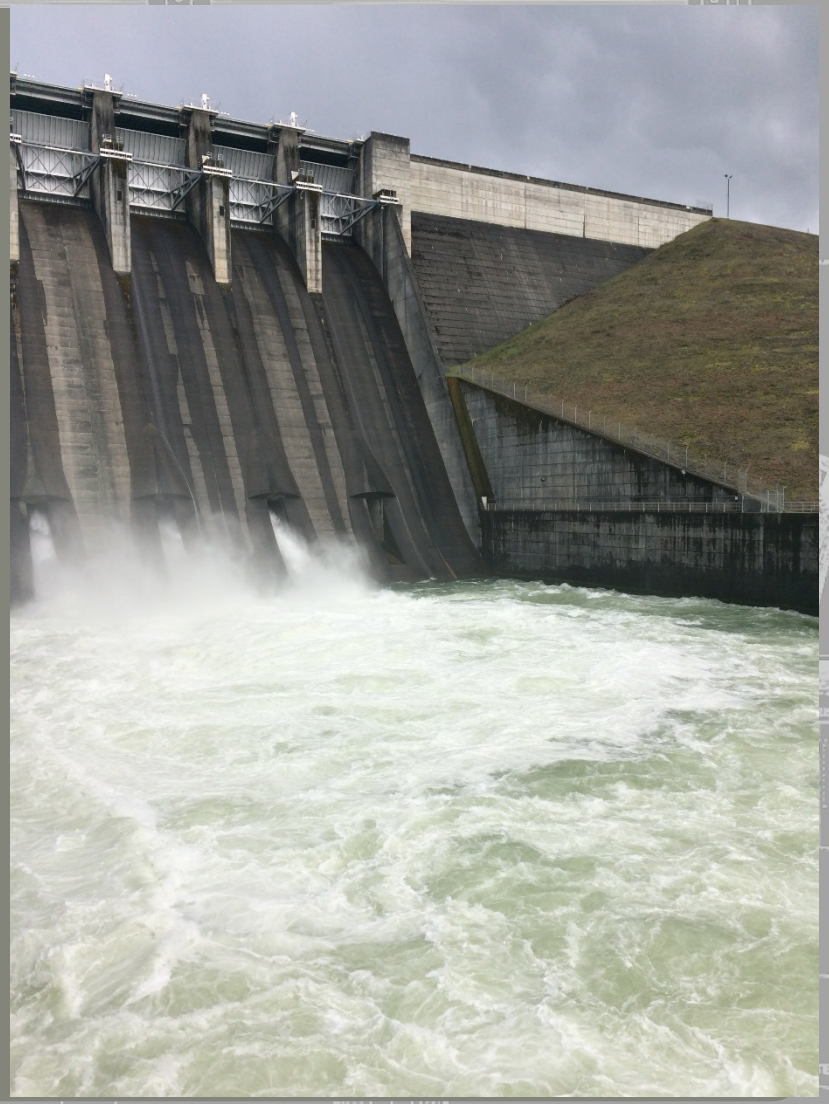
COMPARISON OF ROGUE AND WILLAMETTE DAM OPERATIONS TO SUPPORT FISH OBJECTIVES



Willamette Fisheries Science Review
Greg Taylor
Fisheries Biologist Willamette / Rogue Project
06 Feb 2018

US Army Corps of Engineers ®
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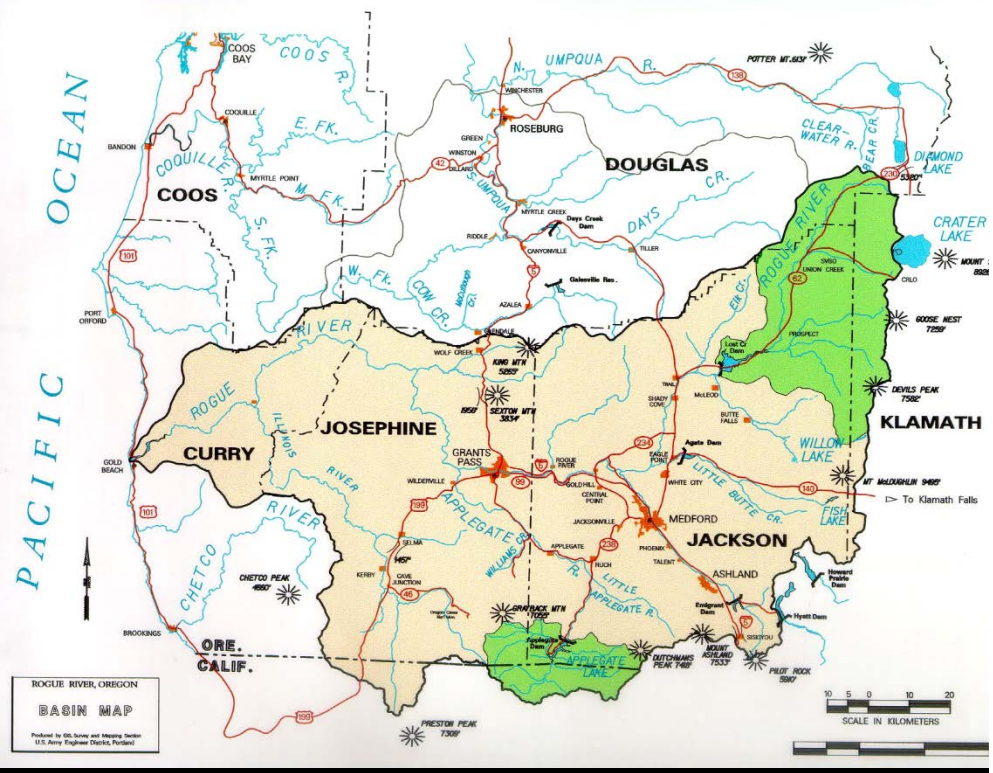

