4 Inventory of Existing Activities

4.1 Introduction, Purpose, and Scope

The information presented in this section is specifically designed to provide context for subbasin planners and to reduce or eliminate duplication of efforts between parties. The tables attempt to categorize project types and geographic areas as well as identify project sponsors. To a degree, this information can be viewed as a snapshot of what is happening on the ground at this time for fish and wildlife protection and restoration. However, it does not depict the full range of actions that have been recommended in the Province even as "high priority actions." This situation is especially prevalent in the Columbia Cascade Province, especially when viewed within the context of population status, past losses and mitigation history, and, when compared to implementation levels in other Provinces.

To provide a regional context for this subbasin plan, Electronic Appendix L provides summarized information for the Columbia Cascade and for the Methow subbasin. This information details an accounting of what project categories and funding levels have been recommended by the basin technical teams, fish and wildlife managers, the ISRP, the CBFWA and the NPPC. The results depict what BPA has actually funded in the 2001-2003 period.

Inventory of existing activities is a key element of the subbasin plans. The following section summarizes agency program, management, and regulatory activities which represent each agency's role in the management of the subbasin. In addition, an inventory of projects follows in Appendix D. This inventory is designed to be compared with the needs of fish and wildlife identified in this plan's Assessment.

Federal and state agencies, local Counties, tribal groups, and public interest groups all manage, regulate, or otherwise are involved in land and water usage within their respective jurisdictions. For the most part, these governing bodies and stakeholders have policies and guidelines to control the demands placed upon the watershed, and their mandates include the management of natural resources for society while maintaining a level of protection of water, land, fish, and wildlife resources.

This subbasin plan's inventory of projects includes projects from the last 10 years. An extensive effort, through multiple planning processes, has occurred to develop this inventory of projects; however, the list is not all-inclusive. Furthermore, not all other planning processes have required the level of information that is required by NPCC. Given the timeframe and funding level, the subbasin planners could not provide all of the information that was suggested in the Technical Guide for Subbasin Planners (Council Document 2001-20). This included: identifying the limiting factors or ecological processes the activity is designed to address; summarizing accomplishments/failures of the activity; and identifying the relationship to other activities in the subbasin. Furthermore, subbasin planners were not able to identify gaps between actions that have already been taken or are underway and additional actions that are needed.

4.1.1 Purpose and Scope

Programs and projects in the subbasin relating to fish and wildlife are primarily directed at rebuilding or maintaining anadromous and resident fish and wildlife habitat that is vulnerable to many direct and indirect impacts within the basin; many of these impacts and their resolution

have cross-border implications. Such impacts include hydroelectric facilities and their operations, water consumption, water management, urban development, infrastructure, agriculture, forestry, water quality, ground disturbances, outright habitat loss, and introduced species.

4.2 Programmatic Actions

A number of programs are available that provide project resources to address offsite mitigation for salmon entrainment in downstream dams, as well as programs to address Endangered species recovery and clean water management.

Many agencies and entities share responsibility for management and protection of fish and wildlife populations and habitats in the Methow subbasin. Roughly 80% of land within the subbasin is owned and managed by the federal government. In addition to federal management, state, county, and tribal regulations and policies guide management activities within the subbasin. Regional coordination efforts and management goals also play vital roles in guiding local management response to specific fish, wildlife and habitat issues, including species-specific recovery plans.

4.3 Projects Summary by Assessment Unit (AU)

Existing and past project efforts in the Methow subbasin span a broad range of habitat restoration work, education and awareness, improvements to irrigation systems, etc., and represent largely cooperative efforts of various combinations of local government, private organizations, private citizens, tribes and state agencies.

The greatest proportion of project effort was dedicated to fish habitat restoration and wildlife projects, followed by fish supplementation and assessment. Aside from the limited project activity directed at habitat procurement, the least project investment was dedicated to research and monitoring.

Click here for a summary of projects in Appendix D.

4.4 Current Management Activities

4.4.1 Federal Agencies and Programs

USDA Forest Service (USFS)

The Forest Service has evolved into a 30,000 employee agency that manages the national forests for a number of multiple uses, including recreation, timber, wilderness, minerals, water, grazing, fish, and wildlife. The history of the agency is long and remarkable. Over the last century, the Forest Service has initiated numerous, innovative products and procedures, as well as led the country and the world in scientific forestry matters.

The USDA Forest Service is a major landowner and land manager in the Methow subbasin, and conducts a broad range of monitoring and evaluation projects in the subbasin, as well as issuing and managing special use permits, conducting biological assessments, issuing biological opinions and participating in many planning and management efforts.

Bonneville Power Administration (BPA)

The BPA is a federal agency established to market power produced by the federal dams in the Columbia River basin. The BPA provides funding for fish and wildlife protection and enhancement to mitigate for the loss of habitat resulting from hydroelectric construction and operations.

USDA Bureau of Land Management

The Bureau of Land Management (BLM), an agency within the U.S. Department of the Interior, administers 261 million surface acres of America's public lands, located primarily in 12 western States. The BLM sustains the health, diversity, and productivity of the public lands for the use and enjoyment of present and future generations.

BLM manages 17,707,693 acres of public lands in Oregon and 399,950 acres of public lands in Washington. BLM also has subsurface responsibilities for an additional 23.4 million acres in Oregon and about 16.5 million acres in Washington. From the forests of western Oregon to the rangelands in eastern Oregon and Washington, BLM uses a multiple-use approach to managing public lands. BLM manages for wildlife, recreation, timber harvest, livestock grazing, mineral extraction and other public uses.

US Fish and Wildlife Service

Partner's for Fish and Wildlife Program

Partner's for Fish and Wildlife is a federal cost-share program to implement voluntary on-the-ground habitat improvement projects on private lands for the benefit of Federal trust species and the landowner. The program is run by the U.S. Fish and Wildlife Service who provides financial and technical assistance.

Fish Restoration and Irrigation Mitigation Act of 2000 (FRIMA)

FRIMA is a federal cost-share program to implement voluntary fish screening and fish passage at water withdrawal projects in Washington, Idaho, Oregon, and western Montana. The program is implemented by the U.S. Fish and Wildlife Service in cooperation with State and Tribal partners within the north western U.S.

US Army Corps of Engineers

Section 10 Permit - Work in Navigable Waters

A Corps (Army Corps of Engineers) permit is required when locating a structure, excavating, or discharging dredged or fill material in waters of the United States, or transporting dredged material for the purpose of dumping it into ocean waters. Typical projects requiring these permits include the construction and maintenance of piers, wharfs, dolphins, breakwaters, bulkheads, groins, jetties, mooring buoys, and boat ramps.

Not every activity, however, requires a separate, individual permit application. Certain activities and work can be authorized by letters-of-permission, nation-wide permits, or regional permits. Some activities authorized by these permits are permitted in advance. Typically, little or no paperwork is required, and consequently, permitting time is reduced. Prior to submitting an

application, applicants can contact the District Engineer's office to receive current information about the type of permit required.

Activity which requires a permit: Locating a structure, excavating, or discharging dredged or fill material in waters of the United States, or transporting dredged material for the purpose of dumping it into ocean waters. Fees are variable.

For 404 permits, the Corps has developed Nation-wide permits to streamline the process for specific activities. The Corps reviews a proposed project to determine if an individual 404 permit is required, or if the project can be authorized under a Nationwide permit. The Nationwide permits also need 401 certification from Ecology. Ecology (Department of Ecology) has already approved, denied, or partially denied specific Nationwide permits.

Applicants receiving a section 404 permit from the Army Corp of Engineers, a Coast Guard permit, or a license from the Federal Energy Regulatory Commission (FERC) are required to obtain a section 401 water quality certification from the Department of Ecology. Issuance of a certification means that the Ecology anticipates that the applicant’s project will comply with state water quality standards and other aquatic resource protection requirements under Ecology's authority. The 401 certification can cover both the construction and operation of the proposed project. Conditions of the 401 certification become conditions of the federal permit or license.

Statewide Contact:

U.S. Army Corps of Engineers, Seattle District Regulatory Branch, PO Box 3755, Seattle, WA98124-2255. Telephone: (206) 764-3495 Fax: (206) 764-6602

* Permit information last updated 10/1/1998.

401 Water Quality Certification (DOE)

If approved, no further 401 certification review by Ecology is required. If partially denied without prejudice, an individual certification or Letter of Verification from Ecology is required. If denied without prejudice, an individual certification is required for all activities under that nation-wide permit.

Activity which requires the permit: Applying for a federal permit or license to conduct any activity that might result in a discharge of dredge or fill material into water or non-isolated wetlands or excavation in water or non-isolated wetlands.

Fees: No fee for certification

Online Application: The application for an individual permit, called the Joint Aquatic Resources Permit Application Form (JARPA), is online and can be downloaded at http://www.ecy.wa.gov/programs/sea/pac/jarpa.html

Application Requirements (if applicable to the project): Mitigation plans, Operation and maintenance plans, Stormwater site plans and Restoration plans.

Permit Dependencies: In most cases, State Environmental Policy Act (SEPA) compliance is needed. If you live within any of Washington's 15 coastal counties, then you may need a Coastal Zone Consistency Determination (CZM).

Permit Time Frame: Individual 401s: Minimum twenty-day public notice; up to one year to approve, condition, or deny; usually less than three months, see notes/comments. Nationwide permits that have been partially denied may take a few days or weeks after receipt of the JARPA and a letter from the Corps issuing a Letter of Verification (LOV). LOV: Usually takes 30 days, but can take up to 180 days.

Permit Review Process: Review is conducted in Shoreline and Environmental Assistance within each regional office (except dredging and WSDOT projects which are done at Ecology's Headquarters). Regional staff review the applications for completeness, and send out a letter or call if additional information is needed. Once the application is considered complete, the regional staff starts reviewing the project to recommend approval or denial. Modifications to plans submitted may be required. A site visit maybe also be required as part of the process.

Permit Duration: 401 certification becomes part of the federal permit or license. The duration of the 401 certification would be in effect for the same time period as the permit or license, however Ecology issues 401 certifications as 90.48 administrative orders, so they may have conditions that apply to the project longer than the federal permit or license.

Permit Appeal Information: Appealable to Pollution Control Hearings Board (P.C.H.B.) within thirty days of Ecology's decision. P.C.H.B. may not hear case for six or more months.

Notes / Comments: If an applicant receives a nation-wide permit and Ecology issues a LOV, there is no public notice requirement under 401 certification for that specific project. If the applicant receives a nation-wide permit but is required to obtain an individual 401 Certification, public notice is required.

Legal Authority:

- Chapter 173-201A State Water Quality Rule WAC
- Chapter 173-225 Federal Clean Water Act, Section 401 WAC
- Chapter 90.48 State Water Quality Law RCW
- Statewide Contact: Department of Ecology, 300 Desmond Drive, Lacey, WA98503. Telephone: (360) 407-6000

* Permit information last updated 10/23/2003.

Section 404 Permit - Discharge of Dredge and Fill Material

A Corps permit is required when locating a structure, excavating, or discharging dredged or fill material in waters of the United States or transporting dredged material for the purpose of dumping it into ocean waters. Typical projects requiring these permits include the construction and maintenance of piers, wharfs, dolphins, breakwaters, bulkheads, groins, jetties, mooring buoys, and boat ramps.

However, not every activity requires a separate, individual permit application. Certain activities and work can be authorized by letters-of- permission, nation-wide permits, or regional permits. Some activities authorized by these permits are permitted in advance. Typically, little or no paperwork is required, and consequently. permitting time is reduced. Prior to submitting an

application, applicants can contact the District Engineer's office to receive current information about the type of permit required.

Activity which requires the permit: Locating a structure, excavating, or discharging dredged or fill material in waters of the United States, or transporting dredged material for the purpose of dumping it into ocean waters.

Fees: Variable

Statewide Contact: U.S. Army Corps of Engineers, Seattle District Regulatory Branch. PO Box 3755, Seattle, WA98124-2255. Telephone: (206) 764-3495. Fax: (206) 764-6602

* Permit information last updated 10/1/1998.

ESA Permits

Section 7

The Endangered Species Act (ESA) has a broader mandate than simply directing the FWS and NOAA Fisheries to protect listed fish, animals and plants. It directs all federal agencies to participate in Endangered species conservation. Under section 7 of the ESA, federal agencies are required to consult with FWS and NOAA Fisheries to ensure that actions they fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species, nor adversely modify designated critical habitats. For further information regarding consultation see http://endangered.fws.gov/consultation.

