HATCHERY AND GENETIC MANAGEMENT PLAN (HGMP)

Hatchery Program:	CHIEF JOSEPH HATCHERY PROGRAM OKANOGAN BASIN SPRING CHINOOK
Species or Hatchery Stock:	NON-ESSENTIAL EXPERIMENTIAL OKANOGAN SPRING CHINOOK
Agency/Operator:	COLVILLE CONFEDERATED TRIBES
Watershed and Region:	OKANOGAN & COLUMBIA RIVERS
Date Submitted:	21 December 2012
Date Last Updated:	13 May 2013

Summary

This document is the Hatchery Genetic Management Plan (HGMP) for the reintroduction of spring Chinook salmon in the Okanogan River Basin. In 2008, a HGMP was submitted and a Biological Opinion (BiOp) issued by NMFS to cover the spring Chinook salmon hatchery programs for the new Chief Joseph Hatchery, a facility that will be operational in 2013 (CCT 2008; NMFS 2008a). The current accepted HGMP includes two spring Chinook programs, a segregated harvest program that uses Leavenworth stock and an integrated conservation program that was also going to use Leavenworth stock (CCT 2008). This revised HGMP only addresses changes to the integrated conservation program. The major differences between the approved 2008 HGMP and this revised HGMP is the source population (Methow Composite instead of Leavenworth) and release location (Okanogan mainstem instead of both the Okanogan mainstem and Omak Creek). These changes are proposed to reduce risk and potential affects to ESA listed spring Chinook in the Methow River and ESA listed steelhead in the Okanogan River basin.

We are revising the Okanogan spring Chinook HGMP at this time because the NMFS is currently evaluating a proposal to designate Methow Composite stock released into the Okanogan as a “non-essential experimental population” under section 10j of the Endangered Species Act. In September of 2012, NOAA determined that a revised HGMP would be required to move forward with the implementation of 10j designation, assuming it is approved through the NEPA process.

The goal of this proposed spring Chinook salmon artificial propagation program is to restore natural spawning spring Chinook salmon in historical habitats of the Okanogan subbasin using the nearest available within-ESU donor stock, Methow Composite. Ultimately, the CCT’s long-term vision is to restore ceremonial and subsistence fishing for its membership throughout their usual and accustomed fishing locations, which includes the Okanogan Basin. Although harvest is not a primary purpose of the reintroduction program described herein, if removal of returning hatchery fish is warranted for conservation objectives, then it is the intent of the CCT to utilize those fish for ceremonial and subsistence.

The release production target for the proposed program is 200,000 fish. These fish will be from the Methow Composite stock, which are collected and reared at the Winthrop National Fish Hatchery. Fish will be acclimated on Okanogan River water near the town of Tonasket in the Okanogan River Basin and released directly into the Okanogan River. This revised HGMP does not include a full suite of information on the operations and effects of the WNFH. The USFWS has prepared a separate HGMP for their program and readers should refer to that document for more details regarding broodstock collection, early rearing, effects to the Methow population, etc.(USFWS 2012a).

Anadromous fish co-managers in the *US v. Oregon* forum have already agreed that when sufficient Methow Composite broodstock can be collected to generate greater than 400,000 smolts, that up to 200,000 fish should be made available for transfer to the Okanogan River basin (US v. Oregon 2012; USFWS 2012b).

The reintroduction program size (200,000 smolts) is based partially on the availability of Methow Composite stock that was agreed to by fish co-managers in the US v. Oregon process (US v. Oregon 2012). However, if the actual SAR is similar to other spring Chinook programs in the upper Columbia (~0.3%) then it is expected that about 600 adults will return to the Okanogan River, which represents a compromise between the genetic need for a reasonable effective population size (usually considered about 500 spawners) with the uncertainties of the carrying capacity of the Okanogan River basin for spring Chinook. The tag and mark plan is for the smolts to be unclipped (adipose present) with a coded wire tag in the snout and 5,000 will have a PIT tag. This will maximize protection through mark selective fisheries and in adult management activities at Wells Dam which could target over escapement of Winthrop fish destined for the Methow River. Currently, the USFWS is obligated to adipose clip all smolts when their program is over 200,000; including those destined for the Okanogan. The USFWS is committed to getting approval for a change in the mark plan through the US v. Oregon process once the 10(j) designation is approved (William Gale, personal communication). There could be one or two releases of adipose clipped smolts in the Okanogan before the 10(j) designation and the US v. Oregon approvals line up for transition to an adipose present mark plan.

This program is expected to continue into the foreseeable future unless M&E indicates certain components should be discontinued due to insufficient benefits or unacceptable and unalterable risks. Program components may be adjusted at any time based on M&E results through an Artificial Production Review (APR) annual meeting that is already underway for the rest of the CJH program. At a minimum, it is expected to take two generations (8-10 years) of reintroduction efforts using primarily hatchery-origin broodstock from the MetComp stock to establish a spawning population that includes some natural-origin spawners. After at least two generations of reintroduction efforts, the strategy and success of the program will be evaluated to determine if modification is warranted. At such time as M&E evaluations indicate that there are sufficient natural-origin returns, the program will shift to an integrated conservation program that uses some natural-origin broodstock and reduces pHOS to achieve a PNI greater than 0.50. It is anticipated that the Okanogan River will always need some level of hatchery supplementation in order to overcome the many anthropogenic factors limiting survival such as hydropower, harvest, and habitat degradation.

The analysis in this HGMP concludes that the proposed program poses no threat of continued existence to UCR spring Chinook salmon or steelhead. Further, we believe this experimental program using MetComp stock will reduce the risk of strays to the adjacent Methow population when compared to the existing approved HGMP (CCT 2008). Simultaneously, this program will help with recovery efforts in the ESU by decreasing pHOS in the Methow (due to 200,000 fewer smolts released there) and increasing the spatial structure and natural origin abundance of the ESU.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

SECTION 1. GENERAL PROGRAM DESCRIPTION

1.1) Name of hatchery or program.

Chief Joseph Hatchery
Okanogan River Spring Chinook (non-essential experimental status under section 10j of the Endangered Species Act)

1.2) Species and population (or stock) under propagation, and ESA status.

The Upper Columbia River Spring Chinook evolutionary significant unit (ESU) were listed as an endangered species on March 24, 1999. The listed ESU includes all naturally spawned populations of spring Chinook in accessible reaches of Columbia River tributaries between Rock Island and Chief Joseph dams, excluding the Okanogan River. The historic independent population of spring Chinook salmon from the Okanogan River is considered extirpated (ICTRT 2007). Several hatchery populations from the Methow and Wenatchee subbasins where included in the listed ESU. Critical habitat for the listed ESU was designated on September 5, 2005, and included all river reaches accessible to listed spring Chinook salmon in Columbia River tributaries between Rock Island and Chief Joseph dams, excluding the Okanogan River (70 FR 52630).

This HGMP is for the proposed reintroduction of “non-essential experimental” spring Chinook that will originate from hatchery broodstock taken from the ESA listed (endangered) Methow population.

The existing approved HGMP for spring Chinook in the Okanogan would have utilized unlisted Leavenworth stock spring Chinook in the Okanogan River basin as well as the Columbia River. The existing approved HGMP included the following statement: “The Colville Tribes’ intent is to transition a portion of this program to ESA-listed Methow Composite stock upon its availability. This HGMP will be revised upon transition.”

This HGMP represents the revision described in the existing approved HGMP (CCT 2008). This HGMP describes a program that will receive pre-smolts or eggs from the Winthrop National Fish Hatchery; however, upon availability and approval by all relevant parties, the program could include and would be expected to function identically with transfer of broodstock, eggs or pre-smolts from any source of Methow Composite stock (e.g. Methow Hatchery, Wells Dam, tributary weirs). The CCT envisions that this adjustment could be done without a formal revision to this HGMP.

1.3) Responsible organization and individuals

Name (and title): Randall Friedlander, Acting Director F&W Department
Agency or Tribe: Confederated Tribes of the Colville Reservation
Address: P.O. Box 150, Nespelem, Washington 99155
Telephone: 509-634-2113

Fax:	509-634-2356
Email:	randall.friedlander@colvilletribes.com

Other agencies, Tribes, co-operators, or organizations involved, including contractors, and extent of involvement in the program:

U.S. Fish & Wildlife Service – operates Winthrop NFH, the source of spring Chinook broodstock, eggs, and juveniles; tribal trust responsibilities

Washington Department of Fish and Wildlife – will co-manage spring Chinook in the Okanogan subbasin

Grant County Public Utility District – cost-share partner
Chelan County Public Utility District – potential cost-share partner
Douglas County Public Utility District – cost-share partner

Bonneville Power Administration – provides funding, tribal trust responsibilities

National Marine Fisheries Service – reviews program for ESA compliance; tribal trust responsibilities.

1.4) Funding source, staffing level, and annual hatchery program operational costs.

SECTION 1.4 TO BE REVISED IN STEP 3 OF PLANNING

<u>CJHP Funding:</u>

All costs are estimated because the hatchery is not yet finalized, cost share agreements are still in negotiation, and actual O&M and M&E costs cannot be accurately estimated until the program is underway.

<u>Capital:</u>

Grant PUD:	*$10M*
Douglas PUD:	*$0*
Chelan PUD	$0
BPA:	$ 40M+pending cost sharing with the above entities

<u>Annual Operation and Maintenance (O&M):</u>

Grant PUD:	*$440,000*
Douglas PUD:	*$85,000*
Chelan PUD:	*$312,000 (pending cost-share agreement)*
BPA:	$1,563,000 (*pending cost share above*)

Anticipated Staffing:

Propagation:	
Winthrop Hatchery:	See USFWS (2012)
Chief Joseph Hatchery[1]:	11- FTE, CCT
Acclimation:	
Tonasket Pond:	3- FTE, CCT
Adult Collection:	
Winthrop Hatchery:	See USFWS (2012a)
Future Okanogan Trapping:	Unknown at this time
M&E:	
BPA # 29033:	6- FTE, CCT

Anticipated Capital Costs:

See above.

Anticipated Operational Costs:

Propagation:	
Winthrop Hatchery:	see USFWS (2012a)
Chief Joseph Hatchery:	$150,000[2]
Acclimation:	
Tonasket Pond:	$200,000
Adult Collection:	
Winthrop Hatchery:	see USFWS (2012a)
Future Okanogan Trapping:	unknown at this time
Monitoring & Evaluation:	
BPA Project #29033:	$65,000

1.5) Description of the program

[1] Full staff levels for all CJH operations for both summer/fall and spring Chinook programs.
[2] Based on proportion of re-introduction spring Chinook at CJH to total facility production and a $2.4M O&M budget minus the spring Chinook acclimation costs.

The goal of this proposed spring Chinook salmon artificial propagation program is to restore natural spawning spring Chinook salmon in historical habitats of the Okanogan subbasin. Ultimately, the CCT's long-term vision is to restore ceremonial and subsistence fishing for its membership throughout their usual and accustomed fishing locations, which includes the Okanogan Basin. However, the short-term focus is on conservation so no harvest activities will occur within the 5-10 year timeframe of this HGMP.

The release production target for the proposed program is 200,000 fish. These fish will be from the Methow "composite" stock (MetComp), which are collected and reared in the Methow subbasin and the Winthrop National Fish Hatchery. Initially these fish will be pre-smolts, transferred to an acclimation site in the Okanogan basin in late October or early November. Within the life of this HGMP and dependent on the USFWS actions and operations, we anticipate transitioning to the transfer of eyed eggs from the Winthrop NFH to CJH. Regardless of early rearing history, fish will be acclimated on Okanogan River water near the town of Tonasket in the Okanogan River Basin and released directly into the Okanogan River in the spring.

1.6) Location(s) of hatchery and associated facilities.

Hatcheries:

Winthrop National Fish Hatchery: USFWS facility located on the Methow River near Winthrop, Washington.

Chief Joseph Hatchery: Under construction on the right bank of the Columbia River below Chief Joseph Dam at river mile 543 (rkm 875).

Juvenile Acclimation Facilities:

Tonasket Pond: a 74,000 ft^3 acclimation pond located on the right bank of the Okanogan River (rm 59) near Tonasket, Washington.

Riverside Pond: a 55,000 ft^3 contingency site that will be rearing summer/fall Chinook, located near the town of Riverside, Washington.

Omak Pond: a 55,000 ft^3 contingency site that will be rearing summer/fall Chinook, located on the left bank of the Okanogan near the confluence with Omak Creek and the town of Omak, Washington.

Adult Collection Facilities:

Winthrop National Fish Hatchery: USFWS facility located near Winthrop, Washington.

1.7) Type of program.

This will be a reintroduction program that will utilize a within-ESU donor stock ("MetComp") from a neighboring population (Methow) to re-establish a population for conservation purposes.

1.8) Purposes (Goal) of programs.

The ultimate purpose of the Chief Joseph Hatchery, including this reintroduction program, is to provide mitigation to replace spring Chinook 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 goal of this proposed spring Chinook salmon artificial propagation program is to restore natural spawning spring Chinook salmon in historical habitats of the Okanogan subbasin. By utilizing a within-ESU stock, the reintroduction can also contribute to ESA recovery by improving spatial structure and abundance of Upper Columbia spring Chinook. The CCT's long-term vision is to restore ceremonial and subsistence fishing for its membership throughout their usual and accustomed fishing locations, which includes the Okanogan Basin. However, the Colville Tribes recognize that they will be sacrificing some local harvest opportunity in the short term but likely gaining a better long-term solution with a locally adapted and naturally productive population.

1.9) Justification for the program.

Currently, Upper Columbia River Spring Chinook ESU includes stream-type Chinook salmon spawning in the Wenatchee, Entiat, and Methow rivers. All current Chinook salmon in the Okanogan River are considered "ocean-type" and are considered part of the Upper Columbia River Summer/Fall Chinook ESU (Myers et al. 1998). However, historically, spring Chinook salmon were numerous in the Okanogan sub-basin as they were harvested by the Colville Confederated Tribes in the Okanogan River during their May thru October salmon fisheries (Post 1938 as cited in NPPC 1986).

Historical Indian fisheries for Okanogan salmon in May, June, and early July were likely spring Chinook salmon. Alexander Ross in 1811 wrote that the Southern Okanogans assembled in large bands in June for the purpose of fishing during the summer season (Ray 1972). French and Wahle (1965) designated all Chinook salmon passing Rock Island Dam by June 18 to July 9 as spring Chinook. Chapman et al. (1995) reported that fifty percent of the spring Chinook run passes Rock Island Dam in mid-May with passage at Wells Dam occurring slightly later. As with sockeye, spring Chinook are believed to have migrated upstream of Lake Osoyoos into Canada and spawned in the upper Okanogan River and other tributaries. Chapman et al. (1995) reports that, "In 1936, spring Chinook were observed in the Okanogan River upstream from Lake Osoyoos by Canadian biologists (Gartrell 1936). That observation for May estimated 100-300 adults present on the spawning grounds." In the late 1950's and early 1960's, spring Chinook were observed in the Okanogan River as far as Okanogan Falls. Chinook were observed spawning from the Falls downstream to Oliver, with concentrated spawning occurring mainly about 1 ½ miles above Oliver near Vasseaux Creek (Roy Wahle, pers. comm).

The most notable (and influential) artificial production of spring Chinook began in the Columbia Cascade Province in 1939 under the Grand Coulee Fish Maintenance Project (Chapman et al. 1995). Fish were reared and released in the Wenatchee, Entiat, and Methow rivers from three USFWS hatcheries. A fourth hatchery for the Okanogan River was authorized, but not constructed due to the onset of WWII. Broodstock originated from the run-at-large collected at Rock Island Dam and other sources. These early spring Chinook programs were only marginally successful so managers resorted to importing broodstock from other hatchery locations. These programs continued into the 1960's, were stopped for a number of years, and then restarted in the 1970's using Carson stock brood provided by lower Columbia River hatcheries. Broodstock in more recent years has been collected at the local hatcheries, particularly Leavenworth NFH. Ironically, all of the spring Chinook mitigation for Grand Coulee Dam has been located downriver, inaccessible to the Colville Tribes who have been most harmed by the dam's construction.

Construction of Grand Coulee Dam eliminated salmon from the majority of the Colville Reservation. To provide partial mitigation for the anadromous fish losses caused by construction of Grand Coulee Dam, Congress authorized construction of four hatcheries. Only three of these hatcheries were built. The fourth hatchery, which was to be located on the Okanogan River was never constructed. In the 1980s the Colville Tribes reinitiated the question of the fourth hatchery and in 2000 the U.S. Bureau of Reclamation agreed that the full, authorized mitigation for construction of Grand Coulee Dam was still not complete and could be pursued..

Tribes of the Colville Reservation have been seriously harmed by the lack of Grand Coulee mitigation, with ceremonial and subsistence fisheries declining to minimal levels. Fishing opportunity is now severely limited to summer Chinook immediately below Chief Joseph Dam and an occasional sockeye fishery in the Okanogan River.

This adverse situation was compounded as later formulas for mitigation of mid-Columbia PUD dams were based on the proportion of smolts lost passing the dams. Without the initial Federal salmon mitigation that other watersheds in the region obtained, the Okanogan sub-basin and Colville Tribes again were provided without adequate mitigation. Additionally, the Federal government has never provided the Colville Tribes with mitigation for Okanogan anadromous fish resulting from losses of adult and juvenile fish passing through the four Corps of Engineers' hydroelectric projects on the lower Columbia River. Losses at these dams were once estimated at 10% to 15% per project. For the 2001 migration, the in-river survival of juvenile UCR spring Chinook and UCR steelhead through the entire hydroelectric system was estimated at 50% and 25% compared to BiOp performance standards of 66.4% and 67.7%, respectively (BPA et al. 2003). Adult fish losses at each dam may now be less than 2%. From these data, there is obviously a large and excessive loss of salmon and steelhead arising from the Columbia Cascade Province at the Federal dams.

Finally with Federal listings under the ESA, the Okanogan spring Chinook populations were declared extirpated. Again no Federal efforts have been focused on reintroduction of spring Chinook for the use and benefit of the Colville Confederated Tribes.

Anadromous fish waters in and about the Colville Reservation were either blocked or have become devoid of sufficient numbers of salmon and steelhead to maintain viable and productive ceremonial and subsistence fisheries. The traditional salmon ceremony for the first returning spring Chinook salmon, which is currently celebrated by most other tribes in the Columbia River Basin, was only reinitiated on the Colville Reservation in 2005 after decades of no spring Chinook. In that year, the Colville Tribes were able to harvest one spring Chinook. Under its tribal trust responsibilities, the Federal government is to ensure that natural resources critical to Native American culture and subsistence are maintained. Historical fisheries critical to the bands of the Colville reservation have been severely limited in geographic scope and extent due to the Federal government's own development of the FCRPS, Federal irrigation projects, mismanagement of marine and main stem fisheries, and overlooking the importance of protecting tributary waters and habitats for anadromous fish. The Federal government's tribal trust responsibilities for the Colville Tribes have been seriously abrogated.

The previously approved program of releasing unlisted Leavenworth stock into the Okanogan River (CCT 2008) does not help the Upper Columbia spring Chinook salmon ESU achieve recovery objectives. By switching to a within-ESU stock as outlined herein, the Okanogan Basin program can contribute to the recovery of the ESU as envisioned in the Upper Columbia Salmon and Steelhead Recovery Plan (UCSRB 2007).

1.10) List of program "Performance Standards" and Biological Rule Set.

The Biological Rule Set is intended to ensure that the benefits from the program will not impair the health of the summer/fall Chinook populations in the Okanogan and Columbia rivers, spring Chinook in the Methow River, and UCR steelhead. These rules may be adjusted in the future based on monitoring and evaluation (M&E) of the program, pertinent new scientific evidence clarifying the effects of artificial propagation, harvest, the hydrosystem, climate change, and ocean conditions on the viability of spring Chinook in the upper Columbia River.

