Yakima Tributary Access & Habitat Program

Monitoring Plan

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Washington Resource Conservation & Development Council

With funding from the

Bonneville Power Administration

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YTAHP MONITORING PLAN

Purpose

The Yakima Basin in Central Washington is home to more than 600,000 acres of irrigated agriculture lands and numerous municipalities, with a population nearing 400,000. The 214 mile Yakima River and its 6,155 square mile watershed provide habitat for resident and anadromous fish species, including Chinook and coho salmon, as well as federally threatened Middle Columbia River Steelhead and Columbia River Bull Trout. In an effort to enable private landowners to actively participate in salmon, steelhead, and bull trout recovery, the Yakima Tributary Access & Habitat Program (YTAHP) was formed to provide fish passage at man-made barriers, screen irrigation diversions and improve in-stream and riparian habitat conditions. The investment of funding and other resources into these habitat projects warrants an evaluation of their effectiveness at achieving their objectives.

Bonneville Power Administration (BPA) through the Northwest Power and Conservation Council's Fish and Wildlife Program currently provides the base funding for YTAHP. Since 2002, over 203 major projects have been implemented in addition to well over 88 NOAA Fisheries and WDFW compliant fish screens installed due to YTAHP efforts. Future YTAHP funding from BPA is contingent upon monitoring and evaluating projects to determine their effectiveness in providing fish passage and preventing entrainment within artificial irrigation waterways. The following outlines the proposed protocol for basin wide projects in order to monitor the biological indicators associated with such habitat improvement projects.

Program Background

YTAHP has been working with landowners to implement restoration projects since it was first funded in 2002 by the BPA. YTAHP has been successful at using this funding as leverage for matching funds from various other grant sources to implement fish passage, screening, and habitat enhancement projects. YTAHP incorporates all efforts focused on water conservation, habitat enhancement, and fish recovery.

During planning, design and implementation phases, YTAHP focuses on using conservation measures that will minimize negative impacts to fish and wildlife and ultimately benefit all fish species, especially salmonids, within the project reach. Every effort is made to ensure projects are compliant with WDFW and NOAA guidelines for fish passage (juvenile and adult) and screen design as well as water quality standards.

The following outlines the proposed protocol for projects in Kittitas and Yakima Counties in order to monitor the biological response variables associated with such habitat improvement projects.

Monitoring Approach

The installation and performance of projects implemented under YTAHP will be monitored for their structural components and operational function. Physical project evaluation will determine if facilities and structures were installed per project plans, whether facilities function according to engineer's designs and within the regulatory agencies' guidelines and criteria. The project sponsors coordinate with the landowners and irrigators to facilitate this monitoring activity.

Upland and riparian monitoring will occur at sites where native vegetation has been planted to ensure the new plants are well established and experience sufficient survival. Exotic species will be controlled via mechanical or physical removal. Project sponsors coordinate with the Washington Conservation Corps (WCC) under contract with YTAHP to conduct the majority of upland and riparian monitoring.

The YTAHP Monitoring Team is a small, volunteer subset of the Core Team, assembled to develop a monitoring plan to evaluate biological response variables at specific project locations. It is also our intention to facilitate and incorporate data sharing between agencies and programs within the basin to report the most complete information.

Installation and Performance Monitoring

The structural components of a project will be monitored after implementation including ensuring that the project was installed as designed and checking on the routine operation and maintenance (O&M) of structures at each site (fish screens and instream structures). Physical monitoring is a major part of each YTAHP project and is conducted by project sponsors to ensure compliance with regulations and that the project is operating and functioning as it was designed. Photo documentation will be available from each site visit through the project sponsor's office. The following questions will be addressed during the physical project monitoring:

1. Is barrier removal or fish passage designed and implemented in accordance with the best available science and technology?
2. Do installed fish screens and instream structures meet state and federal regulations for compliance?
3. Is the project functioning as planned and meeting the needs of the resource, the water user/ landowner/operator?

Riparian and Upland Habitat Monitoring

For YTAHP projects with a riparian and/or upland planting component, the newly planted areas will be evaluated upon site visits. The revegetation of riparian and upland habitat and the stream bank grading and preparation will meet USDA-NRCS or other standards and specifications. Riparian and upland habitat project monitoring will focus on vegetation survival, control of exotic species, and soil/bank stability through photo-documentation and written observations to determine the degree of success. Indications of successful riparian enhancement include, but are not limited to:

a) Bare soil spaces are small and well dispersed, no greater than baseline conditions (end of monitoring period).
b) Soil movement, such as active rills or gullies and soil deposition around plants or in small basins, is absent or slight and local (immediately following construction).
c) If areas with past erosion are present, they are completely stabilized and healed (within one year).
d) Plant litter is well distributed and effective in protecting the soil with few or no litter dams present (end of monitoring period).
e) Native woody and herbaceous vegetation, and germination micro-sites, are present and well distributed across the site (end of monitoring period).