The Willamette River Basin

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AUTHORIZATIONS

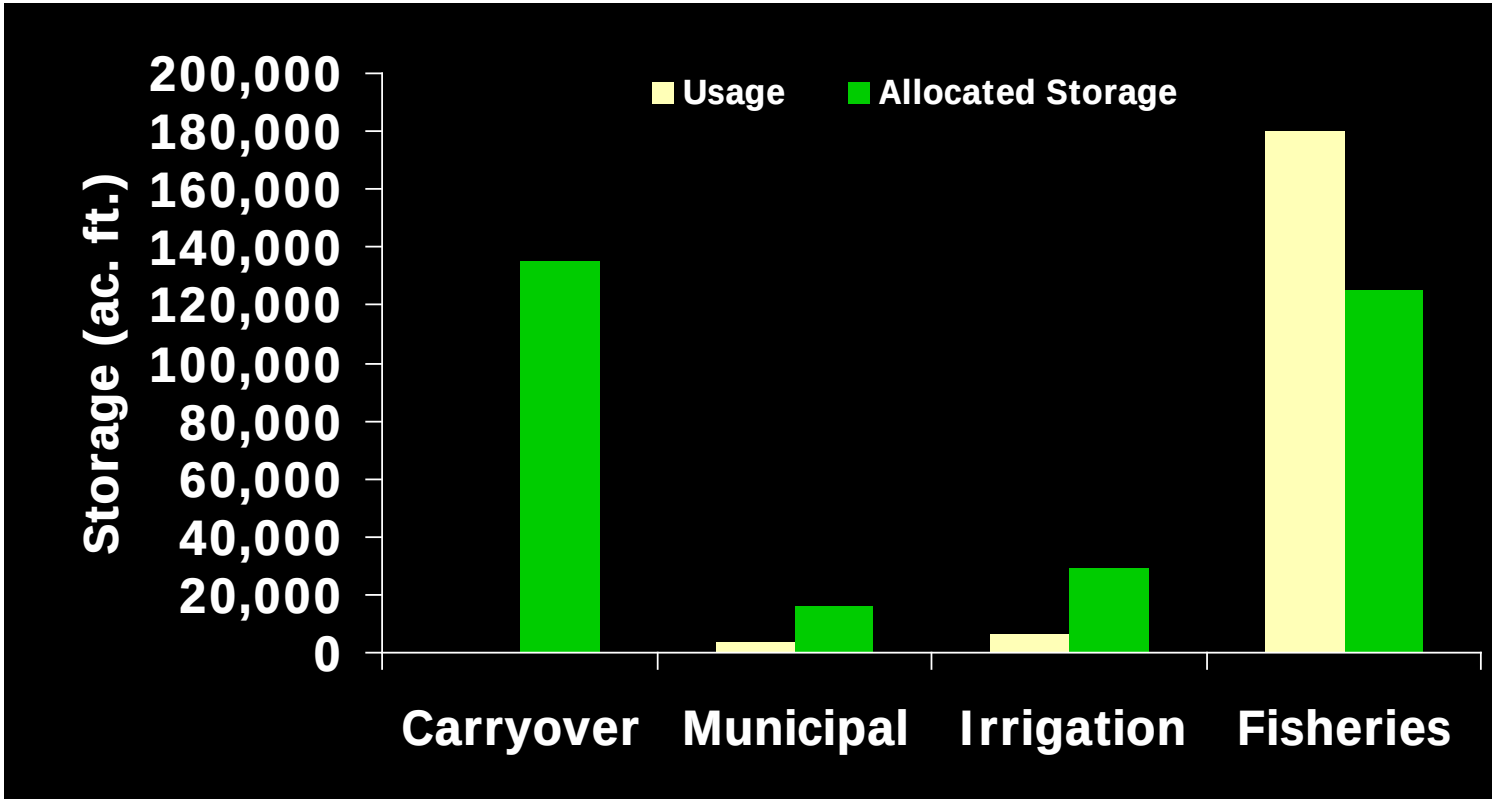
Rogue
Primary Authorized Purpose of Project
1. Flood
2. Fish

Willamette
1. Flood

STORAGE

Rogue – Allocated

Willamette – Unallocated (WBR)



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ESA

Rogue – Coho (15 pg BA)

Wild STS, STW, Coho, Spring and Fall Chinook

Willamette – Chinook, Steelhead, Bull Trout, Oregon Chub (Delisted)

