



10. Monitoring and Evaluation Program Conceptual Design



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Monitoring and Evaluation Program Conceptual Design

The following chapter summarizes key elements of the CJDHP Conceptual Monitoring and Evaluation Program design. In accordance with the Council's requirements the monitoring and evaluation plan presented here is conceptual only. The CJDHP Conceptual Monitoring and Evaluation Program is based on a set of specific quantifiable performance standards and indicators that measure conditions, performance, and interactions within the Chief Joseph Dam Hatchery, within the associated acclimation ponds, and in the Okanogan subbasin ecosystem where the CJDHP will be implemented. The performance standards in the CJDHP conceptual monitoring and evaluation plan were adopted directly from the summer/fall Chinook HGMP (and spring Chinook HGMP), which were in turn adapted from the draft, *Performance Standards and Indicators for the Use of Artificial Production for Anadromous and Resident Fish Populations in the Pacific Northwest* (NMFS 2000).

This chapter contains an abbreviated overview of the CJDHP Conceptual Monitoring and Evaluation Program additional descriptive detail including examples of protocol, methods, and sample tasks is attached in Appendix G. Appendix G also includes a table aligning CJDHP performance standards with performance indicators, and with related sample tasks. Given that the full range of monitoring and evaluation necessary to give a holistic picture of conditions at the

Relationship of Conceptual Monitoring and Evaluation Program to CJDHP Guiding Principles

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Accountability
 - Annual reporting, data archiving, public access to data
 - Contingency plans included
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Best Available Science
 - Use of clearly defined performance standards and indicators
 - Measure effects of program within the hatchery walls and within the ecosystem
 - Inclusion of new findings from other regional and local research and monitoring and evaluation programs
- 
Cost-Effectiveness
 - Complimentary coordination with Okanogan subbasin and Columbia Cascade Province monitoring and evaluation activities to eliminate duplication of effort
- 
Flexibility
 - Coordination with Okanogan/Similkameen Baseline Monitoring and Evaluation Program to round out full range of monitoring and evaluation activities
- 
Innovation
 - Anticipate direct link of monitoring and evaluation activities to adaptation of program size and implementation – from day one

CJDHP facilities and in the Okanogan subbasin will be accomplished by more than one monitoring and evaluation program, this table also aligns related monitoring and evaluation tasks to be completed by other monitoring and evaluation programs with the CJDHP performance standards and indicators.

10.1 CHIEF JOSEPH DAM HATCHERY PROGRAM MONITORING AND EVALUATION PROGRAM GOALS

The three primary goals of the CJDHP Conceptual Monitoring and Evaluation Program are to: 1) measure the relative success of the integrated recovery programs in restoring the abundance, distribution, and diversity of naturally-spawning populations of summer/fall Chinook in the Okanogan River and upper Columbia River above Wells Dam; 2) measure the relative success of the integrated harvest programs in providing a stable ceremonial and subsistence fishery for the Colville Tribes, and in providing for increased recreational fisheries in upper Columbia River above Wells Dam; and 3) provide information necessary to adapt the program in order to minimize deleterious effects and maximize desired results.

10.2 RELATIONSHIP TO OTHER LOCAL AND REGIONAL MONITORING AND EVALUATION PROGRAMS

The CJDHP Conceptual Monitoring and Evaluation Program will be integrally linked to another Okanogan subbasin monitoring and evaluation program, the Okanogan/Similkameen Baseline Monitoring and Evaluation Program (BPA project 200302200). The Okanogan/Similkameen Baseline Monitoring and Evaluation Program will collect baseline data in the Okanogan subbasin (including the Similkameen sub-watershed).

Four objectives are identified in the Okanogan/Similkameen Baseline Monitoring and Evaluation Program: 1) monitor the abundance, survival, timing and life history characteristics of summer/fall Chinook, spring Chinook, sockeye, and steelhead in the Okanogan subbasin; 2) determine if, as a result of actions implemented in the subbasin, there is a statistically significant increase in the harvest of targeted stocks; 3) measure the effectiveness of live-capture, selective fishing gears; and 4) collect data on

existing and historical fish populations, habitat and passage conditions throughout the subbasin for use in EMAP site selection, EDT modeling, and recovery planning.

Substantial portions of the overall monitoring and evaluation activities associated with the CJDHP will be accomplished through the Okanogan/Similkameen Baseline Monitoring and Evaluation Program [see Appendix G for table aligning monitoring and evaluation actions completed under the two programs].

In addition to coordination with the Okanogan/Similkameen Baseline Monitoring and Evaluation Program, information from other existing and new monitoring and evaluation programs (i.e. Pacific Aquatic Monitoring Partnership), will be integrated into the design of the CJDHP Conceptual Monitoring and Evaluation Program as applicable.

