



Yakima Tributary Access & Habitat Program

Monitoring Plan

2007

Yakima Tributary Access & Habitat Program
SCW Resource Conservation & Development Council
With funding from the
Bonneville Power Administration

Purpose

The Yakima Basin in Central Washington is home to over 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 15 major projects have been implemented in addition to well over 20 NOAA Fisheries and WDFW compliant pump 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 complements other basin 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.

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 WCC 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 and in two representative watersheds. Trends in fish presence, species diversity, abundance, and spawning use will be monitored through time on a project specific level and at a watershed scale in two selected watersheds. Baseline population data will be compiled from the selected tributaries to assess changes through time in species richness above and below passage improvement projects. It is 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 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 Monitoring 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 proposes to implement a two-tiered approach to monitoring fish species richness and abundance as biological indicators in passage improvement and artificial waterway screening projects. The first level of monitoring will be project specific before implementation/construction and annually for two years after project completion. The second level of monitoring will be extended *watershed-based* surveys in systems with high potential for increased salmonid use during all life stages. The YTAHP Monitoring Team will exercise adaptive management to implement this monitoring protocol. The best available science and new biological information will be considered and applied for annual project monitoring.

All YTAHP fish monitoring data will be entered and maintained by WDFW in a centralized database. Monitoring reports will be generated by the YTAHP monitoring team and included in annual reports provided to Bonneville Power Administration as a part of the annual program report.

In addition to YTAHP's fish population monitoring efforts, existing baseline population data will be gathered from the selected tributaries to assess changes through time in species richness near project sites. It is our intention to facilitate and incorporate data sharing between agencies and programs within the basin to report the most complete information.

Electrofishing Methods

Electrofishing will be conducted by or supervised by qualified biologists with the appropriate sampling permits, and in accordance with National Marine Fisheries Service Guidelines (2000). The best available science and new biological information will be considered and applied during project monitoring and YTAHP monitoring protocol will adapt to new information, resources, and techniques.

Fish Sampling

Backpack electrofishing will be used as the primary means of gathering fish abundance data in selected tributaries. The electrofishing guidelines established by NMFS (2000) will be strictly adhered to. 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. Many of these sites may also include artificial irrigation canals with or without NOAA/WDFW approved fish screens. For each sampling location, a 50-meter stream section will be isolated with block nets. A section will be sampled on the upstream and downstream sides of man-made barriers; and when possible, a 50-meter section within the irrigation waterway downstream from the point of diversion. We will use multiple-pass removal/depletion methods as described by Zippen (1958) to obtain fish abundance data. A minimum of two electrofishing passes will be performed such that the number of salmonids captured on the last pass is no greater than half of the number of salmonids captured on the previous pass.

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.

Species Abundance & Richness Trend Monitoring

The monitoring protocol described will provide consistent and reliable, trend data related to specific biological response indicators through time. Questions that YTAHP hopes to address include:

1. What fish species are present in the project area before and after implementation?
2. Are the existing fisheries resources, including threatened or endangered species, being protected and enhanced by the project?
3. Has the general distribution of fish throughout the newly accessible and/or enhanced habitat changed?

The first level of 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 richness and abundance through time. We hypothesize that species richness and salmonid abundance will increase above man-made barriers once passage is corrected. In addition, where screens have been installed, irrigation ditches will be sampled when possible and we expect that once screens are in place we will see a significant decrease in the number of anadromous salmonids in artificial irrigation waterways.

The second level of monitoring will be extended, watershed-based surveys in systems with high potential for increased salmonid use at any life stage. Cowiche Creek in Yakima County and Reecer/Currier Creeks in Kittitas County have been selected due to the number of barriers identified in the systems and the high potential each has for supporting native salmonids. Projects will be completed sequentially from the mainstem of the Yakima and Naches Rivers, upstream when possible. YTAHP intends to provide access to the upper watersheds of these systems for salmonid utilization. Four to five sites within each watershed will be sampled annually in the fall using the previously described methods for at least five years. The sample locations will occur throughout the watersheds, in different reaches where proposed or completed barrier correction projects occur. The YTAHP hypothesizes that through time; there will be an increase in salmonid abundance and richness above the corrected barriers in the upper watersheds.

Spawning Surveys

In areas with suitable salmonid spawning habitat, limited redd surveys will be conducted. Once again, specific projects will be the focus of redd surveys within the Cowiche and Reecer Creek Watersheds where suitable and accessible habitat occurs. One half mile stretch below selected barriers and one half mile above the barrier will be walked during peak spawning times for coho (fall) and steelhead (spring) within each watershed. Two individuals will walk a section of stream and look for redds and carcasses. 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 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. The following describes potential affects 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). Within the Middle Columbia River Unit, the United States Fish and Wildlife Service (USFWS) recognizes 14 subpopulations (USFWS 2002). WDFW conducts spawning surveys annually to monitor these subpopulations. Based on redd counts from 1984 to 2005, one stock is healthy, four are depressed, five are critical, and four are of unknown status (WDFW unpublished data). Adult bull trout in the Yakima Basin often begin migrating into their spawning streams in July-August 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. A monitoring approach that will enable detection of large-scale changes in species richness and abundance within individual project sites on a short-term basis as well as a broad, watershed scale for an extended time period has been proposed. It is difficult to extrapolate findings from one watershed to adjacent watersheds, however, given limited monitoring resources within the YTAHP statement of work, we have come up with 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 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.

Estimated Monitoring Costs

The monitoring plan described above will provide meaningful information about the biological benefits of fish passage, screening, and habitat enhancement projects. The YTAHP Monitoring Team is a small, volunteer subset of the Core Team, assembled to develop a monitoring plan. There are however, no dedicated personnel to conduct the surveys. For the preliminary monitoring, staff have conducted the surveys in addition to their full time positions and with the assistance of in-kind matches from other agencies and interested parties. The projected cost for implementation of YTAHP's monitoring plan is below. This is a preliminary estimate for the first complete year of monitoring, based on preliminary sampling and personnel availability. In the future, personnel outside of the YTAHP Core Team may not be available to participate in monitoring efforts. Monitoring efforts and protocol will be adjusted based on funding levels and available personnel.

YTAHP: \$ 16,074

Match: \$ 14,476

Materials: \$ 500

Total: \$ 31,050

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