

US FISH AND WILDLIFE SERVICE

# Mid-Columbia Coho Production at U.S. Fish & Wildlife Service Facilities

---

Leavenworth National Fish Hatchery, Olympia Fish  
Health Center, Willard National Fish Hatchery,  
Winthrop National Fish Hatchery

**Speros Doulos, Columbia Gorge National Fish Hatchery Complex Manager – Steve Wingert, Willard  
National Fish Hatchery Manager – Steve Croci, Leavenworth Fisheries Complex Deputy  
Manager – Chris Pasley, Winthrop National Fish Hatchery Manager – Dave Carie, Winthrop National Fish  
Hatchery Assistant Manager– Joy Evered, Olympia Fish Health Center Veterinary Medical Officer**

**February 1, 2011 – January 31, 2012**

**BPA Project No. 1996-040-00**

**Contract No. 51485**

**Statement of Work:**

The activities in this contract are outlined in the Master Yakama Nation contract under Operation and Maintenance objectives and tasks and identified as Bonneville Power Administration (BPA) direct fund work.

This contract allows the U.S. Fish and Wildlife Service (Service) to rear coho salmon at Willard National Fish Hatchery (NFH), Leavenworth NFH, and Winthrop NFH including adult spawning, egg incubation, nursery rearing, and raceway rearing for transfer to Mid-Columbia River sites located in the Mid-Columbia/Wenatchee River Basin as part of the Yakama Nation coho reintroduction effort. Work also includes fish health laboratory and field services provided by the Olympia Fish Health Center (OFHC) for monitoring juvenile coho salmon health. The Statement of Work (SOW) included within this contract represents activities for the time frame of February 1, 2011 through January 31, 2012.

**Background:**

The long term vision of this restoration project is to restore coho salmon to the Wenatchee and Methow rivers in the Mid-Columbia River basin at or near carrying capacity, and provide harvest opportunities for tribal and non-tribal fisheries. The project works toward development of locally adapted, naturally spawning coho populations in the Wenatchee and Methow basins by increasing the fitness of reintroduced coho salmon by reducing domestication and emphasizing local adaptation. The program will use strict broodstock collection protocols, which ultimately will place a limit on the proportion of natural origin adults in the hatchery program and place a limit on the proportion of hatchery origin adults on the spawning ground. Hatchery smolt production work is covered under BPA contracts with other agencies.

The Service, with funding from BPA, has assisted the Yakama Nation in an effort to re-establish and increase the number of coho salmon in the Upper Columbia River system using both locally adapted and lower river stocks of fish. The highest priority rearing program involves the use of gametes collected from fish returning to the Wenatchee and Methow River system in an attempt to develop a locally adapted stock of fish with a long term goal to re-establish coho salmon with enough numbers to be near carrying capacity and provide harvesting opportunities for tribal and non-tribal fisheries.

The Service is contracted to manage on the ground efforts and provide administrative support for this project. Work involves support of BPA's programmatic requirements including preparation of narrative and status reports that describe contract progress, achievement of milestones, preparation of SOW's, financial reports necessary to accomplish contract work and the preparation of an annual report that documents contract performance for all Service coho rearing activities. The Service provides equipment, and utilities to full-term rear and care for coho salmon eyed eggs until reaching a life stage necessary to achieve optimal survival following transfer to the Mid-Columbia Region at Willard NFH and Winthrop NFH while also providing facilities, labor, equipment and services for the spawning, incubation, shipping, rearing, acclimation, and releasing juveniles at Leavenworth NFH and Winthrop NFH. The OFHC maintains fish health of coho salmon at Winthrop and Leavenworth NFH's which includes fish health monitoring, pathology sampling, laboratory processing of samples, and consultation with fish health professionals.

**Willard NFH:**

All deliverables described in the SOW for the Willard NFH were accomplished. Willard NFH production is initiated with the receipt of up to 672,000 eyed eggs resulting in up to 650,000 pre-

smolts for transfer to various acclimation and release sites within the Mid-Columbia/Wenatchee River Basin, achieving a 97% survival rate throughout the incubation and rearing period. Provide labor and fish food necessary to hold and rear up to 650,000 juvenile coho salmon from the previous brood year for transfer as pre-smolts following 18 months of rearing to acclimation facilities within the Mid-Columbia/Wenatchee River Basin to assist reintroduction efforts.