FWS, Central Washington Field Office 215 Melody Lane. Suite 119, Wenatchee WA 98801. Telephone: (509) 665-3508.

NOAA Fisheries, 304 S. Water Street, #201, Ellensburg, WA 98926. Telephone (509) 962-8911

Section 10 : Habitat Conservation Plans

In 1982, the U.S. congress amended Section 10 of the ESA to authorize “incidental take” through the development and implementation of Habitat Conservation Plans (HCP). An incidental take permit allows property owners, state or county entities to conduct otherwise lawful activies in the presence of listed species. A non-federal entity develops an HCP in order to apply for an incidental take permit under Section 10(a)(1)(B) of the ESA. The HCP integrates the applicant’s proposed project or activity with the needs of the species. It describes, among other things, the anticipated effect of a proposed taking on the affected species, and how that take will be minimized and mitigated. Such information must be submitted with any incidental take permit. For more information regarding HCPs, see http://endangered.fws.gov/hcp/

FWS, Central Washington Field Office 215 Melody Lane. Suite 119, Wenatchee WA 98801. Telephone: (509) 665-3508.

NOAA Fisheries, 304 S. Water Street, #201, Ellensburg, WA 98926. Telephone (509) 962-8911

Natural Resource Conservation Service (NRCS)

One of the purposes of the NRCS is to provide consistent technical assistance to private land users, tribes, communities, government agencies, and conservation districts. The NRCS assists in developing conservation plans, provides technical field-based assistance, including project design, and encourages the implementation of conservation practices to improve water quality and fisheries habitat. Programs include the CRP, River Basin Studies, Forestry Incentive Program, Wildlife Habitat Improvement Program, the Environmental Quality Incentives Program, and Wetlands Reserve Program. The USDA Farm Services Administration (FSA) and the NRCS administer and implement the federal CRP and Continuous CRP.

Conservation Reserve Program (CRP)

The enrollment of agricultural land, with a previous cropping history, into CRP has removed highly erodible land from commodity production. The land is converted into permanent herbaceous or woody vegetation to reduce soil and water erosion. Conservation Reserve Program contracts are for a maximum of 10 years per sign-up period (the contracts may be extended) and have resulted in an increase in wildlife habitat. Cover Practices (CP) that occur under CRP include planting introduced or native grasses, wildlife cover, conifers, filter strips, grassed waterways, riparian forest buffers, and field windbreaks.

Conservation Reserve Program contract approval is based, in part, on the types of vegetation landowners are willing to plant. Cover Practice planting combinations are assigned points, based on the potential value to wildlife. For example, cover types more beneficial to wildlife are awarded higher scores. Seed mixes containing diverse native species generally receive the highest scores (FSA 2003).

There are currently an estimated 4,064 acres enrolled in CRP in Okanogan County. Conservation Reserve Program and associated cover practices that emphasize wildlife habitat increase the extent of shrubsteppe habitat, provide connectivity/corridors between extant native shrubsteppe and other habitat types, reduce habitat fragmentation, contribute towards control of noxious weeds, increase landscape habitat diversity and edge effect, reduce soil erosion and stream sedimentation, and provide habitat for a myriad of wildlife species.

Continuous Conservation Reserve Program (CCRP)

The CCRP focuses on the improvement of water quality and riparian areas. Practices include shallow water areas with associated wetland and upland wildlife habitat, riparian forest buffers, filter strips, grassed waterways and field windbreaks. Enrollment for these practices is not limited to highly erodible land, as is required for the CRP, and carries a longer contract period (10-15 years), higher installation reimbursement rate, and higher annual annuity rate.

Conservation Reserve Enhancement Program (CREP)

The CREP, established in 1998, is a partnership between USDA and the State of Washington, and is administered by FSA and the WCC. The CREP provides incentives to restore and improve salmon and steelhead habitat on private land. Program participation is voluntary. Under 10- or 15-year contracts, landowners remove fields from production, remove grazing, and plant trees and shrubs to stabilize stream banks.

The program' efforts also provide wildlife habitat, reduces sedimentation, shades stream corridors, and improves riparian wetland function. Landowners receive annual rent, incentive and maintenance payments, and cost share for practice installations. Payments made by FSA and WCC, can result in no cost to the landowner for participation. Both the CRP and CREP utilize herbaceous seedings, shrubs, and trees to accomplish conservation measures that provide short-term high protection for wildlife habitats. It is unknown how many acres in the subbasin are protected by CREP.

Wildlife Habitat Incentive Program (WHIP)

The WHIP is administered and implemented by NRCS, and provides financial incentives to develop wildlife habitat on private lands; participants agree to implement a wildlife habitat development plan and NRCS agrees to provide cost-share assistance for the initial implementation of wildlife habitat development practices. The NRCS and program participants enter into a cost-share agreement for wildlife habitat development; this agreement generally lasts a minimum of 10 years. It is unknown how many acres in the subbasin are protected by WHIP.

Environmental Quality Incentives Program (EQIP)

The EQIP is administered and implemented by the NRCS and provides technical, educational, and financial assistance to eligible farmers and ranchers to address soil, water, and related natural resource concerns on their lands in an environmentally beneficial and cost-effective manner. The program assists farmers and ranchers with federal, state, and tribal environmental compliance, and encourages environmental stewardship. The program is funded through the Commodity Credit Corporation.

Program goals and objectives are achieved through the implementation of a conservation plan that incorporates structural, vegetative, and land management practices on eligible land. Eligible producers commit to 5- to 10-year contracts. Cost-share payments are paid for implementation of one or more eligible structural or vegetative practices, such as animal waste management facilities, terraces, filter strips, tree planting, and permanent wildlife habitat. Furthermore, incentive payments are made for implementation of one or more land management practices, such as nutrient management, pest management, and grazing land management. It is unknown how many acres in the subbasin are protected by EQIP.

Wetlands Reserve Program (WRP)

The WRP is also administered and implemented by the NRCS. This voluntary program is designed to restore wetlands. Participating landowners can establish permanent or 30-year conservation easements, or they can enter into restoration cost-share agreements where no easement is involved. In exchange for establishing a permanent easement, the landowner receives payment up to the agricultural value of the land, and 100% of the restoration costs for restoring the wetlands. The 30-year easement payment is 75% of what would be provided for a permanent easement on the same site, and 75% of the restoration cost. The voluntary agreements are a minimum of 10 years in duration, and provide for 75% of the cost of restoring the involved wetlands. Easements and restoration cost-share agreements establish wetland protection and restoration as the primary land use for the duration of the easement or agreement. It is unknown how many acres in the subbasin are protected by WRP.

The Public Law 566 Small Watershed Program (PL 566)

The Public Law 566 Small Watershed Program can be leveraged with other federal, state, or local program funds to provide wildlife and fisheries protection. Soil and water conservation districts using other project funding sources leverage NRCS program resources in combination to concentrate conservation within watersheds of concern.

Agricultural Community

Private landowners manage the vast majority of Ponderosa pine, shrubsteppe, and riparian wetland habitats in the subbasin. Many landowners protect, enhance, and maintain privately owned/controlled steppe communities and riparian habitats through active participation in the USDA's CRP and CREP programs.

Agriculturalists apply Best Management Practices (BMPs) to croplands to reduce the amount of soil leaving these areas. The BMPs include use of: upland sediment basins designed to catch sediment; terraces to direct runoff to sediment basins or grassed waterways and filter strips; strip cropping, and; direct seeding of crops reducing summer-fallow acres and reducing erosion by 95% on those acres. Landowners also control noxious weeds, which severely affect wildlife habitats and populations.

Tribes

Colville Tribes

On the western third of the Colville Reservation, 344,146 acres of tribal land fall within the Okanogan subbasin drainage. This massive tract of land, inclusive of both tribal, ceded, and traditional areas, supports viable breeding and/or migratory populations of state and Species of concern, and Threatened or Endangered species.

The Colville Tribes is leading an effort to document what species are still, or are now, occurring in the Upper Columbia River, including the Methow subbasin, to assess after the study period concludes for this area, which species are no longer detected, which are least abundant, and thus, potentially at risk, and to manage and partially mitigate using that information.

The Chief Joseph and Grand Coulee Dam hydroelectric projects forced the Colville Confederated Tribes (CCT) to rely largely on resident fish and wildlife resources. The ensuing decline in wildlife resources and native salmonid fish stocks significantly and negatively impacted the traditional subsistence lifestyle of Colville Tribal members. The extent of that impact to historical and current native wildlife species must be measured for fair partial mitigation and adequate management of the remaining resource for subsistence, cultural, and ceremonial use. The Bonneville Power Administration has committed to protecting native fish and wildlife habitat on the Colville Indian Reservation as a means of partially mitigating the impacts of the Columbia River Hydroelectric System.

Grand Coulee and Chief Joseph hydroelectric projects destroyed, essentially forever, in excess of 88,000 acres of critical low elevation wildlife habitat. This habitat was largely comprised of riverine, island, riparian, shrubsteppe, mixed and coniferous ecosystems that, being rich in biodiversity, supported a large number and abundance of wildlife species. Existing conditions throughout the region very likely preclude management entities from ever being able to fully mitigate these losses; however, many projects throughout the region, and on this reservation,

provide some partial mitigation leading toward the fulfillment of full mitigation for losses because of the dams and the subsequent and continuing habitat loss.

Yakama Nation

Yakama Nation is working towards restoring naturally spawning salmon populations in the Methow subbasin, including coho. Coho recovery programming is considered in the long-term vision for the Mid-Columbia coho ESU, and is described in the Mid-Columbia coho HGMP (Appendix K.). The Yakama Nation also conducted spawning ground surveys and smolt trapping in the Methow subbasin since approximately 1992.

Okanogan County

Lead Entity Strategy

Okanogan County and the Colville Confederated Tribes are co-leads, and thus, co-coordinators for the Okanogan County Lead Entity. Occurring since the creation of the Okanogan County Lead Entity in 1999, this co-coordination effort has proven to be mutually beneficial. A portion of the Colville Confederated Tribes reservation lands is within the boundaries of Water Resource Inventory Area 48: Methow subbasin.

The primary purpose of the Okanogan County Lead Entity Strategy is to provide specific and strategic guidance regarding the development of habitat protection and restoration projects primarily for the Salmon Recovery Funding Board's grant process, and for Okanogan County's related contractual work with the Washington State Department of Fish and Wildlife.

The lead entity strategy is a habitat protection and restoration action plan for the watershed(s) within the lead entity area. The strategy provides a step-wise approach to determining "how," "where" and "when" action is to be taken to restore and protect the habitat and watershed processes that are necessary to support salmon.

Many in the Upper Columbia region view the regional salmon recovery plan as the overall plan for salmon recovery, with the many other ongoing processes feeding directly into its appropriate sections. In the long-term, the Upper Columbia Combined Strategy will be directly derived from the applicable habitat portions of the regional recovery plan.

Consistent with the state Planning Enabling Act (RCW 35.63), each jurisdiction (the towns, the County, and the Colville Confederated Tribes) uses a Comprehensive Plan to guide future development and redevelopment, and a suite of land use regulations to implement the goals, objectives, policies, and recommendations in the land use element of its Comprehensive Plan. The following tools are being used in the Okanogan/Methow subbasin:

Zoning: Zoning is the most important tool for regulating land use. The basic purpose of zoning is to promote a jurisdiction's public health, safety, and welfare, and to assist in the implementation of the comprehensive plan. In a zoning ordinance, the jurisdiction is divided into zoning districts, with types of uses, permit requirements, and other land use regulations defined for each district. The most basic regulations pertain to: the height and bulk of buildings; the percentage of a lot which may be occupied and the size of required yards; population density; and the use of buildings and land for residential, commercial, industrial, and other purposes.

Subdivision: Subdivision regulations are intended to regulate the manner in which land may be divided and prepared for development. They apply whenever land is divided for purposes of sale, lease or transfer. State law specifies that any subdivision of land that results in the creation of a parcel of less than five acres in size must comply with state and local subdivision requirements. There are two basic forms of subdivision: long plats, which contain five or more lots, and; short plats, which contain four or fewer lots. Regulations pertaining to both types of subdivisions are adopted and enforced at the local level in accordance with provisions and statutory authority contained in state law. The regulations specify methods of subdivision procedures for the developer and the local government, minimum improvements (streets, utilities, etc.) to be provided by the developer, and design standards for streets, lots, and blocks. Subdivision regulations are intended to encourage the orderly development and redevelopment of large tracts in the planning area.

