13.
Proposed Spring Chinook Salmon Programs

Chief Joseph Dam Hatchery Program
MASTER PLAN

13

Proposed Spring Chinook Salmon Programs

13.1 CHAPTER OVERVIEW

This chapter describes the proposed spring Chinook components of the CJDHP. As noted at the beginning of this Master Plan document, Council staff and representatives from the BPA agreed to include review of the proposed CJDHP spring Chinook salmon components as a separable piece of the Step 1 CJDHP Master Plan since it was possible to include at very little additional cost. Information pertinent to the CJDHP spring Chinook programs is summarized in this chapter. Much of the information already presented in this document, including the legal and historical background, regional and local context, and conceptual monitoring and evaluation overview is equally relevant to the spring Chinook components of this proposal and is not repeated again in this chapter.

Spring Chinook were once abundant in the Okanogan subbasin and provided an important fishery to the Colville Tribes in the months of May, June and early July. A central objective of the Colville Tribes' long-term anadromous fish management plan is the restoration of Chinook salmon to their historical habitat in the waters around the Colville Reservation, particularly to the Okanogan subbasin. Given the Colville Tribes' almost non-existent remaining salmon fisheries, and the singular cultural importance of the spring Chinook (i.e. the impetus for the First Salmon Ceremony), restoration of a stable ceremonial and subsistence spring Chinook fishery is particularly significant to the Colville Tribes. As noted previously, the Colville Tribes' current limited ceremonial and subsistence salmon fisheries are entirely inadequate to meet even the most cursory needs.

Relationship of Spring Chinook Programs to CJDHP Guiding Principles

☑ ***Accountability***
- Measure program performance against specific performance standards and indicators
- All spring Chinook marked

☑ ***Best Available Science***
- Program designed to address ecological context of subbasin it will be implemented within
- Testing feasibility with Carson stock prior to transitioning to endangered species
- Use of local broodstocks
- Production facilities designed for low density rearing and acclimation on home waters
- Use of marking protocols

☑ ***Cost-Effectiveness***
- Use and modification of existing irrigation ponds for acclimation facilities

☑ ***Flexibility***
- Use of combination of acclimation and hatchery facilities
- Integration of the recovery and isolated harvest programs
- Built-in adaptation and feed-back loops

☑ ***Innovation***
- Use of live-capture, selective-fishing gear for broodstock collection, ceremonial and subsistence harvest, and escapement management
- Experimental program

The following sections of this chapter include: a review of the ecological rationale for including spring Chinook in the CJDHP, an overview of proposed spring Chinook management programs in the Okanogan, notable issues related to local or regional context, a description of the CJDHP spring Chinook programs and facilities, and estimated costs for those specific components. Substantial additional detail regarding all aspect of the spring Chinook programs can be found in the Okanogan River spring Chinook HGMP in Appendix D, a more integrated picture of the summer/fall and spring Chinook facility is presented in the facility conceptual design report in Appendix H. Additional specific detail on costs is included in the cost estimates provided in Appendix B.

13.2 OVERVIEW ECOLOGICAL RATIONALE FOR INCLUSION OF SPRING CHINOOK

13.2.1 STATUS OF SPRING CHINOOK IN UPPER COLUMBIA RIVER AND OKANOGAN SUBBASIN

Upper Columbia River Spring Chinook were listed as endangered on March 24, 1999. The listed ESU includes all naturally-spawning populations of spring Chinook in accessible reaches of Columbia River tributaries between Rock Island and Chief Joseph dams, *excluding* the Okanogan River. Several hatchery populations from the Methow and Wenatchee subbasins were also included in the listed ESU.

The Upper Columbia River Spring Chinook ESU includes stream-type Chinook salmon that spawn above Rock Island Dam in the Wenatchee, Entiat, and Methow rivers. Native spring Chinook salmon are considered extirpated from the Okanogan River. All Chinook salmon in the Okanogan River are now believed to be ocean-type and are considered part of the Upper Columbia River Summer/Fall Chinook ESU (Talayco 2002).

Although populations of the Upper Columbia River Spring Chinook ESU are in general dangerously depressed, in 2000, 2001, and 2002 the returning runs increased significantly. Spring Chinook escapement to the Columbia Cascade Province from 1990 through 2003 is summarized in Table 36. Based on the numbers of natural-origin fish returning to the Wenatchee, Entiat, and Methow rivers, the proportion of the Upper Columbia River Spring Chinook passing Priest Rapids Dam was estimated to average 13% from 1990 to 1999 [see SP HGMP, pp. 31-33].

13.2.2 OVERVIEW LIFE HISTORY

Adult spring Chinook destined for the Columbia Cascade Province enter the Columbia River beginning in March, reaching peak abundance in the lower Columbia River in April and early May (Chapman et al. 1995). From 1985 to 1993, the average 10th, 50th, and 90th percentile passage at Rock Island Dam was April 21st, May 10th, and June 3rd, respectively (Chapman et al. 1995). Although these percentages are strongly influenced by releases from Leavenworth National Fish Hatchery, Chapman et al. (1995) suggest the naturally produced migrants have a run timing similar to the hatchery component. Spring Chinook enter the Columbia Cascade Province tributaries from late-April to July, with spawning occurring from late-July through September and generally peaking in mid to late August (Chapman et al. 1995).

Analysis of data from post-spawn spring Chinook adults collected and sampled in the mid-Columbia tributaries from 1986 to 1993 shows that on average, 5% of males return at age 3, 58% at age 4, and 37% at age 5. Female averages are 58% at age 4, and 42%

Table 36: Spring Chinook – Adult Counts at Rock Island and Wells Dams. Source: Fish Passage Center.

YEAR	ROCK ISLAND	WELLS
2003	16,881	4,504
2002	24,017	7,587
2001	39,785	9,989
2000	14,850	2,130
1990 - 1999 average	6,568	753
1980 - 1989 average	13,315	2,581

Note: Numbers include endangered Upper Columbia River Spring Chinook and unlisted Carson-stock Fish

return at age 5 (Chapman et al. 1995). Once on the spawning grounds, Chapman et al. (1995) indicated that females may dominate the males in numbers. The actual ratio, however, may be closer to 1:1 since females are more likely to be recovered than males (Chapman et al. 1994).

Wild juvenile spring Chinook salmon originating in the Columbia Cascade Province generally emigrate towards the ocean during their second year (Chapman et al. 1995). However, Okanogan spring Chinook may have historically exhibited an ocean-type life history with juveniles migrating out of the warming waters of the Okanogan subbasin as 0-age pre-smolts or smolts. Such a life history adaptation is thought to have occurred in other Columbia River subbasins with similar ecological characteristics. It is also likely that Okanogan spring Chinook that spawned above Osoyoos Lake, reared in Osoyoos Lake prior to smoltification. This is a life history strategy that has proven effective for both sockeye and coho salmon. A similar life history strategy occurred historically in Idaho, where spring Chinook salmon spawned above Redfish Lake with the juveniles rearing in the lake alongside sockeye salmon prior to their ocean migration. In another example, it is probable that juvenile spring Chinook from the White and Little Wenatchee rivers, rear in Lake Wenatchee (Bugert, 1998). Reservoir rearing of juvenile spring Chinook was also a successful strategy in Fall Creek and Green Peter reservoirs in the Willamette subbasin, where large smolts and sizeable adult runs have been produced. In recent years large juvenile, or residual Chinook, were once captured in gill nets in upper Osoyoos Lake [see SP HGMP, p. 11].

13.2.3 HISTORICAL AND CURRENT ARTIFICIAL PRODUCTION

Artificial production of spring Chinook began in the Columbia Cascade Province in 1939 under the auspices of the Grand Coulee Fish Maintenance Project (Bugert 1998). Under this program fish from three USFWS hatcheries were reared and released in the Wenatchee, Entiat, and Methow rivers. It is generally assumed that operation of the Grand Coulee Fish Maintenance Project through the 1930s and early 1940s resulted in substantial homogenization of Upper Columbia River Spring Chinook (Myers et al. 1998).

Beginning in the 1950s, the Carson National Fish Hatchery established the Carson spring Chinook stock through collection of brood from the spring Chinook run-at-large at Bonneville Dam. The majority of fish collected for the Carson broodstock were most likely Snake River subbasin-origin fish, although populations from tributaries in the upper and middle Columbia River regions were also significantly represented (Myers et al. 1998, quoting Hymer et al. 1992).

The initial spring Chinook artificial production programs in the Wenatchee, Entiat, and Methow rivers proved only marginally successful. In very little time the managers resorted to importing broodstock from other downstream hatchery locations. Production programs using these downstream imported broodstocks continued into the 1960s, were suspended briefly, and were then reinitiated in the 1970s using Carson stock brood. In recent years broodstock have been collected from these three Cascade Columbia Province hatcheries, with particular dependence on the Leavenworth National Fish Hatchery.

Leavenworth National Fish Hatchery is presently used to collect, rear, and release non-listed spring Chinook salmon into Icicle Creek, a tributary of the Wenatchee River. Leavenworth National Fish Hatchery spring Chinook are derived primarily from the Carson lineage spring Chinook broodstocks (Marshall et al. 1995). In addition to the transfers of Carson National Fish Hatchery stocks, the broodstocks used at Leavenworth were established through large transfers of spring stocks from other non-local sources, including the Little White Salmon National Fish Hatchery, WDFW's Klickitat Hatchery, and WDFW's Cowlitz Hatchery. Genetic evaluations by WDFW determined that the Leavenworth stock is derived primarily from Carson National Fish Hatchery stocks (Marshall et al. 1995) [see SP HGMP, pp. 57-58].

In its, *Status Review of Chinook Salmon from Washington, Idaho, Oregon, and California*, NOAA Fisheries (formerly NMFS) concluded that indigenous spring Chinook in the Upper Columbia River tributaries still represent an important genetic resource since they contain the last remnant gene pools for Columbia River headwater populations (Myers et al. 1998).

The potential for adverse genetic introgression resulting from the widespread transplants of non-native Carson stock spring Chinook in the Columbia Cascade Province is a significant source of concern. In 1999, a work group associated with the Northwest Fishery Science Center's Conservation Biology Division concluded that Carson-origin stocks propagated at the Leavenworth, Entiat and Winthrop National Fish Hatcheries were not biologically part of the Upper Columbia River Spring Chinook ESU. In its listing decision for that ESU, NOAA Fisheries stated that the Leavenworth National Fish Hatchery spring Chinook salmon stock is non-local, and not part of the Upper Columbia River ESU [see SP HGMP, p. 57].

13.2.4 HISTORICAL AND CURRENT DISTRIBUTION

Spring Chinook are known to have historically inhabited both Salmon and Omak creeks. They may also have occurred in the Similkameen River, although there is some disagreement regarding historical levels of production in the Similkameen. Chapman (1995) stated, "No reliable information indicates that spring Chinook ever used the Similkameen River." It is possible that a 15-foot fall, located near the current site of Enloe Dam (RM 8.8) may historically have posed a barrier to anadromous fish passage. The Similkameen River is presently impassable to all anadromous salmonids at Enloe Dam.