<u>CJHP Biological Rule Set</u>

<u>Reintroduction Program:</u>

1. Spring Chinook introduced into the Okanogan River basin are of Upper Columbia ESU origin.
2. All returning adults of natural origin are allowed to spawn naturally.
3. On average, less than 5% of the spawner composition of adjacent populations (Wenatchee, Entiat, or Methow) should be comprised of spring Chinook that were released into the Okanogan.

4. On average, less than 5% of the broodstock collected at the Methow and Winthrop facilities in the Methow basin will be comprised of spring Chinook that were released into the Okanogan.

In addition to the above CJHP Biological Rule Set, the following performance standards are also established for the CJHP. These performance standards and performance indicators are derived from the draft, "Performance Standards and Indicators for the Use of Artificial Production for Anadromous and Resident Fish Populations in the Pacific Northwest", NMFS, 12 December 2000.

Legal Standards:

Program contributes to fulfilling tribal trust responsibility mandates and reserved fishing rights while minimizing the risk of adverse effects to listed wild populations.

Indicator: Total number of spring Chinook transferred to and released in the Okanogan River basin.
Indicator: Stock origin and ESA listing status of spring Chinook salmon released into the Okanogan River basin.

Programs contribute to mitigation and cost sharing agreements, if any. Measured performance of the hatchery programs meet or exceed performance requirements of any mitigation or cost sharing agreement.

Indicator: Performance requirements within each mitigation or cost sharing agreement are measured and reported to parties of the agreements.

Programs address ESA responsibilities as evidenced by NOAA Fisheries' concurrences.

Indicator: Spring Chinook transferred to and released in the Okanogan River are designated as a nonessential experimental population under ESA Section 10(j). ESA consultation(s) under Section 7 have been completed, Section 10 permits have been issued. This HGMP has been determined current and sufficient under the ESA Section 4(d) as applicable.

Harvest Standards:

The segregated harvest program will produce and released unlisted spring Chinook in a manner enabling effective harvest while avoiding over-harvest of non-target species (CCT 2008). There will be no directed harvest on the reintroduced fish in the terminal areas (i.e. above Wells Dam) during the initial re-colonization phase of the program. Some harvest will occur in the Ocean and lower Columbia River as part of those ongoing fisheries.

Indicator: Annual number of program's hatchery-origin spring Chinook caught in all Columbia River fisheries (Zones 1-6 recreational, Zone 1-5 commercial, Zone 6 treaty, upper Columbia River recreational, Colville Tribes Chief Joseph Dam Tailrace).

Indicator: Comparison of harvest rate of the Okanogan reintroduction program fish with other reference stocks (e.g. CJH segregated, WNFH, Methow State Fish Hatchery, Chiwawa).

Release groups are sufficiently marked and tagged (100% coded wire tagged, 5,000 PIT tagged) in a manner consistent with information needs and protocols to enable determination of impacts to natural- and hatchery-origin fish in fisheries and comparisons between hatchery programs.

Indicator: Marking rate by mark type for each spring Chinook release group (Tonasket Pond).

Indicator: Sampling rate by mark type for each Columbia River fishery (Zones 1-6 recreational, Zone 1-5 commercial, Zone 6 treaty, upper Columbia River recreational, and Colville Tribes Chief Joseph Dam Tailrace).

Indicator: Number of marks of this spring Chinook program observed in fishery samples and estimated total contribution of this population to Columbia River fisheries (Zones 1-6 recreational, Zone 1-5 commercial, Zone 6 treaty, upper Columbia River recreational, Colville Tribes Chief Joseph Dam Tailrace, and combined ocean fisheries).

<u>Conservation Standards:</u>

The reintroduction program provides spawners returning to the Okanogan River to achieve an initial escapement objective of 600 hatchery origin spawners for re-colonization (spawning) in suitable habitats (200,000 smolts at 0.003 SAR).

Indicator: Annual number of spring Chinook spawners in Okanogan River Basin.

Indicator: Spatial distribution of spring Chinook spawners in Okanogan River Basin

Releases of the experimental spring Chinook salmon are sufficiently tagged (100% coded wire tagged, 5,000 PIT tags) to allow statistically significant evaluation of program contribution to natural production, and to evaluate effects of the program on the local natural population, including proportion of hatchery-origin fish on the spawning grounds.

Indicator: Annual marking rates by mark type for each spring Chinook release group (see above).

Indicator: Annual number of marks and estimated total proportion of program's hatchery-origin fish in collections of juvenile spring Chinook within the Okanogan basin and at any Columbia River dam.

Life-History Characteristics:

Fish collected for broodstock are taken throughout the return or spawning period in proportions approximating the timing and age distribution of the population from which broodstock is taken.

Indicator: Broodstock collection protocols, indicators, data, and reporting will be evaluated as part of the Winthrop NFH HGMP (USFWS 2012a).

Life history characteristics of the natural population do not change as a result of the artificial production program.

Indicator: None at this time. In the long-term, when/if the program has shifted to a local broodstock supplementation program it makes sense to have performance standards for life history characteristics. Initially, this cannot be measured because there is not a natural population. Divergence of life history characteristics from Methow Composite stock to something locally adapted to the Okanogan is desirable. However; as long as Methow Composite stock are being used as the parent source we would not expect detectable divergence of the developing natural population. Once Methow Composite stock are no longer needed, it will likely take several generations to develop unique life history characteristics and to detect that change with a monitoring program. Because the timeframe is long-term and undefinable, we are not going to list indicators for this performance standard at this time.

Annual release numbers do not exceed estimated Okanogan basin-wide and local habitat capacity, including spawning, freshwater rearing, migration corridor, and estuarine and near-shore rearing.

Indicator: Juvenile carrying capacity of the Okanogan subbasin including method of calculation, based on modeling.

Indicator: Annual release of hatchery-origin spring Chinook in the Okanogan subbasin, the Methow Basin, and the Upper Columbia ESU.

Indicator: Annual naturally spawning escapement of spring Chinook in the Okanogan River basin.

Indicator: Timing of hatchery releases from Okanogan acclimation site (volitional or forced) relative to emigration, densities, and estimated number of natural-origin spring Chinook.

Indicator: Residualism rates of hatchery-origin juveniles in natural habitats. Note: due to M&E difficulties, we may need to use pre-release mini-jack rate as a surrogate for measured residual rate in natural environment.

Genetic Characteristics:

Patterns of genetic variation within and among natural populations do not change significantly as a result of artificial production.

Indicator: None at this time. In the long-term, when/if the program has shifted to a local broodstock supplementation program it makes sense to have performance standards for genetic characteristics. Initially, this cannot be measured because there is not a natural population. Genetic divergence from Methow Composite stock to something locally adapted to the Okanogan is desirable. However; as long as Methow Composite stock are being used as the parent source we would not expect detectable genetic divergence of the developing natural population. Once Methow Composite stock are no longer needed, it will likely take many generations to detect change in the genetic signal. Because the timeframe is long-term and undefinable, we are not going to list indicators for this performance standard at this time.

Collection of broodstock does not adversely impact the genetic diversity of the naturally spawning population.

Indicator: Broodstock collection protocols, indicators, data, and reporting will be evaluated as part of the Winthrop NFH HGMP (USFWS 2012a).

Okanogan spring Chinook do not exceed 5% of non-target spawning or broodstock populations.

Indicator: Location and timing of annual juvenile releases (see above).
Indicator: Annual number of adult spring Chinook returning to intended return location compared to number returning to unintended dams, fisheries, hatcheries, and natural production areas (i.e. the stray rate).
Indicator: Proportion of Okanogan spring Chinook in non-target spawning and broodstock populations (Methow, Entiat, Wenatchee)(i.e. spawner composition). Initially, the average of the first three years of adult returns will be evaluated for this indicator. Subsequently, the five year mean will be used.

Juveniles are released at fully smolted stage.

Indicator: For each release group, the annual type of release (volitional, forced, or direct stream release).

Indicator: For each release group, the number (or proportion) of voluntary migrants during the volitional period versus the number (or proportion) of non-migrants that are forced out.

Indicator: The pre-release proportion of smolts, parr, and mini-jacks for the entire release group (before volitional period) and for non-migrants (after volitional period). Determined through visual examination for smolt versus parr and physical "squeeze test" for parr versus mini-jacks.

Research Activities:

The artificial production program uses standard scientific procedures to evaluate various aspects of artificial propagation.

Indicator: All program research employs scientifically based experimental design, with measurable objectives and hypotheses.

The artificial propagation program is monitored and evaluated on an appropriate schedule and scale to address progress toward achieving the experimental objective and evaluate beneficial and adverse effects on natural populations.

Indicator: The program's annual Monitoring & Evaluation Plan addresses this HGMP's performance standards and Biological Rule Set through measurement of the Plan's indicators.

Indicator: Annual M&E reports are submitted and made readily available for the public and scientific community.

Indicator: Findings pertaining to program benefits and risks are presented at the Annual Program Review for the Chief Joseph Hatchery, scientific conferences, regional performance reviews, and when appropriate, in peer-reviewed scientific journals.

Operation of Artificial Production Facilities:

Artificial production facilities are operated in compliance with all applicable fish health guidelines and facility operation standards and protocols such as those described by IHOT, PNFHPC, the Co-Managers of Washington Fish Health Policy, INAD, and MDFWP.

Indicator: Compliance with guidelines, standards, and protocols are reported in annual reports.

Indicator: Periodic reviews and audits are conducted, particularly in the programs' early years.

Effluent from artificial production facilities will not detrimentally affect natural populations. Effluent criteria are met or exceeded.

Indicator: Discharge water quality at each propagation facility annually compared to applicable water quality standards and guidelines in IHOT, PNFHPC, and the Co-Managers of Washington Fish Health Policy.

Water withdrawals and in-stream water diversion structures for artificial production facility operations will not prevent access to natural spawning areas, affect spawning behavior of natural populations, or impact juvenile rearing environment.

Indicator: Water withdrawals compared to WDFW adult passage criteria.
Indicator: Water withdrawals compared to NMFS juvenile screening criteria.
Indicator: Annual number of spring Chinook aggregating or spawning immediately below water intake.
Indicator: Proportion of diversion of average monthly stream flow between intake and outlet for each hatchery facility.

Releases do not introduce pathogens not already existing in the local populations, and do not significantly increase the levels of existing pathogens.

Indicator: Annual certification of juvenile fish health immediately prior to release, including pathogens present and their virulence, for each release site.
Indicator: Periodic samples of natural-origin fish for disease occurrence.
Indicator: CJHP implements HSRG's recommended BKD culling procedures.

Any distribution of carcasses or other products for nutrient enhancement is accomplished in compliance with appropriate disease control regulations and guidelines, including state, tribal, and federal carcass distribution guidelines.

Indicator: Annual number and locations of carcasses distributed for nutrient enrichment.
Indicator: Statement of compliance with applicable regulations and guidelines.

Adult brood stock collection does not significantly alter spatial and temporal distribution of any naturally produced population.

Indicator: Spatial and temporal spawning distribution above and below weir/trap compared to historical distribution.

Weir/trap operations do not result in significant stress, injury, or mortality in natural populations.

Indicator: Annual mortality rates in each broodstock collection facility.
Indicator: Annual prespawning mortality rates of trapped fish in the hatchery or after release.

Predation by artificially produced fish on naturally produced fish does not significantly reduce numbers of natural fish.

Indicator: Fish size and timing of release of hatchery-origin fish compared to fish size and timing of natural-origin Chinook and steelhead .
Indicator: Number of fish in stomachs of sampled hatchery-origin fish in the Okanogan River, with estimate of natural-origin fish composition, and estimate of total consumption of natural-origin fish.

Socio-Economic Effectiveness:

Juvenile production costs are comparable to or less than other regional programs designed for similar objectives.

Indicator: Total costs of each spring Chinook program release component.
Indicator: Average and representative costs for similar hatchery programs.

Non-monetary societal benefits for which the program is designed are achieved.

Indicator: Contribution of this program to total ESU natural-origin abundance and distribution of spring Chinook.
Indicator: Number of spring Chinook available for Colville Tribes' ceremonial and subsistence use.[Note: initially, the term 'use' may not mean 'harvest' because the priority is reintroduction/conservation. There is a ceremonial value/benefit (First Salmon Ceremony) that would initially be non-consumptive. Eventually, excess hatchery fish removed for conservation purposes may be utilized for ceremony and subsistence].

Contingency Actions Based on Early Performance Measurement:

The collection and evaluation of performance information through an M&E program will result in potential modifications to the spring Chinook program described in this HGMP to increase benefits or minimize risks as the programs are managed to the CJHP Biological Rule Set, ESA permits, etc. The CJHP and associated selective fisheries will need to be flexible, adaptive and responsive to optimize benefits and minimize risks as the Colville Tribes react to inherent variations in the abundance of natural-origin and hatchery-origin spring Chinook passing Wells Dam. The Colville Tribes expect significant variations in run size caused by environmental and other conditions.

At the behest of the ISRP, significant contingency planning has been performed using the All-H Analyzer model and an associated Terminal Escapement Management Schedule model for the Leavenworth stock under the current HGMP. This adaptive management study (Appendix D, CCT 2008) quantified the likely range in key program variables that can be expected to significantly influence the terminal run of Okanogan/Columbia River spring Chinook passing Wells Dam and the harvest and hatchery management actions in the terminal area. The contingency planning study provides a number of adaptive management options available to the Colville Tribes and other fishery managers to respond to a broad range of variability. The study also serves to emphasize the importance of the Colville Tribes being successful now in the development of their selective fishing gears. The adaptive management study demonstrates that the CJHP and associated terminal selective fisheries, as designed, can meet the CJHP Biological Rule Set.

1.11) List of program “Performance Indicators”, designated by "benefits" and "risks."

See Section 1.9

1.11.1) “Performance Indicators” addressing benefits.

See Section 1.9

1.11.2) “Performance Indicators” addressing risks.

See Section 1.9

1.12) Expected size of program.

General:

The reintroduction program size of 200,000 smolts is based partially on the availability of Methow Composite stock from the revision of Winthrop NFH program size and objectives for spring Chinook in the Methow. However, if SAR is similar to other spring Chinook programs in the upper Columbia (0.3%) then we expect about 600 returning adults which represents a good compromise between the genetic need for a reasonable effective population size (usually considered to be at least 500) with the uncertainties of the capacity of the Okanogan River basin for spring Chinook.

Spring Chinook were extirpated long ago from the Okanogan subbasin due to degradation of tributary and mainstem Okanogan habitat, hydroelectric development and over-fishing on the Columbia River. Therefore, critical information on the viability and likely performance of spring Chinook in the Okanogan does not exist. Also rehabilitation of historical habitats in the Okanogan subbasin is ongoing. It is therefore premature to establish precise long-term numeric goals for adult returns from the reintroduction program or its transition to an integrated conservation program. This program will need to be initiated in an experimental manner with monitoring and evaluation to provide the information to determine long-term program goals and size.

At any time during operation of the spring Chinook programs, should irresolvable conflicts arise that threaten the viability of Upper Columbia summer/fall Chinook ESU, Upper Columbia Steelhead ESU, or Upper Columbia Spring Chinook ESU, the program will be suspended until a modification with acceptable risk can be found.

1.12.1) Proposed annual broodstock collection level (maximum number of adult fish).

Full program for the Winthrop NFH spring Chinook is approximately 360 brood fish, 1/3 of which (approximately 120) will be needed for the Okanogan reintroduction component. See USFWS (2012a) for full details.

1.12.2) Proposed annual fish release levels (maximum number) by life stage and location.

200,000 yearlings at 15/lb at Tonasket acclimation pond, a mainstem Okanogan River site at river km 94 (Figure 1). Our contingency release locations include Omak and Riverside acclimation ponds which are also on the Okanogan River.

1.13) Current program performance, including estimated smolt-to-adult survival rates, adult production levels, and escapement levels. Indicate the source of these data.

This reintroduction program is new and as such does not have past performance information. Experimental releases of spring Chinook have occurred from Tonasket Pond in 2008 and 2010. Tonasket acclimation pond proved to be a viable overwinter acclimation site for spring Chinook with estimated transfer to release survivals of 96% and 97% for release years 2008 and 2010, respectively (CCT unpublished data).

Mid-Columbia spring Chinook survival from smolts to adults is generally expected to be 0.3% (NMFS 1999). For the HSRG review of upper Columbia River hatchery programs, the following smolt-to-adult survivals are used based on the most recent spring Chinook SAR information:

Leavenworth NFH:	0.17%
Eastbank Hatchery:	0.50%
Methow Hatchery:	0.32%
Winthrop NFH:	0.32%

Based on the above information our initial assumption is that the program will have an SAR of 0.3% which will return 600 adult fish.

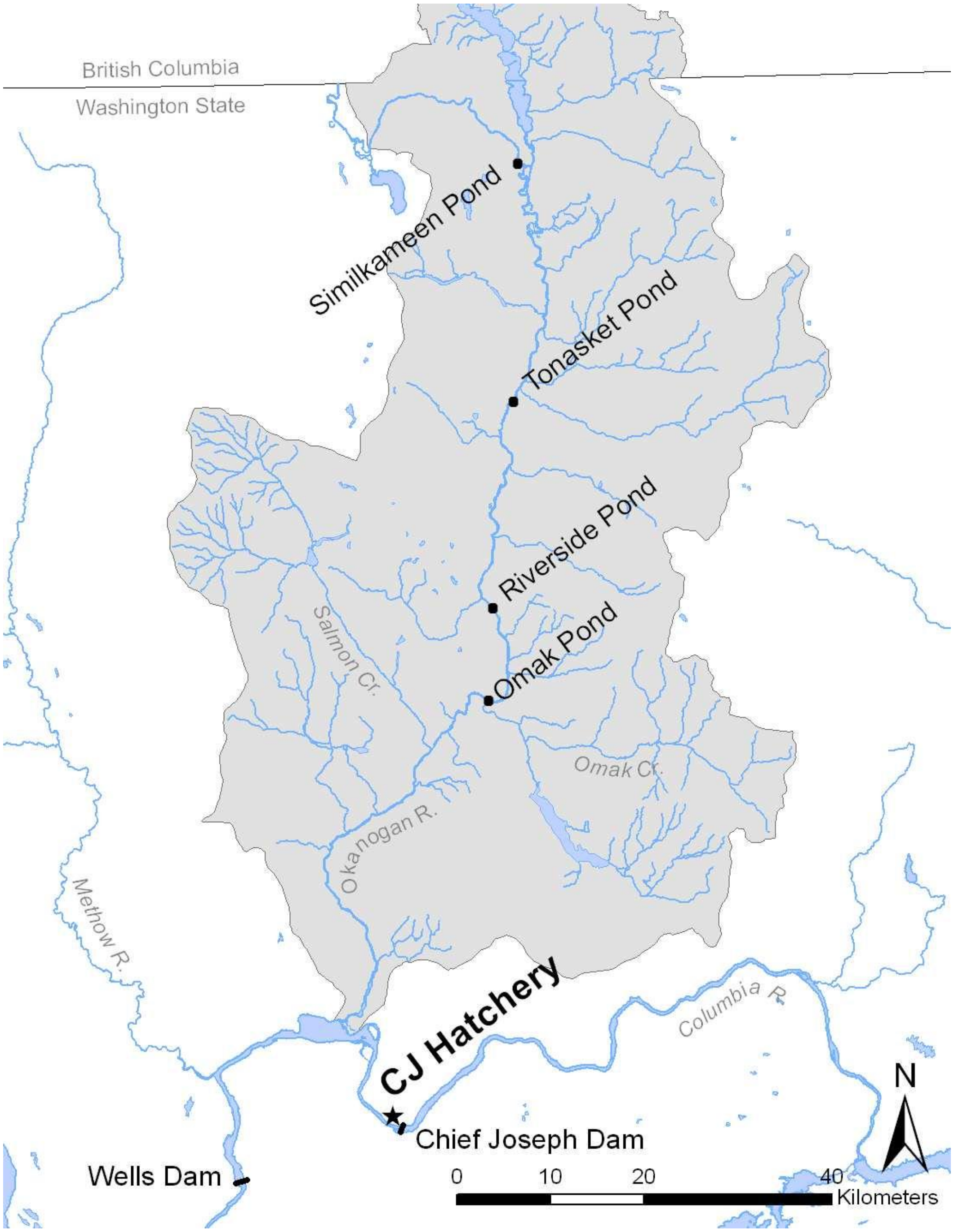

Figure 1. Map of the U.S. portion of the Okanogan River basin, the Chief Joseph Hatchery, and Chinook salmon acclimation sites. Tonasket Pond is the primary intended acclimation site for Okanogan spring Chinook.