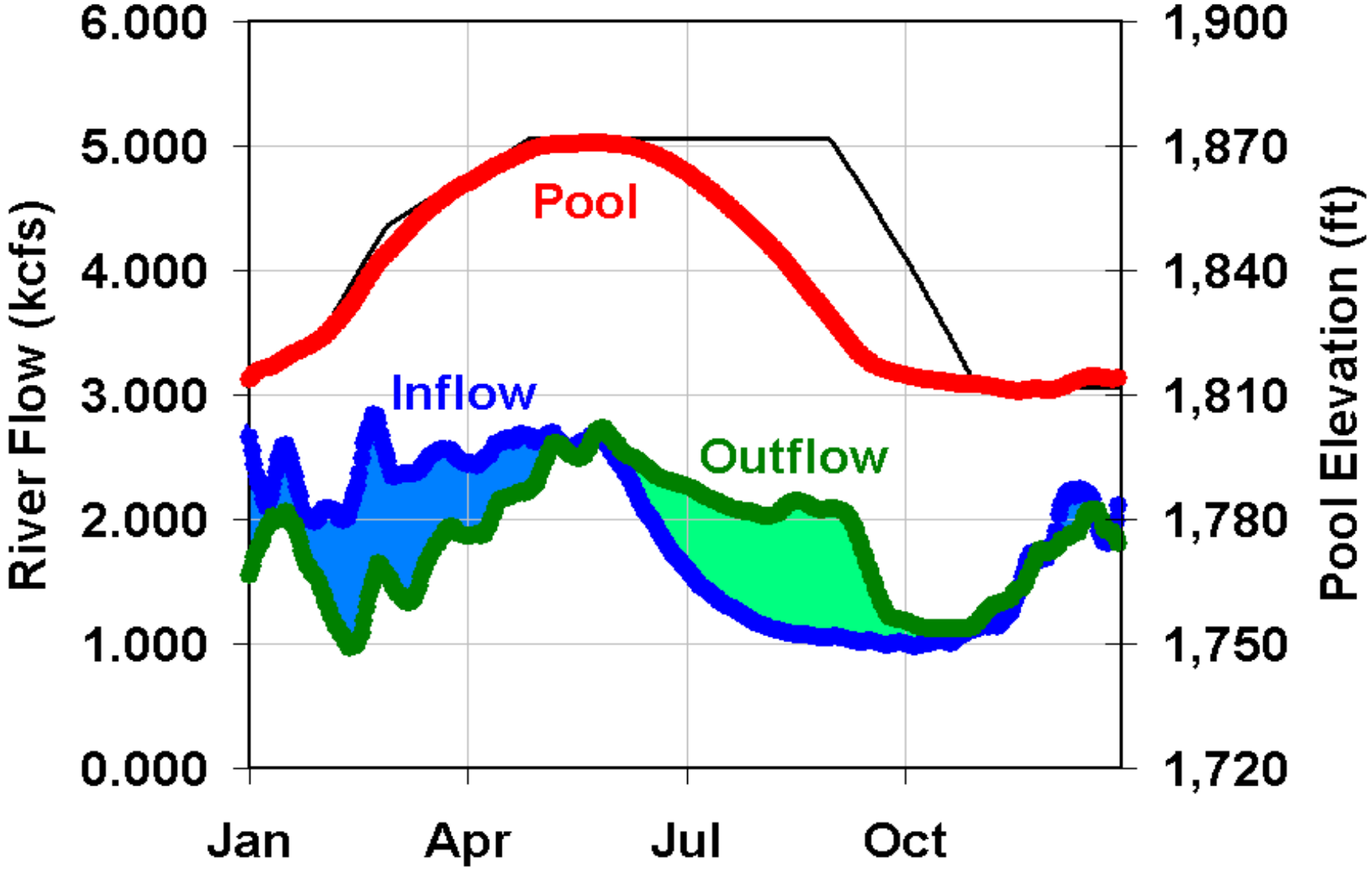
FISHERIES RESEARCH

Rogue – 25 years (1975-2000)

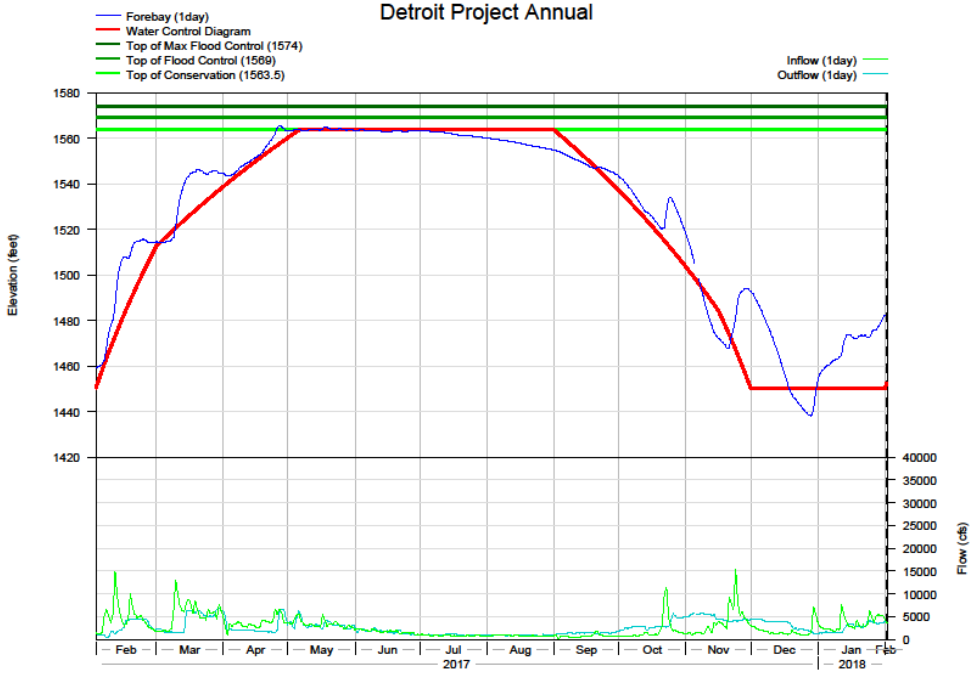
Completion reports for CHS, CHF, STW, STS, Coho