Spring Chinook also are known to have migrated above Osoyoos Lake into Canada and spawned in the upper Okanogan River and other tributaries. Up through the late 1950s and early 1960s, spring Chinook were observed in the Okanogan River as far upstream as Okanagan Falls. In particular, spring Chinook have been observed spawning from Okanagan Falls downstream to the town of Oliver, with concentrated spawning occurring primarily in a reach about 1 mile above the town of Oliver near Vasseaux Creek. In recent years, there are reports of small numbers of spring Chinook spawning in the Okanogan River above Osoyoos Lake (Bartlett, 2001 personal communication). However, it is likely that these remnant runs may now be summer/fall Chinook.

13.2.5 HISTORICAL AND CURRENT HARVEST

Okanogan subbasin tribal salmon fisheries occurred historically in May, June, and early July. Based on this timing it is most likely that these were spring Chinook fisheries. In 1811, Alexander Ross described Southern Okanagans assembling in large bands in the month of June for the summer fishing season (Ray 1972).

Spring Chinook bound for the Okanogan and the Columbia River above its confluence pass through Columbia River fisheries managed pursuant to the Columbia River Compact and *U.S. v Oregon*. The Okanogan River fisheries are not yet included in any existing harvest plan or regulations because the existing and proposed programs are too recent.

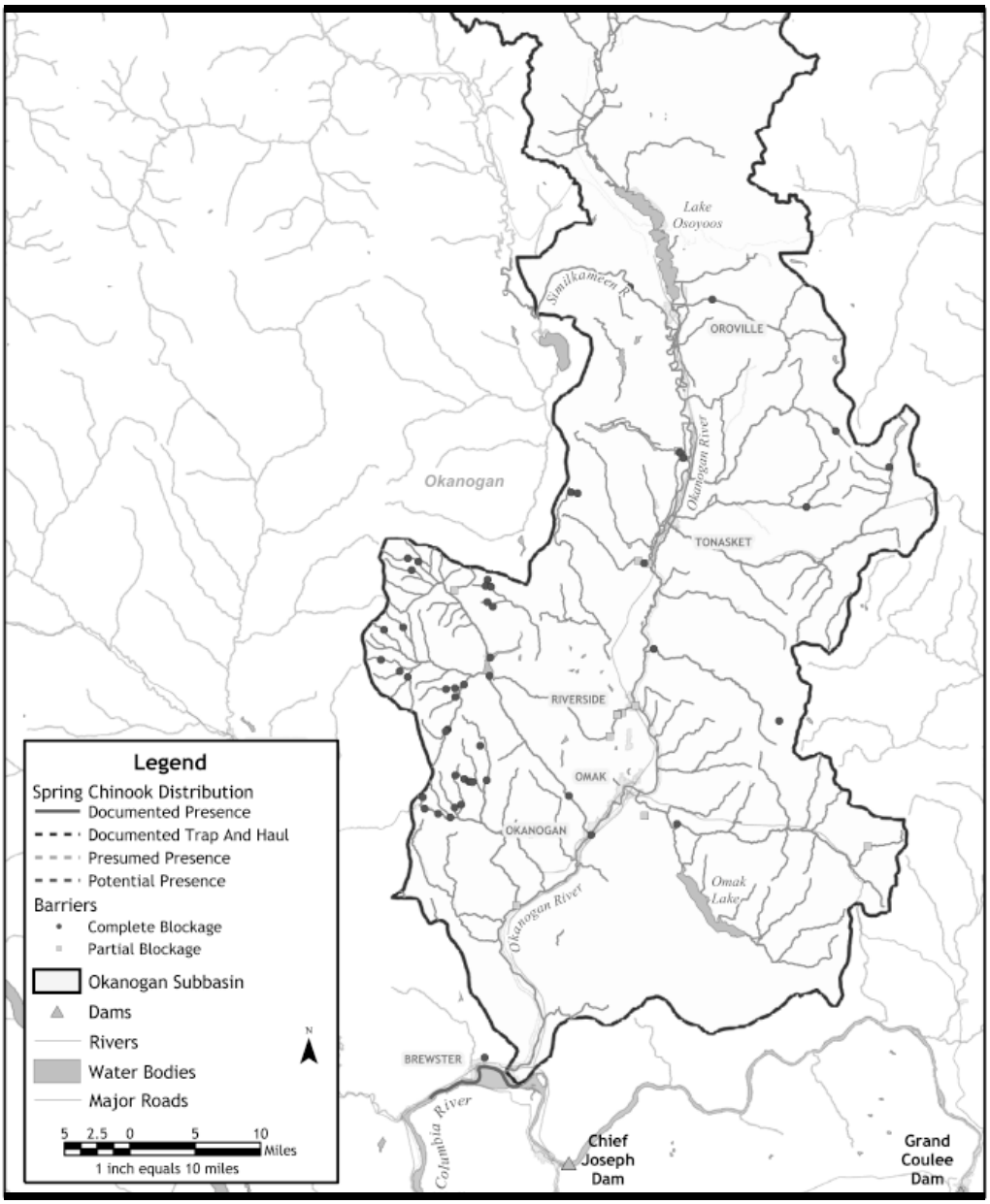
Between 1988 and 1999, 86% of the harvest of Carson stock spring Chinook returning to Leavenworth National Fish Hatchery occurred in the Wenatchee subbasin while 14% occurred in all other fisheries [SP HGMP, p. 41].

13.2.6 LIMITING FACTORS AND HABITAT CAPACITY

Over the years, substantial degradation of tributary and mainstem Okanogan River habitat, combined with downstream hydroelectric development, and historical over-fishing on the ocean and Columbia River, have resulted in the decimation of the Okanogan subbasin runs of spring Chinook.

A review of larger out-of-subbasin limiting factors, such as the impacts of Columbia River operations for electricity, flood control and spill; changing ocean conditions; uncertainty related to the carrying capacity of the Columbia River and estuary; and other out-of-subbasin variables was presented in Chapter 6. As presented in previous chapters, actions to improve juvenile and adult salmon passage through the hydroelectric system are critical to the long-term viability of natural-origin Upper Columbia River spring Chinook populations.

Because spring Chinook were extirpated from the Okanogan subbasin so many years ago, critical information on the viability and likely performance of



Courtesy KWA Ecological Sciences, Inc.

FIGURE 43: Spring Chinook Distribution

spring Chinook in the Okanogan subbasin does not exist. Adequate information to determine with much certainty the historical, or current, carrying capacity of the Okanogan subbasin habitat for spring Chinook simply does not exist.

The carrying capacity of the Okanogan River and the effect of spring Chinook re-introduction programs will be an important focus of both the CJDHP monitoring and evaluation program and the Okanogan/Similkameen Baseline Monitoring and Evaluation Program.

The primary limiting factors for spring Chinook in the Okanogan subbasin in order of descending importance are: agricultural water withdrawals from Okanogan tributaries and the mainstem Okanogan River, elevated summer water temperatures, sedimentation, the loss of riparian vegetation along tributaries and the Okanogan mainstem, and passage barriers on some tributaries. Lesser, but nevertheless significant, factors include water quality and quality of in-channel habitat. Rehabilitation of historical spring Chinook habitat has occurred in select tributaries, primarily Omak and Salmon creeks. However, on a subbasin scale, rehabilitation efforts are still in their infancy.

13.3 LOCAL AND REGIONAL CONTEXT RELATIVE TO SPRING CHINOOK COMPONENTS

Please refer to the description of the Okanogan subbasin, the status of current environmental assessments, coordinated planning, current and planned management activities, and highlights of projects and activities relevant to both summer/fall and spring Chinook presented in Chapter 6.

13.3.1 CURRENT MANAGEMENT ACTIVITIES SPECIFIC TO SPRING CHINOOK

A comprehensive ESU-wide plan for propagation of spring Chinook in the Columbia Cascade Province does not presently exist. Spring Chinook management in the Okanogan River and in the Columbia River above its confluence was omitted from many of the recent salmon management plans and agreements addressing the Columbia River Basin and the Mid-Columbia River region.

The Mid-Columbia BAMP did not include any activities related to spring Chinook in the Okanogan subbasin. However, the BAMP provides a framework for managing spring Chinook in the Wenatchee, Entiat, and Methow rivers. Given the precarious state of the endangered spring Chinook populations, the BAMP recommended an artificial production "spread the risk" strategy [see SP HGMP, p. 39].

Spring Chinook management in the Okanogan River and in the Columbia River above its confluence was not addressed in the draft Mid-Columbia River Hatchery Program or the HCPs for the Wells, Rocky Reach, and Rock Island hydroelectric projects.

The Colville Tribes will be using the Okanogan River spring Chinook HGMP [Appendix D] as a basis for renegotiating mitigation agreements with the PUDs and the Bureau of Reclamation to recover and rebuild the Colville Tribes' historical trust resources and fisheries.

There is no ESA recovery plan addressing spring Chinook in the Okanogan subbasin. The Okanogan River and the Columbia River above its confluence was not included as critical habitat in the ESA listing of Upper Columbia River Spring Chinook.

Spring Chinook management in the Okanogan River and in the Columbia River above its confluence was also not addressed in the now expired Columbia River Fish Management Plan adopted pursuant to *U.S. v Oregon*. In the future, negotiations for harvest management in *U.S. v Oregon* will need to specifically account for the Colville Tribes' ceremonial and subsistence harvest as well as recreational harvest in the Columbia Cascade Province [see also SP HGMP, p. 41].

13.3.2 AD HOC EXPERIMENTAL SPRING CHINOOK RELEASES

Since 2001, experimental releases of spring Chinook have been undertaken on an ad hoc basis in the Okanogan subbasin. The Carson stock fish used for these releases were made available from existing mitigation programs to test rearing habitat on the Okanogan River and Omak Creek and to reduce risks to listed spring Chinook in the Methow River.

13.3.2.1 Experimental Integrated Recovery Releases

In 2001, the Colville Tribes' released Carson stock spring Chinook into Omak Creek for the first time. This release was part of an agreement to reduce the release of Carson stock fish in the Methow subbasin (and eliminate the destruction of surplus stock). This initial release consisted of 40,000 BY'99 smolts, which were scatter-planted in Omak Creek below Mission Falls.

In 2002, another 48,000 BY'00 smolts were scatter-planted in Omak Creek below Mission Falls.

In 2003, construction of the new St. Mary's Mission (RM 32) acclimation pond on Omak Creek was completed. Later that year 44,000 smolts were acclimated in the pond. Unfortunately, 10,000 yearlings were lost prior to release when the pond's water supply failed (modifications to the Pond to address this problem are proposed as part of the CJDHP).

In 2004, 45,000 juveniles being acclimated in St. Mary's Mission Pond were lost when an auxiliary pump failed resulting in a complete fish kill.

An additional proposed release in Salmon Creek has been indefinitely deferred pending completion of an agreement with the Okanogan Irrigation District.

13.3.2.2 Experimental Isolated Harvest Releases

In 2002, 254,000 BY'00 smolts were released in the Okanogan subbasin from the Ellisforde Pond (RM61.7). These releases were the result of negotiations to address excess Carson stock returning to the Methow subbasin.

In 2003, 100,000 BY'01 smolts were released from Bonaparte Pond.

In 2004, 100,000 yearling spring Chinook will be released from Ellisforde Pond.

13.4 ALTERNATIVES CONSIDERED IN DEVELOPING SPRING CHINOOK COMPONENTS

In identifying the best alternative(s) for long-term re-introduction of spring Chinook in the Okanogan subbasin, two basic alternatives were given consideration: natural re-colonization, and assisted relocation. In addition, consideration was given to the appropriate spring Chinook stock(s) to use.

