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## STUDY CODE: APH-19-02-FC

**TITLE:** Fall Creek adult trap post-construction evaluation

**MANAGEMENT PURPOSE:** Determine if the new Fall Creek Adult Fish Facility (AFF) is performing adequately. This study will evaluate the collection efficiency of adult spring Chinook salmon and assess if pre-spawn mortality rates for spring Chinook salmon released above the dam have changed as a result of operating the new AFF or transport protocols.

**FISH PROGRAM FEATURE:** CRFM

**BIOLOGICAL OPINION ACTION:** RPA measures; 4.1, 4.6, 4.7, and 6.2.3

**BACKGROUND:** A new adult fish collection facility was constructed at Fall Creek with the purpose of minimizing upstream migration delays and improving outplanting success. This provides a unique opportunity to examine the efficiency of the new trap, managed for wild fish as hatchery fish are absent.

Annual rates of pre-spawn mortality (PSM) in adult Chinook salmon transported upstream of Fall Creek Dam are high (often >40%). Recent studies suggest options exist to reduce PSM for Chinook salmon, as several manageable factors have been shown to correlate with PSM rates, including temperature exposure, fish density, transport date, anesthetic, handling protocols, and transport location (e.g. Naughton et al. 2016; Caudill et al. 2014; Mann et al. 2010; Colvin, pers. comm. 2016).

An experimental design is needed to evaluate the trap collection efficiency and spawner success, and to identify what factors affect these attributes. The design likely needs to include all fishes that are to be outplanted during a given year and handled using best management practices as outlined in the Willamette Fish Operations Plan (USACE, 2018, http://pweb.crohms.org/tmt/documents/FPOM/2010/Willamette\_Coordination/WFOP/2018/index.html). Evaluating the trap on the basis of observed PSM events prior to and after installation of the new trap at Fall Creek could aid in measuring the efficiency and effectiveness of the Fall Creek trap and informs a critical data gap regarding PSM.

Field work and analysis began in 2017 to document conditions immediately prior to operation of the new trap, however data collection was limited by very low returns of adult spring Chinook salmon in this year. Assessment of PSM with operation of the new AFF began in 2020. The study is proposed again for FY2021. A fundamental assumption of the proposed study is that observed changes in PSM of Chinook Salmon outplanted in Fall Creek are attributable to the improvements to trapping facilities at Fall Creek Dam. Therefore, it is imperative that protocols used in the pre-trap improvement period, 2010-2017, be implemented during the post evaluation phase, using a systematic sampling of survey reaches.

**OBJECTIVES:**

1. Estimate PSM of outplanted Chinook salmon in Fall Creek

2. Identify which outplanting locations and conditions result in lower PSM

3. Quantify the changes in PSM associated with the improved trapping facilities.

**SCHEDULE**: 2019 to 2021 (update after experimental design established)

References:

Caudill CC, Jepson MA, Lee SR, Dick TL, Naughton GP and Keefer ML. 2014. A Field Test of Eugenol‐Based Anesthesia versus Fish Restraint in Migrating Adult Chinook Salmon and Steelhead. Transactions of the American Fisheries Society, 143: 856-863. doi:[10.1080/00028487.2014.892533](https://doi.org/10.1080/00028487.2014.892533)

Keefer ML, Taylor GA, Garletts DF, Gauthier GA, Pierce TM, Caudill CC. 2010. Prespawn mortality in adult spring Chinook salmon outplanted above barrier dams. Ecology of Freshwater Fish. 19: 361-372.

Mann RD, Caudill CC, Keefer ML, Roumasset AG, Schreck CB, Kent ML. Migration behavior and spawning success of spring chinook salmon in fall creek and the north fork middle fork willamette river: relationships among fate, fish condition, and environmental factors, 2010. Idaho Cooperative Fish and Wildlife Research Unit. 2010.

Sharpe CS, Mapes RL, Cannon B, Olmsted P, Sinnott M, DeBow B, Bailey E, Hoblit T, and Friesen TA. 2017. Abundance, distribution, diversity, and survival of adult spring Chinook salmon in the upper Willamette River: 2015 and 2016. Oregon Department of Fish and Wildlife report to US Army Corps of Engineers: W9127N-12-2-0004-4009 and W9127N-10-2-0008-0036.

USACE. 2018. 2018 Willamette Fish Operations Plan (WFOP). URL: <http://pweb.crohms.org/tmt/documents/FPOM/2010/Willamette_Coordination/WFOP/2018/index.html> (Accessed: April 30, 2018).

**NMFS Comments:**

Observing PSM events prior to and after installation of the new trap is a useful way to ensure the AFF operations make the best use of a new structure.