Willamette – Research program established in 2008 following signed BIOP

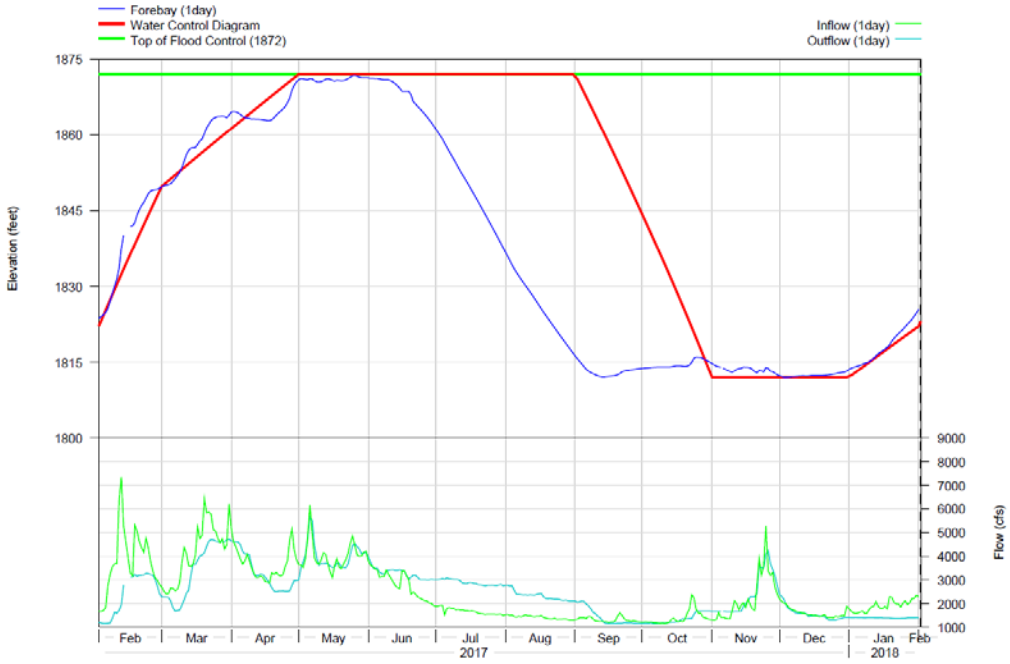
OPERATIONS


6.000
5.000
4.000
3.000
2.000
1.000
0.000
River Flow (kcfs)
1,900
1,870
1,840
1,810
1,780
1,750
1,720
Pool Elevation (ft)
Pool
Inflow
Outflow
Jan
Apr
Jul
Oct

Detroit Project Annual



Lost Creek Project Annual

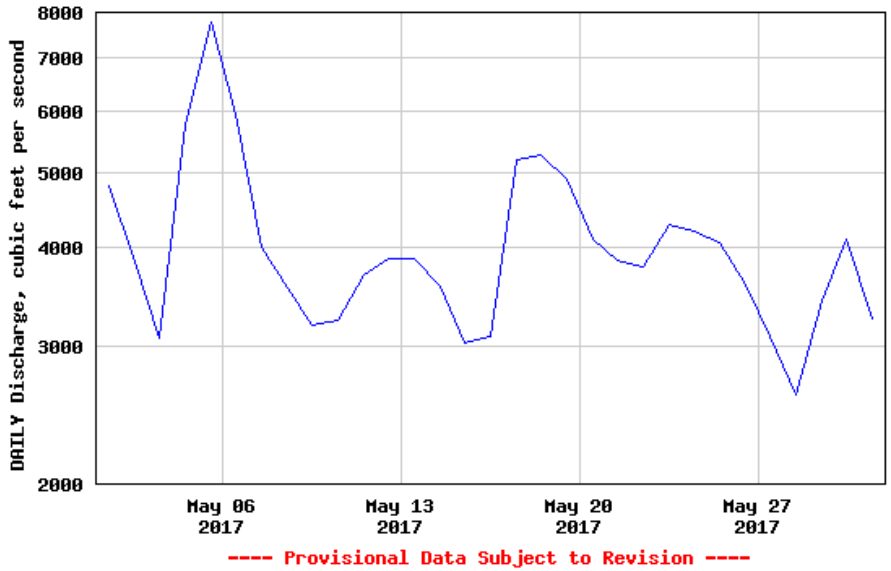


OPERATIONS – RAMP RATES

	Rampdown / hr	Rampdown / 24
Rogue	150 cfs / 3 hr	.15 x outflow
Willamette	.1ft night / .2 ft day	.50 x outflow

