Cultural and Educational Releases of Salmon Upstream of Chief Joseph and Grand Coulee Dams

Environmental Assessment

The Confederated Tribes of the Colville Reservation

Proposed Action: The Confederated Tribes of the Colville Indian Reservation propose the Cultural and Educational Releases of Salmon Upstream of Chief Joseph and Grand Coulee Dams Project. This project proposes to release up to several thousand adult salmon and up to tens of thousands of juvenile salmon into the Columbia River and its tributaries upstream of the current anadromous salmonid barriers at Chief Joseph and Grand Coulee dams.

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1.0 Purpose and Need

1.1 Introduction

The purpose of this project is to bring salmon back to the habitat, animals and people that have been disconnected from anadromous fish for more than 80 years following the construction of Chief Joseph and Grand Coulee dams.

1.2 Purpose and Need for Action

The phased approach outlined in the 15 Tribes Coalition Fish Passage and Reintroduction document (CBTFN 2015) and the NPCC Fish and Wildlife Program amendment (NPPC 2014) is a methodical, experimental, expensive, and long-term approach to bringing anadromous salmonids back to the blocked area of the upper Columbia River. Given the lack of adequate funding and the various tribes' desire to achieve short-term objectives with salmon in the blocked area, a parallel path to the phased approach has emerged from the effort (Figure 1). Various UCUT tribes are interested in implementing 'cultural releases' that draw on information generated in the phased approach, but are not explicitly part of an experiment in the phased approach. This parallel path is consistent with the phased approach because it shares a common scientific foundation with Phase 1 (specifically the donor stock, risk and habitat assessments) and it can provide information relevant to the experimental approach in Phase 2 if the cultural release includes a monitoring component. Therefore, we are proposing to begin cultural and educational releases as soon as possible and are seeking Colville Tribal regulatory coverage to do so with this proposal.

1.3 Issues, Concerns and Objectives

The guiding document for fish passage and reintroduction planning upstream of Chief Joseph and Grand Coulee dams is a joint paper of the Columbia Basin Tribes and First Nations (CBTFN 2015). The phased approach proposed by the CBTFN was generally adopted by the Northwest Power and Conservation Council (NPCC) in the 2014 amendment of their Fish and Wildlife Program (NPCC 2014). Since 2015, the UCUT central staff, participating tribes and the NPCC have been working to complete Phase 1. Phase 1 includes various scoping studies including habitat assessments, donor stock and risk assessments, study designs for experimental releases, evaluation of passage facilities and emerging technologies at existing high-head dams, life cycle modeling, key uncertainties, cost and financing considerations and recommendations. A draft report for Phase 1 is scheduled to be completed by fall of 2018. It is unclear exactly what the process and timeline would be to move to Phase 2 (experimental pilot reintroductions and interim passage facilities). Funding for implementation of Phase 2 is not currently available and it may take years to get federal partners and processes (Columbia River Treaty, NPCC Fish and Wildlife Program) involved in the implementation of fish passage in a meaningful way. The CCT F&W Department and UCUT partners do not want to wait for those processes in order to begin selective releases which may include cultural, ceremonial, educational and experimental releases.

Definitions and Primary Purposes of Releases

Various terminologies have been used to describe fish releases into the blocked area and in some cases may have caused or would cause confusion regarding an action or its intent. The following explanations and descriptions are intended to provide a guide for UCUT and member tribes to

adopt a common set of terms to describe fish passage or reintroduction actions that intend to meet specific purposes (Figure 2).

Cultural releases address immediate needs of the Tribes by release of juvenile or adult salmon that have the primary purpose of partially addressing the spiritual, ceremonial, ecological, or harvest practices historically exercised by the Tribes.

An educational release is the release of juvenile or adult salmon that has the primary purpose of informing fish managers, researchers, youth or the general public of the behavior, ecology or social importance of salmon in the region. Limited monitoring (e.g. PIT, acoustic, and/or radio tags), when possible, would greatly strengthen the value of these releases as an educational tool for outreach, inform managers about the effectiveness of the action, and may help to inform future experimental releases in Phase 2. Educational releases that include tagging may also be consistent with the concept of 'selective release' used in the NPPC 2014 amendment of the F&W Program as part of Phase 1.

An experimental release is the release of juvenile or adult salmon that is part of the larger phased approach to reintroduction planning and implementation. These releases must have adequate monitoring and sample size to contribute to answering key management questions and hypothesis testing with statistical rigor.

In general, cultural and educational releases would not be expected to meet the scientific rigor of an experimental release, but nearly all educational and experimental releases would meet a cultural objective of returning salmon to their historic habitat.

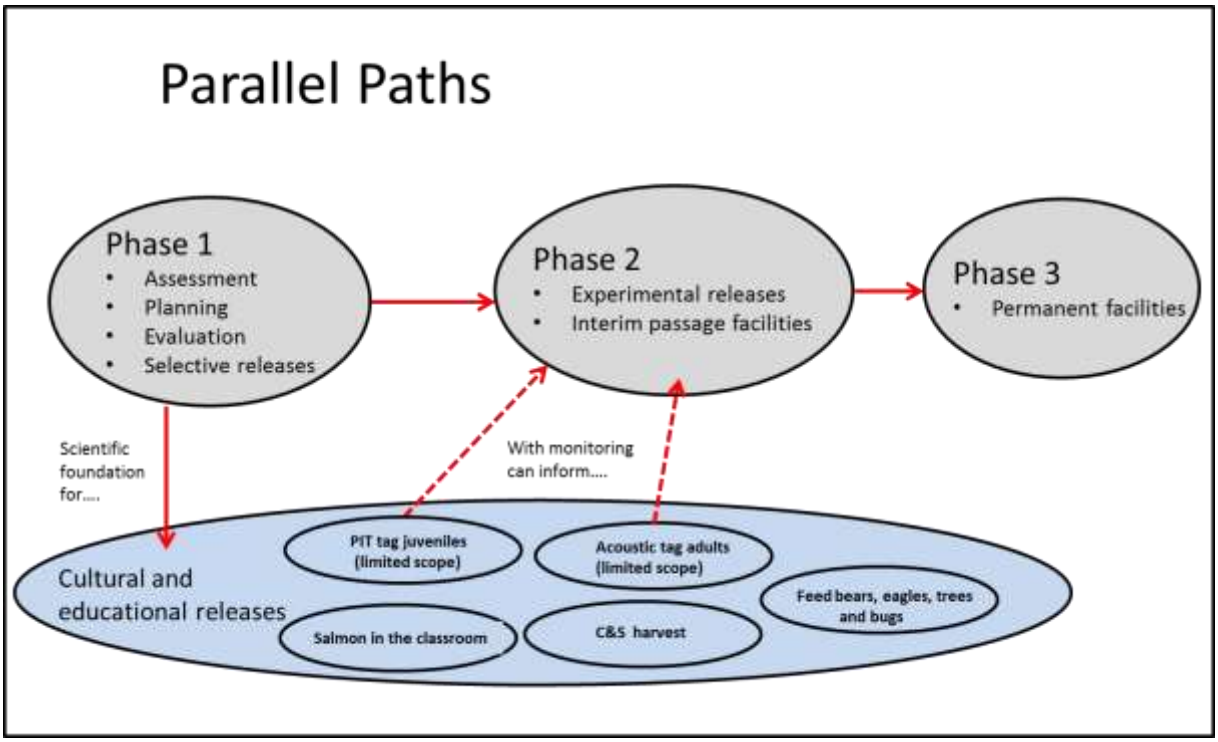
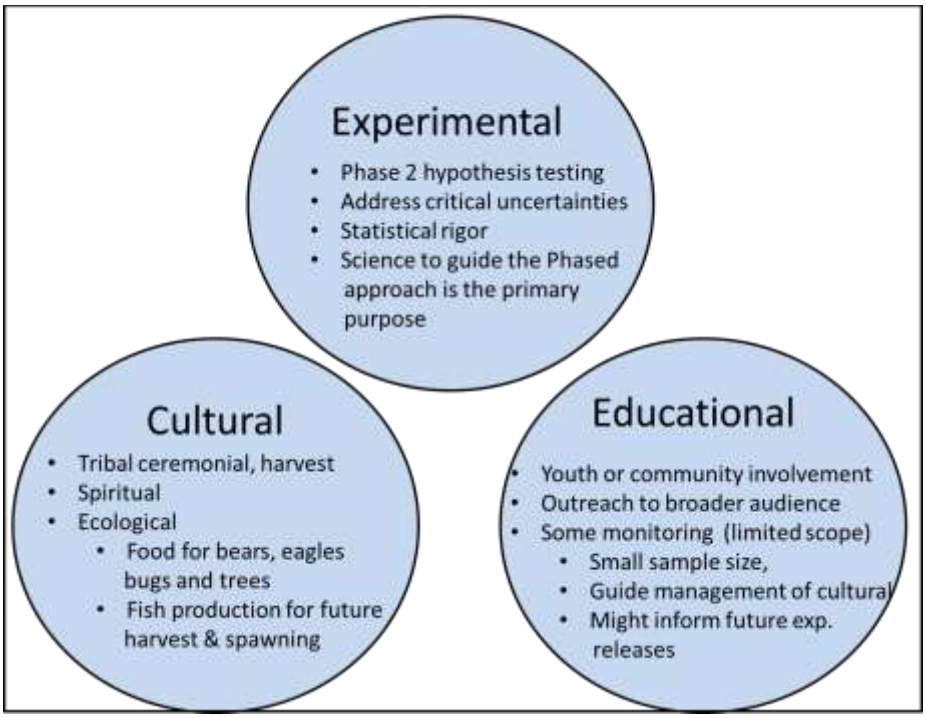


Figure 1. Diagram illustrating how the Phased approach and cultural releases are parallel paths that are consistent with each other and share a common foundation of planning and scientific background information. The primary purpose of monitoring a cultural or educational release is evaluate its effectiveness and provide information for outreach and education, but the results may be useful to inform planning of Phase 2 experimental releases.