During this report period a total of 617,036 coho salmon, derived from a native, locally adapted stock returning to and spawned on the Wenatchee River, WA, were reared at the Little White Salmon/Willard NFH Complex and transferred to the Wenatchee or Methow River watersheds for release by biologists from the Yakama Nation. These transfers consisted of 490,869 brood year 2009 and 126,168 brood year 2010 coho. Through a MOU, 60% of this project is supported by the Yakama Nation using BPA funds and the remaining 40% is provided by NOAA-Fisheries Mitchell Act funding. This is a cooperative effort by the Service and the Yakama Nation to assist with the reintroduction of coho salmon and development of locally adapted, naturally spawning populations of fish in the Wenatchee River watershed.

*Brood Year 2009 Coho Salmon Production Summary*

The following tables display brood year 2009 coho salmon production. Table 1 displays the inventory of brood year 2009 coho at the beginning of the report period.



Table 1. Willard NFH brood year 2009 coho salmon production as of February 1, 2011.

Willard National Fish Hatchery							OUTDOOR RACEWAYS						
COS-WEN-09-Wi-15													
Raceway	Current	Size		Length	Density	Flow							
Number	Number	(#/Lb.)	Weight	(Inches)	Index	Index	Strain & take	Basin	Transfer Date	FPP Goa	Tagcodes	Destination	
1*	25,519	31.0	824.3	4.61	0.12	0.45	Winthrop 1/8	MET	3/7/11 - 3/21/11	23-25	19-02-45	Wells FH	
2*	26,316	29.8	882.8	4.67	0.12	0.47	Winthrop 12/29	MET	3/7/11 - 3/21/11	23-25	19-02-45	Wells FH	
3*	25,636	31.5	814.9	4.58	0.12	0.44	Winthrop12/18	MET	3/7/11 - 3/21/11	23-25	19-02-49	Twisp Ponds	
4	23,550	31.5	748.6	4.58	0.11	0.41	Winthrop12/18	MET	3/1/11 - 3/14/11	23-25	19-02-46+3.5K PIT	Winthrop NFH back-channe	
5	25,790	31.5	819.8	4.58	0.12	0.45	Winthrop12/18	MET	3/1/11 - 3/14/11	23-25	19-02-46+3.5K PIT	Winthrop NFH back-channe	
6	22,192	24.7	897.7	4.97	0.12	0.45	Entiat 12/15	WEN	4/1/11 - 4/14/11	23-25	19-02-52	Twisp Ponds	
7*	18,913	24.7	765.1	4.97	0.10	0.39	Entiat 12/15	WEN	4/1/11 - 4/14/11	23-25	19-02-52+3.5K PIT	Twisp Ponds	
8	22,612	24.7	914.7	4.97	0.12	0.46	Entiat 12/15	WEN	4/1/11 - 4/14/11	23-25	19-02-52+3.5K PIT	Twisp Ponds	
44	29,227	27.0	1082.5	4.82	0.15	0.56	Peshastin 12/7	WEN	3/14/11 - 3/28/11	23-25	19-02-50+BT+3K PIT	Beaver Pond	
45	25,305	28.5	886.7	4.74	0.12	0.47	Entiat 12/2	WEN	3/14/11 - 3/28/11	23-25	19-02-54+BT+1K PIT	Butcher Pond	
46	25,172	28.5	882.0	4.74	0.12	0.47	Entiat 12/2	WEN	3/14/11 - 3/28/11	23-25	19-02-54+BT+1K PIT	Butcher Pond	
47	10,350	28.5	362.6	4.74	0.05	0.19	Entiat 12/2	WEN	3/14/11 - 3/28/11	23-25	19-02-54+BT+1K PIT	Butcher Pond	
48*	23,918	28.5	838.1	4.74	0.12	0.44	Entiat 12/2	WEN	4/1/11 - 4/14/11	23-25	19-02-48+BT	Nason Creek Wetlands	
49*	27,113	27.9	971.4	4.77	0.13	0.51	Winthrop 12/10	MET	4/1/11 - 4/14/11	23-25	19-02-48+BT	Nason Creek Wetlands	
50*	27,257	26.0	1050.4	4.89	0.14	0.54	Winthrop 12/2	MET	3/14/11 - 3/28/11	23-25	19-02-51+BT+3K PIT	Rohlfing's Pond	
TOTAL >>	358,870	28.2	12741.4	4.76	0.09	0.33							