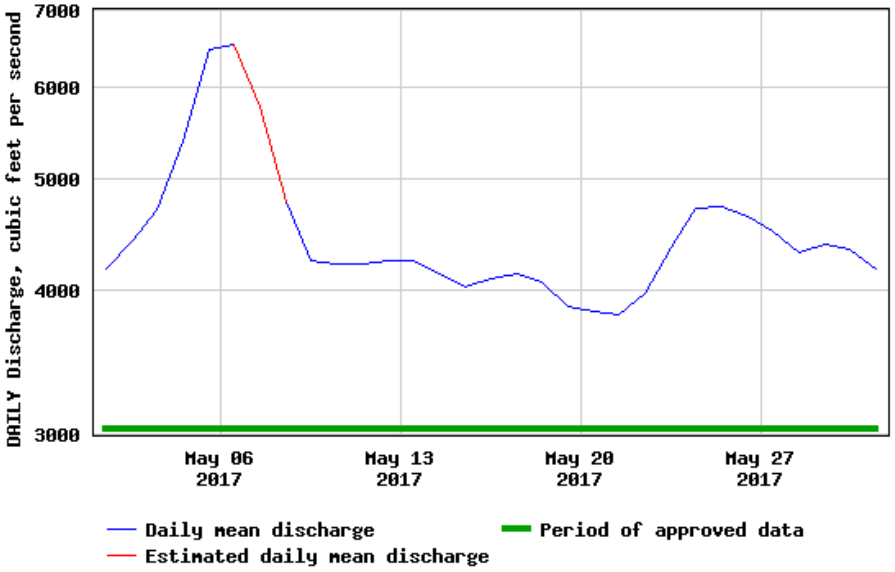
USGS

USGS 14181500 NORTH SANTIAM RIVER AT NIAGARA, OR

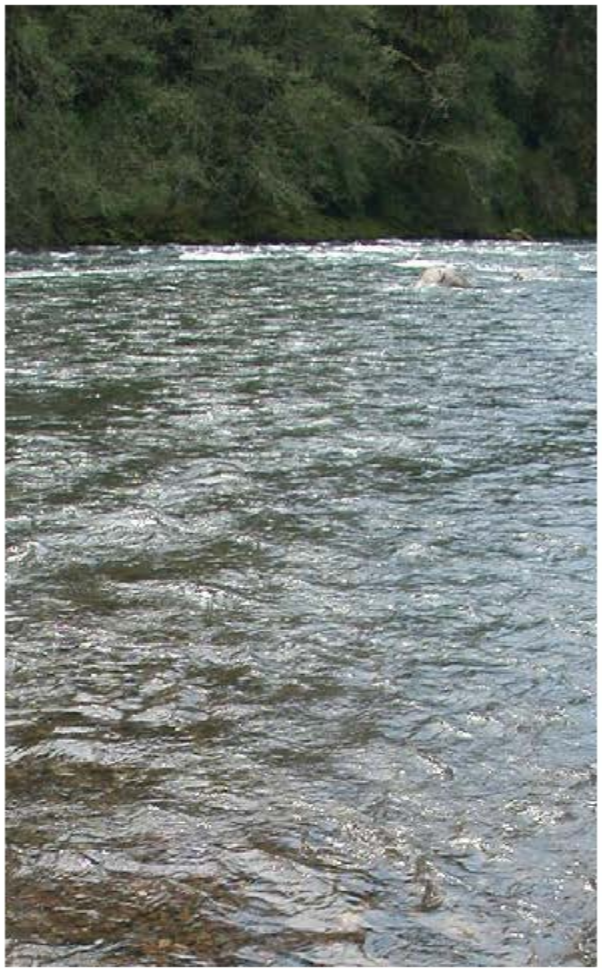


USGS

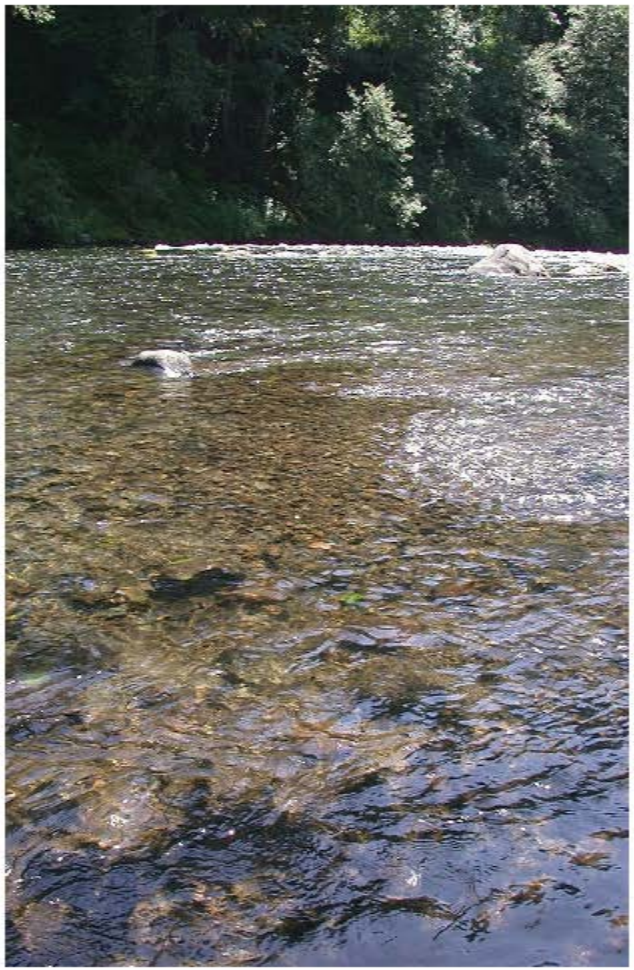
USGS 14337600 ROGUE RIVER NEAR MCLEOD, OR



