UPPER-COLUMBIA RIVER STEELHEAD KELT RECONDITIONING PROJECT:

2012 ANNUAL REPORT
February 1, 2012 through January 1, 2013

Prepared by:
Matthew S. Abrahamse
Keely G. Murdoch

Yakama Nation
Fisheries Resource Management
P.O. Box 151
Toppenish, Washington 98948

January 2013

Prepared for

Project # 2008-458-00
Contract #55957
U.S. Department of Energy
Bonneville Power Administration
Division of Fish and Wildlife
P.O. Box 3621
Portland, Oregon 97283-3621

Yakama Nation Fisheries
Toppenish, WA

Table of Contents

1.0 INTRODUCTION 1
2.0 KELT RECONDITIONING FACILITY 1
3.0 LIVE SPAWNING 1
4.0 LITTLE BRIDGE CREEK WEIR TRAP 2
4.1 BACKGROUND (BRIEF) 2
4.2 METHODS 3
4.2.1 Trap Construction 3
4.2.2 Trap Operation 4
4.3 RESULTS 4
4.4 CONCLUSIONS 9
5.0 KELT RECONDITIONING 9
6.0 PLANS FOR 2013 10
6.1 KELT COLLECTION 10
6.1.1 Temporary Weir Traps 10
6.1.2 Live Spawning 11
6.1.3 Hook-and-Line 11
6.2 KELT RECONDITIONING 11
6.3 KELT RELEASE 12

List of Figures

Figure 0.1 - Little Bridge Creek weir trap layout, downstream view 3

Figure 4.2 - Little Bridge Creek weir trap layout, upstream view 4

Figure 1.3 - Road Approach: Pre-Installation 6

Figure 1.4 - Road Approach: Post-Installation 6

Figure 1.5 - In-Channel Downstream: Pre-Installation 7

Figure 1.6 - In-Channel Downstream: Post-Installation 7

Figure 1.7 - In-Channel Upstream: Pre-Installation 8

Figure 1.8 - In-Channel Upstream: Post-Installation 8

List of Tables

Table 4.1. – Summary data for fish encountered at the temporary weir on Little Bridge Creek. 6

1.0 Introduction

Upper Columbia River (UCR) steelhead are listed as "Endangered" under the ESA, and naturally-spawning populations currently exist at threshold levels. Unlike other species of Pacific salmon, anadromous steelhead are iteroparous. However, rates of iteroparity for UCR populations are extremely low, likely due to high mortality imposed by such factors as extreme energetic demand, degraded habitat quality, and post-spawning migration through the Columbia River hydropower system.

The Yakama Nation (YN) is implementing a kelt reconditioning project within the Upper Columbia consistent with FCRPS BiOp requirements and the Columbia Basin Anadromous Fish Accords. The goal of the Upper Columbia River Steelhead Kelt Reconditioning Project (UCKRP) is to increase the abundance of naturally-produced UCR steelhead on natural spawning grounds by as much as 10 percent through the use of kelt reconditioning. The program has three objectives:

> Implement a kelt reconditioning program in the UCR to increase natural origin steelhead abundance relative to current conditions,
>
> Evaluate kelt survival and program effectiveness, and
>
> Collaborate with ongoing M&E studies to document the reproductive success of kelts released from the reconditioning program.

This report documents the work performed under the 2012 contract and how it pertains to the project goals and objectives. The scope of this contract covers steps taken in the first year of implementation of a kelt reconditioning program in the Upper Columbia River. Topics covered in this report include summaries of modifications made to the Methow Steelhead Kelt Facility (MSKF), live spawning steelhead at Winthrop National Fish Hatchery, steelhead kelt weir operations in Little Bridge Creek, steelhead kelt care and facility operation, and future plans for the project.

2.0 Kelt Reconditioning Facility

The majority kelt reconditioning facility construction work was completed under the 2011 contract. Construction work at the facility under the 2012 contract was done to improve function and to address tasks that there was insufficient time to complete in 2011. Work was completed in early spring to prepare one of the circular tanks to hold fish including: building a jump/shade screen around one of the tanks and set up of a temporary formalin drip system. Work completed in the summer included installation of an irrigation system, landscaping the grounds surrounding the kelt facility, asphalting the access road, and installing concrete pads in front of the doors.

3.0 Live Spawning

The acquisition of kelts is the critical component for the UCKRP's success. Under the 2011 contract, the UCKRP explored potential of live spawning natural origin (NOR) steelhead broodstock females collected for Methow River hatchery conservation programs. The application of live spawning techniques for NOR steelhead females would allow their inclusion into a reconditioning program and subsequently an

opportunity to repeat spawn in the natural environment. The results the 2011 study demonstrated that live spawning did not negatively impact the number of eyed eggs collected. As a result, an agreement was reached with USFWS hatchery managers to begin live spawning the NOR female steelhead broodstock and allow for their inclusion into the UCKRP starting in the spring 2012.