*Brood Year 2010 Coho Salmon Production Summary*

The following tables summarize brood year 2010 coho salmon production during this report period at the Little White Salmon/Willard NFH Complex. Table 2 displays the inventory of brood year 2010 coho after all lots had been ponded and table 3 displays the fish inventory at the end of the contract period.



Table 2. Willard NFH brood year 2010 coho salmon production, initial lot status.

Initial Lot Status as of F Willard National Fish Hatchery						INDOOR NURSERY TANK	
COS-WEN-10-Wi-22						"Lot Update"	
Tank Number	Current Number	Size (#/Lb.)	Weight	Length (Inches)	Density Index	Flow Index	Notes
13	20,158	878.8	22.9	1.511	0.16	0.76	Ponded 2/7/2011
14	20,159	878.8	22.9	1.511	0.16	0.76	Ponded 2/7/2011
15	17,052	935.7	18.2	1.479	0.13	0.62	Ponded 2/11/2011
16	17,000	935.7	18.2	1.479	0.13	0.61	Ponded 2/11/2011
17	17,048	935.7	18.2	1.479	0.13	0.62	Ponded 2/11/2011
18	17,059	935.7	18.2	1.479	0.13	0.62	Ponded 2/11/2011
19	18,850	1066.7	17.7	1.416	0.13	0.62	Ponded 2/16/2011
20	18,783	1066.7	17.6	1.416	0.13	0.62	Ponded 2/16/2011
21	18,806	1066.7	17.6	1.416	0.13	0.62	Ponded 2/16/2011
22	27,270	1271.4	21.4	1.336	0.17	0.80	Ponded 2/22/2011
23	27,365	1271.4	21.5	1.336	0.17	0.81	Ponded 2/22/2011
24	32,662	1226.7	26.6	1.352	0.21	0.98	Ponded 2/24/2011
25	32,663	1226.7	26.6	1.352	0.21	0.98	Ponded 2/24/2011
26	32,654	1226.7	26.6	1.352	0.21	0.98	Ponded 2/24/2011
27	32,600	1226.7	26.6	1.352	0.21	0.98	Ponded 2/24/2011
28	32,620	1226.7	26.6	1.352	0.21	0.98	Ponded 2/24/2011
29	32,606	1226.7	26.6	1.352	0.21	0.98	Ponded 2/24/2011
30	27,317	1271.4	21.5	1.336	0.17	0.80	Ponded 2/22/2011
31	27,320	1271.4	21.5	1.336	0.17	0.80	Ponded 2/22/2011
32	18,834	1066.7	17.7	1.416	0.13	0.62	Ponded 2/16/2011
33	18,847	1066.7	17.7	1.416	0.13	0.62	Ponded 2/16/2011
34	18,822	1066.7	17.6	1.416	0.13	0.62	Ponded 2/16/2011
35	17,003	935.7	18.2	1.479	0.13	0.61	Ponded 2/11/2011
36	17,036	935.7	18.2	1.479	0.13	0.62	Ponded 2/11/2011
37	17,034	935.7	18.2	1.479	0.13	0.62	Ponded 2/11/2011
38	17,053	935.7	18.2	1.479	0.13	0.62	Ponded 2/11/2011
39	20,161	878.8	22.9	1.511	0.16	0.76	Ponded 2/7/2011
40	20,160	878.8	22.9	1.511	0.16	0.76	Ponded 2/7/2011
TOTAL >>	634,942	1078.3	589	1.411	0.16	0.75	

Table 3. Willard NFH brood year 2010 coho salmon production as of January 30, 2012.