1.14) Date program started (years in operation), or is expected to start.

The CJH is scheduled for completion in mid-2013. Acclimation ponds at Tonasket, Riverside and Omak are existing and functional and will be ready to receive fish in 2013. It is anticipated that USFWS will have pre-smolts marked and tagged and ready to go to the Tonasket acclimation pond by October 2013. The first release of the experimental population would then occur in April 2014.

1.15) Expected duration of program.

This program is expected to continue into the foreseeable future, and it will definitely extend beyond the timeframe of this HGMP (5-10 years). At a minimum, it is expected to take two generations (8-10 years) of reintroduction efforts using primarily hatchery-origin broodstock to establish a spawning population that includes some natural-origin spawners. It is expected to take much longer than that to fully recover spring Chinook in the Okanogan. After at least two generations of reintroduction efforts we will evaluate the strategy and success of the program to determine if modification is warranted. At such time as M&E efforts indicate that there are sufficient natural-origin returns, the program may shift to a supplementation program that strives to meet HSRG guidelines for a "contributing population". It is anticipated that the Okanogan River will always need some level of hatchery supplementation in order to overcome the many anthropogenic factors contributing to decreased survival such as hydropower, harvest, and habitat degradation.

1.16) Watersheds targeted by program.

The watershed targeted by these programs is the Okanogan River.

1.17) Indicate alternative actions considered for attaining program goals, and reasons why those actions are not being proposed.

Two basic alternatives exist for reintroduction of spring Chinook in the Okanogan River basin, A) natural re-colonization and B) assisted relocation. The other key variable in this analysis is the appropriate spring Chinook stock(s). Concerning stocks, Carson, Methow Composite, and Wenatchee were considered. The Methow Composite and the Wenatchee stocks are populations of the endangered Upper Columbia River Spring Chinook ESU. The Methow Composite stock is the nearest in geography and includes lineage from the Upper Columbia above Wells Dam. Therefore we believe it is the most appropriate source population.

An effort was initiated (by NOAA) to evaluate the benefits of reintroductions as a result of the adaptive management implementation plan for the FCRPS BiOP. The NOAA

Northwest Fisheries Science Center lead workgroup recently completed a draft manuscript for peer review that outlined a recommended approach for reintroductions (Anderson et al. 2012). Following the scientific principles of this manuscript, using an adjacent within ESU population as a donor stock has a stronger conservation value than using a more distant (Wenatchee) or out of ESU (Leavenworth) stock. Likewise, release of hatchery reared juveniles from the Methow Composite stock is a viable alternative assuming that the risks of hatchery effects are acceptable to the reintroduced population and that the risks of using some broodstock from the source population are acceptable. Anadromous fish co-managers in both the Mid-C HCP forum and the US v. Oregon forums have already agreed that when sufficient Methow Composite broodstock can be collected to generate > 400,000 smolts, that up to 200,000 fish should be made available for transfer to the Okanogan (i.e. the risk to the Methow population is acceptable)((US v. Oregon 2012; USFWS 2012b).

The alternative of using non-local, unlisted Leavenworth stock is already approved through the HGMP and BiOp permitting processes. However, this option would not allow the Okanogan to contribute to recovery of the Upper Columbia ESU. Additional considerations for using this non-local stock include negotiations with the Canadian and provincial governments and First Nations tribes.

The alternative of natural re-colonization is not acceptable due to the low stray rates into the Okanogan subbasin seen over the past 50 years and the low smolt-to-adult survival rates in the upper Columbia basin that will not allow re-colonization to be successful within an acceptable timeframe. The objectives of the Colville Tribes to restore naturally spawning populations, create ceremonial and subsistence fisheries, create recreational fisheries, and help recover the listed ESU cannot be satisfied by natural re-colonization. This alternative will therefore not be pursued.

Many options exist to implement assisted relocation depending on the life stage used and the area of relocation. Relocation can be undertaken 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 un-acclimated smolts. These options are further permutated by which stock(s) are used.

Six strategic options were developed and are described in Appendix A of CCT (2008), “Strategic Options for Okanogan Spring Chinook”, May 7, 2001. In summary these strategic options are:

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 determined stock of spring Chinook.

The preferred alternative upon which the current accepted HGMP has been developed is strategic option #5 (CCT 2008). This option was selected as having the highest likelihood of meeting the conservation and harvest goals of the Colville Tribes at the least risk to other fishery objectives in the Columbia Cascade Province. This HGMP represents the revision of the current accepted HGMP that is transitioning from Carson stock to Methow Composite Stock before Carson stock are ever officially incorporated into the new CJHP.

SECTION 2. PROGRAM EFFECTS ON ESA-LISTED SALMONID POPULATIONS.

2.1 List all ESA permits or authorizations in hand for the hatchery program.

A CJHP Biological Assessment was submitted by BPA to NOAA Fisheries for Section 7 consultation. A Biological Opinion was issued by NOAA on 28 July 2008, which concluded that the CJHP is not likely to jeopardize the continued existence of endangered UCR spring Chinook or endangered UCR Steelhead, nor result in the destruction or adverse modification of critical habitat. Further, the activities are not likely to adversely affect Essential Fish Habitat for Chinook salmon (NMFS 2008b).

The Biological Assessment was also submitted to the U.S. Fish and Wildlife Service for ESA approval relative to threatened Bull Trout (*Salvelinus confluentus).* That consultation was successfully completed with a concurrence letter from USFWS on 9 June 2006 which concurred that the program "may affect, not likely to adversely affect" bull trout and other wildlife species under their jurisdiction (USFWS 2006). In 2012, CCT contacted USFWS and confirmed that the proposed revision to the program under this HGMP is well within terms of our existing consultation (Jeff Krupka, personal communication).

The propagation programs at USFWS' Leavenworth NFH operate under NMFS' 1999 Biological Opinion on Artificial Production in the Columbia River Basin (NMFS 1999). These programs are currently under review again by NOAA Fisheries within its Phase I/II HGMP Process.

The major differences between the currently approved HGMP and this revised HGMP is the source population (Methow Composite instead of Leavenworth) and release location (Okanogan mainstem instead of both the Okanogan mainstem and Omak Creek). These changes will reduce risk and affects to ESA listed spring Chinook in the Methow and ESA listed steelhead in the Okanogan.

2.2) Provide descriptions, status, and projected take actions from the proposed program.

2.2.1) Description of life history and status of ESA-listed salmonid population(s) potentially affected by the program.

Life History and Status of the UCR Steelhead DPS

Oncorhynchus mykiss has an anadromous form, commonly referred to as steelhead, of which UCR steelhead are a DPS. They depend on freshwater areas for spawning and rearing and marine environments for growth and maturation. They differ from other Pacific salmon in that they are iteroparous or capable of spawning more than once before death.

UCR steelhead return to freshwater between May and October and are in a sexually immature condition. They seek-out areas with adequate flows and cover to hold in until spawning occurs between January and May (Chapman et al. 1994). In general, they prefer smaller higher gradient streams relative to other Pacific salmon and they spawn farther upstream than winter steelhead (Withler 1966; Behnke 1992). Intermittent streams may also be used for spawning (Everest 1973; Barnhart 1986). Progeny typically reside in freshwater for two years before migrating to the ocean, but freshwater residence can vary between 1and 7 years. For UCR steelhead, marine residence is typically one year. They migrate directly offshore during their first summer rather than migrating nearer to the coast as do salmon. During fall and winter, juveniles move southward and eastward (Hartt and Dell 1986). Maturing Columbia River steelhead are found off the coast of Northern British Columbia and west into the North Pacific Ocean (Busby et al. 1996).

The ESA, under section 4(c)(2), directs the Secretary of Commerce to review the listing classification of threatened and endangered species at least once every five years. After completing this review, the Secretary must determine if any species should be: (1) removed from the list; (2) have its status changed from threatened to endangered; or (3) have its status changed from endangered to threatened. (Ford et al. 2011) describes the results of the agency’s 5-year review and provides the most recent information and analysis on the status of UCR steelhead and UCR spring Chinook salmon.

The UCR steelhead DPS was comprised of three MPGs before the construction of Grand Coulee Dam. It is currently limited to one MPG and four extant populations, a fifth population in the Crab Creek drainage is believed to be extinct. What remains of the DPS includes all naturally spawned fish in all tributaries accessible to steelhead upstream from the Yakima River in Washington State, to the U.S.-Canada border. The four extant populations are the Wenatchee, Methow, Okanogan and Entiat. Six hatchery programs are considered part of the DPS: the Wenatchee River, Wells Hatchery in the Methow and Okanogan rivers, Winthrop NFH, Omak Creek, and the Ringold hatchery programs.

Overall, best available information indicates that all four UCR steelhead populations remain at high risk (Table 1) and the DPS as a whole remains at threatened status. The mean abundance of natural-origin spawners has increased for all four populations (Table 2) to approximately 50 percent of the minimum threshold for ESA Recovery (UCSRB 2007). However, productivity, assuming that hatchery-origin and natural-origin spawners are equally effective, is below replacement for all four populations (even at low to moderate spawning levels) and spatial structure and diversity metrics have not improved because the proportion of natural-origin spawners in each population remains below the minimum abundance thresholds, particularly for the Methow and Okanogan populations.

Table 1. Viability assessments for UCR steelhead populations. The data include return years through 2009 (Ford et al. 2011).

Population	**Abundance/Productivity Metrics**				**Spatial Structure and Diversity Metrics**			**Overall Viability Rating**
	ICTRT Minimum Threshold	***Natural Spawning Abundance***	***ICTRT Productivity***	***Integrated A/P Risk***	***Natural Processes Risk***	***Diversity Risk***	***Integrated SS/D Risk***	
Wenatchee River 2000-2009	**1000**	***795*** (365-1947)	**0.87** (0.44-1.74)	**High**	Low	High	**High**	**HIGH RISK**
1994-2003		*559* (241-1947)	0.84 (0.68-1.39)	*(High)*				
Entiat River 2000-2009	**500**	**112** (52-263)	**0.55** (0.35-0.88)	**High**	Moderate	High	**High**	**HIGH RISK**
1994-2003		79 (31-263)	0.48 (0.3-0.66)	*(High)*				
Methow River 2000-2009	**1000**	**468** (256-703)	**0.32** (0.14-0.72)	**High**	Low	High	**High**	**HIGH RISK**
1994-2003		289 (68-554)	0.28 (0.12-0.81)	*(High)*				
Okanogan River 2000-2009	**750**	**147** (84-212)	**0.15** (0.06-0.35)	**High**	High	High	**High**	**HIGH RISK**
1994-2003		95 (22-181)	0.12 (0.07-0.21)	*(High)*				

Table 2. Abundance and hatchery proportions for UCR steelhead populations. Estimates use data sets from (Ford et al. 2011).

Population	**Natural Spawning Areas**								
	Total Spawners (5-year geometric mean, *range*)			**Natural-Origin (5-year geometric mean)**			**% Natural-Origin (5-year average)**		
	1991-1995	***Prior to ESA Protection (1997-2001)***	**Current (2005-2009)**	***1991 - 1995***	***Prior to ESA Protection (1997-2001)***	**Current (2005-2009)**	***1991 - 1995***	***Prior to ESA Protection (1997-2001)***	**Current (2005-2009)**
Wenatchee River	*1,880*	*696 (343-1,655)*	**1,891 *(931-3608)***	*458*	*326 (241-696)*	**819 *(701-962)***	24%	48%	**47%**
Entiat River	*121*	*265 (132-427)*	**530 *(300-892)***	*59*	*46 (31-97)*	**116 *(99-137)***	48%	19%	**23%**
Methow	*1,184*	*1,935*	**3,504**	*251*	*162*	**505**	21%	9%	**15%**

River		*(1417-3,325)*	***(2,982-4,394)***		*(68-332)*	***(361-703)***			
Okanogan River	*723*	*1,124 (770-1,956)*	**1,832 *(1,483-2,260)***	*84*	*53 (22-109)*	**152 *(104-197)***	12%	5%	**9%**
Aggregate Count at Priest Rapids Dam	*8,420*	*14,592*	**16,989**	*1,147*	*3,007*	**3,604**	*14%*	*19%*	**19%**

There is a considerable gap between recovery and the current status of the UCR steelhead DPS. The ESA Recovery Plan (UCSRB 2007) calls for improvement in each of the four extant populations (no more than a 5% risk of extinction in 100 years) and for a level of spatial structure and diversity that restores the distribution of naturally produced steelhead to previously occupied areas and allows natural patterns of genetic and phenotypic diversity to be expressed. This corresponds to a threshold of at least "viable" status compared to the current status which falls into the category "high risk".

Life History and Status of the UCR Spring Chinook Salmon ESU

Oncorhynchus tshawytscha, the Chinook salmon, exhibit a wide variety of life history patterns that include: variation in age at seaward migration; length of freshwater, estuarine, and oceanic residence; ocean distribution; ocean migratory patterns; and age and season of spawning migration. Two distinct races of Chinook salmon are generally recognized: "stream-type" and "ocean-type" (Healey 1991; Myers et al. 1998). The proposed action produces "ocean-type" Chinook, which have very different characteristics compared to ESA-listed UCR spring Chinook salmon, which are the "stream type. Ocean-type Chinook salmon spawn in lower elevation mainstem rivers shortly after entering freshwater in the fall. Progeny typically reside in fresh water for no more than 3 months, leave freshwater to reside in coastal ocean waters 3 to 4 years, and then return to freshwater to spawn.

UCR spring Chinook salmon enter freshwater between February and April on their way to spawning areas where they will reproduce and then perish. Four and five year old fish dominate adult returns. These fish are in fresh water for up to six months before spawning in late summer. They typically spawn in upstream areas high in the watershed. The extremes in spawning distributions of stream-type and ocean-type Chinook salmon sometimes overlap. Progeny reside in fresh water for 1 year following emergence, reside in the ocean for 2 to 3 years, and exhibit extensive offshore ocean migrations.

The UCR Spring Chinook Salmon ESU was comprised of three MPGs and eight populations before the construction of Grand Coulee Dam. Approximately half of the area that originally produced spring Chinook salmon in this ESU is blocked by dams. The ESU is currently limited to one MPG and three extant populations, a fourth population in the Okanogan River is considered extirpated. What remains of the ESU includes all naturally spawned fish upstream of Rock Island Dam and downstream of Chief Joseph Dam in Washington State, (64 FR 14208, March 24, 1999). Six artificial propagation programs are considered part of the ESU including the Twisp, Chewuch, Methow Composite, Winthrop NFH, Chiwawa, and the White River hatchery programs. Overall, best available information indicates that the ESU is endangered. Although increases in natural-origin abundance relative to the extremely low spawning levels observed during the mid-1990s, are encouraging (Table 3), overall productivity has decreased to extremely low levels. Based on the combined ratings for abundance/productivity and spatial structure/diversity, all three extant populations and the ESU remain at high risk of extinction (Table 4).

Table 3 - Estimates of total and natural origin spawning escapement for UCR spring Chinook salmon populations. Estimates are based on (Ford et al. 2011).

Population	Natural Spawning Areas								
	Total Spawners (5 year geometric mean, *range*)			Natural Origin (5 year geometric mean)			% Natural Origin (5 year average)		
	1991to 1996	*1997 to 2001*	2000 to 2008	*1991 to 1996*	*1997 to 2001*	2003 to 2008	*1991 to 1996*	*1997 to 2001*	2003 to 2008
Wenatchee River	*167*	*470 (119-4,446)*	**1,554 *(936-2,119)***	*NA*	*274*	**489**	*69%*	*58%*	**31%**
Entiat River	*89*	*111 (53-444)*	**253 *(207-317)***	*NA*	*65*	**111**	*82%*	*58%*	**46%**
Methow River	*325*	*680 (79-9,904)*	**1,327 *(984-1,801)***	*NA*	*282*	**402**	*78%*	*41%*	**29%**

Table 4 –Summary of current population status vs. ICTRT viability criteria for UCR spring Chinook salmon (Ford et al. 2011).

Population	Abundance/Productivity Metrics				Spatial Structure and Diversity Metrics			Overall Viability Rating
	ICTRT Minimum Threshold	*Natural Spawning Abundance*	*ICTRT Productivity*	*Integrated A/P Risk*	*Natural Processes Risk*	*DiversityRisk*	*IntegratedSS/D Risk*	
Wenatchee River 1987-2009	**2000**	***449 (119-1,050)***	**0.61 (0.40-0.95)**	**High**	Low	High	**High**	**HIGH RISK**
1981-2003		*222 (18-1,050)*	*0.93 (0.57-1.53)*	*(High)*				
Entiat River 1999-2009	**500**	**105 (27-291)**	**1.08 (0.75-1.55)**	**High**	Moderate	High	**High**	**HIGH RISK**
1981-2003		*59 (10-291)*	*0.72 (0.59-0.93)*	*(High)*				
Methow River 1999-2009	**2000**	**307 (79-1,979*)***	**0.45 (0.26-0.8)**	**High**	Low	High	**High**	**HIGH RISK**
1981-2003		*180 (20-1,979)*	*0.80 (0.52-1.24)*	*(High)*				

There is a considerable gap between recovery and the current status of the UCR spring Chinook salmon ESU. The ESA Recovery Plan (UCSRB 2007) calls for each of the three extant populations to improve (no more than a 5% risk of extinction in 100 years) and for a level of spatial structure and diversity that restores the distribution of naturally produced spring Chinook salmon to previously occupied areas and allows natural patterns of genetic and phenotypic diversity to be expressed. This corresponds to a threshold of at least "viable" status compared to the current status of the ESU which falls into the category "high risk".

2.2.2) Effects on ESA Protected Species

To determine the potential effects of the hatchery program on ESA-listed species, the CCT have followed the description and analysis of the latest NMFS consultations on hatchery programs (NMFS 2011; NMFS 2012b). The following section is based on these references.

This section describes and analyzes the potential effects of the proposed program. The description and analysis includes the direct and indirect effects of the proposed hatchery program on ESA-listed species. Indirect effects are those that are caused by the proposed hatchery program and are later in time, but still are reasonably certain to occur. This analysis will determine whether the proposed hatchery program is likely to appreciably reduce the likelihood of survival and recovery of ESA protected species.

2.2.2.1) Factors to be considered

Evaluation of the effects of the proposed hatchery program begin at the population scale (McElhany et al. 2000). Population performance measures are defined in terms of natural-origin fish and the four key VSP attributes: abundance, productivity, spatial structure, and diversity and then relates effects of the proposed hatchery program at the population scale to the survival and recovery of an entire ESU or DPS.

2.2.2.2) Methodology for Analyzing Hatchery Effects

This section describes how the hatchery effects are analyzed, both, positive and negative, on salmon ESUs and steelhead DPSs. As previously mentioned, the analysis is based on the latest NMFS considerations and consultation on hatchery programs (NMFS 2011; NMFS 2012b).