The UCKRP aided hatchery staff in collection of natural origin steelhead broodstock (which would eventually be reconditioned) as part of the agreement with the US Fish and Wildlife Service. Ten of the 16 NOR steelhead collected of were females. The first spawn date was April 17, 2012. Two females were live spawned on that date. One of the females was successfully spawned and included in the reconditioning project. The second female died following egg extraction. Upon examination, it appeared that the needle was injected too slowly and air was injected into the muscle tissue. There were a total of two mortalities out of the 10 NOR females. These mortalities will likely become less frequent as the personnel involved gain more experience with live spawning techniques. It is noteworthy that despite this mortality during spawning, that all would have been lethally spawned in the absence of this reconditioning program.

A total of eight NOR female broodstock from the Winthrop National Fish Hatchery were included in the reconditioning project. An additional eight hatchery origin (HOR) female broodstock were live spawned and included in the project. Multiple benefits were realized by adding the HOR fish. Increasing the number of kelts in the tank increased the competition for food and encouraged the kelts to resume feeding. Reconditioning the HOR kelts also proved useful as it allowed us to cull them measure determine fat levels, gamete maturation, and other helpful metrics of reconditioning success. The results of this study were presented to USFWS hatchery managers and fisheries biologists. They agreed with our findings. As a result, WNFH has agreed to begin live spawning the NOR female steelhead broodstock and allow for their inclusion into the UCKRP starting in the spring of 2012.

4.0 Little Bridge Creek Weir Trap

4.1 Background (brief)

The employment of passively operated adult fish traps may be one of the most effective methods for the collection of NOR steelhead kelts in the Methow River basin. Collecting kelts from the Twisp River drainage is of particular interest because of the high proportion of natural origin spawners present and the ongoing steelhead genetic analysis being conducted by Department of Fish and Wildlife which will allow assessment of the reproductive success of reconditioned kelts (a research need identified in the Upper Columbia Salmon Recovery Plan and by the ISRP).

During the spring of 2012, the Upper Columbia Steelhead Kelt Reconditioning Project tested a temporary picket weir for the capture of steelhead kelts in Little Bridge Creek, at tributary to the Twisp River. The goal of the study was to determine if the picket weir design would be an effective collection method for steelhead kelts and to transport any NOR kelts to the MSKF for reconditioning.

4.2 Methods

4.2.1 Trap Construction

The trap consisted of weir panels, pickets, a downstream trap box, and an upstream passage chute. The weir panels were constructed of angle iron 4.5 feet tall and 6 feet long with 0.875 inch holes spaced 1.5 inches apart. Two adjustable legs were attached to each frame for support and to allow the angle of the panel to be modified to best suit their placement location and stream flow. Steel electrical conduit pickets, 5 ft tall and 0.75 inch diameter, were inserted into the holes in the cross pieces of the weir panels. The pickets were not attached to the panel frame to allow their removal during cleaning and times of high flow. The trap box was constructed of an angle iron frame 3 ft wide by 4 ft long by 3 ft deep. The sides and floor of the trap consisted of 1 inch aluminum pipe installed horizontally at a spacing of 1.5 inches to allow small, non-target fish to swim through the trap box. The downstream end of the box was removable. The upstream end of the trap was configured into a downstream facing V with a gap of 4 inches to which a caudal trigger was attached to prevent fish from swimming out. The top of the trap was hinged to allow fish to be removed (Figure 4.1). The upstream passage chute allows fish to move past the weir unimpeded. The frame of the chute was constructed of the same materials used on the trap box, 2 ft wide by 4 ft long by 2 ft deep. A downstream trap box was placed in a deep area directly downstream of an existing side channel. An upstream passing chute was placed in the thalweg (Figure 4.2).

Figure 0.1 - Little Bridge Creek weir trap layout, downstream view.

Figure 4.2 - Little Bridge Creek weir trap layout, upstream view.

4.2.2 Trap Operation

The trap location on Little Bridge Creek was 0.15 river miles from the mouth of Little Bridge Creek. At this point, limited gradient creates a wide pool area where water velocity is diminished. The site can be accessed from a small two track road off of National Forest Development Road 4415.

The trap was to be installed in mid-April and be removed mid-June. The trap was checked a minimum of twice per day, seven days a week. If the trap could not be checked regularly, the downstream panel of the trap box would be removed so fish could move past the weir without obstruction.

