

Annual Work Plan Summary

Chief Joseph Hatchery Science Program

This summary of activities provides general information on what work will occur as part of **the Chief Joseph Hatchery Science Program, and its Monitoring and Evaluation** annual activities.

These activities are presented within the context of where and when data collections occur, the annual analysis and adaptive management process, and finally, the underlying management and scientific basis or each major category of actions.

1. The CJHP Monitoring and Evaluation Plan:

The monitoring and evaluation (M&E) plan is derived from a large number of related sources. Examples are: the 2008 Fish and Wildlife Accords, the NPPC CJHP Master Plan, The Columbia Cascade Subbasin Summary's, the 2013 CJHP Implementation Plan, The CJHP Operations Plan, detailed recommendations from the Independent Science Review Group (NPCC) and the Hatchery Scientific Review Group recommendations. Further, specific detail for these activities comes from the 2004 and 2009 CJHP spring and summer/fall Chinook M&E plans, the Upper Columbia River Public Utility Districts' hatchery M&E and Habitat Conservation Permit programs, the Upper Col. River ESU/ESA Recovery Plan, the FCRPS BiOp, PNAMP's mm.org, the Okanogan summer/fall and spring Chinook Hatchery Genetic Management Plan's, the Colville Tribes' Tribal Resource Management Plan, scientific literature and other sources.

Five key management questions inform the development of the M&E activities. *What is the status of natural populations? Is the hatchery program meeting operational targets? What effects does the hatchery program have on natural populations? Is the hatchery program contributing as expected to harvest and abundance? And, are assumptions about natural production potential valid?* With these questions as the basis, the following work elements, milestones, protocols and deliverables have been developed for this list of activities. A total of eight additional science-based questions help to complete the design of the program.

2. The Annual Chief Joseph Hatchery and Colville Tribes Anadromous Program Annual Review:

Each year the Chief Joseph Hatchery Program (CJHP) hosts a four-day meeting and workshop to review and present findings from the previous year and plan for the upcoming fish production and science monitoring cycle. The first day of each meeting is set aside to present results from the previous year's activities and to discuss what has been learned. Monitoring and evaluation designs, habitat restoration efforts, harvest regimes and the programs fish culture and production operations are assessed by a group of no less than twenty-five staff and regional experts.

The goal of the Annual Program Review (APR) is to increase the overall scientific rigor and effectiveness of the programs that inform management decisions. The decision procedures used in the APR includes thousands of modeled calculations and statistical analysis from data collected throughout the Okanogan and Columbia Basins. Specifically, staff investigate opportunities for

adaptation of the key assumptions and biological targets to shape the next year's hatchery, harvest, habitat, hydro and monitoring programs. The APR also supports the refinement and implementation of the entire Colville Tribes' Anadromous Division activities. Areas of presentation emphasis range from research, monitoring and evaluation data collections and analysis, to fish population and harvest monitoring, adult fish management, and habitat restoration and ecosystem status and trend conditions. All contribute to in-depth discussions at the annual meeting and its subsequent workshops. The CCT's Fish and Wildlife Program host the meeting, and it is led by the CJHP Science Program.

Information on the CJHP, including all APR materials, can be found at: www.colvilletribes.com/cjhp.php

3. The Annual Planning Tool (APPT):

In 2013 and 2014 the Science Program, in consultation with regional partners and experts, initiated an effort to systematize the Chief Joseph Hatchery's annual planning workshops. The result is a set of tools used to improve efficiency and coordination of integrated, all H-planning processes. The APPT tools help link activities across the CJHP and the Colville Tribes' Anadromous Fish Division to management decisions, and bring the relationship to resource goals into focus.

The APPT tool consists of interconnected modules contained in an Excel-based environment and workbook. Examples of subjects with input/output routines include:

- Define staffing levels and improve budget preparations;
- Document lead staff responsibilities;
- Produce an schedule for delivery of key data products,
- Match CJHP goal and objectives with regional plans, HSRG recommendations and Bonneville and other Cost Share Partners, work elements, milestones and deliverables;
- Activities required to: manage information and support the adaptive management process;
- Ensure quality, timeliness and access all information needed to support decision making (maintenance/update of ISIT/AHA);
- M&E Activities required to: make annual production adjustments (in-season run-size prediction and updating);
- Reporting/recording (how is information brought into ISIT/AHA);
- M&E activities required to: effectively implement the Program in terms of adult fish management, weir operations, broodstock collection;
- M&E activities required to: effectively implement hatchery operations to meet production targets;
- M&E activities required to: test key program assumptions related to habitat and natural production;
- Sequence harvest activities required to: test key program assumptions related to harvest and adult fish management and natural production, and
- Activities related to Environmental Compliance.