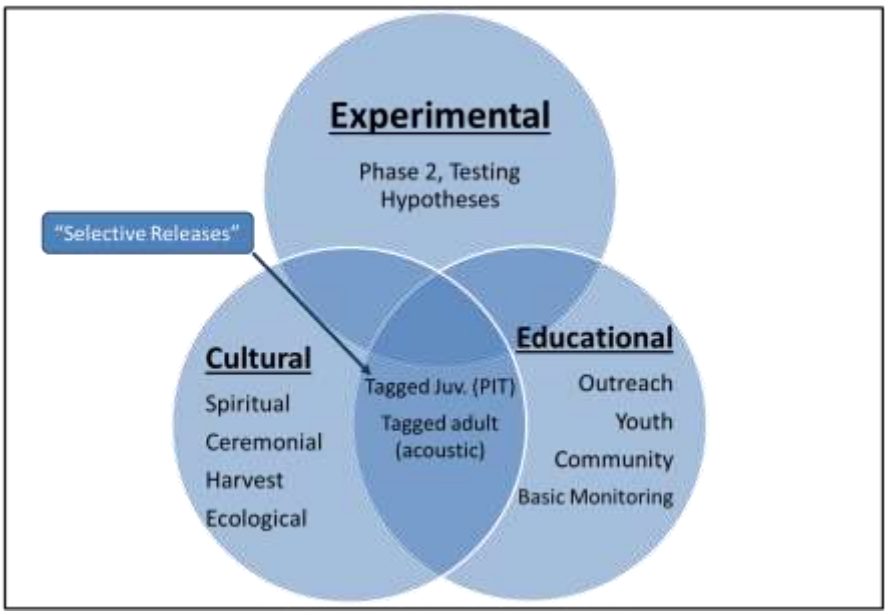


Figure 2. There are multiple purposes (types) of releases of anadromous salmonids into the blocked area upstream of Chief Joseph and Grand Coulee Dams. Most releases would address short-term cultural interests and have a corresponding educational component. With some basic monitoring an educational or cultural release would be consistent with a 'selective release' mentioned in the NPPC 2014 Fish and Wildlife Program Amendment and may inform the planning of larger experimental releases that are designed to test hypotheses and answer key management questions.

Project goals include:

1) Meet cultural and ceremonial needs of Tribes and First Nations by reconnecting anadromous fish with their historic habitat.
2) Provide harvest opportunity for tribal members in areas that have been blocked from salmon since construction of Grand Coulee and Chief Joseph dams.
3) Contribute to knowledge about movement, survival, and behavior of fish in the streams, reservoirs and dams that would answer key uncertainties or better inform the development of experimental designs for studies in later phases of reintroduction.
4) Provide opportunity for salmon spawning in the natural environment to generate offspring for downstream fisheries and future source stock for further reintroductions.
5) Ecosystem function benefits such as reintroduction of marine derived nutrients for stream, riparian, forest and wildlife benefits.

Specific objectives necessary to fulfill each goal would be developed as the project progresses. Many actions (releasing x number of fish in location y) would partially meet several (or perhaps all) of the goals. The scope and scale of the project would be affected by many factors including budget, availability of source fish, regulatory constraints, social constraints, federal processes, fish co-manager input, and tribal leadership inputs.

Goal 1: Meet cultural and ceremonial needs of Tribes and First Nations by reconnecting anadromous fish with their historic habitat.

Issues, Concerns

Salmon have been an essential food and recognized as an important component of a healthy ecosystem for native people since time immemorial. The development of the Columbia River hydropower system has seriously reduced the range of salmon, the people's access to healthy foods, and the overall health of the aquatic ecosystem. Tribal cultural practices were and still are closely tied to the run of salmon each year. There is a spiritual connection between salmon and Native Americans in the Pacific Northwest that is celebrated in many ceremonies including the First Salmon Ceremony, weddings, funerals, and long house gatherings. A large portion of the Colville Reservation has been cut off from salmon returning from the ocean. Other neighboring tribes have been cut off from salmon and steelhead entirely. Offsite mitigation with resident fish and wildlife and production of salmon downstream of Chief Joseph Dam do not fully mitigate for the losses to the upstream areas.

The release of adult and juvenile salmon into the blocked areas can provide meaningful opportunity to implement ceremonies, reconnect spiritually, and begin to heal the ecosystem from 8 decades of disconnection from salmon.

Goal 2: Provide harvest opportunity for tribal members in areas that have been blocked from salmon since construction of Grand Coulee and Chief Joseph dams.

Issues, Concerns

The release of adult salmon into areas upstream of Chief Joseph and Grand Coulee dams can provide a harvest opportunity to areas of the reservation that have been cut off from salmon for more than 80 years. Important historical fishing sites could be restored at Nespelem Falls, the Sanpoil River, Kettle Falls, Kettle River, Hall Creek and many other small tributaries. New sites may need to be discovered or developed to adapt to the reservoir environment that now exists in the blocked area. In some cases the fisheries may be more for ceremony than subsistence, but the opportunity to go fishing in historic areas is a critical component of the overall effort.

Goal 3: Contribute to knowledge about movement, survival, and behavior of fish in the streams, reservoirs and dams that would answer key uncertainties or better inform the development of experimental designs for studies in later phases of reintroduction.

Issues, Concerns

Monitoring fish released into the blocked area is important to help determine the efficacy of particular strategies such as release location, timing, species and life stage. For example, if adult salmon that are translocated upstream of CJD fallback through the dam at a high rate then managers would need to adapt their strategy by hauling fish to a further upstream location, trap and haul more fish, or try a different stock of fish. This monitoring may not have the statistical rigor to answer a critical uncertainty under Phase 2 testing, but it could inform the development of those studies at a later date. Likewise, if one of the goals of cultural releases includes spawning and production of juvenile salmon in the natural environment then it would be important to tag the adult fish that translocated and track them to the spawning grounds to document their success. Again, this monitoring may not prove the long-term feasibility of the larger reintroduction effort, but it would determine if initial efforts are meeting their objectives. The primary concern with implementing a monitoring study with insufficient sample size is that it results in an incorrect conclusion such as a type 1 (false positive) or type 2 (false negative) statistical error. To avoid this problem any tagging studies that are implemented need to clearly define if they are designed to test a hypothesis with statistical rigor or if they are intended to be descriptive and behavioral.

Goal 4: Provide opportunity for salmon spawning in the natural environment to generate offspring for downstream fisheries and future source stock for further reintroductions.

Issues, Concerns

Most salmon management actions (hatcheries, habitat restoration, hydropower facility or operational changes) are intended to produce more fish or increase survival of fish so that they can be harvested or escape to spawn naturally and contribute to the long-term persistence of the species. The CCT is interested in harvest fisheries on translocated fish when part of a cultural release regardless of which Phase the larger fish passage and reintroduction effort is in. Prior to results from Phase 2 studies and without adult and juvenile passage facilities it is difficult to define an objective for conservation. Despite this uncertainty, there is an inherent cultural and spiritual benefit to having salmon spawning and rearing in the blocked area.

When surplus hatchery salmon are allowed to spawn in the blocked area they would generate offspring that would not have existed if the surplused fish had been distributed for food or rendered to a landfill. The offspring of surplus hatchery fish spawning upstream of CJD would contribute to the Columbia River, estuary and Pacific Ocean food webs, be harvested by fishermen from Alaska to Chief Joseph Dam and escape to become a spawner in the next generation. Regardless of low efficacy (which we would learn about by implementing studies), the release of fish into habitats upstream of CJD and GCD would result in more fish coming back to CJD, which would aid in future efforts to translocate more adults to the upstream areas.

Goal 5: Ecosystem function benefits such as reintroduction of marine derived nutrients for stream, riparian, forest and wildlife benefits.

Issues, Concerns

Adult salmon provide a number of benefits to stream ecosystems that is well documented in the scientific literature. The construction of spawning nests (redds) sorts gravels and mobilizes fine sediments which can reduce substrate embeddedness and the proportion of fine sediments in pool tailouts and gravel/cobble riffles. This can have a positive effect on macroinvertebrates and create additional spawning areas for other fishes. Adult salmon bring nitrogen, phosphorus and carbon accumulated in the ocean environment and deposit those marine derived nutrients into streams which can improve stream productivity including macroinvertebrates that provide food for juvenile fish. Salmon (live or carcasses) would be taken from streams by birds, bears and other piscivorous animals and those nutrients would be spread throughout the riparian zone and nearby forests thereby fertilizing the local fauna. These benefits are particularly important in streams that have been cutoff from marine derived nutrients for long periods of time.

Some rivers with large inputs of anthropogenic nutrients may not be phosphorus limited which could mask the ecological benefits of salmon carcasses.

Donor Stock and Risk Assessment

A donor stock and risk assessment was completed (Hardiman et al. 2017) to evaluate the risks and benefits of various donor stocks to resident fish upstream of CJD and anadromous fish downstream of CJD. The donor stock and risk assessment report evaluated the genetic, disease, competition and predation risks and benefits of 40 stocks of fish across five species (Spring Chinook, Summer/Fall Chinook, steelhead, Sockeye, Coho). The risk assessment did not exclude any stock from consideration, but it ranked all the stocks assessed and described the various risks associated with each stock. The primary risk of concern was for genetic effects and disease transmission from anadromous steelhead in downstream populations to the resident redband trout populations in tributaries of Lake Roosevelt. Therefore, under the proposed project we are not proposing to translocate any steelhead of downstream origin into the blocked area. Additionally, we would not move an ESA-listed fish into the blocked area unless the ESA-listing status were removed from the fish for transport and release[1]. The risk assessment determined that all pathogens of concern were already detected within the resident region except 2 forms of the infectious hematopoietic necrosis virus (IHNV). The M genogroup that primarily infects *O. mykiss* (rainbow trout and steelhead) and the UC subgroup that primarily infects Chinook have not been detected whereas the UP subgroup (that infects Sockeye) has been detected. We are proposing to move forward with Chinook and Sockeye from donor stocks in the extant portion of the Cascade Columbia ESU between the Yakima River and Chief Joseph Dam. Priority within the donor stock assessment was influenced by availability, which elevated the priority level for hatchery fish as a donor stock. Although natural-origin fish are more likely to be successful at spawning in the natural environment, the demographic risk to extant populations is likely to be unacceptable unless escapement goals are being met within the spawning areas downstream. To the extent that natural-origin Summer/Fall Chinook become available for reintroduction efforts they can and would be utilized. There are very few hatchery fish in the Sockeye populations of the Upper Columbia, and they are not externally marked, so Sockeye origin would not be differentiated if/when adults are translocated.

Project Details:

[1] In several cases NOAA fisheries has allowed surplus ESA listed fish to be moved into a blocked area for the purpose of meeting tribal or sport fisheries.