10.3 DESCRIPTION OF CONCEPTUAL MONITORING AND EVALUATION PROGRAM

To accomplish the CJDHP goals identified above, the CJDHP monitoring and evaluation program is designed to measure progress against a set of performance standards. Those performance standards are summarized in eight categories: legal, harvest, conservation, life history, genetic characteristics, research activities, operation of artificial production facilities, and socio-economic effectiveness. Each performance standard has a corresponding set of performance indicators.

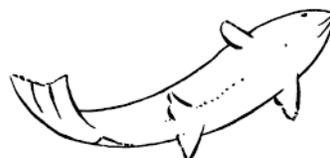
Table 15 provides examples of these performance standards and related performance indicators. A complete list of performance standards and related indicators is included in the Appendix G.

Table 15: Sample Performance Standards and Indicators (partial list)

| PERFORMANCE STANDARDS | RELATED PERFORMANCE INDICATORS |
|--|---|
| LEGAL STANDARDS: | |
| <p>Programs contribute to fulfilling tribal trust responsibilities and treaty rights. Annual ceremonial and subsistence summer/fall Chinook fisheries are conducted with a minimum harvest of 10,000 fish.</p> | <ul style="list-style-type: none"> • Total number of fish harvested in Colville Tribes’ summer/fall fisheries • Total number of days open to tribal fisheries • Unmet demand for ceremonial and subsistence fish for Colville Tribal members |
| <p>Programs contribute to mitigation agreements, if any. Measured performance of the hatchery programs meet or exceed performance requirements of any mitigation agreement.</p> | <ul style="list-style-type: none"> • Performance requirements within each mitigation agreement (number of fish released, returning, or caught) are measured and reported to parties of the agreement |
| HARVEST STANDARDS: | |
| <p>Hatchery-origin fish are produced and released in a manner enabling effective harvest while avoiding over-harvest of non-target species. Tribal and recreational harvest is conducted within incidental mortality limitations of ESA permits or plans.</p> | <ul style="list-style-type: none"> • Annual number of program’s hatchery-origin summer/fall Chinook caught in all Columbia River fisheries (Zones 1-6 recreational, Zone 1-5 commercial, Zone 6 treaty, upper Columbia River recreational, Okanogan recreational, CCT Chief Joseph Dam Tailrace, and CCT Okanogan River) • Annual number of steelhead caught and released during summer/fall Chinook fisheries in the Columbia Cascade Province (CCT Chief Joseph Dam Tailrace, CCT Okanogan River, Okanogan recreational, upper Columbia River recreational) • Etc. |
| CONSERVATION STANDARDS: | |
| <p>The Integrated Recovery Program on the Okanogan and Similkameen rivers contributes to an increasing number and distribution of spawners returning to the Okanogan, Similkameen, and Columbia Rivers. Natural-origin spawners make up at least 80% of spawning population. Minimum escapement objectives of 3,500 early-arriving and 1,200 later-arriving summer/fall Chinook are met.</p> | <ul style="list-style-type: none"> • Annual number of summer/fall Chinook spawners in each spawning area, by age (Similkameen River, Okanogan River, Columbia River above Wells Dam) • Spawner-recruit ratios • Annual number of redds in selected natural production index areas • Annual ratio of natural-origin and hatchery-origin summer/fall Chinook on spawning grounds |
| LIFE-HISTORY CHARACTERISTICS: | |
| <p>Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of the population from which broodstock is taken (once the later-arriving population component is rebuilt).</p> | <ul style="list-style-type: none"> • Annual temporal distribution of summer/fall Chinook broodstock collection and of natural-origin Chinook at point of collection • Annual age composition of broodstock collected and of natural-origin fish at the point of collection |

Table 15: Sample Performance Standards and Indicators (partial list) - cont.