Planned Development: Planned development regulations are intended to provide an alternative method for land development that:

- Encourages flexibility in the design of land use activities so that they are conducive to a more creative approach to development, resulting in a more efficient, aesthetic, and environmentally responsive use of the land;
- Permits creativity in the design and placement of buildings, use of required open spaces, provision of on-site circulation facilities, off-street parking, and other site design elements that better utilize the potential of special features, such as geography, topography, vegetation, drainage, and property size and shape;
- Facilitates the provision of economical and adequate public improvements, such as, sewer, water, and streets. and;
- Minimizes and/or mitigates the impacts of development on valuable natural resources and unique natural features such as agricultural lands, steep slopes, and floodplain and shoreline areas.
- Planned development regulations may be incorporated into a jurisdiction's zoning ordinance, or developed as a separate ordinance. It is also possible for the City, County or tribes to use the planned development process for certain uses that, because of their nature, may be more appropriately reviewed under such regulations.

Planned developments are currently not permitted in the Methow basin because the DOE has placed a moratorium on community well permits.

Binding Site Plan: The binding site plan is a relatively new method for dividing property for commercial and industrial purposes, and in some cases for residential uses, such as manufactured home and recreational vehicle parks, where the individual parcels are not to be sold. This method for regulating development is intended to provide a flexible alternative to developers, and requires that a specific site plan be developed that shows the layout of streets and roads, and the location of utilities required to serve the property. The binding site plan is a legally enforceable document which, when required, can be amended to reflect changing conditions. The plan also must be reviewed to ensure that the cost of providing basic services, and the maintenance of those services, does not represent an unreasonable burden on residents of the planning area.

Shoreline Master Program (SMP): The SMP is, in effect, a special comprehensive plan and zoning ordinance for those areas falling under shoreline jurisdiction, as defined in the State Shoreline Management Act of 1971.

Uniform Building Code: The Uniform Building Code (UBC) is a uniform set of regulations used to regulate and enforce construction activities. The UBC may be used, in conjunction with other implementation tools, to ensure compliance and conformance with the comprehensive plan.

Flood Damage Prevention Ordinance: Flood Damage Prevention ordinances are required for jurisdictions that have areas subject to inundation by 100-year flood events. The purpose of this type of implementation tool is to ensure that new or substantially improved structures and fills are constructed in a manner that, not only will minimize flood damage to the structure, but also will minimize the potential for increasing the flood hazard on adjacent properties.

The State Environmental Policy Act (SEPA) and the Growth Management Act complement local land use regulations. While SEPA is not necessarily an implementation tool, local requirements for SEPA review provide land use administrators with useful information on potential impacts, and proposed measures to mitigate such impacts. The Growth Management Act provides significant direction for planning and regulation of land use. In accordance with RCW 36.70, by July 1, 1993, all City and County ordinances were required to be consistent with the Comprehensive Plan. Those ordinances found to be inconsistent may be held invalid.

Watershed Planning

In 1998, the Washington State legislature approved ESHB 2514 to create RCW 90.82 and subsequently amended the RCW in 2003 with HB 1336. This RCW enables local stakeholders, within their watersheds, to develop management strategies related to water quantity (required by the bill), water quality (optional), instream flow (optional), and habitat (optional).

In the Methow subbasin, a watershed plan has been completed by the local planning unit and is currently under consideration for formal adoption by the Okanogan County Board of Commissioners. Some of the recommendations in the watershed plan include (but are not limited to): the reallocation of water for a greater number of uses in the watershed; utilization of the benefits of groundwater recharge; and creation of the Methow Watershed Council, an organization which will allow for more local control regarding water management.

4.4.2 State Programs

Washington Department of Natural Resources (WDNR)

The WDNR manages 134,000 acres in the Loomis Forest. The Chopaka Natural Reserve, in the Loomis Forest, is a 3,000-acre natural preserve area. In the year 2000, two parcels totaling 25,000 acres were designated as Natural Areas, with access for recreation and grazing. The remaining area in the Loomis Forest is managed for multiple uses, including timber harvest and livestock grazing. There are 15 million board feet harvested annually from the Loomis Forest (C. Johnson 2001, pers. comm.).

Washington Department of Fish and Wildlife (WDFW)

The WDFW's mission embodies sound stewardship in fish and wildlife, and encourages partnerships with public and international entities, tribal leaders, public volunteers, and service

groups to share responsibility for fish and wildlife. WDFW maintains five wildlife areas in the Okanogan Basin, and is an active participant in salmon recovery and subbasin planning.

In addition, the WDFW is responsible for the administration of state statute directed at the protection of fish and wildlife habitats. The key statutes relevant to subbasin planning are listed below:

Priority Habitat and Species Program

The Priority Habitats and Species (PHS) Program fulfills one of the most fundamental responsibilities of the Washington Department of Fish and Wildlife (WDFW): to provide comprehensive information on important fish, wildlife, and habitat resources in Washington. Initiated in 1989, the PHS Program was identified as the agency's highest priority. Today, the PHS Program serves as the backbone of WDFW's proactive approach to the conservation of fish and wildlife.

PHS is the principal means by which WDFW provides important fish, wildlife, and habitat information to local governments, state and federal agencies, private landowners and consultants, and tribal biologists for land use planning purposes. PHS is the agency's primary means of transferring fish and wildlife information from agency resource experts to those who can protect habitat. PHS information is used: a) to screen 12,000 - 15,000 Forest Practice Applications, 10,000 - 18,000 Hydraulic Project Applications, and over 3,000 SEPA reviews annually; b) by a majority of cities and counties to meet the requirements of the Growth Management Act; c) for the development of Habitat Conservation Plans on state, federal, and private lands; d) by state, federal, and tribal governments for landscape-level planning and ecosystem management, and e) for statewide oil spill prevention planning and response.

PHS provides the information necessary to incorporate the needs of fish and wildlife in land use planning. The PHS program addresses three central questions:

- Which species and habitat types are priorities for management and conservation?
- Where are these habitats and species located?
- What should be done to protect these resources when land use decisions are made?

To answer those essential questions, the PHS Program:

- identifies habitats and species determined to be priorities based on defensible criteria;
- maps the known locations of priority habitats and species using GIS technology;
- provides information on the conditions required to maintain healthy populations of priority species, and viable, functioning priority habitats, using best available science;
- provides consultation and guidance on land use issues affecting priority habitats and species, and;
- distributes this information and makes it easily accessible.

1. PHS also furnishes products which enable the agency to provide competent and efficient customer service. In this regard, PHS staff annually produce and distribute:

13. Over 4,000 copies of the Priority Habitats and Species List. The PHS List identifies and defines which species and habitats are priorities, and outlines criteria used for their selection.

14. Over 3,500 copies of Management Recommendations for Washington's Priority Habitats and Species. These detailed documents identify the needs of fish and wildlife based on the best available science. Guidelines for their incorporation in management decisions are provided.

15. Nearly 2,000 state-of-the-art Geographic Information System (GIS) maps which display locations and extent of priority species and habitats on 29 million acres in Washington State.

16. Upland Restoration Program Outstanding text needed for agencies that are involved in protection of fish and wildlife habitats within the subbasin, including:

- Washington Priority Habitat and Species Program
- Washington State Conservation Commission
- Washington Department of Ecology

Upland Restoration Program

The WDFW has worked with private landowners to restore habitat within the subbasin. The Habitat Development Program established small (0.5 to 3 acres) habitat plots primarily for upland game birds on unfarmed areas, usually on poor or rocky soils. In the 1980s, partnerships between WDFW, NRCS, conservation districts, and private landowners made possible habitat restoration projects at the watershed scale. Today, this multi-agency/private landowner partnership continues to enhance, protect, maintain, and increase wildlife habitat throughout the subbasin.

Through cooperative agreements with private landowners, Upland Restoration Program biologists improve and restore riparian, upland, and shrubsteppe habitats used by both resident and migratory wildlife species within the subbasin. Projects typically include establishing riparian grass buffers, planting shrubs and trees (for thermal and escapement cover), seeding wildlife food plots, developing water sources (e.g., guzzlers, ponds, spring developments), and maintaining winter game bird feeders.

The CRP has provided WDFW with another opportunity to work with local conservation agencies and landowners to improve wildlife habitat throughout the subbasin. WDFW biologists assist landowners with selecting and/or planting herbaceous seed mixes, trees, and shrubs.

While habitat restoration is WDFW’s main priority within the subbasin, the Upland Restoration Program requires all cooperators to sign public access agreements in conjunction with habitat projects. Landowners voluntarily open their land to hunting, fishing, and/or wildlife viewing in return for habitat enhancements. The Upland Restoration Program, in conjunction with CREP and CRP, has increased the extent and/or protection and enhancement of riparian wetlands and shrubsteppe habitats within the subbasin.

Programmatic description of Shoreline Management Act:

Reference: http://www.ecy.wa.gov/programs/sea/SMA/index.html

Washington's Shoreline Management Act (SMA) was passed by the state Legislature in 1971 and adopted by the public in a 1972 referendum. It is codified within RCW 90.58. The Shoreline Master Program (SMP) is essentially a shoreline comprehensive plan and zoning ordinance, with an environmental orientation customized to local circumstances. The SMA emphasizes accommodation of reasonable and appropriate shoreline uses, protection of shoreline environmental resources, and protection of the public's rights to access and use shorelines. All allowed uses are required to mitigate for any adverse environmental impacts and preserve the natural character and aesthetics of the shoreline.

The SMA seeks to provide for a balance of authority between local and state government. Cities and counties are the primary regulators. The SMA applies to all 39 counties and more than 200 cities with "shorelines of the state" or "shorelines of state-wide significance" within their jurisdictional boundaries. The Department of Ecology (Ecology) is the lead state agency, and it provides technical assistance and reviews local programs and permit decisions. The SMA places a strong emphasis on public involvement in developing local shoreline programs, and provides opportunities for public involvement in individual permits.

In December 2003, new SMP guidelines were adopted by the state. These guidelines state rules for use by cities and counties as they update plans that regulate development and the use of shorelines of marine waters, rivers and larger streams, lakes and reservoirs over 20 acres, associated wetlands, and portions of flood plains. In addition, the 2003 legislature adopted amendments to the SMA addressing integration with the Growth Management Act.

Fish and Wildlife and the Growth Management Act

The Growth Management Act (GMA) (RCW 36.70A) is intended to avoid the possibility of uncoordinated and unplanned growth inherent in anticipated population increases. It requires county and city governments to adopt locally derived plans and regulations around a basic framework of natural resources issues defined by the state legislature. One of the primary intents of the GMA is to prevent unwise use of natural resources and critical areas in accommodating urban growth.

Each jurisdiction must classify and designate their resource lands and critical areas, and each must adopt development regulations for their critical areas. In addition, some jurisdictions must adopt planning policies and comprehensive plans that address many aspects of urban growth and development that are expected to occur in the county, including land use, housing, utilities, transportation, and others. Subsequent amendments to the GMA require that counties and cities include the best available science in developing policies and development regulations to protect the functions and values of critical areas. In addition, counties and cities must give special consideration to conservation or protection measures necessary to preserve or enhance anadromous fisheries.

The Washington Department of Fish and Wildlife (WDFW) has biologists in five of its six regions that provide technical assistance to local jurisdictions regarding compliance with the requirements of the GMA regarding fish and wildlife resources. One of the primary goals of WDFW is to integrate its Priority Habitats and Species (PHS) program into the local jurisdictions' GMA planning activities.

Washington Conservation Commission

The Washington State Conservation Commission (WCC) supports conservation districts in Washington by promoting conservation stewardship through funding natural resource projects. The WCC provides basic funding to conservation districts as well as implementation funds, professional engineering grants, and Dairy Program grants and loans to prevent the degradation of surface and ground waters. The Agriculture Fish and Wildlife Program (AFWP) is a collaborative process aimed at voluntary compliance. The AFWP involves negotiating changes to the existing NRCS Field Office Technical Guide, as well as to the guidelines being developed for irrigation districts to enhance, restore, and protect habitat for Endangered fish and wildlife species and address state water quality needs. This two-pronged approach has developed into two processes, one involving agricultural interests, and the second concerning irrigation districts across the state.