Data was collected from all steelhead kelts captured in the downstream trap box. The data recorded will included: fork length in millimeters, weight in grams, origin (natural or hatchery), sex, scale samples, fish condition (good- lack of any wounds or descaling; fair- lack of any major wounds and/or descaling; poor- major wounds and/or descaling), and color (bright, medium, and dark). All fish were scanned for the presence of PIT tags. Tag numbers were recorded if present. If no tag was present a tag was inserted into the fish's pelvic girdle. Natural origin kelts were taken to the Methow Steelhead Kelt Facility at Winthrop National Fish Hatchery for reconditioning. All hatchery origin kelts or other non-target fish were released downstream of the weir.

4.3 Results

The weir was installed on May 23, 2012, over a month later than intended. The installation date proved to be too late to trap post spawn females leaving the system as kelts but did provide a good test of the concept. Delays were due to complications in acquiring a Special Use Permit from the US Forest Service. The trap was checked a minimum of twice a day until the trap was removed on June 15, 2012. A total of sixteen steelhead kelts were encountered (Table 4.1).

Fifteen of the sixteen steelhead captured were males. Twelve of the steelhead captured were of hatchery origin. The natural origin steelhead kelts were retained for steelhead kelt reconditioning. Hatchery origin steelhead were released downstream of the weir. One steelhead kelt was found dead on the weir panels on June 12th. The fish was a post-spawn female in poor condition. The fact that this fish was observed approximately a month after peak spawning and its emaciated condition leads us to believe that this fish was not iteroparious. We do not believe the weir was a causative factor for the fish's death, it is possible that she was already dead prior to encountering the weir.

No non-target species were captured in the weir's trap box. One visual observation of a small salmonid approximately 150 mm in total length was made in the trap box while netting out a steelhead kelt. We were unable to identify the fish's species as it swam between the trap box pickets. It is possible that other small fishes could have been in the trap box at other times but the box's was designed to allow free movement of juvenile fish.

Table 4.1. – Summary data for fish encountered at the temporary weir on Little Bridge Creek.

Date	Time	Species	Stage	Sex	Origin	Length	Condition	Disposition	Floy Tag	PIT
5/26/12	10:30	STLH	Kelt	M	W	580	Fair	Retained		3D9.1C2D6161DE
	13:15	STLH	Kelt	M	H	580	Fair	Released	2306	3D9.1C2D3FA484
5/27/12	13:30	STLH	Kelt	M	H	650	Fair	Released		3D9.1C2D3D7E0C
	13:30	STLH	Kelt	M	H	590	Poor	Released		3D9.1C2D8C9413
	15:40	STLH	Kelt	M	H	600	Fair	Released	2381	3D9.1C2D83BCBA
5/29/12	15:30	STLH	Kelt	M	H	600	Poor	Released		3D9.1C2D73CB94
6/01/12	12:00	STLH	Kelt	M	H	550	Fair	Released		3D9.1C2D73BB40
6/03/12	09:45	STLH	Kelt	M	H	590	Fair	Released		3D9.1C2D8C95B2
6/04/12	09:00	STLH	Kelt	M	H	685	Fair	Released		3D9.1C2D460BF7
	14:00	STLH	Kelt	M	W	585	Good	Retained	2172	3D9.1C2D6200A5
	14:15	STLH	Kelt	M	H	675	Fair	Released		3D9.1C2D73301E
6/06/12	12:30	STLH	Kelt	M	H	610	Good	Released	2713	3D9.1C2D8EA363
6/10/12	10:00	STLH	Kelt	M	H	580	Good	Released		3D9.1C2D743B49
	10:15	STLH	Kelt	M	W	650	Good	Retained	2163	3D9.1C2D8748C2
6/12/12	15:30	STLH	Kelt	F	H	555	Poor	Mortality		
6/13/12	16:00	STLH	Kelt	M	W	569	Good	Retained	2090	3D9.1C2D60BC0B

The installation and operation of the Little Bridge Creek kelt weir did not appear to cause any significant adverse effects to the surrounding habitat. There was some trampling of vegetation at the site. Less than one month later the vegetation has already begun recovering (Figures 4.3-8).

Figure 0.3 - Road Approach: Pre-Installation

Figure 0.4 - Road Approach: Post-Installation

Figure 0.5 - In-Channel Downstream: Pre-Installation

Figure 0.6 - In-Channel Downstream: Post-Installation

Figure 0.7 - In-Channel Upstream: Pre-Installation

Figure 0.8 - In-Channel Upstream: Post-Installation

4.4 Conclusions

We consider the trap testing this spring to have been a success, especially considering the trap was installed after the peak spawning period. The combination of the weir design we developed and the trapping location we chose appear to be a viable means for collecting steelhead kelts in Little Bridge Creek. In light of this information we feel that the kelt weir on Little Bridge Creek could become an important part of the Upper Columbia River Steelhead Kelt Reconditioning project and steelhead recovery in the Methow River.