Use of Carson, Methow composite, and Wenatchee stocks were considered. The Methow composite and the Wenatchee stocks are components of the endangered Upper Columbia River Spring Chinook ESU. Carson stock was selected for use in the initial phase of the spring Chinook programs because it is available in the Columbia Cascade Province and has a history of relative success in the hatchery environment. The stock has been propagated for over 50 years in the Columbia Cascade Province. Its productivity rate varies substantially based on the spring migration conditions at the Columbia River dams and with conditions in the marine environment. It is an early returning spring Chinook, a trait that will be critical to recovery in the Okanogan where the mainstem water temperatures reach excessive levels in July.

Natural re-colonization is not deemed a viable alternative due to the low rates of straying into the Okanogan River basin over the past 50 years, and due to the low smolt-to-adult survival rates in the Columbia Cascade Province. The Colville Tribes' combined objectives of restoring naturally-spawning populations, creating stable ceremonial and subsistence fisheries, providing recreational fisheries, and assisting in recovery of this listed ESU, cannot be met solely by natural re-colonization.

A number of options are available to implement assisted relocation, depending on the life stage used, and the area of relocation. Relocation can be accomplished by 1) transplanting adult fish into spawning habitat, 2) placing fertilized eggs into the spawning habitat, 3) planting unfed fry, 4) planting fingerlings or pre-smolts, and/or 5) planting acclimated or unacclimated smolts. These options are further differentiated by which stock(s) are used.

Six strategic options were considered. These options are described in the Okanogan River spring Chinook HGMP [pp. 89-94]. The options considered were:

1. Isolated harvest program using Carson stock released at 1-5 locations.
2. Integrated harvest program using Carson stock released at 1-5+ locations.
3. Integrated recovery program using Methow Composite stock released at 1-5+ locations.
4. Dual isolated harvest and integrated recovery programs using Carson stock and Methow Composite stock, respectively, released at 1-3 sites for each program.
5. Dual integrated recovery and isolated harvest programs using Carson stock initially, transitioning to Methow Composite stock when available. Fish would be released at 1-2+ sites for the recovery program and 1-3+ sites for the harvest program.
6. Dual integrated recovery and isolated harvest programs using an, as yet to be determined, stock of spring Chinook.

The CJDHP proposal is based on alternative number five above. This preferred approach combines comprehensive integrated recovery and isolated harvest programs using Carson stock initially, and then transitioning to Methow composite stock when it becomes available. This option was selected because is

has the greatest likelihood of meeting both the recovery and harvest goals of the Colville Tribes, while also presenting the least risk to other fishery resources and objectives in the Columbia Cascade Province.

13.5 FRAMEWORK FOR OKANOGAN SUBBASIN SPRING CHINOOK PROGRAMS

Based on the alternative identified above, the Colville Tribes are proposing implementation of what is designed to be a long-term, two-phase plan for spring Chinook in the Okanogan subbasin, and in the Columbia River from Chief Joseph Dam downstream to the confluence of the Okanogan River. This framework for a two-phase approach addresses both recovery and mitigation goals and is described in substantial detail in the Okanogan River spring Chinook HGMP [Appendix D].

The **recovery goal** of the spring Chinook programs is restoration of naturally-spawning populations to historical habitats in the waters around the Colville Reservation - waters that once contributed significant fisheries to the Colville Tribes. Spring Chinook produced in the second phase of these programs may also provide benefit in the recovery of the Upper Columbia River Spring Chinook ESU. The **mitigation goal** of these spring Chinook programs is to replace runs in the Okanogan River and the upper Columbia River lost due to the construction and operation of Grand Coulee, Chief Joseph, Wells, Rocky Reach, Rock Island, Wanapum, Priest Rapids, McNary, John Day, The Dalles, and Bonneville dams. The proposed CJDHP will provide necessary expansion of the interim Phase I spring Chinook programs described below.

13.5.1 HGMP PHASE I SPRING CHINOOK PROGRAMS

Under Phase I, the Okanogan subbasin spring Chinook programs will use Carson stock spring Chinook commonly propagated in the Columbia Cascade Province. The Phase I plan includes an integrated recovery program and an isolated harvest program.

The Phase I programs will be implemented in two steps, described in the Okanogan River spring Chinook HGMP, as Phase I: Step A, and Step B. Step A, includes the interim (pre-Chief Joseph Dam Hatchery) programs currently being implemented by the Colville Tribes. These preliminary actions are described briefly in the next section. The proposed CJDHP will implement the expanded Phase I, Step B programs.

The overall goal of the Phase I **integrated recovery program** is to demonstrate the viability of spring Chinook in historical Okanogan subbasin habitat and to provide information to guide rehabilitation of that habitat. In Phase I, Carson composite stock will be used to test the suitability of historical spawning, rearing, and migration habitats in the Okanogan subbasin, to once again produce and support natural-origin populations of spring Chinook. Considerable effort is under way to restore tributary and mainstem habitat quality in the Okanogan subbasin. This program is designed to re-establish naturally-spawning (self-sustaining or supplemented), populations in suitable habitat using Carson stock. This program will initially make use of Carson stock from excess broodstock collected at Leavenworth National Fish Hatchery.

The goal of the **isolated harvest program** is to restore the Colville Tribes' spring Chinook ceremonial and subsistence harvest, and to provide an opportunity for recreational anglers in the Columbia Cascade Province, in a manner compatible with recovery of Upper Columbia River Spring Chinook. The program is designed to create a hatchery-origin run to support tribal and recreational selective fisheries, using Carson stock. This program will be located and operated to minimize interaction with spring Chinook produced from the integrated recovery program, as well as minimizing interaction with summer/fall Chinook. All returning adults will be targeted for selective harvest or collected for brood stock. The program will use Carson stock initially until Methow Composite stock is available on a frequent basis (see Phase II below).

13.5.2 HGMP PHASE II SPRING CHINOOK PROGRAMS

The Phase II programs will transition to use of Methow composite stock from the adjacent Methow subbasin. The Methow composite stock is part of the

Upper Columbia River Spring Chinook ESU, which is currently listed as endangered. Phase II will be initiated once Methow stock, surplus to the recovery programs in the Methow subbasin, is available on a regular basis. The Phase II programs include both an integrated recovery and an integrated harvest program.

The goal of the Phase II **integrated recovery program** will be to aid the recovery, and possibly eventual de-listing, of the ESA-listed Upper Columbia River Spring Chinook by increasing its abundance, productivity, distribution, and diversity. The Phase II program will operate to re-establish, and if necessary, supplement natural spawning populations of spring Chinook. Methow Composite stock will be introduced into the Okanogan only as an "experimental population", with lesser take prohibitions, to avoid significant limitations to tribal and recreational fishing, and other economic activities.

The goals of the Phase II **integrated harvest program** will be to continue to support a spring Chinook ceremonial and subsistence fishery for the Colville Tribes, support an increased recreational fishery targeting hatchery-origin fish, and provide a genetic reserve for the de-listing and recovery of Upper Columbia River Spring Chinook. Spring Chinook destined for harvest under this program will be differentially marked to distinguish them from hatchery-origin fish used in the recovery program.

13.5.3 PHASE 1, STEP A SPRING CHINOOK PROGRAMS

Figure 44 summarizes the Phase I, Step A Okanogan subbasin spring Chinook integrated recovery and isolated harvest program releases that will be implemented prior to the addition of the proposed CJDHP components.

The Phase 1, Step A - **integrated recovery** program is designed to re-introduce spring Chinook into Omak Creek and possibly at a later time, Salmon Creek. Under this program, 50,000 Carson stock spring Chinook fingerling will be obtained from USFWS' Leavenworth National Fish Hatchery. These fish will be transported to St. Mary's Mission Pond in October for over-winter rearing and acclimation. Release will occur in mid-April of the following year.

An additional proposed release in Salmon Creek has been indefinitely deferred pending completion of an agreement with the Okanogan Irrigation District.

Under the Phase 1, Step A - **isolated harvest** program, surplus Carson broodstock will be held at Leavenworth National Fish Hatchery. Fish will be spawned and eggs initially incubated at this hatchery in the Wenatchee subbasin. Eyed eggs will then be transported to USFWS' Willard/Little White Salmon National Fish Hatchery on the Little White Salmon River in the Columbia Gorge Province. The subsequent pre-smolts would then be transported back in to the Okanogan subbasin in October, at which point 200,000 fingerlings would be over-winter reared in Ellisforde Pond, and another 200,000 fingerlings would be acclimated at Colville Trout Hatchery for release as yearlings the following spring.

It is important to note that relatively little is known yet about the short- or long-term effectiveness or potential risks of these spring Chinook programs. The first returns from experimental releases of spring Chinook in Omak Creek should occur in 2004. In order to minimize potential risks, the initial levels of these spring Chinook releases are very conservative, and will remain so until results from the monitoring and evaluation programs can be collected and evaluated. In addition, as mentioned numerous times in this document, understanding the capabilities of live-capture, selective fishing gears is essential to identifying the appropriate size of the programs, and to the success of subsequent broodstock collection.

13.6 OVERVIEW OF CHIEF JOSEPH DAM HATCHERY PROGRAM SPRING CHINOOK PROGRAMS (PHASE I, STEP B)

The proposed CJDHP spring Chinook programs are designed to implement Step B of the Phase I integrated recovery and isolated harvest programs identified above. Both the Step A, and Step B, Phase I programs are sized to optimize collection of information about the potential viability of Okanogan spring Chinook and their habitats in the Okanogan subbasin,

