Columbia River Salmon and Steelhead Endorsement Advisory Board

Application for Funding

Applicant: WA Dept. of Fish & Wildlife, Region 3 Fishery Management

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Proposal Title: "Ringold Springs Hatchery Steelhead Tagging Study – Year 2"

Type of Proposal: Research to support/validate the Ringold Springs Hatchery segregated-harvest program necessary to maintain the Hanford Reach steelhead mark selective fishery (MSF)

Date of Submission: February 25, 2016

Effective Period of Funding: March 1, 2016 – June 30, 2017

Amount of Direct Budget Funding Requested: **$34,128**

Activities to be funded: PIT and Coded-Wire Tagging of BY16 Ringold Springs Hatchery steelhead smolts

Background & Need for Proposed Activity

The lower Hanford Reach (HR) of the Columbia River from the Highway 395 Bridge in Pasco upstream to the old Hanford townsite wooden power line towers is open for steelhead fishing annually from October 1 through April 15 by permanent regulation. This fishery has been monitored with CRSSE funding for six seasons and a renewal proposal for the 2016-17 fishery has been submitted. The HR steelhead fishery is very popular with anglers in the Tri-cities, Moses Lake and Yakima areas because of the close proximity to these major populations and the limited opportunities for steelhead fishing in eastern Washington. The foundation of this fishery is the Mitchell Act-funded, **"segregated-harvest"** steelhead production at Ringold Springs Hatchery (RSH). Without the 180,000 smolts released at RSH there would be significantly reduced opportunity for steelhead fishing in the mid-Columbia. Opportunity would be limited to fishing for Upper Columbia hatchery steelhead returning to Wells Hatchery and other upstream locations. In addition, the fishery would be delayed until escapement targets to the Upper Columbia River tributaries are achieved and fishing is opened in those areas. The RSH steelhead program allows WDFW to open the lower Hanford Reach to steelhead fishing on October 1 by permanent rule regardless of size of the return to Upper Columbia River tributaries.

The RSH steelhead program is dependent upon:

1) Mitchell Act (MA) federal funding (approx. $185,000 per year),

2) Production of 240,000 Wells-stock steelhead fry from Wells Hatchery and/or Ringold Springs Hatchery needed to produce the 180,000 smolt release objective,

3) NOAA-Fisheries approval of a Hatchery Genetic Management Plan (HGMP) and issuance of a permit for the program certifying compliance with the Endangered Species Act (pending).

Mitchell Act Funding

WDFW Fish Program is presently committed to allocating MA funding to RSH for the steelhead program, provided items 2) and 3) are achieved or we are making significant progress towards completion. Overall MA funding for WDFW hatcheries continues to decline, which means that having a secure, permitted program and a reliable source of steelhead fry is essential to continued funding.

RSH Wells Stock Steelhead Fry Production

RSH has been receiving surplus hatchery x hatchery (H x H) fry from Wells Hatchery to rear for this program since 1997. In recent years, the steelhead "safety net" programs in Region 2 funded by the mid-Columbia PUD's have changed and the number of surplus fry available for transfer to RSH has become less reliable. The RSH steelhead program is the lowest priority for receiving fry from Wells Hatchery. RSH has received reduced numbers of steelhead in multiple years and has been notified that there is the potential that the number of steelhead fry delivered to RSH may be further reduced or eliminated in future years. If RSH was unable to source steelhead fry for rearing, the need for the MA funding would disappear and Region 3 would be hard pressed to prevent a reallocation of the funding to other MA hatcheries (all in Region 5).

In the spring of 2014, RSH initiated an effort to become self-sufficient by collecting broodstock, spawning, and incubating steelhead from returning adults to the RSH volunteer trap. Our objective is to produce on-site all or a significant portion of the steelhead fry needed to meet our 180K smolt production goal. This was not possible in the past because RSH did not have an incubation facility with the chilled water necessary to achieve high egg-to-fry survival, hence the need to import fry from Wells Hatchery. RSH staff converted an unused storage building into a steelhead incubation facility by installing Heath stack incubation trays and plumbing them to refrigerated chillers to cool the 60°F spring water down to 52°F. A volunteer angler broodstock collection (ABC) program was conducted in late March 2014 and 2015 and steelhead brood were hook-and-lined by anglers to supplement the adult steelhead collected at the RSH volunteer trap. Ultimately, RSH staff were able to produce 45-50% of the fry needed for the program in this pilot year. This effort was repeated in 2015 with similar results.

