



9.

Chief Joseph Dam Hatchery Program Summer/Fall Chinook Components



9

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9.1 OVERVIEW OF PROPOSED SUMMER/FALL CHINOOK PROGRAMS

The CJDHP is designed to support conservation and harvest of summer/fall Chinook salmon in the Okanogan River and Columbia River above Wells Dam. The CJDHP consists of two complementary programs: an integrated recovery program designed to increase abundance, distribution, and diversity of naturally-spawning summer/fall Chinook salmon populations within historical Okanogan subbasin habitat; and an integrated harvest program designed to support a tribal ceremonial and subsistence fishery. The latter program will also provide increased recreational fishing opportunities for local citizens. In addition, the Colville Tribes plan to use 100 to 300 surplus adult summer/fall Chinook to test the suitability of historical habitat in Rufus Woods Lake for potential re-introduction of summer/fall Chinook above Chief Joseph Dam.

The summer/fall Chinook salmon population in the Okanogan River is at present supported by a single hatchery program that produces 576,000 yearling smolts annually. The proposed CJDHP will increase production of juvenile summer/fall Chinook by 2,000,000: 1,100,000 summer/fall Chinook for conservation purposes, and 900,000 fish for harvest purposes. Figure 23 summarizes the proposed releases.

Relationship of Summer/Fall Chinook Programs to CJDHP Guiding Principles



Accountability

- Measure program performance against specific performance standards and indicators
- Marking of all summer/fall Chinook



Best Available Science

- Program designed to address ecological context of subbasin it will be implemented within
- Use of local broodstock
- Propagation of full life history diversity
- Production facilities designed for low density rearing and acclimation on home waters
- Use of disbursed acclimation sites in historical habitat
- Use of marking protocols



Cost-Effectiveness

- Use and modification of existing irrigation ponds for acclimation facilities
- Apply known water supply



Flexibility

- Use of combination of acclimation and hatchery facilities
- Integration of the recovery and harvest programs to meet overall programmatic objectives
- Built-in adaptation and feed-back loops



Innovation

- Use of live-capture, selective-fishing gear for broodstock collection, ceremonial and subsistence harvest, and to optimize escapement of hatchery-origin summer/fall Chinook
- Partnership with OTID to use acclimation facilities

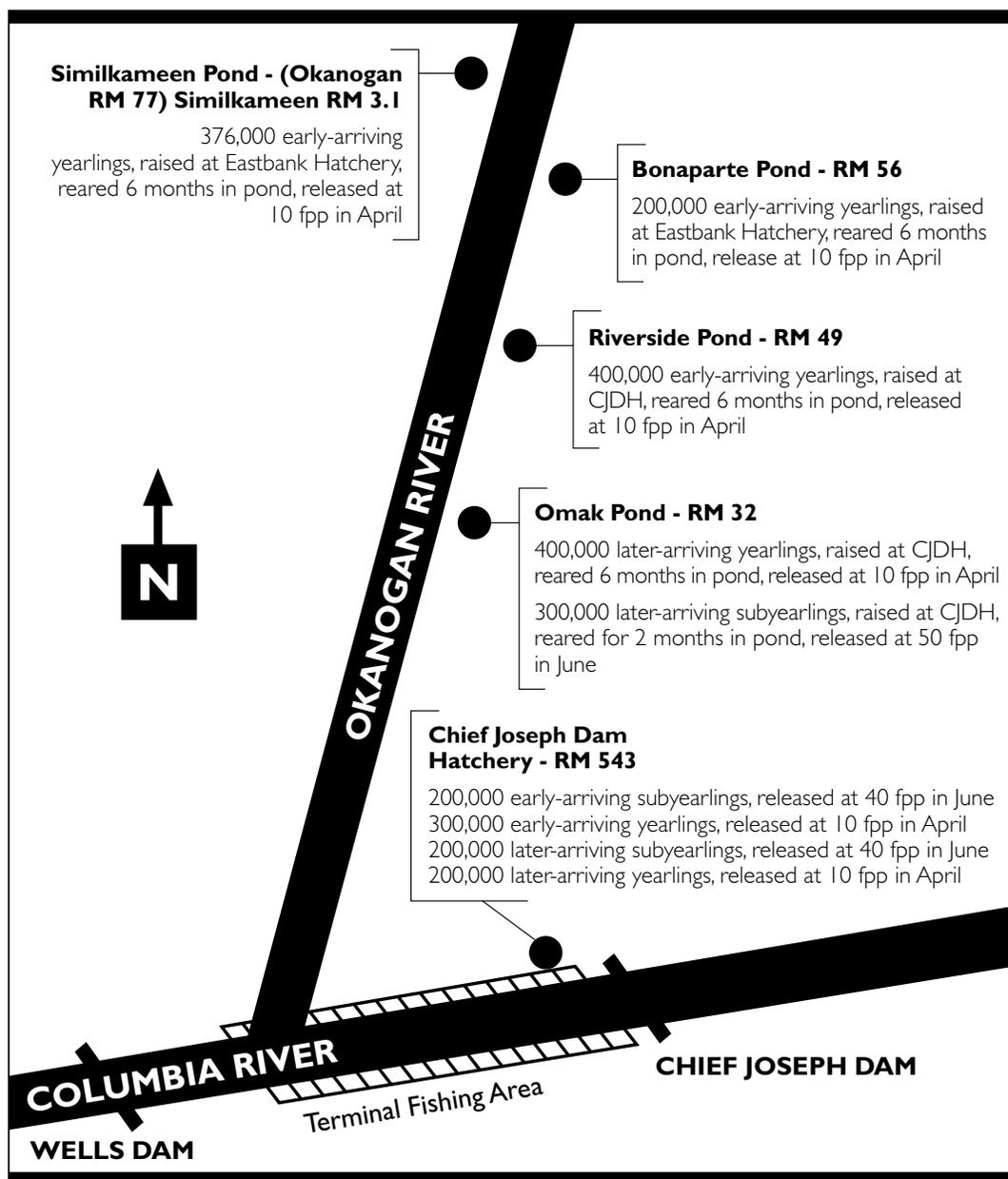


FIGURE 23: Proposed CJDHP Summer/Fall Chinook Releases

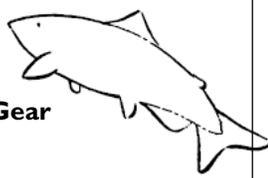
9.2 USE OF NEW AND EXISTING FACILITIES

To ensure programmatic flexibility and to keep costs low, the CJDHP will make use of a combination of new and existing hatchery facilities and acclimation ponds. These facilities include a new hatchery facility at the base of Chief Joseph Dam, two new acclimation facilities, and two existing OTID acclimation facilities

(a contingency acclimation pond is also identified). Table 9 lists the hatchery, acclimation and adult collection facilities that will be used to meet the CJDHP objectives. In addition, in another cost saving measure, existing facilities at the Colville Trout Hatchery may be used to provide food storage and some general maintenance functions rather than constructing additional facilities at the new Chief Joseph Dam Hatchery.