Wildlife Areas

The Methow Wildlife Area is approximately 14,500 acres and is located to the east of the Methow River in the foothills of the Methow Valley. The Town of Twisp is located approximately five miles west of the southern boundary, and Winthrop is located five miles west of the Headquarters. The area consists of moderate to steep south and west facing slopes. Vegetation includes bunchgrasses and bitterbrush, occasionally interspersed with small stands of Douglas fir and Ponderosa pine. Most water sources and wetter areas have deciduous type riparian vegetation. The Methow Wildlife Area is managed primarily for mule deer winter and spring range and blue grouse spring and summer range. Canyon areas have a number of golden eagle nest sites along with some very interesting geological formations. Over l00 bird species use the Methow at various times of the year. Primary recreational uses include hunting, fishing, sightseeing, cross-country skiing, mountain biking, and camping. Fishing opportunities for either trout or limited spiney-ray fish exist on Cougar and Campbell Lakes, Sullivan Pond, portions of Bear, Beaver, and Ramsey Creeks, and the Chewuch River.

The Big Buck Wildlife Area is 5,600 acres, and is located west of the Methow River and north of the Twisp River. The area is just west of the town of Twisp. The unit consists of moderate to steep east and south facing slopes. Vegetation includes bunchgrasses, bitterbrush and sage, occasionally interspersed with stands of Ponderosa pine and Douglas fir. Water sources and wetter areas support deciduous riparian type vegetation. The Big Buck area is managed primarily for mule deer, blue grouse and non-game species. It is also an integral part of the mule deer migratory corridor in and out of the Twisp River drainage. Primary recreational uses include hunting, cross country skiing, and birding. There are three small lakes on the area, but only Aspen Lake holds fish.

The 847-acre Big Valley Wildlife Area is located three and a half miles northwest of Winthrop, and is bounded on the east by state Highway 20, and on the west by the Methow River. Approximately 300 acres are irrigated, with 200 acres in dryland pasture, and the rest in riparian river bottom. The unit is used by mule deer, white-tailed deer and numerous other game and non-game species. Recreational uses include hunting, fishing, hiking, and sightseeing. Fishing opportunities exist on the Methow River.

The Rendezvous Wildlife Area consists of 3,180 acres of land. These lands lie north of the confluence of the Methow and Chewuch Rivers, about two miles northwest of Winthrop.

Vegetation includes bunchgrasses and bitterbrush, occasionally interspersed with small stands of Douglas-fir and Ponderosa pine. The unit is moderately used as winter range, but is key to the migration of mule deer moving to and from summer and winter ranges. Other game and non-game species use the area. Primary recreational uses include hunting, birdwatching, and sightseeing.

The Golden Doe Wildlife Area consists of 1,389 acres of land. This unit is located approximately five miles south of Twisp on the west side of the Methow River in the Alder Creek drainage. Vegetation includes bunchgrasses and bitterbrush, occasionally interspersed with small stands of Douglas-fir and Ponderosa pine. The unit is heavily used as winter range and is also key to the mule deer migration east and west across the Methow Valley. Other game and non-game species use the area. Primary recreational uses include hunting, birdwatching, and sightseeing.

Road Maintenance/Transportation

RCW 77.55.060 requires that "a dam or other obstruction across or in a stream shall be provided with a durable and efficient fishway approved by the director." Culverts and other stream-crossing structures often create obstructions to upstream or downstream fish passage. Water diversions can result in significant mortality to juvenile fishes.

WDFW has developed the Fish Passage Barrier and Surface Water Diversion Screening Assessment and Prioritization Manual (contact Dave Caudill, Habitat Technical Applications Division, 360-902-2486), which includes protocols for assessing fish passage barrier status at culverts and other instream structures, and juvenile fish screening and bypass status at water diversions. WDFW conducts fish passage barrier assessments and provides protocol training to other agencies and grant groups interested in conducting fish passage barrier assessments. WDFW also maintains a statewide Fish Passage and Diversion Screening Inventory database (contact Brian Benson, Habitat Science Division, 360-902-2570), which includes information on barrier status of inventoried culverts and other stream crossing structures, as well as known diversion screening information.

The WDFW Habitat Program Technical Applications Division (TAPPS) also provides technical assistance to fish passage, screening, and habitat restoration project sponsors, to help them develop habitat-related projects. In addition, WDFW in cooperation with other state and federal agencies have developed Aquatic Habitat Guidelines (technical guidance documents) for certain types of habitat projects. The two guidance documents currently available include the Fish Passage Design at Road Culverts and Integrated Streambank Protection Guidelines (ISPG); soon to be available will be Salmon Habitat Restoration Guidelines (SHRG). Information on technical assistance opportunities and contacts are available on the WDFW website at http://wdfw.wa.gov/hab/tapps.index.htm

The Hydraulic Code and Hydraulic Code Rules

The Hydraulic Code (Chapter 77.55 RCW), and the associated Hydraulic Code Rules, provide WDFW with a regulatory mechanism to protect fish life and their habitat from the impacts of most hydraulic projects. The Hydraulic Code requires that "in the event that any person or government agency desires to construct any form of hydraulic project or perform other work that will use, divert, obstruct, or change the natural flow or bed of any of the salt or fresh waters of the state, such person or government agency shall, before commencing construction or work

thereon and to ensure the proper protection of fish life, secure the approval of the department as to the adequacy of the means proposed for the protection of fish life."

WDFW's authority extends only to the protection of fish life. Fish life is broadly defined to be "all fish species, including but not limited to food fish, shellfish, game fish, and other nonclassified fish species and all stages of development of those species." Furthermore, "protection of fish life" is defined to mean "prevention of loss or injury to fish or shellfish, and protection of the habitat that supports fish and shellfish populations." Even though other animals, such as amphibians, reptiles or birds may be impacted by hydraulic projects, the Hydraulic Code is specific to fish life, and HPAs may not be conditioned to protect species other than fish. Measures to protect fish life imposed in HPAs often have multi-species benefits, however, because many species share the same habitat.

Hydraulic project proponents must apply to WDFW for authorization to conduct their projects. With the exception of emergency projects and pamphlet HPAs, which may be applied for verbally, applications must be submitted in writing. Processing time for complete applications is mandated by statute to be no greater than 15 days for expedited projects and 45 days for standard projects. Projects declared to be emergencies by county legislative authorities or WDFW must be granted approval immediately upon request.

Procedures administering the Hydraulic Code, including mitigation requirements and appeal rights, are specified in Chapter 220-110 WAC. Site-specific requirements and mitigation for unavoidable impacts on fish life are written into the HPA by the local Area Habitat Biologist.

Washington Priority Habitats and Species (PHS)

The Washington PHS Program is a guide to management of fish and wildlife "critical areas" on all state and private lands as they relate to the Growth Management Act of 1990. The recommendations address upland as well as riparian habitat, and place emphasis on managing for the most critical species and their habitats.

4.4.3 Non-Governmental Organizations

Methow Conservancy

The Methow Conservancy is an independent land trust and conservation organization dedicated to voluntary protection of the natural and scenic resources in the Methow Valley. As of August 2004, the group has over 450 members and holds 40 conservation easements on 3,774 acres of private land. The Methow Conservancy has received four State grants for riparian conservation easement purchases totaling $4.27 million in the past 5 years. The Methow Conservancy has also received a grant for one agricultural conservation easement to date.

In addition to conservation easements, the Methow Conservancy writes stewardship plans for private landowners, and each conservation easement requires a management plan that is updated annually. The Methow Conservancy published the Good Neighbor Handbook in 2001, a 33-page guide to land conservation for new landowners. The Conservancy sends these to all new landowners in the Valley, and has distributed over 3,500 Handbooks to date. The Conservancy also hosts a monthly natural history lecture series and maintains a conservation resource library.

The Methow Conservancy contracts with WDFW to monitor all WDFW conservation easements in the Methow Valley, and has conducted two landscape-level habitat surveys (the Songbird and Shrub-steppe surveys) for prioritization and outreach to landowners.

The Upper Columbia Salmon Recovery Board (UCSRB)

Our proposal to cooperatively provide the analytic foundation complements the high level of policy and technical coordination already occurring. Policy coordination is facilitated by the Upper Columbia Salmon Recovery Board (UCSRB), a partnership among Chelan, Douglas, and Okanogan counties, the Yakama Nation, and the Colville Confederated Tribes in cooperation with local, state, and federal partners.

One clear objective is to provide an all-inclusive analytic foundation for the aquatic component of subbasin plans on a timely basis, consistent with the NPPC guide, to maximize the likelihood that defensible subbasin plans are completed on schedule.

Additionally, technical coordination is occurring with the Upper Columbia Regional Technical Team and the Regional Assessment Advisory Committee, as well as with individual members of BPA, the NPPC and the CBFWA.

Upper Columbia River Regional Fisheries Enhancement Group (UCRFEG)

The UCRFEG was created to facilitate community stewardship of fish and fish habitats in the Upper Columbia Region, including the Okanogan watershed. The group coordinates delivery of state salmon recovery funding for local community projects, and has facilitated some cross-border U.S./Canada community demonstration projects in the Okanogan in partnership with the OSBFP.

North Central Washington Audubon Society (NCWAS)

North Central Washington Audubon Society, a local chapter of the National Audubon Society, is dedicated to furthering the knowledge and the conservation of the environment of North Central Washington, our Nation, and the World. The status of the yellow-breasted chat population in the Okanagan Valley of B.C. is of significance to the society in the Okanogan as an indicator of riparian ecosystem health. This is of concern in the Okanogan where much riparian habitat has been replaced by other land uses. The Washington population of yellow-breasted chat plays an important role in the persistence of the species in B.C. where current breeding populations of yellow-breasted chats are down to about 40 pairs. The chapter also sponsors regular field trips, publishes a local newsletter, and plays an active role in education events and land conservation issues throughout the Chelan, Douglas, Okanogan and Ferry County region.

4.5 Artificial Production

4.5.1 History of Hatchery Fish production in the Methow and the Upper Columbia ESU

The first hatcheries that released salmonids in the mid-Columbia Basin began operation in 1899 near the confluence of the Twisp River on the Methow River (WDFG 1899). This hatchery was built to replenish the salmon (primarily Chinook, and coho) runs, which had virtually been eliminated by the 1890s (Gilbert and Evermann 1895; WDFG 1898).

The biggest problems encountered in the early years of the hatcheries were a lack of fish for broodstock, the entrainment of a large numbers of juveniles (both naturally- and artificially produced; WDFG 1904) because of irrigation diversions.

Most of the fish planted from the Methow facility in the first few years of production were probably coho (WDFG 1904-1920; Craig and Suomela 1941). For the first few years, species were not differentiated, with up to 3 million eggs per year collected from the Methow.

Very few Chinook were released from the first Methow River hatchery (Craig and Suomela 1941). Egg take between the years 1908 and 1912 ranged from 5,000 - 68,000 (average 24,100). In 1915, the hatchery was moved downstream near the mouth of the river at Pateros for two main reasons: it lacked brood stocks other than coho, and the new location lay downstream from the irrigation intakes (WDFG 1917).

Two years of operation of the new hatchery have demonstrated the wisdom of the change. Not only are more silverside salmon spawn secured at the new location than at the old, but the new location has developed to be the best hatchery in the state for the taking of Steelhead salmon eggs. Spring Chinook salmon eggs have also been able to be secured at this location, though, from Craig and Suomela (1941),

> . . ., Chinooks were never obtained in any quantity. . . some eggs were transferred to Methow from other locations. Even chum salmon eggs were shipped there in 1916 and 1917. . . In many cases there is no indication as to where the transferred Chinook eggs were taken, but some were obtained from the U. S. Bureau of Fisheries hatcheries on the lower Columbia, and probably some of the Washington hatcheries from that section also contributed late run stock to the Methow River. It is very questionable whether any of these fish were able to return to the Methow River, since the distance they would have (had) to migrate is much greater than that to which the original stock was accustomed. However, these records indicate that the Washington State Fisheries authorities made attempts to introduce strange runs of salmon to the Methow as well as to the Wenatchee.

In 1917, 1.5 million eggs were received at the Methow Hatchery from unknown origin. In the late 1920s, eggs were received from exotic hatcheries, but appear to be mostly late-run Chinook (Craig and Suomela 1941).

The release of fry from the early hatcheries on the Wenatchee and Methow rivers probably contributed little to adult returns.

4.5.2 The Effects of Fish Production on the Methow Salmon Ecosystem

Genetic and Ecological Effects on Natural Populations

The genetic risks to naturally produced populations from artificial propagation include reduction in the genetic variability (diversity) among and within populations, genetic drift, selection, and domestication, which can contribute to a loss of fitness for the natural populations (Hard et al.1992; Cuenco et al. 1993; NRC 1996; and Waples 1996).

Disease interactions between hatchery fish and listed fish in the natural environment may be a source of pathogen transmission. Because the pathogens responsible for diseases are present in

both hatchery and natural-origin populations, there is some uncertainty associated with determining the extent of disease transmission from hatchery fish (Williams and Amend 1976; Håstein and Lindstad 1991).

