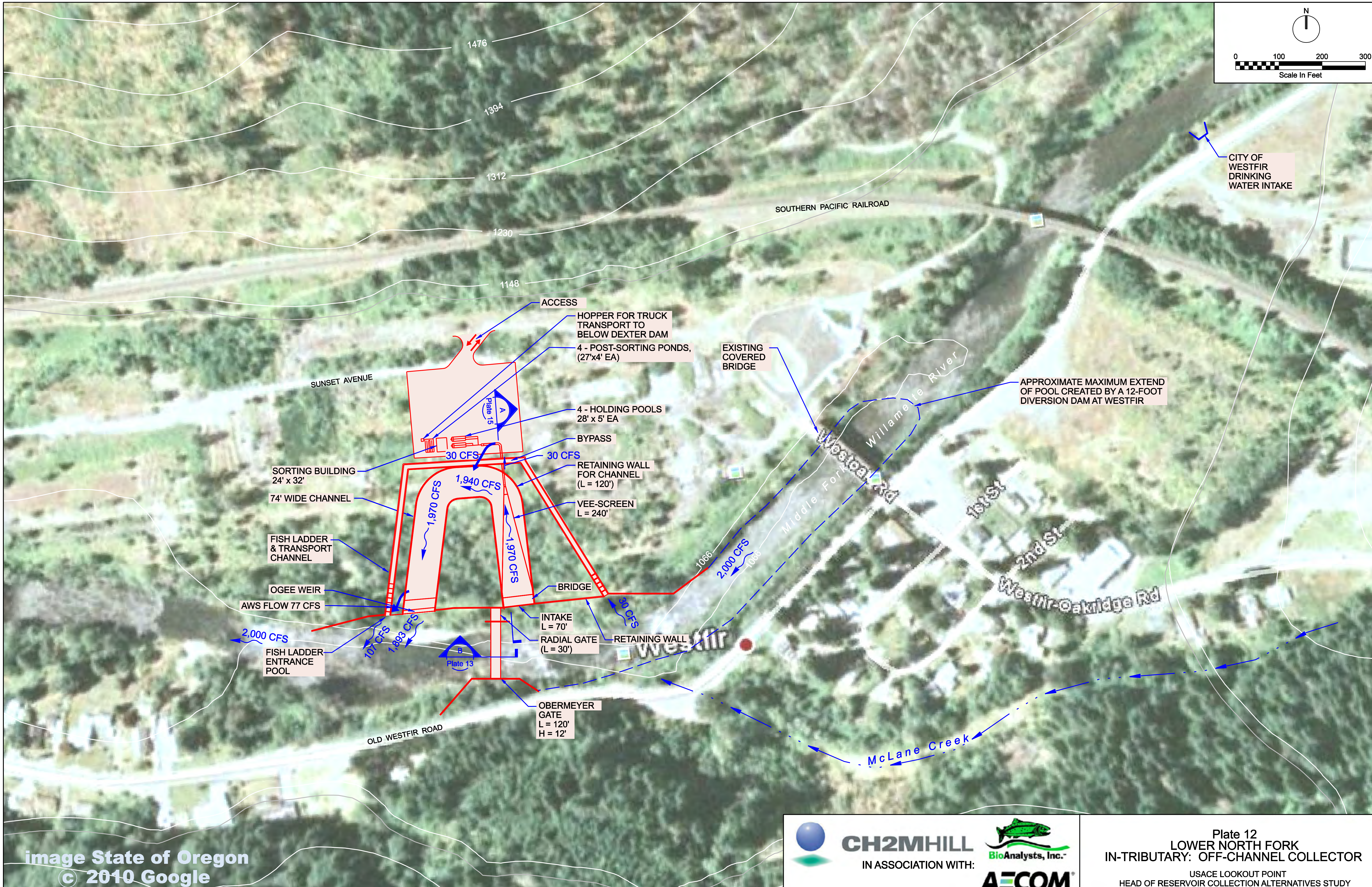
BioAnalysts, Inc.

AECOM

Plate 11
UPPER RESERVOIR
IN-RESERVOIR: DAM FISH TRANSFER FACILITY

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

This page was intentionally left blank.