Table 9: Proposed CJDHP Summer/Fall Chinook New and Existing Facilities

HATCHERIES:	
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:	
Similkameen Pond (existing facility)	Located on the Similkameen River at RM 3.1, near the town of Oroville. The Similkameen River enters the Okanogan River at approximately RM 77.
Riverside Pond (new facility)	To be located on the west bank of the Okanogan River at approximately RM 49 upstream from the town of Riverside.
Tonasket Pond (contingency for Riverside Pond)	Located on the east bank of the Okanogan River at RM 59 about 2 miles upstream from the town of Tonasket.
Bonaparte Pond (existing facility)	Located on the west bank of the Okanogan River at RM 56 about 1 mile downstream from the town of Tonasket.
Omak Pond (new facility)	To be located on the west bank of the Okanogan River at RM 32 at the confluence of Omak Creek.
ADULT COLLECTION FACILITIES:	
Wells Dam Trap (existing facility)	Located on the Columbia River at Wells Dam at RM 515. This is an existing collection site and is a contingency site for future CJDHP broodstock collection.
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 (this is a contingency site for broodstock collection).
Live-Capture Gear	Fishing will occur in the Okanogan River, at its confluence with the Columbia River (RM 533.5), and in the Columbia River above the confluence with the Okanogan and below Chief Joseph Dam.



9.3 SIZE OF PROGRAMS

The initial size of the CJDHP integrated recovery and integrated harvest programs is based on: the Colville Tribes' need to provide a stable ceremonial and subsistence fishery for tribal members; the need to

bolster escapements of summer/fall Chinook to the Okanogan subbasin; the need to increase diversity of summer/fall Chinook in mid and lower Okanogan River habitats; the need to improve distribution of naturally-spawning populations through increasing the use of currently underutilized, but suitable habitat; and the need to address the substantially unmet federal mitigation that is still due to the Colville Tribes.

Depending on out-of-subbasin factors, which have a direct influence on the highly variable summer/fall Chinook smolt-to-adult survival rates in the Okanogan subbasin, the CJDHP is expected to increase runs past Wells Dam by 3,000 to 15,000 early-arriving summer/fall Chinook, and 3,000-14,000 later-arriving summer/fall Chinook. In years with low returning numbers of fish, the programs would be managed to achieve escapement and broodstock needs, and provide a minimal ceremonial and subsistence fishery for the Colville Tribes. In years with higher numbers of returning fish, tribal and recreational selective fisheries would be expanded to capture surplus hatchery-origin fish. In those years characterized by very large run sizes, harvest of natural-origin fish could also take place. The live-capture, selective tribal and recreational fisheries will also be managed to optimize the escapement of hatchery-origin fish to the spawning grounds [see SF HGMP, pp. 51-56].

The size of the integrated recovery and integrated harvest programs will be adjusted as needed based on information and analysis gained from the CJDHP monitoring and evaluation program, the Okanogan subbasin baseline monitoring and evaluation program, and input from other basinwide research, monitoring and evaluation activities. The numbers of fish released in the CJDHP integrated recovery program will be based directly on the response of the natural-origin population.

Over time successful expansion of the natural-origin summer/fall Chinook population is expected to lead to a shift in production from the recovery program to the harvest program, or to a reduction in overall release numbers. When the carrying capacity of the Okanogan River is reached, a portion of the releases might be shifted from the acclimation pond sites to direct releases from Chief Joseph Dam Hatchery in order to increase the run size to the Colville Tribes' terminal fishery below Chief Joseph Dam.

9.4 INTEGRATED RECOVERY PROGRAM

9.4.1 PROGRAM OVERVIEW AND GOAL

The CJDHP summer/fall Chinook integrated recovery program is designed to integrate existing and proposed summer/fall Chinook propagation programs with potential natural production capacity. The goal of the integrated recovery program is to increase abundance, distribution, and diversity of naturally-spawning summer/fall Chinook salmon populations within historical habitat in the Okanogan River and Columbia River above Wells Dam.

The program's goal will be achieved through five conservation actions: 1) development of a local Okanogan River broodstock; 2) expansion of current broodstock collection by two months, in order to propagate the full historical run of summer/fall Chinook; 3) propagation of both the yearling and subyearling life histories, to achieve full, natural diversity; 4) improved distribution of spawning throughout historical habitat; and 5) control of the proportion of hatchery-origin fish spawning in the wild.

9.4.2 CONSERVATION ACTION I: INITIATE LOCAL BROODSTOCK FOR OKANOGAN RIVER

Foundational to the CJDHP is the initiation of a local broodstock for the Okanogan River. The current broodstock collection at Wells Dam does not account for the entire run timing, and spawn timing, from the upper to lower Okanogan River. Under the CJDHP the Upper Columbia River Summer/Fall Chinook in the Okanogan River will be managed as a single population and broodstock, but the full continuum in run timing, and spawn timing, from the upper to lower Okanogan River will be recognized. Progeny will be acclimated at sites from the upper basin to lower river based on parental spawn timing [see SF HGMP, p.52].

Under the CJDHP the Colville Tribes will shift broodstock collection from Wells Dam to collection points in the Okanogan River and in the Columbia River near the confluence of the Okanogan River. When necessary, collection may also take place at Chief Joseph Dam Hatchery.

As noted in Chapter 2, in order to meet the conservation objectives of the CJDHP, critical research on radio-telemetry and live-harvest, selective fishing gear must be completed. Completion of radio-telemetry research to determine where and when summer/fall Chinook migrate, where they congregate, and the extent to which they are spatially separated from other population components in the upper Columbia is necessary to fully develop the CJDHP broodstock collection programs. In addition, research to determine whether the timing of passage over Wells Dam is related to timing and location of subsequent spawning must also be completed. This information is critical to refinement of broodstock protocol and subsequent acclimation of progeny.

The second piece of essential research is testing of live-capture gear, and identification of suitable locations for summer/fall Chinook salmon broodstock collection in the Okanogan, Similkameen, and Columbia rivers.