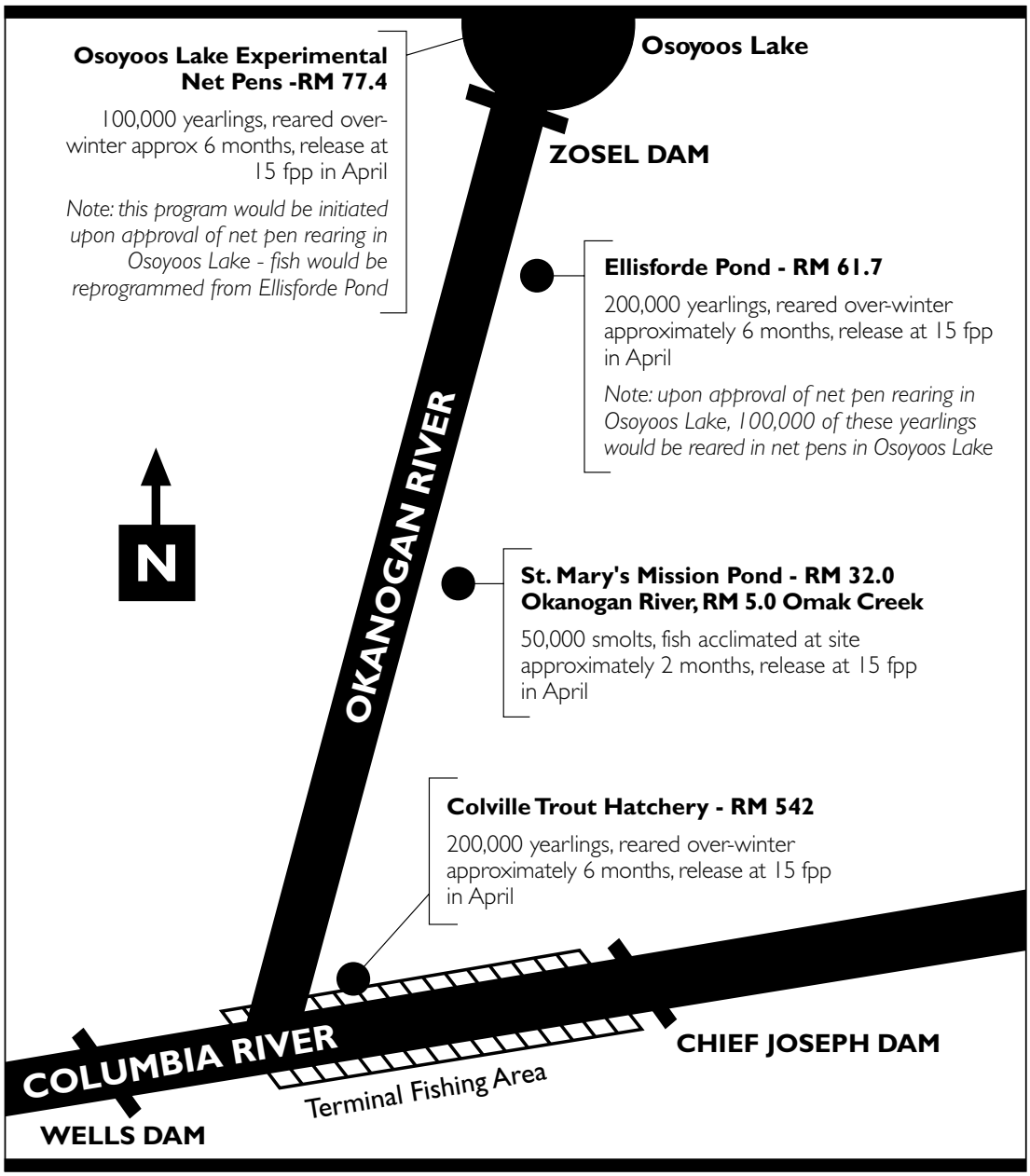


FIGURE 44: Spring Chinook Releases Phase I (Step A)

and the Columbia River Basin. The program objectives are designed to identify any potentially adverse interactions with summer/fall Chinook and steelhead populations, and to document the extent of tribal and recreational harvest. Scientific information collected from these experimental Phase I activities will be used to refine the proposed Phase II programs. At this time the CJDHP spring Chinook component is designed to implement the Phase I actions. However, the proposed facilities should be adequate to implement the Phase II programs.

If, at any time during implementation these programs, irresolvable conflicts arise which threaten the viability of Upper Columbia Summer/Fall Chinook ESU, Upper Columbia Steelhead ESU, or Upper Columbia Spring Chinook ESU; the programs would be discontinued and returning, adult spring Chinook would be collected at Wells Dam, or by other means, to eliminate the conflict.

Like the summer/fall Chinook programs, the spring Chinook CJDHP component relies on a combination of new and existing facilities, and includes innovative

Table 37: Proposed CJDHP Spring Chinook New and Existing Facilities

HATCHERIES:	
Leavenworth National Fish Hatchery (existing facility)	USFWS facility located on Icicle Creek at RM 2.8, near the town of Leavenworth.
Chief Joseph Dam Hatchery (new facility)	To be constructed on the right bank of the Columbia River at approximately RM 543 (Reservation side) immediately below Chief Joseph Dam (Chief Joseph Dam located at RM 544.6).
ACCLIMATION FACILITIES:	
St. Mary's Mission Pond (existing facility)	Located on Omak Creek at RM 5.0, below Mission Falls, near the town of Omak.
Ellisforde Pond (existing facility)	Located on the right bank of the Okanogan River at RM 61.7 near the town of Tonasket
Salmon Creek Diversion (existing facility)	Acclimation waters located on Salmon Creek at RM 3.8, at the Okanogan Irrigation District's diversion dam and channel near Okanogan.
Osoyoos Lake Net Pens (possible site)	Floating net pens located in Osoyoos Lake immediately above Zosel Dam at RM 77.4 on the Okanogan River.
ADULT COLLECTION FACILITIES:	
Leavenworth National Fish Hatchery (existing)	USFWS facility located on Icicle Creek at RM 2.8, near the town of Leavenworth.
Chief Joseph Dam Hatchery (new facility)	To be constructed on the right bank at approximately RM 543 (Reservation side) of the Columbia River immediately below Chief Joseph Dam (Chief Joseph Dam located at RM 544.6).
Omak Creek Weir (new - to be constructed with other funds)	To be constructed on Omak Creek at RM 5.0, below Mission Falls on Omak Creek
Zosel Dam (existing)	Potential future collection site on the Okanogan River at RM 77.4 near Oroville.
Live-Capture Gear (contingency collection)	Fishing will occur in the Okanogan River and in the Columbia River from above the confluence with the Okanogan (RM 533.5) to the area below Chief Joseph Dam.

partnerships with local irrigation districts as part of the overall program. Table 37 summarizes the new and existing facilities associated with implementation of the proposed CJDHP spring Chinook programs.

The CJDHP spring Chinook programs will increase the production of Carson stock spring Chinook destined for the Okanogan subbasin to 900,000 smolts. This increased production level is expected to result in an average adult return to the waters around the Colville Reservation, of about 2,700 spring Chinook. These production levels are intended to support the integrated recovery and isolated harvest programs described below. Broodstock for these programs will be collected at the Chief Joseph Dam

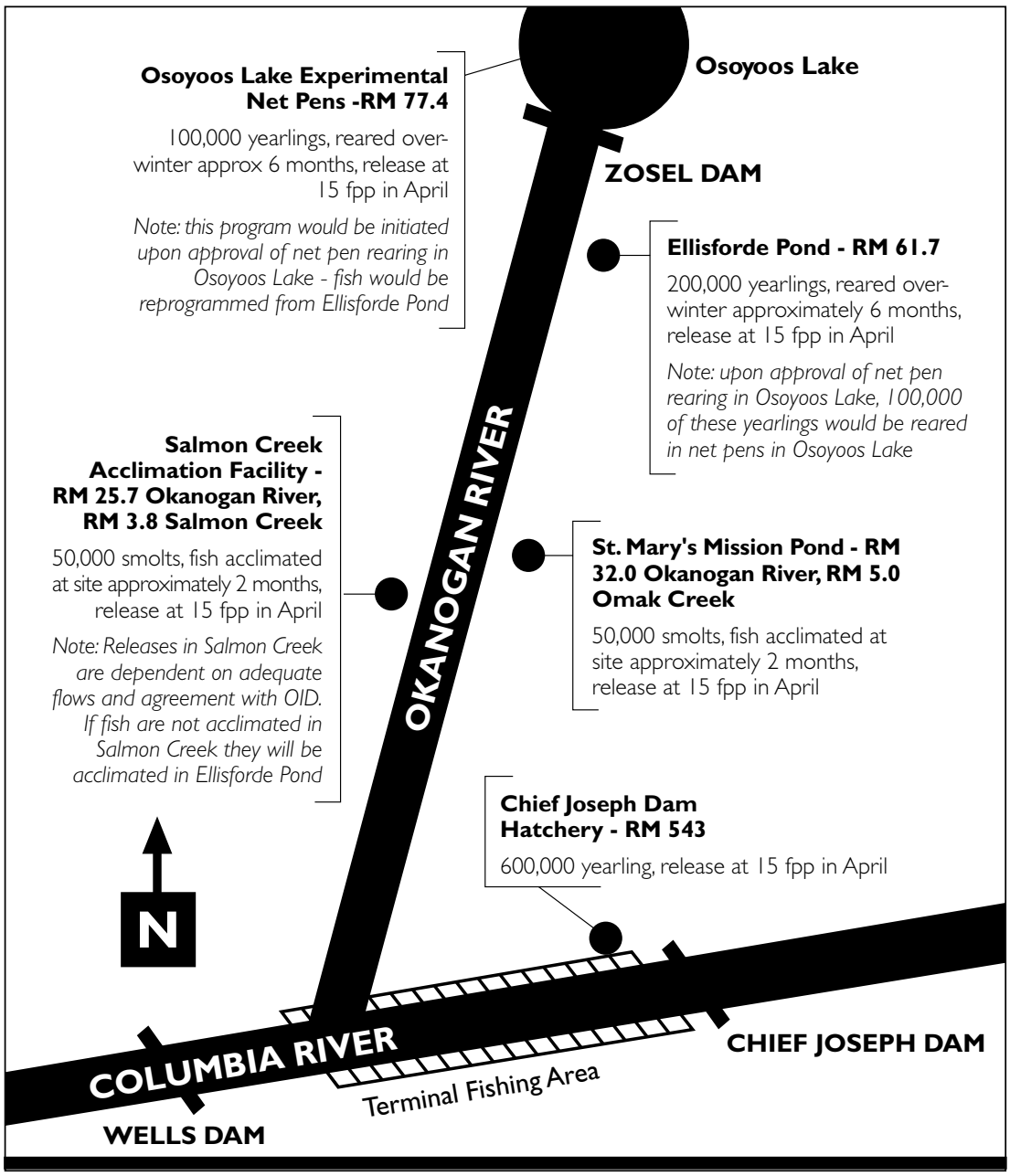


FIGURE 45: Spring Chinook Releases Phase I (Step B)

Hatchery, and supplemented as necessary, with broodstock from the Leavenworth National Fish Hatchery. All 900,000 of the smolts will be reared at the Chief Joseph Dam Hatchery. Figure 45 provides and overview of the program releases that would be associated with these spring Chinook programs.

13.6.1 CHIEF JOSEPH DAM HATCHERY PROGRAM SPRING CHINOOK INTEGRATED RECOVERY PROGRAM

The CJDHP spring Chinook integrated recovery program will re-introduce naturally-spawning populations of Carson stock spring Chinook into Omak Creek and possibly later, in Salmon Creek. This program is sized initially to return an average of 300

adults to the Okanogan subbasin (200-700). This program size should be sufficient to allow for critical survival parameters to be determined and allow assessment of habitat health in Omak Creek and later, Salmon Creek.

The program goals for the Spring Chinook integrated recovery program are:
Smolt - adult survival rate: 0.3%
Total adult production number: 300
Escapement: 300

All spring Chinook released as part of the integrated recovery program will not be adipose fin clipped, but will be coded wire tagged. This marking protocol will protect these fish from the selective fisheries, but allow them to be differentiated from natural-origin fish returning to the Okanogan River.

Under this integrated recovery program, 50,000 yearling spring Chinook will be transported from the Chief Joseph Dam Hatchery to the St. Mary's Mission acclimation pond in late February to early March, depending on fish size and water temperatures. The fish will be acclimated on a mixture of creek and well water, and reared at low densities, until mid-April when they will be allowed volitional migration. In the period immediately prior to release, fish will be acclimated solely on creek water. Fish would be release at 15 fpp in April. After volitional release, any remaining fish will be forced from the facility.

Pending agreement with the Okanogan Irrigation District on the use of their facility, and dependent on adequate water flows in Salmon Creek, 50,000 yearling smolts will be transferred to the Salmon Creek Diversion facility in late February to early March, depending on fish size and water temperatures. These fish would be acclimated on creek water in the ladder pools and upper irrigation canal until mid-April when they would be allowed volitional migration. Fish would be released at 15 fpp. Later, any remaining fish in will be forced from the canal.