Release locations, numbers and life stages would be selected to meet multiple objectives including cultural significance, productive habitat for natural spawning, harvest opportunities, and strategic research needs. We expect to release dozens to thousands of adults and thousands to tens of thousands of juveniles (release numbers would depend on donor stock availability, budget, cultural objectives or study design). Initially, likely locations for adult translocation include boat ramps in Rufus Woods Reservoir (*e.g.*, Bridgeport State Park and Seaton's Grove) and Lake Roosevelt (*e.g.*, Kettle Falls, Northport, Sanpoil River/Arm, Spokane River/Arm) (Figure 3). In addition to meeting cultural and ceremonial objectives, several of these locations have been identified as having considerable habitat potential for spawning and rearing salmon (Hanrahan et al. 2004; ICF 2017; Giorgi 2017). We expect to tag a subset of the releases with PIT, acoustic or radio tags, but current funding levels may not facilitate implementing statistically valid experiments to adequately answer key uncertainties. Regardless, information from small sample sizes of tags as part of Phase 1 selective releases would help inform and guide the effectiveness of the cultural and educational releases and could inform the development of more detailed experimental releases in the future.

Rearing of juveniles would occur in existing facilities. All protocols currently employed at existing CCT aquaculture facilities for handling eggs and fish and testing for pathogens would be applied to fish used in the reintroduction. Specific release locations, numbers and timing would be determined at a later date by the CCT Fish and Wildlife Department in consultation with relevant fish co-managers and would depend on availability, cultural or educational objectives. No additional construction, water withdrawals or other infrastructure would be implemented to complete this portion of the project. If the project progresses to a point in Phase 2 where the construction of hatchery facilities, passage facilities, water use or other habitat altering infrastructure is needed then a separate Project Proposal Form would be submitted.

Transport of fish for reintroduction to blocked areas would be conducted with standard hatchery fish transport trucks as per the protocols already adhered to by the CCT Resident Fish Trout Hatchery and the Chief Joseph Salmon Hatchery. Additional support for transport may be provided by hatchery personnel from other fish managers in the region such as Okanogan Nation Alliance, the Spokane Tribe of Indians, the Coeur d' Alene Tribe of Indians, Washington Department of Fish and Wildlife, or other hatchery management entity in the region.

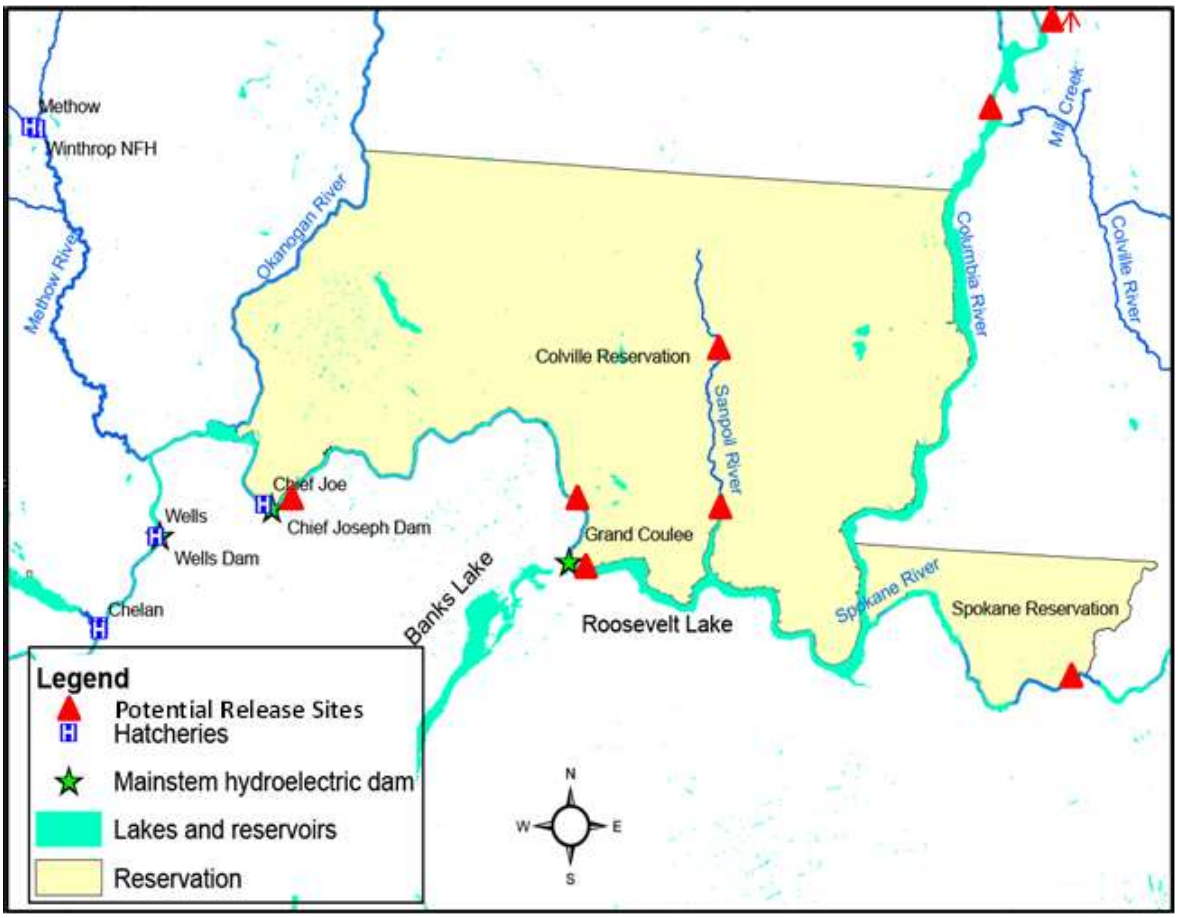


Figure 3. Map of the project area showing some of the major dams, tributaries and some potential release sites/areas. The red arrow indicates that additional release sites may be upstream of the map (but within the United States). Additional releases may occur in Canada but would be outside the scope and jurisdiction of this project. This map was taken from the USGS Donor Stock and Risk Assessment and modified to include potential release sites.

1.4 Compliance with Other Codes and Regulations

This project does not include the construction of any infrastructure or the degradation of any habitat. This project is designed to be compliant with Colville Tribal Forest Practices Code (208), CTC 4-9: Hydraulic Project Permitting, 4-10: Water Resources Use and Permitting, the Endangered Species Act, Clean Water Act, Clean Air Act and other applicable Tribal and Federal Regulations.

This project would transport and release non-ESA listed salmon (Chinook, Sockeye, Coho) from capture locations downstream of CJD and GCD to release locations upstream of those facilities. Fish would only be captured via activities that are already permitted below CJD, such as hatchery surplus at fish ladders, weirs, dams, and purse seining. Colville Tribal facilities and trapping operations are already approved by the National Marine Fisheries Service (NMFS) via a Tribal Resource Management Plan (CTCR, 2014). Facilities operated by other entities (WDFW, USFWS, PUDs) with potential donor stocks are regulated by NMFS through their Hatchery and Genetic Management Plans. CCT Fish and Wildlife Department would work with each entity to be sure all fish or gametes used for translocation are covered under their permitting processes.

Transport permits would be obtained from the State of Washington for transport routes that are not on the Colville Reservation.

1.5 Decision(s) to be Made

Colville Business Council (CBC) with concurrence from the Colville Fish and Wildlife Department will determine which alternative is selected for implementation.

a) To take no action (Alternative A)

b) To approve the proposed action (Alternative B)

c) To direct an additional alternative be created.

2.0 Alternatives Considered

2.1 General Discussion: Alternative Design

For this project, Alternative A (No Action) is included to provide baseline values by which to measure the effects of other alternatives. For the purposes of this document, "no action" means that no release of adult or juvenile salmon would occur upstream of Chief Joseph or Grand Coulee dams if this alternative were adopted.

Alternative B (the Proposed Action) was constructed to fulfill the purpose and need. That is, Alternative B was designed to:

1) Meet cultural and ceremonial needs of Tribes and First Nations by reconnecting anadromous fish with their historic habitat.
2) Provide harvest opportunity for tribal members in areas that have been blocked from salmon since construction of Grand Coulee and Chief Joseph dams.
3) Contribute to knowledge about movement, survival, and behavior of fish in the streams, reservoirs and dams that would answer key uncertainties or better inform the development of experimental designs for studies in later phases of reintroduction.
4) Provide opportunity for salmon spawning in the natural environment to generate offspring for downstream fisheries and future source stock for further reintroductions.
5) Ecosystem function benefits such as reintroduction of marine derived nutrients for stream, riparian, forest and wildlife benefits.

All alternatives are designed to meet all legal and procedural requirements to which the Colville Tribes must adhere.

2.2 Alternative A: No Action

The "No Action Alternative" includes the CBC not approving and the Tribe not implementing activities under the project. Under this alternative no releases of salmon upstream of Chief Joseph or Grand Coulee Dam would take place.

2.3 Alternative B: Preferred Action

The Preferred Action Alternative includes the CBC approving the Cultural and Educational Releases of Salmon Upstream of Chief Joseph and Grand Coulee Dams Project and the Tribe implementing the activities under the proposal. This Alternative does meet the Purpose and Need of the project.

This alternative was proposed by CCT Fish and Wildlife Department to meet the cultural, educational and ceremonial needs of the Colville Tribes by releasing salmon upstream of Chief Joseph and Grand Coulee dams.

Table 1. Alternative B prescription summary.

Prescription	Release Numbers
Trap, haul and release adult salmon from areas downstream of CJD to areas upstream of CJD and GCD.	30 to 15,000
Trap, haul and release juvenile salmon from areas downstream of CJD to areas upstream of CJD and GCD.	1,000 to 10,000

Specific release numbers, locations, donor stocks and life stages would depend on fish availability, budget and staff constraints, habitat capacity limitations and consultation with cooperating entities. Donor stocks would be selected from sources evaluated in the Donor Stock and Risk Assessment report (Hardiman et al 2017). Fish that are listed as threatened or endangered under the Endangered Species Act would not be translocated. Steelhead from donor stocks downstream of CJD would not be utilized due to their ESA listing status as well as genetic and disease risk concerns for the native resident redband trout populations (Hardiman et al. 2017).

Several release strategy concepts have been discussed within the CCT Fish and Wildlife Department and with fish co-managers in UCUT and WDFW to meet the goals outlined in this project. The following examples are meant to provide some insight to current thinking on near-term release strategies and are not meant to be an exhaustive list of all possible approaches to meeting the goals of this project.

Captive Fishery Releases (goals 1 and 2): In other blocked areas fish managers have translocated adult salmon to a blocked off section of a stream for the primary purpose of providing a ceremonial harvest opportunity. Upon release, tribal members used traditional methods (e.g., spears, dip nets) to harvest the adult salmon. This approach would generally use small numbers of salmon (dozens to hundreds) and the goal may be to remove all of the released fish for ceremonial and subsistence consumption by tribal members. This approach would generally occur in small to medium sized streams on the reservation and specific streams or reaches have not yet been identified.