The initial proposed CJDHP broodstock collection goals are identified in Table 10.

**9.4.3 CONSERVATION ACTION 2:
EXPAND BROODSTOCK COLLECTION
TO INCLUDE FULL RUN**

As described in Chapter 5, historically fish passing Wells Dam from July 10th through November 15th were used to propagate the Okanogan River summer/fall Chinook ESU. Since 1987, only the early portion of the run – those fish passing Wells Dam from July 10th through August 28 – have been collected for broodstock. This broodstock collection includes a mix of Okanogan and Methow Chinook. The Colville Tribes and WDFW agree that the Upper Columbia River summer/fall Chinook in the Okanogan River should be managed as a single population and broodstock, but also believe it is important to recognize the full continuum in run timing and spawn timing from the upper to lower Okanogan River in order to restore the complete genetic profile of this ESU. With implementation of the CJDHP, both the early and later-arriving portions of the Okanogan summer/fall Chinook run will once again be propagated in the Okanogan subbasin. A central objective of the CJDHP is to increase the use of suitable lower-river spawning habitat by later-arriving summer/fall Chinook.

Table 10: CJDHP Broodstock Collection Goals

EARLY-ARRIVING SUMMER/FALL CHINOOK: 1070 ADULTS; 1:1 SEX RATIO	
Riverside Pond yearlings	228
Chief Joseph Dam Hatchery yearlings	172
Chief Joseph Dam Hatchery subyearlings	112
TOTAL	512
LATER-ARRIVING SUMMER/FALL CHINOOK: 618 ADULTS, 1:1 SEX RATIO	
Omak Pond yearlings	228
Omak Pond subyearlings	166
Chief Joseph Dam Hatchery yearlings	114
Chief Joseph Dam Hatchery subyearlings	110
TOTAL	618

All hatchery-origin summer/fall Chinook escaping to and above Wells Dam will be adipose fin clipped, whereas natural-origin fish will be unmarked. Natural-origin Chinook will be integrated into the hatchery broodstock to ensure that the hatchery fish are not allowed to genetically diverge from the naturally-spawning fish.

9.4.3.1 Early-Arriving Summer/Fall Chinook

Early-arriving summer/fall Chinook broodstock for the Okanogan subbasin will be collected using live-capture, selective fishing gear fished in and near the Okanogan River consistent with broodstock collection contingencies outlined in the summer/fall Chinook HGMP [p. 52]. All broodstock collection protocols associated with the CJDHP will be reviewed annually. Broodstock collection at Wells Dam will continue only as a contingency action.

The collection of early-arriving summer/fall Chinook broodstock will be based on the run size at Wells Dam. The run at Rocky Reach Dam is also critical as it provides an estimate of the anticipated run at Wells Dam. Since 1990, the Wells Dam count has varied significantly, from 44% to 80%, of the Rocky Reach Dam count. Fishery managers collecting broodstock at Wells Dam will need to be cognizant of the cumulative counts at Rocky Reach Dam to follow collection protocols. The summer/fall HGMP defines program priorities in the event that there are insufficient early-arriving summer/fall Chinook broodstock [SF HGMP, pp. 53 and 56].

Escapement goal for early-arriving summer/fall Chinook past Wells Dam:	3,500
Broodstock objective at Wells Dam:	<u>1,070</u>
Total	4,570

Once the radio-telemetry and broodstock collection research is complete, similar protocols will be developed for broodstock collected in the Okanogan River based on information gathered about the success of live-capture, selective fishing gears and the attributes at various fishing sites.

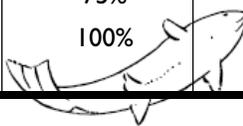
From 1998-2002 the proportion of hatchery-origin fish spawning in the Similkameen River averaged 57% (range 41-70%), while in the Okanogan River, hatchery-origin fish have averaged 51% of the natural spawners (range 33-61%). In both rivers, the proportion of hatchery-origin spawners increases with increasing escapement. This information will be important in establishing protocols for broodstock collection. In collecting broodstock, up to 100% of broodstock will be unmarked, natural-origin fish. Not more than 20% of the natural-origin run will be collected for broodstock (Table 11). Jack Chinook will be collected as a portion of the run at large.

9.4.3.2 Later-Arriving Summer/Fall Chinook

Broodstock for the later-arriving summer/fall Chinook program will be collected using live-capture, selective fishing gear or if necessary, will be collected at Wells Dam's east bank ladder trap from August 29th through November 15th. Fish will be taken equally from throughout the run, with an equivalent collection of males and females. The broodstock collection

Table 11: Proportion of Natural-Origin, Early-Arriving Summer/Fall Chinook in Hatchery Broodstocks

ANTICIPATED COUNT OF EARLY-ARRIVING SUMMER/FALL CHINOOK AT WELLS DAM	MAX. % OF BROOD-STOCK NATURAL-ORIGIN	MAX. % OF NATURAL-ORIGIN FISH IN BROOD-STOCK
< 2,000	50%	20%
2,000 - 5,000	75%	20%
>5,000	100%	20%



objective will be 616 adults to achieve a total program goal of 600,000 yearlings and 500,000 subyearlings.

Interim escapement goal for later-arriving summer/fall Chinook past Wells Dam:	1,200
Broodstock objective at Wells Dam:	<u>616</u>
Total	1,816

The number of broodstock to be collected will be based on the anticipated escapement past Wells Dam. The management objective is to fully seed the available habitat in the Okanogan and Columbia rivers while spreading the risk of low population productivity and survival of this ESU between natural and hatchery production. However, the habitat capacity and corresponding escapement needs are not fully known. The size of the CJDHP will be adjusted based on information gathered through the CJDHP and Okanogan/Similkameen Baseline monitoring and evaluation program. At this time, an escapement objective for later-arriving summer/fall Chinook above Wells Dam is assumed to be 1,200. Because summer/fall Chinook populations in the Okanogan subbasin must pass nine dams and as a result face substantial cumulative passage mortalities, higher productivity of hatchery populations is factored into the broodstock collection protocol as a means to minimize risks of population failure [see SF HGMP, p.56].