13.6.2 CJDHP SPRING CHINOOK ISOLATED HARVEST PROGRAM

The primary purpose of the isolated harvest program is to re-establish the Colville Tribes' ceremonial and subsistence fisheries, and to provide recreational fisheries in the Okanogan subbasin and upper Columbia River. The isolated harvest program is design to create selective fisheries in the Okanogan and Similkameen rivers, in the tailrace of Chief Joseph Dam and in the Wells Pool, and near the confluence of the Okanogan River, which will target these Carson-stock spring Chinook fish. The goal of the harvest activities will be to remove all adult fish from the waters of the Okanogan subbasin for ceremonial, subsistence, and recreational purposes and to collect broodstock to support production activities at Chief Joseph Dam Hatchery.

The primary management tool for this program is the marking protocols. All spring Chinook for the isolated harvest program will be adipose fin clipped – these will be the only adipose fin clipped spring Chinook returning to the areas above Wells Dam. Spring Chinook will also be coded wire tagged (42%) for monitoring and evaluation purposes. The adipose fin clip will allow these fish to be distinguished from hatchery-origin and natural-origin Upper Columbia River Spring Chinook that are ESA-listed.

The isolated harvest program is sized to return 600 adults on average to the Okanogan subbasin (400 - 1,400) and 1,800 adults to the vicinity of Chief Joseph Dam (1,200 - 4,200). This program size should be sufficient to determine critical survival parameters pertaining to viability and to support assessment of the suitability of Okanogan River habitat. This program size should also be sufficient to provide for tribal ceremonial and subsistence and recreational fisheries; as well as providing adequate returns to test selective, live-capture fishing gear. Risks of incidental take and program thresholds are described in the Okanogan River spring Chinook HGMP in Appendix D [pp. 42-44].

The program goals for spring Chinook isolated harvest program (hatchery-origin fish) are:
Smolt - adult survival rate: 0.30%
Total adult production number: 2,400
Escapement: 0

To provide a fishery selective fishery in the tailrace of Chief Joseph Dam, in the Wells Pool, and near the confluence of the Okanogan River, and to provide

broodstock for the Chief Joseph Dam Hatchery: 600,000 spring Chinook will be reared and released from the Chief Joseph Dam Hatchery facility as yearlings. Prior to release, fish will be reared on a mix of relief tunnel water from Chief Joseph Dam and water from Rufus Woods Lake to promote homing back to the hatchery site and terminal fisheries. Prior to release, acclimation will be solely in river water.

To provide a fishery in the Okanogan River, 200,000 subyearling Chinook will be transported to the Ellisforde acclimation pond in October, depending on fish size and temperature of the Okanogan River. Fish will be reared over the winter for six months in the pond. Fish will be reared on pumped Okanogan River water, at low densities, until release in approximately mid-April, providing a six-month acclimation period.

On approval of a tentative net pen program in Osoyoos Lake, 100,000 of the Ellisforde Pond fish would be reprogrammed to Osoyoos Lake. The fish would be reared over the winter for approximately six months and released in April. Nets would be dropped allowing the spring Chinook to migrate naturally to the lake outlet at Zosel Dam.

The Ellisforde pond site and the Osoyoos Lake net pen program would also support the Colville Tribes' efforts to restore in-lieu fishing sites located at sites of important historical tribal fisheries.

13.7 DESCRIPTION OF THE CJDHP SPRING CHINOOK PRODUCTION PROGRAM

Elements of the proposed spring Chinook CJDHP programs are described in substantial detail in the Okanogan spring Chinook HGMP located in Appendix D.

The discussion of facilities presented in the following sections provides an abbreviated overview. Complete descriptions of the Chief Joseph Dam Hatchery water supply and the conceptual design of the Chief Joseph Dam Hatchery summer/fall and spring Chinook facilities, are included in Appendices F and G, respectively.

13.7.1 BROODSTOCK

The CJDHP production objective of 900,000 smolts will require 644 fish for broodstock. This includes 74 fish for the integrated recovery program, and 570 fish for the isolated harvest program. Broodstock for the integrated recovery program will be collected from fish returning to Omak Creek, supplemented as necessary, with spring Chinook captured (in priority order) at Zosel Dam, in the Okanogan River with live-capture gear, or at the Chief Joseph Dam Hatchery. A weir is being constructed in Omak Creek for Chinook and steelhead management.

Broodstock for the isolated harvest program will be collected by three means. Chinook will enter a fishway and trap at the Chief Joseph Dam Hatchery, be trapped at proposed facilities at Zosel Dam, or be taken by live-capture fishing gear in the Okanogan and Columbia rivers. The ladder at the hatchery will be operated from May through November to allow entry of spring and summer/fall Chinook. Fish excess to spawning needs will be distributed to tribal members.

13.7.2 INCUBATION AND REARING

Incubation and rearing of all spring Chinook will occur at the Chief Joseph Dam Hatchery. Water will be supplied from the Chief Joseph Dam relief tunnel, wells, and from Rufus Woods Lake. Waters from all three sources will be mixed to achieve desired temperatures.

Pre-smolt rearing and acclimation will continue at St Mary's Mission and Ellisforde ponds. Acclimation might also occur, on an experimental basis, in Osoyoos Lake immediately above Zosel Dam, from late October until early April using floating net pens. Flow through the net pens would depend on currents derived from flows past Zosel Dam. Water quality would be ambient in the lake.

Pre-smolt rearing and acclimation may also occur at a future date in Salmon Creek at the Okanogan Irrigation District diversion. Fish would be acclimated to Salmon Creek surface waters.

13.8 POTENTIAL ECOLOGICAL AND GENETIC EFFECTS

The following section summarizes potential ecological interactions and genetic effects associated with implementation of the CJDHP [see SP HGMP, pp. 31-39].

13.8.1 POTENTIAL RISKS ASSOCIATED WITH BROODSTOCK COLLECTION

There are no risks to listed natural fish in the Okanogan subbasin associated with broodstock selection since spring Chinook are at present extinct in the Okanogan subbasin. However, the use of Carson stock could pose genetic risks to listed populations of spring Chinook in the Methow River. The Carson stock from the Okanogan programs could stray into the Methow and spawn with listed Chinook. Straying could also be caused by inadequate acclimation in Okanogan waters, or excessive water temperature in the Okanogan that could cause Carson stock to seek other holding and spawning habitat. Secondly, Carson stock from the Okanogan could be misidentified and included in Methow broodstock if collected at Wells Dam [see SF HGMP, pp. 31-39, and 83].

These risks will be minimized by 1) initiating the Okanogan programs with smaller releases to gather risk and other information prior to ramping up to full production levels, 2) marking all hatchery-origin Carson stock, 3) emphasizing early-arriving adults in the broodstock to build the isolated harvest program with fish that will likely return prior to occurrence of excessive water temperatures at the mouth of the Okanogan, 4) using trap nets near the mouth of the Okanogan to harvest hatchery-origin fish and collect broodstock, thereby preventing later straying, 5) acclimating all hatchery-origin fish to Okanogan and upper Columbia waters for a minimum of 150 days prior to release, and finally 6) transitioning over to Methow Composite stock upon its availability.

Naturally produced Carson stock originating from the small integrated recovery program in the Omak Creek will not be readily distinguishable from Methow stock at Wells Dam. Risks of these fish being included in Methow broodstock will be minimized by 1) eventually collecting Methow broodstock in the Methow basin, 2) monitoring the success of natural spawning in the Okanogan basin and marking natural-origin smolts should their numbers become excessive, and 3) transitioning to Methow Composite stock upon its availability. Initially, the numbers of unmarked, adult, natural-origin Carson stock Chinook arising from the Omak Creek program should be very small in comparison to numbers of returning Chinook to the Methow basin [see SP HGMP, pp. 59-60].

13.8.2 ECOLOGICAL RISKS TO ESA-LISTED FISH

No ESA-listed population would be affected directly by the proposed CJDHP spring Chinook Phase I programs since spring Chinook are extinct in the Okanogan River and do not spawn or rear in the Columbia River immediately below Chief Joseph Dam.

Spring Chinook from the Okanogan River and Columbia River immediately below Chief Joseph Dam would share the lower Columbia River, estuary and ocean environments with a number of other listed species, but with inconsequential effects.

The Upper Columbia River Summer Steelhead currently in the Okanogan are primarily a product of a supplementation program that uses Wells Hatchery stock. No steelhead would be expected to reside in the Columbia River upstream from the confluence with the Okanogan. Fishery managers in the Okanogan subbasin are re-directing steelhead programs toward the development of locally adapted broodstocks (BAMP 1998).

Steelhead adults migrate into the Mid-Columbia tributaries in the fall and spring months after spending 1-3 years in the ocean, although most spend 1-2 years in the ocean. Spawning occurs primarily in May, but may extend to later in the season. Eggs incubate from late March through July, and fry emerge in early summer to September. Fry and smolts disperse downstream in late summer and fall. Smolts typically leave the sub-basins in March to early June after spending 1-7 years (mostly 2-3 years) in rearing waters.

CONDITION:	CONTINGENCY RESPONSE ACTION:
Excessive introgression of spring Chinook with Okanogan River summer/fall Chinook	• Increase selective fishing pressure; shift some or all of the juvenile releases from Ellisforde Pond to Chief Joseph Dam Hatchery or Colville Trout Hatchery • Reduce production numbers; or change some spring Chinook production to summer/fall Chinook
Excessive introgression of Carson stock spring Chinook with Methow fish	• Improve homing to acclimation sites • Reduce production • Deploy selective harvest capability to the Methow River
Significant adverse ecological interactions with endemic populations	• Improve rearing and release protocols to reduce juvenile residency time • Reduce production • Shift some or all of the production from Ellisforde Pond to Chief Joseph Dam Hatchery
Unsatisfied harvest demand of tribal or recreational fishermen	• Increase smolt quality or passage survival to increase adult returns • Increase production; increase selective fishing capability • Adjust harvest allocation between fishing sectors
Underutilized supply of harvestable spring Chinook	• Reduce production • Develop new release sites to expand fishing opportunity • Open access to fishery for other tribes
Excessive harvest mortality to non-target species or natural-origin spring Chinook	• Improve or restrict selective fishing gears • Alter timing or location of fisheries • Reduce production • Shift releases to other acclimation sites
Inadequate broodstock collection at Chief Joseph Dam Hatchery	• Increase homing signal to the hatchery • Shift production from Ellisforde Pond to the hatchery • Use live-capture fishing gear to supplement hatchery broodstock returns • Supplement with surplus broodstock from Leavenworth NFH
Insufficient escapement to Omak Creek	• Improve smolt quality • Reallocate production from the isolated harvest program to the recovery program • Reduce incidental harvest mortalities • Increase habitat improvements • Initiate adult supplementation
Inadequate natural production in Omak Creek	• Increase habitat improvements • Adjust broodstock collection and juvenile rearing protocols • Suspend integrated recovery program until Phase II.

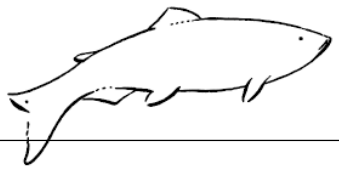


Table 38: Summary of Proposed CJDHP Spring Chinook Production Programs

Program Number[a]	Release Numbers	Release Age	Transfer Date	Transfer Size	Transfer/Release Location	Release Date	Release Size
Spring Chinook							
5.1	200,000	Yearling	10/30	25/lb	Ellisforde Pond	4/15	15/lb
6.1	50,000	Yearling	10/30	25/lb	St. Mary's Mission Pond	4/15	15/lb
6.2	50,000	Yearling	10/30	25/lb	Salmon Creek	4/15	15/lb
7.3	600,000	Yearling	–	–	CJDH	4/15	15/lb
Total	**900,000**						

[a] Program numbers established in the bioengineering model.