f) Vegetation structure is resulting in rooting throughout the available soil profile (end of monitoring period).

g) Plants have normal, vigorous growth form, and a high probability of remaining vigorous, healthy and dominant over undesired competing vegetation (70% of planted trees and shrubs at < 5 ft apart on center) (end of monitoring period).

h) High impact conditions are confined to small areas necessary for access or other special management situations (throughout construction period).

i) Stream banks have less than 5% exposed soils with margins anchored by deeply rooted vegetation or coarse-grained alluvial debris (end of monitoring period).

j) It is expected that natural site potential vegetation will be present within approximately nine years.

k) Weeds (including noxious and invasive species) do not account for more than 20% of the area covered within the riparian and/or upland enhancement zone (end of monitoring period).

Fish Monitoring

Little research exists on the actual biological benefits of habitat improvement projects (Roni et al. 2002) and the rates of salmonid recolonization above previously impassable barriers. The YTAHP team hypothesizes that species richness and salmonid abundance will increase above man-made barriers through time, once passage is provided and additional habitat becomes available.

The YTAHP is not funded for – nor has the staff capacity – to conduct extensive monitoring and data analysis, but does conduct basic salmonid presence/absence surveys when needed or required to do so. Monitoring presence/absence of our target fish species can be used as a biological indicator in evaluating the effectiveness of passage improvement projects.

The YTAHP completed thorough fish assemblage sampling at YTAHP project sites in the mid-2000s and analysis of those data concluded that when a fish passage barrier is removed, anadromous fish move upstream into the previously inaccessible habitat.

The YTAHP fish monitoring data are maintained by WDFW in a centralized database. Monitoring reports will be generated by the YTAHP monitoring team as needed and provided to Bonneville Power Administration when requested. It is our intention to facilitate and incorporate data sharing between agencies and programs within the basin to report the most complete information.

Fish Sampling

Backpack electrofishing will be used as the primary means of gathering fish abundance data in selected tributaries. Electrofishing will be conducted by or supervised by qualified biologists with the appropriate sampling permits. The electrofishing guidelines established by NMFS (2000) will be strictly adhered to. The best available science and new biological information will be considered and applied during project monitoring and the YTAHP monitoring protocol will adapt to new information, resources, and techniques.

Experienced crews will sample in the late summer/fall when flows are low enough that creeks can be sampled effectively and safely and the risk of encountering spawning and/or incubating salmonids is lowest.

Sites will be selected where a man-made fish passage barrier currently exists or where YTAHP has corrected one and site access is permitted. For each sampling location, a 100 meter stream section will be sampled for new sites and a minimum of 50 meters for previously surveyed sites, on the upstream and downstream sides of current or previously removed man-made barriers. A single-pass method to determine presence/absence of fish will be used. If salmonids are not detected then continue until detection but do not exceed 300 meters, or for smaller streams with a width of less than 8 meters, survey a stream length of 35 times the mean stream width (at normal base flow; Lyons 1992).

Fish will be held in large coolers and fresh water will be added periodically to ensure cool temperatures and adequate levels of dissolved oxygen such that they remain in good condition. To aid in the safe and efficient handling of fish, they will be lightly sedated then measured to fork length (mm). Once species and lengths are recorded, they will be immediately placed in a recovery cooler and not released until they are fully recovered. Rainbow trout/steelhead (*Oncorhynchus mykiss)*, bull trout *(Salvelinus confluentus),* and other salmonids will be processed first so they can be released into the flowing water as quickly as possible.

The monitoring will be project specific. Proposed projects would be sampled in the previously described method before implementation/construction, and annually for two years after project completion. Sample locations will remain constant throughout the monitoring period. Data pre and post implementation will be examined to detect differences in species presence/absence. We hypothesize that species richness and salmonid abundance will increase above man-made barriers once passage is corrected.

Spawning Surveys

In areas with suitable salmonid spawning habitat, opportunistic coho and steelhead redd surveys will be conducted. Two individuals will walk a section of stream and look for adult fish, redds and carcasses (coho only). All redds will be marked with a GPS location and flagged in the field. Carcasses will be examined to determine their origin (hatchery or wild) and their sex. Surveys will occur two to three times at about ~10 day intervals when conditions allow. All spawning surveys will be coordinated with other agencies that already conduct similar surveys. In order to have comparable data, YTAHP will adopt the methods of the lead agency conducting redd counts for the specific species (ie: WDFW – bull trout, YN – coho, USFS – steelhead). YTAHP efforts will be coordinated with other entities that conduct extensive redd surveys within the Yakima Basin in an effort to share information and eliminate redundant surveys. With improved fish passage and less entrainment, it is expected that over time (several generations), redd counts will increase and expand to the upper watersheds.