The purposes of the Annual Program Planning Tool (APPT) are to: 1.) *Link CJHP activities to Key Management Questions, hypotheses, indicators and variables.* 2.) *Identify the specific data necessary for AHA/ISIS and other analyses.* 3.) *Schedule annual Chief Joseph Hatchery Program (CJHP), Production and Science Program Activities.* 4.) *Identify specific and integrated data input deliverables from Harvest, Hatchery, Hydro and Habitat Programs (“All-H” integration).* 5.) *Assign staff responsible for leading each activity, and 6.) Produce output suitable for developing budgets, work and implementation plans, staffing levels, activity schedules and identification and linkages to BPA’s PISCES work elements.*

4. Data Collections:

Data from over one-hundred-fifty groupings are collected, or acquired, using methods derived from mm.org, the scientific literature and in-process protocols for the CJHP. Major activity classes include: rotary screw trapping, implementation of tags and marks, in-hatchery monitoring, habitat restoration and status and trend monitoring, harvest monitoring, juvenile fish beach seining and fish management at the Okanogan adult fish weir in fisheries and at the hatchery’s fish ladder. To accomplish this, we will employ aerial, ground, electronic and video passage survey sites and methods. These data are managed within the Chief Joseph Hatchery’s Master Database and shared with the region. All data are incorporated into the CJHP’s analytical modeling process and presented at the Annual Program Review and Planning Workshops.

5. Rotary Screw Trapping:

This activity uses the general OBMEP RST protocol and occurs in the Okanogan mainstem below the HWY 20 Bridge near the City of Okanogan. This protocol will be adapted annually to produce estimates to shape Okanogan NOR and HOR subyearling and yearling releases, assess juvenile emigration for SAR computations, format relative reproductive success parameters, evaluate release site survival and timing, monitor travel times to McNary dam (survival), and other parameters to determine the contribution of hatchery origin fish to the natural population. Additionally, genetic and PIT tagging will occur at the RST while sockeye and steelhead passage information for hydro operations will be provided to CCT and PUD biologists and managers. The M&E program will continue its assessment of the R-Based Flow Regression method to improve and accuracy of RST-derived outmigration estimates and trap efficiency.

6. Juvenile Beach Seining:

Juvenile NOR Chinook are also collected by CJHP M&E staff as part of the CJHP’s Tag and Mark program. Operations consist of capture, tagging and release at the mouth of the Okanogan River and the confluence with the mainstem Col. R. 7-miles north of Brewster, WA in the Wells Pool. Fish > or equal to 50 mm will be tagged with full duplex 9 mm or 12mm Passive Integrated Transponder (PIT) tags. Fish will be held 24-hours prior to tagging to assess capture effects and 24-hours after tagging to assess tag loss and tag application mortality rates. Fish will then be released into the Wells Pool of the mainstem Col. R. A standard 3/8” mesh 100ft beach seine will be used for capture. Fish are then immediately transferred to an on-site tagging barge and holding pens.

The tag and mark program includes PIT, CWT, Genetic and possibly radio and other forms of tag and mark actions. This activity is necessary to attain the statistical design level of PIT tagging for the entire NOR population of Okanogan summer/fall CK. Spring Chinook juvenile monitoring will be addressed through a series of scoping sessions. Finally, the CJHP uses eDNA, PBT and ArcView analysis for assessing spring Chinook presence, absence and the status and trend of the reintroduction program.