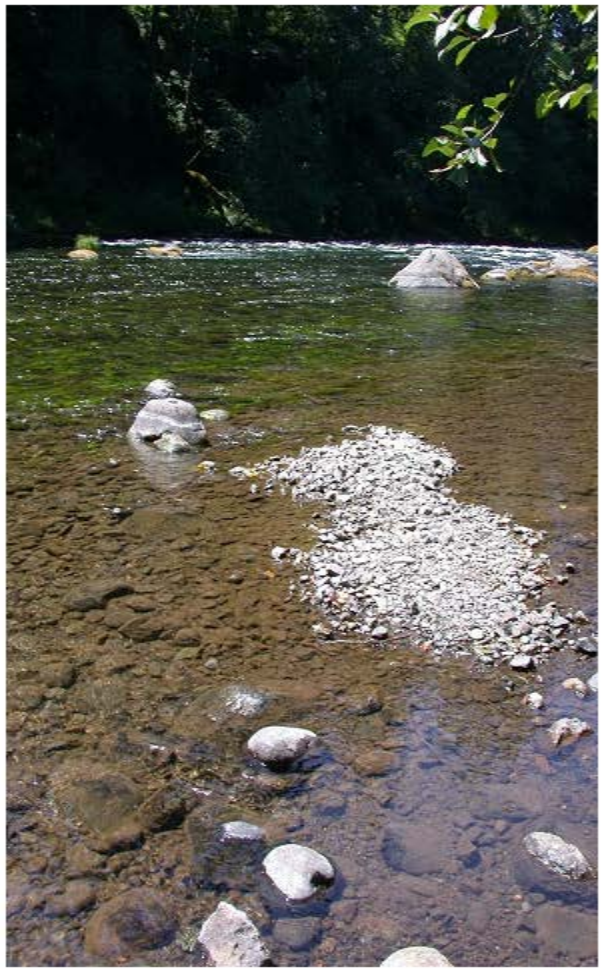
SPAWNING AND INCUBATION FLOWS



2000 cfs
05/08/03



1200 cfs
06/24/03



850 cfs
07/23/03

Primary Fishery Objective	Potential Operations to Maximize Fisheries Benefit	Description of Biological Impacts / Potential Fisheries Benefits
Maximize survival rates salmon eggs and sac-fry incubating in the gravel	1) Without compromising flood control capability, decrease the intensity of peak flows in the upper Rogue to the greatest degree possible. 2) Release the coldest water possible to slow the development rate of spring chinook salmon eggs and sac-fry in the gravel.	1) Reduce scour of redds 2) Promote emergence timing of spring chinook fry that is closer to historic timing thus improving survival.