As with the early-arriving fish, the broodstock for the later-arriving summer/fall Chinook must also be managed for natural-origin fish as indicated in Table 12. In collecting broodstock, up to 100% of broodstock

Table 12: Proportion of Natural-Origin, Later-Arriving Summer/Fall Chinook in Hatchery Broodstock

ANTICIPATED COUNT OF LATER-ARRIVING SUMMER/FALL CHINOOK AT WELLS DAM	MAX. % OF BROOD-STOCK NATURAL-ORIGIN	MAX. % OF NATURAL-ORIGIN FISH IN BROOD-STOCK
< 2,000	50%	20%
2,000 - 3,000	75%	20%
>3,000	100%	20%

should be unmarked, natural-origin fish; not more than 20% of the natural-origin run should be collected for broodstock.

9.4.4 CONSERVATION ACTION 3: PROPAGATE YEARLING AND SUBYEARLING LIFE HISTORIES

Diversification of juvenile fish releases to include both subyearling and yearling fish is also an important action of the CJDHP. Information gleaned from artificial production programs in both the Columbia and Snake rivers indicate that yearling smolts have a 15 times higher survival rate than that of subyearlings (Bugert 1998). Although the lower survival rates of subyearling programs make such programs somewhat controversial, maintaining and enhancing life history diversity is an important component of the CJDHP integrated recovery program.

The subyearling programs proposed in the CJDHP will be based initially on information gathered from new subyearling programs for fall Chinook in the Snake River, successful releases from the Priest Rapids Hatchery program, and subyearling programs at Wells and Turtle Rock hatcheries. The subyearling component of the CJDHP will provide an opportunity to compare cost-effectiveness and biological characteristics of the subyearling program with the yearling program. The subyearling program will also allow exploitation of the potential capacity of the Columbia River reservoirs to rear juvenile fish. Although the lower survival rates of subyearling programs make such programs somewhat controversial, maintaining

and enhancing life history diversity is an important component of the CJDHP integrated recovery program. Improving passage conditions at the nine downstream dams is also likely to yield better results from subyearling programs and may be a preferable option to altering the life history characteristics to accommodate the downstream dams.

In order to accomplish this action, production will be dispersed to fully utilize historical spawning habitats. Yearling, early-arriving summer/fall Chinook, will be reared, acclimated, and released at Similkameen, Bonaparte, and Riverside ponds and from Chief Joseph Dam Hatchery. Yearling and subyearling later-arriving Chinook will be reared, acclimated, and released from Omak Pond on the lower Okanogan River and from Chief Joseph Dam Hatchery to increase spawning in historical, Columbia River habitat.

9.4.5 CONSERVATION ACTION 4: IMPROVE SPAWNING DISTRIBUTION

As explained in Chapter 5, summer/fall Chinook spawning is currently highly concentrated in the Similkameen River with superimposition of redds occurring on a regular basis, while substantial suitable habitat in the rest of the Okanogan subbasin remains largely under seeded. The CJDHP will redistribute existing production and add new acclimation sites to increase abundance, distribution, and diversity of naturally-spawning summer/fall Chinook salmon populations through their historical Okanogan subbasin habitat.

Under the program, the current production of 576,000 early-arriving summer/fall Chinook reared at Similkameen Pond will be split between WDFW’s Similkameen Pond and the Oroville-Tonasket Irrigation District’s Bonaparte acclimation pond (200,000 reared and released from the Bonaparte Pond and the remaining 376,000 will be reared at the Similkameen Pond). A new pond constructed just upstream from town of Riverside at Okanogan river mile 49, will be used to rear and release 400,000 early-arriving summer/fall Chinook yearlings. In addition, 700,000 later-arriving summer/fall Chinook (300,000 subyearling and 400,000 yearling), will be reared and released from Omak Pond at river mile 32. Figures 23 and 24 illustrate the relative locations of the new and existing acclimation facilities.