Implementation of the spring Chinook programs in the Okanogan subbasin will indirectly affect listed steelhead in Omak Creek, possibly Salmon Creek (depending on if the program is implemented there), and in the Okanogan River. Adult steelhead enter these tributaries in the early spring to spawn and may co-habit these waters with returning adult spring Chinook. Again, this co-habitation is a natural occurrence. Trapping and collection activities associated with the spring Chinook program will encounter adult and juvenile steelhead.

Natural-origin spring Chinook juveniles will co-habit rearing waters with natural-origin juvenile steelhead. This co-habitation is a natural occurrence. The two species minimize competition for food and space largely by occupying different rearing habitats.

Hatchery-origin spring Chinook will also occupy waters with juvenile steelhead, but interactions should be minimized by acclimation procedures and volitional releases. Chinook smolts are expected to migrate promptly out of the creeks and Okanogan River on their downstream migration.

13.9 CONCEPTUAL MONITORING AND EVALUATION COMPONENTS SPECIFIC TO SPRING CHINOOK

Rebuilding a spring Chinook population in Omak Creek and other historical habitats in the Okanogan subbasin will best be accomplished by eventually creating a spawning population consisting primarily of natural-origin fish. Until better knowledge exists about the relative reproductive success of hatchery-origin and natural-origin salmon, the spawning population will be managed to maximize the proportion of natural-origin fish in the escapement.

The CJDHP monitoring and evaluation program described in Chapter 10 in combination with other Okanogan subbasin monitoring and evaluation activities will be designed specifically to collect this information. The CJDHP conceptual monitoring and evaluation program includes performance standards and indicators derived from the spring Chinook HGMP [see SP HGMP, pp. 14- 21]. For a complete list of sample tasks associated with measuring progress against these performance standards see Appendix H.

13.9.1 CONTINGENCY ACTIONS

The collection and evaluation of performance information gathered from the CJDHP monitoring and evaluation program is likely to result in some modifications to the spring Chinook program. Such actions might be directed towards increasing benefits or minimizing risks. The actions described on the previous page describe potential adaptations that could be implemented to optimize program performance based on evaluation of performance indicators. These actions do not include a plethora of changes that might also be made within the hatchery to improve fish culture.

13.10 CONCEPTUAL DESIGN OF SEPARABLE SPRING CHINOOK COMPONENTS

The conceptual design of the CJDHP is described in detail in Appendix G. The following section summarizes necessary modifications and additional new construction associated with the separable CJDHP spring Chinook components.

Tetra Tech/TCM developed a bioengineering model to analyze each of the proposed CJDHP fish rearing programs. Each production program was evaluated using the model (the full list of variables is in Appendix G). Table 38 summarizes the total production numbers for the spring Chinook programs around which the facilities were designed.

Figure 46 indicates the location of the two spring Chinook acclimation facilities that will require modifications as part of the CJDHP.

13.10.1 EXISTING ACCLIMATION PONDS

In addition to the Chief Joseph Dam Hatchery facility, the CJDHP spring Chinook programs will use two existing rearing and acclimation ponds. In addition, two non-pond sites may be used to implement the programs. These include a site at Okanogan Irrigation District's diversion dam on Salmon Creek, and the possible use of floating net pens in Osoyoos Lake. Neither the Salmon Creek nor Osoyoos Lake sites will require modifications under this proposal. Necessary modifications to the three existing ponds are described below.

13.10.1.1 St. Mary's Mission Pond

The St. Mary's Mission rearing pond, is an existing Colville Tribes' owned acclimation pond constructed on Omak Creek below Mission Falls near Omak, Washington. Surface water is supplied to the pond from Omak Creek.

To avoid future fish losses, the pond requires intake modifications. These will include adding a wing wall, removing grating and supports on the pond, installation of chain link fence around the perimeter of site, installation of bird netting, installation of channels with tail and head screens in the pond, and installation of a water level alarm system with reliable radio telemetry.

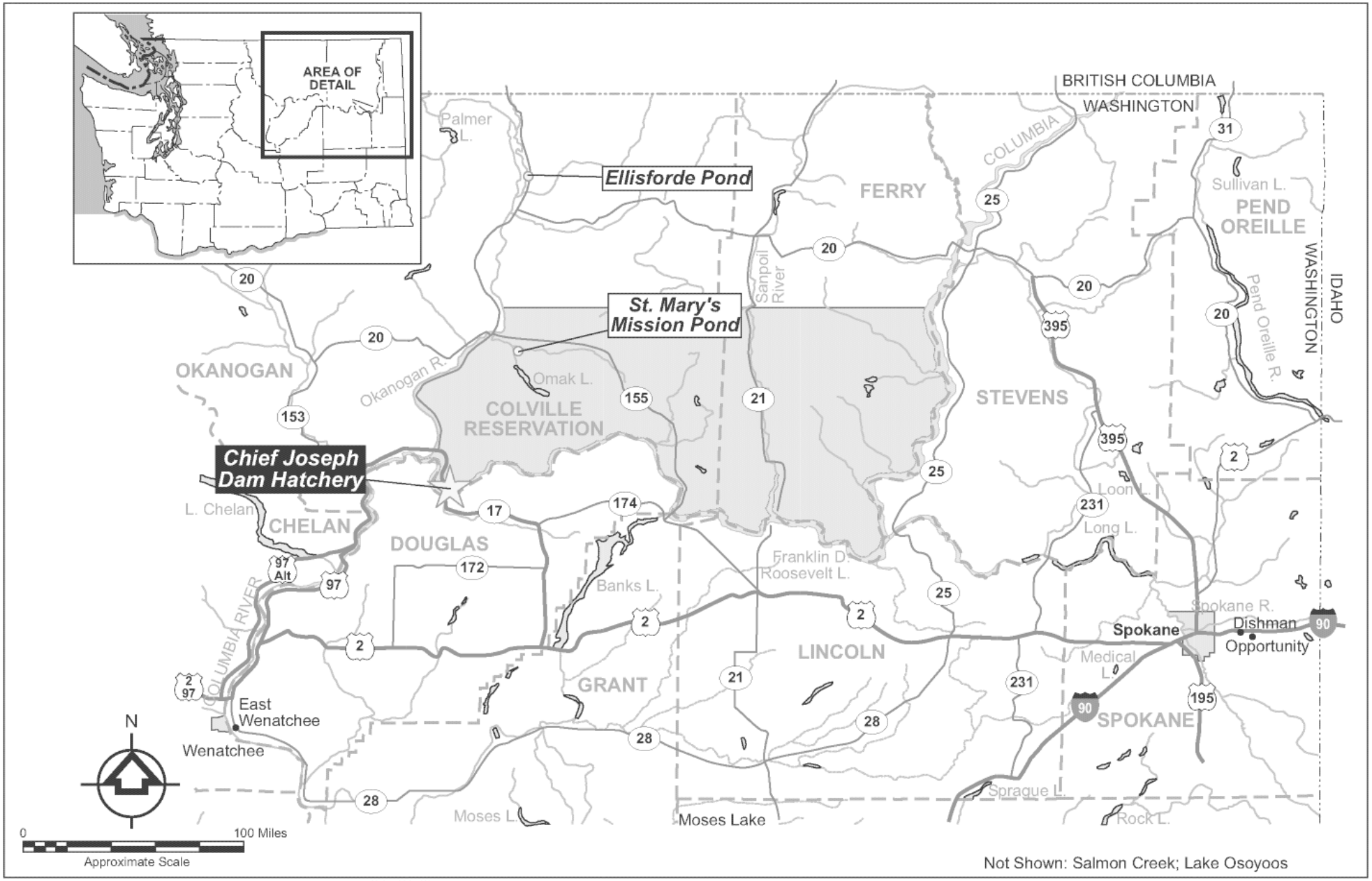
13.10.1.2 Ellisforde Pond

Ellisforde Pond is located on the left bank of the Okanogan River at river mile 62, near the community of Ellisforde. It is an existing open-air pond with a useable rearing volume of 121,500 cubic feet and is supplied with 30 cfs of water from the Okanogan River.

OTID owns and operates the pond for irrigation purposes. The pond has been modified for fish acclimation and has been used for that purpose. However, improvements to the outlet are required to provide for complete drainage of the pond. This will improve release of the fish and ease of operation and maintenance. Installation of a telemetry system with water level alarms and monitoring of other fish rearing parameters is needed.

13.10.2 RELEASE FROM THE CHIEF JOSEPH DAM HATCHERY SITE

Release of juvenile spring Chinook from the Chief Joseph Dam Hatchery will be from the raceways through a pipe running directly from the raceway area to the river. The pipe can be either temporary or permanent.



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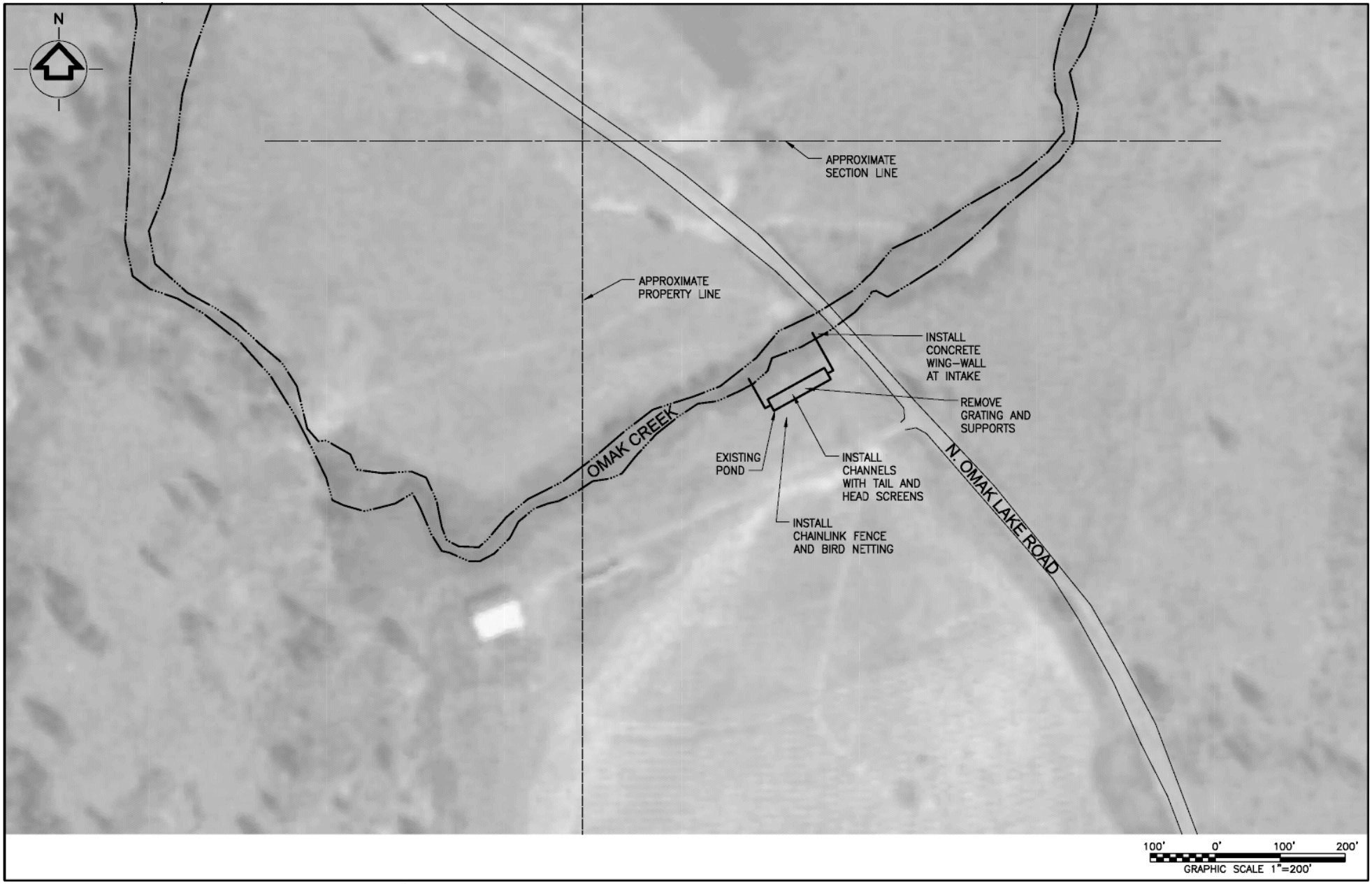
Colville Tribes
CHIEF JOSEPH DAM HATCHERY
CONCEPTUAL DESIGN

