



Washington
Department of
**FISH and
WILDLIFE**

**ELWHA RIVER – HGMP
SUMMER/FALL CHINOOK
HATCHERY PROGRAM
ANNUAL REPORT
CALENDAR YEAR 2013**

TABLE OF CONTENTS

INTRODUCTION.....	1
HATCHERY OPERATION	3
Fish Production Goals.....	3
Broodstock Collection.....	4
Spawning	5
Incubation and Rearing	6
Monitoring and Evaluation of the Hatchery Environment	6
Fish Health Monitoring	6
Water Quality Monitoring	6
Release of Chinook.....	7
IN-RIVER MONITORING	9
ANALYSIS OF CONTRIBUTION TO ESCAPEMENT AND FISHERIES.....	16
LITERATURE CITED	16

INTRODUCTION

The Washington Department of Fish and Wildlife (WDFW) and the Lower Elwha Klallam Tribe (LEKT) have operated salmon and steelhead hatchery programs in the lower portion of the Elwha River watershed for decades (Figure 1). Artificial propagation of the Elwha River Chinook salmon population commenced in 1914, with consistent, annual fish releases supported by WDFW's Dungeness Hatchery beginning in 1953. Initial juvenile Chinook salmon releases from WDFW's Elwha Channel Hatchery site began in 1974 (WDFW 2012), and continue through the present. The hatchery programs were implemented to preserve genetic resources and to mitigate for impacts on fisheries caused by construction of the Elwha and Glines Canyon dams in 1910 and 1927, respectively, which resulted in the loss of access to 90% of the spawning and rearing areas of the river.

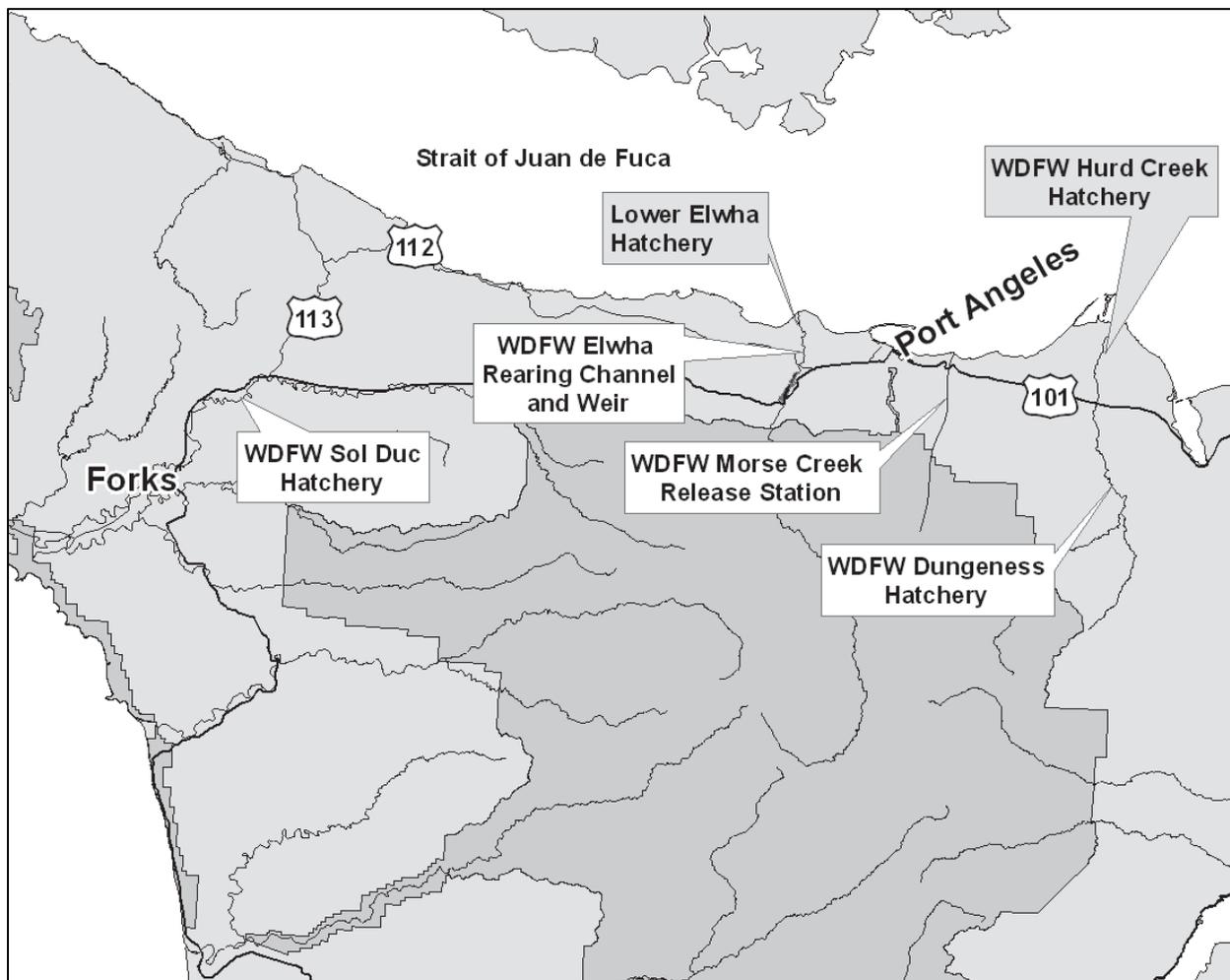


Figure 1. Hatchery facilities supporting the Elwha River Fish Restoration Plan.

