



FISH PASSAGE CENTER

847 NE 19th Ave., Suite 250, Portland, OR 97232

Phone: (503) 833-3900 Fax: (503) 232-1259

<http://www.fpc.org/>

e-mail us at fpcstaff@fpc.org

MEMORANDUM

TO: Tom Lorz, Rob Lothrop, Christine Golightly, CRITFC
Greg Silver, Jon Hess, CRITFC
Lance Hebdon, Jonathan Ebel, IDFG
Jay Hesse, NPT
Ritchie Graves, Claire McGrath, NOAA Fisheries
Tucker Jones, Erick VanDyke, ODFW
Janine Castro, David Swank, USFWS
Dan Rawding, Bill Tweit, Charles Morrill, WDFW

FROM: *Michele DeHart*
Michele DeHart, FPC

DATE: November 6, 2020

RE: Planning for the future Smolt Monitoring Program and Comparative Survival Study

The purpose of this memorandum is to present an integrated plan for the Smolt Monitoring Program (SMP) and Comparative Survival Study (CSS) for future years, for your consideration. The following discussion includes the need and rationale for an updated Smolt Monitoring Program and an expanded Comparative Survival Study. A brief summary of the development of the two projects is included to provide historical context as a basis for consideration of the future. The following proposal is based on the portfolio approach utilized by some agencies to manage priorities within the limitations of available funding. The overall objective is to enhance the monitoring programs to meet the present management priorities of the state, federal and tribal fishery management agencies.

The Problem

The fundamental problem precipitating the need to consider options for the future, is the Bonneville Power Administration's flat funding policy for Fish and Wildlife projects in the Columbia Basin.

The Background

The SMP was established by the first NPCC Fish and Wildlife Program in 1982. The same Fish and Wildlife Program established the Water Budget, which was a limited volume of water that the fishery management agencies and tribes would manage to benefit downstream migrating salmonids for the spring out-migration. The fishery managers would decide the timing and amount of water releases from that water volume. At the time, the management of the water budget relied on passage index data collected in the SMP. There has been very little change in the SMP since that time.

The CSS was established in 1996, when PIT-tags became available for monitoring both the juvenile life stage and adult life stage. Currently about 87% of the CSS project funding goes to purchase and application of tags at upstream sites and tributaries. The remaining 13% of the CSS funding goes to the agencies and tribes analytical work and representation on the CSS Oversight Committee.

Change Occurs

In 1992 with the Endangered Species Act Listings, the passage management arena was transformed. Dates for provision of flow targets and reservoir operations targets were set. The Water Budget concept ended. As changes occurred the monitoring program supporting management deliberations was modified to meet the changing needs of the managers. Gas bubble trauma monitoring was added, the condition monitoring activities were updated and data management processes were continually updated. As PIT-tag detection sites have been expanded, more and more emphasis for management decisions have been based on PIT-tagged fish. At the present time, the managers rely heavily on the PIT- tagged juvenile and adult fish to assess and analyze multiple aspects of adult and juvenile survival, travel time, and migration characteristics. Over time the CSS mark groups and analyses have formed the basis for passage management considerations.

Proposal Objectives

- Respond to the needs of the fishery management agencies and tribes by expanding CSS mark groups and coverage while staying within the total flat funded budget limit established by BPA for these two projects combined.
- Expand the CSS mark groups by moving funding from the SMP to the CSS while staying within the total flat funding level for these two projects. This is similar to the project portfolio management approach implemented by other agencies.
- Update the SMP to improve resultant data, reduce fish handling and respond to agencies management needs.
- Maintain a modified SMP, while continuing Gas Bubble Trauma (GBT) monitoring.
- Recognizing funding responsibilities, such as condition monitoring and smolt transportation which is a requirement and funding responsibility of the US Army Corps of Engineers.

Proposed Changes to the SMP

- Eliminate SMP sampling at Rock Island Dam starting in 2021 (2020 SMP budget \$203,566)
- Eliminate SMP sampling at John Day Dam starting in 2021 (2020 SMP budget \$165,977)

- Eliminate SMP sampling at Lower Monumental Dam starting in 2021 (2020 SMP budget \$219,216 PSMFC and \$44,000 WDFW)
- Total funds eliminated from SMP and moved to CSS mark groups \$626,554 (estimate includes increase in PSMFC pass through funding rate to 2.06% in 2021)

Proposed changes to CSS

- Increase CSS PIT-tag mark groups above Rocky Reach Dam
- Increase CSS PIT-tag mark groups above Lower Granite Dam, specifically fall Chinook

Rationale John Day

The primary rationale for eliminating the SMP at John Day is that passage management has changed significantly and the data resulting from the SMP at John Day is not utilized in management decisions as it was when the SMP originated. Eliminating SMP sampling at John Day will reduce handling of smolts, which NOAA Fisheries has encouraged in recent years. In recent years both the length of the sampling season and the frequency of daily sampling has been reduced at John Day. This modification of SMP sampling at John Day will not affect the current GBT monitoring program, because John Day is not a GBT monitoring site. PIT-tag detections of juveniles salmon and steelhead at John Day will still occur. Calculation and analyses of migration passage characteristics are based on PIT- tag detections and sampling at upstream sites. Condition monitoring occurs at John Day, but this is not an SMP responsibility, this is a USACOE responsibility. For Snake River SMP sites and McNary SMP, the Walla Walla District funds condition monitoring activities separately from the SMP sampling. Similarly, we expect the Portland District, USACOE to fund condition monitoring at John Day in the absence of the SMP.