Hatchery Genetic Management Plan (HGMP)

RSH does not have an approved Hatchery and Genetic Management Plan (HGMP) and no ESA permit coverage for the steelhead program. The recent settlement with the Wild Fish Conservancy for WDFW's hatchery steelhead programs in Puget Sound is "wake-up call" for all

WDFW steelhead and salmon programs and without a robust monitoring and evaluation plan, the RSH steelhead program is vulnerable to similar actions. RSH needs an ESA permit to continue to operate long-term. R3 Fish Program has recently updated the HGMP to incorporate the described infrastructure changes necessary to make the program self-sufficient. The 30-day public comment period closed on 12/5/14 and there were no comments submitted. WDFW formally submitted the HGMP to NOAA on 12/29/14. No response (e.g. "Letter of Sufficiency") has been received by WDFW from NOAA as of 12/15/15 indicating that the HGMP is ready for formal ESA consultation. Action on the HGMP by NOAA is pending.

Hatchery Scientific Review Group (HSRG) guidelines require that **"segregated hatchery programs"**(i.e. reproductively isolated from wild steelhead populations) must not contribute more than five percent of the actively spawning adults on the spawning grounds…an attribute known as pHOS (proportion of hatchery-origin spawners). RSH is fortunate in that there is no population of wild steelhead that spawn in the Hanford Reach near the hatchery. The HR is simply a migration corridor for upper Columbia River steelhead smolts and adults. Nonetheless, some adult steelhead, both wild and hatchery stocks, are known to stray far from their natal area (i.e. wild spawning area or hatchery….see http://www.ybfwrb.org/News/Post/When-Steelhead-Go-Too-Far/). Tributary systems with wild steelhead populations nearest in geographic proximity to RSH include the Wenatchee, Yakima, Walla Walla, and Tucannon. Steelhead in the Mid-Columbia, Upper Columbia, and Snake River Distinct Population Segments (DPS) are all listed as "threatened" under the ESA.

At this time, WDFW has limited data to support our premise that RSH steelhead are segregated from ESA-listed natural spawning populations. We believe RSH steelhead return to the Hanford Reach and the hatchery with high fidelity (i.e. low stray rate) because they are reared/imprinted for approximately a year on spring water at RSH with its unique "chemical signature" and constant 58^{o} F. water temperature, rather than on pumped Columbia River water. Rearing on spring water should provide a strong olfactory signature and improve homing fidelity. Both the adipose and right ventral fins are clipped on steelhead released from RSH to distinguish them from wild or other hatchery steelhead. R3 staff have not received any documentation of AD+RV steelhead being observed in natural spawning areas. However, this is not conclusive proof that RSH steelhead are not contributing to natural spawning and RSH are routinely documented passing upstream through the fish ladder at Priest Rapids Dam.

Steelhead spawning surveys are conducted in the spring and are often difficult to perform because of spring runoff which leads to elevated flows and increased turbidity. Visually observing a right ventral fin clip during surveys is problematic. In addition, steelhead do not commonly die on the spawning grounds like other Pacific salmon, so recovery of carcasses to check for marks and/or tags is not feasible.

Manned and video system counting stations at mainstem Columbia River and tributary diversion dams (e.g. Prosser Dam) typically distinguish between wild and hatchery origin steelhead by the presence/absence of an adipose fin, but the identification of other fin clips is not part of the standard protocol. Even if the fish counting protocol was modified to collect information on all fin clips, the right ventral fin clip is only visible from video systems and manned counting stations that view the right side of the fish. Some viewing stations only view the left side of the fish. The adipose fin clip on the dorsal surface is viewable from either side.

In order to obtain defensible data that supports our hypothesis that RSH steelhead do not exceed the HSRG guideline of pHOS ≤ 0.05, WDFW needs a defensible means of documenting the influence of the RSH steelhead reproduction on surrounding natural/wild populations.