The decline in Elwha River salmonid abundance resulting from dam placement and operation has severely affected the abundance and distribution of Elwha River salmon and steelhead. Hatchery programs were implemented by WDFW and the LEKT to

partially replace lost natural salmon and steelhead abundances and maintain adult returns of the species to the Elwha River.

In 1992, Congress enacted Public Law 102-495, the Elwha River Ecosystem and Fisheries Restoration Act, funding the federal acquisition of the two dams and requiring a plan to achieve full restoration of the Elwha River ecosystem and fisheries.

Following the decision to remove the dams from the Elwha River, two anadromous salmonid species present in the basin were listed under the ESA: the Puget Sound Chinook salmon ESU (64 FR 14308, March 24, 1999) and the Puget Sound steelhead DPS (72 FR 26722, May 11, 2007). In response to the listing of Chinook salmon, WDFW and the Puget Sound tribes completed two resource management plans as the frameworks for 114 HGMPs, including HGMPs for the Elwha hatchery programs. The HGMPs described how each hatchery program would operate including effects on listed fish in the Puget Sound region.

Take associated with the collection of Chinook salmon adults for use as broodstock for the Elwha Channel Hatchery Chinook salmon program was previously exempted from ESA Section 9 take prohibitions by NMFS. Following consultation, NMFS issued an incidental take statement together with an ESA section 7 biological opinion to the NPS at the conclusion of a formal consultation for the “Elwha River Ecosystem and Fisheries Restoration Project”.

Role of Hatchery Production in Fish Restoration

WDFW and the LEKT submitted Hatchery and Genetic Management Plans (HGMPs) to NOAA Fisheries for artificial programs intended to assist the recovery of anadromous salmon and steelhead during the Preservation and Recolonization phases of recovery as defined by the Elwha Monitoring Group.

Hatchery production at the WDFW Elwha Hatchery is intended to support restoration of Chinook salmon species in the Elwha River, and to assist the LEKT restoration programs at the Lower Elwha Fish Hatchery. Fish production is directly linked to the biological response of salmon in the Elwha River during and following the removal of the Elwha and Glines Canyon dams. A biologically-oriented phased approach to restoration has been developed to guide hatchery actions and establish conservation goals for the House of Salmon. Phases of restoration include:

1. Preservation
2. Recolonization
3. Local adaptation
4. Full restoration

Each of these phases is governed by a number of measurable objectives that must be met for each species of fish to advance to a later level of restoration or retreat to an earlier level. Fish populations may move in either direction during the restoration process and all measurable objectives must be met in order to move to a later phase of recovery.

HATCHERY OPERATION

Fish Production Program Goals

Production goals for the Elwha Chinook program during the Preservation Phase are:

Age Class	Facility	Maximum Number	Size* (fpp)	Release Date	Location
Fingerling	Elwha Hatchery	2,500,000	80	June	Elwha River
Yearling	Elwha Hatchery	200,000	10	April	
	Morse Creek Hatchery	200,000	10	April	

* 80 fpp ~ 80 mm fork length
10 fpp ~ 155 mm fork length

Specific locations of releases.

Primary:

Stream, river, or watercourse: Elwha River (18.0272)

Release point: RM 2.9

Major watershed: Elwha River

Basin or Region: Strait of Juan de Fuca

Auxiliary:

Stream, river, or watercourse: Morse Creek (18.0185)

Release point: RM 1.0

Major watershed: Morse Creek

Basin or Region: Strait of Juan de Fuca

I. BROODSTOCK COLLECTION

Elwha Hatchery Chinook

Adult Recovery and Disposition

A total of 1,930 adult Chinook and 25 jacks were received and held at the WDFW Elwha Rearing Channel for broodstock purposes. Chinook adults were netted and collected from the river 23 times in the reporting period. All broodstock were checked for marks and tags. The number of Chinook adults that were collected and transported to the WDFW Elwha Rearing Channel pond is as follows: 999 were netted from the river, 146 were collected at the Lower Elwha S'Klallam Hatchery, 167 were collected from the Elwha River weir, and 618 returned to the WDFW Elwha Rearing Channel facility (Personal comm. Troy Tisdale, Elwha Hatchery).

Chinook Off-station received from seining

In-river seining operations netted 1,009 Chinook salmon. All Chinook were placed in holding bags, transferred to truck with holding tank, then transported to the adult pond at the Elwha Rearing Channel. Of the 1,009 collected, 588 were males, 411 females, and 10 jacks. First collection occurred 6/26/13 and continued until 9/22/13.

Chinook received from the LEKT facility

A total 157 Chinook salmon entered the LEKT hatchery during the reporting period, including 146 adults (28 females and 118 males) and 11 jacks. All returning Chinook salmon were transported to the WDFW Elwha Rearing Channel adult holding pond for broodstocking.

Chinook entering Elwha Hatchery

Volunteer returns were collected as they entered the adult pond. The first chinook adults processed from the fish ladder into the pond was on 8/15/13 with the final volunteers showing up on 10/11/13. During the reporting period, 622 Chinook volunteered into the adult trap. Of these, 618 were adults (475 males, 143 females), and 4 were jacks.

Chinook Off-station received from weir

Chinook were received and transported from the weir to the adult pond 23 times beginning 8/9/13 with final transfer on 9/22/13. 167 Chinook (90 males, and 77 females) were transferred during the reporting period.

Mortalities

During the reporting period, there were 340 mortalities at the facility, including 94 females, 236 adult males, and 10 jack salmon.

Chinook returned to river

During the reporting period, 117 males, and 11 jacks were transported upstream and planted into Little River. Five separate plants took place between 9/16/13 and 9/27/13.