Risk Assessments

Two species of fish in the Yakima Basin are listed under the Endangered Species Act as threatened: Mid-Columbia River Steelhead and Bull Trout. The following describes potential effects on these fish from monitoring activities and what will be done to minimize any negative outcomes. WDFW personnel will be the project leads for monitoring efforts involving electrofishing. They have the appropriate sampling permits

to conduct scientific research in waters containing species listed under the Endangered Species Act. Protocol will be strictly adhered to and every effort will be made to prevent harm to any species. If incidental take or injury shall occur to a federally listed species, WDFW will report the incident to the appropriate federal Service as soon as possible according to the terms in the sampling authorization.

Steelhead

Federally threatened Middle Columbia River Steelhead are present within the Yakima River Basin. Based on low steelhead counts at Prosser and Roza Dams, historical redd counts (both available at www.ykfp.org), and gene flow data from Pearsons et al. (2003); it is not likely that the anadromous form of *O. mykiss* encountered within the Yakima Basin exceeds 4% of all *O. mykiss*. Previous electrofishing surveys within YTAHP selected tributaries (WDFW, unpublished data) indicate that the majority of *O. mykiss* encountered are less than 250 mm fork length. McMichael et al. (1998) determined that injury rates associated with electrofishing to *O. mykiss* less than 250 mm fork length in Yakima Basin tributaries was only 5% when using a multiple pass sampling approach similar to our proposed methods. Cumulative electrofishing mortality rates were calculated to be only 10% of injured fish (McMichael et al. 1998). Based on the low probability of encountering *O. mykiss* of the anadromous life history form, and low incidences of injury, we feel that the risks associated with the proposed methods will have discountable effects on Middle Columbia River Steelhead. A 4d collection permit has been obtained from NOAA Fisheries to conduct our sampling within waters occupied by steelhead.

Bull Trout

Bull trout occurred historically throughout most of the Yakima River subbasin. Today, however, they are fragmented into relatively isolated stocks and federally listed as threatened. Although bull trout were probably never as abundant as other salmonids in the Yakima River basin due in part to their requirements for cold, clear water, they were certainly more abundant and more widely distributed than they are today (WDFW 1998). There are 15 identified bull trout populations in the Yakima Basin, representing adfluvial, fluvial, and resident life history types. There are twelve genetically distinct populations of bull trout (Small et al., 2009) in the Yakima subbasin and an additional three populations potentially extirpated (Reiss et al., 2012). WDFW began conducting spawning surveys in 1984 and continues to annually to monitor these populations.
Bull trout in the Yakima Basin often begin migrating into their spawning streams in early summer and hold until spawning in September-November. Their eggs incubate until emergence in March-April, depending on stream temperature. The majority of bull trout spawning occurs above 3000 feet in elevation within the Yakima Basin (WDFW 1998). Most of YTAHP's sampling efforts are in lower elevation reaches of tributaries during the time adult bull trout are spawning in the headwaters. Spawning bull trout locations are well documented, and they will be avoided during any instream sampling. For these reasons, we believe there is little chance of encountering any threatened bull trout in our monitoring efforts and any impacts would be discountable.

Measures of Success

YTAHP recognizes that habitat above and around project sites may not be recolonized immediately by species that previously were denied access to upper reaches of streams. Given limited monitoring resources within the YTAHP statement of work, we have developed a manageable monitoring plan that will provide specific information on the biological benefits of our projects. It is generally assumed that removal of fish passage

barriers and implementation of correctly designed fish passage structures leads to reestablished access for salmonids. Roni et al. (2002) supports this assumption by prioritizing restoration efforts into five general categories: (1) habitat reconnection, (2) road improvement, (3) riparian restoration, (4) instream habitat restoration, and (5) nutrient enrichment. The highest category includes removing passage barriers and screening diversions as a means of re-connecting habitat.

Although restoring watershed processes is generally the preferred approach to attain watershed health and function. Restoring "process" (i.e. channel migration; re-connection of off-channel habitat) often involves a different temporal scale than site-specific projects, such as those most often implemented by the YTAHP. Site specific remedies are warranted when considering near-term benefits to threatened species (i.e. steelhead and bull trout). In addition, fish passage was listed as a limiting factor throughout the Yakima Basin in the Salmon Recovery Plan and the Yakima Subbasin Summary. YTAHP projects are contributing to the overall watershed recovery by enabling fish access to valuable tributary habitat.

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