

References & End Notes

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Note: Annual pHOS_{census} estimates, defined as the proportion of the naturally spawning population that is composed of hatchery-origin adults, are presented in this report to provide a surrogate measure of population diversity, specifically population gene flow. NMFS recommends using pHOS_{census}, rather than effective pHOS, as the appropriate metric for genetic risk evaluation. Five-year rolling average pHOS_{census} data is presented for each population; this metric is consistent with NMFS ESA section 7(a)(2) take indicators for evaluating the amount or extent of take resulting from hatchery-origin fish spawning naturally in ESA listed natural spawning areas.
5. Recruits per spawner is defined as the number of offspring in a brood that survive to adulthood divided by the number of parents in the brood. Brood refers to a parental group of returning salmon. Brood year is the year that the adult recruits (offspring) were born. The 20-year geometric mean reflects the trend in abundance and productivity over four steelhead generations.
Note: Each population needs to meet or exceed the minimum productivity threshold at/above its' designated minimum abundance (natural-origin spawner) threshold to achieve a low extinction risk (viable) rating for abundance and productivity.
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Note: A multi-agency collaborative research approach was initiated in 2014 to facilitate data sharing and synthesis, evaluate critical uncertainties, and identify potential recommendations regarding this overshoot limiting factor. The Overshoot Research Workgroup (Workgroup) formed as an ad-hoc technical subgroup to the Middle Columbia Steelhead Recovery Steering Committee and included various government agencies: ODFW, WDFW, USGS, NOAA, USACE, Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, CRITFC, University of Idaho, and University of Washington. The Workgroup developed a comprehensive research proposal to (1) compare pre-spawn survival among population groups using a standardized approach for analysis, (2) characterize overshoot behavior and survival rates for each population, (3) estimate potential impacts to Mid-Columbia, Upper-Columbia, and Lower Snake River steelhead populations using VSP parameters, and (4) provide recommendations for future research analyses and potential management actions [Source: 11]. Army Corps staff have acquired funding to support the mainstem overshoot research components of the Workgroup's research proposal, with specific focus on McNary Dam operations and steelhead migration within the FCRPS corridor. Estimates of conversion and survival of PIT-tagged fish are dependent on adequate detection facilities within the FCRPS and in tributaries. Detection efficiencies of in-stream arrays are needed to quantitatively determine entry of adults into natal tributaries and straying into neighboring populations and watersheds. Additional funding for increased tributary monitoring is needed to identify population-specific pre- and post-overshoot trends, evaluate intra-population causal mechanisms (e.g., overshoot timing and mainstem river and natal tributary environments; overshoot behavior and within tributary hatchery effects), assess inter-population mechanisms and synchronous movements, and improve estimates of homing and straying rates, population survival, and potential fate of natural-origin adult steelhead that do not return to their natal tributaries [Sources: 11, 60]. Tributary monitoring is highest priority to address the critical uncertainties of overshoot behavior, its effects on population viability, and develop effective management strategies to improve wild steelhead survival [Sources: 11, 60].
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Note: In response to low water levels that caused a fish kill in 2009, Fifteenmile Creek watershed irrigators, in collaboration with The Freshwater Trust, Fifteenmile Watershed Council, and other state agencies, developed the Fifteenmile Creek Action Plan to Stabilize [Stream] Temperatures (FAST) in 2013. FAST includes a real-time, climate-streamflow-water temperature prediction model, developed by Oregon Department of Fish and Wildlife, which forecasts stream temperatures for seven days at five different sites along Fifteenmile Creek. When the model predicts stream temperatures lethal to threatened steelhead at two or more sites for two or more days, the Watershed Council issues an alert to irrigators prompting a 'voluntary self-regulation' period where irrigators agree to voluntarily curtail the rate of their diversions to help avoid or lessen the intensity of high air temperature/low flow events. FAST has been implemented since 2013 and received recognition by NOAA Fisheries for being an innovative, collaborative partnership. Funding was secured in 2014 to provide an incentive for irrigator participation in the FAST Program and to hire a Wasco SWCD Flow Restoration Coordinator for the Program in 2015.

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Note: The facility has not operated since 2002 and since then, has had no impact on flows, and little to no passage impacts on adults or juveniles. The converted 500 cfs water right, exercised December through June, will be subordinate to other beneficial uses as was the original Boyd hydroelectric water right. It is recommended that local restoration partners explore the feasibility of removing the facility infrastructure to improve instream-floodplain connectivity at the site.
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