At-large Releases of Adult Salmon (goals 1,2,3,4,5): For larger streams and rivers including the Columbia River, up to several thousand adult salmon could be released at multiple locations to provide a fishery opportunity as well as to escape the fishery to meet spawning, ecosystem, productivity and monitoring goals of the project. A portion of these fish may be tagged to evaluate their behavior, movement, survival and potential for spawning. These fish would be released into waters that are co-managed by the State of Washington and so a portion of them may be harvested by state anglers.

At-large Releases of Juvenile Salmon (goals 1, 3): The release of juvenile salmon has been an important part of ceremonies implemented by the Okanogan Nation Alliance in areas that are blocked from returning adults. Salmon in the Classroom is a program that is already underway at CJH and other facilities around the state and by other UCUT tribes. Dozens to hundreds of eggs

or fry are transferred to schools so that students and teachers can participate in the rearing and release of salmon fry and smolts. The primary purpose of these releases is to educate children about the life-cycle of salmon and to provide an opportunity to participate in fish aquaculture. If juveniles are tagged, survival and behavioral information can be obtained. These efforts also contribute returning adults to downstream fisheries and can serve the dual purpose of the meeting goals of this project and the original mitigation intent for which the juveniles were generated (e.g., hydropower mitigation, fisheries enhancement).

3.0 Affected Environment

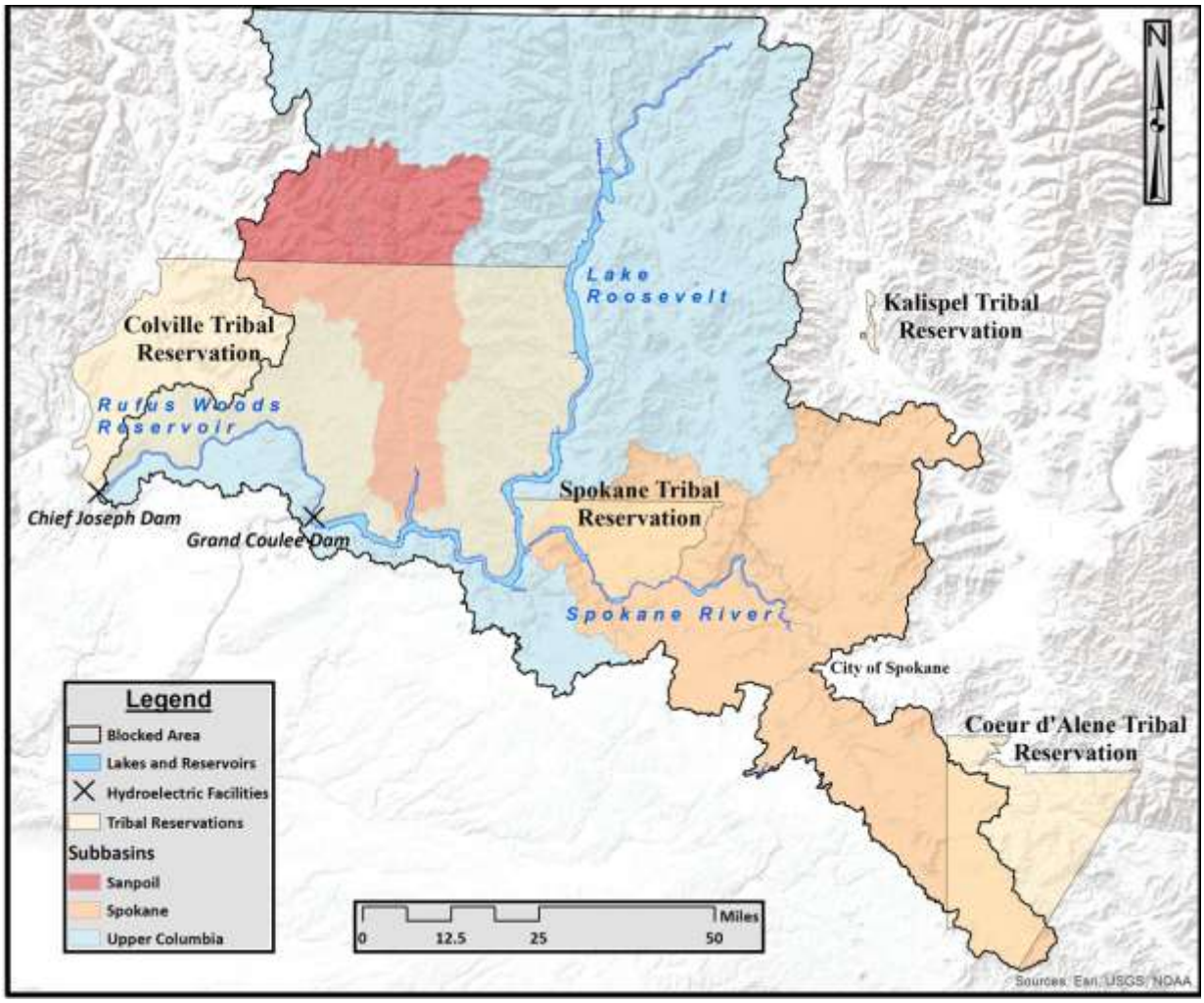


Figure 4. Location of the Colville Indian Reservation, the Columbia River and its tributaries in the United States that are blocked from anadromous fishes and neighboring tribal reservations of the Upper Columbia United Tribes in Washington State (map provided by C. Giorgi).

3.1 Land Resources

The Colville Indian Reservation is located in the north central portion of the State of Washington in a physiographic province called the Okanogan Highlands. The Reservation is bounded on the east and south by the Columbia River and on the west by the Okanogan River. Much of the Reservation is mountainous with conifer forest, but lands bordering the Okanogan and Columbia

Rivers are arid and naturally covered with vegetation of shrub-steppe environments. (Center for Applied Research 2016)

Soils

Soil, water, and vegetation are intrinsically linked through the water cycle and all three components functioning properly are vital to a robust and resilient watershed (Brady & Weil 1996; Hunner 2014). Soils also provide habitat for micro- and macro-organisms and perform nutrient recycling functions (Brady & Weil 1996). As a medium and ecosystem, soil and soil functions are key to plant productivity.

Soils across the Reservation vary widely in texture, depth, rock fragment content, and natural drainage (Center for Applied Research 2016).

3.2 Water Resources

The Columbia River (Lake Roosevelt) flows along the eastern and southern project boundary. The Columbia River is defined as a Type I Water system; in part this is defined as: all waters having exceptional resource functions and values (CCT 2006). A water resource of exceptional resource function and value, as determined by the Tribal Council is a water resource that provides values critical to the well-being of the Reservation population and resources, which may include but are not limited to:

1) Traditional or cultural uses 2) Major domestic water supplies 3) Tribal or public recreation 4) Fish spawning, rearing or migration 5) Wildlife habitat and uses 6) Agricultural or industrial uses 7) Capital improvements

There are 26 primary streams along with ten major lakes on the Colville Reservation. Between the bordering Columbia and Okanogan rivers are 32 watersheds and major drainages, large and small, which drain to these rivers and to lake basins on the Reservation. Large watersheds are the Sanpoil River, Omak Creek, the Nespelem and Little Nespelem rivers, and Nine Mile, Wilmont, Stranger and Hall Creeks. (Center for Applied Research 2016)

Water Quality

In general the water quality on the Reservation is good. In the summer month's violations do occur when water temperatures exceed standards, dissolved oxygen levels fall below minimum standards, and bacteria counts become concentrated during low flows. Turbidity values are high in the spring during periods of enhanced runoff and erosion. (Hunner 2015)

Most of the streams on the Reservation have been altered from their natural state as a result of the Tribe's management of its natural resources including logging, road building, grazing, dams and agricultural use. The loss of stream bank vegetation, large woody debris, and stream complexity has impacted seasonal temperature extremes and made fish populations more vulnerable. (Center for Applied Research 2014)

3.3 Air Quality

There are four airsheds delineated on the Reservation where local topography influences air movement and emission dispersion. The Lake Roosevelt airshed is bounded on the west by the southern tip of the Kettle mountain range and on the east by Franklin D. Roosevelt Lake. Air and water typically flow into the river corridor. The Sanpoil River airshed originates near the city of Republic and flows south through the Colville National Forest following the Sanpoil River past

the town of Keller into Franklin D. Roosevelt Lake. Nespelem is the smallest airshed which goes along the Nespelem River and down the center of the valley with several small tributaries including the Little Nespelem River. Air and water flow into Lake Ruffus Woods or potion of the Columbia River behind Chief Joseph Dam. The Okanogan River airshed includes two of the highest points on the Reservation, Moses Mountain and Omak Mountain, which influence local weather patterns and air movement. The Okanogan River comprises the western border of the airshed and the Reservation. (Center for Applied Research 2016)

Point Sources which release pollutants into the atmosphere in Reservation airsheds include:

- Wood processing facilities
- Gas stations
- Asphalt and concrete facilities

Nonpoint sources on the Reservation include:

- Residential wood stoves
- Landfill fires
- Prescribed fires
- Wildfires

Generally air quality is good on the Reservation. The majority of days range in the least polluted category of the Air Quality Index (AQI). During the years of 2012-2014 there were no days where air quality reached a pollution level that was very unhealthy or hazardous. The primary reasons for lower air quality readings is from wildfire smoke during the summer months and from wood stoves during the winter month when inversions occur. (Center for Applied Research 2016)

3.4 Living Resources

Ecosystems

A variety of habitats vital to fish and wildlife are present on the Reservation, including rivers, streams, lakes, riparian zones, wetlands, shrub-steppe, and forest. These habitats include features such as snags, cliffs, woody debris, and old growth trees that are necessary to support a wide variety of fish and wildlife species. The ecosystems of the Reservations have been altered and shaped by multiple human activities and natural occurrences that have impacted the quantity and quality of fish and wildlife habitat. As a result, the fish and wildlife managers are challenged to utilize various management practices to achieve the desired future conditions for the Tribe and its membership. (Center for Applied Research 2016)

Wildlife

The Colville Reservation and surrounding areas supports habitat for a variety of fish and wildlife species. Over the vastness of 1.4 million acres that comprise the Colville Reservation, vital habitat supports over 300 species of birds, mammals and herptiles. Big game wildlife species such as, mule deer (*Odocoileus hemionus*) and rocky mountain elk (*Cervus elaphus*) are culturally significant spices to tribal members for both subsistence and ceremonial uses. A wide variety of bird species exist on the Reservation, such as Northern goshawks (*Accipiter gentilis*), great gray owls (*Strix nebulosa*), golden (*Aquila chrysaetos*) and bald (*Haliaeetus leucocephalus*) eagles and other raptors, pileated woodpeckers (*Dryocopus pileatus*) and other

cavity nesters, Columbian Sharp-tailed grouse (*Tympanuchus phasianellus*) and other upland game species and a wide range of songbirds. Section 7.2 provides lists of Fish and Wildlife species found on the Reservation, including 66 wildlife species that are designated as a Colville Tribes priority species due to their importance as game, their status as a sensitive species or because of the cultural significance (Center for Applied Research 2014, Pacific Biodiversity Institute 2015).