FIGURE 46
ACCLIMATION POND SITES
FOR SPRING CHINOOK



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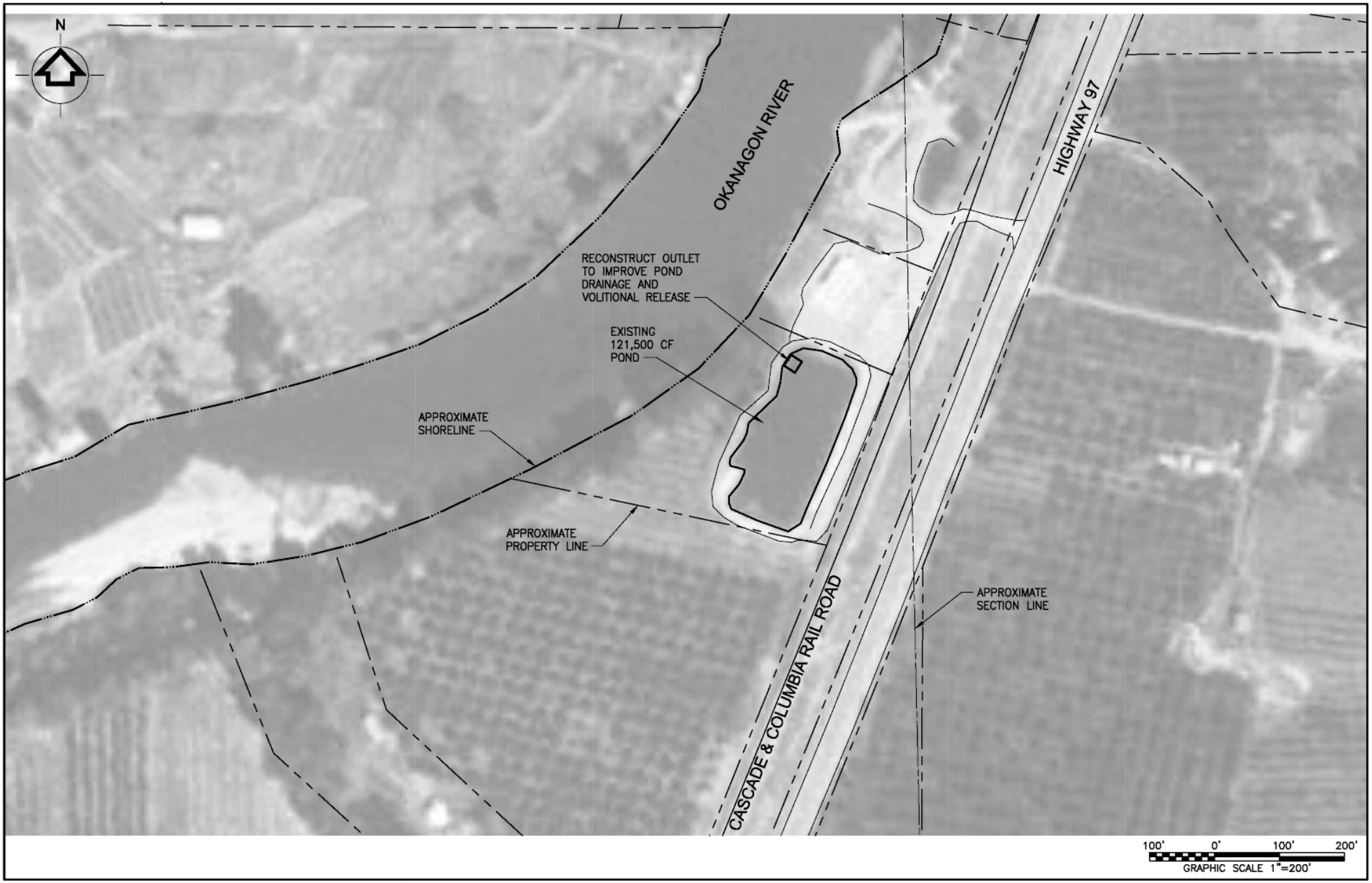
Colville Tribes
CHIEF JOSEPH DAM HATCHERY
CONCEPTUAL DESIGN

FIGURE 47
ACCLIMATION POND SITE PLAN
MODIFICATIONS TO ST MARY'S MISSION POND



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CONCEPTUAL DESIGN

FIGURE 48
ACCLIMATION POND SITE PLAN
MODIFICATIONS TO ELLISFORDE POND

13.10.3 OUTDOOR RACEWAYS

The spring Chinook raceways will be 8 feet wide. Their rearing length will be 120 feet and their average depth will be 4-feet, resulting in an individual raceway rearing volume of 3,800 cubic feet. Design analysis using the bioengineering model indicates that if these were the same size as the summer/fall Chinook raceways, about 40 raceways would be required. With the 3,800-cubic-foot raceways, only 28 raceways are required.

13.11 SUPPORT FACILITIES SPECIFIC TO THE SPRING CHINOOK COMPONENTS

The following specific additional support facilities would be required for the spring Chinook components of the CJDHP.

13.11.1 WATER TREATMENT

With the proposed spring Chinook program, the maximum relief tunnel flow requirement would increase to 36.5 cfs, based on fish biological needs. This peak requirement would occur at the end of October, just prior to the transfer of 300,000 subyearling spring Chinook to the acclimation ponds. The difference between the required 36.5 cfs and the 20 cfs to be supplied by the COE is not likely to be made up by minor adjustments in the rearing programs.

With the inclusion of the spring Chinook programs at the hatchery facility, the incubation flow would increase to 730 gpm, which might require a 250-ton chiller and tower. It may be possible to reduce chilling costs by cooling the relief tunnel water with a heat exchanger and Rufus Woods Lake water during portions of the incubation period.

13.11.2 ADULT FISH HOLDING/ CROWDING/SORTING AREAS

To include the spring Chinook programs, the minimum holding volume would need to be increased to about 10,700 cubic feet to hold the spring Chinook along with the summer/fall Chinook. The increase of only 1,000 cubic feet occurs because most of the spring Chinook will be spawned before all of the summer/fall Chinook enter the facility. The calculated volume for adult holding should be increased to allow space for sorting, excess fish holding and program revision. Water will be supplied through an upwelling sump at the head end of each holding/crowding/sorting raceway.

13.12 COST ESTIMATES FOR SPRING CHINOOK COMPONENTS

All costs estimates and discussion in this section are based on the supposition, that the spring Chinook programs' costs components would be added to the summer/fall Chinook CJDHP costs (i.e. that spring Chinook components would not be constructed without the summer/fall components).

The following sections include separable rollups of estimated costs for the construction of unique facilities, modifications to existing facilities, operations, and monitoring and evaluation activities that would be associated with the additional spring Chinook programs. In many of the following tables the costs associated with the spring Chinook components are shown in relation to the costs of the summer/fall Chinook elements. Substantial additional detail is presented in Appendix B.

13.12.1 COST ESTIMATES FOR SPRING CHINOOK CONSTRUCTION COMPONENTS

The total construction costs to add facilities necessary for the spring Chinook programs to the Chief Joseph Dam Hatchery and to modify the two existing acclimation ponds that would be used for the program is approximately $5.57 million dollars. These costs, as is true of other costs presented in this Master Plan, are preliminary estimates based on a conceptual planning and design. A 30% contingency is added as a line item in recognition of the substantial degree of uncertainty at this stage of design planning.

Constructing the spring Chinook facilities and the summer/fall Chinook facilities at the same time is anticipated to result in cost savings of approximately

5%, or $280,000. This does not take into account additional expenses that would be associated with modifying existing facilities at a later date to incorporate spring Chinook or increase materials costs.

Table 39 provides a summary of capital construction costs for the spring Chinook additions to the Chief Joseph Dam Hatchery facility and for the acclimation pond modifications that would be required for those additional programs.

Table 39: Capital Construction Costs For Spring Chinook Programs

DESCRIPTION	ESTIMATED COST
Water Supply	
Develop well water supply from park 2.5 miles upstream	$ 2,482,000
Piping from summer/fall raceways to spring raceways	$ 183,100
Raceways	
Spring Chinook raceways (bank of 28 units)	$ 664,866
Rearing and incubation additional building space	
Start tank building & incubation area for spring Chinook	$ 533,350
Markups and Other Direct Costs	
Subtotal raw costs with 15% O & 15% P	
Mobilization/demobilization	$ 30,000
Sales tax @ 9%	$ 347,698
Contingency @ 30%	$ 1,158,995
Additional Costs for CJDH Facility Spring Chinook Programs	**$ 5,400,009**
Acclimation Ponds for Spring Chinook Programs	
Saint Mary's Mission Pond - modify existing acclimation pond	$ 56,800
Ellisforde Pond - modifications to an existing 121,500 cubic feet acclimation pond	$ 57,300
Markups and Other Direct Costs	
Sales Tax @ 9%	$ 10,269
Mobilization/demobilization	$ 11,410
Contingency @ 30%	$ 34,230
Additional Cost for Acclimation Ponds for Spring Chinook Programs	**$ 170,009**
TOTAL FOR SPRING CHINOOK PROGRAMS WITH COE SUPPLIED WATER SYSTEMS	**$ 5,570,018**

Chief Joseph Dam Hatchery operational costs for the spring Chinook programs, would add about $222,000 (FY 2004 dollars) to the overall operational costs associated with the summer/fall Chinook programs. Table 40 provides a summery of the anticipated cost increases by operations area.

A 10-year projection for operational areas of the combined summer/fall and spring Chinook programs is presented in Table 41. This 10-year projection includes annual increases of 3.4%.

Table 42 provides a rough estimate of annual operational costs for Ellisforde and St. Mary's Mission acclimation ponds. These costs are included in the overall budget (Tables 40 and 41). Costs would be incurred on an annual basis as part of the full program operations budget.