Morse Creek Hatchery Chinook

WDFW collected a total of 266 adult Chinook salmon (147 males, and 119 females) at the Morse Creek facility by netting and in-river trapping.

Other species entering the WDFW Elwha Channel facility during the reporting period included 906 coho salmon, 91 chum salmon, and 12 winter steelhead.

Coho: A total 906 coho entered the hatchery during the reporting period. The 343 females, 311 males, and 252 jacks were transported to upriver release sites to promote natural recolonization.

Chum: A total 91 chum salmon entered the hatchery during the reporting period. These fish were transported to the LEKT hatchery for spawning. All 91 adults (47 females and 44 males) were spawned, with a total 111,878 eggs taken for hatchery production.

Winter steelhead (WDFW): Twelve (12) early winter steelhead of early winter stock entered the WDFW hatchery during the reporting period, and were destroyed. No late winter steelhead (Elwha River stock) entered the WDFW hatchery during the reporting period.

II. SPAWNING

Total Brood Year 2013 egg collection for both the Elwha Rearing Channel and Morse Creek included the take of 3,540,680 green eggs.

Elwha Hatchery

During the reporting period, spawning occurred 8 separate times between 8/28/13 and 10/15/2013. Spawning consisted of 947 males, 526 females, 4 jacks, and 10 non-viable females, for a total 1,487 Elwha chinook used in the spawning program. A total 3,100,641 green eggs were taken.

Morse Creek Hatchery

Spawning occurred 6 times between 9/4/13 and 10/9/13 at the Morse Creek facility. Spawning included 68 males and 82 females for a total 150 adult chinook used in the program. A total 440,039 green eggs were taken.

III. INCUBATION AND REARING

Brood 2013 green egg to eye-up survival data are as follows:

Elwha green egg to eye survival was 92.02 percent.

Morse Creek green egg to eye survival was 92.84 percent.

Eyed up to ponding survival – Elwha Chinook eye to ponding survival during the reporting period was 99.50 percent.

Elwha stock Chinook subyearlings are shipped at 600 fish per pound from Sol Duc Hatchery to Elwha Hatchery in February, and yearlings are shipped at 20 fish per pound from Hurd Creek in October. Survival for Elwha stock Chinook from ponding until planting in the Elwha River and Morse Creek are as follows:

	Ponded	Shipped	Planted	Loss	Percent Survival
BY 2011 Hurd to Elwha	204,000	201,000	196,575	7,425	96.4
BY 2011 Sol Duc To Morse	221,602	211,638	197,900	23,702	89.3
BY 2012 Sol Duc to Elwha	1,371,608	1,160,607	1,159,279	6,227	99.5

Note: A total 206,102 Brood year 2012 yearlings remain for planting in 2014

IV. MONITORING AND EVALUATION OF HATCHERY ENVIRONMENT

Fish Health Monitoring

All Juveniles were monitored by Dr. Jed Varney (WDFW) as-needed during the reporting period.

No diseases were noted in adult Chinook salmon during reporting period.

Chemicals used during the reporting period include formalin (parasite-S) administered 35 times to adults for *Saprolegnia* fungal control. Draxxin® and Vetrinycin™ were injected into adult Chinook upon being placed for holding in the adult pond, used as a prophylactic.

V. WATER QUALITY MONITORING

Incoming water at the hatchery derives from two sources.

1. Well water is pathogen-free and not monitored.
2. Water from Elwha Water Facilities is operated and monitored by Veolia Water operators.

Elwha hatchery discharge results are monitored and reported per NPDES guidelines and are in compliance with NPDES guidelines under permit number

WAG13-1043. Monitoring and reporting of effluent discharge results at Morse Creek have been in compliance with NPDES permit number WAG13-1013. During the reporting period no non-compliance events occurred.

VI. RELEASE OF CHINOOK

A total 1,159,279 Subyearling and 196,575 yearling Chinook were released from the Elwha Channel facility. Of these, 251,892 sub-yearlings were coded-wire tagged and marked with an adipose clip, as per the Biological Opinion. The remaining 907,387 zeroes were released with an otolith mark. The 196,575 yearlings released into the Elwha River were coded-wire tagged and otolith marked. A total 197,900 yearlings into Morse Creek were likewise coded-wire tagged and otolith marked (**Table 1**)

Table 1. Number of Elwha River Fall Chinook released into the Elwha River and Morse Creek (From WDFW Hatcheries Headquarters Database).

Age Class	Facility	Release Number	Size (fpp)	Release Date	Location	Mark
Fingerling	Elwha Hatchery	907,387	59.5	31 May	Elwha R.	OT
	Elwha Hatchery	31,892	59.5	31 May	Elwha R.	Ad-CWT OT
	Elwha Hatchery	220,000	59.5	31 May	Elwha R.	Ad-CWT OT
Yearling	Elwha Hatchery	196,575	7.4	April	Elwha R.	CWT, OT
	Morse Creek	197,900	9.7 – 11.6	April	Morse Cr.	CWT, OT

The USGS Washington Water Science Center conducts monitoring of the Elwha River (Curran et al. 2014). High flows in November and December 2012 created suspended-sediment conditions in the lower river consistently greater than 1,000 mg/L and often exceeding 5,000 mg/L. Relatively low flow in February allowed a slight decrease in suspended-sediment concentration, but late spring rainfall combined with larger-than-normal snowmelt caused suspended-sediment concentrations to rise above 1,000 mg/L for much of the time period from March to June 2012 (fig. 1). The lower river cleared in the late summer 2013 with suspended-sediment concentrations commonly less than 100 mg/L during several weeks in August and early September 2013.

