

Project Name	2021 CFNSC Evaluation Recommendations
Date Proposal Submitted	12/24/2020
Date of Requested Decision	1/5/2021
Completed By	Matt Bleich

FTC Decision and Justification

The following Fisheries and Technical Committee members were in attendance at the 1/5/21 meeting: Department of Ecology (Carol Serdar), Washington Department of Fish and Wildlife (Bryce Glaser), Tacoma Power (Travis Nelson), National Marine Fisheries Service (Rich Turner).

Motion to approve was brought forward by Travis Nelson, seconded by Bryce Glaser. With the comments/changes discussed during the FTC meeting, the committee approved.

Proposed Decision or Consideration

As part of the 2021 evaluation year at the Cowlitz Falls North Shore Collector (CFNSC), Tacoma proposes implementing seven actions intended to test hypotheses regarding salmon and steelhead collection efficiency in relation to collector configuration, dam operations, and life history strategies. Specifically, Tacoma will:

1. Opportunistically evaluate increasing flow within the collector from 500 cfs to 750 cfs during spring freshets and any resultant effect on steelhead and Coho Salmon collection efficiency.
2. Evaluate the effect on steelhead retention efficiency of modified floor geometry in the Capture Zone region of the CFNSC.
3. Design and implement a block study design to evaluate Chinook Salmon Entrance Efficiency in response to the configuration of the Pumpback Diffuser Structure during pumpback operations. The proposed study will be implemented using PIT tags in 2021, with results guiding future acoustic telemetry based directed studies in 2022.
4. Develop a debris management evaluation study design to assess turbine unit trash rack debris loading and potential impact on fish collection.
5. Conduct post-hoc analyses of 2019 and 2020 Fish Collection Efficiency in relation to unit operations.
6. Continue the extended collection season initiated in 2020 at Cowlitz Falls by operating the CFNSC beginning in mid-March and continuing through October, outside of the historic April through August timeframe, to allow for a fuller understanding of life history expressions in Upper Cowlitz river basin spring Chinook Salmon.

7. Develop and implement a study plan to evaluate the adult return of spring Chinook Salmon to the Cowlitz Salmon Hatchery and the relative contribution of different life history strategies to the Upper Cowlitz River spring Chinook Salmon population.

Background

As part of the Cowlitz Hydroelectric Project Federal Energy Regulatory Commission operating license requirements, Tacoma Power is engaged in restoration efforts of anadromous salmonid populations in the Upper Cowlitz River basin. These efforts include ensuring the effective passage of juvenile salmonids during their migration downstream from the Upper Cowlitz and Cispus rivers, through collection in the Cowlitz Falls fish collection system, and transport around Tacoma hydroelectric facilities, where they are returned to the Cowlitz river.

The Cowlitz Falls North Shore Collector was added to the existing fish collection system at Cowlitz Falls Dam in 2017 and has been subject to annual performance evaluations since commissioning. Annual evaluations of the fish collection system include estimates of Fish Collection Efficiency (FCE), defined as the percentage of marked fish released at the head of Lake Scanewa that are subsequently collected alive at the Cowlitz Falls Fish Facility. Fish Passage Survival (FPS) is derived from FCE, adjusted for natural and transportation mortality, and includes a term for survival of collected fish to the smolt recovery ponds at the Cowlitz Salmon Hatchery, and subsequently exit into the Cowlitz river downstream of Barrier Dam. FPS has a performance goal of 95%, with a minimum of 75%, using the best available technology. Since the completion of Cowlitz Falls Dam in the late 1990's, FPS performance goals have yet to be met for Coho Salmon, steelhead, or Chinook Salmon, although estimates have improved significantly with the commissioning of the CFNSC.

Historically, fish collection operations at Cowlitz Falls span from April 1 through August 31. Spring Chinook salmon outmigration at Cowlitz Falls typically peaks in July and August. However, based on migration timing observed in similar systems, it is likely that there is a second component of the outmigration with more typical run timing in early spring or late fall. The CFNSC is capable of operating during these periods, and offers the potential of detecting these outmigration signals.

An evaluation of adult salmon returning to the separator at Barrier Dam can provide insight into the most successful life history strategies. It is currently unclear to what degree each component of the Spring Chinook juvenile outmigration contributes to the adult return and overall population. Information collected from returning adults (e.g., scales and otolith) can help determine which strategies should be prioritized during the outmigration.

The CFNSC tailrace discharge structure allows water to be discharged directly in to the tailrace, while still maintaining fish collection activities. During spring spill events, the CFNSC can be configured to operate at 750 cfs, providing an opportunity to test fish collection performance at higher than normal flows.

Preliminary results from the 2019 telemetry evaluations suggest that steelhead smolts are able to exit against the high velocity flow of the capture zone, resulting in low Capture Zone Efficiency (39 – 78%) and overall Retention Efficiency (48 – 77%) across weekly release groups. The floor of the Capture Zone was designed to be adjustable and can be modified to improve hydraulic conditions and increase Retention Efficiency in the CFNSC.

Preliminary results from the 2019 telemetry evaluations reveal that weekly estimates of Chinook smolt Entrance Efficiency varies widely by release group (30 – 85%), and the season-wide value is lower than desired (71%). The Pumpback Diffuser Structure (PDS) has been set to operate in the “no eddy” configuration since the collector was commissioned, but was designed with alternate configurations to address low Entrance Efficiency. One configuration, “Entrance Directed Flow”, allows the PDS baffles to be set in such a way as to direct discharge directly towards the CFNSC entrance, encouraging fish to find and enter the collector. A qualitative analysis of Chinook smolt behavior and overall collection during pumpback operation will be used to inform future actions.

Occlusion of turbine unit trash racks due to debris accumulation may alter hydraulics in the dam forebay resulting in increased attractive flow to turbine intakes and other undesirable locations. It is currently not understood to what degree, if any, trash rack occlusion affects fish behavior in the dam forebay and ultimately, FCE estimates.

Annual evaluations of the Cowlitz Falls fish collection system suggest there may be a relationship between turbine unit operations and FCE. A comprehensive multi-year analysis of potential relationships will add to the overall understanding of fish passage at Cowlitz Falls.

Coordination Need

Summary of Potential Impacts

Spring Chinook Salmon outmigrant abundance is expected to be low in 2021. Evaluations involving tagging and releasing spring Chinook Salmon smolts upstream of Cowlitz Falls Dam may be impacted by failure to reach minimum sample sizes for statistically valid results. Losses of fish associated with evaluations (e.g., passage failure or handling mortality) could further impact the anticipated low abundance of outmigrants.