The proposed hatchery program is analyzed for effects on the attributes that define population viability, including abundance, productivity, diversity, and spatial structure. The effects of a hatchery program on the status of an ESU or steelhead DPS "will depend on which of the four key attributes are currently limiting the ESU, and how the hatchery fish within the ESU affect each of the attributes." This analysis takes into account the effects of hatchery facilities, for example weirs and water diversions, on each VSP attribute. The presence of hatchery fish within the ESU can positively affect the overall status of the ESU by increasing the number of natural spawners, by serving as a source population for repopulating unoccupied habitat (as is the case for the proposed program) and increasing spatial distribution, and by conserving genetic resources. "Conversely, a hatchery program managed without adequate consideration can affect a listing determination by reducing adaptive genetic diversity of the ESU, and by reducing the reproductive fitness and productivity of the ESU" (70 FR 37215 June 28, 2005).

The effects, positive and negative, for two categories of hatchery programs are summarized in Table 5. Generally speaking, effects range from beneficial to harmful for programs that use local fish[3] for hatchery broodstock and from neutral or negligible to harmful when a program does not use local fish for broodstock[4].

Table 5. Effects, benefits (+), and threats (-) on natural population viability posed by two categories of hatchery programs (NMFS 2012b).

Natural population viability parameters	Broodstock originate from the local population and are included in the ESU or DPS	Broodstock originate from a non-local population or from fish that are not included in the same ESU or DPS
Productivity	+/- [1]	-
Diversity	-	-
Abundance	+/- [2]	-
Spatial Structure	+/-[3]	-

1 Unlikely to benefit productivity except in cases where the natural population's small size is, in itself, a predominant factor limiting population growth.

2 Increases the number of natural spawners and thus the number of fish in the gene pool.

3 Can accelerate re-colonization and increase spatial structure.

Eight factors were analyzed for their potential effects related to listed fish: (1) broodstock collection, (2) interactions on the spawning grounds from hatchery returns and from returns of naturally spawning hatchery fish, (3) interactions in juvenile rearing areas from hatchery releases and from the progeny of naturally spawning hatchery fish, (4) interactions in the migration corridor, the estuary, and in the ocean from hatchery releases and from the progeny of naturally spawning hatchery fish, (5) research, monitoring, and evaluation (RM&E), (6) masking (i.e., when hatchery fish are not identifiable from other fish and thus undermine or confuse the status of a population), (7) construction, operation, and maintenance (e.g., handling fish at weirs), and (8) fisheries.

The next step in the analysis is to assign an affect for each factor from the following categories. The categories are: (1) net biological benefit, (2) not a threat, (3) an uncertain threat, or (4) is a threat. The category of effect assigned to each factor is based on an analysis of available scientific information weighed against the affected population(s) current risk level for abundance and productivity and for spatial structure and diversity (low, moderate, high, or very high), the role of the affected natural population(s) in ESU

[3] The term "local fish" is defined to mean fish that are no more than moderately divergent from the local natural population. See 70 FR 37204; June 28, 2005
[4] Exceptions include restoring extirpated populations and gene banks.

or steelhead DPS recovery (primary, contributing, or stabilizing), and the target viability (highly viable, viable, or maintained) for the affected natural population(s).

2.2.3) Effects of the Proposed Action

Effects assignments for each of the eight factors are described below in Table 6. Analysis of the proposed action identified one factor that is an unknown threat to ESA protected spring Chinook salmon and steelhead (Table 6). Following Table 6 is further description and analysis of each factor.

Table 6. Effects of the Okanogan spring Chinook salmon program on UCR spring Chinook salmon and steelhead and on designated critical habitat.

Factors	Range in Effects	Assigned Effects Category and Mitigation
Hatchery broodstock collection when broodstock originate from the same ESU or DPS	Beneficial to harmful	NA for this proposed program NMFS will consult with the USFWS on their current hatchery program.
Hatchery broodstock collection when broodstock originate from a different ESU or DPS	Neutral to harmful	NA for this proposed program Hatchery broodstock will be part of the ESU,
Interactions on the spawning grounds with hatchery returns and the progeny of naturally spawning hatchery fish that are included in the same ESU or DPS	Beneficial to harmful	NA for this proposed program
Interactions on the spawning grounds with hatchery returns and the progeny of naturally spawning hatchery fish that are not included in the same ESU or DPS	Neutral to harmful	Not a threat Since this is a reintroduction program, returning hatchery-origin fish will not be interacting with natural-origin cohorts until natural production begins. Spring Chinook salmon and steelhead spawn at different times of the year, so there is no threat for this factor between these two species.
Interactions in juvenile rearing areas with the progeny of naturally spawning hatchery	Neutral to harmful	Not a threat Since this is a reintroduction program, this is not considered a threat to UCR spring Chinook salmon. Because of the current habitat conditions within the

Factors	Range in Effects	Assigned Effects Category and Mitigation
fish and hatchery releases		Okanogan Basin (e.g. high water temperatures), it is likely that any potential interactions between released hatchery spring Chinook or naturally produced spring Chinook from hatchery parents on steelhead would occur outside the basin. A potential benefit of increased numbers of spawning spring Chinook salmon on steelhead juvenile rearing could be addition of marine-derived nutrients.
Interactions in the migration corridor, estuary, and ocean with hatchery releases and the progeny of naturally spawning hatchery fish	Neutral to harmful	Unknown threat Effects of the proposed action are not detectable. Available information does not show the level of hatchery production that leads to measureable competition, nor does it identify how and to what extent listed species would be disadvantaged. The conditions under which competitive interactions occur, and competitive advantages and disadvantages for different life-history stages, populations, ESUs and DPSs, and for hatchery and natural-origin fish are unknown.
Hatchery research, monitoring, and evaluation	Beneficial to harmful	Not a threat RM&E will observe natural spawners and estimate abundance, origin, and spatial distribution. RM&E can reduce survival from collection and handling, for example from rotary screw traps (purposeful or inadvertent), from captivity, from sampling (e.g., the removal of scales and tissues), from tagging and fin-clipping, and from observation that leads to changes in behavior.
Masking	Neutral to harmful	Not a threat All fish released from the hatchery will be coded wire tagged.
Construction, operation, and maintenance of hatchery facilities	Neutral to harmful	Not a threat Broodstock capture, origin, and other factors will be evaluated in a separate consultation (USFWS 2012a).
Fisheries	N/A	Terminal fisheries targeting Chinook salmon produced by this program has been evaluated and authorized in a separate opinion (NMFS 2008a) and is therefore included in the environmental baseline.

2.2.3.1) Description and Analysis of Factors

In the following, each factor that was considered in the analysis is further described followed by a brief description of the analysis.

Broodstock collection

Broodstock collection is not evaluated in this HGMP, since broodstock is collected as part of the USFWS's Winthrop NFH (USFWS 2012a).

Interactions on the spawning grounds from hatchery returns and from the returns of naturally spawning hatchery fish

The relevant considerations here are gene-flow and competition on the spawning grounds between hatchery fish and fish from natural populations, demographic risk, and pathogen transmission.

The benefits and risks from interactions on the spawning grounds between fish derived from hatchery production is not applicable for spring Chinook salmon because it is a reintroduction program. Steelhead spawn in the spring and therefore there is no temporal overlap, and thus no threat.

Interactions in rearing areas from hatchery releases and the progeny from naturally spawning hatchery fish

The potential for competition, predation, and premature emigration when the progeny of naturally spawning hatchery fish and hatchery releases use juvenile rearing areas is another important factor to consider. Generally speaking, competition and a corresponding reduction in productivity and survival may result from direct interactions when hatchery-origin fish interfere with the accessibility to limited resources by natural-origin fish or through indirect means, when the utilization of a limited resource by hatchery fish reduces the amount available for fish from the natural population (SIWG 1984). Naturally produced fish may be competitively displaced by hatchery fish early in life, especially when hatchery fish are more numerous, of equal or greater size, when hatchery fish take up residency before naturally produced fry emerge from redds, and when hatchery releases become non-migrants and residualize. Hatchery fish might alter naturally produced salmon behavioral patterns and habitat use, making them more susceptible to predators (Hillman and Mullan 1989; Steward and Bjornn 1990). Hatchery-origin fish may also alter naturally produced salmonid migratory responses or movement patterns, leading to a decrease in foraging success (Hillman and Mullan 1989; Steward and Bjornn 1990). Actual impacts on naturally produced fish would thus depend on the degree of dietary overlap, food availability, size-related differences in prey selection, foraging tactics, and differences in microhabitat use (Steward and Bjornn 1990).

Salmon and steelhead are piscivorous and are known to feed on other salmon and steelhead. Predation, either direct (direct consumption) or indirect (increases in predation by other predator species due to enhanced attraction) can result from hatchery fish released into the wild. Considered here is predation by hatchery-origin fish and by the progeny of naturally spawning hatchery fish and by avian and other predators attracted to the area by an abundance of hatchery fish. Hatchery fish originating from egg boxes and fish planted as non-migrant fry or fingerlings can prey upon fish from the local natural population during juvenile rearing. Hatchery fish released at a later stage, to emigrate quickly to the ocean, can prey on fry and fingerlings that are encountered during the downstream migration. Some of these hatchery fish do not emigrate and instead take up residence in the stream (residuals) where they can prey on stream-rearing juveniles over a more prolonged period. The progeny of naturally spawning hatchery fish also can prey on fish from a natural population and pose a threat. In general, the threat from predation is greatest when natural populations of salmon and steelhead are at low abundance and when spatial structure is already reduced, when habitat, particularly refuge habitat, is limited, and when environmental conditions favor high visibility.

SIWG (1984) rated most risks associated with predation as unknown, because there is relatively little documentation in the literature of predation interactions in either freshwater or marine areas. Predation may be greatest when large numbers of hatchery smolts encounter newly emerged fry or fingerlings, or when hatchery fish are large relative to naturally produced fish (SIWG 1984). Some reports suggest that hatchery fish can prey on fish that are ½ their length (Pearsons and Fritts 1999; HSRG 2004), but other studies have concluded that salmonid predators prey on fish 1/3 or less their length (Horner 1978; Hillman and Mullan 1989; Beauchamp 1990; Cannamela 1992; CBFWA 1996). Hatchery fish may also be less efficient predators as compared to their natural-origin conspecifics, reducing the potential for predation impacts (Sosiak et al. 1979; Bachman 1984; Olla et al. 1998).

Interactions between juvenile fish derived from hatchery releases from the proposed program and natural-origin juveniles is not a threat to ESA-listed salmon and steelhead.

The most important considerations here are competition and predation by juvenile hatchery fish and premature emigration of natural-origin fish caused by hatchery fish. Since this is a reintroduction program, interactions with naturally produced juvenile spring Chinook is not an issue. Interactions with steelhead is not believed to be an issue either because the program will be releasing active migrants into the mainstem Okanogan during the spring when flows are high and the water is turbid. We expect hatchery spring Chinook to move quickly out of the Okanogan and into the Columbia River, thereby reducing the temporal overlap with steelhead. Given the large volume of turbid water in the Okanogan and the short duration of spatial overlap we anticipate very little competition for space, food, or cover between hatchery released spring Chinook and natural origin steelhead.

En-masse hatchery salmon smolt releases may cause the displacement of naturally produced juvenile salmonids leading to the abandonment of advantageous feeding stations or premature out-migration (Pearsons et al. 1994). Displacement and premature out-migration constitutes take and would be expected to reduce population spatial structure and could reduce abundance if displacement leads to lower survival. This possibility was considered but rejected because in this case, hatchery spring Chinook salmon will be released to the mainstem Okanogan River, which is not believed to be substantial rearing habitat for UCR steelhead. Perennial rearing in the Okanogan River is not a viable life history pathway for steelhead due to high summer water temperatures (USGS 2012). Therefore, interactions between hatchery releases of spring Chinook and steelhead should be limited to actively migrating smolts.

Predation is dependent upon two factors: the predatory fish and their prey must overlap temporally and spatially, and the prey should be less than 1/3 the length of the predatory fish, as discussed above. The CCT anticipates that hatchery spring Chinook salmon will average approximately 140 mm in length at the time of release. Using the 1/3 "rule", hatchery spring Chinook would not prey on fish larger than 47 mm in length. This is not believed to be an issue for this reintroduction program because of the timing of release, naturally produced steelhead will be larger than 47 mm, if they occur near the point of release or areas downstream.

It is also unlikely that any hatchery-origin fish that do not migrate to the ocean and instead become residuals pose any threat to spring Chinook and steelhead populations in the Okanogan River basin. Even if fish did not initially migrate when released, temperatures in the mainstem Okanogan would most likely require fish to move out of the Okanogan River.

The CCT propose to minimize the risk of adverse competitive interactions between hatchery spring Chinook and steelhead by:

- Releasing hatchery smolts that are physiologically ready to migrate. Hatchery fish released as smolts emigrate seaward soon after liberation, minimizing the potential for competition with juvenile natural-origin fish in freshwater (Steward and Bjornn 1990).
- Operating the hatchery such that hatchery fish are reared to sufficient size that smoltification occurs within nearly the entire population (Bugert et al. 1991).
- Releasing hatchery smolts in river areas not used for stream-rearing natural-origin juveniles.
- Monitoring the spawning location of hatchery spring Chinook salmon, spatial distribution of juvenile hatchery fish, and the incidence of residualism by spring Chinook salmon released from the proposed program.

Interactions in the migration corridor, in the estuary, and in the ocean from hatchery releases and the progeny of naturally spawning hatchery fish

It is beyond the scope of current knowledge and research abilities to understand and estimate the effect of the proposed hatchery program releases on the growth and survival of listed salmon and steelhead in the main-stem Columbia River, the Columbia River estuary, and the Pacific Ocean. Millions of hatchery smolts are released into the Columbia and Snake River systems and the Okanogan reintroduction program will not add any new fish to that total because the Okanogan reintroduction program smolts would be reared and released into the Methow basin if they are not transferred to the Okanogan. Therefore, there is no change in interactions in the mainstem corridor, Columbia River estuary or Pacific Ocean.

Research, monitoring, and evaluation

There are five factors to take into account when assessing hatchery RM&E and they are; 1) the status of the affected species and effects of the proposed RM&E on the species and on designated critical habitat, 2) critical uncertainties over effects of the proposed action on the species, 3) performance monitoring and determining the effectiveness of the hatchery program at achieving its goals and objectives, 4) identifying and quantifying collateral affects, and 5) tracking compliance of the hatchery program with the terms and conditions for implementing the program.

The proposed hatchery program includes M&E to inform future adjustments that further reduce risks to ESA-listed salmon and steelhead. RM&E included in this HGMP is not a threat to ESA-listed salmon and steelhead. Very minor lethal and sub-lethal effects to listed species could occur. The CCT will monitor risks to UCR steelhead productivity from interactions with hatchery spring Chinook salmon.

Masking hatchery fish identity

Hatchery actions also must be assessed for masking effects. For these purposes, masking is when hatchery fish included in the proposed action mix with and are not identifiable from other fish. The effect of masking is that it undermines and confuses RM&E and status and trends monitoring and it reduces management flexibility. For example, management decisions may be more conservative than necessary because of uncertainty over their effects on protected species. Both adult and juvenile hatchery fish can have masking effects.

Masking caused by hatchery fish is not a threat to ESA-listed salmon and steelhead as a result of the proposed hatchery program. Hatchery fish from this program will not confuse or conceal the status of a natural population or the effects of the hatchery program on any natural population. All hatchery fish released from this program will be coded wire tagged.. Thetag code will be different from any of the releases in the Methow and the central CJH facility. Therefore, M&E programs can easily distinguish the origin of a recovered carcass.

Construction, operation, and maintenance activities

Construction, operation, and maintenance activities ongoing at hatchery facilities can alter fish behavior and injure or kill eggs, juveniles and adults. Analysis focuses on the incidental effects on ESA-listed fish from sorting through the run at large to collect hatchery broodstock. Some programs collect their broodstock from fish volunteering into the hatchery itself, typically into a ladder and holding pond, while others sort through the run at large, usually at a weir, ladder, or sampling facility. Generally speaking, the more a hatchery program accesses the run at large for hatchery broodstock– the more fish that are handled or delayed during migration - the greater the threat to listed species.

Weirs are installed and operated to collect broodstock and to prevent hatchery fish from spawning naturally. Weirs are devices that are employed to effectively block upstream passage and force returning adult fish to enter a trap and holding area. The effects of weirs on natural-origin adult salmonids have been evaluated by NMFS (NMFS 2010; NMFS 2011). The physical presence and operation of a weir and trap can cause:

- Delayed upstream migration;

- Rejection of the weir, thus inducing spawning downstream of the weir;
- Impacts from increased fallback of fish released above the weir;
- Injury or mortality from fish when they attempt to jump the barrier;
- Physical harm to the fish during their capture and retention in the trap;
- Harm to fish that are held for long periods of time;
- Harm to fish during handling; and
- An increase in the fish's susceptibility to downstream displacement and predation the during recovery period.

There are a number of actions that can be taken to address these effects (2011 WDFW Weir Biop, Nisqually weir). Weir rejection, fallback, handling injury, and delay from the operation of the weir and trap have been reduced by using trained personnel, removing debris, preventing poaching, holding fish for the shortest time possible, and removing any fish not needed for broodstock to allow for recovery and release.

This factor is not considered a threat during the first phase of this program since broodstock will be collected in the Methow River and that program will be evaluated through a different consultation. During later phases of the program, weirs will be operated in Salmon and Omak Creek for management actions related to both steelhead and spring Chinook. It is possible that smaller tributaries will also have temporary weirs for steelhead or spring Chinook broodstock collection. These weirs will be operated to minimize delay and displacement.

Disease transmission

The rearing densities (0.03/ft3) and flow index (0.97) in the proposed Tonasket Pond will be much lower than standard propagation standards thereby reducing the opportunity for disease outbreaks. The volitional release strategy for this pond should also minimize interactions with other species in the Okanogan and Columbia rivers, reducing the potential for disease transmission (see section 10 of this document). As outlined in this HGMP, standard disease monitoring, treatment, and certification will all be occurring to minimize the opportunity for disease transmission. The NOAA ESA BiOp for CJHP also requires implementing proper disease protocols.

The Colville Tribes will be implementing BKD culling to minimize the occurrence and potential spreading of this disease. The broodstock holding facilities have been expanded to accommodate additional broodstock for this purpose. A pre-spawning mortality rate of 10% has been factored into program planning and hatchery design to allow for culling.

Fisheries

There are two aspects of fisheries that are considered: 1) when listed species are inadvertently and incidentally taken in fisheries targeting hatchery fish, and 2) when fisheries are used as a tool to prevent hatchery fish from spawning naturally. The latter case includes ESA-listed hatchery fish that are surplus to recovery needs. In each case, the fishery must be strictly regulated based on the take of ESA-listed species.

Fisheries targeting these hatchery fish were described and evaluated in a separate opinion (NMFS 2008a). These effects are therefore incorporated into the environmental baseline. There are no plans for a directed fishery on the reintroduced spring Chinook in the Okanogan River. Therefore there will not be any increased risk of indirect take of steelhead within the Okanogan River. However, most fisheries and adult collection activities for spring Chinook salmon occur prior to steelhead entering freshwater.

SECTION 3. RELATIONSHIP OF PROGRAM TO OTHER MANAGEMENT OBJECTIVES

3.1) Describe alignment of the hatchery program with any ESU-wide hatchery plan. Explain any proposed deviations from the plan or policies.

UCR Spring Chinook are extirpated in the Okanogan subbasin and therefore not included as critical habitat for the species. Recovery of spring Chinook in the Okanogan subbasin is not a requirement for delisting of the ESU (ICTRT 2007; UCSRB 2007). However, the Upper Columbia Salmon and Steelhead Recovery Plan (2007) "…recognizes that if a major spawning area could be established in the Okanogan using an Upper Columbia spring Chinook stock, then the ESU would be at a lower risk of extinction."

Reintroduction of spring Chinook in the Okanogan River Basin has been included as mitigation in the FCRPS Biological Opinion to reduce the short-term risk of extinction and increase recovery of UCR spring Chinook.