1/30/2012		Willard National Fish Hatchery				OUTDOOR RACEWAYS						
		COS-WEN-10-Wi-22										
Raceway	Current	Size		Length	Density	Flow						
Number	Number	(#/Lb.)	Weight	(Inches)	Index	Index	Egg Take	Transfer Date	FPP Goal	PIT Tags	Tagcodes	Destination
1*												
2	Raceways 1-4 transferred to LNFH on 12/01/2011											
3*												
4												
5*	31,520	26.7	1182.7	4.84	0.16	0.56	LNFH 10/19/10	3/7/2012	23-25		19-02-85	Wells FH
6	31,422	26.7	1179.1	4.84	0.16	0.56	LNFH 10/19/10	3/26/2012	23-25	3000	19-02-87 + BT	Beaver Pond
7	32,002	32.2	993.5	4.55	0.14	0.50	Winthrop 10/18&10	3/7/2012	23-25	2000	19-02-79	Twisp Ponds
8	31,683	32.2	983.6	4.55	0.14	0.50	Winthrop 10/18&10	3/7/2012	23-25	2000	19-02-79	Twisp Ponds
9*	31,568	32.2	980.1	4.55	0.14	0.50	Winthrop 10/18&10	3/7/2012	23-25	2000	19-02-79	Twisp Ponds
10	31,874	32.2	989.6	4.55	0.14	0.50	Winthrop 10/18&10	3/7/2012	23-25		19-02-81	Wells FH
11	31,604	27.4	1152.2	4.80	0.16	0.55	Winthrop 11/1/10	3/7/2012	23-25		19-02-81	Wells FH
12*	31,623	27.4	1152.9	4.80	0.16	0.55	Winthrop 11/1/10	3/7/2012	23-25		19-02-81	Wells FH
13	31,473	27.4	1147.4	4.80	0.16	0.55	Winthrop 11/1/10	3/7/2012	23-25	3000	19-02-82	Winthrop NFH back-channel
14	21,527	27.4	784.8	4.80	0.11	0.38	Winthrop 11/1/10	3/7/2012	23-25	3000	19-02-82	Winthrop NFH back-channel
15	28,066	27.2	1030.3	4.81	0.14	0.49	LNFH 10/26/10	4/1/2012	20-22	2000	19-02-83 + BT	Coulter Pond
16	28,871	27.2	1059.9	4.81	0.14	0.51	LNFH 10/26/10	4/1/2012	20-22	2000	19-02-83 + BT	Coulter Pond
17	30,005	27.2	1101.5	4.81	0.15	0.53	LNFH 10/26/10	4/1/2012	20-22	2000	19-02-88 + BT	Coulter Pond
18*	29,840	27.2	1095.4	4.81	0.15	0.53	LNFH 10/26/10	4/1/2012	23-25		19-02-84 + BT	Nason Creek Wetlands
19	28,602	27.2	1050.0	4.81	0.14	0.50	LNFH 10/26/10	4/1/2012	23-25		19-02-84 + BT	Nason Creek Wetlands
20	31,501	27.2	1156.4	4.81	0.16	0.56	LNFH 10/26/10	3/14/2012	23-25	3000	19-02-89 + BT	Rohlfing's Pond
TOTAL >>	483,181	28.4	17,039	4.75	0.15	0.52						

*Brood Year 2011 Coho Salmon Production Summary*

Table 5 summarizes brood year 2011 coho salmon egg and fry incubation during this report period at the Little White Salmon/Willard NFH Complex.



Table 5. Willard NFH brood year 2011 coho salmon egg and fry incubation as of January 30, 2012.