The Monitoring & Evaluation (M&E) section of the RSH Summer Steelhead HGMP submitted to NOAA was revised to include a brief description of this proposed tagging study. The previous draft version had no provision for hatchery M&E to evaluate the level of genetic segregation. WDFW believes that NOAA would have eventually identified our lack of scientific data to definitively determine the influence of RSH reproduction on natural-origin steelhead and withheld approval of the HGMP/ESA permit if we submitted the HGMP without committing to this evaluation. WDFW is trying to be proactive to address this M&E deficiency in advance of formal ESA consultation with NOAA.

Summer steelhead have an extended adult migration period, returning to the Columbia River and tributaries over several months from late spring through the fall and may migrate well outside of their natal areas or hatchery of origin between the time they returned to fresh water and spawning the following spring. Passive integrated transponder (PIT) tags are one of the most effective, versatile, and commonly used methods to passively monitor fish populations. The adult fish ladders at most of the Columbia and Snake River hydroelectric projects including Bonneville, McNary, Ice Harbor, and Priest Rapids Dams have PIT tag detection arrays to document upstream passage of steelhead and salmon. In addition, all the tributaries that RSH steelhead may potentially stray into are "wired" with antenna arrays to detect PIT tags (i.e. Yakima, Wenatchee, Tucannon, etc.), so we can take advantage of existing detection infrastructure that has been paid for and deployed by other projects. A PIT tag array will be installed in the Ringold Springs Hatchery release channel during the late winter of 2016 providing detection of adults returning to the volunteer trap, as well as enumerating the number of PIT tagged smolts leaving the hatchery each spring.

Coded wire tagging is the most effective tagging method to generate accurate estimates of smolt-to-adult survival and hatchery contributions to sport and commercial fisheries. Most lower Columbia fisheries (sport and Zone 6 tribal) do not scan harvested fish for PIT tags, but do "wand" fish for the presence of a CWT and take snouts for tag extraction and reading. We also don't receive consistent data on fin clips (AD+RV) from fisheries other than the HR terminal sport fishery that is monitored by Region 3 staff with CRSSE funding. Current SAR estimates only include the terminal harvest estimate from HR creel census and hatchery trap captures, which means SAR and fishery contribution are under-estimated. The proposed CWT group will allow WDFW to refine these estimates to more fully show the value of the program in providing harvest opportunity to multiple fisheries in addition to the ability to determine SAR for the production. A refined SAR estimate will allow WDFW to develop improved pre-season return forecasts.

Proposed Activity

We are requesting funding to coded-wire tag and PIT tag sufficient numbers of RSH steelhead smolts prior to release in April 2017 to evaluate straying, estimate pHOS for local and out-of-basin populations, calculate SARs and adult return estimates, determine migration patterns, and estimate contributions of RSH produced steelhead to commercial and sport fisheries. A significant portion of the smolt production, 20%-25%, need to be coded wire tagged (CWT) to

provide accurate estimates/impacts of the variables listed above. We are proposing to apply 50,000 CWTs to brood year 2016 (BY16) pre-smolts next fall. The WDFW automated trailer will be brought on site to adipose clip and CWT the steelhead. The right ventral fin will be manually clipped for the PIT tag group as well as the remaining production from the facility.

We are also requesting funding to PIT-tag 7,000 RSH BY16 steelhead. Approximately 1,000 of the steelhead would be tagged as pre-smolts after the adipose + right ventral fin clip and CWT is applied. All PIT tagged steelhead will be held in the RSH vinyl raceways and monitored for tagging mortality until the pre-smolts are transferred to the 5-acre earthen rearing pond for final rearing and subsequent release in April 2017. These 1,000 early marked PIT tagged steelhead will be used to estimate survival during rearing in the five-acre earthen pond in addition to providing in-river and ocean juvenile and adult analysis. The remaining 6,000 PIT tags will be applied to the steelhead from the five-acre earthen pond one month prior to release. The late group of tagged steelhead will be held in a vinyl raceway to evaluate delayed mortality and then returned to the general population in the earthen pond two weeks prior to release. By delaying the marking until one month prior to release rather than tagging at the pre-smolt stage will result in a larger number of PIT tagged fish in the actual smolt release (less natural mortality and avian predation). All PIT tagging will be conducted using Region 3 agency-funded staff. CRSSE funds will only be used to purchase tags. Based on our current SAR estimates, 7,000 PIT tags should be sufficient to yield an adult escapement above McNary Dam of approximately 200 fish. This is believed to be sufficient to evaluate straying to other systems relative to returns to the hatchery. The combination of coded wire and PIT tagging will provide a robust assessment of the impacts, influence, and contributions of the RSH steelhead program and a strong scientific defense in the event of a third-party legal challenge. This request funds the second year (replicate) of CWT and PIT tagging first funded in 2015 (2016 smolt release). Partial funding for construction of the RSH detection array was provided in 2015 (about 67%). Due to increased costs of equipment and labor, the remaining funding needed to complete the installation before the mid-April smolt release is included in this proposal.