Table 40: Comparison of Operating Expenses Combined Summer/Fall Base Less Summer/Fall Chinook Budget

OPERATIONAL AREA	SUMMER/FALL AND SPRING CHINOOK BUDGET	SUMMER/FALL CHINOOK BUDGET	DIFFERENCE IN OPERATING BUDGETS
	FY 2004	FY 2004	FY 2004
Payroll (taxes, benefits, mark-ups)	$534,528	$467,843	$66,685
Vehicles (fuel, oil, maintenance, mileage, and insurance)	$27,824	$27,824	$0
Repairs and maintenance (site, buildings, equipment)	$10,000	$10,000	$0
Rent and lease (equipment, vehicles)	$19,200	$19,200	$0
Program supplies (shop, office)	$15,999	$13,999	$2,000
Program supplies (lab, water system, eggtake, incubation)	$15,583	$13,583	$2,000
Program supplies (rearing and release)	$133,999	$74,000	$60,000
Program supplies (tagging, tag recovery)	$150,000	$100,000	$50,000
Utilities (electrical, telephone)	$134,446	$94,462	$39,984
Travel Costs (mileage, lodging, per diem)	$4,939	$4,939	$0
Education and training	$1,500	$1,500	$0
Subcontracts (professional fees, testing, sampling)	$21,500	$20,500	$1,000
Facility insurance	$9,900	$9,900	$0
TOTALS	**$1,079,419**	**$857,780**	**$221,669**

Notes and assumptions: Estimates in FY 2004 Dollars.

Table 41: Operating Expenses Summer/Fall Chinook with Spring Chinook Program Addition 10-Year Projection

OPERATIONAL AREA	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Payroll (taxes, benefits, mark-ups)	$534,528	$552,702	$571,494	$590,925	$611,016	$631,791	$653,272	$675,483	$698,449	$722,197
Vehicles (fuel, oil, maintenance, mileage, insurance)	$27,824	$28,770	$29,748	$30,759	$31,805	$32,887	$34,005	$35,161	$36,356	$37,592
Repairs and maintenance (site, buildings, equipment)	$10,000	$10,340	$10,691	$11,055	$11,431	$11,819	$12,221	$12,637	$13,066	$13,511
Rent and lease (equipment, vehicles)	$19,200	$19,853	$20,528	$21,226	$21,947	$22,694	$23,465	$24,263	$25,088	$25,941
Program supplies (shop, office)	$15,999	$16,543	$17,106	$17,687	$18,289	$18,911	$19,554	$20,218	$20,906	$21,617
Program Supplies (lab, water system, eggtake, incubation)	$15,583	$16,113	$16,661	$17,227	$17,813	$18,418	$19,045	$19,692	$20,362	$21,054
Program supplies (rearing and release)	$133,999	$138,555	$143,266	$148,137	$153,174	$158,382	$163,767	$169,335	$175,092	$181,046
Program supplies (tagging, tag recovery)	$150,000	$155,100	$160,373	$165,826	$171,464	$177,294	$183,322	$189,555	$196,000	$202,664
Utilities (electrical, telephone)	$134,446	$139,017	$143,744	$148,631	$153,685	$158,910	$164,313	$169,900	$175,676	$181,649
Travel costs (mileage, lodging, per diem)	$4,939	$5,107	$5,281	$5,460	$5,646	$5,838	$6,036	$6,242	$6,454	$6,673
Education and training	$1,500	$1,551	$1,604	$1,658	$1,715	$1,773	$1,833	$1,896	$1,960	$2,027
Subcontracts (professional fees, testing, sampling)	$21,500	$22,231	$22,987	$23,768	$24,576	$25,412	$26,276	$27,169	$28,093	$29,048
Facility insurance	$9,900	$10,237	$10,585	$10,944	$11,317	$11,701	$12,099	$12,511	$12,936	$13,376
TOTALS	**$1,079,419**	**$1,116,119**	**$1,154,067**	**$1,193,305**	**$1,233,878**	**$1,275,830**	**$1,319,208**	**$1,364,061**	**$1,410,439**	**$1,458,394**

Notes and assumptions: Projection is based on annual increase of 3.4% in all operational areas. Acclimation pond operational costs are included.

Table 42: Estimated Costs for Operation of Acclimation Ponds Spring Chinook

Pond Name	Pumping	Feed	Personnel	Vehicles	Transport	Total
Ellisforde	$3,000	$7,000	$5,800	$2,000	$800	$18,600
St. Mary's Mission	$600	$1,500	$1,100	$1,000	$500	$4,700
TOTALS	**$3,600**	**$8,500**	**$6,900**	**$3,000**	**$1,300**	**$23,300**

Notes and assumptions: These costs are approximate estimates based on pounds of production. These costs are included in operating estimates for spring Chinook.

13.12.2 COST ESTIMATES FOR CONCEPTUAL MONITORING AND EVALUATION PROGRAM

Additional monitoring and evaluation costs that would be incurred for the spring Chinook portions of the CJDHP monitoring and evaluation program include:

- Costs associated with the base CJDHP monitoring and evaluation program;
- Annual costs of tagging at the base facility; and
- Capital equipment needs.

Table 43 shows the annual monitoring and evaluation costs for the spring Chinook program components projected out ten years. These figures are based on FY 2004 dollars and assume a 3.4% annual increase in all operational areas.

Table 43: Monitoring and Evaluation Expenses Spring Chinook Program 10-Year Projection

OPERATIONAL AREA	FY 2004	FY 2005	FY 2006	FY 2007	FY 2008	FY 2009	FY 2010	FY 2011	FY 2012	FY 2013
Payroll (taxes, benefits, mark-ups)	$120,797	$124,904	$129,151	$133,542	$138,083	$142,777	$147,632	$152,651	$157,841	$163,208
Vehicles (fuel, oil, maintenance, mileage, insurance)	$8,687	$8,982	$9,287	$9,603	$9,930	$10,267	$10,616	$10,977	$11,351	$11,737
Repairs and maintenance (site, buildings, equipment)	$5,377	$5,560	$5,749	$5,944	$6,146	$6,355	$6,571	$6,795	$7,026	$7,265
Rent and lease (equipment, vehicles)	$8,533	$8,823	$9,123	$9,433	$9,754	$10,086	$10,429	$10,783	$11,150	$11,529
Program supplies (shop, office)	$7,031	$7,270	$7,517	$7,773	$8,037	$8,310	$8,593	$8,885	$9,187	$9,499
Program Supplies (tagging, tag recovery)	$827	$855	$884	$914	$945	$977	$1,011	$1,045	$1,081	$1,117
Utilities (electrical, telephone)	$2,895	$2,993	$3,095	$3,200	$3,309	$3,422	$3,538	$3,658	$3,783	$3,911
Travel costs (mileage, lodging, per diem)	$1,250	$2,060								
Education and training	$4,956	$5,124	$5,299	$5,479	$5,665	$5,858	$6,057	$6,263	$6,476	$6,696
Subcontracts (professional fees, testing, sampling)	$1,241	$1,283	$1,327	$1,372	$1,419	$1,467	$1,517	$1,568	$1,622	$1,677
Postage, Dues, Subscriptoins	$827	$855	$884	$914	$945	$977	$1,011	$1,045	$1,081	$1,117
TOTALS	**$161,998**	**$167,506**	**$173,201**	**$179,090**	**$185,179**	**$191,476**	**$197,986**	**$204,717**	**$211,678**	**$218,875**

Notes and assumptions: Hatchery fish are tagged at the Chief Joseph Dam Hatchery facility. Some costs of monitoring and evaluation labor is added, but all equipment costs are covered in the monitoring and evaluation program. Wild fish are tagged at trapping facilities in Okanogan River. All costs covered in the monitoring and evaluation program. Portable PIT tag station and trailer is included in the monitoring and evaluation capital costs. Colville Tribes will use the trailer and equipment at both central facility (PIT tag hatchery fish) and in the field (wild tagging). The Okanogan/Similkameen Baseline Monitoring and Evaluation Program will cover costs during the first year of wild fish tagging (establish a baseline). The hatchery monitoring and evaluation program will cover costs thereafter. Spring Chinook monitoring and evaluation labor and PIT tagging costs are calculated at .45 of summer/falls.

Tagging costs at the proposed main facility are included in the operating expenses budget (Tables 40 and 41). Estimated annual operating expenses for the Chief Joseph Dam Hatchery related to on-site tagging for both the summer/fall and spring Chinook programs are presented in Table 44. A comparison of operating expenses associated with tagging, and with monitoring and evaluation, for the combined summer/fall and spring Chinook programs, as compared to the summer/fall Chinook program, is provided in Table 45. The cost estimate for on-site tagging associated with the spring Chinook programs is approximately $71,000.

Table 44: Operating Expenses Spring Chinook Program Coded Wire Tagging Costs

AREA	QUARTER				YEAR
	Q1	Q2	Q3	Q4	
Payroll (taxes, benefits, markups)	$93,972	$5,694	$5,694	$64,546	$169,906
Vehicles (fuel, oil, maintenance, mileage, insurance)	$75	$75	$75	$151	$376
Repairs and maintenance (site, buildings, equipment)	$175	$175	$175	$175	$700
Rent and lease (equipment, vehicles)	$900	$900	$900	$900	$3,600
Program supplies (shop, office)	$225	$225	$225	$225	$900
Program supplies (lab, water system, eggtake, incubation)	$125	$125	$125	$125	$500
Program supplies (rearing and release)	$50	$50	$50	$50	$200
Program supplies (tagging, tag recovery)	$0	$0	$37,500	$112,500	$150,000
Utilities (electrical, telephone)	$312	$312	$312	$312	$1,250
Travel costs (mileage, lodging, per diem)	$46	$46	$46	$46	$182
Education and training	$0	$0	$0	$0	$0
Subcontracts (professional fees, testing, sampling)	$50	$50	$50	$50	$200
Facility insurance	$21	$21	$21	$21	$82
TOTALS	**$95,951**	**$7,673**	**$45,173**	**$179,100**	**$327,896**

Table 45: Operating Expenses for Tagging and Monitoring and Evaluation Cost for Summer/Fall and Spring Chinook Programs

AREA	BUDGET TOTAL	BUDGET ADDITION	TOTAL BUDGET
	SUMMER/FALL PROGRAM	SPRING CHINOOK PROGRAM	ALL PROGRAMS
Annual Operational Costs	$857,780	$221,639	$1,079,419
Annual M &E Costs	$345,000	$161,988	$506,988
Capital Equipment Budget	$613,978	$0	$613,978

Notes and assumptions: All Figures in FY 2004 Dollars.

13.13 SUMMARY DISCUSSION

Additional construction costs associated with adding and modifying facilities necessary for the spring Chinook programs is $5.57 million dollars. Additional operational costs for the proposed spring Chinook programs add about $222,000 to the operational costs of the hatchery facility, which includes about $22,000 for the operations and maintenance of the acclimation ponds.

Implementing a long-term spring Chinook program is vital to the anadromous fish management goals, as well as the ceremonial and subsistence requirements, of the Colville Tribes. Including the production components described in the previous chapter in the next phases of Step 2 and Step 3 planning, as well as in the eventual construction of Chief Joseph Dam Hatchery would be cost effective. In Step 2, the Colville Tribes will be seeking cost share partners to implement the spring Chinook component of the CJDHP. However, as articulated in this Master Plan, inclusion of spring Chinook production as mitigation for the devastating effects of the Federal Columbia River Hydropower System is clearly justified.