5.0 Kelt Reconditioning

The Methow Steelhead Kelt Facility (MSKF) was brought online on April 16th. The first wild origin females were spawned on April 17th. YN personnel were present at each spawn from April 17th to May 22nd, to help live (air) spawn any ripe wild females available. A total of eight wild females were live spawned and brought to the MSKF for reconditioning. An additional eight hatchery female broodstock were also live spawned and included in the project.

A natural origin male was trapped at the Little Bridge Creek weir on May 26th and brought to the MSKF. The male was removed from the tank on May 29th because of the fish's poor condition and concern of spreading pathogens to the other fish. The male was released into the Methow River. Three additional wild male steelhead kelts captured at the Little Bridge Creek weir were introduced into the kelt facility. Though in good condition, these males did not reinitiate a feeding response and died shortly after being brought to the facility. By the end of June no wild males remained.

There were a total of eight mortalities during the month of June, including the wild males. Despite the installation of jump nets, one wild female managed to jump out of the tank. The other four mortalities, two wild and two hatchery, were the likely result of a combination of lack of feeding and fungal infection. There were two mortalities during the month of July, one wild female and one hatchery female. Both fish had significant fungal infection in the head and opercular area. There was one mortality during the month of August and another in early October, both wild females. These fish had a minor fungal infection in the head and opercular area and was found with a significant copepod infestation.

Initial attempts to stimulate a feeding response on the first several fish in the facility were unsuccessful. The first observed feeding occurred on April 21st. Feeding response developed slowly, with only a few fish consuming a small amount of feed and progressed to a point at which nearly all the kelts were feeding to some degree. Kelts were fed a combination of krill, cyclo-peez, and menhaden oil. Feeding response to the combination of krill, cyclo-peez, and menhaden oil increased significantly and several fish began taking food items from the water surface. Two types of krill were fed, freeze dried and frozen. The kelts demonstrated a strong preference to the frozen krill. BioOregon brood pellets were introduced once the fish had been in the facility approximately 1 and 1/2 months. Interest in the pellet feed was very limited at first. The fish that would take pellets spit them out after a few seconds. Pellets were gradually mixed into the krill mixture and acceptance of the new feed slowly increased, but the kelts showed a strong preference for natural food items. Kelts were fed the normal feed top coated with SLICE in the first week in October in an attempt to treat parasitic copepod infestation. The kelts fed poorly on the medicated feed, indicating that the medication made the feed less palatable.

We began administering a formalin drip to the kelt tank on May 18th. The kelts received formalin treatments three times a week to prevent the growth of fungus. A concentration of 166 ppm was administered. Treatment frequency was increased to five days a week on May29th when fungus growth was observed on two of the kelts. Treatment frequency was reduced back to three times a week in the month of August once no observable fungal infection could be observed. Formalin treatments remained at a three day a week until the fish were released October 15th.

Three wild and five hatchery kelts survived until the end of the reconditioning process. They appeared to be in good condition. They gained weight and took on a bright, silvery coloration. In the first week of October we examined the kelts for gonadal maturation prior to release. We were unable to confirm that the kelts were mature as no ova were observable using ultrasound imaging. During the work up all of the kelts were observed to have large numbers of copepods on their gills. One of the NOR kelts died during the work up process. Two NOR kelts were released at the end of the season.

6.0 Plans for 2013

The 2012 season was the first year implementing a kelt reconditioning program in the Upper Columbia River. This season we gained a great deal of experience, tested the facility and trapping and spawning techniques. We learned what did and did not work. In the 2013 season we will implement the lessons we learned in 2012 and aim to increase both the number of kelts we collect and increase survival to release.

6.1 Kelt Collection

We will continue to use three methods for the collection of NOR steelhead kelts and explore opportunities to expand these efforts. The methods of kelt collection are: (1) temporary weir traps, (2) live spawning of NOR broodstock females, and (3) hook-and-line collection of NOR kelts in the Methow River.

6.1.1 Temporary Weir Traps

We will continue to operate and maintain a temporary weir trap in Little Bridge Creek in 2013. The results from 2012 were promising and we feel that if we are able to get the trap in earlier we will have success collecting natural origin kelts for the project. We will also be putting in weirs in Hancock Springs and South Fork Gold Creek. These design and operation of these weirs will be the same as the weir in Little Bridge Creek.