Stock	Date Received	Date Spawned	Number of eggs received	T.U.'s Delivery	T.U.'s Hatch
LNFH random	11/29/11	10/11/11	46,577	615	831.0
LNFH random	12/2/11	10/18/11	26,245	573	827.0
LNFH ubm / lbf	12/2/11	10/18/11	39,623	573	827.0
LNFH lbm / ubf	12/2/11	10/18/11	29,602	573	827.0
LNFH ubf / ubm	12/11/11	10/25/11	32,973	598	844.0
LNFH random	12/11/11	10/25/11	133,580	598	844.0
LNFH lbf / lbm	12/16/11	11/1/11	34,959	573	830.0
Winthrop	12/19/11	10/17/11	178,352	605	844.0
Winthrop	12/21/11	10/24/11	104,996	620	841.0
Winthrop	12/23/11	10/31/11	42,991	587	847.0
Winthrop	1/5/2012	11/15/11	39,832	589	
Total/avg.			709,730	591	836
	Date Received	Egg pick off	% pick off	total eggs after pick off	Hatch Date
LNFH random	11/29/11	4,622	9.92%	41,955	12/23/11
LNFH random	12/2/11	3,278	12.49%	22,967	12/30/11
LNFH ubm / lbf	12/2/11	6672	16.84%	32,951	12/30/11
LNFH lbm / ubf	12/2/11	3771	12.74%	25,831	12/30/11
LNFH ubf / ubm	12/11/11	9,042	27.42%	23,931	01/07/12
LNFH random	12/11/11	6,334	4.74%	127,246	01/07/12
LNFH lbf / lbm	12/16/11	924	2.64%	34,035	1/13/2012
Winthrop	12/19/11	3,040	1.70%	175,312	01/14/12
Winthrop	12/21/11	1,533	1.46%	103,463	01/14/12
Winthrop	12/23/11	578	1.34%	42,413	1/19/12
winthrop	1/5/2012	206	0.52%	39,626	
Total/avg.		40,000	5.64%	669,730	

## **Leavenworth Fisheries Complex:**

### **Leavenworth NFH:**

All deliverables described in the statement of work for Leavenworth NFH were accomplished. Leavenworth NFH ensured adequate water flow to coho rearing units; removed snow on a recurring basis in order to access coho rearing units; responded to water alarms and coordinated with YN prior to severe weather events; monitored effluent discharge to maintain compliance with the NPDES permit; provided electrical power to operate pumps and other equipment; provided guidance on or assisted with equipment repair and maintenance; and provide program administrative services in support of coho reintroduction program. To accommodate acclimation and rearing of juvenile coho salmon Leavenworth NFH provided adequate water and space and assisted the YN with planning and execution of fish release and other fish culture issues such as water temperature, dissolved oxygen and flow rates. In support of holding, spawning and incubating maintenance activities the Leavenworth NFH assisted YN staff with installation, operation, maintenance, and modifications of the ladder fish trap, holding pond, spawning area and egg incubation system.

Leavenworth NFH was hoping to rebuild the spawning building using Grand Coulee Mitigation funds. The construction was to primarily accommodate spring Chinook salmon adult holding and spawning activities. BPA provided additional funding to accommodate features (windows, doors and walls) for coho spawning. Unfortunately, the Complex was unable to fund the new spawning building and the BPA funding was then directed towards building additional facilities to increase the egg incubation capacity. Materials to expand the egg incubation capacity have been purchased.

Coordination meetings, discussions, and consultations with Yakama Nation staff responsible for rearing and care of these fish were performed during this time period. Coordination and consultation with Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, and US Fish and Wildlife Service Fish Health Specialists/Biologists was conducted during this time period regarding fish health concerns and transfer requirements for this program.

### **Winthrop NFH:**

All deliverables described in the statement of work for Winthrop NFH were accomplished and included performing routine and preventative maintenance on facilities and equipment to accommodate the Coho salmon production program.

#### *Brood Year 2009 Coho Salmon*

This group originated entirely from adult Coho salmon collected at Winthrop NFH and Wells Dam. From a fish health perspective, this group reared very well. In March 2011, approximately 49,300 juveniles were transferred from Willard NFH and placed in the back channel for release in April. Total distribution of yearling Coho from Winthrop NFH to the Methow basin was 296,625 (247,529 from raceways and 49,096 from back channel).