7. Adult Fish Returns and Harvest:

In addition CCT data collections from direct tribal harvest (e.g., Purse Seine, hook-line, netting), the Okanogan weir, CJH ladder returns and spawning and carcass surveys, CJHP staff acquire data from other sources. Examples of “acquired data” later used for analysis are: the Fish Passage Center, PTAGIS, RMIS, state creel programs and all hydroelectric dam passage facilities. CJHP M&E staff use the Wells Ladder Count data from WDFW and Wells Hatchery staff and calculate the percentage of Okanogan NOR fish as a key milestone and planning consideration. This estimate is based on a linear regression model developed by CJHP M&E staff and regional experts. Data are entered directly in the AHA and ISIT models by CJHP M&E staff. The AHA and ISIT models are described in the “Analysis” section of this summary as is the annual decision and planning support process.

8. Okanogan Adult Fish Weir:

CJHP personnel and select subcontractors continue to test a number of M&E, management, broodstocking and environmental compliance elements for the fish weir. The trap and weir is comprised of an in-stream picket guidance and live capture system that is in place during the August - October period. The weir guides fish along the picket structure into a 25x10 trap to provide a system for adult fish video and PIT tag interrogation, fish census, fish management and broodstocking. This structure spans the Okanogan River and is approximately 364 feet long. It is located at RM 14.7 near the town of Malott WA. The weir will be operated 24-hrs during a 7-day/week period. The CJHP staff assesses the feasibility of safe and effective fish capture, handling, release, and by-pass of all non-target species. A series of behavioral assessments are also monitored to assess any negative effects of the weir on migrating salmon and steelhead and the efficiency of the weir to conduct broodstock and adult fish management (HOR removal) activities. PIT tag arrays are used to assess run-timing, pre-spawn mortality, mortality from CT harvest below the weir and assist in tracking status and trends of the population. The weir is operated as a live capture, live release facility for all NOR salmon, sockeye and steelhead and all other non-target species. In addition, staff monitors and assesses installation efficiency, structural stability, operational flexibility and guidance effectiveness. Monitoring and Evaluation activities are conducted to provide environmental data for permitting purposes, environmental compliance and future NEPA and engineering options for a permanent weir configuration.

9. Spawning and Carcass Surveys:

In addition to direct enumeration at Wells Dam and harvest data collection, redd and carcass surveys in the Okanogan river are used to refine the mark rate on hatchery fish and the proportion

of the NOR run at Wells Dam that are of Okanogan River origin. Summer/fall Chinook spawning ground and redd surveys are conducted weekly from late September through mid-November. Surveys are conducted by foot, raft, and aircraft using methods described in: BioAnalysts 2007 and consistent with methods used by the region PUD hatchery monitoring and evaluation programs over an extended data period. During spawning surveys, all redds are counted and sited with GPS. The data files will be used for statistical evaluation and represented in ArcView GIS mapping formats for analysis and presentation. Twenty-five percent of all recovered carcasses are sampled for species, size, sex, location and date of recovery. Scale samples from all NOR fish are taken and coded wire-tags (CWTs) collected from all HOR fish to determine age, age-at-return, freshwater residency and growth in coordination with WDFW laboratories and entered into the RMIS database. Data will be used for analytical purposes such as escapement, total run-size, spatial structure, diversity, fitness, survival by life stage and SAR. Subsamples of the coded wire-tag HOR fish are collected to estimate the accuracy of scale readers to properly age sample scales. CCT will also review Zosel Dam video counts to enumerate CK migrating into the Canadian portion of the Okanogan/Okanagan River Basin. Staff coordinates with the Okanogan Nations Alliance to determine the methods and protocols necessary to conduct future analyses, such as radio tagging, to determine the fate of what have been preliminarily assessed to be over 2,000 spawning CK entering areas not currently surveyed in a systematic manner.

10. In-Hatchery monitoring and reporting:

CJHP M&E staff facilitates data collection and transfer of a distinct set of biological data at the hatchery's central facility in Brewster WA, and at the Omak, Riverside, Tonasket and Similkameen acclimation sites. This includes data described below and data used to assess each release strategy relative to predation rates, survival, travel time, Sex Ratio, Origin, stray rates, jacks rates (percosity), HOR v. NOR and pHOB, pNOB values to the Okanogan River Rotary Screw Trap and in beach seining sites. Data are collected for in-hatchery fish survival by life stage, hatchery fish disease rate, types, treatment and data on growth, and survival rates. Data are also collected to estimate the contribution rate of Okanogan adult HORs to out-of-basin populations, stray rates of on-station fish released into the Okanogan and all other Col. River tributaries that have detection capabilities. Additionally, Parental-Based-Tagging (PBT) of all spawning fish occurs at the Bridgeport facility. Data are provided to the Columbia River Intertribal Fish Commission to assist in developing both genetic pedigree information for the Okanogan populations and support for funding the analytical work necessary for investigating alternatives to stock assessment methodologies for monitoring hatchery programs. This activity involves the genotyping of hatchery broodstock and use of parentage assignments to identify the origin of captured adult fish and brood year of their progeny collecting during rotary screw trap operations and beach seining activities. CJHP M&E staff also incorporate monthly "Production Summary Reports," and summarized sections, into the CJHP Annual Report.

