

# 2016 Spring Chinook Acclimation Planting Schedule and Evaluation Plan

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*Final*

## Background

Section 8.8.1 of the Lewis River Settlement Agreement states:

*“Beginning upon completion of the Swift Downstream Facility, the Licensees shall place juvenile salmonid acclimation sites in areas reasonably accessible to fish hauling trucks and in practical areas in the upper watershed above Swift No. 1 Dam, as determined by the Licensees in Consultation with the Yakima Nation and the ACC...”*

To meet this requirement, three acclimation sites were constructed in the upper Lewis River basin upstream of Swift Reservoir. Two of these sites (Muddy River and Clear Creek Acclimation Ponds) were designed to take advantage of natural habitat by reconditioning side channels and using flow control structures to manage in-flow from the main river channel and to maintain adequate water elevation in the ponds. Construction of these sites was completed in fall 2013. The third site diverted water from Crab Creek, which served as inflow to a holding tank placed downstream near the confluence of Crab Creek and the Lewis River. The Crab Creek site was completed in fall 2015. The original intent of all three sites was to hold fish in the early spring for up to 6-weeks before allowing for volitional passage into the river. A total of 38,000 spring Chinook were originally to be stocked at Muddy River site, 19,000 at the Clear Creek site, and 15,000 at the Crab Creek site annually.

Due to a number of unforeseen challenges, these sites have not been utilized as intended. A procedural decision made by the Aquatic Coordination Committee (ACC) to begin releasing acclimation fish in the fall as opposed to holding them in the hatchery and releasing them the following spring has also complicated the use of these sites<sup>1</sup>. A brief summary describing each of these challenges is provided below:

- *Muddy River Acclimation Pond* – Following completion of the pond, the Muddy River site experienced too low of dissolved oxygen levels to support juvenile salmonid life (< 4 mg/L) due to high levels of iron-oxidation from iron bacteria. Aeration units were tried, but they did not increase dissolved oxygen to suitable levels. Pending actions to remedy the iron problem, acclimation fish were planted directly into the Muddy River. In December 2015, the infiltration gallery and water supply control structure to the pond were heavily damaged due to high water. After a site visit and information provided by the Gifford-Pinchot NF Staff on July 14, 2016, the ACC decided that the Muddy River Site would be decommissioned. No fish were ever stocked into this pond.

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<sup>1</sup> During their June 2015 meeting, the ACC agreed that releasing acclimation fish earlier in the fall is a better strategy and more akin to the natural out-migration behavior that has been observed in the upper basin. It was also determined that fish released in the fall would be held a shorter amount of time in the hatchery and thus less susceptible to disease (i.e., Bacterial Kidney Disease – BKD) that has been observed in previous years.

- *Clear Creek Acclimation Pond* – Maintaining adequate inflow and pond elevation has been the largest challenge for this site. During spring 2014, approximately 9,000 smolts were stocked in to the Clear Creek Pond, however all fish were released the following week due to low river conditions and reduced inflow. In August 2015, rip-rap was added along the shore near the intake largely improve the structural integrity of the intake structure, but it was also thought to improve inflow. However, similar to the Muddy River Site, the Clear Creek Acclimation Pond sustained heavy damage during the December 2015 high water event. PacifiCorp in coordination with the ACC are in the process of deciding the future of this site.
- *Crab Creek Acclimation Pond* – This site has not been used since its completion in fall of 2015. The Crab Creek site was designed and permitted for spring rearing and release of fish. Fall releases may be difficult at this site due to the hydraulic regime of Crab Creek, which may limit the timeframe in which smolts may be held. PacifiCorp in coordination with the ACC are in the process of deciding the future of this site.

Because of the challenges faced with the holding ponds, the vast majority of acclimation fish have been directly released near the acclimation sites, but not held in the ponds. Since 2012, approximately 355,000 spring Chinook have been directly released into the upper basin (Table 1). All of these releases have been done using a large capacity fish hauling truck and releasing approximately 9,000 to 12,000 fish per load over a short period of time (1-2 days). Overall, information regarding the effectiveness of these releases is largely unknown. Data from PIT tag detections (USGS Crab Creek site) and downstream collection numbers at the Swift Floating Surface Collector suggest that a large portion of these fish move out of the upper basin into the reservoir relatively quickly<sup>2</sup>. Additional information on the residency time following release particularly for fish released during the fall would be helpful for directing future release strategies for the program as well as help make decisions regarding the future of the remaining acclimation sites.

## **Planting Schedule and Evaluation Plan (2016)**

### *Overview*

A total of approximately 34,000 acclimation Chinook are scheduled for direct release in fall 2016 (Table 1). Rather than releasing all these fish in large numbers over a short period of time, it is proposed a proportion of these fish be released in smaller groups over a slightly longer time frame this fall. It is thought that by decreasing the number of fish stocked per planting event, smolts may stay in the system longer and move downstream at a slower rate due to decreased

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<sup>2</sup> Detection histories collected at the confluence of Crab Creek in spring 2013 indicated that approximately 60% of tagged acclimation Chinook emigrate within the first seven days following release and 98% within 60 days. Observations at the Swift Floating Surface Collection have noted the arrival of acclimation fish as early as four days after release.

densities. Releasing fish over a slightly longer timeframe will also allow for evaluation of whether timing of release affects residency time for fish released in the fall. That is, do fish released earlier in the fall remain in the tributary streams longer than those released later?

By utilizing a number of Passive Integrated Transponder (PIT) tag antennas presently located in the upper basin, downstream passage of these smaller groups can be monitored. Detection histories will be summarized to determine residency time upstream of the monitoring arrays for each release group. The data collected from PIT interrogations at each antenna will allow for biologist to infer the migration behavior of smolts post-release. These data will help determine the length of time in which smolts resided in their respective system, mean length of time spent in the system prior to outmigration, and whether there are significant differences in residence time among different plantings (i.e., date, system). The 2016 effort will be considered a pilot study and could be used to guide future evaluations designed to assess strategies for acclimation fish releases.