| PERFORMANCE STANDARDS | RELATED PERFORMANCE INDICATORS |
|---|--|
| GENETIC CHARACTERISTICS: | |
| <p>Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.</p> | <ul style="list-style-type: none"> Genetic profile of Okanogan basin natural-origin summer/fall Chinook, as measured at program’s outset (e.g. through DNA or allozyme procedures) is compared to genetic profiles developed in subsequent generations |
| <p>Collection of broodstock does not adversely impact the genetic diversity of the naturally-spawning population.</p> | <ul style="list-style-type: none"> Annual number of natural-origin summer/fall Chinook at point of broodstock collection Annual escapement to spawning grounds compared to the minimum effective population size (when established) required for each spawning population Timing of broodstock collection compared to overall run timing |
| RESEARCH ACTIVITIES: | |
| <p>The artificial production program uses standard scientific procedures to evaluate various aspects of artificial propagation.</p> | <ul style="list-style-type: none"> All program research employs scientifically based experimental design, with measurable objectives and hypotheses |
| OPERATION OF ARTIFICIAL PRODUCTION FACILITIES: | |
| <p>Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, and INAD.</p> | <ul style="list-style-type: none"> Compliance with guidelines, standards, and protocols are reported in annual reports Periodic reviews and audits are conducted, particularly in the programs’ early years |
| SOCIO-ECONOMIC EFFECTIVENESS: | |
| <p>Cost of program operation does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population or does not exceed other available options to provide fish to satisfy tribal trust responsibilities.</p> | <ul style="list-style-type: none"> Total cost of program operations. Sum of ex-vessel value of commercial catches and monetary value of recreational fisheries targeting these summer/fall Chinook (based on proportion of summer/fall Chinook in harvest) Total Colville Tribal harvest and harvest by other tribes Cost of feasible and available alternatives to provide similar or better tribal harvest for Colville and other tribes |



10.3.1 SAMPLE CONSERVATION AND PERFORMANCE OBJECTIVES

Following are a sampling of preliminary objectives consistent with the CJDHP performance standards and performance indicators.

OBJECTIVE 1:

Program Coordination and Administration - Plan for, administer, and coordinate project activities

Methods:

Effective implementation and analysis of the monitoring and evaluation program and coordination with other regional monitoring and evaluation programs requires extensive coordination among co-managers. This will be achieved through regularly scheduled meetings, formal and informal consultations, and document preparation, submittal and review.

Monthly Technical Oversight Team meetings will be established to share information and develop solutions to problems. This Technical Oversight Team would include participation from team members, project partners and state and federal co-managers. Through these and other forums the CJDHP program monitoring and evaluation activities will be coordinated with activities of the Mid-Columbia Coordination Committee, Columbia Basin Fish and Wildlife Authority, HCP Hatchery Committee, and Canadian recovery efforts.

OBJECTIVE 2:

Integration with Okanogan River Baseline Monitoring and Evaluation Program - Coordinate activities, share staff, resources, and data to ensure that the objectives of these two closely linked Monitoring and Evaluation Programs objectives are achieved in the most comprehensive and cost effective manner.

Methods:

The CJDHP monitoring and evaluation plan will be closely coordinated with the Okanogan Baseline Monitoring and Evaluation Plan (scheduled to begin in 2004). Together the two complementary monitoring and evaluation plans will provide information about conditions within and outside of the hatchery walls. The Okanogan Baseline Monitoring and Evaluation

Plan will use the Environmental Protection Agency's EMAP protocol. Project staff, resources, and data will be shared between the two monitoring and evaluation projects to the extent possible. If necessary, data collection protocols will be adjusted to fit the information needs of both efforts. Habitat assessment within the Okanogan subbasin will be conducted under the Okanogan/Similkameen Baseline Monitoring and Evaluation Program. A corresponding assessment will be continued under the Hatchery monitoring and evaluation plan in the Columbia River mainstem above Wells Dam and possibly to include Rufus Woods Lake.

OBJECTIVE 3:

Fish Marking - Mark release groups of hatchery origin juvenile summer/fall Chinook and representative numbers of natural-origin summer/fall Chinook in a manner sufficient to satisfy the information needs and protocols necessary to determine the impacts to natural- and hatchery-origin fish in terms of: fisheries, spawning escapement, juvenile outmigration timing, and relative survival rates.

Methods:

To facilitate program evaluations, all hatchery-origin summer/fall Chinook will be adipose fin clipped and about 40% coded wire tagged using standardized methods. Unique tag codes will be used for each treatment group. In addition, a minimum of 800 hatchery-origin summer/fall Chinook from each treatment group will be PIT tagged to allow comparisons of outmigration timing and survival. Similarly, a minimum of 800 naturally produced juvenile summer/fall Chinook will be PIT tagged to allow comparisons to hatchery treatment groups. PIT tagging will be conducted using standardized methods. Fish less than 60mm will not be PIT tagged.

OBJECTIVE 4:

Facility Operation and Fish Health - Monitor operation of artificial production facilities to ensure compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, and INAD.