#### *Brood Year 2010 Coho Salmon*

This group originated entirely from adult Coho salmon collected at Winthrop NFH and Wells Dam. Seven hundred and eight adults were processed at Winthrop NFH this brood year, which included 260 females and 260 males spawned and 175 returned to the river for natural spawning. A total of 786,198 green eggs were harvested, which resulted in 652,921 eyed eggs at an eye-up rate of 83%. Approximately 253,506 eyed eggs were transferred to Willard NFH. The resulting progeny

(267,710 at end of December 2011), other than a brief bout of Gas Bubble Disease, have had minimal health issues and are on schedule to be released in April of 2012.

#### *Brood Year 2011 Coho Salmon*

This group originated entirely from adult Coho salmon collected at Winthrop NFH and Wells Dam. Four hundred sixty-six adults were spawned at Winthrop NFH this brood year (233 females and 233 males). A total of 662,830 eggs were harvested, which resulted in 601,802 eyed-eggs at an eye-up rate of 90.8%. Approximately 326,339 eyed-eggs were transferred to Willard NFH leaving 275,463 eggs remaining on station as of December 2011.

### **Olympia Fish Health Center:**

#### **Fish Health at Leavenworth NFH:**

OFHC staff performed routine juvenile monitoring of brood years 2009 and 2010 during the period from February 2011 through January 2012. Monitoring included on site examinations and necropsies of juveniles captured from representative ponds of coho salmon to determine overall health and potential infections with bacteria or parasites. Diagnostic trips were also performed during this time period as requested by fish culture staff and as deemed necessary by OFHC staff and treatment and control measures were recommended when appropriate.

In March 2011, three pre-release Inspections were performed on the brood year 2009 coho salmon that had been transferred in from Willard NFH and Cascade SFH. Inspections of each group consisted of 60 fish sampled for kidney and spleen tissues and tested for viruses and culturable bacteria plus 30 fish sampled for individual kidneys and tested for *Renibacterium salmoninarum* using ELISA.

In October and November 2011 broodstock testing was performed on the spawned fish and consisted of 168 female ovarian samples tested for viruses (36 pooled samples), 168 male kidney spleen samples tested for viruses and culturable bacteria (36 pooled samples), 100 female kidney samples tested individually for *Renibacterium salmoninarum* by ELISA, head core samples from 60 fish (12 pooled samples) tested for *Myxobolus cerebralis*, and 1 hindgut samples tested for *Ceratomyxa shasta*.

Coordination meetings, discussions, and consultations with Yakama Nation staff responsible for rearing and care of these fish were performed during this time period. Coordination and consultation with Oregon Department of Fish and Wildlife, Washington Department of Fish and Wildlife, and US Fish and Wildlife Service Fish Culturists and Fish Health Specialists/Biologists was conducted during this time period regarding fish health concerns and transfer requirements for the coho program at Leavenworth and Winthrop NFHs.

#### **Fish Health at Winthrop NFH:**

In October and November 2011 broodstock testing was performed on the spawned fish and consisted of 152 female ovarian samples tested for viruses (40 pooled samples), 64 male kidney spleen samples tested for viruses and culturable bacteria (16 pooled samples), 95 female kidney samples tested individually for *Renibacterium salmoninarum* by ELISA, head core samples from 60 fish tested for *Myxobolus cerebralis*, and 1 hindgut samples tested for *Ceratomyxa shasta*.

The OFHC monitored brood year 2009 and 2010 coho salmon juveniles during this contract period from February 2011 through January 2012. Monitoring included on site examinations and necropsies of juveniles captured from representative ponds of coho salmon to determine overall health and potential infections with bacteria or parasites.

In March 2011 a pre-release Inspection was performed on the brood year 2009 coho salmon which consisted of 60 fish (12 pooled samples of kidney-spleen from Methow origin broodstock) sampled and tested for viruses and bacteria plus 30 fish sampled for individual kidneys and tested for *Renibacterium salmoninarum* using ELISA.