Reptiles and amphibians are also common residents of the Reservation, with more than 15 different species occurring and 8 species being Tribal priority species. These spices include western toad (*Anaxyrus boreas*) tiger salamander (*Ambystoma tigrinum*), Columbia spotted frog (*Rana luteiventris*) and western painted turtle (*Chrysemys picta*). These wildlife species occupy both aquatic and terrestrial habitats and are especially susceptible to increased risk from exposure to contaminants due to their permeable skin.

Following is a selection of the priority and listed wildlife species that are monitored on the reservation.

Birds

Bald and Golden Eagles

Currently, bald and golden eagles are protected under the Bald and Golden Eagle Protection Act and the Migratory Bird Treaty Act. The bald eagle is listed as a State Sensitive Species and a Federal Species of Concern, whereas the golden eagle is listed as a State Candidate for listing under the Endangered Species Act. Both of these species are culturally important to the CCT, and as such are listed as a Tribal Priority Species.

Bald eagles on the reservation protect and defend territories that may include multiple nests, with only one being active per year. These territories are generally near or within one mile of rivers or large lakes where there is an adequate food supply. The stick built nests are typically found in mature or old growth trees, snags, and cliffs or on rock ledges.

Golden eagles nest on rocky ledges, cliffs, and in large trees of the arid and open plateaus of shrub steppe and grassland communities of eastern Washington. These areas often are in transition zones between shrub steppe to forests, where streams and canyons cut through the arid desert environment. They use these cliffs and trees in an interspersed fashion, alternating nest sites in different years throughout the same vicinity.

Protection of foraging habitat and prey are critical to eagle distributions in north central Washington. While lakes and rivers are important for fishing and hunting opportunities during the summer months, bald eagles rely on ungulate and carrion during the winter months. Habitat fragmentation and loss of habitat is known as the highest impact to eagles and their nesting success. This is particularly important where prey is concentrated in lakes and rivers, water impoundments, shorelines and wetlands, and near agricultural and aquaculture areas.

Over the past 5 years bald and golden eagle populations have been monitored by CCT Biologists. There are currently 19 known golden eagle territories and 28 known bald eagle nest sites. Every year these are surveyed for occupancy and production in order to track population activities. Buffers and seasonal restrictions are put into place in order to protect nesting bald and golden eagles.

Columbian Sharp-tailed Grouse

Columbian Sharp-tailed Grouse are currently listed on the Washington State's Threatened Species list and is a culturally significant species for the Colville Confederated Tribes. The Colville Reservation currently is a last remaining stronghold of the species in Washington State. Columbian Sharp-tailed Grouse are limited by cover; predation, vegetation composition, and winter diet.

Columbian Sharp-tailed grouse are a grassland species that require native grassland and shrub-steppe habitats to meet their life requirements. During the lekking season native bunchgrasses and residual forbs and shrubs provide hiding cover for males and females. Female sharp-tailed grouse use grassland and shrub steppe environments to lay their eggs and raise their young. (Berger et.al 2005)

In 2005 CCT developed the Columbian Shape-tailed Grouse Management plan. In 2014 there were 19 active lek sites; annually the historical and active lekking sites on the reservation are surveyed. These surveys collect data in order to monitor population numbers and trends.

Great Gray Owl

Great gray owls occur in mid to high elevation conifer forests such as lodgepole pine, Douglas-fir, larch, and mixed Ponderosa pine throughout the Pacific Northwest. They nest in old growth, mature forest stands with broken topped trees and large snags which support their platform nests. Foraging habitat is in adjacent grassy/herbaceous meadows and cleared areas where small mammal prey densities and visibility are high. There are two active territories with 2 nest sites in each territory on the CCT Reservation that were monitored in past years. Buffering of nests and seasonal restrictions has been put into place to protect active owl nesting activities.

Northern Goshawk

The northern goshawk is a large forest raptor, strongly associated with mature forests where there is dense and closed canopy cover, open understory for flyways, and multiple canopy layers for protection. These attributes are critical for nesting and foraging northern goshawks. They are an indicator species of mature forest types that provide habitat to a range of other species. Northern goshawks are a Tribal Priority species and a State Candidate for listing under the Endangered Species Act.

There are 4 known goshawk territories on the reservation, which are monitored every year for occupancy and production. Per CCT IRMP goshawk nests are to be protected from habitat disturbance with a 750 foot buffer and in order to protect fledgling activities, disturbance activities would be avoided within a 0.5 mile during the period of March 1 through August 31 (Klock 2001).

Mammals

Big Game

Mule deer, white-tailed deer, elk, and moose are culturally significant species to tribal members for both subsistence and ceremonial uses. The reservation provides vital winter range habitat for these species. Mule deer can be found throughout the area from steep forested ridges to lowland shrub-steppe habitat at all elevations. White-tailed deer are primarily found using riparian associated habitat adjacent to streams, rivers, meadows or agriculture at elevations below 3,500 feet. Moose utilize open shrubby habitats and wetlands during the summer months on the Reservation and mature conifer forests during winter months, dependent of forage availability.

Rocky mountain elk on the reservation are associated with transitions zones between shrub-steppe and coniferous forests in mountains, foothills and canyon areas. Every other year winter aerial big game counts are conducted in order to model and monitor population trends for each species. All of the big game species are managed for subsistence hunting, with target population numbers that can support these Tribal needs.

Canada Lynx (*Lynx Canadensis)*

Canada lynx is federally and state listed as Threatened and is a CCT culturally significant species. They tend to utilize lodgepole pine, Englemann spruce, and subalpine fir habitats. The main prey is the snowshoe hare and their occurrence is strongly correlated with the hare's presence and abundance. CCT Wildlife program is working to establish a base data set on current lynx populations on the Reservation. There are historical and recent sittings of lynx within the bounds of the Reservation, but currently there is no known population numbers or trends.

Gray Wolf (*Canis lupus)*

In 2016 a CCT Gray Wolf Management plan was developed to aid in management strategies of this species. Gray wolves have returned to Washington State in the last 10 years. This apex predator plays an important role in ecosystem function, preying primarily on ungulates such as deer, elk and moose. The Colville Reservation is currently home to four known wolf packs. Individuals from each pack have at one point over the last 4 years have been outfitted with GPS collars. The data collected from these collars have provided valuable movement and prey consumption information. These packs continue to be monitored and tracked in order to determine population numbers and trends. Being habitat generalists there are currently no codes in place to protect wolf habitats.

Pronghorn Antelope (*Antilocapra americana)*

Habitat utilized by pronghorn antelope includes flat grasslands and shrublands. They have been found to prefer forbs over grasses and shrubs over herbaceous material. Historically, pronghorn antelope occupied the reservation, but were extirpated in the 1900's. In 2016 the CCT Wildlife program worked with Nevada Department of Wildlife to capture and relocate 52 pronghorn to the southwest plateau of the reservation, with an additional 98 the following year. Successful reproduction was documented in 2017 and the population is continually monitored to assess trends. Future work includes augmenting this herd with more individuals from the same or different source populations.

Fish

There are 26 native fish species known to exist in the waters of the Reservation (Section 7.2). Additionally, there are 23 non-native fish species and 4 species, native and non-native that are rare or unlikely to occur in Reservation waters. Anadromous species like Chinook Salmon (*Oncorhynchus tshawytscha*), Sockeye Salmon (*O. nerka*), and steelhead (*O. mykiss*) are still present in accessible boundary waters of the Reservation, downstream of Chief Joseph Dam.

There are several resident salmonid populations present on Reservation waters and boundary waters. Native Redband Trout (*O. mykiss gairdnerii*) (both fluvial and adfluvial life-histories) are present is most streams throughout the Reservation. Non-native Brook Trout (*Salvelinus fontinalis*) are also widely distributed in streams and lakes throughout the Reservation. Low numbers of non-native Brown Trout (*Salmo trutta*) are also found in some Reservation streams

and boundary waters. Bull Trout (*S. confluentus*) have not been observed in recent history and are assumed to be extirpated from Reservation waters.

The scope of the affected environment for fish and wildlife would depend partially on how extensively the action is implemented and which species are utilized. All species of salmon in consideration would rely heavily on the Columbia River as a migration corridor and Summer/Fall Chinook would also spawn in sections that have suitable habitat. Some species, such as Coho and Sockeye may utilize small streams and Sockeye, Spring Chinook and Summer Chinook would use medium to large streams for spawning. The affected environment may extend to the end of potential anadromy, which is easy to define in some areas (large falls, hydroelectric dams) and difficult to define in other areas (smaller streams with no falls).

Agriculture

Only a small portion of the Reservation is used for agriculture, about 2% of the available land. Crops include grains, feed, hemp, and orchard crops. The majority of production is in the west portion of the Reservation where both irrigated and dryland farming occurs near the Columbia and Okanogan Rivers. (Center for Applied Research 2016)

Range Management

The affected environment of this proposal is the major rivers, lakes, and streams along the eastern portion of the Reservation, Columbia River, Rufus Woods, Lake Roosevelt, Sanpoil River, and all the stream tributaries to the Sanpoil River.

The Colville Confederated Tribes Range Program permits livestock on several range units that are located along the waterways for the anadromous salmonids reintroduction area. Grazing utilization is directly impacted by the availability of water and usable forage during the average 214 day season of use.

3.5 Cultural Resources

The Reintroduction of salmon above Chief Joseph and Grand Coulee dams would affect the ancestral lands of the Okanogan, Nespelem, Colville, Sanpoil, and Lakes Tribes, who trace their ancestry in this area since time immemorial. This project proposal includes a phased approach for the reintroduction of anadromous salmon into the Columbia River upstream of Chief Joseph and Grand Coulee dams, which have blocked passage, with no alternative means of migration, for 60-77 years, respectively. The project area encompasses approximately 200 linear river miles. For the purposes of consultation with the Tribal Historic Preservation Officer (THPO) under Section 106 of the National Historic Preservation Act, the 200 river miles above Chief Joseph and Grand Coulee Dams shall be considered the Area of Potential Effects (APE).