It is acknowledged that among-population diversity for a portion of the ESU (Methow River Basin populations) may be negatively affected by the WDFW and FWS programs if escapements remain low. Specifically, this effect may result from the consolidation of Methow Basin populations into a single Methow population through collection and mating of upriver-origin spawners arriving at Wells Dam. This strategy, however, will provide unique information on how best to increase the abundance of fish and the population's recovery.

FWS and the fisheries co-managers have implemented the phasing out of the non-endemic Carson stock spring Chinook hatchery program to address the potential for genetic introgression and out-breeding depression. Efforts are being made to minimize the effects of these fish on the natural spawning population. By phasing out the Carson stock spring Chinook and changing to Methow Composite stock, the potential adverse genetic effects from natural spawning hatchery fish will be greatly reduced.

Direct competition for food and space between hatchery and listed fish may occur in spawning and/or rearing areas, the migration corridor, and ocean habitat. These impacts are assumed to be greatest in the spawning and nursery areas, and at points of highest fish density (release areas), and assumed to diminish as hatchery smolts disperse (FWS 1994).

Competition for space and cover in the Methow River probably occurs between hatchery and natural fish shortly after release and during downstream migration, but based on the smolt travel times, the duration of interaction is minimal in the river (WDFW 1998a). Rearing and release strategies at all WDFW salmon and steelhead hatcheries are designed to limit adverse ecological interactions through minimizing the duration of interaction between newly liberated hatchery salmon and steelhead and naturally produced fish.

Hatchery fish may prey upon listed fish. Because of their location, size, and time of emergence, newly emerged Chinook salmon fry are likely to be most vulnerable to predation by hatchery-released fish. Their vulnerability is believed to be greatest as they emerge, decreasing somewhat as they move into shallow, shoreline areas (FWS 1994). Emigration out of hatchery-release areas and foraging inefficiency of newly released hatchery smolts may minimize the degree of predation on Chinook salmon fry (FWS 1994).

Hatchery salmonids that do not emigrate after release are said to have residualized. These fish that residualize can adversely affect naturally produced fish through competition and predation. Chinook salmon do not tend to residualize (Groot and Margolis 1991); thus, no effects are expected on natural UCR spring Chinook salmon or steelhead in the Methow River. If residualization is substantial, significant interaction may occur. The residual rate for steelhead smolts in the Methow River is unknown, but is currently being investigated. WDFW facilities attempt to release steelhead and Chinook that are active migrants, thereby reducing the potential residual component; however, the direct stream release strategy employed for the majority of the releases may result in residual rates greater than those resulting from volitional releases. WDFW is assessing the efficacy of volitional versus direct releases.

Harvest Management

Fish harvest in the Columbia River basin affects the listed species by incidentally taking them in fisheries that target non-listed species. The largest potential impacts on UCR spring Chinook and steelhead come from treaty Indian and non-tribal fisheries in the Columbia River mainstem and tributaries (Myers et al. 1998).

A sport fishery for steelhead in the UCR has been authorized under Section 10 Permit 1395. In years when the escapement of hatchery-origin steelhead is greater than expected (i.e., over-escapement) the fishery was specifically designed to remove excess hatchery fish from the spawning grounds with minimal impacts on the natural origin steelhead.

Domestication of Hatchery Fish

Another concern of the artificial propagation of salmon is domestication, which is the change in quantity, variety, and combination of alleles, within a captive population or between a captive population and its source population in the wild, that are the result of selection in an artificial environment (Busack and Currens 1995). Domestication may occur when fish are placed into an artificial environment for all or part of their lives, imposing different selection pressures on them than does the natural environment. The concern is that domestication effects will decrease the performance of hatchery fish and their descendants in the wild. The concern is that hatchery fish, selected to perform well in a hatchery environment, tend to not perform well when released into the wild because of the difference between the hatchery and the wild environments.

Potential risks to the natural population occur when the hatchery fish spawns in the wild and the resulting performance of the natural population is reduced because of outbreeding depression (Busack and Currens 1995). The selection of broodstock is a common source of biased sampling. In general, broodstock selection should be random, but bias occurs when selection is based on particular traits. Genetic changes because of unintentional selection can be caused by the hatchery environment that allows more fish to survive compared to the natural environment. The elimination of all risks because of genetic diversity loss and domestication is not possible, but NOAA Fisheries believes that these risks can be minimized through the following measures proposed for the adult supplementation program:

- Address genetic concerns regarding selectivity; the collection of adult broodstock at traps for the supplementation program shall be representative of the run-at-large with respect to natural and hatchery parentage, migration timing, age class, morphology, and sex ratio;
- Provide that a proportion of each population, that will not be subjected to artificial propagation and the associated potential risk of negative genetic effects (upper Columbia River spring Chinook upstream escapement goal of approximately 80 adults per population), will be maintained as a minimum level for natural spawning when escapement to Wells Dam is greater than 668 adults;
- An effective population size (Ne) of 500 fish per population per generation should be the long-term program production objective to maintain an adequate genetic base, even thought an Ne of at least 50 adults per generation is required to reduce the risk of inbreeding depression and genetic drift in the short-term (fewer than five salmon generations) (BAMP 1998). If fewer adults are available, production can be scaled to ensure that hatchery-origin progeny do not overwhelm the population as a whole;

- Rear fish at minimum pond-loading densities to reduce the risk of domestication effects and;
- Eliminate Carson stock spring Chinook (a highly domesticated stock) that will further reduce potential genetic effects.

4.5.3 Current fish production programs in the Methow subbasin

For a detailed description of facilities and production/return summaries, see Appendix E. Artificial production of anadromous fish in the Methow subbasin includes spring Chinook, summer Chinook, summer steelhead, and reintroduction of coho salmon. A Hatchery and Genetics Management Plan for reintroduction of coho salmon is included in Appendix K.Spring Chinook and summer steelhead are currently ESA-listed as Endangered through the Endangered Species Act of 1973. Summer Chinook are considered a Depressed population. Once extirpated from the Methow subbasin, small numbers of coho salmon have been reintroduced, and plans are currently in the feasibility stage for a larger-scale reintroduction. Hatchery intervention in the Methow subbasin is guided by a two-pronged approach that encourages local adaptation, preservation and enhancement of specific populations, while simultaneously spreading the risk through selection of several artificial production alternatives.

Spring Chinook

Considerable controversy regarding the effects of the GCFMP, non-indigenous introductions, recent fishery management actions (variable broodstock collection and hatchery mating) on population structure, and regarding interpretation of available genetic data has prompted variable interpretations of spring Chinook population structuring in the Methow Basin.

In response to uncertainty about population structure, poor adult returns, and a desire to spread the risk of hatchery intervention strategies, a conceptual approach was developed during the creation of the Biological Assessment and Management Plan (BAMP) for mid-Columbia River Hatchery Programs. The approach consisted of enlarging the effective hatchery supplementation spawning population of Methow River and the Chewuch River populations, during periods of low adult returns, by managing them as a single gene pool. During years of sufficient adult returns, tributary trapping locations would be utilized to obtain the broodstock components of each tributary population, and within-population mating would be a priority in an attempt to preserve and enhance discrete population attributes that exist in the Methow Basin.

Management decisions regarding the Twisp River population varied from those developed for the Methow and Chewuch populations. The Twisp River population was deemed the most divergent of the indigenous populations in the subbasin, and the least tolerant of genetic introgression (Wells Project Coordinating Committee 1995). The Twisp River population is managed more as a distinct population, using adult supplementation and captive broodstock programs. The Joint Fisheries Party (JFP, composed of federal and state agencies and tribes) opted to phase out the Twisp Captive brood program beginning in 2000, leaving 1999 as the last brood year remaining in the program.

Various processes are underway within the Columbia Basin that direct hatchery program implementation. The listing of certain populations of fish under the ESA has also dictated hatchery program modifications and reform.

Current spring Chinook artificial production in the Methow subbasin is provided through the Winthop NFH (FWS) and through the Methow State Fish Hatchery. Production level objectives are 600,000 and 550,000 yearling spring Chinook smolts, respectively. Actual release levels have been variable, and have been influenced by run size, origin composition, genetic concerns, and disease management.

Since the Endangered listing of upper Columbia River spring Chinook in 1998, both facilities have implemented measures to decrease and minimize the influence of the non-endemic Carson spring Chinook stock in the hatchery production component. Both facilities target ESA-listed upper Columbia River spring Chinook. The Methow State Fish Hatchery also targets wild-origin Chinook for the supplementation program through tributary trap operations; however, relative success has been poor because of extremely low natural-origin escapement and poor trapping efficiencies.

Summer steelhead

Steelhead in the upper Columbia River (including the Methow River population) were listed as Endangered on August 18, 1997. The Methow population is likely an admixture of native upper Columbia River steelhead stocks resulting from the GCFMP. The Wells Hatchery steelhead stock (stock utilized for supplementation activities in the Methow subbasin) was derived from this admixture population and, because it was genetically indistinguishable from the naturalized population and was deemed necessary for recovery, was included in the ESA Endangered listing in 1997.

Steelhead population abundance in the Methow River has increased in recent years; however, much of the increase can be attributable to adults returning from supplementation program releases in the subbasin, with hatchery-origin fish comprising 60-85% of the escapement in the Methow Basin (Busby et al. 1996). The most recent five-year geometric mean of natural returns over Wells Dam (includes Methow and Okanogan River subbasins) is 358 fish, representing an increasing trend of 5.9% per year (NOAA fisheries 2002). The 2001 return provide an estimated 1,380 natural-origin steelhead past Wells Dam, the greatest in the 25-year data series; however, natural-origin proportion within the returns has decreased from 19%, for the period prior to the status review, to a range of 5-11% for the period 1997 to 2001. NMFS concluded in their 1996 status review, and again in the Biological Opinion issued in 2002 for ESA Section 10 Permit 1395, that because of poor natural recruitment, this ESU might not exist today if it were not for hatchery production based on indigenous stocks (NMFS 1996 and NOAA Fisheries 2002).

Smolt production for the Methow subbasin has been variable; current steelhead artificial production within the Methow subbasin includes smolt production from the Wells Hatchery facility (approximately 280,000 - 320,000) and Winthrop NFH (approximately 100,000). Historically, smolt production, contributing to the enhancement of the Methow population, has been a product of hatchery-origin crosses. More recently (past five years), spawning has sought to maximize the proportion HxW parentage in the production. The 2004 brood year incorporated 30% of the broodstock as wild, resulting in 100% of the projected smolt production as HxW parentage. The direction toward selective broodstocking and spawning protocol to enhance the proportion of HxW parentage will continue in efforts to enhance the performance of hatchery fish spawning in the wild, and subsequently to improve the Natural Cohort Replacement Rate.

Summer Chinook

Artificial production of summer Chinook in the Methow subbasin is provided through Rock Island Settlement Agreement and pending FERC approval, will be included as a Rock Island Dam HCP obligation.

Current and future (HCP) summer Chinook production for the Methow Basin is 400,000 yearling smolts. Adult collected are a mixture of upper Columbia River summer and fall races resulting from the GCFMP. The current brood collection terminates at the end of August, reducing the probability of incorporation of fall Chinook into the summer Chinook program. Additionally, summer/fall Chinook spawning ground survey in the Methow River have yet to identify known fall Chinook spawning populations (Andrew Murdoch 2004, pers comm.). While the GCFMP may have combined races initially in early years of hatchery production, the lack of demonstrated fall Chinook spawning populations indicates that historical and current hatchery practices have had minimal, if any, impact on the Chinook race delineation in the Methow River subbasin. Incorporation of non-indigenous stocks into the program has been minimal, and does not appear to have had a significant impact on the genetic integrity of the ESU (Chapman et al. 1994a; Myers et al. 1998).

Coho

The current coho reintroduction plan still in the feasibility stage through 2004 relies on existing or temporary facilities. Currently, coho smolts are acclimated and released in the Methow River from the WNFH for the sole purpose of broodstock development, although some natural production does occur. This phase of the program is expected to last through 2004 or 2005, after which the reintroduction program will expand to included acclimated releases in natural production areas of the basin in order to reach the tribal natural production goal.