Although not ESU-wide, the program described in this HGMP is part of a multi-population plan to reduce risk to the ESU by reducing risk to one of the primary populations (Methow) and establishing another population to increase spatial structure, diversity, and abundance.

<u>Hatchery Scientific Review Group:</u>
The HSRG (2009) reviewed hatchery programs in the upper Columbia River and made a number of observations and recommendations regarding spring Chinook that largely support or are implemented by this proposed program.

Observations:

1. There is no current spring Chinook program in the Okanogan River, but there are plans for reintroduction.
2. The Colville Tribes are initiating a significant habitat improvement program that is essential for any spring Chinook reintroduction program.

Recommendations:

1. During reintroduction the Okanogan spring Chinook populations should be managed using a phased transition approach.
2. Hatchery facilities should be in the basin or long-term acclimation and adult recapture facilities should be developed within the basin.
3. CJHP should transition to local broodstock as soon as possible.

4. Reintroduce locally-adapted hatchery spring Chinook into rehabilitated habitats.
5. As the number of natural-origin spring Chinook increases, they should be incorporated into the hatchery broodstock in ever-increasing proportions to achieve a PNI greater than 0.5.
6. A segregated spring Chinook program could be considered below Chief Joseph Dam using Leavenworth or Methow stock.

This HGMP is designed to implement the preliminary HSRG recommendations.

3.2) List all existing cooperative agreements, memoranda of understanding, memoranda of agreement, or other management plans or court orders under which program operates.

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 Bureau of Reclamation agreed that hatchery mitigation associated with the construction of Grand Coulee Dam in 1937 was never fully implemented. According to the Bureau, "…hatcheries were to be used to mitigate for the loss of 'upper Columbia River migratory fish runs' by providing greater production in the 'lower tributaries' – the Wenatchee, Entiat, Methow, and Okanogan." The obligation still exists, and will be pursued.

For a list of the federal treaties and orders with which the Winthrop portion of the program complies please see USFWS (2012a).

Spring Chinook management in the Okanogan River and in the Columbia River above its confluence was not addressed in the recently negotiated Columbia River Fish Management Plan adopted pursuant to *US v. Oregon* (Sohappy v. Smith, "Belloni decision, case 899). However, the USFWS has agreement from *US v. Oregon* parties to transfer 200,000 of their 600,000 smolt program to the Okanogan (US v. Oregon 2012; USFWS 2012b). Therefore, the Okanogan portion of this program is consistent with *US v. Oregon* even though the Colville tribes are not a party to that agreement.

3.3) Relationship to harvest objectives.

The spring Chinook propagation programs and selective fisheries described in the CJH HGMP (CCT 2008) are designed to restore ceremonial and subsistence harvest opportunity whereas this revised HGMP now focuses on reintroducing spring Chinook in the Okanogan subbasin to contribute to recovery. Some of the reintroduced fish will be captured in the ocean, estuary, and Columbia River fisheries. There will not be harvest targeting the reintroduced fish in the terminal area (Columbia River above Wells Dam and the Okanogan River and its tributaries); however, analogous to the lower Columbia scenario, some reintroduction spring Chinook may be harvested incidentally as the CCT conducts fisheries in the mainstem Columbia River upstream of the Okanogan River confluence targeting adults retuning from the Chief Joseph Hatchery segregated harvest production program. In later phases of the program, excess hatchery fish removed for conservation purposes (reduce pHOS, increase PNI) at weirs or with other live capture gear will be utilized for ceremony and subsistence. We do not believe that there will be an excess of returning hatchery fish during the timeframe of this HGMP (5-10 years).

The Colville Tribes' fisheries are currently described and managed through a Biological Assessment (CCT 2002) with more recent updates in a draft Tribal Resource Management Plan (CCT 2012). As selective gears are tested and deployed, a more comprehensive assessment will be developed. The Colville Tribes intends to pursue development of in-lieu fishing sites in waters adjoining the Reservation and ceded lands, including the Okanogan River upstream to Zosel Dam. These sites will provide tribal members access to fishing waters and include facilities related to the conduct of their ceremonial and subsistence fisheries in accord with the guidelines in the CJH HGMP (CCT 2008). Tribal fisheries in the Okanogan River will not target the reintroduced fish during the timeframe of this HGMP.

3.3.1) Describe fisheries benefiting from the program, and indicate harvest levels and rates for program-origin fish for the last twelve years (1988-99), if available.

The fisheries benefiting from this program will include:

1) Columbia River Zone 1-5 commercial fishery
2) Columbia River Zone 1-6 recreational fishery
3) Columbia River Zone 6 tribal C&S and commercial fisheries
4) Columbia River CCT mark selective fisheries upstream of Okanogan River confluence.

Although fish will be incidentally harvested in the above noted fisheries, they will not be targeted in these fisheries.

The HSRG used the following expected harvest rates on marked upper Columbia spring Chinook in its 2008 review of upper Columbia River hatchery programs:

Ocean Sport & Commercial	1%
Lower Columbia Sport & Commercial (Zones 1-5)	8%
Columbia River Tribal Treaty (Zone 6)	8%

The Winthrop NFH fish would be a good surrogate stock for predicting the effects of Columbia River and Ocean fisheries. From 2000 to 2011, an average of 11% of the Winthrop spring Chinook were harvested in Lower Columbia fisheries (USFWS 2012a).

Terminal harvest of spring Chinook above Wells Dam will be managed according to the CCT and WDFW harvest agreement (CCT and WDFW 2007) (Table 7). Acceptable take levels for all natural origin spring Chinook as well as hatchery origin spring Chinook from the reintroduction program will be determined within the Tribal Resource Management Plan (CCT 2012). We anticipate a very low harvest rate of the reintroduced fish in the CCT fisheries targeting Leavenworth stock released at CJH.

Table 7. Tribal and recreational allocations for selective harvest of Okanogan origin and CJH spring Chinook above Wells Dam with Chief Joseph Hatchery spring Chinook production returns.

Wells Dam Okanogan Ad-Clip Chinook Count April 1 – June 30	Maximum CCT Ad-Clip Chinook Harvest (%)	Maximum Recreational Ad-Clip Chinook Harvest	Broodstock
< 1,000	30	0	70%
1,001 – 1,500	40	0	60%
1,501– 2,000	50	0	50%
2,001 – 4,000	50	20	30%
4,001 – 6,000	60	20	20%
6,001 – 10,000	70	20	10%

1.18) Relationship to habitat protection and recovery strategies.

The major factors affecting natural production of all species in the Okanogan subbasin are thoroughly discussed in the Okanogan Subbasin Plan and the RTT Biological Strategy (NPPC 2004; RTT 2008). The key perturbations affecting UCR summer/fall Chinook include juvenile and adult passage mortalities through nine mainstem dams, agricultural water withdrawals from tributaries and the mainstem Okanogan River, high summer water temperatures, sedimentation, and loss of riparian vegetation.

The State of Washington and the Colville Tribes initiated a comprehensive habitat rehabilitation program in the Okanogan basin. Initial efforts focused on improving passage, stream flows, reduction in sediment loads, and riparian rehabilitation in Omak and Salmon creeks. This program has been greatly supplemented with the 2008 MOA between BPA and the Tribes. Under the MOA, the Colville Tribes will receive nearly $6 million annually for ten years for habitat improvement projects.

Actions to improve juvenile and adult salmon passage through the hydroelectric system are critical to the long-term viability of the natural-origin spring Chinook populations and the success of the propagation program described in this HGMP. Significant improvements have been made in system survivals in recent years through increases in spring flows, spill programs, improved juvenile bypass systems and transportation of juvenile fish at McNary Dam. Through the Council's Fish and Wildlife Program, FERC licensing requirements, and NOAA's ESA regulation, performance standards have been developed for adult and juvenile passage. M&E programs are being initiated to provide actual performance measures for comparison to the standards.

The Okanogan Nation Alliance and the Colville Tribes have agreed to collaborate on recovery of fish and wildlife in the trans-boundary Okanogan subbasin, including the recovery of sockeye, Chinook, and steelhead in Canadian waters. The Okanogan Nation Alliance is now working through Canada's Species At Risk Act (SARA) to seek a listing and recovery of Chinook salmon in the Canadian Okanogan River.

SECTION 4. WATER SOURCE

4.1) Provide a quantitative and narrative description of the water source (spring, well, surface), water quality profile, and natural limitations to production attributable to the water source.

Several water supplies will be used in these spring Chinook programs at Winthrop NFH, Chief Joseph Hatchery and at the Tonasket acclimation pond.

Winthrop NFH: The Winthrop NFH uses a combination of Methow River surface water (75%) and groundwater (25%). For more details please see USFWS (2012a).

Chief Joseph Hatchery: Chief Joseph Hatchery will be supplied with Sixty cfs of surface water from Rufus Woods Lake and 39 cfs of well water. Temperatures of the relief tunnel water range from 48°F in July to 55°F in December. Other water quality parameters of the relief tunnel water are all within normal fish culture thresholds (Koch and Cochran 1977). Lake waters range from about 39°F in winter to 66°F in late summer. Well water should be similar to that at Colville Trout Hatchery several kilometers downstream, 47°F in winter to 58°F in summer. Both water supplies will require gas stabilization and the surface water will be filtrated and up to 3.3 cfs disinfected.

Tonasket Pond: Tonasket pond will utilize up to 25 cfs of Okanogan River surface water. Water temperature should be mid to high 30's in December, low to mid 30's in January and February, mid 30's to mid 40's in March, mid 40's to mid 50's in April. Well water may be used to reduce icing problems during cold snaps.

Riverside Pond: Riverside pond will utilize up to 15.3 cfs of Okanogan River surface water. Water temperature should be mid to high 30's in December, low to mid 30's in January and February, mid 30's to mid 40's in March, mid 40's to mid 50's in April.

Omak Pond: Up to 15.3 cfs of Okanogan River surface water. Water temperature should be mid to high 30's in December, low to mid 30's in January and February, mid 30's to mid 40's in March, mid 40's to mid 50's in April.

4.2) Indicate risk aversion measures that will be applied to minimize the likelihood for the take of listed natural fish as a result of hatchery water withdrawal, screening, or effluent discharge.

Winthrop NFH: The Winthrop NFH intake and water intake and delivery systems are in compliance with NOAA Fisheries criteria (USFWS 2012a).

CJH, Tonasket, Riverside, and Omak Ponds: The water intake and delivery systems are in compliance with NOAA Fisheries criteria.

Effluent from all hatcheries and acclimation ponds will be monitored and kept within discharge thresholds. Acclimation ponds will be dewatered and cleaned before receiving fish each year. During fish rearing, the ponds will be vacuumed of propagation wastes as needed and solids properly disposed.

At Chief Joseph Hatchery, a cleaning waste collection and treatment system will remove pollutants, primarily un-eaten feed and fish feces, from the rearing raceways and ponds. The collection system will be based on an eductor-type vacuuming system that discharges into a dual cell settling pond designed to comply with WDOE criteria.

SECTION 5. FACILITIES

5.1) Broodstock collection facilities (or methods).

Winthrop NFH: See USFWS 2012a.

Chief Joe Hatchery: Chief Joseph Hatchery has spring Chinook broodstock management facilities, but it is not anticipated that Chief Joseph Hatchery will be used to collect, hold, or spawn broodstock for this program during the life of this HGMP.

5.2) Fish transportation equipment (description of pen, tank truck, or container used).

The Winthrop National Fish Hatchery utilizes a truck with a 400 gallon tank capable of transporting up to 15 adult spring Chinook. Eggs are transported on station using coolers and aerated ziplock bags (USFWS 2012a).

Initially, the program will be transporting pre-smolts (~ 25 fpp) from Winthrop NFH to the Tonasket acclimation pond. Fish will be loaded into a 2500 gallon truck via a fish pump with a capacity of 1875 lbs of fish (0.75 lbs/gal). Based on a program of 200,000 fish, it will take five trips to move the fish to the Tonasket acclimation pond.

When the program starts to transport eyed eggs from Winthrop NFH to CJH the trays will be removed from the incubators by hand, and eggs will be placed into wire baskets, lined with damp burlap. Eggs will be transported in an egg box, via a pickup truck. Once at the Chief Joseph Hatchery, eggs will be weighed and placed into vertical incubators.

5.3) Broodstock holding and spawning facilities.

Winthrop NFH broodstock holding and spawning facilities are described in USFWS (2012a).

5.4) Incubation facilities.

Winthrop NFH broodstock holding and spawning facilities are described in USFWS (2012a).

Chief Joseph Hatchery: A Heath incubator tray will be provided for each female's 4,400 eggs. Incubation will use 3.0 gpm for each half stack (8) of trays. Incubation flows will be disease–free (groundwater) that will be slightly chilled to achieve optimum incubation temperature of 48°F. Up to 20% may be culled depending on ELISA results.

5.5) Rearing facilities.

Winthrop NFH: Winthrop NFH will utilize tanks, ponds, and raceways depending on the lifestage (USFWS 2012a).

Chief Joseph Hatchery: Rearing facilities at Chief Joseph Hatchery will include indoor start troughs for use prior to moving Chinook to outdoor raceways and ponds. Loading criteria for the fry will be 1.0 lbs/gpm-inch, at least 1 tank turnover per hour, and a density not to exceed 0.125 lbs/cu. ft.-inch. Button-up fry will be transferred to the start tanks at about 0.45 grams.

At about 0.50 grams/fish, the fry will be transferred via gravity flow to outdoor raceways. A total of 40 raceways (10' x 100' x 3.25') and three rearing ponds (two at 38,400 ft^3 and one at 79,200 ft^3) will be available for the summer/fall and spring Chinook programs. Flows will be a combination of well water and reservoir water mixed to achieve optimum rearing temperatures to meet smolt size objectives. Loading densities will not exceed 1.0 lbs/gpm-inch, at least 1.0 raceway turnover per hour, and 0.12 lbs./cu. ft.-inch. Rearing will be accomplished with a single pass of water, with effluent delivered to the facility overflow drain.

5.6) Extended rearing/Acclimation facilities.

Tonasket Pond is an open-air, rectangular pond with 74,300 ft^3 of useable rearing volume. The Pond's water is supplied by five pumps, each delivering 5 cfs from the Okanogan River. The pond is located on the right bank of the Okanogan River at river mile 59.0, near the town of Tonasket. Spring Chinook have been successfully reared at the Tonasket acclimation ponds during years that included periods of ice cover and we expect similar functionality in the future.

Omak and/or Riverside acclimation sites may be used as a contingency for the program should any problems arise at the Tonasket acclimation pond.

Both Omak and Riverside acclimation ponds are an open-air, rectangular pond with 55,000 cubic feet of useable rearing volume. The pond's water is supplied with three pumps, using Okanogan River water, and one well pump. Only two of the river pumps are used at any one time, with one pump as a backup. Each pump provides 7.65 cfs, with the well pump providing 100 gpm. The design on the well pump is to assist in keeping the surface of the pond ice free, and to assist in keeping the intake ice free.

All outdoor acclimation facilities will be fitted with netting to prevent avian predation and electrical wiring to prevent entry of land-based predators will be installed if other measures such as live trapping and relocation prove ineffective.

Integration of NATURES rearing techniques will be considered for testing and installation at the acclimation facilities. Consideration will be given to adding in-pond or floating structure and subsurface feeders to emulate natural conditions.

5.7) Describe operational difficulties or disasters that led to significant fish mortality.

Winthrop NFH has not had any disasters in their spring Chinook salmon program in the last 15 years (USFWS 2012a).

The CJH program is a new program, so no operation difficulties or disasters have occurred.

5.8) Indicate available back-up systems, and risk aversion measures that will be applied, that minimize the likelihood for the take of listed natural fish that may result from equipment failure, water loss, flooding, disease transmission, or other events that could lead to injury or mortality.

Winthrop NFH: The hatchery is staffed full-time, eight hours per day. Three employees live in residential quarters on hatchery grounds. The hatchery has a centrally located low-water alarm which is connected to an automatic dialer. If the dialer fails, a paging system engages and contacts employees up to five miles away. A low water level switch also triggers a horn alarm to alert employees. If power is lost to the facility, a back-up generator engages automatically to restore power. The hatchery sometimes loses its surface water source (Foghorn Ditch) during extreme cold spells during the winter months. Flows to all rearing units are trimmed during these events and the facility must depend on available ground water (USFWS (2012a).

Chief Joseph Hatchery: The hatchery is staffed full time, with multiple employees scheduled 8 hours per day, and one staff member on call 24 hours a day on a rotating 7 day schedule. Four employees share this responsibility and live in hatchery provided housing less than 1 mile from the facility. The hatchery is monitored by a SCADA system that is connected to an automatic dialer. Once an alarm is detected, the dialer engages and staff will respond in the appropriate amount of time, depending on the time of year and need. All rearing vessels are monitored by a low level float, as well as the incubation system. All wells are monitored by multiple alarm points, including pressure and flow. All 5 wells are equipped with dedicated backup generators, as well as the main facility. An addition gravity water source, from Rufus Woods Reservoir, is available to all rearing vessels and incubation.

Tonasket Pond: Water supplied to the pond is screened to NOAA flow and screen standards to avoid entrainment of UCR steelhead. The pond is located above the flood zone. Disease prevention methods will be employed for health of program fish and to minimize the transmission of diseased fish or disease agents to the Okanogan River. The pond will receive regular cleaning and personnel will routinely remove mortalities. Fish health monitoring will follow WDFW and USFWS guidelines.

SECTION 6. BROODSTOCK ORIGIN AND IDENTITY

Describe the origin and identity of broodstock used in the program, its ESA-listing status, annual collection goals, and relationship to wild fish of the same species/population.

6.1) Source.

Since 2000, the stock origin of the egg source for the WNFH has been the Methow Composite (MetComp) (USFWS 2012a). This will continue to be the egg source for the Okanogan reintroduction program.

6.2) Supporting information.

6.2.1) History.

The following was taken directly from USFWS (2012a): "A spring Chinook salmon propagation program at WNFH started in 1974 with releases in 1976. Since 1974, eggs have been obtained from several lower Columbia River sources as well as from Leavenworth NFH. The Little White Salmon stock originated in 1967 from fish of unknown origin returning to the Little White Salmon River. These adults were probably descendants of several different stocks. The Carson NFH stock originated from a collection of commingled adults captured at Bonneville Dam. Use of the Methow River Composite stock at WNFH began in 2000. The Methow River Composite incorporated listed hatchery origin and natural origin Methow River and Chewuch River stocks and is cooperatively managed at both WNFH and MFH."

6.2.2) Annual size.

The full Winthrop NFH program will need approximately 360 adults (but up to 400) with a 50:50 sex ratio to meet their full program objective of 600,000 smolts released (USFWS 2012a). Therefore, the Okanogan program (200,000) is 1/3 of their total program based on smolts released and assuming that the ratio is the same for adults then 120 to 133 of the adult broodstock need is for the Okanogan.

6.2.3) Past and proposed level of natural fish in broodstock.

Natural origin adults are generally not captured or utilized for the Winthrop NFH program (USFWS 2012a). Natural origin fish may be used in the broodstock after transition to a locally adapted program in the Okanogan, but that is not expected to occur within the timeframe of this HGMP.

6.2.4) Genetic or ecological differences.

Spring Chinook in the Okanogan were extirpated and there are no genotypic, phenotypic, or behavioral information on the extinct population. This is a reintroduction so there will not be any genetic or ecological differences initially.

6.2.5) Reasons for choosing (the selected stocks).

The Methow Composite stock raised at the Winthrop NFH was chosen as the source population for the reintroduction effort because it is the most locally-adapted stock available and because the hatchery is capable of producing fish that are surplus to recovery needs in the Methow. The Biological Opinion for the Chief Joseph Hatchery recommended use of this stock for the reintroduction program, if possible (NMFS 2008b). Detailed information concerning the history of the Methow Composite stock and hatchery practices at the Winthrop NFH can be found in the HGMP prepared for that hatchery (USFWS 2012a). The HGMP provides for an annual transfer of up to 200,000 pre-smolts for release into the Okanogan River basin, or an equivalent number of eyed eggs transferred to the CJH.