The basis for the quantity of PIT tagging and coded-wire tagging is provided in Appendix A.

Assistance Required

Region 3 is requesting $34,128 (direct budget) to PIT tag 7,000 juvenile steelhead, coded wire tag 50,000 pre-smolt steelhead, purchase a hand held PIT tag reader, and complete the installation of the PIT tag detection array at the Ringold Spring Hatchery volunteer trap. Fish Program staff from Region 3 headquarters, Fish Management, Hatchery and Science Divisions will PIT tag the 7,000 steelhead pre-smolts (no CRSSE funding requested for labor). WDFW's Fish Marking Program will supply the specialized marking trailer to CWT the 50,000 pre-smolts prior to the Mitchell Act AD+RV fin clipping. RSH staff will assist the two marking crews by managing the supply of fish to the marking trailers. The hand held PIT tag reader will be used to recover PIT tag information from individual steelhead captured at the RSH volunteer trap and harvested in the sport fishery.

Budget Summary

1) Preloaded PIT tags (HPT-12) under the WDFW contract are $2.67 per tag plus shipping and sales tax.

7,000 * $2.67	= $18,690
601 hand-held PIT tag reader	= $565
Sales Tax	= $1,598
Shipping	= $25
Subtotal	= $**20,878**

2) 50K CWT's @ $163/1,000 = **$8,150**

3) Complete PIT tag array at RSH

Equipment	= $4,100
Labor (WDFW)	= $1,000
Subtotal	= **$5,100**

4) Total Direct Budget = **$34,128**

We are requesting $5,100 in additional funds to complete the installation of the PIT tag array at the RSH volunteer trap. The cost of installation of the array was initially estimated at $10,000 when the proposal was submitted (Fall 2014). We planned for a winter 2015-16 array installation prior to the April 2016 steelhead smolt release. I receive two quotes this December preparing for the installation. The cost of the necessary equipment has increased substantially to $13,878 since the original estimate (Appendix B). Labor costs for installation are estimated at $1,000. We are coordinating with WDFW staff from the Science Program in Wenatchee for the installation. By using "in-house" staff our costs will be greatly reduced compared to using an outside contractor (West Fork Environmental bid of $31,695). We are still on schedule to complete the PIT array prior to the 2016 juvenile release with fabrication/installation in March, contingent on the approval of this proposal request at the Feb. 25th CRSSRAB meeting.

Benefit of Proposed Activity: The primary benefit of this activity is to take action to collect necessary data to support and defend the RSH steelhead program. Without good data to support our hypothesis concerning straying and the effect on pHOS for ESA-listed steelhead populations in nearby sub-basins, the HGMP/ESA permit for the RSH steelhead program is in serious jeopardy. In the absence of ESA compliance, WDFW Fish Program will eventually be forced to withdraw Mitchell Act funding support and terminate the hatchery program to avoid penalties imposed by NOAA-Fisheries or potential third-party legal challenges. If the RSH steelhead program is terminated, the foundation of the terminal sport fishery in the Hanford Reach collapses and steelhead fishing as we currently know and enjoy will end. The intent of this proposal, and the actions taken by WDFW to make the program self-sufficient at RSH, without the need to import Wells-stock steelhead fry, is to assure the long-term viability of this important fishery.