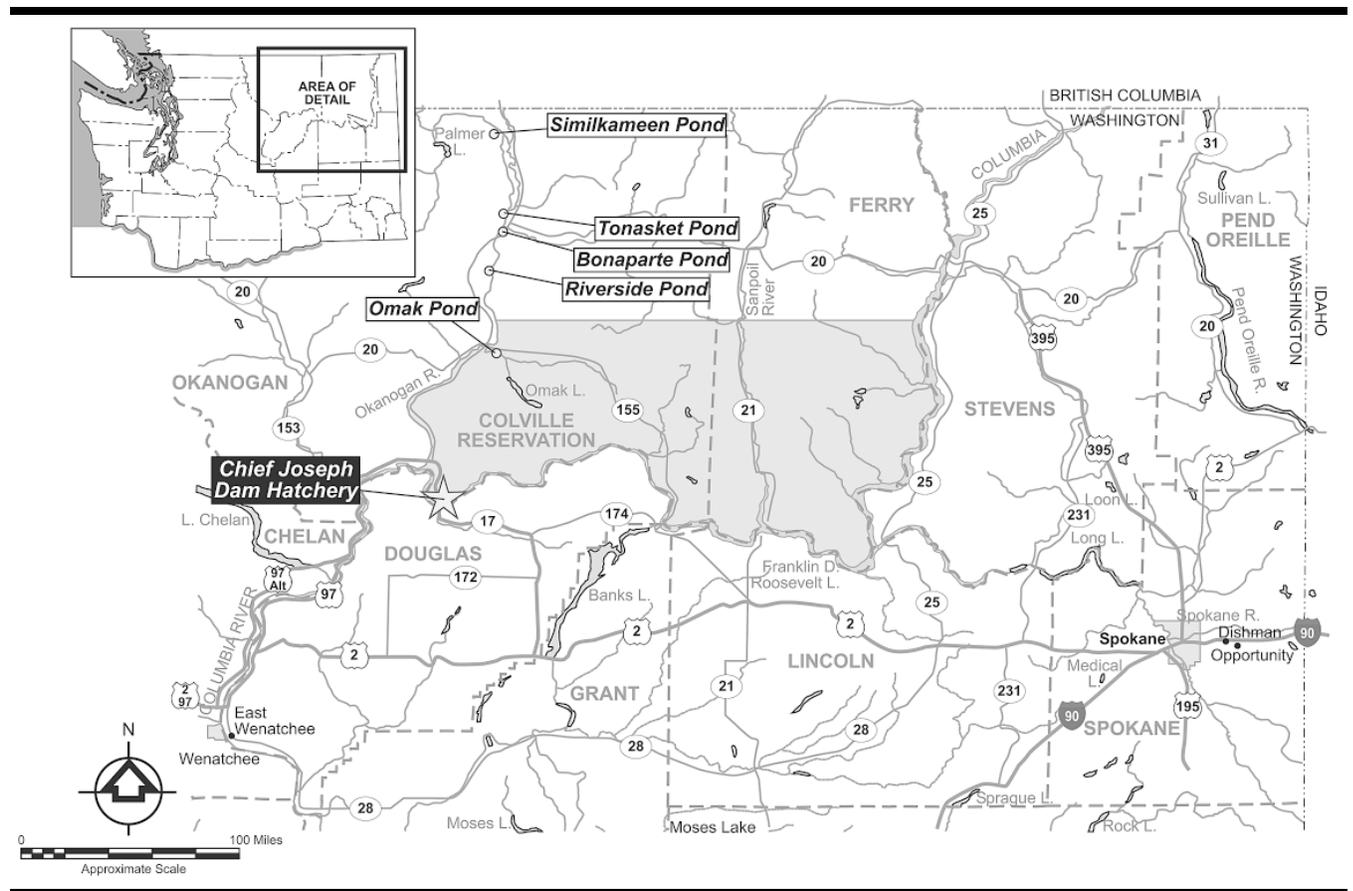


FIGURE 24: Location of Chief Joseph Dam Hatchery and Summer/Fall Chinook Acclimation Facilities

9.4.6 CONSERVATION ACTION 5: CONTROL PROPORTION OF HATCHERY-ORIGIN FISH SPAWNING IN THE WILD

Until better knowledge exists about the relative reproductive success of hatchery-origin and natural-origin salmon, the naturally-spawning population will be managed to increase the proportion of natural-origin fish in the escapement. Collecting information to answer these uncertainties will be a core function of the CJDHP monitoring and evaluation program. Preliminary CJDHP goals to guide harvest and propagation activities are reflected in Table 13.

The Colville Tribes recognize that a number of years of low escapement may be expected due to out-of-subbasin conditions. In years with lower escapements, the sustainability of the population may best be served

by allowing a greater proportion of the locally adapted hatchery-origin fish on the spawning grounds. Also, during early years of the later-arriving summer/fall Chinook propagation program, a high proportion of hatchery-origin spawners will be necessary. These goals will need to be revised based on ongoing results of the monitoring and evaluation program as well as on improved general knowledge of the effects of supplementation as such information becomes available.

Marking protocols in combination with the live-capture, selective fishing gear will be used as important tools to control the proportion of hatchery-origin fish relative to wild fish in the Okanogan subbasin.

Table 13: Desired Proportion of Naturally-spawning, Hatchery-Origin Summer/Fall Chinook, Okanogan and Similkameen Rivers

	CURRENT % HATCHERY	LONG-TERM % HATCHERY
Wells Dam Escapement << 3,500 Early-Arriving Summer/Fall Chinook	~ 47%	< 50%
Wells Dam Escapement >> 3,500 Early-Arriving Summer/Fall Chinook	~ 64%	< 20%

9.5 INTEGRATED HARVEST PROGRAM

9.5.1 PROGRAM OVERVIEW AND GOAL

The goal of the CJDHP integrated harvest program is to support a tribal ceremonial and subsistence fishery and to provide increased recreational fishing opportunities for local citizens. To support the CJDHP integrated harvest objectives 500,000 early-arriving (200,000 subyearling and 300,000 yearling), and 400,000 later-arriving summer/fall Chinook (200,000 subyearling and 200,000 yearling) will be released at Chief Joseph Dam Hatchery.

The CJDHP integrated harvest program will rear summer/fall Chinook using the same broodstock as the CJDHP integrated recovery program to ensure that naturally-spawning fish from both programs are the same. Summer/fall Chinook will be reared and released at Chief Joseph Dam Hatchery to enhance the Colville Tribes’ ceremonial and subsistence fishery located immediately below Chief Joseph Dam. Hatchery fish released at Chief Joseph Dam Hatchery specifically for the integrated harvest program will return to the terminal fishing area below Chief Joseph Dam.

9.5.2 HARVEST ACTION 1: MARK ALL HATCHERY SUMMER/FALL CHINOOK

In order to determine their role in population viability, to support tribal ceremonial and subsistence fishing, and recreational angling on hatchery-origin fish surplus

to conservation needs, all hatchery-origin summer/fall Chinook produced at Chief Joseph Dam Hatchery will be adipose fin clipped, and approximately 40% will be coded wire tagged.

9.5.3 HARVEST ACTION 2: LIVE-CAPTURE, SELECTIVE FISHERIES FOR HATCHERY-ORIGIN FISH

The success of the CJDHP requires deployment of live-capture, selective fishing gear as the primary means of harvest. The major objective for these new, selective fisheries is to harvest surplus hatchery-origin summer/fall Chinook specifically to rebuild ceremonial and subsistence fishing. This innovative fishing strategy will be critical to limiting the proportion of hatchery-origin fish spawning in the wild and limiting the take of non-target species.

Once the CJDHP programs are in operation, the Colville Tribes plan to: 1) continue their modest hook-and-line tailrace fishery immediately below Chief Joseph Dam from July 1 to October 31; 2) initiate a live-capture, selective fishery from Chief Joseph Dam downstream to the area of the Okanogan River confluence from July 1 to October 31; and 3) initiate a live-capture, selective fishery in the upper Okanogan River from July 1 to September 30 (in some years a thermal barrier may limit the Okanogan River fishery at this time of year), and in the lower Okanogan River from July 1 to October 15. These tribal ceremonial and subsistence fisheries will be regulated in cooperation with recreational fisheries, which will also target hatchery-origin summer/fall Chinook.

As discussed in detail in Chapter 4, the Colville Tribes have reserved rights to harvest anadromous fish in an area including the entire length of the Okanogan River within the United States (approximately 75 river miles) and the Columbia River within the United States above the Okanogan confluence (160 river miles), as well as all tributaries within the 3 million acre encompassed by the current Reservation boundaries and the ceded North Half. The Colville Tribes intend to pursue development with the federal government of in-lieu fishing sites in waters adjoining the Reservation and ceded lands, including the Okanogan River upstream to Zosel Dam.



FIGURE 25: Photo Chief Joseph Dam

measured as part of the CJDHP monitoring and evaluation program. Data gathered through this

monitoring and evaluation program, and the Okanogan/Similkameen Baseline monitoring and evaluation program will provide the information necessary to shift production (both short- and long-term) between release sites on the Okanogan River and below Chief Joseph Dam to optimize conservation and harvest benefits, and to minimize risks.

