2015 NATURAL-ORIGIN CHINOOK: OUTPLANT ABOVE DETROIT?

SUMMARY OF ISSUE

Fish managers are assessing outplanting protocols for Chinook salmon in the North Santiam River and whether they should be revised in 2015 based on stream conditions. The primary management question is whether some portion of the natural origin (NOR) Chinook collected at Minto should be outplanted above Detroit Dam, rather than releasing all of the NORs in the North Santiam below Big Cliff Dam and in downstream tributaries, as in previous years. Current protocol permits outplanting of only hatchery origin (HOR) Chinook above Detroit Dam until safe downstream fish passage at Detroit and Big Cliff is achieved.

The need for this decision is prompted by an unusual water year with low Cascade snowpack and very dry conditions. Detroit Reservoir flood risk reduction operations in the winter months resulted in very low reservoir levels (as of June 1st, Detroit was 38% of full). Without spill capability at Detroit, the Corps cannot provide operational temperature control in 2015. As a result, fish habitat below Big Cliff Dam will be less suitable than in recent years due to high water temperatures during the Chinook incubation period in the fall.

In addition, recent pedigree study results indicate natural-origin adult Chinook salmon collected at Minto trap on the North Santiam River were produced from both above and below Big Cliff/Detroit dams. These results prompt consideration of an alternate outplanting strategy in this difficult water year to provide the NOR population the best opportunity for survival.

FACTORS IN DECISION MAKING

1. Biological Opinion
   RPA 9.3 in the NMFS (2008) Biological Opinion for the Willamette Project provides guidance for the passing of spring Chinook salmon at Big Cliff/Detroit dams. RPAs 4.1 and 6.2.3 allow for the capture, transport, and release of spring Chinook salmon from Minto trap to above the federal dams. The decision to outplant NOR Chinook has been based upon risk/benefit assessments that determined the best place to outplant these NOR Chinook so that they had the optimal chance for survival under current conditions. To date, NMFS and ODFW have not outplanted NOR Chinook above Big Cliff/Detroit dams due to the lack of safe downstream fish passage facilities at these dams. Survival studies using balloon tags showed poor survival through the turbines, and somewhat better survival through the spillway, though even spillway survival (66-82%) was much lower than seen at other large dams in the region. However, recent biological information and current water conditions in 2015 indicate that a “spread the risk” approach, including outplanting of NORs above Big Cliff/Detroit, may be warranted in 2015. This action is already covered under the Incidental Take Statement of the NMFS’ (2008) BiOp (Table 11.1-1).
2. Pedigree Study
   Preliminary data. Of returning Chinook sampled at and below the Minto trap in 2013, 350 (of 593 sampled) assigned to adults outplanted above Detroit Dam. In 2014, 529 (of 801 Chinook sampled) assigned to parents above Detroit Dam. Chinook released later in the season had higher spawning success.
   a. The purpose of the pedigree study is to evaluate the contribution of salmon outplanted above Big Cliff/Detroit dams to subsequent natural-origin (NOR) salmon recruitment to the North Santiam River
   b. Study results depend mainly on fish that enter the trap at Minto. However carcass samples taken during spawning ground surveys are also used.