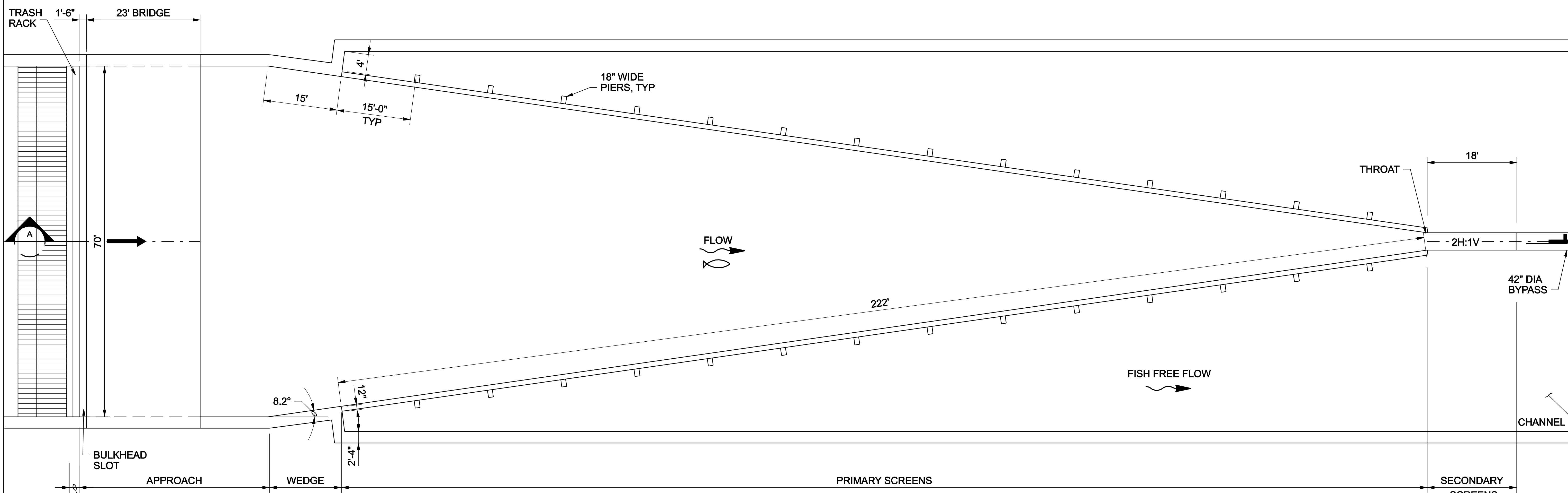


CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

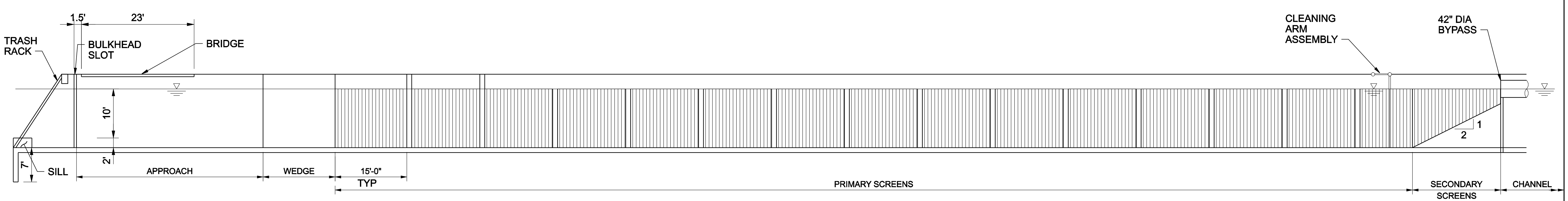
Plate 12
LOWER NORTH FORK
IN-TRIBUTARY: OFF-CHANNEL COLLECTOR

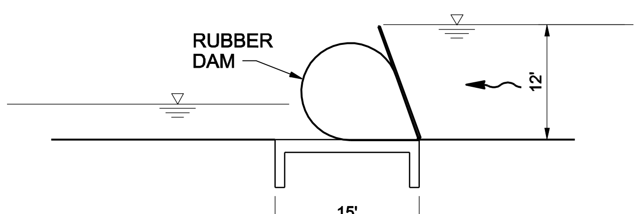
USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

This page was intentionally left blank.



PLAN
1"=10'





A SECTION
1"=10'
PLATE 14

B SECTION
NTS
PLATE 13

CH2MHILL
IN ASSOCIATION WITH:
BioAnalysts, Inc.
AECOM

Plate 13
VEE-SCREEN
TYPICAL PLAN AND SECTION

USACE LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

402429. FILENAME: 402429-Plate-13.dgn PLOT DATE: 12/7/2010 PLOT TIME: 7:52:50 AM

This page was intentionally left blank.

CH2MHILL IN ASSOCIATION WITH: BioAnalysts, Inc. AECOM

Plate 14

RECOVERY AND RELEASE
FACILITY SITE PLAN

USACE - LOOKOUT POINT
HEAD OF RESERVOIR COLLECTION ALTERNATIVES STUDY

FILENAME: NTS - Plan View.dwg PLOT DATE: 07/08/10 PLOT TIME: 1:41 pm

...\402429-Plate-14.dgn 3/4/2011 6:52:45 AM