Over the last few years, SMP staff at John Day have provided juvenile lamprey samples for tribal lamprey research. In 2020, there was no SMP index sampling at John Day, only condition monitoring occurred. The condition monitoring and the lamprey samples were provided by staff funded by the SMP. This proposal would require the COE to fund condition monitoring at the John Day site, similar to what the Walla Walla District for their Snake River projects and McNary to meet condition monitoring requirements. In 2020, John Day condition monitoring occurred from 0700 hours to 1300 hours, SMP index sampling did not occur at John Day in 2020. If condition monitoring occurred during nighttime hours, when more fish pass through the powerhouse, it is likely that more lamprey would be caught in the condition sample and a condition monitoring contractor could continue supplying juvenile lamprey samples to tribal researchers, if deemed necessary.

Rationale Lower Monumental

The primary rationale for eliminating the SMP at Lower Monumental is that passage management has changed significantly and the data resulting from the SMP at Lower Monumental is not utilized in management decisions as it was when the SMP originated. Migration characteristics such as juvenile survival, fish travel time, and passage timing are determined by PIT-tag detections and SMP sampling at the upstream sites. Condition monitoring and barge loading are presently being funded and carried out by USACOE funded contractors and are not a part of the SMP. Although this proposal eliminates SMP index sampling, GBT sampling components of the SMP would continue at Lower Monumental. The

USACOE will continue to operate the juvenile sampling facility to meet their fish condition monitoring and barge loading requirements. A GBT crew funded through the SMP, would coordinate with these scheduled USACOE activities to conduct scheduled weekly GBT monitoring at Lower Monumental.

Rationale Rock Island

The primary rationale for eliminating the SMP at Rock Island Dam (RIS) is that more reliable estimates of survival and passage characteristics can be generated by increasing PIT-tag mark groups upstream of Rocky Reach Dam (RRE) and avoiding the downward bias generated in estimates from marking and handling at dams (Storch et al. 2020 (in press)). In addition, the passage index generated at Rock Island is not utilized as it was when the SMP was first implemented. The dates of reservoir releases are set by Biological Opinions and regional water management plans. GBT monitoring is conducted by Chelan County PUD.

To understand the potential magnitude of handling and marking effects from tagging at RIS, FPC staff compared survival estimates and avian predation recoveries from upstream-marked, PIT-tag passive (no handling) detections at RRE, 33 river kilometers upstream from RIS, to the groups captured and marked at RRE. Consistent with the methods utilized in Evans et al (2019), we tabulated the number of tagged steelhead that were recovered at Potholes Reservoir, the location with the highest estimated predation rates in the Upper Columbia River. These recoveries form the basis for the avian predation estimates, after accounting for deposition and detection probabilities. To assess the potential for tagging and handling effects on overall smolt-to-adult survival, we also tabulated the number of returning adults at Bonneville Dam for each year and group. We used binomial generalized linear models with year and release site effects (RIS versus RRE) to quantify the tagging and handling effects.

Recovery rates at Potholes Reservoir for steelhead tagged and released at RIS were 51% higher (95% confidence interval: 42% - 61%) compared to steelhead passively detected at RRE. The significantly higher relative recovery rates for steelhead tagged at RIS clearly indicates that the tagging and handling processes have resulted in predation probabilities that are biased high compared to steelhead that were previously tagged and passively detected at the smolt bypass system at RRE. This represents a considerable impact of marking and handling at RIS, particularly when the longer migration of steelhead detected at RRE (33 additional river kilometers) is taken into account. There is also strong evidence that steelhead tagged at RIS have significantly lower Smolt-to-Adult Return rates (SARs). The SARs for steelhead tagged and released at RIS were 29% lower (95% confidence interval: 20% - 37%) compared to steelhead passively detected at RRE. This differential in survival exists despite the mortality that occurs between RRE and RIS, which would tend to result in lower SARs for RRE if RIS tagging and handling effects were minimal. The differential in SARs suggests that there may be also differences in juvenile survival rates that are estimated using the steelhead that are tagged and released at RIS. Thus, the available information demonstrates that there is a significant negative bias in SARs and a significant positive bias in avian predation mortality associated with steelhead tagged at RIS compared to steelhead tagged upstream and detected at RRE. When these marking and handling effects at RIS are considered, it becomes apparent that increasing PIT-tag mark groups above Rocky Reach will provide more useful data. Eliminating RIS from

the SMP is consistent with the SMP overall and the CSS overall, which does not utilize mark groups from at-dam tagging programs.