MAINSTEM FLOW AND TEMPERATURE TARGETS

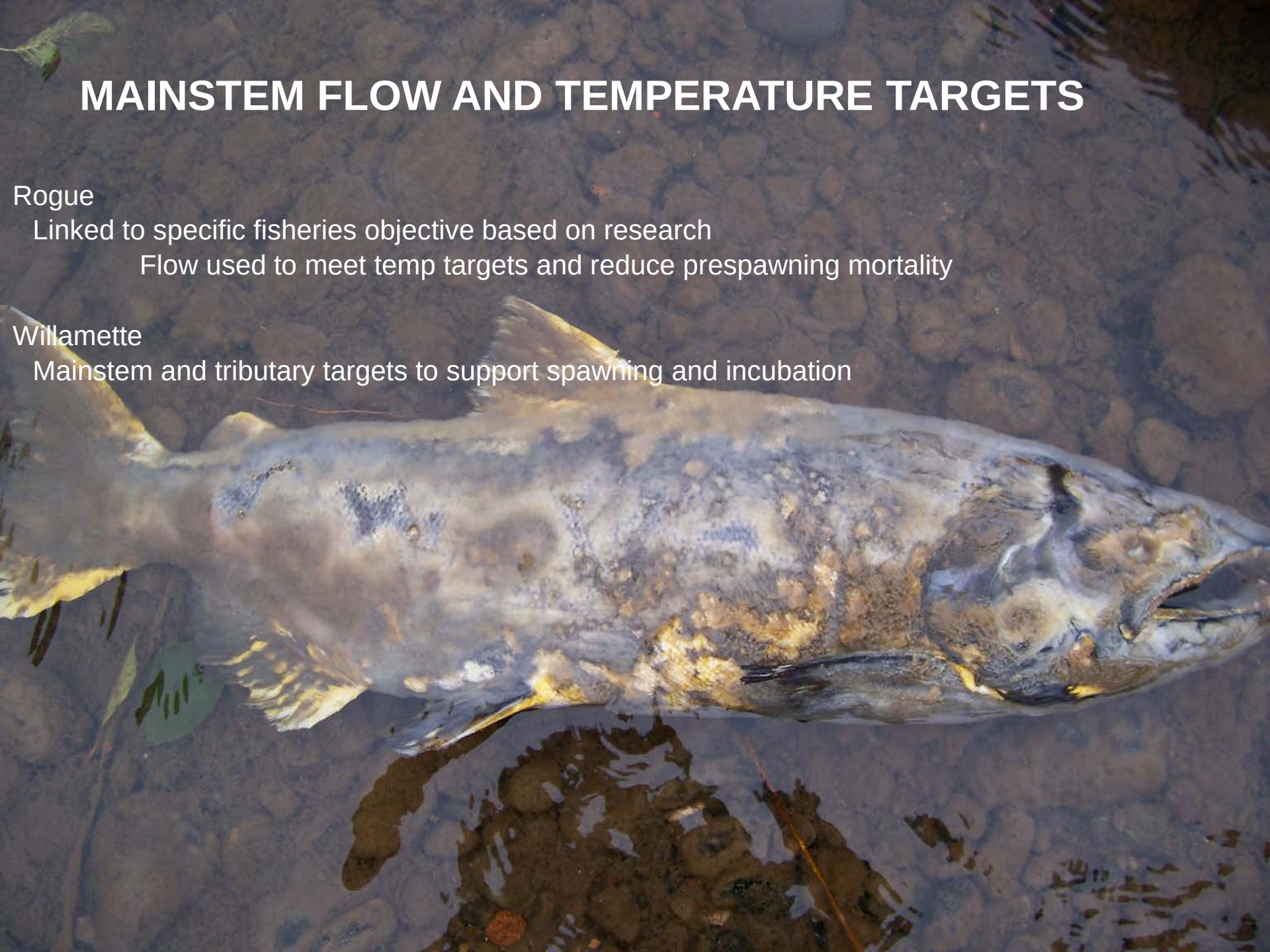
Rogue

Linked to specific fisheries objective based on research

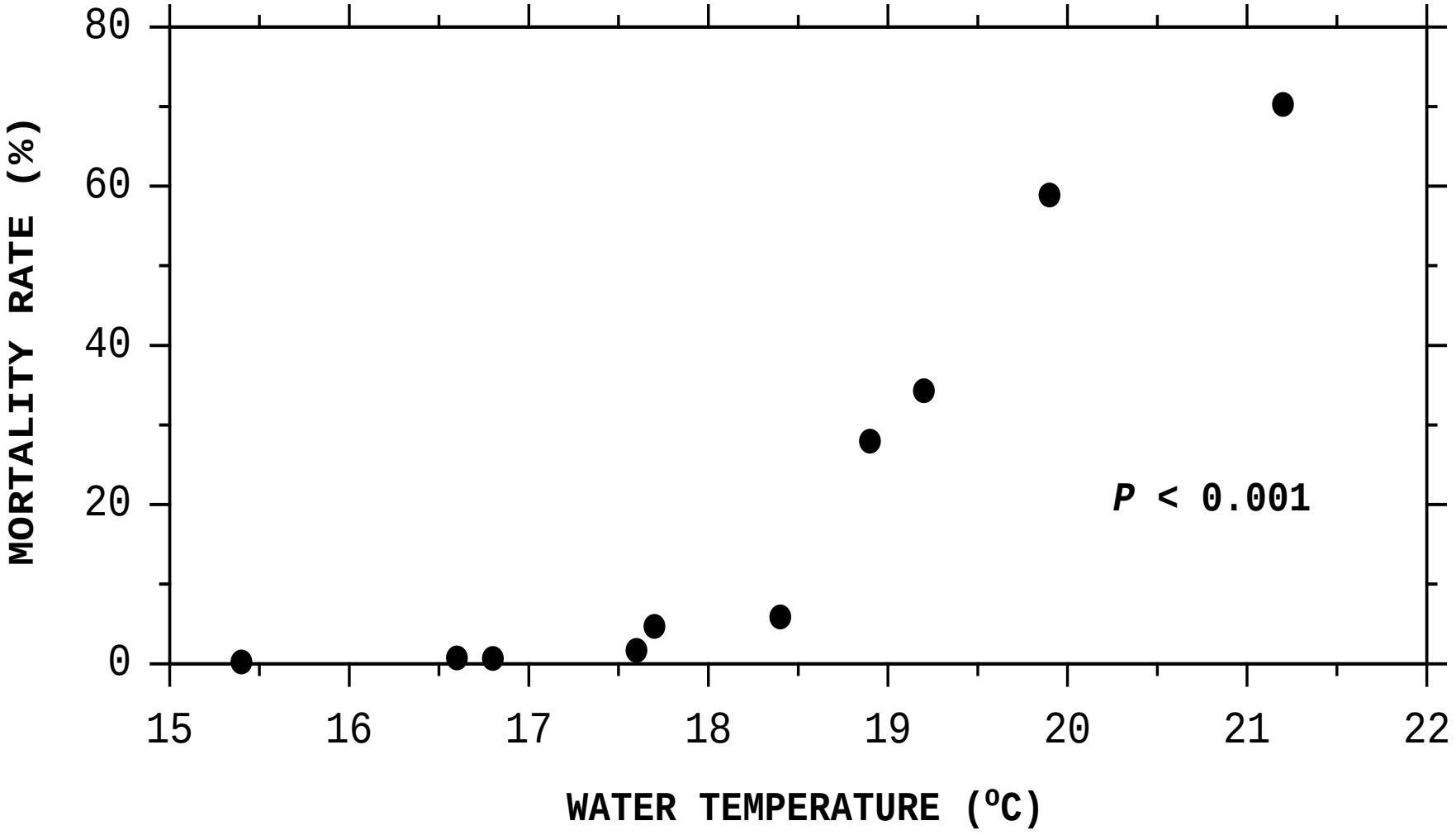
Flow used to meet temp targets and reduce prespawning mortality

Willamette

Mainstem and tributary targets to support spawning and incubation



RELATIONSHIP BETWEEN WATER TEMPERATURE AND RATE OF PRESPAWNING MORTALITY OF ADULT SPRING CHINOOK SALMON DOWNSTREAM OF GOLD RAY DAM



STRATEGIES EMPLOYED TO MINIMIZE *COLUMNARIS* LOSSES OF CHINOOK SALMON IN THE ROGUE RIVER

Release conservation storage from Lost Creek Lake to minimize losses in areas downstream of Gold Ray Dam

Release cold water from Lost Creek Lake to minimize losses in areas upstream of Gold Ray Dam

Structure releases of conservation storage, and cold water, to achieve most effective use during critical time periods

EFFICACY OF STRATEGIES EMPLOYED TO MINIMIZE *COLUMNARIS* LOSSES OF CHINOOK SALMON

Rates of prespawning mortality for fall Chinook salmon have not exceeded 10% since early 1980s (2001 excepted)

Rates of prespawning mortality for spring Chinook salmon have not exceeded 20% since 1994

USACE water temperature modeling and ODFW statistical assessments indicate that flow augmentation cools the Rogue River at Agness by about 1oC for every additional 1000 cfs released during critical periods for Chinook salmon

Side benefit of release strategies – extends potential rearing distribution of juvenile coho salmon (ESA listed) that rear in the Rogue River upstream of Gold Ray Dam