The Methow Composite stock is presently a mix of indigenous and non-local origin stocks, but is sufficient similar to the natural origin population in the Methow to be included with the UCR spring Chinook salmon ESU. Natural origin progeny in excess to the needs of the Methow Fish Hatchery will be utilized by the Winthrop NFH (USFWS 2012a). If this occurs, future transfers of eggs or fry for release into the Okanogan may become more locally adapted than the fry presently available for transfer, further enhancing the chances of success of the reintroduction effort.

An effort was initiated (by NOAA) to evaluate the benefits of reintroductions as a result of the adaptive management implementation plan for the FCRPS BiOP. The NOAA Northwest Fisheries Science Center lead workgroup recently completed a draft manuscript for peer review that outlined a recommended approach for reintroductions (Anderson et al. 2012 (draft manuscript)). Following the scientific principles of this manuscript, using an adjacent within ESU population as a donor stock has a stronger conservation value than using a more distant (Wenatchee) or out of ESU (Leavenworth) stock. Likewise, release of hatchery reared juveniles from the Methow Composite stock is a viable alternative assuming that the risks of hatchery effects are acceptable to the reintroduced population and that the risks of using some broodstock from the source population are acceptable. Anadromous fish co-managers in both the Mid-C HCP forum and the US v. Oregon forums have already agreed that when sufficient Methow Composite broodstock can be collected to generate > 400,000 smolts, that up to 200,000 fish should be made available for transfer to the Okanogan (i.e. the risk to the Methow population is acceptable) (US v. Oregon 2012; USFWS 2012b).

The alternative of using non-local, unlisted Leavenworth stock is already approved through the HGMP and BiOp permitting processes. However, this option would not allow the Okanogan to contribute to recovery of the Upper Columbia ESU. Additional considerations for using this non-local stock include negotiations with the Canadian and provincial governments and First Nations tribes.

6.3) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish that may occur as a result of broodstock selection practices.

There are no risks to listed natural fish in the Okanogan subbasin from broodstock selection as spring Chinook were extirpated in the Okanogan subbasin. There is no indigenous population.

Please see the Winthrop NFH HGMP for details regarding their risk aversion measures for broodstock selection practices (USFWS 2012a).

SECTION 7. BROODSTOCK COLLECTION

7.1) Life-history stage to be collected (adults, eggs, or juveniles).

Adult spring Chinook will be collected for broodstock.

7.2) Collection or sampling design.

Winthrop NFH: Adult spring Chinook will be collected from adults volunteering to the hatchery's collection ladder, additional adults or gametes may be used from excess collected at the Methow Fish Hatchery (USFWS 2012a).

Chief Joseph Hatchery: We do not anticipate taking broodstock for the Okanogan reintroduction program at the Chief Joseph hatchery or in the Okanogan during the timespan of this HGMP.

7.3) Identity.

Winthrop NFH: All adults used for broodstock will be of WNFH or MFH origin as identified by adipose fin clips and/or CWT codes (USFWS 2012a).

7.4) Proposed number to be collected:

7.4.1) Program goal (assuming 1:1 sex ratio for adults):

Approximately 120 adults are needed to meet program goals. Actual need might vary depending on age structure, sex ratio, fecundity, culling rate, and survival.

7.4.2) Broodstock collection levels for the last twelve years (e.g. 1988-99), or for most recent years available:

This is a new program with no history of prior broodstock collection. For the Winthrop NFH, broodstock collection since 2001 has averaged 111 Methow Fish Hatchery Origin (29%) and 267 Winthrop NFH origin (71%) for their full program (USFWS 2012a).

7.5) Disposition of hatchery-origin fish collected in surplus of broodstock needs.

Winthrop NFH: The following is taken directly from the Winthrop NFH HGMP, "All adipose fin clipped adults collected in surplus of broodstock needs will be: 1) provided to the Colville Confederated Tribes for use as brood for the initiation of Okanogan and/or Chief Joseph Hatchery programs, 2) surplused to local Native American tribes for ceremonial and subsistence purposes or other approved outlets (e.g. Federal prison system, local food banks, etc.), or 3) spawned with the full intent of shipping green or eyed eggs to the Colville Confederated Tribe for rearing and mainstem Columbia River release at Chief Joseph Hatchery." (USFWS 2012a).

We do not anticipate any surplus hatchery fish in the Okanogan River during the timeframe of this HGMP (5-10 years). It is assumed that all returning hatchery fish are needed and wanted for spawning in the natural environment during the initial reintroduction phase.

7.6) Fish transportation and holding methods.

Winthrop NFH: There are no plans to transport adult broodstock from the Winthrop NFH.

7.7) Describe fish health maintenance and sanitation procedures applied.

Winthrop NFH: "Fish health services are provided by staff from the USFW Services Olympia Fish Health Center (OFHC) which is a full service aquatic health facility capable of monitoring, diagnostic, and certification procedures that meet or exceed all national, international, IHOT or co-manager requirements."(USFWS 2012a).

Chief Joseph Hatchery: Fish health services are provided by staff from the USFW Services Olympia Fish Health Center (OFHC) or WDFW Fish Health services, both of which are a full service aquatic health facilities capable of monitoring, diagnostic, and certification procedures that meet or exceed all national, international, IHOT or co-manager requirements.

Pathogen and disease monitoring start with adult testing of captured populations for all reportable aquatic viruses and bacteria at the minimum assumed pathogen prevalence level of 5% (i.e. 60 individuals). In addition, all females spawned are specifically and individually tested for *Renibacterium salmoninarum*, the causative agent of bacterial kidney disease (BKD). This is essential to determine the pathogen levels and eliminate or segregate the resulting eggs from different risk levels. This process greatly reduces the impact of transmission of disease from infected females to progeny. All eggs and accompanying containers are disinfected with iodine solution during the water hardening process following fertilization.

The HSRG has recently recommended adoption of BKD control strategies, with culling of high titer BKD females. As part of the recommended strategy, broodstock may be injected, pre-spawning, with azithromycin (40 mg/kg fish) and the resulting eggs surface disinfected. Application of this strategy will depend on the availability of broodstock.

7.8) Disposition of carcasses.

Winthrop NFH: All carcasses are disposed of in an earthen pit at the Winthrop NFH (USFWS 2012a).

Chief Joseph Hatchery: We do not anticipate taking broodstock for the Okanogan reintroduction program at the Chief Joseph hatchery or in the Okanogan during the timespan of this HGMP.

7.9) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the broodstock collection program.

Winthrop NFH: The risk of fish disease amplification will be minimized by following co-manager Fish Health Policy sanitation and fish health maintenance and monitoring guidelines. Since “wild” fish rarely enter the collection facility, there is a minimal likelihood for adverse genetic or ecological effects to the natural population (USFWS 2012a).

SECTION 8. MATING

Describe fish mating procedures that will be used, including those applied to meet performance indicators identified previously.

8.1) Selection method.

Winthrop NFH: Prioritized based on hatchery or natural origin. Two stocks currently utilized in the hatchery programs within the basin are Methow River Composite and Twisp River stocks. Fish of natural origin (by scale pattern) will be transferred to the MFH to be crossed with the listed Methow Composite stock. All Twisp River stock gametes are transferred to the MFH (USFWS 2012a).

8.2) Males.

Winthrop NFH: The run is consistently comprised of 60% females and 40% males. Therefore, all males are used at least once and jacks are included over the 10% level, if necessary, to fulfill broodstock requirements. When necessary, some adult males are used twice, but no more than twice, to compensate for the differing sex ratio. Backup males are only used when a problem is noticed with the milt (blood, water, etc.) (USFWS 2012a).

8.3) Fertilization.

Winthrop NFH: Gametes are fertilized as 1:1 individual matings. Factorial matings have occurred in the past when returning adult numbers dropped below 50 individuals in order to maximize the effective population size. Fertilization does not occur until stock origin has been determined (coded wire tag). Therefore, all gametes are placed in individual zip-lock bags, oxygenated, and placed in coolers. Any containers used during the spawning and/or fertilization process are disinfected in an iodophore solution between fish. All eggs are water hardened in a 75 ppm iodophore solution for 30 minutes (USFWS 2012a).

8.4) Cryopreserved gametes.

No cryopreserved gametes have been or are expected to be used in the spring Chinook programs.

8.5) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic or ecological effects to listed natural fish resulting from the mating scheme**.**

The progeny generated from these fish will be part of the non-essential experimental population. There is not a current population in the Okanogan so there will not be any risk to the population from the mating scheme.

SECTION 9. INCUBATION AND REARING

Specify any management *goals* (e.g. "egg to smolt survival") that the hatchery is currently operating under for the hatchery stock in the appropriate sections below. Provide data on the success of meeting the desired hatchery goals.

Winthrop NFH: Survival goals for green egg to fry and fry to smolt are 95% each (Integrated Hatchery Operations Team (IHOT) 1995).

Chief Joseph Hatchery: Chief Joseph Hatchery has been designed based on 90% green egg to eyed egg survival; 95% survival of eyed-egg to ponding of unfed fry; 97.5% survival of unfed fry to fed fry and transfer to raceways; 97.5% survival fed fry to fingerling; and 96% survival fingerling to smolt.

9.1) Incubation:

Winthrop NFH: see table 25 from USFWS (2012a).

9.1.2) Cause for, and disposition of surplus egg takes.

Winthrop NFH: Provided that brood is available, Winthrop NFH will collect approximately 10% above the production goal number of 600,000 smolts in order to compensate for normal losses and culling for females with high ELISA readings (USFWS 2012a).

9.1.3) Loading densities applied during incubation.

Winthrop NFH: Spring Chinook salmon eggs average around 1800 eggs per pound although there can be significant variation to this mean value from year to year depending on adult size and age composition for a particular brood year. Heath trays are loaded at one female per tray through the entire incubation cycle (3000 to 6000 eggs/tray). Flows through the incubation stacks are 1 to 2 gpm to the eyed stage and 3 to 5 gpm from the eyed to button-up fry stage (USFWS 2012a).

Chief Joseph Hatchery: Incubation of spring Chinook at Chief Joseph Hatchery will follow guidelines recommended by Piper et al. using Heath incubators. Facilities have been designed based on incubating 4,400 eggs/tray and using 3 gpm/half-stack. The top tray in each 8-tray half stack will not contain eggs to allow for any settling of sediments. Incubation water will be chilled as necessary to meet an optimum incubation temperature. Prior to placement in Heath trays, eggs of single families will be kept isolated in vertical incubators until disease tests can be performed.

An extra 20% incubation capacity has been designed for Chief Joseph Hatchery to allow for incubation of extra eggs in anticipation of culling high ELISA eggs. After discarding of high ELISA eggs at eyeing, extra incubation capacity can be used to provide extended isolation incubation for moderate ELISA eggs until ponding.

9.1.4) Incubation conditions.

Winthrop NFH: All spring Chinook salmon eggs are incubated on 100% ground water. This water source is free of silt, does not create fungus problems, and provides temperatures in the 39 (chilled) to 52 ˚F (unchilled) range during incubation. Dissolved oxygen is relatively constant at 9 ppm on the inflow and not less than 8 ppm at the outflow. It is not necessary to use formalin during incubation since *saprolegnia* fungus or silt have not been a problem (USFWS 2012a).

Chief Joseph Hatchery: At Chief Joseph Hatchery, incubation waters will be silt-free well water, with dissolved oxygen levels above 7 ppm. Temperatures will be controlled, with chilling as necessary.

9.1.5) Ponding.

Winthrop NFH: Spring Chinook are fully buttoned up at 1800 daily temperature units (DTU) when they are ponded-out. Swim-up fry average 1.3 to 1.4 inches (1100 to 1400 fish per pound). Ponding is forced as trays are removed from the Heath stacks and transferred to a plastic tub of water and moved to the appropriate start tanks. Density indices are kept below 0.13 lbs/cu.ft./inch during early rearing (USFWS 2012a).

Chief Joseph Hatchery: Ponding will occur at or about 1900 FTU's when fry are at about 0.33 grams. Loading criteria will not exceed 1.0 lb/gpm-inch, no less than 1.0 pond turnover/hour, and 0.125 lbs/cu.ft.-inch.

9.1.6) Fish health maintenance and monitoring.

Winthrop NFH: Disease monitoring is accomplished through daily observations by hatchery staff and monthly monitoring by fish health biologists/pathologists from the OFHC (USFWS 2012a).

Chief Joseph Hatchery: Disease monitoring is accomplished through daily observations by hatchery staff and monthly monitoring by fish health pathologist.

Any abnormal situations observed by hatchery personnel are called to the attention of the fish health specialist, which performs diagnostic and confirmatory clinical tests before recommending appropriate treatments. Treatment procedures may include environmental manipulation to control stresses and enhance the fish's ability to recover from infectious agents and/or appropriate chemicals or antibiotics. Antibiotics and chemicals that are registered for fish disease treatments are applied as per labeled instructions. Other therapeutic drugs and chemicals may be applied through appropriate INAD permits or by allowable extra-label prescription by staff Veterinary Medical Officer or local veterinarian.

9.1.7) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish during incubation.

Winthrop NFH: see USFWS (2012a).

Chief Joseph Hatchery: The progeny generated from these fish will be part of the non-essential experimental population. There is not a current population in the Okanogan so there will not be any risk of adverse genetic and ecological effects to the population due to incubation.

9.2) Rearing:

9.2.1) Provide survival rate data (average program performance) by hatchery life stage (fry to fingerling; fingerling to smolt) for the most recent twelve years (1988-99), or for years dependable data are available.

Winthrop NFH: see Table 26 in USFWS (2012a).

Chief Joseph Hatchery: New program; no survival rate data exist. The objective for Chief Joseph Hatchery is survival of 97.5% from fed fry to fingerling and 96% from fingerling to smolt. Cumulatively, the operational objectives for spring Chinook result in about 78% green egg-to-smolt survival.

Tonasket Pond: New program; no survival rate data exist.

9.2.2) Density and loading criteria (goals and actual levels).

Winthrop NFH: Winthrop NFH strives to maintain density indices at or below 0.11 lbs/cu.ft./inch (DI). Actual density indices for various months are displayed in Table 27 of USFWS (2012a).

Chief Joseph Hatchery: The hatchery raceways and ponds have been designed based on the criteria of 1.0 lbs/gpm-inch, 0.125 lbs/cu ft-inch, and a minimum pond turnover rate of 1.0/hour.

Tonasket Pond: The Pond will have maximum loading criteria of 1.0 lbs/gpm-inch, 0.10 lbs/cu ft-inch With 200,000 spring Chinook at a release size of 15 fpp, rearing densities could be lower and flow rates higher than the above criteria if deemed beneficial.

9.2.3) Fish rearing conditions

Winthrop NFH: The Winthrop NFH rears spring Chinook on 100% ground water for the first 10-12 months (USFWS 2012a). Since fish will be transferred to the Okanogan within that timeframe they will not receive any surface water during their rearing at Winthrop NFH.

Chief Joseph Hatchery: With the two sources of water available for the Chief Joseph Hatchery, mixing capabilities will allow rearing temperatures to be maintained within the ideal range of 48 to 54 °F. An ample water supply should also allow for ideal flow conditions for optimal rearing. These capabilities should allow the hatchery to meet ideal flow and density indices for optimal survival and growth. Spring Chinook will be reared in 100' x 10' x 4' raceways. Influent and effluent gas concentrations and temperatures will be constantly monitored following best hatchery management practices.

Tonasket Pond: Influent and effluent gas concentrations and temperatures will be constantly monitored following best hatchery management practices. Water supply is 100% Okanogan River, whereby the temperatures will be the same as the Okanogan River from late-October through end of April. Temperatures will vary dependent upon ambient temperatures but are expected to be 8^0C – 9^0C in late October, and average monthly temperatures for November, December, January, February, March and April of 5^0C, 0.9^0C, 1.1^0C, 2.2^0C, 6.7^0C and 10.6^0C, respectively (USGS Surface-water Monitoring Statistics for USGS Station 12445000, Okanogan River near Tonasket, WA).

Although the pond is expected to be ice-covered much of December – early March, past utilization of the Tonasket Pond for over-winter acclimation of spring Chinook (2007-08 and 2009-10) were successful even with the ice cover for much of the winter months.

9.2.4) Indicate biweekly or monthly fish growth information (average program performance), including length, weight, and condition factor data collected during rearing, if available.

Winthrop NFH: see USFWS (2012a).

Chief Joseph Hatchery: This will be a new program. No data are available. The hatchery has been designed based on an expected growth rate of 0.04 mm/ctu/day.

With two sources of water available at Chief Joseph Hatchery, mixing capabilities will allow rearing temperatures to be maintained within the ideal range of 48 – 54 °F. An ample water supply should also allow for ideal flow conditions for optimal rearing.

Tonasket Pond: This will be a new program, no data are available.

9.2.5) Indicate monthly fish growth rate and energy reserve data (average program performance), if available.

Winthrop NFH: Energy reserve data, through routine monitoring of body fat content, is not conducted on a routine basis. On a quarterly basis, fish health profiles are conducted through the collection of a Goede Index that ascribes qualitative values to external and internal observations of fish health. Data is available through WNFH (USFWS 2012a).

Chief Joseph Hatchery: New program, no data available.

9.2.7) Fish health monitoring, disease treatment, and sanitation procedures.

Winthrop NFH: Disease monitoring is accomplished by daily visual observations by hatchery staff and once monthly monitoring by fish health biologists/pathologists from the OFHC. At least three weeks prior to release, all smolt lots are tested for reportable pathogens at the 5% APPL. All test records and results are on file at the OFHC (USFWS 2012a).

Chief Joseph Hatchery: A fish health monitoring program will be developed that reflects the Washington Fish Health Policy (NWIFC and WDFW 2006), the Integrated Hatchery Operation Team (IHOT 1995) and the Pacific Northwest Fish Health Protection Committee (PNFHPC 1989), to promote production of healthy fish and to reduce the incidence of diseases.

9.2.8) Smolt development indices (e.g. gill ATPase activity), if applicable.

Not applicable.

9.2.9) Indicate the use of "natural" rearing methods as applied in the program.

Winthrop NFH: Not applicable.

Chief Joseph Hatchery: At this time, natural rearing techniques are not anticipated to be applied at the Chief Joseph Hatchery facilities. Integration of NATURES rearing techniques will be considered for testing and installation at the acclimation facilities where extended rearing will occur. Consideration will be given to adding structure and subsurface feeders to simulate natural conditions.

9.2.10) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish under propagation.

The progeny generated from these fish will be part of the non-essential experimental population. There is not a current population in the Okanogan so there will not be any risk of adverse genetic and ecological effects to the population due to rearing.

SECTION 10. RELEASE

Describe fish release levels, and release practices applied through the hatchery program.

10.1) Proposed fish release levels. The objective is 200,000 smolts. The Winthrop NFH plans to produce 10% additional eggs and if survival is high and BKD culling is low then somewhat greater than 200,000 fish may be released, but not more than 220,000.

10.2) Specific location(s) of proposed release(s).
Stream, river, or watercourse: Okanogan River
Release point: Tonasket Pond, river mile 59.0
Major watershed: Okanogan River
Basin or Region: Columbia River

10.3) Actual numbers and sizes of fish released by age class through the program

This is a new program, so there have not been any releases thus far.

10.4) Actual dates of release and description of release protocols.

Releases of yearlings 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, the average date of release from 2005-2011 at Winthrop NFH was April 16th (USFWS 2012a). Fish will be provided at least a two week volitional release period from the acclimation site. The remainder will be forced out of the pond in late-April or early May.

If monitoring indicates a high rates of non-migrants or precocity, then rearing and release methods will be adaptively managed to minimize residualism.