Coho salmon are collected as volunteers into the Winthrop National Fish hatchery and from the run-at-large at Wells Dam west bank and/or east bank fish traps to support a 250,000 smolt program (YN et al. 2002). Methow basin coho broodstock may be supplement with eyed-eggs transferred from Wenatchee Basin incubation facilities or from hatcheries on the lower Columbia River (Cascade FH, Eagle Creek NFH, or Willard NFH) in years where broodstock collection falls short of production goals. Coho reared at Winthrop NFH are volitionally released into the Methow River or transferred to the Wenatchee River for acclimation and release. Under the current feasibility program, coho releases from the Winthrop National Fish Hatchery are design to contribute to the broodstock development process. Details on mating protocols, rearing and acclimation strategies, size at release and monitoring and evaluation can be found in the Yakama Nation's Mid-Columbia Coho HGMP (YN et al.2002).

4.5.4 Principal Policy Processes Managing Hatchery Fish Production

Federal

Hatchery and Genetic Management Plans

The Hatchery and Genetic Management Plan (HGMP) process was initiated to identify off-site mitigation opportunities associated with operation of the federal Columbia River Power System. The HGMP process is designed to describe existing propagation programs, identify necessary or

recommended modifications of those programs, and help achieve consistency of those programs with the Endangered Species Act. The HGMP process only addresses anadromous salmon and steelhead programs.

Hatchery and Genetic Management Plans are described in the final salmon and steelhead 4(d) rule (July 10, 2000; 65 FR 42422) as a mechanism for addressing the take of certain listed species that may occur as a result of artificial propagation activities. NOAA Fisheries will use the information provided by HGMPs in evaluating impacts on anadromous salmon and steelhead listed under the ESA. In certain situations, the HGMPs will apply to the evaluation and issuance of Section 10 take permits. Completed HGMPs may also be used for regional fish production and management planning by federal, state, and tribal resource managers.

The primary goal of the HGMP process is to devise biologically based artificial propagation management strategies that ensure the conservation and recovery of listed Evolutionarily Significant Units (ESUs). The HGMP process also seeks to document and implement hatchery reform in the Columbia Basin. Much of the initial work on the HGMP process was coordinated and combined with efforts to complete the Artificial Production Review and Evaluation (APRE) analysis, which looked at the same sorts of information.

Artificial Production Review and Evaluation (APRE)

The APRE process seeks to document progress toward hatchery reform in the Columbia Basin. The NPCC used consultants and representatives of the Columbia Basin fishery managers to analyze existing programs and recommend reforms; a draft report that will go to the Council and the region has been prepared. The APRE process includes both anadromous and nonanadromous fish in its analysis.

Pacific Coastal Salmon Recovery Fund

The Pacific Coastal Salmon Recovery Fund (PCSRF) was established in FY2000 to provide grants to the states and tribes to assist state, tribal and local salmon conservation and recovery efforts. The PCSRF was requested by the governors of the states of Washington, Oregon, California and Alaska in response to Endangered Species Act (ESA) listings of West Coast salmon and steelhead populations. The PCSRF supplements existing state, tribal and federal programs to foster development of federal-state-tribal-local partnerships in salmon recovery and conservation, promoting efficiencies and effectiveness in recovery efforts through enhanced sharing and pooling of capabilities, expertise and information. The goal of the Pacific Coastal Salmon Recovery Fund is to make significant contributions to the conservation, restoration, and sustainability of Pacific salmon and their habitats.

The PCSRF's enhancement objective is: To conduct activities that enhance depressed stocks of wild anadromous salmonids through hatchery supplementation, reduction in fishing effort on depressed wild stocks, or enhancement of Pacific salmon fisheries on healthy stocks in Alaska. This includes supplementation, salmon fishery enhancements, and the Yakama Nation spring chinook pedigree study.

ESA

Current ESA Section 10 permits for listed summer steelhead (Permit #1395), listed spring Chinook (Permit #1196), and non-listed anadromous fish (Permit # 1347) also direct artificial

production activities associated with the habitat conservation plans. Douglas PUD, Chelan PUD and WDFW are co-permittees; therefore, provisions within the permits and associated Biological Opinions are incorporated into the hatchery programs undertaken in the HCPs.

State

The state and federal government have various forums in which they are active. All have some role in determining or balancing artificial production programs, as well as the ones that follow under "other." Essentially no specific action would occur until the action is determined to be warranted in the already established processes.

Other

FERC processes

Under current settlement agreements and stipulations, the three mid-Columbia PUDs pay for the operation of hatchery programs within the Columbia Cascade Province. These programs determine the levels of hatchery production needed to mitigate for the construction and continued operation of the PUD dams.

Habitat Conservation Plans

In 2002, habitat conservation plans (HCPs) were signed by Douglas and Chelan PUDs, WDFW, FWS, NOAA Fisheries, and the Colville Confederated Tribes. The overriding goal of the HCPs are to achieve No Net Impact (NNI) on anadromous salmonids as they pass Wells (Douglas PUD), Rocky Reach, and Rock Island (Chelan PUD) dams. One of the main objectives of the hatchery component of NNI is to provide species-specific hatchery programs that may include contributing to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest.

Biological Assessment and Management Plan (BAMP)

The biological assessment and management plan was developed by parties negotiating the HCPs in the late 1990s. The BAMP was developed to document guidelines and recommendations on methods to determine hatchery production levels and evaluation programs. It is used within the HCP as a guiding document for the hatchery programs.

All of these processes affect the hatchery programs within the Methow River Basin in one way or another.

Federal programs

Grand Coulee Fish Maintenance Project (GCFMP)

The FWS operates the Leavenworth NFH Complex in the UCR region constructed by the U.S. Bureau of Reclamation (BOR) to mitigate for fish losses that resulted from construction of Grand Coulee Dam. These programs were authorized as part of the Grand Coulee Fish Maintenance Project (GCFMP) on April 3, 1937, and re-authorized by the Mitchell Act (52 Stat. 345) on May 11, 1938. The complex consists of three hatchery facilities (Leavenworth, Entiat, and Winthrop NFHs), and has the following mission:

To produce high quality spring Chinook salmon and summer steelhead smolts commensurate with the production goals established by the Columbia River Fisheries Management Plan (FWS 2002a)

Historically, these facilities have reared and released spring Chinook salmon eggs transferred from the Carson NFH on the lower Columbia River. Carson stock spring Chinook salmon are not included in the ESA-listed UCR spring Chinook salmon ESU. The FWS has discontinued transferring eggs from Carson NFH in favor of utilizing hatchery-origin adult spring Chinook salmon, returning to each facility, as the primary egg source.

The hatcheries built as part of the GCFMP began operation in the early 1940s at Leavenworth (Icicle Creek, a tributary of the Wenatchee River), Entiat, and Winthrop (Methow River). The Leavenworth facility was built as the main hatchery site, and the Entiat and Winthrop hatcheries, as substations. These hatcheries were built as part of the program to relocate populations of salmon and steelhead that formerly ascended the Columbia River upstream from the Grand Coulee Dam site.

Winthrop National Fish Hatchery (NFH)

Located on the Methow River, this substation of the Leavenworth NFH complex began operation in 1941. The Winthrop Hatchery released stream-type Chinook every year from 1941 through 1962. Releases of spring Chinook ceased until 1976, when the current program began, and have since been ongoing. Releases of sockeye have taken place at Winthrop from 1943 to 1957. Spring Chinook, steelhead and coho are all currently cultured at the facility.

Broodstock origin for fish released from Winthrop NFH has varied over the years. The first four years of releases were from broodstock collected at Rock Island Dam as part of the GCFMP (see above). Eggs from the Cowlitz, Little White, Carson, Klickitat, and Leavenworth (all Carson-stock) hatcheries have been raised and released from Winthrop since the current program began in 1976, although since 1992, all brood used for the program has come from adults returning to the Methow River.

Since brood year 1999, which is the same year spring Chinook were listed under the ESA, no releases of the “pure” unlisted Carson-stock has occurred. The listed Methow Composite stock has been utilized in an effort to aid in the recovery of that population.

Facility description: Located on the Methow River, at RM 50.4, this facility has two 40 by 80 foot adult holding ponds (construction was never completed), sixteen 17 x 76 foot Foster-Lucas ponds, sixteen 12 x 102 foot, and thirty 8 x 80 foot raceways. Inside the hatchery building, there are 42 (eight-tray) incubators, thirty-five 3 x 16 foot fiberglass tanks, and four 16.5 x 16 concrete starting troughs (FWS 1986c).

The primary water source for the hatchery is the Methow River. The water right allows for withdrawals up to 50 cfs. Spring Branch Springs provides up to 10 cfs, and two groundwater infiltration galleries and wells provide 1,500 gpm each, with a maximum of 2,400 acre foot per year each. The springs and infiltration galleries provide warmer water during the winter months. A third infiltration gallery, capable of pumping 4,500 gpm, is currently under construction.

Evaluation: The Mid-Columbia River Fishery Resource Office (MCRFRO) provides monitoring, evaluation, and coordination services concerning Winthrop NFH production.

MCRFRO staff monitors hatchery returns, biological characteristics of the hatchery stock, fish marking, tag recovery, and other aspects of the hatchery program, as well as maintain the database that stores this information. MCRFRO also cooperates with the hatchery, fish health and technology centres, and co-managers to evaluate fish culture practices, assess impacts on native species, and coordinate hatchery programs both locally and regionally.

The Leavenworth NFH Complex (which includes Winthrop NFH) has a team comprised of staff from the hatcheries, Fish Health, and the MCRFRO (Hatchery Evaluation Team). Current evaluation practices/studies include, among others: bio-sampling of returning adults, 100% marking of released juveniles, application of PIT tags, assessment of stray rates, travel-time of released juveniles through the Columbia River corridor, assessment of potential of hatchery fish to transfer diseases to wild stocks, success/failure of hatchery-produced adults to reproduce naturally, use of NATURE's type rearing, raceway density studies, genetic comparisons of hatchery and wild stocks, and feed (fish food) evaluations.

State Programs

Methow Fish Hatchery Complex

The Methow Fish Hatchery Complex (MFHC) was built to compensate for losses of smolts caused by the operation of Wells Dam (Erho and Bugert 1995). The facility was constructed by, and operates, under funding from Douglas PUD. Eggs are collected at weirs on the Methow, Twisp, and Chewuch Rivers and incubated discretely at the central facility near the town of Winthrop. Smolts (246,000 for each facility) are released from acclimation ponds on the Twisp, Chewuch, and Methow (central facility) Rivers (Peck 1993; Bartlett and Bugert 1994).

The overall goal of the Methow Fish Hatchery Complex is to mitigate for No Net Impact on upper Columbia River spring Chinook as they pass Wells (Douglas PUD), Rocky Reach, and Rock Island (Chelan PUD) dams, and contribute to the rebuilding and recovery of naturally-reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest.

Facility description: The MFHC consists of a central facility on the Methow River, near the town of Winthrop, and two satellite facilities on the Chewuch and Twisp Rivers. The main facility is located on the Methow River, approximately 45 miles upstream of the confluence with the Columbia River. This facility has three canopy-covered 8 x 78 x 4 foot adult holding ponds, 12 canopy-covered juvenile raceways of the same dimensions as the adult ponds, and twenty-four indoor 3 x 59 x 4.5 foot start tanks. In addition, there are three separate incubation rooms with 15 single-stack (eight trays per stack) vertical incubators and one 107 x 59 x 4.5 foot acclimation pond, which releases into the mainstem Methow River (Bartlett and Bugert 1994).

The main water source for the Methow facility is from four wells that provide almost 10 cfs. An additional water right of 18 cfs of Methow River water is provided, with 11 cfs guaranteed (the additional 7 cfs is shared with Winthrop NFH in the spring; Bartlett and Bugert 1994).

Almost eight miles upstream of the confluence of the Methow River is the Chewuch River acclimation site. The site has one large acclimation pond, which measures 107 x 70 x 4.5 feet. The water source of the acclimation pond is the Chewuch River, which is supplied by gravity feed from the Chewuch Canal Company's irrigation ditch. The maximum flow to the pond is six cfs (Bartlett and Bugert 1994). Adult trapping for the Chewuch fish occurs at Fulton Dam,

approximately 4.5 miles downstream of the acclimation pond (1.5 miles upstream of the confluence with the Methow River).

The Twisp River acclimation site is approximately 5 miles upstream of the confluence with the Methow River. The facility has one acclimation pond, which measures 107 x 59 x 4.5 ft. The water source of the pond is the Twisp River from the Valley Power irrigation canal, with a maximum flow of six cfs. The adult collection weir and trap is located adjacent to the acclimation pond (Bartlett and Bugert 1994).