11. Habitat Data:

CJHP M&E staff acquire data from the CCT's OBMEP and OSHIP programs each year, and after every five year update, for use during the annual analytical and planning process. Productivity and Capacity estimates from the Ecosystem Diagnosis and Treatment model for summer/fall Chinook

will be refined by CJHP M&E staff. These data are important indicators of the health of the Okanogan ecosystem and assess the efficacy of habitat restoration and protection program. CJHP staff will also begin scoping modeling and life history rules for spring Chinook and the scope of M&E protocols necessary to determine baseline parameters for the Endangered Species Act's 10(j) experimental designation. The program's progress is monitored and documented for status and trend and environmental compliance purposes.

12. Data Management:

CJHP M&E program will complete the development of the Chief Joseph Hatchery Master Database. FY14 represents the concluding effort to build and deploy a robust database system. The CJHP, working with its consultant team, will accomplish the following: A CJHP Data Management technical report for use in publishing the database in mm.org. Refinement of data forms, SQL program coding and data base query architecture, finalization of data collection point and data query QA/QC routines, a new file server system and installation of wireless hot spots at field locations. This will result in expedited and secure transfer of field data to the database housed in a Tier 3 Enterprise Cloud center. Data are also transferred to the StreamNet data store and CJHP staff continues participation in the development of "hatchery indicator" data exchange standards (PNAMP, Coordinated Assessments). CJHP M&E staff also review the Master Database for compliance with BPA's Database Framework guidance. Completing the database system provides consistent data management among All- Hs and is the primary tool used to store, inspect and query collected and acquired data for inclusion in the analytical phase, presentation at the Annual Program Review, Planning Workshops, and in the annual reports.

13. Analysis:

All data are assessed using the All-H Analyzer (AHA), the Inseason Implementation Tool (ISIT) and the Annual Program Planning Tool (APPT) to define production levels for the hatchery's FY14 brood. Analysis also provides biological and program targets for harvest and adult management goals in fisheries, the Bridgeport fish ladder and at the Okanogan Adult Fish Weir. The CJH M&E program also uses the AHA and ISIT for annual planning, developing and adapting Key Assumptions, Biological Targets and Decision Rules. Results are presented at the Annual Program Review where Production levels and Science Program activities are developed.

The All-H Analyzer (AHA) tool is a Microsoft Excel-based application modified to evaluate salmon management options in the context of the "All-Hs." These include: Habitat conditions, passage through the Columbia River Hydroelectric system, Harvest, and Hatcheries. The fundamental concept for planning is predicated upon the Beverton-Holt Production Potential curve. The Beverton-Holt model is a classic discrete-time population model which gives the expected number n_{t+1} (or density) of individuals in generation $t + 1$ as a function of the number of individuals in the previous generation. The AHA calculator integrates the four "Hs" using the methods to estimate equilibrium natural escapement, brood stock requirements, and harvest by fishery for natural-and hatchery-origin fish. Most importantly, AHA estimates reflect a measure of hatchery influence on natural populations that is a function of both the percent hatchery-origin spawners in the natural

escapement and the percent of natural-origin brood stock incorporated into the hatchery program. The assumptions underlying these fitness impacts are based on published work (Ford 2002; Lynch and O'Hely 2001) and further development of these ideas by Campton, Busack, and Currens (pers. comm. 2002).