During the week prior to the yearling Chinook release, turbidity levels remained under 1,000 mg/L. On the morning of April 5th, WDFW staff checked the pond, then opened the gate valves and began our release which takes about 12 hours. During midafternoon, the USGS graph was showing approximately 1,500 Nephelometric Turbidity Units (NTUs). The release continued since the graph showed a steady trend and was not rising. During the following days, WDFW received reports from the LEKT of dead yearling Chinook observed on the river banks downstream of the hatchery. In a subsequent conversation with Veolia Water, the contractor and plant operator at the Elwha Water Treatment Plant, WDFW was informed that sediment levels were actually above 4,000 mg/L, the upper detection level of their equipment.

Following this event, hatchery staff set up a circular tank fed from untreated river water. Ten age-zero chinook were placed in the tank and monitored daily for loss. One fish was removed every other day for testing by WDFW pathologist, Dr. Jed Varney. The study ran for 9 days at the end of May, and for 4 days in June prior to the planting of subyearling chinook. No further loss was observed in the circular tank, with sediment levels ranging from 500-1,400 NTUs during the study.

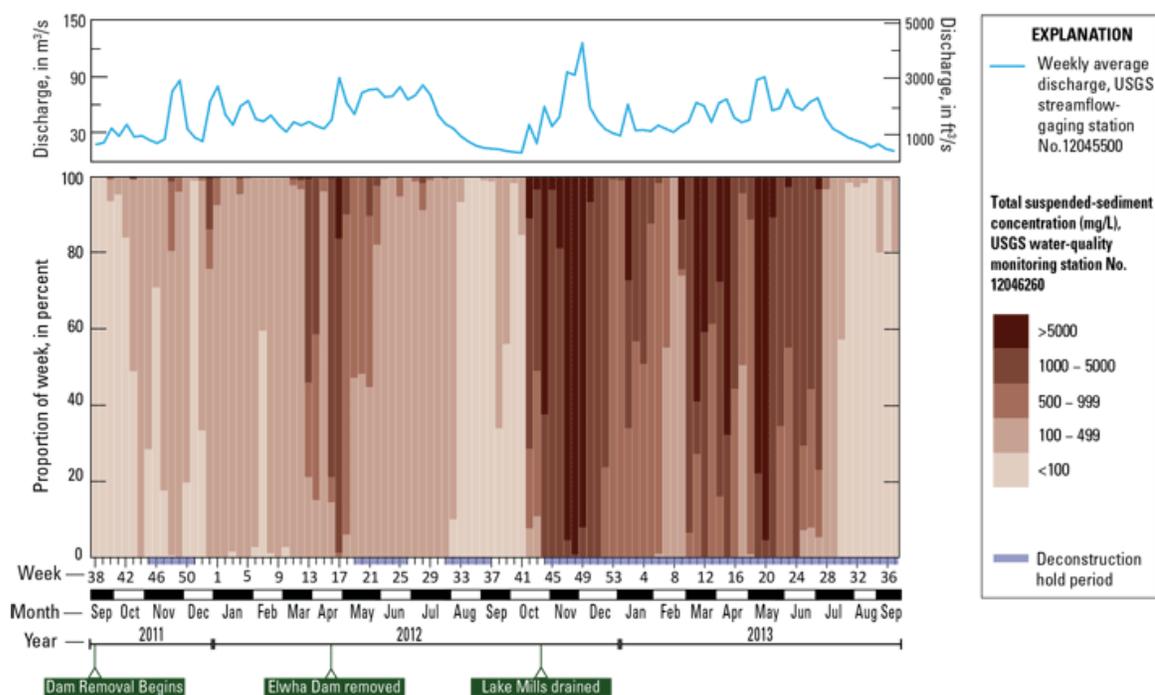


Figure 1. Graph showing suspended-sediment concentration bins as a proportion of each week (based on a maximum of 672 15-minute turbidity samples per week) from September 2011 to February 2013 at U.S. Geological Survey water-quality monitoring station Elwha River at Diversion, near Port Angeles (12046260). At top, a corresponding hydrograph of weekly average discharge 8 km upstream at U.S. Geological Survey streamflow-gaging station Elwha River at McDonald Bridge, near Port Angeles (12045500).

The sub-yearling Chinook were released from the rearing channel on May 31st without reported incident.

2014 Releases:

Elwha River sub-yearlings

WDFW currently has the planned 2,500,000 otolith-marked subyearlings on-site, with a June, 2014 release date planned per Brood Document. Of this number, 250,000 will be adipose-clipped and Coded-wire Tagged as described in the HGMP.

Elwha River yearlings

WDFW currently has the planned 200,000 yearlings on-site, with a scheduled April, 2014 release of otolith-marked and coded-wire tagged fish.

Morse Creek yearlings

WDFW currently has the planned 200,000 yearlings on-site, with a scheduled April, 2014 release of otolith-marked and coded-wire tagged fish.

IN-RIVER MONITORING

These data were provided by WDFW Biologist Randy Cooper.

National Park Service, Lower Elwha S’Klallam Tribe, National Marine Fisheries Service, and Washington Department of Fish and Wildlife personnel conducted an Elwha River Chinook spawner survey on September 17, 2013 from below Glines Powerhouse at RM 13.3 to near the mouth at RM 0.2. Three tributaries upstream of the lower dam outflow were also surveyed. Surveyors counted and mapped visible redd locations in 13.1 miles of the main stem river, 0.45 miles of Hughes Creek, 1.2 miles of Little River, and 1.2 miles of Indian Creek. Live males, live females, live jacks, and live fish with sex not determined were counted along with the total number of carcasses. A total of 602 visible Chinook redds and 839 live and 459 dead Chinook were observed upstream of the lower dam outflow. A total of 163 visible Chinook redds and 381 live and 62 dead Chinook were observed downstream of the lower dam outflow. A grand total of 765 visible redds, 1,207 live adult Chinook, 13 live jack Chinook, and 521 dead Chinook were observed during the survey (**Table 2**).