9.5.4 HARVEST ACTION 3: OPTIMIZE ESCAPEMENT OF HATCHERY CHINOOK IN NATURALLY-SPAWNING POPULATION

Future harvest management of Okanogan summer/fall Chinook will be managed to: 1) ensure adequate natural escapement of Okanogan summer/fall Chinook, 2) ensure broodstock collection for summer/fall Chinook propagation programs, 3) provide at least a minimal ceremonial and subsistence fishing opportunity for tribal members, 4) share surplus hatchery-origin Chinook between tribal and recreational fisheries, and 5) develop fishery capacity in strong run years to harvest significant surpluses of hatchery-origin Chinook and even natural-origin fish when appropriate.

The productivity of the natural spawning population should be improved by allowing significant numbers of hatchery-origin fish to spawn only when necessary to maintain minimum escapement levels. Production and harvest will be managed to optimize escapement of hatchery fish to the benefit of the natural population.

Progress against a comprehensive set of performance standards and performance indicators will be

9.5.5 HARVEST ACTION 4: SHARE HARVEST OPPORTUNITIES WITH RECREATIONAL ANGLERS

In addition to addressing federal trust obligations and meeting the ceremonial and subsistence needs of the Colville Tribes, the summer/fall Chinook releases from the Chief Joseph Dam Hatchery will increase recreational angling opportunities in the Columbia River between Wells and Chief Joseph dams from approximately mid-July through October. The Lower Columbia River and ocean fisheries will also be supported by production from the CJDHP summer/fall Chinook programs.

The recreational fishery would be closed in years with lower summer/fall Chinook runs (less than 8,000 fish), to ensure adequate natural escapement and broodstock needs are met, and to assure a minimal tribal ceremonial and subsistence fishery. In medium run years, the tribal ceremonial and subsistence and recreational fisheries would share in the harvestable surplus of hatchery-origin fish. In higher run years both tribal and recreational fisheries would be managed to also allow harvest of natural-origin fish that are in excess of broodstock needs, are in excess of natural spawning escapement goals, and are not needed to ensure the proportion of hatchery-origin fish is not too high in the naturally-spawning population [see SF HGMP, p. 94].

9.6 DESCRIPTION OF PRODUCTION PROGRAM

The proposed summer/fall Chinook CJDHP programs are described in substantial detail in the Okanogan summer/fall Chinook HGMP located in Appendix C. However, reviewers should note the summer/fall Chinook HGMP describes a comprehensive program for management of summer/fall Chinook in the Okanogan River and therefore includes current production programs for the Eastbank Hatchery in addition to the proposed CJDHP.

9.6.1 MATING

Fish will be spawned at a one male to one female ratio. When necessary, gametes of the least numerous sex are split into subsets and these are crossed with gametes from a different individual of the more numerous sex.

Depending on the run size, natural-origin fish will make up to 100% of the broodstock, unless limited by unexpected low numbers of natural-origin recruits in the run. Hatchery-origin brood will be randomly spawned to achieve a random mix of HxH, WxW, HxW, and WxH crosses. A one-to-one mating scheme

will be used for summer/fall Chinook. Males will be live-spawned on the first spawning day as necessary to make up for a low male to female ratio. Jacks will be included because inclusion of jacks in the run-at-large broodstock collection can help alleviate occasional low adult male occurrence (Brown 2001) [see SF HGMP, p. 62].

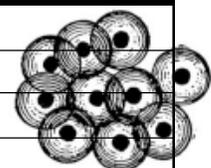
9.6.2 INCUBATION

The CJDHP summer/fall Chinook programs will require 1.14 million early-arriving summer/fall Chinook eggs and 1.39 million later-arriving summer/fall Chinook eggs. In cases where there is a shortage of eggs, the subyearling programs will be initially deferred in favor of the yearling programs.

The summer/fall Chinook programs may take up to 10% surplus eggs to ensure program release goals are met. The number of surplus eggs will be based on program performance and the preeminent objective of ensuring adequate escapement to the spawning grounds. Under no circumstances, will smolts in excess of 110% of program objectives be released. Ultimately, the take of surplus eggs will be minimized when program survival levels are determined and stabilized through information gleaned through the monitoring and evaluation program [see SF HGMP, p.64].

Table 14: Number of Eggs Required to Meet CJDHP Production Goals

PROGRAM	PRODUCTION GOAL	SURVIVAL	EGGS REQUIRED
EARLY-ARRIVING			
Riverside Pond	400,000 yearling	Egg-to-smolt 78%	513,000
Chief Joseph Dam Hatchery	300,000 yearling	Egg-to-smolt 78%	385,000
Chief Joseph Dam Hatchery	200,000 subyearling	Egg-to-fingerling 81%	245,000
Total early-arriving eggs			1,143,000
LATER-ARRIVING			
Chief Joseph Dam Hatchery	200,000 yearling	Egg-to-smolt 78%	Total combined 503,000
Chief Joseph Dam Hatchery	200,000 subyearling	Egg-to-fingerling 81%	
Omak Pond	300,000 subyearlings	Egg-to-smolt 78%	Total combined 890,000
Omak Pond	400,000 yearlings	Egg-to-fingerling 81%	
Total later-arriving eggs			1,393,000



9.6.3 REARING

Rearing conditions at the proposed Chief Joseph Dam Hatchery are based on density and flow criteria of 1 lb./inch/gpm, 0.75 lbs./cubic foot, and 1 turnover/hour.

Acclimation pond rearing densities for the CDJHP are designed to be very low in order to create a more natural rearing environment. The Similkameen Pond (an existing facility) was initially designed based on rearing densities described by Piper (1982).

Redistributing the Similkameen Pond production between Similkameen and Bonaparte ponds will result in much lower rearing densities at Similkameen, close to about 4 lbs/gpm and 0.49 lbs./ cubic foot at time of release (assuming 10 fpp). At Bonaparte Pond, rearing densities could be as low as 1.8 lbs./gpm and 0.26 lbs./ cubic foot. Rearing densities in Tonasket Pond (an existing OTID irrigation settling pond which is a contingency for Riverside) could be as low as 3.6 lbs./ gpm and 0.54 lbs./cubic foot. However, flow rates in the pond may be reduced to save on pumping costs, in which case loading rates would be closer to Piper's criteria. Descriptions of the two new acclimation ponds, at Riverside and Omak, are included in Chapter 11. Loading densities at both ponds will be substantially lower than Piper's criteria.