Wells Hatchery

The Wells Hatchery goal includes both operational and construction mitigation aspects. The mitigation goal of the Wells Fish Hatchery Complex is to mitigate for No Net Impact on upper Columbia River summer steelhead as they pass Wells Dam (Douglas PUD) and to mitigate for fisheries losses because of the original construction (inundation). One of the main hatchery goal components is to achieve NNI for summer steelhead (Methow and Okanogan River subbasins), and contribute to the rebuilding and recovery of naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest.

Hatchery Objectives

- minimize interactions with other fish populations through rearing and release strategies; maintain stock integrity and genetic diversity of each population or unique stock through proper management of genetic resources;
- maximize survival at all life stages using disease control and disease prevention techniques; prevent introduction, spread or amplification of fish pathogens;
- conduct environmental monitoring to ensure that the hatchery operations comply with water quality standards and to assist in managing fish health;
- communicate effectively with other salmon producers and managers in the Columbia River basin, and with implementers of local and regional flow and spill programs;
- increase the number of naturally produced upper Columbia River summer steelhead on the spawning grounds, and;
- develop a Conservation Plan and conduct a comprehensive monitoring/evaluation program to determine that the program meets mitigation obligations, estimate survival-to-adult, evaluate effects of the program on local naturally producing populations, and evaluate downstream migration rates in regards to size and timing of fish released.

Eastbank Fish Hatchery

Artificial production of summer Chinook for the Methow subbasin is provided through the Rock Island Project Settlement Agreement (and will be superseded by the HCP), via the Eastbank Hatchery.

The overall goal of the Methow River subbasin summer Chinook production is to mitigate for No Net Impact on upper Columbia River summer Chinook as they pass Wells (Douglas PUD), Rocky Reach, and Rock Island (Chelan PUD), and contribute to the rebuilding and recovery of

naturally reproducing populations in their native habitats, while maintaining genetic and ecologic integrity, and supporting harvest.

Hatchery Objectives

- minimize interactions with other fish populations through rearing and release strategies; maintain stock integrity and genetic diversity of each population or unique stock through proper management of genetic resources;
- maximize survival at all life stages using disease control and disease prevention techniques; prevent introduction, spread or amplification of fish pathogens;
- conduct environmental monitoring to ensure that the hatchery operations comply with water quality standards and to assist in managing fish health;
- communicate effectively with other salmon producers and managers in the Columbia River basin, and with implementers of local and regional flow and spill programs;
- increase the number of naturally produced upper Columbia River summer steelhead on the spawning grounds, and;
- develop a Conservation Plan and conduct a comprehensive monitoring/evaluation program to determine that the program meets mitigation obligations, estimate survival-to-adult, evaluate effects of the program on local naturally producing populations, and evaluate downstream migration rates in regards to size and timing of fish released.

United States v. Oregon

United States v. Oregon, originally a combination of two cases, Sohappy v. Smith and U.S. v. Oregon, legally upheld the Columbia River treaty tribes' reserved fishing rights. Specifically, the decision acknowledged the treaty tribes reserved rights to fish at "all usual and accustomed" places, whether on or off the reservation, and were, furthermore, entitled to a "fair and equitable share" of the resource. Although the Sohappy case was closed in 1978, U.S. v. Oregon remains under the federal court's continuing jurisdiction, serving to protect the tribes treaty-reserved fishing rights. This case is tied closely to U.S. v. Washington, which among other things defined "fair and equitable share" as 50% of all the harvestable fish destined for the tribes' traditional fishing places, and established the tribes as co-managers of the resource.

In 1988, under the authority of U.S. v. Oregon, the states of Washington, Oregon and Idaho, federal fishery agencies, and the treaty tribes agreed to the Columbia River Fish Management Plan (CRFMP), which was a detailed harvest and fish production process. There are no financial encumbrances tied to the process. Rather, the fish production section reflects current production levels for harvest management and recovery purposes, since up to 90% of the Columbia River harvest occurs on artificially produced fish. This Plan expired in 1998, and has had subsequent annual rollover of portions in which agreement has been reached; however, a newly negotiated CRFMP is forthcoming.

Hatchery production programs in the upper Columbia sub-basins are included in the management plans created by the fishery co-managers identified in the treaty fishing rights case U.S. v. Oregon. The parties to U.S. v. Oregon include the four Columbia River Treaty Tribes (Yakama Nation, Warm Springs, Umatilla, and Nez Perce tribes), NOAA-Fisheries, U.S. Fish and Wildlife

Service, and the states of Oregon, Washington, and Idaho. The Shoshone-Bannock Tribe is admitted as a party for purposes of production and harvest in the upper Snake River only. These parties jointly develop harvest sharing and hatchery management plans; these are then entered as orders of the court and are binding on the parties. The "relevant co-managers" described in the U.S. v. Oregon management plans are, for the mid-Columbia sub-basins, the federal parties, Yakama Nation, and Washington Department of Fish and Wildlife.

Hatchery programs are viewed by the Yakama Nation as partial compensation for voluntary restrictions to treaty fisheries to assist in rebuilding upriver populations of naturally spawning salmonids. Because treaty and non-treaty fisheries are restricted on the basis of natural stock abundance, the tribal priority is to use hatcheries in a manner that supplements natural spawning and increases average population productivity. Perspectives on the appropriate use of hatchery-origin fish for supplementation vary among federal, state, and tribal fish co-managers. Federal and, to a lesser degree, state co-managers place a higher priority on managing the genetic risks of hatchery supplementation of natural populations, while the tribe sees the demographic threats of habitat loss and degradation as the greater risk to natural populations. In general, however, all parties agree that hatcheries can and should be operated as integral components of natural populations, where the survival benefits of the hatchery can result in a significant increase in net population productivity.

4.5.5 Current Fish Production Program Goals and Objectives

Federal Programs

Grand Coulee Fish Maintenance Project (GCFMP)

The FWS's mission for the Leavenworth complex is:

> To produce high quality spring Chinook salmon and summer steelhead smolts commensurate with the production goals established by the Columbia River Fisheries Management Plan (FWS 2002a)

Winthrop National Fish Hatchery (NFH)

Objectives originally established for the Leavenworth Hatchery Complex, as part of the GCFMP were (from Calkins et al. 1939):

- to bring, by stream rehabilitation and supplemental planting, the fish populations in the 677 miles of tributary streams between Grand Coulee Dam and Rock Island Dam, up to figures commensurate with the earlier undisturbed conditions and with the natural food supply in the streams, and;
- to produce in addition, by the combination of artificial spawning, feeding, rearing and planting in these streams, a supplemental downstream migration equivalent to that normally produced by the 1,245 miles of streams and tributaries above Grand Coulee Dam.

Current objectives of the FWS hatcheries are outlined in FWS (1986a, b). In the FWS Statement of Roles and Responsibilities, the broad role of the hatcheries is:

> …to seek and provide for mitigation of fishery resource impairment because of Federal water-related developments . . . the Fishery Resource Program

> goal, in fulfilling its mitigative responsibilities, is to ensure that established and future fishery resource mitigation requirements are fully and effectively discharged. Implicit in this goal is the replacement of fishery resource losses caused by specific Federal projects . . . and another responsibility of the Leavenworth Hatchery . . . is to restore depleted Pacific salmon and steelhead stocks of national significance in accord with statutory mandates such as the Pacific Northwest Electric Power Planning and Conservation Act, Mitchell Act, Salmon and Steelhead Conservation Act, Pacific Salmon Treaty Act of 1985, and Indian Treaties and related Court decisions.

Shelldrake (1993) updated the objectives of the mid-Columbia NFHs:

- Hatchery production [specific to each facility].
- Minimize interaction with other fish populations through proper rearing and release strategies.
- Maintain stock integrity and genetic diversity of each unique stock through proper management of genetic resources.
- Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens.
- Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.
- Communicate effectively with other salmon producers and managers in the Columbia River Basin.

State programs

Methow Fish Hatchery Complex

One of the guiding principles of the Methow Basin Spring Chinook Salmon Supplementation Plan (MBSCSP) is to increase natural production of the three principal stocks from the mainstem Methow, Chewuch, and Twisp Rivers. With this in mind, the general supplementation plan has established separate strategies for each of the three streams. Each stock will have specific escapement goals, designed to provide a basis for evaluating the progress of achieving the original intent of the program

Methow River: Collaboration between Winthrop FH and Methow FH is of paramount importance for the MBSCSP. Gene flow between the two hatcheries will inevitably occur. To be consistent with this situation, all spring Chinook salmon that spawn in the mainstem Methow River upstream of the Chewuch River confluence will be managed as one genome. To be successful, this management strategy requires three conditions: 1) no spring Chinook salmon from outside this reach will be imported to either hatchery for propagation and release into the Methow River (exogenous salmon may be reared at the hatcheries if they are acclimated and released into their natal stream); 2) all salmon released from either hatchery into the Methow Basin will be externally marked, and; 3) salmon that spawn in the Lost River will be included in this population.

Chewuch River: The Fishery Parties recognize the opportunity to implement innovative fish cultural practices at Methow FH, yet also are acutely aware of the need to ensure high survival of the supplemented populations. The Chewuch River population will, therefore, be the designated stock used for innovative hatchery management. In general terms, the Chewuch stock may be considered an experimental "treatment" stream, compared to the Twisp River population, which will serve as the "reference." Alternative fish culture may include such practices as life skills training (Olla and Davis 1989, Suboski and Templeton 1989), side-channel rearing (Budhabhatti and Maughan 1994), autumn presmolt releases (Bjornn 1978, Bilby and Bisson 1987), or other prototypical hatchery strategies.

Twisp River: The Twisp River stock will be managed in a manner that ensures the highest survival of both natural and hatchery salmon in that river. Low risk production strategies will be implemented in all stages of the program. The Evaluation Plan will place an emphasis on long-term genetic and demographic monitoring of the Twisp population in order to evaluate the stability of a small semelparous population. An estimate of minimum viable population (MVP; Shaffer 1981, 1990; Lacava and Hughes 1984) size will be derived, either through empirical or heuristic analysis (Kapuscinski and Lannan 1986). The escapement goal for the Twisp River will then be based upon the estimated MVP.

The overall goal of the state hatcheries is to use artificial production to replace adult production lost because of smolt mortality at mainstem hydroelectric projects, while not reducing the natural production or long-term fitness of salmonid stocks in the area (WDF 1993). Specific goals of the WDFW hatcheries (WDF 1993) are:

- Hatchery production [in terms of number of fish released from each site];
- Minimize interactions with other fish populations through rearing and release strategies; maintain stock integrity and genetic diversity of each population or unique stock through proper management of genetic resources;
- Maximize survival at all life stages using disease control and disease prevention techniques. Prevent introduction, spread or amplification of fish pathogens;
- Conduct environmental monitoring to ensure that the hatchery operations comply with water quality standards and to assist in managing fish health;
- Communicate effectively with other salmon producers and managers in the Columbia River basin, and with implementers of local and regional flow and spill programs, and;
- Develop a Conservation Plan and conduct a comprehensive monitoring/evaluation program to determine that the program meets mitigation obligations, estimate survival to adult, evaluate effects of the program on local naturally producing populations, and evaluate downstream migration rates in regards to size and timing of fish released.

4.5.6 Fish Production Program Operations

Federal Program

Winthrop NFH

FWS operates the Winthrop National Fish Hatchery (WNFH) located only a few miles downstream from the Methow FH. Broodstock are typically collected from the volunteer trap located in the hatchery outfall. Approximately 600,000 smolts are released annually directly into the Methow River from the WNFH.

Adult spring Chinook salmon return to the hatchery beginning in early- to mid-May. The escapement goal for this hatchery is 350 adults, for a subsequent release of 600,000 smolts annually. Spawning begins in mid-August and can continue to mid-September. The stock of spring Chinook propagated at WNFH is listed as "Endangered" under the Endangered Species Act (ESA). Brood year 1999 was the first year propagating this stock. Prior to the switch in stocks, a Carson NFH (lower Columbia River) stock was utilized (not ESA-listed).

In most years, all broodstock used for production are volunteers to the hatchery. Adults swim up the collection ladder and into a holding area. The capacity of this pond can only support about 400 adults. The current program calls for adults in excess of brood needs to spawn naturally; therefore, hatchery staff must limit the number of adults entering the ladder. A weir is placed in the channel leading to the ladder and is selectively opened and closed.

During years of extremely low adult returns, as in 1996 and 1998, all spring Chinook ascending Wells Dam are captured and transferred to WNFH and the Methow Fish Hatchery. Adult brood for the Winthrop program has, in some years, been captured at the MFH and transferred to WNFH.