    c. Numerous caveats are associated with the study's results based upon previous years' sampling. However known biases of the study suggest that actual production above Detroit in years with spill was likely greater than estimated.
    d. Chinook that assign as progeny to parents outplanted above Detroit arrive at Minto throughout the migration season, not earlier as occurs at the Cougar trap (based on preliminary 2013 and 2014 data; pers. comm. Melissa Evans)
3. Paired Release Study
   This study monitored hatchery-reared juvenile Chinook that were released in groups at several locations above Detroit and below Big Cliff. Spill at Detroit occurred during most of the release periods and concurrent active tag studies showed more Chinook passed the dam via spill than turbines. Full results from the paired release study are not available because all age classes have not yet returned as adults. Preliminary information from returning adults that have ascended Willamette Falls in 2015 show no significant effect of release location on survivorship.
    a. 2012 release. Returns: 28 age-4 adults. 13 were released at the head of Detroit Reservoir; 15 below the dams. Release numbers were roughly 12,500 per group.
    b. 2013 release. Returns: six age-3 adults. Two from the head of the reservoir, three from the forebay, one from the tailrace. Release numbers ~33,000 per group.
    c. Zero jacks detected from the 2014 release.
4. Low water levels in Detroit
    a. Temperature control will not occur because Detroit Reservoir will not be spilling.
        i. Water temperatures below Detroit/Big Cliff dams will be colder than natural water temperatures during the adult migration, which may delay Chinook reaching the Minto trap. But Chinook collected at the Minto trap and outplanted above Detroit Dam will be released into naturally warm water during the peak of the summer. Outplanting water temperature protocols will be violated from this unnatural situation.
        ii. Spawning and rearing conditions below Big Cliff may be worse without the ability to provide operational temperature control. Water heated up in Detroit will be released in late summer and fall adversely affecting incubating Chinook eggs.
5. Through the summer 1,000 cfs is expected to continue to be released from Big Cliff.
    a. Sept 1st flow is scheduled to increase to 1,500 for Chinook spawning.
    b. Water is currently cool due to its release point from the reservoir and hypolimnetic flow releases. It is expected to stay relatively cool until reservoir turnover.
    c. The lower river may offer good holding habitat for Chinook as long as the water stays cool.
6. Low streamflow levels
    a. Natural streamflow will be warmer and shallower than normal.
    b. After September, water levels above Detroit are likely to be lower but temperatures cooler than below Big Cliff.
7. Conditions directly below Big Cliff Dam are not optimal for spawning and rearing
    a. The amount of spawning and rearing habitat is undetermined
    b. Water levels fluctuate either seasonally or because of regulated river management for non-biological purposes
    c. Redds have been dewatered in the past
    d. High levels of total dissolved gases occur unpredictably and may have negative impacts on fish and incubating eggs.
8. Real-time genetic information that could differentiate between above and below Detroit offspring is not currently available.
9. Typical outplanting sites for adults in Detroit Reservoir are not available due to low water levels.
    a. Constructed outplanting sites are either poor options this year, or are not useable.
    b. New potential outplant sites are being investigated but all require working with landowners and possible improvements. It is unknown how quickly these options could come available if at all.

c. Current outplanting sites are below and each has factors or conditions that make them less than ideal:
    i. USGS site on Breitenbush
        1. Chinook would have to back down past the island in Detroit Reservoir to gain access to the N. Santiam and are likely to get beat up doing so.
        2. Release chute is at the upper limit of allowable velocity.
    ii. Breitenbush Hot Springs:
        1. Higher upstream on the Breitenbush.
        2. Chinook would have to back down past the island in Detroit to gain access to the N. Santiam
        3. Very unlikely that any NORs being outplanted would have originated in the Breitenbush.
        4. A total of 300 Chinook (2 days per month, one load per day, June/July/Aug) can be outplanted there.
    iii. Mongold
        1. Water temperature is currently 70˚ at the boat ramp, which is almost 20˚ warmer than the North Santiam River at Minto. This is inconsistent with BiOp outplanting protocols.
        2. To reach the low 50˚s, outplanted Chinook would need to sound about 60 feet.
        3. Measures that would allow release below the thermocline, could make this site usable again.
    iv. Log Deck Site:
        1. Agreement is being worked on, but it isn't clear when it will be finalized, or an access road built.
        2. Would require holding Chinook at Minto until August, and handling them at least twice more for injections and release.
        3. Holding Chinook in one place presents a risk in terms of disease.
    v. Upper Log Deck Site:
        1. Close to the road, easy angler access.
        2. Best used after August when angler numbers are reduced.
    vi. Horn Creek:
        1. Directly below the hatchery
        2. A total of 75 Chinook pairs can be placed here
        3. A weir has been placed at the mouth of Horn Creek to exclude additional fish from spawning there (eliminating extensive redd superimposition)
    vii. Bridge at Parrish Lake Rd
        1. Low water, small channel, poor long-term holding
        2. Usable as late outplant site
        3. Max number: 25 pair
    viii. Big Meadows Horse Camp
        1. Low water, small channel, poor long-term holding
        2. Usable as late outplant site
        3. Max number: 25 pair

BACKGROUND DATA

N. SANTIAM CHINOOK COUNTS

Location	Marked Adults	Unmarked Adults	Total
Bennetts (6/6/15)	4,751	675	5,472
Minto (6/12/15)	620	97	353

PEDIGREE RESULTS, IN BRIEF

Return Year	Number assigned to above Detroit	Number Unassigned
2010	6	44
2011	96	180
2012	31	53
2013	350	243
2014	529	272

- Outplant year 2009: 29% of outplants produced adult progeny. However there was a skewed sex ratio: approx. six males for every female outplanted.
- Percent assignment above Detroit for the 2010-2013 return years should be considered minimum estimates because genetic sampling of outplanted adults was incomplete.