**Table 1. A summary of spring Chinook releases as part of the Lewis River acclimation program since 2012.**

Species	Brood Year	Plant Date	Number	Size (F/LB)	Plant Site
CK:SP	2015	N/A	34,090	44.5	N/A
CK:SP	2014	10/21/2015	14,739	23.3	Crab Cr
			33,261	23.3	Clear Cr
CK:SP	2013	3/3/2015	37,022	20.0	Crab Cr
		3/4/2015	72,644	20.0	Clear Cr
CK:SP	2012	10/7/2013	16,200	23.2	Crab Cr
		4/23/2014	18,416*	10.3	Clear Cr
		4/23/2014	21,012	10.6	Muddy R.
		5/1/2014	44,000	10.5	Clear Cr
CK:SP	2011	10/19/2012	15,440	23.0	Crab Cr
		4/1/2013	17,655	12.5	Muddy R.
		4/1/2013	13,665	12.5	Clear Cr
		4/3/2013	18,560	13.5	Clear Cr
		4/3/2013	18,560	12.2	Muddy R.
		4/4/2013	14,256	12.0	Crab Cr

\*Note: Includes approximately 9,000 smolts released into the Clear Creek acclimation pond.

## *Methods*

Five upper basin locations will be used as release sites during the fall of 2016 effort. These locations are (Figure 1):

1. Clear Creek Bridge;
2. Upper Muddy River just upstream of the Smith Creek confluence;
3. Muddy River Bridge;
4. Drift Creek Bridge; and
5. Lewis River Bridge at Crab Creek

Acclimation fish will be released at each location beginning the first week of September, through mid-October (Table 2). Smolts will be released bi-weekly to minimize the effects of overcrowding within the release streams. Four groups of approximately 1,000 smolts each will be released at both the Clear Creek and Muddy River sites for a total of about 4,000 fish released. At the Drift Creek release site, four groups of about 500 fish each will be released for a total of 2,000 smolts. Drift Creek will receive fewer fish than the other two test sites due to its smaller overall size. The remainder of the smolts (23,000) will be considered surplus and be released at the Upper Lewis River Bridge at Crab Creek (15,000) and at the Muddy River Bridge (8,000) in a single group in early September (Table 2).

Approximately 25 percent each release group will be tagged with PIT tags and all tag codes will be identified for each group (Table 2). All fish will be tagged in the belly between the posterior tip of the pectoral fin and the anterior point of the pelvic girdle using methods outlined in CBFWA (1999). All tagged fish will be randomly selected and measured to fork length (mm); it is anticipated that fish will range in size from 90 mm to 160 mm. Tagged smolts will be held a minimum of 24 hours to fully recover and assess any delayed mortality before being released.

Downstream passage of PIT tagged fish will be monitored utilizing existing detection arrays located at the confluence of Clear Creek and the Muddy River, the confluence of the Muddy River and Lewis River, and lower Drift Creek (Figure 1). No detection array will be placed in the Lewis River due to logistical constraints associated with installation and maintenance, as well as expected low detection efficiency (consequently, no fish released in the upper mainstem Lewis River will receive PIT tags). All detection arrays will be downloaded weekly. Beacon tags will be used to monitor detection array operation and identify any outages.

**Figure 1. Location of Muddy River, Clear Creek, Lewis River (Crab), and Drift Creek release site(s) and PIT antennae arrays.**



**Table 2. Proposed 2016 Spring Chinook smolt release schedule for the five upper Lewis River Release sites. Number of PIT tagged fish within each release group is shown in parentheses.**

<b>Period</b>	<b>Muddy River</b>	<b>Clear Creek</b>	<b>Crab Creek</b>	<b>Drift Creek</b>	<b>Total</b>
Sept. 5-9	1,000 (250) Upper Site  8,000 (500) Bridge Site	1,000 (250)	15,000 (0)	500 (125)	2500
Sept. 12-16	0	0	0	0	
Sept. 19-23	1,000 (250) Bridge Site	1,000 (250)	0	500 (125)	14000
Sept. 26-30	0	0	0	0	
Oct. 3-7	1,000 (250) Upper Site	1,000 (250)	0	500 (125)	14000
Oct. 10-14	0	0	0	0	0
Oct. 17-21	1,000 (250) Bridge Site	1,000 (250)	0	500 (125)	2500
<b>Total</b>	<b>12000 (1500)</b>	<b>4000 (1000)</b>	<b>15000 (0)</b>	<b>2000 (500)</b>	<b>33000 (3000)</b>

Date, time of day, and tag code will be stored for each detection. Detection data for each release group will be summarized across the monitoring period at each site. Residency time upstream of each monitoring site will be calculated for each tagged fish as the difference in date/time between release and detection downstream. To decrease the influence of outlying data points, upstream residency time will be evaluated based on median as opposed to mean time. Comparisons of median upstream residency time among release groups will be made using a standard median test (Conover 1999). Date of release, PIT interrogations at the antennae arrays, and date that tagged smolts are recaptured at the FSC will also be used to estimate residence time in Swift Reservoir.

Conover, W. J. 1999. Practical nonparametric statistics, 3rd edition. John Wiley and Son, Inc. New York, NY.

CBFWA (Columbia Basin Fish and Wildlife Authority). 1999. PIT Tag Marking Procedures Manual. Prepared by Columbia Basin Fish and Wildlife Authority, PIT Tag Steering Committee. Version 2.0. Pages 22.