Appendix A: Tagging Summer Steelhead at Ringold Springs Hatchery to Calculate Smolt-to-Adult Recruit (SAR) rate and to Evaluate Adult Straying (Paul Hoffarth, District 4 Fish Biologist)

SARs have been estimated for the RSH summer steelhead releases based on catch and harvest in the terminal fishery, but this is likely an underestimate as contributions from lower river fisheries, returns to the hatchery, and strays are not included in this estimate. A PIT tag study was conducted on summer steelhead at RSH from 2003 through 2005 to determine SARs for in-river, bypassed, and transported steelhead. SARs for in-river migrants from release at the hatchery to return to McNary Dam averaged 0.034, range 0.032-0.038. SARs for Lyons Ferry released summer steelhead to McNary for 2008-2010 also averaged 0.034, range 0.026-0.047. Based on these data sets, we currently use an SAR of 0.034 to estimate adult PIT tag returns to McNary Dam.

Ringold Springs Hatchery		Lyons Ferry Hatchery	
Year	SAR	Year	SAR
2003	0.038	2008	0.047
2004	0.032	2009	0.026
2005	0.033	2010	0.029
	0.034		0.034

Roughly 230,000 fry are needed to meet the release goal of 180,000 smolts at the RSH. Survival during the period when the steelhead are held in vinyl raceways (May-December) has varied from 91% to 98% over the most recent four years (mean = 95%). PIT tagging would likely be conducted just prior to moving the fish from the vinyl raceways to the 5-acre earthen pond. The population of steelhead at the time of marking will likely vary from 209,300 to 225,400.

Survival from ponding to release has averaged 83% for the 2010 to 2013 releases, range 77% - 89%. Based on these survival estimates the smolt releases from the RSH should range from 161,200 to 200,600. Adult returns based on an SAR of 0.032 to 0.038 will range from 5,125 to 7,603, mean = 6,227.

	Fry	Survival	Ponded	Survival	Release	SAR	Adult Return
Mean	230,000	95%	218,500	83%	181,355	0.034	6,227
Max	230,000	98%	225,400	89%	200,606	0.038	7,603
Min	230,000	92%	209,300	77%	161,161	0.032	5,125

An adult PIT tag return to McNary Dam of 200 steelhead annually should generate a relatively accurate SAR for the RSH summer steelhead production and provide sufficient PIT tagged adult returns to evaluate straying of the RSH production into the upper Columbia and Snake River systems. 7,000 juvenile summer steelhead, 3.2% of the juvenile production prior to ponding, would need to be tagged annually to produce an adult PIT tagged group of 200 to McNary Dam.

Proportion of Production Tagged						Adult PIT Returns to McNary			
Tagged	3,500	5,000	7,000	10,000		3,500	5,000	7,000	10,000
Mean	1.6%	2.3%	3.2%	4.6%		100	142	199	285
Max	1.6%	2.2%	3.1%	4.4%		118	169	236	337
Min	1.7%	2.4%	3.3%	4.8%		86	122	171	245

Because steelhead harvested in the river are not routinely sampled for PIT tags, a CWT program should accompany the PIT tag program for the RSH steelhead production. CWTs would provide a more accurate SAR and allow WDFW to evaluate harvest contributions for the Ringold production. In addition, CWTs will provide an additional metric to evaluate straying. A minimum of 25% of the fish ponded, ~50,000, should be coded wire tagged annually.

Appendix B: WDFW cost estimate to install PIT tag array at the RSH volunteer trap (Ben Truscott, December 2015)

1	**PERSONNEL**						**$992**
	Scientific Technician 4	Installation	0.06	mo	@	$4,237	$254.22
	Scientific Technician 3	Installation	0.06	mo	@	$3,838	$230.28
	Scientific Technician 2	Installation	0.06	mo	@	$3,309	$198.54
	Total		0.2		*Wages Subtotal*		$683.04
	Benefits						
	OASI			salary	@	6.20%	$42.35
	Retirement			salary	@	11.18%	$76.36
	Labor and Industries		0.18	mo	@	$161.16	$29.01
	Health Insurance		0.18	mo	@	$841.00	$151.38
	Medical Aide			salary	@	1.45%	$9.90
					Benefits Subtotal		$309.01
2	**SUPPLIES/EQUIPMENT**						**$13,884**
	Data Processing Fee		0.2	mo	@	$20.10	$3.62
	Personnel Service Fee			salary	@	0.4058%	$2.77
	06067M 3/4 ton Pickup		0, 0	(mo, mile)	@	($315,$0.44)	$0.00
	Site Materials		1.0	ea	@	$13,878	$13,878.00
2	**COMBINED COSTS (PERSONNEL & EQUIPMENT)**						**$14,876**