Table 2. Number of Chinook redds, live adults, carcasses, and live jacks observed during an Elwha River Chinook spawner survey at numerous sections conducted on September 17, 2013 from downstream of Glines Powerhouse at river mile 13.3 to river mouth.

Elwha River Chinook Adult and redd Survey on September 17, 2013.							
Section	RM sections	# of Redds	# Live Males	# Live Females	# Live Unknown Sex	# Carcasses	# Live Jacks
Upstream of lower Elwha Dam outflow							
Glines Powerhouse to Top of Altaire Canyon	13.3-12.9	162	132	103	60	77	2
Altaire Canyon to Altaire Bridge	12.9-12.5	11	0	2	0	10	0
Altaire Bridge to Griff Creek (Right Channel)	12.5-12.0	32	5	9	8	9	0
Griff Creek to Rabbit Hole (Right Channel)	12.0-11.3	39	26	12	2	36	1
Altaire Split to Griff Creek (Left Channel)	12.5-12.0	10	6	5	17	21	0
Griff Creek to Rabbit Hole (Left Channel)	12.0-11.3	34	4	6	20	15	0
Rabbit Hole to Fishermans Corner	11.3-10.7	59	8	19	14	32	0
Fishermans Corner to Park Boundary	10.7-9.7	13	7	3	23	33	0
Park Boundary to McDonald Bridge Gage	9.7-8.5	45	4	0	108	47	4
McDonald Bridge Gage to A-Frame	8.5-8.2	8	1	3	6	35	0
A-Frame to 101 Bridge	8.2-7.7	16	0	0	13	6	0
101 Bridge to Gooseneck	7.7-6.3	68	19	19	24	20	0
Gooseneck to Elwha Dam	6.3-4.9	8	12	6	0	5	0
Gooseneck Supplemental		8	0	0	10	1	0
Hughes Creek	0.0-0.45	8	6	7	0	39	1
Little River	0.0-1.2	23	23	12	0	9	0
Indian Creek	0.0-1.2	58	43	19	0	64	5
Totals (Upstream of lower dam outflow)	11.25	602	296	225	305	459	13
Downstream of lower Elwha Dam outflow							
Dam Outflow to HWY 112 Bridge	4.9-4.4	51	0	0	81	16	0
HWY 112 Bridge to Weir	4.4-3.7	100	0	0	251	25	0
Weir to New Bridge	3.7-3.2	9	0	0	13	20	0
New Bridge to Sisson's Riffle	3.2-2.8	3	0	0	0	0	0
Sisson's Riffle to Spruce Hole	2.8-2.3	0	0	0	13	0	0
Hunt Side Channel							
Right Bank Side Channel (by LEKT Hatchery)	2.3-0.9	0	0	0	23	1	0
Elwha Bluff to Mouth	0.7-0.2	0	0	0	0	0	0
Totals (Downstream of lower dam outflow)	4.5	163	0	0	381	62	0
Grand total(Downstream of Glines Powerhouse to mouth)	15.75	765	296	225	686	521	13
DOES NOT INCLUDE HUNT SIDE CHANNEL							

WDFW used an expansion factor of 1.837 for redds made after the September 17 survey date. This expansion factor was based on three years of historical survey data downstream of the lower Elwha Dam where Chinook redds were visible during the entire season.

The expanded redd count for the 13.3 mile section and the 2.85 miles of tributaries was 1,432. The estimated number of Chinook spawning naturally in the river was 3,580, which was calculated by multiplying the expanded total number of redds (1,432) by 2.5. The value 2.5 equals one female per redd plus 1.5 males per redd (**Table 3**).

Table 3. Number of observed and estimated Chinook redds in the mainstem Elwha River below Glines Powerhouse at river mile 13.3 and its' tributaries, Indian Creek, Little River, and Hughes Creek during a spawner survey conducted on September 17, 2013.

Channel	Total Length	Unsurveyed Length	Surveyed Length	% Surveyed	Observed redds	Expanded redds (1)	Expanded redds (2)
Mainstem	13.3	0	13.3	100.0%	676	676	1242
Indian Creek (4)	1.5	0.3	1.2	80.0%	58	73	133
Little River(5)	1.2	0	1.2	100.0%	23	23	42
Hughes Creek (6)	0.45	0	0.45	100.0%	8	8	15
Total Redds					765	780	1,432
Adults (redds * 2.5 adults/redd)					1,913	1,949	3,580
Number of Chinook transported from weir, LEK hatchery, netted, and volunteers to WDFW Elwha Channel =					1,930	1,930	1,930
Terminal Run Size (Spawners+Hatchery+weir)					3,843	3,879	5,510
Sonar Adult Count (Denton estimate)-not used for 2013 forecast estimate				3,739	4,243	4,749	
Note (1) - Expanded by missed area only							
Note (2) - Expanded by increase in visible redds from Stat week 38 to Stat wk 40 (1.837)							

The estimated total return to the Elwha River was 5,510 which consisted of 1,930 adult broodstock plus 3,580 natural spawning adults (**Table 4**). Denton et al. (2013) estimated a total Chinook return of 4,243 (3,739 - 4,749; 95% C.I.) using SONAR. The difference between the SONAR count and WDFW redd based survey estimate could be due to the redd expansion factor. WDFW will review the methodology of estimating total redds after a particular survey date, as determined by the Elwha Monitoring Group. Another option would be to investigate the proportion of broodstock females that reach maturity by a given date.