The AHA tool consists of a battery of interconnected modules for each H incorporating the equations described previously to estimate total recruits, escapement, and harvest for populations and hatchery programs. A critical feature of the analytical tool is the distribution of hatchery recruits to harvest, those recovered back at the point of release, and those straying to spawn in natural populations. In turn, the number of strays to natural populations affects the degree of hatchery influence in all natural populations receiving strays, and thus the fitness, abundance, and harvest potential for each population. The purpose of the AHA tool is to allow managers to explore the implications of alternative ways of balancing hatcheries, harvest, habitat, and hydrosystem constraints. This tool is used neither to make decisions nor to judge the "correctness" of management policies. Rather, it illustrates the implications of alternative ways of balancing the H's and facilitate informed decisions. Example parameters that will be reported include: pHOS, PNI, pHOB etc.

14. Reporting:

The goal of the APR is to increase the overall scientific rigor and effectiveness of the Anadromous Division's programs that inform management decisions. The procedures used in the APR include thousands of modeled calculations and statistical analysis. Integrated steps require development and adaptation for key assumptions and biological targets and enable the use of learned knowledge. The APR also supports the refinement and implementation of the entire Colville Tribes' Anadromous Division activities. Areas of presentation emphasis range from research, monitoring and evaluation data collections and analysis, to fish population and harvest monitoring, adult fish management, and habitat restoration and ecosystem status and trend conditions.

Each April, following the APR, a draft report for the CJHP is produced. The InSeason Implementation process provides up-to-date information through July and the report is finalized in August. This report is shared with all regional fish management entities, our Cost Share Partners and is used throughout the region as a "model for hatchery adaptive management (2014, Lars Mobrand, pers. comm.).

15. Cost Share Agreements:

The CJHP M&E staff works in close coordination with fish production activities to provide program information to Grant, Chelan and Douglas County PUD's and the Bonneville Power Administration. A coordinating committee reviews annual budgets, activity reports and monthly financial accounting. Grant County PUD also funds major portions of the design, construction and maintenance for the Okanogan Fish Weir. Funding from BPA allows us to collect and analyze data on weir effects such as delay, impingement, bed stream scour, turbulence, changes in water quality,

trapping efficiency, passage, PIT tag detection, harvest (adult fish management) and broodstocking activities.

16. Program Implementation and Logistics:

Monitoring and Evaluation activities include work elements, milestones and deliverables that require many logistical steps, and are required elements of contract administration. In addition to status reports and annual reporting, the CJHP conducts the following administrative activities: Staff level assessment and management and use of a Phased-Growth Planning model to implement the program and to meet compliance with federally-mandated employment policy. Staff is trained to execute data collection/acquisition, data management, analysis and reporting scheduling, equipment and site maintenance. Prevailing administrative policies are required to develop and monitor implementation of health and safety plans, obtain dozens of permits, standard office and field equipment procurement, and to develop budgets, Scopes-of-Work, develop contracts and monitor all subcontract work. The Science Program's administrative activities provide monthly accounting, invoicing and purchase reviews and approvals, review and approve all Cost Share Partner invoices in a timely and accurate manner, and participation in quarterly Anadromous Division meetings and Accord planning sessions. The CJHP M&E program manages logistical and administrative actions to facilitate program Integration, APR Planning, Protocols and Method development, modification and publishing and improvements to analytical and planning Tool(s). Where appropriate, the CJHP project manager will determine conference and meeting attendance and or presentation of CJHP M&E activities and results-to-date throughout the region. Staff also participate in public outreach and assist other F&W program staff as necessary (e.g., press releases, information sheets, M&E activity tours, presentations to local governments, PUD's and stakeholders.

In summary:

Research, Monitoring and Evaluation actions are developed and implemented with the goal of linking work elements, milestones, deliverables and the budget to M&E activities and their associated Key Management Questions (KMQs). These define each year's Fish Production Plan and assess the hatchery program while supporting harvest allocation negotiations, mitigation and trust obligations and future Fish and Wildlife Accords.

Testing and analysis to determine status and trend, population dynamics is conducted to assess the programs progress in meeting specified biological targets, measure hatchery performance and in reviewing the key assumptions used to define future actions for the entire CJHP. In several instances, these activities provide guidance to the CCT's habitat, harvest and hydro activities directly related to the CJHP.

The processes used to analyze collected and acquire data, manage it, present it to the public and our cost share partners, is described above and the CJHP's Annual Program Review and Workshops. Conclusions are contained within the Annual Report drafted in April and finalized in August each year.