Approximately 50,000 acres were previously surveyed within and immediately adjacent to both the Chief Joseph Reservoir (Rufus Woods Lake) and the Grand Coulee Reservoir (Lake Roosevelt) since 1996. This inquiry has resulted with the formal documentation of approximately 470 precontact, historic, and multi-component sites and TCPs within the Rufus Woods Lake portion of the project area and APE and approximately 1,050 precontact, historic, and multi-component sites and TCPs within the Lake Roosevelt portion of project area and APE.

3.6 Socioeconomic Conditions

According to the 2010 Census, the population living within the Colville Indian Reservation is 7,500. The majority of residents are Tribal members and descendants. Tribal member unemployment is a major concern for the Tribes and it is thought that the unemployment rate is very high. U.S. census data from 2010 reports unemployment at just over 10%. However, the American Indian Population and Labor Force uses data provided by the Tribes' Human resource Department, the Colville Tribal Federal Corporation and the BIA, to provide employment data for American Indians residing on the Reservation, and they report unemployment in 2010 of 66%. As of 2010, 27% of individuals on the Reservation reside in households below the poverty line. (Center for Applied Research 2016)

Lifestyle and Cultural Values

With the development of an integrated natural resource management strategy, the Tribes' developed a Holistic Goal passed by resolution by the Colville Business Council in 1996. This Holistic Goal expresses the Tribal memberships desire for a sustainably biodiverse environment with holistic management of resources that provide economic and cultural benefits. (Center for Applied Research 2016)

3.7 Resource Use Patterns

Hunting, Fishing, Gathering

Residents of the Reservation are very interested in the management of the Reservations resources. Hunting, fishing and gathering provide for subsistence and recreation to the majority of residents. Cultural plants are important and provide food, medicine and are used in ceremonial activities. Historically, salmon were central to the diet of the Tribal members and sustained them for thousands of years. (Center for Applied Research 2016)

Recreation

There are numerous recreational locations and activities within the Reservation. Due to the Tribes culture, traditions and way of life, expanding recreational opportunities is taken very cautiously. The parks and Recreation program have categorized current recreational sites into the following categories:

- North Lake Roosevelt
- South Lake Roosevelt
- Twin Lakes
- Sanpoil
- Buffalo Lake
- Omak Lake
- Rufus Woods

In 1940, Congress authorized the acquisition of Indian lands for the Columbia Basin project. The legislations recognized that the Colville Tribes have the right to hunt, fish and boat within an area of Lake Roosevelt equal to one quarter of the entire reservoir. (Center for Applied Research 2016)

4.0 Environmental Consequences

4.1 Land Resources

Impacts to Land Resource Resources Alternative A: No Action

The “no action” alternative would have no impact on land resources within the project area.

Impacts to Land Resource Alternative B: Proposed Action

If salmon are released into the Columbia River and its tributaries upstream of Chief Joseph and Grand Coulee dams there could be small (likely undetectable) benefits through nutrient cycling and terrestrial dispersal of salmon carcasses.

4.2 Water Resources

Impacts to Water Resources Alternative A: No Action

The “no action” alternative would have no impact on the water resources within the project area.

Impacts to Water Resources Alternative B: Proposed Action

The preferred alternative would likely have no detectable impact on the water resources within the project area. There could be small localized increases in nutrient levels from salmon carcass decomposition.

4.3 Air Quality

Impacts to Air Quality Alternative A: No Action

The “no action” alternative would have no impact on air quality.

Impacts to Air Quality Alternative B: Proposed Action

The “proposed action” alternative would have no impact on air quality.

4.4 Living Resources

Impacts to Living Resources Alternative A: No Action

The “no action” alternative would not have adverse effects to fish, wildlife, or habitat on the Reservation or boundary waters.

The “no action’ alternative would not allow anadromous salmonids to be returned to their ancestral spawning grounds. Ecological processes and interactions between the land, trees, invertebrates, birds, mammals, and fishes would continue to be cut off from salmon and their link to marine resources.

Under the “no action” alternative, the pathogen risk and burden to resident salmonids would not be increased by the presence of anadromous salmonids. For kokanee, the genetic risk of hybridization with anadromous sockeye from downstream populations would not be increased.

Impacts to Living Resources Alternative B: Proposed Action

Ecosystem

Reintroduction of anadromous salmon has the potential to affect nutrient balances in the impounded area above CJD and GCD by transporting marine-derived nutrients and carbon to

freshwater and riparian ecosystems (Scheuerel et al. 2007). These marine-derived nutrients affect the productivity of riparian vegetation of spawning streams and salmon are consumed by a wide range of terrestrial vertebrates such as waterfowl, gulls, corvids, raptors, rodents, mustelids, canids, and ursids (Hilderbrand et al. 2004). Although initially, in newly restored populations out-migrating juveniles may export more nutrients than translocated adults import (West et al. 2010). At the scale of proposed reintroduction, the net increase or decrease is likely to be minimal.

Fish

A risk and donor stock assessment was completed by USGS under contract by the CCT and UCUT to assist the tribes in evaluating the most appropriate stocks for releases in the blocked area and to understand the risk associated with those stocks (Hardiman et al. 2017). More than 50 resident fish species reside in the blocked area and the risks of releasing anadromous salmon to resident species were focused on genetic, disease, competition and predation. Additional considerations were included for demographic risks of removing individuals from downstream populations. For most species the use of hatchery fish as a donor source ranked higher than natural fish due to their availability and because of less demographic risk to the donor population. The following are summaries of pertinent information from the risk and donor stock assessment:

Genetic risks:

The reintroduction of salmonids has genetic risks to existing wild populations, such as:

1. Fitness reductions through loss of local adaptations and disruption of interactions between co-adapted loci;
2. Changes in genetic diversity—for example, genetic homogenization, and
3. Reduction in effective population size

Genetic risk occurs when introduced stocks hybridize with and pass non-native and (or) maladaptive genes into wild populations. Hybridization with conspecifics may occur through straying of introduced stocks and lack of spatial and (or) temporal segregation during spawning. To evaluate genetic risks, four factors contributing to increased genetic risk were identified:

1. **Donor choice.** Several donors were assessed for each salmonid species considered for reintroduction. Donors were assessed by their relationship with other populations in the basin. The history of hatchery-origin donors also was considered, and this included founding source(s), potential genetic changes through hatchery practices, whether the donor was from a segregated or integrated hatchery, and the number of generations a stock has been artificially propagated.
2. **Likeliness of hybridization with existing assemblages.** For blocked areas upstream of the dams, we considered that introduced steelhead could hybridize with native Redband Trout and that introduced Sockeye Salmon could hybridize with native kokanee. For areas downstream of Chief Joseph Dam, we considered the likelihood of hybridization with anadromous conspecifics.
3. **Reintroduction strategy.** This included an assessment of natural recolonization, transplantation (hatchery-origin or natural-origin adults), and hatchery releases of juveniles. We considered that the risks imposed by the different reintroduction strategies

may not be equal and, therefore, present different genetic risks to native populations of concern.

4. **Fitness declines with hatchery-origin donor use.** This was considered an important factor, as studies suggest that early-generation hatchery fish that spawn in the wild have lower reproductive success relative to wild fish.

Chinook and Coho pose no genetic risks to resident fish in the blocked area because they do not currently naturally occur in the area as a resident species, however; there are some landlocked Chinook in Lake Roosevelt due to entrainment from releases of Chinook in Lake Coeur D' Alene.

The genetic risk to resident redband trout from donor stocks of steelhead downstream was considered high relative to using the redband trout as the donor source. Likewise, the genetic risk of using donor stocks of Sockeye from downstream sources (Okanogan, Wenatchee) was high relative to using a source of kokanee from within the study area. This portion of the assessment did not take into account the difficulty or uncertainty associated with re-programming anadromy from resident life history forms.

Disease risks: All pathogens of concern were detected within the resident region except infectious hematopoietic necrosis virus (IHNV), which is highly virulent in steelhead. Therefore, introduction of IHNV would pose a risk to extant Redband Trout and reintroduced steelhead. The most important risk factor of IHNV disease occurring in juvenile fish is the presence of anadromous adults in the same water body, and in conservation hatcheries the most effective control strategy is surveillance and biosecurity (for example, well water and equipment decontamination). All other pathogens of concern were detected at higher frequency in candidate donor populations than in resident populations, indicating that nearly all potential donors impose the risk of increasing pathogen burden in the resident region. It is a general phenomenon in microbial pathogenesis that the greater the number of causative microbes, the greater the chance is of developing disease (for example, dose response). The most important pathogens in this risk category were for the bacterial pathogens *Renibacterium salmoninarum*, the causative agent of Bacterial Kidney Disease, and *Flavobacterium psychcrophilum*, the causative agent of Bacterial Coldwater Disease. Pharmacological treatments are available for these conditions, and so the most effective control strategy is surveillance, biosecurity, and treatment.

Predation Risk: The risk assessment did not identify predation on resident fish as a concern. Conversely, the risk assessment focused on resident species that were likely to prey on the reintroduced salmon and thereby affect the performance and success of the releases. During the workshops, 14 resident species of interest were identified, consisting of six native species and eight non-native species. Several non-native species were selected because they were potential predators or competitors of introduced salmonids. Workshop participants identified Redband Trout, triploid Rainbow Trout, kokanee, and Burbot (*Lota lota*) as the primary competitors of introduced salmonids. For predation, workshop participants identified Smallmouth Bass (*Micropterus dolomieu*), Walleye (*Sander vitreus)*, and Northern Pike (*Esox Lucius*) as the greatest predation risks to juvenile salmon. White Sturgeon (*Acipenser transmontanus*), Redband Trout, Burbot, and Northern Pikeminnow (*Ptychocheilus oregonensis*) also were identified as potential predators of juvenile salmon, but with a lower relative predation risk.

Competition Risk: In the Risk and Donor Stock Assessment, Hardiman et al. (2017) identified Redband Trout, kokanee, and triploid Rainbow Trout, as the primary competitors of reintroduced

salmonids. Competition for space likely would occur in tributary habitats, whereas competition for food is more likely to occur in reservoir habitats. In particular, competition between Redband Trout and reintroduced salmonids is more likely in tributary habitats, whereas competition between reintroduced salmonids and kokanee would occur in reservoir habitats. Sockeye Salmon are the only species that are likely to spend an entire year feeding in Lake Roosevelt, potentially competing with kokanee and Redband Trout for zooplankton. Other smolts and transient parr may feed for days to months while migrating through the reservoirs.