Table 4. Estimated Elwha River Chinook terminal run size for 2013 based on redd counts from natural spawners and number of broodstock collected from the Elwha River weir, netted in the main stem river, Lower Elwha S'Klallam Hatchery, and returns to the WDFW Elwha Rearing Channel.

Elwha Chinook Terminal Runsize Estimate 2013			
Total number of redds based on surveys and expansion			
Additional LEK counted chinook redds-Hunt Channel =		Not surveyed	
Number of natural adult spawners in the river = 1432 redds x 2.5 fish per redd		3,580	
Number of Chinook gaffed downstream of weir and spawned =		0	
Number of Chinook netted /seined in river downstream of weir and taken to WDFW Channel		999 (588 males + 411 females + 10 jacks)	1009 with jacks
Number of Chinook transported from LEK Hatchery to WDFW Elwha Channel =		146 (118 males + 28 females + 11 jacks)	157 with jacks
Number transported from Elwha River weir to WDFW Elwha Channel =		167 (90 male + 77 female +0 jacks)	167 with jacks
Number of Elwha Channel Trap Returns (Volunteers) =		618 (475 males +143 females +4 jacks)	622 with jacks
Number of Chinook transported from weir, LEK hatchery, netted to WDFW Elwha Channel =		1,930	1,271 males 659 females
			1,930 Plus 25 jacks
Terminal Run Size (gaffed, seined, redd based, prespawn mortalities, fish released upstream and surplused) =		5,510	3,419 males 2,091 females 5,510 Total
Number of adults equals number of redds times 2.5 fish per redd (males + females) 1432 females+ 2148 males = 3,580			
Poor survey conditions downstream of lower dam due to dam removal project			

Table 5 summarizes the number of tagged / unmarked, untagged / unmarked, and tagged / marked returns by sex and by brood year. The number of tags and their code numbers are listed in the table.

Table 5. Summary of the Elwha Chinook sampled at the WDFW Elwha Rearing Channel, by sex and age, during RY2013 for coded wire tagged (CWT) and non-tagged returns. Origin (hatchery or natural) of non-tagged fish will be determined by otolith analysis which is currently not available.

Sex	Total age	CWT No.	BY2008	BY2009	BY2010	BY2011	Grand Total
Female	3	No tag			7		7
Female	Age 3 Total				7		7
Female	4	210773		1			1
Female	4	635270		28			28
Female	4	635275		19			19
Female	4	635287		5			5
Female	4	635366+ADP		1			1
Female	4	No tag		213			213
Female	Age 4 Total			267			267
Female	5	631424	2				2
Female	5	634786	12				12
Female	5	No tag	8				8
Female	Age 5 Total		22				22
Female	All ages		22	267	7	0	296
Male							
Male	2	636170				3	3
Male	2	No tag				9	9
Male	Age 2 Total					12	12
Male	3	635977			57		57
Male	3	No tag			162		162
Male	Age 3 Total				219		219
Male	4	210893		1			1
Male	4	635270		63			63
Male	4	635275		30			30
Male	4	635287		4			4
Male	4	635367+ADP		1			1
Male	4	Lost tag		1			1
Male	4	No tag		210			210
Male	Age 4 Total			310			310
Male	5	634786	6				6
Male	5	No tag	2				2
Male	Age 5 Total		8				8
Male	All ages		8	310	219	12	549
Sex unknown							
Sex unknown	Age 2	No tag				1	1
Sex unknown	Age 3	No tag			3		3
Sex unknown	Age 4	635287		1			1
Sex unknown	Age 5	No tag	1				1
Sex unknown	All ages		1	1	3	1	6
Grand total			31	578	229	13	851

Of the total of 235 CWTs recovered, two (0.85%) originated from the Dungeness Basin (WRIA18), two (0.85%) were from George Adams Hatchery at Purdy Creek (WRIA 16), ten (4.25%) were from Morse Creek Hatchery (Elwha origin Chinook) in WRIA 18, one (0.43%) tag was lost before being identified, and the remaining 220 (93.6%) tags originated from the Elwha Hatchery (**Table 6**). The total number of tagged Chinook that returned to the Elwha River that were of Elwha origin was 230 (97.9%).

Table 6. Summary of the Elwha Chinook coded wire tag numbers sampled at the WDFW Elwha Rearing Channel during RY2013. Tag number and mark, rearing hatchery, release location, release date, brood year, and the total number released by tag group.

CWT No./Mark 1/	Rearing Hatchery	Release Site -WRIA	Release date	Brood year	No. hatchery releases	No. tags recovered	Proportion
210773-UM	Dungeness Hatchery	Dungeness River-18.0018	June 3, 2010	2009	49,694	1	0.004
210893-UM	Hurd Creek Hatchery	Hurd Creek-18.0028	April 21, 2011	2009	42,636	1	0.004
635270-UM	Elwha Hatchery	Elwha River-18.0272	April 13, 2011	2009	101,892	91	0.387
635275-UM	Elwha Hatchery	Elwha River-18.0272	April 13, 2011	2009	97,943	49	0.209
635287-UM	Morse Creek Hatchery	Morse Creek- 18.0185	April 12, 2011	2009	201,548	10	0.043
635366+ADP	George Adams Hatchery	Purdy Creek- 16.0005	May 14, 2010	2009	227,151	1	0.004
631424-UM	Elwha Hatchery	Elwha River-18.0272	April 7, 2010	2008	99,470	2	0.008
634786-UM	Elwha Hatchery	Elwha River-18.0272	April 7, 2010	2008	95,303	18	0.077
636170-UM	Elwha Hatchery	Elwha River-18.0272	April 5, 2013	2011	195,864	3	0.013
635977-UM	Elwha Hatchery	Elwha River-18.0272	April 2, 2012	2010	212,900	57	0.243
635367+ADP	George Adams Hatchery	Purdy Creek- 16.0005	May 14, 2010	2009	227,548	1	0.004
Lost tag				2009		1	0.004
Total						235	1.000