Table 1. Number of previously-tagged juvenile steelhead detected at the Rocky Reach juvenile bypass system, number of adults detected at Bonneville Dam, Smolt-to-Adult Return rate (SAR), the number of tags recovered at Potholes Reservoir and the recovery rate at Potholes Reservoir (Rec. Rate), 2010-2018. Data queried from ptagis.org on 5/15/2019.

Migration Year	RRH Detects	Bonneville Adults	SAR	Potholes Recovery	Recovery Rate
2010	22,139	374	1.69%	857	3.8%
2011	19,222	146	.76%	696	3.6%
2012	13,749	200	1.45%	451	3.3%
2013	14,538	161	1.11%	502	3.5%
2014	21,949	244	1.11%	222	1.0%
2015	23,748	23	0.10%	0	0.0%
2016	15,911	134	0.84%	112	0.7%

Table 2. Number of juvenile steelhead tagged and released at Rock Island Dam (RIS), number of adults detected at Bonneville Dam, the Smolt-to-Adult Return rate (SAR), the number of tags recovered at Potholes Reservoir, and the recovery rate at Potholes Reservoir (Rec. Rate), 2010-2018. Data queried from ptagis.org on 5/15/2019.

Migration Year	RIS Tags Released	Bonneville Adult	SAR	Potholes Recovery	Recovery Rate
2010	7278	85	1.17%	401	5.5%
2011	7224	42	0.58%	330	4.6%
2012	5943	59	0.99%	263	4.4%
2013	5305	57	1.07%	315	5.9%
2014	7338	64	0.87%	97	1.3%
2015	7048	5	0.07%	0	0.0%
2016	7498	25	0.33%	163	2.2%

Project 1987-127-00, Smolt Monitoring	2020 budget	Proposed 2021
CR-325170; Contract # 78040 REL		
March 1, 2019 - February 29, 2020		
<u>1. Pacific State Marine Fisheries Commission</u>	<u>Contract Total</u>	
LOWER MONUMENTAL DAM	\$ 219,216	\$0
JOHN DAY & BONNEVILLE DAMS	\$ 506,815	\$ 340,838
LOWER GRANITE DAM	\$ 213,687	\$213,687
BONNEVILLE SEPARATOR MONITORING	\$131,816	\$131,816
McNARY DAM	\$181,220	\$181,220
HQ ADMINISTRATION	\$29,343	\$29,343
TOTAL PSMFC	\$ 1,282,097	\$896,904
<u>2. Chelan County Public Utility District</u>		
ROCK ISLAND DAM		
TOTAL CHELAN	\$203,566	\$0
<u>3. Washington Department of Fish & Wildlife</u>		
LOWER GRANITE DAM	\$81,399	\$81,399
M McNARY DAM/ LOWER MONUMENTAL DAM	\$88,915	\$44,458
TOTAL WDFW	\$170,314	\$125,857
<u>4. Oregon Department of Fish & Wildlife</u>		
LITTLE GOOSE DAM	\$246,203	\$246,203
GRANDE RONDE TRAP	\$365,517	\$365,517
TOTAL ODFW	\$611,720	\$611,720
<u>5. Idaho Department of Fish & Wildlife</u>		
HEAD OF LOWER GRANITE RESERVOIR & DAM		
TOTAL IDFG	\$352,252	\$352,252
<u>6. PSMFC Administrative pass-thru</u> <u>(1.18% of items 2-5)</u>	\$15,787	\$22,450 PSMFC pass-thru 2.06%
TOTAL PSMFC 2019-20 SMP CONTRACT	\$2,635,737	\$2,009,183

CSS Future Proposal 2021

The total CSS contract budget for 2021 is \$1,230,027. This has been the flat funding level since 2017. In 2021, 87% of the total project funding goes to the purchase and implantation of PIT-tags. Since 2017, when the flat funding policy began, the cost of PIT-tags has increased twice. However, the flat funding level has not been increased to cover the increase in cost of PIT-tags, which is negotiated by BPA with the vendor. The proposed modifications of the SMP shifts an estimated \$626,554 to the CSS for the purchase and application of PIT-tags. This represents approximately 300,000 tags, including the cost of the tags and the application of the tags. The specific application of these tags will be dependent on discussions and agreement of the CSS Oversight Committee and the agencies and tribe's fishery managers. Consistent with one of the overall objectives of the CSS is to pursue collaborative actions to coordinate CSS mark groups with other marking efforts to maximize the benefit and multiple use from existing mark groups. Our overall objective is to increase PIT-tag mark group representation above Rocky Reach and Rock Island in the Upper Columbia and establish mark groups that are not already represented or under-represented in the Snake River above Lower Granite Dam, such as fall Chinook, while maintaining present CSS mark groups as directed by the agencies and tribes.