10.5) Fish transportation procedures, if applicable.

Spring Chinook will not be transported immediately prior to release.

10.6) Acclimation procedures

Tonasket Pond: Spring Chinook will be transferred to the Tonasket Pond from Winthrop NFH or CJH in late October or early November and will receive approximately 6 months of acclimation on Okanogan River water.

10.7) Marks applied, and proportions of the total hatchery population marked, to identify hatchery adults.

All fish will be coded wire tagged with a unique batch of codes. Approximately 5,000 will receive a PIT tag.

10.8) Disposition plans for fish identified at the time of release as surplus to programmed or approved levels.

At time of release, all fish up to 110% of approved program levels will be released. Fish will not be transported to acclimation sites in excess of 110% of approved program levels, with allowances for over-winter mortality.

10.9) Fish health certification procedures applied pre-release.

See Section 9.2.7

10.10) Emergency release procedures in response to flooding or water system failure.

Tonasket Pond: In the event of an irresolvable water supply emergency that threatens the health of the Chinook, the fish will be immediately forced from the rearing pond.

10.11) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from fish releases.

The progeny generated from these fish will be part of the non-essential experimental population. There is not a current population in the Okanogan so there will not be any risk of adverse genetic and ecological effects to the population due to these releases. Volitional releases of smolts are the primary risk aversion measures for minimizing ecological effects to steelhead. Volitional releases of active migrants into a large, turbid, high flow environment will minimize any potential for negative ecological effects.

SECTION 11. MONITORING AND EVALUATION OF PERFORMANCE INDICATORS

11.1) Monitoring and evaluation of "Performance Indicators" presented in Section 1.10.

11.1.1) Describe plans and methods proposed to collect data necessary to respond to each "Performance Indicator" identified for the program.

A conceptual monitoring and evaluation program for CJHP was developed in 2005 and submitted with the Master Plan. In 2007, a Step 2 M&E plan was submitted on the CJHP. During Step 3, a final CJHP M&E plan was developed and circulated for co-manager and scientific review (CCT 2009). The M&E plan focused on collecting the necessary information to evaluate the CJHP against the performance standards and

Biological Rule Set described. A final M&E plan also included a process for regular assessment of the CJHP and adaptation to meet or exceed expected benefits and to minimize or eliminate risks.

Appendix D of CCT (2008) provides a detailed adaptive management plan containing contingency actions that can be taken based on M&E results.

Previous planning documents indicated that the reintroduced fish would be adipose clipped and coded wire tagged. During the development of this HGMP, CCT, NOAA, and USFWS realized a more conservative mark strategy may better serve this programs needs and work in better synchrony with adjacent spring Chinook programs (i.e. Methow and Winthrop programs). The strategy of adipose present and coded wire tag in the snout was determined to be the optimal tradeoff between conservation objectives, uniquely identifying the Okanogan reintroduction fish, and cost/feasibility. In addition to providing protection through mark-selective fisheries, this would allow fish to escape the adult hatchery fish removal at Wells Dam which seeks to lower pHOS values in the Methow, particularly when that effort is focused only on Winthrop fish that are adipose clipped and wired. If Okanogan fish were marked the same as Winthrop fish then they would be removed at the same rate.

The modified tag/mark strategy does create a problem for a couple of monitoring objectives. Since the fish will not have a unique identifying mark the stray rate to the CJH facility and the CCT fishery at CJD will not be known. If there is a high proportion of adipose present fish in the hatchery ladder collections at CJH, or in the CCT fishery at CJD then we may need to consider implementing an additional mark strategy that allows us to identify the proportion of adipose present fish that are natural origin fish, Okanogan reintroduction fish, or Methow hatchery conservation fish. Additionally, our current mark strategy will require that WDFW and USFWS read coded wire tags before making crosses for the Methow conservation program and Winthrop NFH program if broodstock are collected at Wells Dam. This broodstock collection would still reduce the number of fish destined for the Okanogan spawning grounds, but at least those interceptions at Wells Dam could be used for Okanogan broodstock.

The cost and feasibility issues surrounding alternative CWT locations or fin clips (e.g. cheek CWT, body/adipose CWT; ventral fin clip) limit the utility of these approaches. If ongoing M&E in the Methow, Okanogan, and at CJH indicate that stray rates are high then alternative mark and tag strategies will need to be revisited. This adaptive management approach will occur at the Annual Program Review workshops described in the CJH M&E plan and which have been occurring since 2011.

USFWS has indicated that fish on station in 2013 cannot be marked with an alternative strategy due to the late timing of this potential change. Therefore, if the necessary permits and designations can be attained for a 2014 release those fish would be adipose clipped and CWT in the snout. Once this HGMP is accepted and permits issued then the 10(j) designation can be completed. Once the 10(j) designation is completed then the change in mark/tag strategy can be incorporated into the US v Oregon agreement.

11.1.2) Indicate whether funding, staffing, and other support logistics are available or committed to allow implementation of the monitoring and evaluation program.

In 2005, the Colville Tribes initiated the Okanogan Basin Monitoring and Evaluation Program (OBMEP), which is currently collecting comprehensive baseline information on life history and status of summer/fall Chinook, steelhead and sockeye in the Okanogan River. The CJHP will be funded for M&E which will be fully integrated with the existing baseline program and coordinated with similar M&E programs throughout the Columbia Cascade Province.

In June 2008, the Colville Tribes signed an MOA with BPA that ensures full funding of the ongoing Okanogan Basin Monitoring and Evaluation Program ($1.245 million annually) and the M&E associated with the CJHP (part of the program's $2.452 annual O&M).

11.2) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse genetic and ecological effects to listed fish resulting from monitoring and evaluation activities.

The monitoring program will not cause any adverse genetic or ecological effects to the population.

SECTION 12. RESEARCH

Other than a comprehensive M&E plan to measure the benefits and risks of this spring Chinook program, there is no research planned at this time to be conducted in direct association with this HGMP.

12.1) Objective or purpose.
NA

12.2) Cooperating and funding agencies.
NA

12.3) Principle investigator or project supervisor and staff.
NA

12.4) Status of stock, particularly the group affected by project, if different than the stock(s) described in Section 2.
NA

12.5) Techniques: include capture methods, drugs, samples collected, tags applied.
NA

12.6) Dates or time period in which research activity occurs.
NA

12.7) Care and maintenance of live fish or eggs, holding duration, transport methods.
NA

12.8) Expected type and effects of take and potential for injury or mortality.
NA

12.9) Level of take of listed fish: number or range of fish handled, injured, or killed by sex, age, or size, if not already indicated in Section 2 and the attached "take table" (Table 1).
NA

12.10) Alternative methods to achieve project objectives.
NA

12.11) List species similar or related to the threatened species; provide number and causes of mortality related to this research project.
NA

12.12) Indicate risk aversion measures that will be applied to minimize the likelihood for adverse ecological effects, injury, or mortality to listed fish as a result of the proposed research activities.
NA

SECTION 13. REFERENCES

Anderson, J. A., G. R. Pess, R. W. Carmichael, M. J. Ford, T. D. Cooney, C. M. Baldwin, and M. M. McClure. 2012 (draft manuscript). Planning anadromous salmonid reintroductions aimed at long-term viability and recovery.

Bachman, R. A. 1984. Foraging behavior of free-ranging wild and hatchery brown trout in a stream. Trans. Am. Fish. Soc. 113: 1-32.

Barnhart, R. A. 1986. Species profiles: Life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest) - steelhead. U.S. Fish Wildl. Serv. Biol. Rep. 82(11.60). U.S. Army Corps of Engineers, TR EL-82-4. 21 pp.

Beauchamp, D. A. 1990. Seasonal and diet food habits of rainbow trout stocked as juveniles in Lake, Washington. Trans. of the American Fish Society. 119: 475-485.

Beck, K. 2003. Rocky Reach relicensing project Spiranthes diluvalis survey, 2003. Beck Botanical Services, 1708 McKenzie Ave., Bellingham, WA.

Behnke, R. J. 1992. Native trout of western North America, volume Monograph 6. American Fisheries Society, Bethesda, MD.

BPA , USBOR (U.S. Bureau of Reclamation), COE (US Army Corps of Engineers), and NOAA (National Oceanic and Atmospheric Administration). 2003. Draft research, monitoring and evaluation plan for the NOAA-Fisheries 2000 Federal Columbia River Power System Biological Opinion.

Bugert, R., C. Busack, G. Mendel, K. Petersen, D. Marbach, L. Ross, and J. Dedloff. 1991. Lower Snake River Compensation Plan, Lyons Ferry Fall Chinook Salmon Hatchery Program. 1990. Report AFF l/LSR-91-15 Cooperative Agreement 14-1600001-90525. Lower Snake River Compensation Plan, USFWS, Boise, Idaho.

Busby, P. J., T. C. Wainwright, G. J. Bryant, L. J. Lierheimer, R. S. Waples, F. W. Waknitz, and I. V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California. U.S. Dept. Commer. NOAA Tech. Memo. NMFS-NWFSC-27.

Cannamela, D. A. 1992. Potential impacts of releases of hatchery steelhead trout smolts on wild and natural juvenile chinook and sockeye salmon. White Paper. Appendix A.

CBFWA, C. B. F. a. W. A. 1996. Draft programmatic environmental impact statement. Impacts of artificial salmon and steelhead production strategies in the Columbia River basin. USFWS, NMFS, and Bonneville Power Administration. Portland, Oregon.

CCT. 2002. 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. 2008. Hatchery and Genetic Management Plan. Chief Joseph Hatchery Program. Okanogan Basin Spring Chinook. 116 pages.

CCT. 2009. Chief Joseph Hatchery Program Monitoring and Evaluation Plan for Spring Chinook Salmon. Colville Confederated Tribes Fish and Wildlife Department. Nespelem, Washington.

CCT. 2012. Tribal Resource Management Plan for the Confederated Tribes of the Colville Reservation. Draft Report.

CCT and WDFW 2007. Agreement between the Confederated Tribes of the Colville Reservation and the Washington Department of Fish and Wildlife on Jointly Managed Salmon and Steelhead Populations. Nespelem, Washington.

Chapman, D. W., C. Peven, A. Giorgi, T. Hillman, and F. Utter. 1995. Status of spring Chinook salmon in the mid-Columbia Region. 477 pages.

Chapman, D. W., C. Peven, T. Hillman, A. Giorgi, and F. Utter. 1994. Status of summer steelhead in the Mid-Columbia River.

Consulting, C. 2002. A rare plant survey of the Rocky Reach Reservoir. Bellingham, WA.

Everest, F. H. 1973. Ecology and management of summer steelhead in the Rogue River. Fish. Res. Rep. 7. Corvallis, OR: Oregon State Game Commission. 48.

Ford, M. J., T. Cooney, P. McElhany, N. Sands, L. Weitkamp, J. Hard, M. McClure, R. Kope, J. Myers, A. Albaugh, K. Barnas, D. Teel, P. Moran, and J. Cowen. 2011. Status review update for Pacific salmon and steelhead listed under the Endangered Species Act: Pacific Northwest. U.S. Dept. Commer., NOAA Tech. Memo. NMFS-NWFSC-113, 281 p. Available at:

http://www.nwr.noaa.gov/Publications/Biological-Status-Reviews/upload/SR-2010-all-species.pdf

French, R. R., and R. J. Wahle. 1965. Salmon escapements above Rock Island Dam, 1954-60. U. S. Fish Wildl. Serv. Spec. Sci. Rep. No. 493.

Gartrell, G. N. 1936. November 12, 1936 "Report on salmon streams." Fish. Res. Brd. Can. mimeo. report.

Hartt, A. C., and M. B. Dell. 1986. Early oceanic migrations and growth of juvenile Pacific salmon and steelhead trout In Nickelsonet al. (1992a), volume 46.

Healey, M. C. 1991. The life history of Chinook salmon (*Oncorhynchus tshawytscha*) *In* C. Groot and L. Margolis (eds.), Life history of Pacific Salmon, 311-393. University of British Columbia Press. Vancouver, B.C.

Hillman, T. W., and J. W. Mullan. 1989. Effect of hatchery releases on the abundance of wild juvenile salmonids. In, Summer and Winter Ecology of Juvenile Chinook Salmon and Steelhead Trout in the Wenatchee River, Washington. Report to Chelan County PUD by D.W. Chapman Consultants, Inc. Boise, Idaho.

Horner, N. J. 1978. Survival, densities and behavior of salmonid fry in stream in relation to fish predation. M.S. Thesis, University of Idaho, Moscow, Idaho. 115p.

HSRG. 2004. Hatchery reform; principles and recommendations of the Hatchery Scientific Review Group. April 2004. Available at: www.hatcheryreform.org.

HSRG. 2009. Columbia River Hatchery Reform System Wide Report.

ICTRT. 2007. Viability criteria for application to interior Columbia basin salmonid ESUs. Review draft. 93p. .

Integrated Hatchery Operations Team (IHOT). 1995. Policies and procedures for Columbia basin anadromous salmonid hatcheries, Annual report 1994, Report to Bonneville Power Administration, contract No. 1992BI60629, project No. 199204300, (BPA Report DOE/BP-60629). Bonneville Power Administration. 119 electronic pages Available at: http://www.efw.bpa.gov/cgi-bin/efw/FW/publications.cgi.

Koch, D., and G. Cochran. 1977. Feasibility Report of a Fish Hatchery on the Colville Indian Reservation at Chief Joseph Dam. Bridgeport, Washington.

McElhany, P., M. H. Rucklelshaus, M. J. Ford, T. C. Wainwright, and E. P. Bjorkstedt. 2000. Viable salmonid populations and the recovery of evolutionarily significant units. U.S. Dept. of Commerce, NOAA Tech. Memo, NMFS-NWFSC-42.

Miller, B. F., J. L. Panther, and J. E. Arterburn. 2012. Okanogan Basin Monitoring and Evaluation Program, 2011 Annual Report. Colville Confederated Tribes Fish and Wildlife Department, Nespelem, WA. Report submitted to Bonneville Power Administration, Project No. 2003-022-00.

Myers, J. M., R. G. Kope, G. J. Bryant, D. Teel, L. J. Lierheimer, T. C. Wainwright, W. S. Grant, F. W. Waknitz, K. Neely, S. T. Lindley, and R. S. Waples. 1998. Status review of Chinook salmon from Washington, Idaho, Oregon, and California, U.S. Dept. Commer., NOAA Tech Memo. NMFS-NWFSC-35, 443p.

NMFS. 1999. Biological Opinion on artificial propagation in the Columbia River basin. Incidental take of listed salmon and steelhead from federal and non-federal hatchery programs that collect, rear and release unlisted fish species. March 29, 1999.

NMFS. 2008a. Biological Opinion: Impacts of *U.S. v. Oregon* Fisheries in the Columbia River in years 2008-2017 on ESA listed Species and Magnuson-Stevens Act Essential Fish Habitat. May 5, 2008. https://pcts.nmfs.noaa.gov/pls/pctspub/biop_results_detail?reg_inclause_in=%28%27NWR%27%29&idin=107547

NMFS. 2008b. National Marine Fisheries Service Endangered Speceis Act (ESA) Section 7 Consultation and Magnuson-Stevens Act (MSA) Essential Fish Habitat Consultation. Construction and Operation of Chief Joseph Hatchery by the Confederated Tribes of the Colville Reservation. https://pcts.nmfs.noaa.gov/pcts-web/publicAdvancedQuery.pcts;jsessionid=JLHqQ5WDHS7CL8X413mXJFz1TyM3pWydHLrndw6ZywvjrBsVTtvk!-832948743.

NMFS. 2010. Draft Environmental Impact Statement to Inform Columbia River basin Hatchery Operations and the Funding of Mitchell Act Hatchery Programs. Portland, Oregon. Available at: http://www.nwr.noaa.gov/Salmon-Harvest-Hatcheries/Hatcheries/MA-EIS.cfm (as of 06mar12).

NMFS. 2011. Effects of hatchery programs on salmon and steelhead populations: Reference document for NMFS ESA hatchery consultations.

NMFS. 2011 Anadromous Salmonid Passage Facility Design. NMFS, Northwest Region, Portland, Oregon.

NMFS. 2012a. Action Plan for Columbia Basin Hatchery Programs to Achieve Compliance with the Endangered Species Act. NMFS Northwest Region, Portland, Oregon.

NMFS. 2012b. Endangered Species Act (ESA) Section 7(a)(2) Biological Opinion, Section 7(a)(2) Not Likely to Adversely Affect Determination, and Magnuson-Stevens Fishery Conservation and Management Act Essential Fish Habitat (EFH) Consultation. Sandy River Spring Chinook Salmon, Coho Salmon, Winter Steelhead, and Summer Steelhead Hatchery Programs. NMFS Consultation Number: 2011/02491.

NPPC. 1986. Council staff compilation of information on salmon and steelhead issues in the Columbia River basin. NPPC, Portland, OR.

NPPC. 2004. Okanogan Subbasin Plan.

NWIFC, and WDFW. 2006. The salmonid disease control policy of the fisheries co-managers of Washington state, version 3. 38.

Olla, B. L., M. W. Davis, and C. H. Ryer. 1998. Understanding how the hatchery environment represses or promotes the development of behavioral survival skills. Bulletin of Marine Science. 62(2): 531-550.

Paradiso, J. L., and R. M. Nowak. 1982. Wolves Canis lupus and Allies. Pages 460-474. Chapman J. A. and G. A. Feldhamer eds. Wild Mammals of North America Biology, Management and Economics. The Johns Hopkins University Press. Baltimore and London.

Pearsons, T. N., and A. L. Fritts. 1999. Maximum size of chinook salmon consumed by juvenile coho salmon. North American Journal of Fisheries Management. 19: 165-170.

Pearsons, T. N., G. A. McMichael, S. W. Martin, E. L. Bartrand, M. Fischer, and S. A. Leider. 1994. Yakima River species interaction studies - annual report 1993. Bonneville Power Administration, Portland, Oregon. Project No. 89-105. 247.

PNFHPC. 1989. Model comprehensive fish health protection program. Olympia, Washington.

Ray, V. F. 1972. Fisheries of the confederated tribes of the Colville Reservation. Washington D.C., 54 pgs.

RTT. 2008. A biological strategy to protect and restore salmonid habitat in the upper Columbia region. A draft report to the Upper Columbia Salmon Recovery Board.

Servheen, C. 1997. Grizzly Bear Recovery Plan. Supplement: North Cascades Ecosystem Recovery Plan Chapter. U. S. Fish and Wildlife Service.

SIWG. 1984. Evaluation of potential interaction effects in the planning and selection of salmonid enhancement projects. J. Rensel, chairman and K. Fresh editor. Report prepared for the Enhancement Planning Team for implementation of the Salmon and Steelhead Conservation and Enhancement Act of 1980. Washington Dept. Fish and Wildlife. Olympia, Washington. 80p.

Sosiak, A. J., R. G. Randall, and J. A. McKenzie. 1979. Feeding by hatchery-reared and wild Atlantic salmon (*Salmo salar*) parr in streams. Journal of the Fisheries Research Board of Canada. 36: 1408-1412.

Steward, C. R., and T. C. Bjornn. 1990. Supplementation of salmon and steelhead stocks with hatchery fish: A synthesis of published literature *in* Analysis of salmon and steelhead supplementation, William H. Miller editor. Report to Bonneville Power Administration (BPA), Portland, Oregon. Project No. 88-100. 126p.

Stinson, D. W. 2001. Washington state recovery plan for lynx. Washington Department of Fish and Wildlife, Olympia, Washington. 78 pp. +5 maps.

Team, N. C. G. B. R. 2001. Recovery plan for grizzly bears in the North Cascades of British Columbia. Province of British Columbia. Ministry of Water, Land and Air Protection. 50 pp.