Methods:

Artificial production facilities will be operated in accordance with established fish health guidelines and facility operational standards and compliance will be monitored. Protocols will be developed for weir/trapping operations to minimize stress, injury, and/or mortality to natural populations. A professional pathologist in accordance with established fish health guidelines will examine hatchery fish. Natural-origin fish will also be periodically sampled at traps/weirs for disease occurrence. Distribution of carcasses or other products for nutrient enhancement will be accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines. Spatial and temporal spawning distribution above and below weir/trap will be monitored through spawning surveys and compared to historical distribution to verify that adult brood stock collection does not significantly alter spatial and temporal distribution of any naturally produced population.

OBJECTIVE 5:

Habitat Assessment - Conduct assessment of habitat conditions and environmental factors affecting migration or survival of summer/fall Chinook in the mainstem Columbia River above Wells Dam and in the Okanogan River.

Methods:

Habitat assessment within the Okanogan subbasin will be conducted under the Okanogan Baseline Monitoring and Evaluation Program. Those areas relevant to the CJDHP that are not addressed through the Okanogan Baseline Monitoring and Evaluation Program (i.e. Wells Dam to Chief Joseph Dam) will be covered through a corresponding assessment conducted as part of the CJDHP monitoring and evaluation program.

OBJECTIVE 6:

Acclimated Juvenile Chinook Performance - Evaluate acclimated juvenile Chinook salmon performance in terms of juvenile growth, survival, and migration, as these are critical indicators of the success of hatchery supplementation in rebuilding natural populations of Chinook salmon.

Methods:

Approximately 100 fish from each Pond will be randomly sampled before release and fork lengths and weights recorded. Length and weight data for migrating Chinook salmon smolts will also be collected in screw traps downstream of acclimation facilities. At least 800 fish from each captive brood treatment group and 800 conventional- origin juveniles will be PIT tagged. Date and time of release for volitional-release and forced-release fish will be obtained using PIT tag readers on outlet pipes. Data on arrival timing of PIT-tagged wild and hatchery-origin smolts will be obtained from the PTAGIS database for all recovery locations downstream.

OBJECTIVE 7:

Natural Productivity and Species Interactions - Optimize natural production of Chinook salmon while managing adverse impacts from interactions between and within species and stocks. This objective includes maintaining Okanogan Chinook natural production and escapement at a level that would contribute an annual average of (XXX - to be determined through a combination of EDT analysis and recovery planning processes) adult fish to the Okanogan subbasin and consistently greater than (XXX- to be determined through a combination of EDT analysis and recovery planning processes) spawners per year.

Methods:

Local broodstocks of known natural component from the target population will be used for supplementation. Natural production (presmolt, smolt and adult numbers) and productivity (survival, life stage characteristics, pathogens, straying, and genetic composition) of supplemented populations will be monitored and compared to a baseline. Predation of naturally produced fish by artificially produced fish will also be evaluated.

OBJECTIVE 8:

Life History Characteristics - Monitor and evaluate life history characteristics of production fish to ensure that characteristics of the natural population are retained.

Methods:

Records will be maintained of the annual number of hatchery-origin juveniles released in natural rearing areas in the Okanogan subbasin, Columbia Cascade Province, and Columbia Basin by life stage to ensure that release numbers do not exceed estimated basinwide and local habitat capacity, including spawning, freshwater rearing, migration corridor, and estuarine and near-shore rearing. Spawning ground survey data will be collected through the Okanogan Baseline Monitoring and Evaluation Program including fork length, sex, percent spawned, scales, and marks.

OBJECTIVE 9:

Harvest - Monitor and evaluate harvest of hatchery-origin fish to ensure that production and release strategies allow effective harvest while avoiding over-harvest of non-target species.

Methods:

Juvenile hatchery-origin summer/fall Chinook will be marked (40% coded wire tagged and 100% fin clipped, Objective 3) to allow monitoring of the annual number of adults caught in all Columbia River and ocean fisheries. Non-target species (steelhead) will also be intercepted during these fisheries and information regarding steelhead catch and escapement will also be collected and assessed. Annual catch, catch per unit of effort, total effort, escapement, and mark recovery information will be collected through cooperation with established information sources (WDFW, ODFW, PSMFC, etc.).

OBJECTIVE 10:

Genetics - Monitor and evaluate changes in genetic composition of target and adjacent populations following supplementation to manage genetic risks (extinction, loss of within- and between population variability, and domestication selection) to all stocks and to conserve and/or expand Okanogan stocks of Chinook salmon (identify and minimize artificial mixing of genetic stocks in the Okanogan and Methow subbasins).

Methods:

Tissue samples will be collected from target and adjacent populations to establish baseline genetic

composition and evaluate long-term changes to establish that patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production. Tissues samples will be analyzed to evaluate genetic differences that may occur over time within mainstem Okanogan and mainstem Columbia River Chinook populations and for comparison with other Chinook populations in the Columbia Basin and upper Columbia region.