1/ Tag/ Mark status: CWT= coded wire tag number; ADP= adipose clipped; UM= unmarked or unclipped

Of the 851 Chinook samples, 233 (27.4%) were CWT and unmarked, 616 (72.4%) were untagged and unmarked, and 2 were CWT and adipose clipped. The 616 untagged and unmarked fish could be either hatchery origin (otolith marked) or natural origin (no otolith mark). A total of 296 (34.8%) were females, 549 (64.5%) were males, and 6 (0.7%) were sex could not be determined (**Table 7**).

Table 7. Summary of the Elwha River Chinook sampled at the WDFW Elwha Rearing Channel during RY2013. Number of Chinook by sex with CWT, no tags and no marks, and CWT and adipose clipped.

Tag-Mark	Female	Male	Sex Unknown	Total	Proportion Tag-Mark
CWT+ no mark	67	165	1	233	0.274
No tag+ no mark	228	383	5	616	0.724
CWT+ADP	1	1	0	2	0.002
Totals	296	549	6	851	1.000
Proportion females, males, and sex unknown	0.348	0.645	0.007	1.000	

The age class of the 851 samples consisted of 13 (1.5%) age 2; 229 (26.9%) age 3; 578 (67.9%) age 4; and 31 (3.6%) age 5. Ninety-six percent of the age 2 and 3 adult Chinook combined consisted of males. The percentages for ages 3, 4, and 5 females were 2.4%, 90.2%, and 7.4%, respectively. The percentages for ages 2, 3, 4, and 5 males were 2.2%, 39.9%, 56.5%, and 1.5%, respectively (**Table 8**).

Table 8. Summary of the tagged and untagged Elwha Chinook sampled at the WDFW Elwha Rearing Channel, by sex and age, during RY2013. Origin (hatchery or wild) of non-tagged fish will be determined by otolith analysis which is currently not available.

Brood year	2011	2010	2009	2008	Total
Total age	Age 2	Age 3	Age 4	Age 5	
No. of females	0	7	267	22	296
Proportion by female age	0.000	0.024	0.902	0.074	1.000
Proportion by sex	0.000	0.031	0.463	0.733	0.350
No. of males	12	219	310	8	549
Proportion by male age	0.022	0.399	0.565	0.015	1.000
Proportion by sex	1.000	0.969	0.537	0.267	0.650
Total females + males	12	226	577	30	845
No. of sex und.	1	3	1	1	6
Grand total	13	229	578	31	851
Proportion	0.015	0.269	0.679	0.037	1.000

For the 2013 return year, a total of 4,117 Elwha Chinook were estimated to have originated from fingerling releases and 1,393 originated from yearling releases for a total of 5,510. The total number of fingerling returns in the table includes any potential natural origin fish. The final numbers in this table are subject to change until the 2013 otolith analysis has been completed. Of the estimated 4,117 fingerling returns, 26.5% (1,089) were age 3; 72.1% (2,967) were age 4, and 1.5% (61) were age 5. Of the estimated 1,393 yearling returns, 24.9% (347) were age 3; 66.3% (924) were age 4 and 8.8% (122) were age 5 (**Table 9**).

Table 9. Summary of the Elwha Chinook adult returns, by age class, from the hatchery fingerling and yearling release groups for return years 2006 through 2013. 1/

Return Year	Total Age	Brood year	Returns from Fingerling Releases	Age %	Returns from Yearling Releases	Age	Total	Age %
2006	3	2003	183	0.0964	0	0.0000	183	0.0948
2006	4	2002	829	0.4368	33	1.0000	862	0.4464
2006	5	2001	870	0.4584	0	0.0000	870	0.4505
2006	6	2000	16	0.0084	0	0.0000	16	0.0083
2006	Totals		1,898	1.0000	33	1.0000	1,931	1.0000
2007	3	2004	234	0.2175	17	0.2429	251	0.2190
2007	4	2003	727	0.6757	53	0.7571	780	0.6806
2007	5	2002	105	0.0976	0	0.0000	105	0.0916
2007	6	2001	10	0.0093	0	0.0000	10	0.0087
2007	Totals		1,076	1.0000	70	1.0000	1,146	1.0000
2008	3	2005	795	0.7092	0	0.0000	795	0.6895
2008	4	2004	262	0.2337	21	0.6563	283	0.2454
2008	5	2003	64	0.0571	11	0.3438	75	0.0650
2008	6	2002	0	0.0000	0	0.0000	0	0.0000
2008	Totals		1,121	1.0000	32	1.0000	1,153	1.0000
2009	3	2006	109	0.0499	8	1.0000	117	0.0534
2009	4	2005	2,052	0.9396	0	0.0000	2,052	0.9361
2009	5	2004	23	0.0105	0	0.0000	23	0.0105
2009	6	2003	0	0.0000	0	0.0000	0	0.0000
2009	Totals		2,184	1.0000	8	1.0000	2,192	1.0000
2010	3	2007	529	0.4222	0	0.0000	529	0.4136
2010	4	2006	118	0.0942	21	0.8077	139	0.1087
2010	5	2005	606	0.4836	5	0.1923	611	0.4777
2010	6	2004	0	0.0000	0	0.0000	0	0.0000
2010	Totals		1,253	1.0000	26	1.0000	1,279	1.0000
2011	3	2008	792	0.4602	105	0.7343	897	0.4812
2011	4	2007	913	0.5305	24	0.1678	937	0.5027
2011	5	2006	16	0.0093	14	0.0979	30	0.0161
2011	6	2005	0	0.0000	0	0.0000	0	0.0000
2011	Totals		1,721		143	1.0000	1,864	1.0000
2012	3	2009	985	0.4937	43	0.2240	1,028	0.4701
2012	4	2008	933	0.4677	144	0.7500	1,077	0.4925
2012	5	2007	77	0.0386	5	0.0260	82	0.0375
2012	6	2006	0	0.0000	0	0.0000	0	0.0000
2012	Totals		1,995		192	1.0000	2,187	1.0000
2013	3	2010	1,089	0.2645	347	0.2491	1,436	0.2606
2013	4	2009	2,967	0.7207	924	0.6633	3,891	0.7062
2013	5	2008	61	0.0148	122	0.0876	183	0.0332
2013	6	2007	0	0.0000	0	0.0000	0	0.0000
2013	Totals		4,117		1,393	1.0000	5,510	1.0000