The release of adult salmon into the blocked area would add marine-derived nutrients to streams that have been deprived of this resource for many decades. Many studies have evaluated the benefits of salmon carcasses (or other nutrient sources) to stream and terrestrial ecosystems and, although detectable results can vary widely by study, it is generally accepted that salmon carcasses would increase localized productivity of invertebrates and benefit juvenile fish by providing more food (directly and indirectly)(Stockner 2003; Quinn 2005). Releasing pre-spawn adult salmon and allowing some of them to escape fisheries would therefore reduce competition compared to a strategy that only released juveniles or harvested most/all of the adults that are released.

Adult salmon would spawn in pool tailouts, gravel riffles and portions of glides. When salmon spawn they create a redd (nest) by digging into the gravel to create a pit with a mound downstream. This sorts the gravels and creates temporary hydraulic roughness. In general, a less homogenous streambed and more dynamic hydraulics are good for aquatic organisms, particularly in stream channels that have a history of effects from roads, diking, irrigation withdrawals, fire suppression, and other anthropogenic activities.

Utilizing hatchery transport trucks and equipment from other areas poses a risk, however small, of introducing aquatic invasive species and spreading pathogens. Invasive species that may be of concern include invertebrates such as: Siberian prawn, *Exopalaemon modestus*; the estuarine mysid, *Neomysis mercedis*; the calanoid copepod, *Pseudodiaptomus forebesi*; Asian clam, *Corbicula fluminea*; the amphipod, *Corophium* spp.; and quagga and zebra mussels (USGS 2017). Potential invasive aquatic flora such as milfoil and flowering rush are a risk as well. Infestations of invasive species can affect resident fish populations. Protocols should include efforts to prevent, minimize, and decontaminate particularly when utilizing equipment between water bodies (WDFW 2012).

Mitigation for Fish and Wildlife

The following mitigation efforts are requested by the Fish and Wildlife department for any alternative that is chosen and implemented.

- Utilize best practices to prevent or minimize the spread of aquatic invasive species.
- Monitoring to identify potential conflicts and risks reintroduced salmonids may pose to resident fish.
- Develop predictive models to estimate nutrient flux related to reintroduction of anadromous salmonids in Lake Roosevelt.
- Quantify zooplankton production in the reservoirs to identify potential consumptive demands to existing food webs to accommodate anadromy.

Range Management

Impacts to Range Resources Alternative A: No Action

The "no action" alternative would have no impact on range resources within the project area.

Impacts to Range Resources for Alternative B: Proposed Action

There are potentially negative impacts to rangeland resources when considering this reintroduction proposal. With this reintroduction the salmon are planned to return to "native environment" to reproduce their offspring and by that the Range Program believes there is a high potential for salmon to utilize the tributary streams that fall within range units.

According to the Shoreline Management code salmon spawning habitat is considered a "sensitive area." If the salmon establish themselves in these tributary streams, then more mitigation and precautions would have to occur, including the installation of livestock exclusion fences and/or removal of livestock from the range units. With the installation of livestock exclusion fences, cattle would be offered less available areas to drink. This would lead to a larger disturbance in the areas still available, leading to more concentrated streambank degradation. If livestock were to be removed because of this project, the possibility for increased and/or higher intensity fires is more likely to occur. Livestock can be used as a tool for fire suppression. Livestock graze the understory of timbered areas and reduce the fuel load, which decreases the speed of fire spread through the underbrush. With no livestock on the range units where these sensitive areas are located, uncontrolled growth of the understory would take place, leading to higher intensity and more frequent burning on the Colville Reservation. Many Tribal members also feed their livestock using the forage on these range units. Most Tribal members raise livestock as a means of extra income; however some Tribal members rely on cattle as a way of supporting their families. Range land forage is a cheap source of feed for Tribal members livestock, costing them only $1.20 per AUM to run on range, as opposed to supplemental feeding which can cost a person up to $200 per round bale of hay.

Mitigation for Range Resources

The CCT Fish and Wildlife and Range Program would need to work together to monitor the success rate and locations of the salmon spawning to plan for future mitigations if necessary. They would also need discuss the responsibility of maintenance of the livestock exclusion fences should a range unit containing those fences become vacant.

The Range Program is working with Natural Resources Conservation Services (NRCS) to apply for Environmental Quality Incentive Program (EQIP) funds to develop alternative watering locations along with 4-strand barbed wire fence to keep livestock out of riparian zones. Also, the program is continuing to acquire additional funding from available federal funds to improve the infrastructure of fences, watering developments, weed control and cattle guards for our Best Management Practices (BMP's) on the Colville Reservation. These actions are outlined in the Colville Confederated Tribes (CCT) Range Management Plan.

4.5 Cultural Resources

Impacts to Cultural Resources Alternative A: No Action

Although there may be a number of direct and indirect effects to the Reservation's resources from the implementation of Alternative A, it is important to recognize that cultural resources are, for the most part, non-renewable resources. The 'No Action' alternative would have the same ongoing impacts currently documented, including wind and water erosion and site looting to the extant cultural resources identified within the project area.

Potential impacts of Alternative A include the continuation of erosion of archaeological resources caused by daily reservoir operations. The 'No Action' alternative would also perpetuate the disconnect of tribal members from their traditional fishing practices and grounds, resulting from the construction of Grand Coulee Dam and subsequently the Chief Joseph Dam without any fish passage devices.

Impacts to Cultural Resources Alternative B: Proposed Action

There are approximately 1,520 known cultural resources, including four archaeological districts, recorded along both the Rufus Woods Lake and Lake Roosevelt Reservoirs. An official determination of National or Colville Register eligibility for some of these sites has been made and some of them are considered eligible.

All of the 1,520 known sites fall within the APE of this project; however it is not known whether some or all of them would be adversely affected. Reservoir elevation, the dynamic underwater environment, and the timing of spawning activities would predicate where the effects to archaeological sites and TCPs may be observed. Sites located at the "current" mouths of creeks and rivers, as well as gravelly areas located near the shores of both reservoirs are the most vulnerable to adverse effect caused by spawning activities. It is important to note, that the current full-pool water line of both reservoirs is much higher than they historically were, and as such now-inundated archaeological sites, along the pre-dam banks of the Columbia River, may be the most desirable locations for salmon spawning. Spawning activities may cause adverse effects to archaeological sites within the reservoirs. Mitigations should be considered to offset these impacts.

Alternative B could also make the possibility of traditional fisheries viable once more. There are many TCPs located along both reservoirs that were utilized as salmon fishing locations and their associated camps. This outcome of the proposed project could be considered a cultural positive, allowing tribal members to fish in their traditional places once more, as well as participate in the associated ceremonies.

An official determination of National or Colville Register eligibility for some of these sites has been made and some of them are considered eligible. The 'Proposed Action' would result in adverse effects to some of these sites, although the suggested mitigation measures could offset the impacts to sites by creating tribal benefits.

Mitigation for Cultural Resources

Possible mitigation measures could include annual monitoring during reservoir drawdowns, in conjunction with Fish &Wildlife, to assess where and how much damage has occurred to archaeological sites as a result of spawning. If damage is severe, salvage of impacted archaeological features should be considered. Additional mitigation options could include projects and activities that would directly benefit tribal members and salmon fishing activities. For example, installation of fish processing stations at fishery locations, educational classes on how to create or use traditional fishing methods, such as basket traps, weirs, and nets, and tribally organized and funded fishing opportunities. Any mitigation activity should allow for the benefit of tribal members and the continuation of cultural practices

It would be further recommended for the Fish & Wildlife staff, as well as other tribal employees, who may be working on this project to attend Cultural Resource Technician training, provided

by the History/Archaeology Program, so they can more accurately identify cultural resources they may encounter while working on this project.

The Resource Archaeologist would brief the employees working in the Reintroduction of Salmon Project area regarding the steps to be taken to identify and report cultural resources. If resources are found, the supervisor shall ensure that all work stops in the vicinity of the find, that steps are taken to protect the find, and that the Tribal Archaeologist is called immediately. No work shall resume until the Tribal Historic Preservation Officer (THPO) has approved a management plan.

4.6 Socioeconomic Conditions

Impacts to Socioeconomic Conditions Alternative A: No Action

The no action alternative would have no impact to the socioeconomic conditions of the population of the Colville Indian Reservation.

Impacts to Socioeconomic Conditions Alternative B: Proposed Action

The scale of this project would not have a noticeable impact.

4.7 Resource Use Patterns

Impacts to Resource Use Patterns Alternative A: No Action

The no action alternative would not change the resource use patterns in the project area.

Impacts to Resource Use Patterns Alternative B: Proposed Action

This alternative would provide opportunity harvest opportunity for tribal members in areas that have been blocked from salmon since the construction of Grand Coulee and Chief Joseph dams. Important historical fishing sites could be restored at Nespelem Falls, the Sanpoil River, Kettle Falls, Kettle River, Hall Creek and many other small tributaries.

These fish would be released into waters that are co-managed by the State of Washington and so a portion of them may be harvested by state anglers.

5.0 List of Preparers

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7.0 Technical Supplements

7.1 Cultural Resources

The Reintroduction of Salmon above Chief Joseph and Grand Coulee Dam would affect the ancestral lands of the Okanogan, Nespelem, Colville, Sanpoil, and Lakes Tribes, who trace their ancestry in this area since time immemorial. The languages of the twelve tribes comprising the Confederated Tribes of the Colville Reservation have been grouped into general Salishan and Sahaptian language families. The majority of the Tribes speak the Interior Salish languages of nxaʔamcín and nsləxcín, while the Sahaptian language is spoken by the Nez Perce (nímípuʔ) and Palus (palús). The language of the Okanogan, Nespelem, Colville, Sanpoil, and Lakes Tribes is nsləxcín.

All TCPs and archaeological sites must meet at least one of the following criteria, and retain integrity, to be considered eligible for nomination and listing on the National Register of Historic Places: A) they must be associated with events that have made a significant contribution to the broad patterns of history, B) they must be associated with the lives of persons significant to our past, C) they must embody the distinctive characteristics of a type, period, or method of construction or they represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction, or D) they must have yielded, or be likely to yield, information important in prehistory or history. Additionally, to be a “property” a TCP must have tangible boundaries (36 CFR 60.4; Parker & King 1998).

Shannon and Moura (2007) have aptly observed that due to the unique nature of TCPs, the standards identified above must also be evaluated with perception of Native American history. When reviewing TCPs for continued use of at least 50 years, for instance, it must be recalled that federal and state policies common in the 1800s restricted, regulated and denied access to property to Tribal people which had previously been in their exclusive territory. Oftentimes, Indian people may shift their area of use to adjacent or nearby location if a previously utilized property suddenly (and beyond Tribal control) became unavailable. Therefore, a location may still retain value and continue to be a TCP when access is restored (Shannon & Moura 2007).