OBJECTIVE 11:

Socio-economic effectiveness - Determine cost of program operation to verify that it does not exceed the net economic value of fisheries in dollars per fish for all fisheries targeting this population or does not exceed other available options to provide fish to satisfy tribal trust responsibilities.

Methods:

Total program and component costs will be determined and compared to monetary and non-monetary societal program benefits. Cost of feasible and available alternatives to provide similar or better tribal harvest for Colville Tribes and other tribes will also be evaluated. Juvenile production costs will be calculated and compared to other regional programs designed for similar objectives to verify program cost efficiency. Cost of providing increased harvest opportunities for all fishers consistent with requirements of genetic, natural production, and experimentation objectives will also be addressed.

OBJECTIVE 12:

Legal Standards - Operate CJDHP to be consistent with tribal trust responsibilities and treaty rights, mitigation agreements, and ESA responsibilities.

Methods:

Monitoring and evaluation activities will take into account total number of fish harvested, total fishing days, unmet demand for ceremonial and subsistence fish, total number of fish harvested in Zone 6 treaty fisheries.

10.3.2 RESEARCH

In the ISAB's 2000 report to the Council, ISAB members cite a number of unanswered, and critical, questions that persist around the topic of supplementation. Resolution of these questions will require formal and rigorous experimental design supported by substantial commitments of resources and infrastructure. Research to address a number of these critical questions is currently being conducted in the Imnaha, Yakima, Deschutes, Tucannon, and other river systems in the Columbia basin.

The CJDHP does not contain a major research component. Inclusion of a major research component in the CJDHP is cost-prohibitive. Furthermore, the current lack of baseline data for much of the Okanogan subbasin poses an impediment to some research (this lack of baseline data will be addressed through the Okanogan/Similkameen Baseline Monitoring and Evaluation Program). Instead, the CJDHP will focus on establishing an effective and thorough monitoring and evaluation program designed to answer the smaller-scale, but equally important uncertainties associated with the CJDHP. The Colville Tribes and others involved in the implementation of the CJDHP are following progress of supplementation research throughout the region with great interest and plan to incorporate relevant findings into the CJDHP as such information becomes available.

10.3.3 REPORTING, DATA DISSEMINATION, AND COORDINATION

There are many uncertainties associated with salmon recovery at both the macro and micro scale. Research, monitoring and evaluation activities are essential to answering some of those uncertainties. In order to be most useful to decision-makers and program managers, the raw data and information obtained through monitoring and evaluation programs needs to be collected, analyzed, and broadly disseminated. Development of standardized data collection and reporting protocols, publicly accessible databases (particularly web-based), and coordination among monitoring and evaluation programs occurring at different scales and geographic areas is also vital to the short and long-term effectiveness of monitoring programs.

Data collected through the CJDHP Monitoring and Evaluation Program will be stored in an electronic data archive that is being developed as part of the Okanogan/Similkameen Baseline Monitoring and Evaluation Program. The data archive will consist of standardized Access/Excel database formats and will be compatible with similar database standards used by BPA and others. Access to this data will be unrestricted. Data collected in the CJDHP Monitoring and Evaluation Program and Okanogan/Similkameen Baseline Monitoring and Evaluation Program will be stored in the short-term in this system. In the long-term data will be delivered to other entities and programs for inclusion in larger regional monitoring and evaluation programs (i.e. PNAMP) and for inclusion in local and regional datasets (i.e. Upper Columbia Regional Technical Team, Columbia Basin Fish and Wildlife Authority, StreamNet, IBIS, and SSHIAP).

The Okanogan/Similkameen Baseline Monitoring and Evaluation Program will include development and maintenance of a project website. Information gathered as part of the CJDHP Monitoring and Evaluation Program will be incorporated on this website. The website will be password protected on the data entry side while also providing a public portal. An FTP transfer protocol and secure site will also be developed for interim data access and transfer.

The CJDHP Monitoring and Evaluation Program will also produce annual reports for BPA and other appropriate (i.e. Council, co-managers, Upper Columbia Regional Technical Team, Upper Columbia Salmon Recovery Board) entities to fulfill program requirements and provide additional levels of coordination and accountability. Where appropriate, reports will also be published in peer-reviewed journals.

Staff associated with the CJDHP Monitoring and Evaluation Program will also participate in annual monitoring and evaluation symposia and coordination meetings in the upper Columbia Basin (including coordination with Canadian entities) and coordinate with the oversight committee that will be established as part of the Okanogan/Similkameen Baseline Monitoring and Evaluation Program.