Thomas, J. W., E. D. Forsman, J. B. Lint, E. C. Meslow, B. B. Noon, and J. Verner. 1990. A Conservation Strategy for the Northern Spotted Owl. Interagency Scientific Committee to Address the Conservation of the Northern Spotted Owl. USDA Forest Service. USDI Bureau of Land Management. USDI Fish and Wildlife Service. USDI National Park Service. 427 pp.

UCSRB, U. C. S. R. B. 2007. Upper Columbia spring Chinook salmon and steelhead recovery plan.: 307. http://www.nwr.noaa.gov/Salmon-Recovery-Planning/Recovery-Domains/Interior-Columbia/Upper-Columbia/upload/UC_Plan.pdf.

USFWS. 1992. Final rule to list the plant Spiranthes diluvialis (Ute ladies'-tresses) as a threatened species. Federal Register Vol. 57 (17 January):2048-2054.

USFWS. 2006. Letter of concurrance from USFWS to BPA regarding the Biological Assessment of the construction, maintenance, operation, and monitoring of the Chief Joseph Hatchery spring and summer/fall Chinook programs. USFWS reference number: 13260-2006-I-0198.

USFWS. 2012a. Draft Hatchery and Genetic Management Plan. Winthrop National Fish Hatchery.

USFWS. 2012b. Changes to Winthrop NFH Spring Chinook salmon program. 15 February 2012 memorandum from USFWS to HCP Hatchery Committee members. Leavenworth, Washington.

USGS 2012. Real time temperature monitoring data available on the internet for: Okanogan River at Malott: http://waterdata.usgs.gov/nwis/uv?site_no=12447200 ; Okanogan River near Tonasket: http://waterdata.usgs.gov/nwis/uv?site_no=12445000 ; Okanogan River at Oroville: http://waterdata.usgs.gov/nwis/uv?site_no=12439500

US v. Oregon 2012. United States versus Oregon management agreement 2008-2017 production tables (B1-B7) updated in May of 2012.

Withler, I. L. 1966. Variability in life history characteristics of steelhead trout (Salmo gairdneri) along the Pacific coast of North America. J. Fish. Res. Board Can. 23(3): 365-393.

SECTION 14. CERTIFICATION LANGUAGE AND SIGNATURE OF RESPONSIBLE PARTY

"I hereby certify that the foregoing information is complete, true and correct to the best of my knowledge and belief. I understand that the information provided in this HGMP is submitted for the purpose of receiving limits from take prohibitions specified under the Endangered Species Act of 1973 (16 U.S.C.1531-1543) and regulations promulgated thereafter for the proposed hatchery program, and that any false statement may subject me to the criminal penalties of 18 U.S.C. 1001, or penalties provided under the Endangered Species Act of 1973."

Name, Title, and Signature of Applicant:

Certified by_____________________________ Date:_____________

SECTION 15. PROGRAM EFFECTS ON OTHER (NON-ANADROMOUS SALMONID) ESA-LISTED POPULATIONS. Species List Attached (Anadromous salmonid effects are addressed in Section 2)

As of August 5, 2009, there are 44 separate listings of Federal Status endangered/threatened species within the State of Washington (http://ecos.fws.gov), 58 listings in Oregon, and 22 listings in Idaho. In the lists below (Tables 8-10), are all non-salmonid listed species and their current status ratings. Of the following species listed, the plant species Ute ladies'-tresses is confirmed to be found in Okanogan County (http://ecos.fws.gov/speciesProfile/profile/speciesProfile.action?spcode=Q2WA), and along the Columbia River in the northeastern corner of Chelan County (Calypso Consulting 2002; Beck 2003). In addition, species such as the Gray Wolf (http://wdfw.wa.gov/conservation/gray_wolf/gray_wolf_fact_sheet.html), Grizzly Bear (http://www.fws.gov/mountain-prairie/species/mammals/grizzly/cascades.htm), Canadian Lynx (Stinson 2001), and Northern spotted owl (http://www.northernspottedowl.org/owlLocations/) are also known to be found in Okanogan County. The geographic distributions of the other listed species were generally limited to the Cascade Mountain Range, the Selkirk Mountains in NE Washington, the Willamette Valley (Oregon), Puget Sound and Coastal areas.

In 2006, the USFWS issued a letter of concurrence with the NMFS Biological Assessment that the construction and operation of CJH "may affect, unlikely to adversely affect" the gray wolf, bald eagle, bull trout and Ute ladies' –tresses (USFWS 2006). Additional analysis occurred for the candidate species, yellow billed cuckoo, and the Service agreed that the action would "not jeopardize the continued existence" (USFWS 2006).

Table 8. List of current ESA listed species (animal and plant) within the State of Washington.

Status Rating	Species
ANIMALS	
Endangered	Albatross, short-tailed (*Phoebastria (=Diomedea) albatrus*)
Threatened	Bear, grizzly (*Ursus arctos horribilis*)
Threatened	Butterfly, Oregon silverspot (*Speyeria zerene hippolyta*)
Endangered	Caribou, woodland (ID, WA, B.C.) (*Rangifer tarandus caribou*)
Endangered	Curlew, Eskimo (*Numenius borealis*)
Endangered	Deer, Columbian white-tailed (*Odocoileus virginianus leucurus*)
Threatened	Lynx, Canada (lower 48 States DPS) (*Lynx canadensis*)
Threatened	Murrelet, marbled (CA, OR, WA) (*Brachyramphus marmoratus marmoratus*)
Threatened	
Threatened	Otter, southern sea except where EXPN (*Enhydra lutris nereis*)
Endangered	Owl, northern spotted (*Strix occidentalis caurina*)
Threatened	Pelican, brown (*Pelecanus occidentalis*)

Endangered Threatened Endangered Threatened Endangered Endangered Endangered Endangered	Plover, western snowy (Pacific coastal pop.) (*Charadrius alexandrinus nivosus*) Rabbit, pygmy Columbia Basin DPS (*Brachylagus idahoensis*) Sea turtle, green (*Chelonia mydas*) Sea turtle, leatherback (*Dermochelys coriacea*) Sea-lion, Steller eastern pop. (*Eumetopias jubatus*) Sea-lion, Steller western pop. (*Eumetopias jubatus*) Whale, humpback (*Megaptera novaeangliae*) Whale, killer Southern Resident DPS (*Orchinus orca*) Wolf, gray (lower 48 states, except where delisted and where EXPN) (*Canis lupus*)
PLANTS	
Threatened Endangered Threatened Endangered Threatened Threatened Endangered Threatened Threatened	Paintbrush, golden (*Castilleja levisecta*) Stickseed, showy (*Hackelia venusta*) Howellia, water (*Howellia aquatilis*) Desert-parsley, Bradshaw's (*Lomatium bradshawii*) Lupine, Kincaid's (*Lupinus sulphureus (=oreganus) ssp. Kincaidii (=var. kincaidii)*) Checker-mallow, Nelson's (*Sidalcea nelsoniana*) Checkermallow, Wenatchee Mountains (*Sidalcea oregana var. calva*) Catchfly, Spalding's (*Silene spaldingii*) Ladies'-tresses, Ute (*Spiranthes diluvialis*)

15.1) List all ESA permits or authorizations for all non-anadromous salmonid programs associated with the hatchery program.

Section 10 permits, 4(d) rules, etc. for other programs associated with hatchery program. Section 7 biological opinions for other programs associated with hatchery program.

Refer to Section 2.1

15.2) Description of non-anadromous salmonid species and habitat that may be affected by hatchery program.

Ute ladies'-tresses

General species description and habitat requirements.

Ute ladies'-tresses is known from eight states. It occurred in eastern Nevada (historically) and occurs in Utah, Colorado, Idaho, Nebraska, Wyoming, Montana, and Washington (USFWS 1992). In Washington it occurs in north central Okanogan County (WA Natural Heritage Program Website 2003) and along the Columbia River in the northeastern corner of Chelan County (Beck 2003; Calypso Consulting 2002).

Ute ladies'-tresses is endemic to mesic or wet meadows and riparian/wetland habitats near, springs, seeps, lakes, and perennial streams. It occurs where the over-story vegetation is relatively open and not dense or overgrown (WA Natural Heritage Program Website 2003).

Local population status and habitat use.
Ute ladies'-tresses occurs at three locations along the Rocky Reach Reservoir shoreline on the Chelan County shore between Columbia River river miles 505 and 510.

Site-specific inventories, surveys, etc. (citations).

Site-specific findings in Okanogan County not available.

Gray wolf

General species description and habitat requirements.
The gray wolf originally occupied most of the continent from the Arctic to the mountains of Mexico. The gray wolf was not found on the coastal plains of southeast United States and Mexico (Paradiso and Nowak 1982). Wolves were well distributed throughout Washington State before European settlers arrived. Wolves can thrive in a diversity of habitats from the tundra to woodlands, forests, grasslands and deserts.

Local population status and habitat use.
Reliable reports of wolves have increased in Washington since 2005, many of which have involved single animals. A pack with pups was confirmed in July 2008 in western Okanogan and northern Chelan counties and represented the first fully documented breeding by wolves in the state since the 1930's. A second pack with pups was confirmed in Pend Oreille County in July 2009. A pup from a pack that is likely using Washington and British Columbia habitat was radio-collared in 2010 in northeastern Washington. Another pack may exist in the Blue Mountains of southeastern Washington, but has not yet been confirmed (preceding source of information: http://wdfw.wa.gov/conservation/gray_wolf/gray_wolf_fact_sheet.html).

Site-specific inventories, surveys, etc.

There are two known wolf packs on the Colville Indian Reservation, and others both southeast and especially northeast of the Reservation (http://wdfw.wa.gov/conservation/gray_wolf/packs/packs_map_20121004.pdf).

Grizzly bear

General species description and habitat requirements.
The historic range of grizzly bears once covered over a third of what is now the continental United States. It is listed as threatened in the lower 48 states, where it survives only in parts of the Rocky Mountains and northern Cascades. The Recovery Plan focuses on the six remaining areas in Idaho, Montana, Washington, and Wyoming that have habitat suitable for self-sustaining grizzly populations; only five of these are currently inhabited by grizzlies. Grizzly bears recovery areas include: Yellowstone,

Northern Rocky Mountains, Selkirk Mountains, Cabinet-Yaak Mountains, Bitterroot Mountains, and North Cascade Mountains. No evidence of grizzly bears has been found in the Bitterroot Mountains but U. S. Fish and Wildlife Service planned to reintroduce grizzlies into the ecosystem until recently.

The North Cascade Grizzly Bear Recovery Area includes all of the North Cascade National Park, and most of the Mount Baker-Snoqualmie and all of the Wenatchee and Okanogan National Forests. The recovery area extends roughly from Interstate Highway 90 to the Canadian Border and east to the Columbia and Okanogan rivers on the east side of the Cascade Mountains. The North Cascade recovery area is adjacent to the grizzly bear recovery area in British Columbia (North Cascades Grizzly Bear Recovery Team 2001).

Grizzly bears once occurred throughout the North Cascade recovery area. The decline of the grizzly bear population in the recovery area was likely caused by intensive hunting during the fur trade in the 1800s and rapid human settlement of the area in the late 1800s (Servheen 1997).

Local population status and habitat use.
Currently, there are believed to be fewer than 20 grizzly bears in the North Cascades Ecosystem in Washington State, and another 50 – 70 in the Selkirk Mountain Ecosystem, which includes parts of eastern Washington, northern Idaho and southern British Columbia. Wildlife agencies in these regions have set up recovery areas to focus their management efforts on landscapes that have the most potential to support viable populations of grizzly bears).

Site-specific inventories, surveys, etc.
The North Cascades Grizzly Bear Recovery Area includes portions of Chelan and Okanogan counties. The Wenatchee, Entiat, and Methow rivers and tributaries of the Okanogan River extend into the North Cascades Grizzly Bear Recovery Area. Most grizzly bear habitat and use would be expected to be at high elevations within the recovery area.

Lynx

General species description and habitat requirements.
Lynx inhabit boreal forests and wet bogs from the arctic tree line of Alaska and northern Canada, south to the northern United States border. Lynx are found from Newfoundland west to Alaska and British Columbia (Stinson 2001). Lynx are found in the northern United States where the boreal forest extends south of the border. Lynx are found in northern New England, the Great Lake States, the Rocky Mountains south to Utah and in the mountains of eastern Washington (Stinson 2001).

Lynx are found in high-elevation forests of north central and northeast Washington, including Chelan, Okanogan, Ferry, Stevens and Pend Oreille counties (Stinson 2001). Lynx may be extirpated from the southern Cascades (Stinson 2001). Transient lynx may occasionally be found west of the Cascade crest, probably during years of low prey availability east of the Cascades.

Local population status and habitat use.
The largest number of lynx in Washington State are found in the Okanogan Lynx Management Zone (LMZ) (Stinson 2001). The Okanogan LMZ includes the Okanogan and Wenatchee National Forest, part of the Mt. Baker-Snoqualmie National Forest, part of the Pasayten, Glacier Peak and Lake Chelan Sawtooth Wilderness areas, Loomis State forest and parts of the Lake Chelan National Recreation Area and National Park.
Lynx were considered a predatory animal and hunted for a $5 bounty in Washington state before 1947 (Stinson 2001). Lynx were trapped or hunted for fur until 1991. The US Fish and Wildlife Service declared the lynx a threatened species in 1993. Fragmented boreal forest habitat, forest management, low snowshoe hare numbers, and human exploitation of the lynx all contributed to the decline of lynx in Washington State. It is estimated that there are fewer than 100 Lynx in Washington State.

In the Cascade Mountains, lynx live in the lodgepole pine (*Pinus contorta*) and Engelmann spruce-subalpine fir (*Picea engelmann-Abies lasiocarpa*) forests of the high mountains (Stinson 2001). Older, mature forests with downed trees and windfalls provide cover for denning sites, escape, and protection from severe weather. Lynx use the more heavily timbered north facing slopes between 1,400 and 2,150 meters in elevation during summer months. In the winter, lynx move below 1,520 meters in elevation and use flatter areas (Stinson 2001).

Site-specific inventories, surveys, etc.

We are unaware of any site-specific surveys in Okanogan County.

Northern Spotted Owl

General species description and habitat requirements.
The Northern spotted owl is found in old growth forests and occasionally in younger conifer forest of the Cascade, Sierra Nevada, and coastal mountains of British Columbia, Washington, Oregon, and northern California. The range of the spotted owl habitat on the Wenatchee and Okanogan National Forests has been described as being in old growth and late succession conifer forest below 5,000 feet elevation.

Local population status and habitat use.
Northern spotted owls generally have large home ranges and use large tracts of land containing significant acreage of older forest (Thomas et al. 1990). Nesting pairs require 2,000 – 5,000 acres of conifer forest habitat, usually Douglas' fir stands. Northern spotted owl nesting and roosting habitat typically include a moderate to high canopy closure of 60 to 80 percent. Multi-layered trees with various deformities provide cavities for spotted owl nesting (Thomas et al. 1990). Spotted owls use a wider variety of forest types for hunting, including more open and fragmented habitat (Thomas et al. 1990).

There does not appear to be any Northern spotted owl sites in Okanogan County (http://www.northernspottedowl.org/owlLocations/)

Site-specific inventories, surveys, etc.

We are unaware of any site-specific surveys in Okanogan County.

15.3) Analysis of effects.

In 2006, the USFWS issued a letter of concurrence with the NMFS Biological Assessment that the construction and operation of CJH "may affect, unlikely to adversely affect" the gray wolf, bald eagle, bull trout and Ute ladies' –tresses (USFWS 2006). Additional analysis occurred for the candidate species, yellow billed cuckoo, and the Service agreed that the action would "not jeopardize the continued existence" (USFWS 2006). In 2012, the CCT informally approached the USFWS to determine if the proposed revisions to the program (changing fish stocks) would change the determination or re-open consultation. The USFWS confirmed that there was no need to re-open consultation (J. Krupka, personal communication).

Ute ladies'-tresses, Gray wolf, Grizzly bear, Lynx, and Northern Spotted owl

Identify potential direct, indirect, and cumulative effects of hatchery program on species and habitat (immediate and future effects).

To the best of our knowledge, the program as described in this HGMP will not have direct, indirect, or cumulative effects on the listed species. The surrounding habitat associated with this hatchery mitigation program will not be altered, which would be the only source of "take" possible to the listed species. Interactions with the spring Chinook will not occur.

Identify potential level of take (past and projected future).

None (past or projected future)

Hatchery operations - water withdrawals, effluent, trapping, releases, routine operations and maintenance activities, non-routine operations and maintenance activities (e.g. intake excavation, construction, emergency operations, etc.)

Operation of the adult trap, incubation/rearing, or acclimation areas at CJFH will not affect (directly or indirectly) the existence of the listed species in the area. Habitat requirements for the species do not apply at the CJFH adult trap or hatchery facility. Effluent from the hatchery will exceed state water quality standards guidelines, and is therefore not a concern.

Fish health - pathogen transmission, therapeutics, chemicals.

Not Applicable – Pathogens would not be transmitted between the species.

Ecological/biological - competition, behavioral, etc.

Not Applicable - Non-overlapping habitats between the spring Chinook and the flower.

Predation -

Not Applicable

Monitoring and evaluations - surveys (trap, seine, electrofish, snorkel, spawning, carcass, boat, etc.).

When monitoring and evaluation (e.g., screw traps) occurs, little to no impact should be expected as survey areas will likely be out of the range of the listed species.

Habitat - modifications, impacts, quality, blockage, de-watering, etc.

The hatchery and acclimation ponds are built. Modifications to the surrounding hatchery areas are not planned at this time, so no loss of potential habitat to the listed species is expected.

15.4 Actions taken to mitigate for potential effects.

Identify actions taken to mitigate for potential effects to listed species and their habitat.

No actions are considered necessary at this time. Disturbance to the listed species will be minimal in the area, and land disturbance where the listed species may habitat will not occur over the course of the program.

APPENDIX A: ACRONYMS AND ABBREVIATIONS

ATP:	Adenosine Triphosphate
BAMP:	Biological Assessment and Management Plan – Mid-Columbia River Hatchery Program (April 1998)
BIOP:	Biological Opinion
BKD:	Bacterial Kidney Disease
BPA:	Bonneville Power Administration
BOR:	Bureau of Reclamation
C&S:	Ceremonial and Subsistence
CCT:	Colville Confederated Tribes
CFS:	Cubic Feet per Second
CJH:	Chief Joseph Hatchery
COE:	United States Army Corps of Engineers
Cu. Ft.:	Cubic Feet
EDT:	Ecosystem Diagnosis and Treatment
ELISA:	Enzyme-Linked Immunosorbent Assay
ESA:	Endangered Species Act
ESU:	Evolutionarily Significant Unit
FPC:	Fish Passage Center
FPP:	Fish per Pound
FTE:	Full-Time Equivalents
Gpm:	Gallons per Minute
HGMP:	Hatchery and Genetic Management Plan
HxH:	Hatchery-Origin Fish Breeding with a Hatchery-Origin Fish
HxW:	Hatchery-Origin Fish Breeding with a Natural-Origin Fish
IHOT:	Integrated Hatchery Operations Team
INAD:	Investigational New Animal Drugs
ISAB:	Independent Scientific Advisory Board
M&E:	Monitoring and Evaluation
NMFS:	National Marine Fisheries Service; now designated National Oceanic and Atmospheric Administration – Fisheries
NRR:	Natural Return Rate
O&M:	Operation and Maintenance
OTID:	Oroville/Tonasket Irrigation District
PNFHPC:	Pacific Northwest Fish Health Protection Committee
PUD:	Public Utility District
Rkm:	River kilometer
Rm:	River Mile
RM&E:	Research Monitoring and Evaluation
UCR:	Upper Columbia River
USFWS:	United States Fish and Wildlife Service
WDFW:	Washington Department of Fish and Wildlife
WRIA:	Water Resource Inventory Area
WxW:	Natural-Origin Fish Breeding with a Natural-Origin Fish
ylng:	Yearling