Transfer of summer/fall Chinook from the hatchery facilities to the CJDHP acclimation ponds will occur only after river temperatures are similar to the water temperature at the hatchery. Typically this thermal condition occurs in October. Transfer to the acclimation ponds might be further delayed to prevent disease infections if substantial numbers of naturally spawned carcasses are present immediately above the pond's water intake. Prior to complete production transfer, tests will be conducted with a sample size of

fish to ensure acclimation conditions are suitable to ensure fish survival.

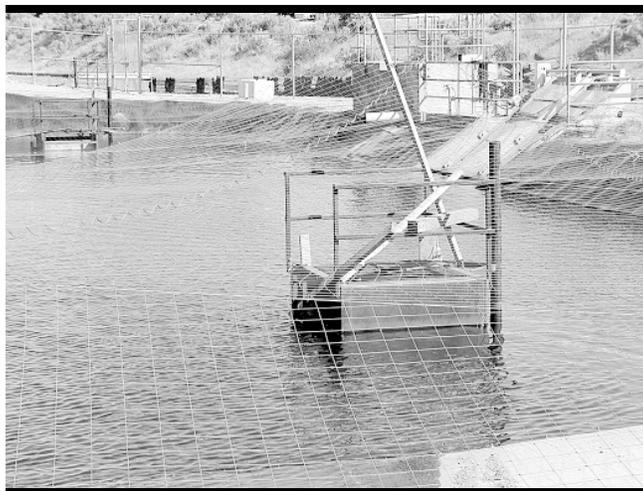
All fish will be transported to their final rearing and acclimation ponds months prior to release.

The yearling summer/fall Chinook fish will be reared in the acclimation ponds for six months and then released volitionally in early to mid April with forced release to follow as necessary. The subyearling fish will be reared for two months and released volitionally in June, with forced release to follow as necessary. All fish will be reared in the acclimation ponds on local river water at very low densities. All of the

acclimation facilities will be covered with netting to prevent avian predation. Releases will be coordinated with initiation of the mid-Columbia flow and spill programs to increase survival of fish passing the dams. These operations normally start about April 12th.

Integration of rearing techniques to mimic natural conditions will be considered at the acclimation facilities. In particular, consideration will be given to adding structure and subsurface feeders to emulate natural conditions. The research on NATURES and other relevant data will be reviewed prior to final design to determine if survival advantages justify the cost of necessary modifications or additions. At this time natural rearing techniques will not be applied in the design of the Chief Joseph Dam Hatchery facilities.

Those remaining summer/fall Chinook not transported to acclimation ponds (destined for the terminal Chief Joseph Dam fishery) will be reared and acclimated at Chief Joseph Dam Hatchery from hatching through release. Fish will be reared on water from the Chief Joseph Dam relief tunnel and subsurface waters from Rufus Woods Lake [see Chapter 11, see also SF HGMP, pp. 64-78].



Alison Squier

FIGURE 26: Photo Bonaparte Acclimation Pond

9.7 POTENTIAL ECOLOGICAL AND GENETIC EFFECTS

9.7.1 POSSIBLE EFFECTS ON ESA LISTED SPECIES

Two ESA-listed anadromous fish ESUs could be incidentally affected by the CJDHP - Upper Columbia River Spring Chinook and Upper Columbia River Steelhead. Because Upper Columbia River Spring Chinook are extirpated from the Okanogan subbasin, the majority of possible effects of the CJDHP would be between summer/fall Chinook and Upper Columbia River steelhead.

The CJDHP monitoring and evaluation program will assess all aspects of steelhead and Chinook interactions as well as measuring possible interactions between Methow River Spring Chinook (i.e. straying of summer/fall into the Methow River). Information derived from the CJDHP monitoring and evaluation program will be used to adjust the Chinook program as necessary to minimize or eliminate any significant problems with listed species. The Council's Step 2 requirement to complete NEPA includes completion of a Biological Assessment and Essential Fish Habitat report to comply with possible effects on ESA listed species.

9.7.1.1 Upper Columbia River Spring Chinook

There are no ESA-listed Upper Columbia River Spring Chinook spawning in the Okanogan or Columbia rivers. The summer/fall Chinook released into the Okanogan subbasin would be expected to migrate back to their natal river. Fish released directly from Chief Joseph Dam Hatchery will either be harvested, return to the hatchery, or spawn in the Columbia River. No genetic interactions are expected between these two Chinook ESUs. Spring Chinook in the Methow River will be monitored to determine if Okanogan summer/fall Chinook are present in the spawning spring Chinook population in sufficient numbers to cause concern. Spring Chinook in the Methow would spawn earlier in the season than summer/fall Chinook so surveys will be completed earlier in the season. Coded wire tags recovered from salmon carcasses will indicate any presence of hatchery-origin fish from the Okanogan subbasin.

Adult upper Columbia River Spring Chinook could be minimally exposed to the harvest directed on the adult summer/fall Chinook arising from this program. Incidental harvest effects are examined in *Biological Assessment for the 2002 - 2012 Chief Joseph Dam Tailrace Fishery for Colville Tribal Members and the Incidental Impacts on Salmon and Steelhead Species Listed Under the Endangered Species Act (CCT 2002)*.

9.7.1.2 Upper Columbia River Steelhead

Low numbers of upper Columbia River steelhead may spawn and rear in the upper Okanogan River including Canadian waters, the lower Similkameen River, and in lower tributaries of the Okanogan River. Rearing and migrating steelhead may be affected by the summer/fall Chinook arising from the CJDHP.

Upper Columbia River steelhead spawn in tributaries of the Okanogan River. Young of the year steelhead are thought to rear in the tributaries until their smolt migration the following spring. Some juvenile steelhead may drop out of the tributaries in May and June of their first year and rear through the summer in limited microhabitats in the Okanogan River where water temperatures from subsurface flow are suitable. Yearling summer/fall Chinook should have migrated from the Okanogan River prior to any juvenile steelhead inhabiting these waters. Any steelhead fry that would be in the Okanogan River would also be occupying shallow habitats, whereas the larger Chinook should be in deeper, faster waters. Therefore predation and competition by Chinook on young of the year steelhead for food and space should be minimal and insignificant.

Yearling Chinook can be expected to co-habit waters of the Okanogan River with yearling steelhead (arising from tributary streams) prior to and during their migration. Predation is not expected to occur because the steelhead will be too large for Chinook consumption. Competition for food and space will occur to a limited extent, but should have only minor adverse effects since the Chinook will be actively migrating to the larger waters of the Columbia River. Also steelhead and Chinook tend to occupy different habitat types when rearing, with steelhead occupying riffle habitat and Chinook occupying deeper pools.