At the request of NMFS and the US Forest Service we will be conducting a study in 2013 to determine if the weir has an impact on upstream passage timing of steelhead in Little Bridge Creek. The YN will install and operate a temporary PIT antenna array either upstream or downstream of the weir. Placement of the array will be determined by the location of a second PIT array to be operated by another agency (USGS or WDFW). The antenna array will be installed prior to weir installation. The YN will analyze data from the arrays to determine the travel time through the weir and if the weir is causing significant migration delays. Significant migrations delays will be defined as a median travel time of greater than 48 hours to pass between the lower PIT array and the upper PIT array or multiple hits at the lower array consistent with a fish unable to pass the weir.

Adaptive management practices will be utilized to insure that upstream passage is not hindered. If it is determined that the weir is causing significant delays, a weir panel will be removed every other day to allow free passage upstream. The YN will continue alternate 24 hrs of open passage, 24 hrs of closed

passage at the weir until after the peak of steelhead upstream migration. The peak migration date will be determined in season and will be based on input from co-managers of the resource (USGS, USFS, WDFW, and YN). After peak migration, the YN will cease removing a weir panel every 24 hrs and resume trapping 24 hrs a day 7 days a week.

6.1.2 Live Spawning

In 2013 we will continue to live spawn female NOR broodstock and incorporate them into the UCKRP. We expect to collect 8 to 12 NOR females in this fashion each year, depending on broodstock availability. It is the goal of the USFWS to increase the proportion of natural origin fish in their steelhead broodstock, as well as expand the size of the program. If successful the number of steelhead live spawned and reconditioned is would increase. As in 2012, we may live spawn and recondition HOR female broodstock. This will be dependent on the amount of space available. These fish could provide useful information to an ongoing study being conducted by CRITFC in which they are comparing the levels of hormones and other indicators in the plasma to the gonadosomatic index to determine the impact of artificial reconditioning on kelt maturation.

We will look to improve our air spawning techniques in 2013 to prevent or greatly reduce mortalities caused by injecting air into the muscle tissue. Ways in which we will reduce mortalities may include visiting other kelt programs that utilize air spawning to practice the techniques and modifying air spawning equipment to allow air to be shut off while inserting the needle.

The UCKRP will continue efforts to expand live spawning broodstock other Methow basin steelhead hatchery programs. Discussions with the WDFW and Douglas County PUD took place in 2012 regarding live spawning broodstock for the Twisp River program and will continue in 2013. Future work may include creating isolated incubation and rearing space for the progeny of the Twisp River broodstock as required by WDFW fish health.

6.1.3 Hook-and-Line

No kelts were collected using hook-and-line methods in 2012 but it remains a potential source for future collections. The USFWS has occasionally encountered steelhead kelts during their broodstock collection. Any NOR steelhead kelts caught during broodstock collection will be included in the kelt reconditioning project. Angling methods employed will be in accordance with Washington Department of Fish and Wildlife regulations, however, permits obtained by the USFWS will allow persons listed to fish after the designated season.

6.2 Kelt Reconditioning

All NOR steelhead kelts collected will be brought to the Methow Steelhead Kelt Facility for reconditioning. Upon arrival at the facility the kelts will be administered an injection of emamectin benzoate for the treatment of parasitic copepods. Kelts will be segregated by location and/or method of capture. Segregation will be done to allow for differentiation between groups and to prevent horizontal transmission of pathogens, if present.

An effort will then be made to reinitiate feeding in the kelts. Small amounts of thawed krill will be administered to the kelts. We will no longer be using freeze dried krill as kelts demonstrated a preference to the thawed krill, which was also much less expensive. The thawed krill will also prepare the kelts for the introduction of pelleted feed, which sinks at a similar rate. Pelleted fish feed will be gradually

introduced after approximately one month and the amount of krill fed gradually decreased. Pelleted feed will be top coated with fish oil and Cyclo-peez to increase palatability of the feed.

After approximately six months of feed and pathogen treatment, the gonadal maturation status will be examined via ultrasound. Once it is confirmed the majority fish have mature gonads, all fish will be released at the mouth of the Methow River regardless of maturation status. Any mortalities in the project will be buried at a designated site in accordance with Winthrop National Fish Hatchery protocols.

6.3 Kelt Release

Kelts will be transported from the Methow Steelhead Kelt Facility (MSKF) to a release site at the mouth of the Methow River. Kelts will be released after ultrasound examinations confirm that the majority of fish have mature gametes. All fish will be released regardless of maturation status. The release date will likely be in mid-October. Water temperature and dissolved oxygen data will be collected from the source and receiving waters to prevent stress to the fish caused by differences in values.