In precontact and historic times, the knowledge of these TCPs and their locations and use provided people with a means for subsistence and important cultural items for personal use or trade, cultural practices which continue to this day. Additionally, the nature of these sites and their close proximity to other documented cultural resources, including precontact, historic and additional TCP sites, increases their potential to yield information important to the CCT.

It is the position of the CCT that "A place is significant due to its location and the meaning assigned to it, not the language of the name by which it is known. While recording place names in the original languages is of immeasurable value, the places would continue to have meaning and significance regardless of the language used to describe them (George 2011)."

7.2 Fish and Wildlife Resources

Fish and Wildlife Species

Tribal Priority Wildlife Species			
Name	Priority Habitats	State	Fed.
Herpetiles			
Columbia Spotted Frog *Rana luteiventris*	Wetlands, wet meadows, springs and seeps	C	
Northern Leopard Frog *Rana pipiens*	Wetlands, wet meadows, springs and seeps	E	
Sagebrush Lizard *Sceloporus graciosus*	Shrub-steppe	C	
Short horned lizard *Phrynosoma douglasii*	Shrub-steppe	M	
Tiger salamander *Ambystoma tigrinum*	Wetlands, wet meadows, springs and seeps, shrub-steppe	SM	
Western Painted Turtle *Chrysemys picta*	Deep watered ponds and lakes, wetlands, wet meadows, springs and seeps		
Western rattlesnake *Crotalus viridis*	Shrub-steppe		
Western Toad *Bufo boreas*	Wetlands, wet meadows, springs and seeps, Douglas fir series	C	
Birds			
American white pelican *Sceloporus graciosus*	Deep watered ponds and lakes	E	

Bald eagle *Haliaeetus leucocephalus*	Deep watered ponds and lakes, mature forest/late successional (old growth)	S	FCo
Belted kingfisher *Megaceryle alcyon*	Instream, riparian		
Black capped chickadee *Poecile atricapillus*	Douglas fir series, snags and logs		
Black tern *Chlidonias niger*	wetlands, wet meadows, springs and seeps, deep watered ponds and lakes	SM	
Black-backed woodpecker *Picoides arcticus*	Snags and logs	C	
Blue grouse *Dendragapus obscurus*	Shrub-steppe		
Burrowing owl *Athene cunicularia*	Shrub-steppe	C	
Columbian Sharp-tailed Grouse *Tympanuchus phasianellus*	Shrub-steppe	T	
Common loon *Gavia immer*	Deep watered ponds and lakes	S	

Tribal Priority Wildlife Species			
Name	Priority Habitats	State	Fed.
Ferruginous hawk *Buteo regalis*	Shrub-steppe	T	
Flammulated owl *Otus flammeolus*	Eastside dry mixed conifer forests	C	
Golden eagle *Aquila chrysaetos*	Cliffs	C	
Great blue heron *Ardea herodias*	Deep watered ponds and lakes	SM	
Great gray owl *Strix nebulosa*	Mature forest/late successional (old growth)	M	
Greater Sage-grouse *Centrocercus urophasianus*	Shrub-steppe	T	C
Killdeer *Charadrius vociferus*	Dry uplands, fields, meadows and wetlands		
Lewis' Woodpecker *Melanerpes lewis*	Snags and logs	C	
Loggerhead shrike *Lanius ludovicianus*	Shrub-steppe	C	
Northern goshawk *Accipiter gentilis*	Mature forest/late successional (old growth)	C	

Osprey *Pandion haliaetus*	Deep watered ponds and lakes	SM	
Peregrine falcon *Falco peregrinus*	Cliffs, deep water ponds and lakes	S	FCo
Pileated woodpecker *Dryocopus pileatus*	Snags and logs, mature forest/late successional (old growth)	C	
Prairie falcon *Falco mexicanus*	Cliffs, shrub-steppe	SM	
Pygmy nuthatch *Sitta pygmaea*	Ponderosa Pine Series (old growth), snags and logs	SM	
Ruffed grouse *Bonasa umbellus*	Douglas fir series, aspen stands		
Sagbrush sparrow *Artemisiospiza nevadensis*	Shrub-steppe	C	
Sage thrasher *Oreoscoptes montanus*	Shrub-steppe	C	
Sandhill crane *Grus canadensis*	Eastside steppe, wetlands, wet meadows, springs and seeps	E	
Tribal Priority Wildlife Species			
Name	Priority Habitats	State	Fed.
Vaux's swift *Chaetura vauxi*	Mature forest/late successional (old growth)	C	
Western bluebird *Sialia mexicana*	Shrub-steppe, snags and logs	SM	
White-headed woodpecker *Picoides albolarvatus*	Ponderosa Pine Series, snags and logs	C	
Mammals			
American Badger *Taxidea taxus*	Shrub-steppe. eastside steppe	SM	
Beaver *Castor canadensis*	Riparian, deep water ponds and lakes		
Black Bear *Ursus americanus*	Shrub-steppe, subalpine fir series		
Bobcat *Lynx rufus*	Ponderosa pine series, subalpine fir series		
California Bighorn Sheep *Ovis canadensis*	Shrub-steppe		
Cascade red fox Vulpes vulpes	Douglas fir series	C	
Cougar *Puma concolor*	Ponderosa pine series		
Coyote Canus latrans	Shrub-steppe		

Fisher *Martes pennanti*	Mature forest/late successional (old growth)	E	C
Gray wolf *Canis lupus*	Big game winter range	E	E
Grizzly bear Ursus arctos	Douglas fir series	E	T
Lynx *Lynx canadensis*	Subalpine fir series	T	T
Mink *Neovison vison*	Deep watered ponds and lakes		
Moose *Alces alces*	Wetlands, wet meadows, springs and seeps		
Mule Deer *Odocoileus hemionus*	Shrub-steppe		
Pine Marten *Martes americana*	Mature forest/late successional (old growth)		

Tribal Priority Wildlife Species			
Name	Priority Habitats	State	Fed.
Preble's shrew *Sorex preblei*	Snags and logs	C	
River Otter *Lontra canadensis*	Instream		
Rocky Mountain Elk *Cervus elaphus*	Eastside steppe		
Snowshoe Hare *Lepus americanus*	Douglas fir series		
Townsend's big-eared bat *Corynorhinus townsendii*	Caves	C	
Washington ground squirrel *Urocitellus washingtoni*	Shrub-steppe	C	C
Weasel Spp. *Mustela*	Shrub-steppe, riparian		
Western gray squirrel *Sciurus griseus*	Conifer forest	T	
White-tailed jackrabbit *Lepus townsendii*	Shrub-steppe. eastside steppe	C	
Wolverine *Gulo gulo*	Subalpine fir series	C	
Source: Colville Tribes Fish and Wildlife Department *Source: Washington State Department of Fish and Wildlife* *U. S. Fish and Wildlife Service*			

State C = Candidate SM = State Monitored SE = State Endangered T = Threatened S = Sensitive
Federal E = Endangered T = Threatened C = Candidate FCo = Federal Species of Concern

Fish Species Present on the Colville Reservation	
Native Species	
Chinook salmon: Summer/Fall run	*Oncorhynchus tshawytscha*
Chinook salmon: Upper Columbia River Spring Run	*Oncorhynchus tshawytscha*
Sockeye salmon	*Oncorhynchus nerka*
Steelhead - Anadromous (Rainbow Trout)	*Oncorhynchus mykiss*
White sturgeon	*Acipenser transmontanus*
Redband trout – Non-anadromous	*Oncorhynchus mykiss gairdnerii*
Sockeye - landlocked (kokanee)	*Oncorhynchus nerka*
Mountain whitefish	*Prosopium williamsoni*
Westslope cutthroat trout*	*Oncorhynchus clarki lewisi*
Pacific lamprey	*Entosphenus tridentatus*
Brook lamprey	*Lampetra planeri*
Burbot	*Lota lota*
Chiselmouth	*Acrocheilus alutaceus*
Peamouth	*Mylocheilus caurinus*
Northern pikeminnow	*Ptychocheilus oregonensis*
Longnose dace	*Rhinichthys cataractae*
Speckled dace	*Rhinichthys osculus*
Redside shiner	*Richardsonius balteatus*
Longnose sucker	*Catostomus catostomus*
Bridgelip sucker	*Catostomus columbianus*
Largescale sucker	*Catostomus macrocheilus*
Prickly sculpin	*Cottus asper*
Mottled sculpin	*Cottus bairdii*
Slimy sculpin	*Cottus cognatus*
Shorthead sculpin	*Cottus confusus*
Torrent sculpin	*Cottus hubbsi*
*Source: Colville Tribes Department of Fish and Wildlife. *-A 2010 genetic analysis of Westslope cutthroats in Wells, Gibson, Cook and Olds creeks indicates possible native stock*	

Fish Species Present on the Colville Reservation	
Non-Native Species	
Rainbow trout (Coastal)	*Oncorhynchus mykiss irideus*
Carp	*Cyprinus carpio*
Tench	*Tinca tinca*

Brown bullhead	*Ameiurus nebulosus*
Black bullhead	*Ameiurus melas*
Yellow bullhead	*Ameiurus natalis*
Channel catfish	*Ictalurus punctatus*
Lake whitefish	*Coregonus clupeaformis*
Lake trout	*Salvelinus namaycush*
Lahontan cutthroat trout	*Oncorhynchus clarkii henshawi*
Northern pike	*Esox Lucius*
Fathead minnow	*Pimephales promelas*
Brown trout	*Salmo trutta*
Brook trout	*Salvelinus fontinalis*
Pumpkinseed	*Lepomis macrochirus*
Bluegill	*Lepomis gibbosus*
Smallmouth bass	*Micropterus dolomieu*
Largemouth bass	*Micropterus salmoides*
Black crappie	*Pomoxis nigromaculatus*
Green sunfish	*Lepomis cyanellus*
Yellow perch	*Perca flavescens*
Walleye	*Sander vitreus*
Three spine stickle back	*Gasterosteus aculeatus*
Golden shiner	*Notemigonus crysoleucas*

Fish Species That Are Rare or Unlikely to Occur on the Reservation		
Goldfish	*Carassius auratus*	Non Native
Leopard dace	*Rhinichthys falcatus*	Native
Pygmy whitefish	*Prosopium coulterii*	Native*
Lake chub	*Couesius plumbeus*	Native
Bull trout	*Salvelinus confluentus*	Native
**-Extirpated*		