All early-arriving summer/fall Chinook released in the Okanogan and Similkameen rivers in April will be yearling smolts and are therefore expected to actively migrate down to, and through, the Columbia River. These fish will be about 130 to 140 mm in length at the time of release. Early-arriving summer/fall Chinook released from Chief Joseph Dam Hatchery will be yearlings of a similar size and will be released at approximately the same time. Under the CJDHP subyearlings about 45 to 55 mm in length will also be released from the Chief Joseph Dam Hatchery in June. Later-arriving summer/fall Chinook released in the lower Okanogan River and at Chief Joseph Dam Hatchery will be yearlings of about 130 to 140 mm in length and will be released in April. Subyearling summer/fall Chinook of about 45 to 55 mm in length will be released in June.

The June subyearling summer/fall Chinook released in the lower Okanogan River should not co-habit waters used by steelhead fry because these fish are expected to reside primarily in the tributary streams. If some steelhead fry are present in the lower Okanogan, it is possible some competition for food could occur until the Chinook migrate out to the Columbia River. This competition is expected to be short-lived and fairly insignificant since steelhead and Chinook tend to occupy different habitat types.

The increased numbers of summer/fall Chinook spawning in the Okanogan River as a result of the CJDHP should provide a beneficial effect for the steelhead populations. Carcasses of spawned out Chinook will provide nutrients and a direct food source for rearing steelhead. Chinook will also be spawning in riffle areas that until recently have been unutilized or underutilized. This spawning action will clean the gravels of silt, a perennial problem in the Okanogan River, which in some areas might provide better rearing habitat for steelhead. Emerging Chinook fry will also provide a food supply for yearling steelhead.

If trapping of broodstock at Wells Dam is necessary, delay of adult steelhead could occur. Trapping protocols will be designed to minimize any delays that could affect steelhead survival and spawning success.

9.7.1.3 Bull Trout

Listed bull trout are not believed to exist in the Okanogan River downstream from Zosel Dam and Enloe Dam. Therefore the CJDHP should not affect this listed species in the Okanogan subbasin. The change in numbers of migrating Chinook resulting from this program should also have inconsequential effects to any bull trout residing in the Columbia River.

9.7.2 DISEASE TRANSMISSION

Interactions between hatchery-origin and natural-origin fish can be a source of pathogen transmission. Because most pathogens responsible for diseases are present in both hatchery-origin and natural-origin fish, there is uncertainty as to the extent to which hatchery-origin fish are responsible for transmission of diseases. Hatchery fish are often more susceptible to disease because of high rearing densities (Bugert 1998). The rearing densities in the CJDHP acclimation ponds will be much lower than standard propagation guidelines thereby reducing the probability of disease outbreaks. The volitional release strategy for these ponds should also minimize crowding of hatchery-origin and natural-origin fish in the Okanogan and Columbia rivers, reducing the potential for disease transmission.

The carcasses from the numbers of fish returning to spawn as a result of this program, in combination with the relatively high fall temperatures, could provide a medium for colonization of pathogens. To reduce the risk of infection, transporting juvenile fish to acclimation ponds may need to be occasionally delayed until water temperatures decline.

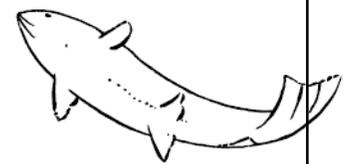
9.8 PROGRAM CONTINGENCIES AND ADAPTATION LOOP

Due in large part to the extensive negative out-of-subbasin impacts on Okanogan summer/fall Chinook populations, at this time it is highly improbable that the conservation and harvest goals of the CJDHP could be met without assistance of artificial production. All components of the CJDHP are expected to continue into the foreseeable future unless results from the monitoring and evaluation programs suggest that

certain components should be discontinued, due to either insufficient benefits, or unacceptable risks. The CJDHP is designed as an adaptive program. The summer/fall Chinook HGMP identifies a comprehensive set of performance standards and indicators, which are the basis of the CJDHP monitoring and evaluation program. The integrated recovery and

integrated harvest components will be adjusted regularly based on the results of the CJDHP monitoring and evaluation program analysis. In addition, information gathered through the Okanogan/Similkameen Baseline Monitoring and Evaluation Program will be incorporated into the management of the CJDHP to provide a more comprehensive picture

CONDITION:	CONTINGENCY RESPONSE ACTION:
Excessive escapement of hatchery-origin summer/fall Chinook in the Okanogan subbasin.	<ul style="list-style-type: none"> • Increase selective fishing pressure • Shift some of the juvenile releases from Okanogan River ponds to Chief Joseph Dam Hatchery or Colville Trout Hatchery • Reduce production numbers • Change some summer/fall Chinook production to spring Chinook
Significant adverse ecological interactions with natural populations.	<ul style="list-style-type: none"> • Improve rearing and release protocols to reduce juvenile residency time • Reduce production; shift some or all of the production from Okanogan River ponds to Chief Joseph Dam Hatchery
Unsatisfied harvest demand of tribal or recreational fishermen.	<ul style="list-style-type: none"> • 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 summer/fall Chinook.	<ul style="list-style-type: none"> • 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 summer/fall Chinook.	<ul style="list-style-type: none"> • Improve or restrict selective fishing gears • Target harvest to hatchery-origin fish only • Alter timing or location of fisheries • Reduce production • Shift releases to other acclimation sites
Inadequate broodstock collection using live-capture, selective fishing gears.	<ul style="list-style-type: none"> • Improve gear efficiency or effort • Incorporate volunteers to Chief Joseph Dam Hatchery • Supplement with fish from Wells Dam trap
Insufficient escapement to the Okanogan subbasin.	<ul style="list-style-type: none"> • Improve smolt quality • Reallocate production from the Integrated Harvest Program to the Integrated Recovery Program • Reduce incidental harvest mortalities • Increase habitat improvements



of the fit between the CJDHP and the rest of the Okanogan subbasin ecosystem [see Chapter 10 and Appendix H for information on the conceptual monitoring and evaluation program].

The preceding list of possible contingency actions identifies a limited range of conditions that might arise, along with examples of potential responsive actions. It is not possible to foresee all of the conditions that might arise, or to anticipate the single correct response. The list below is intended to indicate that many adaptive responses are possible; in fact in some cases many combined responses might be appropriate. The following list does not include any of the possible actions that could be taken to improve fish culture within the Chief Joseph Dam Hatchery itself. The integrated programs of the CJDHP will be adjusted and adapted to comport to existing conditions and best available scientific knowledge.