ODFW RECOMMENDATIONS FOR RELEASES FROM LOST CREEK LAKE

ASSUMES 180 KAF RELEASE DURING CONSERVATION SEASON

ASSUMES 446KAF STORAGE ON 21 MAY

2013 July update

Period	# days	Average Predicted inflow	Average Proposed release	Fishery Purpose	Flow change	Change in storage (acre-ft)* Period	Sum	Reservoir height at period end	ASSUMED flow change LCD-Agness	ODFW target at Agness (max temp.) (min flow)	Reservoir volume at period end
May 1-10	10			a,b	0	0	0			66oF	455,786
11-20	10			a,b	0	0	0			66oF/67oF	446,354
21-31	11			a,b	0	0	0			67oF	446,287
June 1-10	10			a,b	0	0	0		--	68oF	420,805
11-20	10			a,b	0	0	0		--	68oF/69oF	399,798
21-30	10	0	0	a,b	0	0	0		--	69oF	382,309
July 1-10	10	1,213	1,500	a,b,f	-287	-6,070	-6,070		--	--	376,239
11-20	10	1,099	1,500	f	-401	-8,350	-14,420		--	--	367,889
21-31	11	1,001	1,500	f	-499	-11,308	-25,728		--	--	356,581
Aug 1-10	10	931	1,500	f	-569	-11,710	-37,438		--	--	344,871
11-20	10	900	2,000	e,f	-1,100	-22,330	-59,768		--	2,000 cfs	322,541
21-31	11	884	2,000	e,f	-1,116	-24,882	-84,650		--	2,000 cfs	297,659
Sept 1-5	5	862	2,000	e,f	-1,138	-11,710	-96,360		--	2,000 cfs	285,949
6-10	5	862	1,500	e,f	-638	-6,710	-103,070			--	279,239
11-20	10	855	950	d,e,f,g,h	-95	-2,230	-105,300		--	--	277,009
21-30	10	828	900	c,d,g,h	-72	-1,770	-107,070		--	--	275,239
Oct 1-10	10	826	900	c,d,g,h	-74	-1,810	-108,880		--	--	273,429
11-20	10	827	900	c,d,g,h	-73	-1,790	-110,670		--	--	271,639
21-31	11	859	900	c,d,g,h	-41	-1,232	-111,902		--	--	270,407

*Recent plans assumed that water temperature at Agness would not reach 68oF until after 1 June. This year is warmer.

*Plan assumes 1,000 acre-feet lost monthly to evaporation after augmentation starts.

*Total reservoir releases (acre-feet) under plan = 180,379

STORAGE ALLOCATION SUMMARY

CHS	72,478
CHF	66,530
JUVS	36,106
Sept/Oct	5,270

ODFW FISHERY MANAGEMENT OBJECTIVES AFFECTED BY RIVER FLOW

IN PRIORITY ORDER

(a) minimize prespawning mortality among adult spring chinook.
(b) minimize dewatering of juvenile salmonids in spring 2014.
(c) minimize dewatering of spring chinook redds in 2014 filling season.
(d) minimize early emergence by spring chinook fry in spring 2014.
(e) minimize prespawning mortality among adult fall chinook.
(f) increase survival rates of juvenile salmonids in summer.
(g) minimize the proportion of fall chinook that spawn above Gold Ray Dam (site).
(h) minimize the effects of flow augmentation on the fly fishery in the canyon.

RECOMMENDATIONS FOR RELEASES FROM DETROIT LAKE

ASSUMES 75K RELEASE BY 1 SEPT (SPILLWAY CREST)

ASSUMES 428 K STORAGE ON 15 MAY

Period	# days	Average Predicted inflow	Release	BIOP Target	Objective	Flow change	Change in storage (acre-ft)* Period	Sum	Reservoir height at period end	Reservoir volume at period end
Apr 1-15 *	15	2,900	1,750	1,500	e,g	1,150	34,155		1550.00	392,000
16-30 *	15	2,900	1,750	1,500	e,g	1,150	34,155	--	1561.00	420,000
May 1-15 *	15	2,900	1,750	1,500	c, e, g	1,150	34,155	--	1563.50	428,000
16-31 **	16	2,700	2,700	1,500	c, e, g	0	0			
Jun 1-15 **	15	2,200	2,200	1,200	a,b,c,d, e	0	0	--		
Jun 16-30 **	15	1,600	1,600	1,200	a,b,c,d, e	0	0	--		
Jly 1-15 **	15	1,100	1,200	1,200	a,b,c,d, e	-100	-2,970	--		
16-31 **	16	850	1,000	1,000	a,b,c,d	-150	-4,752			
Aug. 1-15 **	15	700	1,000	1,000	a,b,c, e	-300	-8,910	--		
16-31 **	30	650	1,000	1,000	a,b,c, e	-350	-20,790	--	1541.00	355,000
Sep 1-30 **	15	680	1,500	1,500	a,b,f	-820	-24,354	--		
Oct 1-15 **	16	840	1,500	1,500	a,b,f	-660	-20,909			
16-31										
							-82,685			

*Release from 1 April - 15 May equals inflow - 1,150 cfs

** Release from 16 May through 15 October equals inflow or the BIOP target (which ever is higher)

	Elevation	Storage
Power Pool	1,425	111,892
Min Con Pool	1,450	148267
Spillway Crest	1,541	355266
Max Con Pool	1,563	428,754

OBJECTIVES IN PRIORITY ORDER

(a) maximize survival of juvenile spring chinook passing downstream through Detroit Dam

(b) minimize early emergence by spring chinook fry and late emergence of steelhead fry

(c) minimize prespawning mortality among adult spring chinook.

(d) increase survival rates of juvenile salmonids in summer.

(e) minimize dewatering of winter steelhead redds

(f) minimize dewatering of spring chinook redds

(g) minimize dewatering of juvenile salmonids in spring

1.983 ac ft / cfs

SUMMARY

Rogue

Used a long term monitoring data set to refine project operations to meet fisheries objectives

Willamette

RME program designed to inform questions that guide implementation of BIOP actions

Differences in application of ramp rates, spawning flows, flood damage reduction operations, flows to support adult migration and reduce prespawning mortality,

Rogue - fisheries objectives are prioritized and shape releases of conservation storage, shape of hydrograph is the same, but magnitude of releases change based on annual water supply. Use flow to meet temperature targets to reduce prespawning mortality. In season changes tracked with spreadsheet model to assess tradeoffs of early and late season operations.

Willamette – mainstem flow targets (change slightly based on annual water supply), tributary targets to support spawning and incubation. Targets recognized lack of knowledge on limiting factors. Objectives not prioritized…difficult to track tradeoffs of early and late season operations.

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