ASSESSMENT

1. *Currently there aren't good locations, above or below Detroit, to place Chinook this year on the N. Santiam.* Until reservoir turnover, the lower river may offer cooler holding areas.
2. It would be best to spread the risk geographically as much as possible to promote the best chances of survival since none of the available options are particularly good.
3. The Log Deck site offers a potential good site for outplanting if we can get access to it.
4. Based on available information, the Big Cliff to Minto reach can likely accommodate a release of 200 unclipped fish (equal sex ratio) this year and these Chinook also have the option to back down the river to below Minto.
5. There is likely going to be a decline in NOR productivity downstream as a result of moving NORs above Detroit.
6. Pedigree results suggest NOR production above Detroit exceeds that of the lower river; however, more data is needed to evaluate the consistency of this result.

DECISION FOR 2015

Due to unusual habitat conditions for 2015, the fisheries managers have decided to spread the risk of pre-spawn mortality (PSM) geographically in hopes of increasing the survival of NOR progeny. The disposition target of 1,500 HORs (750 females) above Detroit will be partially filled this year by NOR fish. Approximately 50% of NORs counted at Bennett Dam (not at Minto trap) will remain in the lower river, and approximately 50% will be moved above Detroit provided good outplant sites are available. Roughly 200 of the NOR Chinook that enter Minto will be released above Minto Dam. If there are not good outplant sites then NORs will be released into the reach above Minto or downstream of Minto. Since it is unlikely that NOR outplant levels will reach the disposition target, hatchery fish will be outplanted above the dam to supplement NOR releases. Currently a preference in

outplanting will be given to NORs, except in the Breitenbush where only HORs will be outplanted (at this time only 300 HORs are expected to be outplanted in the Breitenbush, rather than the 600 noted in the 2015 disposition table). NORs will be distributed above and below the dams throughout the run since pedigree results have not shown distinct differences in return timing.

The plan below and associated numbers may change depending upon actual returns to the trap, conditions above and below the dams and available outplant sites, and is at the fisheries managers' discretion. NORs that come into the Minto trap will be PIT tagged, DNA samples and scales taken, and may be Floy tagged depending upon their outplant site.

June

1. 100 NORs into Minto to Big Cliff reach
2. 38 NOR pairs into Horn Creek (filled 6/12/15).
3. 140 HORs in at Breitenbush Hot Springs
4. Remaining NORs released downstream from Minto, unless a good outplant site above Detroit becomes available.

July

1. 50 NORs into Minto to Big Cliff reach
2. 37 NOR pairs into Horn Creek
3. 100 HORs in at Breitenbush Hot Springs
4. Remaining NORs released downstream from Minto, unless a good outplant site above Detroit becomes available.

August

1. 50 NORs into Minto to Big Cliff reach
2. 25 NOR pairs (in good condition) into Parrish Bridge Rd.
3. 25 NOR pairs (in good condition) into Big Meadows Horse Camp
4. 60 HORs in at Breitenbush Hot Springs
5. Remaining NORs in good condition may be outplanted above Detroit if good sites are available. Otherwise NORs will be released downstream from Minto.

September

1. NORs able to withstand the transport in good condition will be released at Upper Log Deck or other outplant sites if available. It is not likely however than most NORs will transport well this late in the season and therefore will be released into the Minto to Big Cliff reach.

This decision is for 2015 only and is based upon emergency conditions. The fisheries managers may alter the above plan without notice. The above represents the fisheries manager's best understanding of the situation but the plan is subject to change as conditions warrant.

FUTURE CHINOOK OUTPLANT DECISIONS: NEEDED INFORMATION

1. Additional pedigree assessment (currently scheduled for funding in FY15)
2. Spawning surveys, including the Minto to Big Cliff reach, if possible
3. TDG impact assessment in the reach below Big Cliff Dam
4. Monitoring of trends in precipitation, ability to fill reservoir, ability to spill for temp control and fish passage
5. Real-time pedigree results to inform parentage source and passage choice