1/ Numbers in table subject to change based upon otolith analysis to determine origin (hatchery or natural).

For the 2003 to 2007 brood years, the hatchery fingerling return rates have ranged from 0.009% to 0.117% and averaged 0.0518%, and the yearling return rates have ranged from 0.004% to 0.022% and averaged 0.014%. The number of fingerling releases for these brood years ranged from 1.87 million to 2.98 million and the number of yearling releases ranged from 140,900 to 340,946. The preliminary fingerling and yearling return estimates for the 2008 brood year releases are 0.193% and 0.185%, respectively. This preliminary estimate is based on the age 3, 4 and 5 adult returns from the 2008 brood year. The age 6 returns will not be available until fall of 2014.

The number of age 6 hatchery returns has been zero since the 2003 brood year. The total number of fingerling returns in the table includes any potential natural origin fish.

The final numbers in the table are subject to change until the 2013 otolith analysis has been completed (**Table 10**).

Table 10. Summary of the number of adult Elwha Chinook returns, by age class, and the percent return from hatchery fingerling and hatchery yearling release groups for brood years 2003 through 2010. 1/

Brood year	No. Fingerling releases (BY+1)	Age	Returns from Fingerling Releases	Fingerling percent return	No. Yearling releases (BY+2)	Returns from Yearling Releases	Yearling percent return
2003		3	183	0.00613		0	0.00000
2003		4	727	0.02436		53	0.01666
2003		5	64	0.00214		11	0.00346
2003		6	0	0.00000		0	0.00000
2003	2,984,000	Totals	974	0.03264	318,150	64	0.02012
2004		3	234	0.00851		17	0.00974
2004		4	262	0.00953		21	0.01203
2004		5	23	0.00084		0	0.00000
2004		6	0	0.00000		0	0.00000
2004	2,750,000	Totals	519	0.01887	174,500	38	0.02178
2005		3	795	0.02689		0	0.00000
2005		4	2,052	0.06939		0	0.00000
2005		5	606	0.02049		5	0.00355
2005		6	0	0.00000		0	0.00000
2005	2,957,000	Totals	3,453	0.11677	140,900	5	0.00355
2006		3	109	0.00417		8	0.00289
2006		4	118	0.00451		21	0.00758
2006		5	16	0.00061		14	0.00506
2006		6	0	0.00000		0	0.00000
2006	2,614,000	Totals	243	0.00930	276,950	43	0.01553
2007		3	529	0.02832		0	0.00000
2007		4	913	0.04888		24	0.00704
2007		5	77	0.00412		5	0.00147
2007		6	0	0.00000		0	0.00000
2007	1,868,000	Totals	1,519	0.08132	340,946	29	0.00851
2008		3	792	0.08553		105	0.05223
2008		4	933	0.10076		144	0.07164
2008		5	61	0.00659		122	0.06069
2008		6	TBD	TBD		TBD	TBD
2008	926,000	Totals			201,017		
2009		3	985	0.03232		43	0.02141
2009		4	2,967	0.09735		924	0.46010
2009		5	TBD	TBD		TBD	TBD
2009		6	TBD	TBD		TBD	TBD
2009	3,047,730	Totals			200,824		
2010		3	1,089	0.08807		347	0.16299
2010		4	TBD	TBD		TBD	TBD
2010		5	TBD	TBD		TBD	TBD
2010		6	TBD	TBD		TBD	TBD
2010	1,236,562	Totals			212,900		

1/ Numbers in table subject to change based upon otolith analysis to determine origin (hatchery or natural).

ANALYSIS OF CONTRIBUTION TO FISHERIES AND ESCAPEMENT

Harvest rate impacts are not available for this release. There is no update from the data presented in the November, 2012 Hatchery and Genetic Management Plan.

LITERATURE CITED

Curran, C.A., Magirl, C.S., and Duda, J.J., 2014, Suspended-sediment concentrations during dam decommissioning in the Elwha River, Washington: U.S. Geological Survey Data Set:

<http://wa.water.usgs.gov/pubs/misc/elwha/ssc/>, doi:10.5066/F7M043DB.

Denton, K., M. McHenry, R. Moses, M. Liermann, and G. Pess. 2013. 2013 Elwha River Chinook escapement estimate based on DIDSON/ARIS Multi-Beam SONAR Data. Report provided to Olympic National Park by the Lower Elwha Klallam Tribe in partial fulfillment of Task 2 and 6 of Contract #1443PC00296. 35 pp.

Final Report: 10 April 2014