For years 1984 to 2001, an average of 685 adults of WNFH origin have returned to the Methow River Basin. Although the original objective of this mitigation program was to provide fish for harvest, it is also trying to aid in the recovery of ESA-listed populations.

All juveniles released from WNFH have a coded-wire tag (CWT) inserted in their snout. During the spawning of adults, CWTs from all adults are removed and decoded prior to the mixing of gametes. This way, FWS has the ability to manage particular crosses (matings); some are more desirable than others.

Juveniles are annually released as yearlings in mid-April. The smolts are forced from the raceways into the ¼ mile long spring-fed channel (where the ladder is located), which flows to the Methow River. Currently, all juveniles carry a CWT, and a portion may also have an adipose-fin clip (depending on lineage).

Throughout the years, the spring Chinook release goal at WNFH has varied. The current goal is 600,000 smolts at 15 to18 fish/pound. During the years 1980 to 2001, an average of 642,682 have been released annually.

Winthrop NFH also has a small summer steelhead program. This stock is listed as "Endangered" under the ESA. The annual release goal is currently 100,000 smolts. Brood for this program is secured at Wells Dam by WDFW; none of the steelhead are collected as volunteers to WNFH. Eyed eggs are transferred to WNFH from Wells Hatchery in January or February each year.

Approximately 14 months later, the smolts are volitionally released over a two-to-four week period starting in early April. Juveniles are 100% fin-clipped, and returning adults may be harvested in the sport fishery above Rocky Reach Dam.

State Program

Spring Chinook

The Methow Fish Hatchery operates as an adult-based supplementation program using multiple adult broodstock collection locations including the Chewuch, Twisp, and upper Methow Rivers. Additional supplementation includes volunteer returns to Methow Fish Hatchery and Winthrop NFH. The long-term production objective for the Methow Fish Hatchery was set at 738,000 yearling spring Chinook smolts in the Wells Dam Settlement Agreement (1990); however, the maximum capacity of the facility was modified during the development of the Mid-Columbia Habitat Conservation Plan (MCHCP) to 550,000 yearlings at 15 fish/pound (BAMP 1998). Three acclimation facilities are components of the spring Chinook supplementation program and include the Twisp acclimation, Chewuch acclimation, and on-site acclimation at the Methow State Fish Hatchery.

Poor returns of wild fish and limited broodstock collection capabilities, coupled with historically poor spring Chinook replacement rates of 0.7 recruits per spawner (1985-1990; L. LaVoy, WDFW, unpublished data), prompted the development of a three-tiered broodstock collection protocol for the spring Chinook supplementation program in the Methow subbasin. Under a revised approach adopted in 1996, the location and extent of broodstock collections is based on projected escapement at Wells Dam (**Table 53**). Broodstock collection protocols are now developed annually and are determined by adult escapement above Wells Dam, expected escapement to tributary and hatchery locations, estimated wild/hatchery proportion, and production objectives and stock origin (endemic/non-endemic).

Table 53 Broodstock collection guidelines of the Methow Basin spring Chinook supplementation plan

Wells Escapement Projection	Broodstock Collection Objective
< 668	100% collection of Wells Dam escapement; place all fish into the adult-based supplementation program.
>668 <964	Pass a minimum of 296 adults upstream of Wells Dam for natural spawning.
> 964	Collection at levels to meet interim production level of 550,000 and 600,000 smolts at Methow Fish Hatchery and Winthrop NFH, respectively.

(ESA Section 7 Draft Biological Opinion, Section 10 Permit 1196)

The hatchery and acclimation ponds are operated in a manner that is consistent with accepted aquaculture standards and those identified in the Wells Dam Settlement Agreement. Broodstock handling, spawning, fertilization, incubation, rearing, fish transport, and release activities are

detailed in annual summary reports of specific brood years for the Methow Basin Spring Chinook Salmon Hatchery Program (Bartlett et al. 1994; Bartlett 1996, 1997, 1998, 1999; and Jateff 2001).

Since adult returns were so low in the beginning years of the program, WDFW used some Carson stock fish in their program. WDFW is now actively avoiding fish of Carson ancestry in their broodstock; the WNFH is also moving away from using these fish.

WDFW spawns both listed hatchery x natural and natural x natural crosses to the extent possible. When possible, naturally produced fish retained for broodstock shall represent the natural-origin population in terms of age composition, sex ratio, and run timing. To the greatest extent possible, WDFW shall maintain known Twisp River spring Chinook salmon as a separate broodstock within the hatchery. The progeny of known Twisp River spring Chinook salmon shall be distinctly marked for identification purposes.

To reduce and control fish disease incidences, WDFW will use the disease control procedures identified in the operations plans, and adhere to the Washington co-manager, Pacific Northwest Fish Health Protection Committee and IHOT (Integrated Hatcheries Operation Team) fish disease control policies.

Summer Chinook

Artificial production of summer Chinook for the Methow subbasin is provided through the Rock Island Project Settlement Agreement (and will be superseded by the HCP), via the Eastbank Hatchery. The hatchery was constructed in 1989, and is located adjacent to Rocky Reach Dam on the Columbia River. The program is funded by Chelan County PUD and operated by WDFW. Summer Chinook production at Eastbank Hatchery is intended to mitigate for summer Chinook losses at Rock Island Dam. The production objective for the Methow River is a total of 400,000 yearling summer Chinook at 10 fish/pound (BAMP 1998).

Broodstock (556 adults) are collected at the Wells Dam east ladder trapping facility and transported to the Eastbank Hatchery. These fish originate from Okanogan/Methow (Wells Dam East ladder trap) summer Chinook populations of natural- or hatchery-origin, and are indigenous to the Methow/Okanogan system. Returning salmon from the Carlton (Methow River) program also volunteer into Wells Fish Hatchery, yet they are identified by Code Wire Tags (CWT) and can be placed into their program of origin if desired (Eltrich et al. 1995; BAMP 1998). Incubation, spawning, and initial rearing of Methow summer Chinook take place at the Eastbank facility. The fish are then transferred to the Carlton Acclimation Pond towards the end of their second winter, where they are volitionally released at smolt size (10fish/lb.) into the Methow River during April and May (these fish are currently raised for Wells mitigation under a “species trade” between Chelan and Douglas PUD; once the HCPs are finalized, the 400,000 fish will be split 50:50 between the two PUDs (until 2013, when Chelan’s obligation may go down)).

Broodstock collection protocols are developed annually and determined by annual escapement at Rocky Reach Dam, subject to in-season adjustments. Facility operation description, biological attributes and aquaculture practices and standards are detailed in the HGMP for summer Chinook as developed for the Biological Opinion for ESA-Section 10 Permit #1347 (Incidental Take of Listed Salmon and Steelhead from federal and Non-federal Hatchery Programs that Collect, Rear

and Release Unlisted Fish Species; WDFW 2000) and as developed for the Rocky Reach and Rock Island Anadromous Fish Agreement and Habitat Conservation Plan.

Summer Steelhead

Steelhead are collected from the run-at-large at the west ladder trap at Wells Dam. Beginning in 2003, wild-origin fish were also collected from the east ladder trap to incorporate a greater number of wild fish into the broodstock (33%). Adult steelhead are spawned and reared at Wells FH.

Approximately 125,000 eyed eggs are shipped to Winthrop National Fish Hatchery to support a 100,000 smolt program that releases directly from the hatchery into the Methow River. Wells FH annually transports and releases an additional 350,000 smolts into the Twisp, Chewuch, and Methow Rivers, and an additional 130,000 steelhead smolts for release into the Okanogan and Similkameen rivers.

Broodstock collection protocols are developed annually and subject to in-season adjustments. Facility operation description, biological attributes and aquaculture practices and standards are detailed in the Draft HGMP for summer steelhead and in the Biological Opinion for ESA-Section 10 Permit #1395, #1396 and #1412, and as developed for the Wells Dam, Rocky Reach and Rock Island Anadromous Fish Agreement and Habitat Conservation Plan(s).

Coho

Coho are collected as volunteers into the Winthrop National Fish hatchery and from the run-at-large at Wells Dam west bank and/or east bank fish traps to support a 250,000 smolt program. Methow basin coho broodstock may be supplemented with eyed eggs transferred from Wenatchee Basin incubation facilities or from hatcheries on the lower Columbia River (Cascade FH, Eagle Creek NFH, or Willard NFH) in years where broodstock collection falls short of production goals. Coho reared at Winthrop NFH are volitionally released into the Methow River or transferred to the Wenatchee River for acclimation and release. Under the current feasibility program, coho releases from the Winthrop National Fish Hatchery are designed to contribute to the broodstock development process. Details on mating protocols, rearing and acclimation strategies, size at release, and monitoring and evaluation can be found in the Yakama Nation's mid-Columbia coho HGMP (YN 2002).

Non-anadromous fish releases

Non-anadromous fish have been planted within the Methow Basin since the early 1900s. Rainbow trout, cutthroat trout, brook trout, and a few brown trout have all been planted at various times through multiple hatchery programs.

Following micro-habitat work in the 1980s that showed negative effects on presmolt steelhead from "catchable" releases of rainbow trout, all releases of rainbow were shifted from streams to various lakes within the basin that did not have connectivity to anadromous areas.

Conservation of the Species: The capture of Endangered UCR spring Chinook salmon and summer steelhead by WDFW for artificial propagation efforts are designed to benefit the species. The primary objectives of these efforts are to preserve extant spring Chinook and steelhead populations in the region, and to boost the abundance of remaining stocks. There are risks of ecological and genetic impacts on the ESA-listed juvenile and adult spring Chinook salmon and

steelhead resulting from the proposed programs; however, the risk of extinction to natural populations is high enough that aggressive intervention is required.

Monitoring and Evaluation

The Wells Settlement Agreement (by which MFHC and Wells Fish Hatchery were authorized, and which will be superseded by the HCP) includes provision for evaluation of the MFHC and Wells Fish Hatchery, both able to meet their production requirements under Phase I of the HCP, and its effects on natural production. This evaluation plan includes genetic monitoring of hatchery and naturally produced fish, migration timing, survival studies of hatchery releases, and studies to evaluate interaction between hatchery- and naturally produced fish. Monitoring and evaluation of the hatchery programs in the Methow River is ongoing. The plan for the adult-based supplementation program addresses three critical uncertainties associated with the program:

- whether the hatchery facilities can safely meet their production objectives;
- the effect of the programs on the long-term reproductive success of the population in the natural environment, and;
- the identification of ways to operate the facilities to reduce the short-term ecological impacts on the naturally produced fish (WDFW 1998a).

In addition, the Yakama Nation is monitoring summer chinook stock status in the Methow River using visual observations and video recordings taken near Pateros. This work is funded by Alaska through the Columbia River Inter-Tribal Fish Commission.

4.5.7 Program Results

Federal Program

Winthrop NFH was constructed to mitigate for lost habitat because of the construction of Grand Coulee Dam. The original objective of this facility was to provide adults for harvest. This role has changed in recent years. While in some years a sport fishery is open for adult steelhead returning to WNFH, it is desired that adult spring Chinook salmon (in excess of brood needs) are allowed to spawn naturally in the Methow River. This program change was driven by the ESA, and now focuses primarily on recovery.

State Program

Spring Chinook

Record escapements of spring Chinook in the Methow Basin in recent years have been positively influenced, in part, by the hatchery program at Methow Fish Hatchery. In recent years, the number of hatchery fish on the spawning grounds has greatly exceeded the number of wild fish (>90%). The number of spring Chinook (hatchery and wild) returning to the Methow Basin has also greatly exceeded escapement levels. While an increase in wild fish abundance has been

observed, future adult returns should provide more information to the efficacy of the hatchery program in increasing the abundance of naturally produced populations.

Summer Chinook

Record escapements of summer Chinook in the Methow Basin in recent years have been positively influenced in part by the hatchery program at Carlton Pond. A goal of a supplementation program is to increase the number of spawners by allowing hatchery fish to spawn naturally. Subsequent increases in the number of naturally produced fish on the spawning grounds would support the hypothesis that hatchery fish contributed to future adult returns.

Steelhead

Hatchery fish have been a dominant part of the spawning population for many years; however, the objective of the hatchery program has only recently changed to a recovery role versus a harvest augmentation role. Wild or naturally produced fish comprise approximately 10% of the run over Wells Dam. If the hatchery program is successful, the proportion of wild fish should increase in subsequent years. An increase in the number of wild fish incorporated into the broodstock may reduce potential genetic impacts on the wild fish. In the Methow Basin, a high abundance of hatchery fish, because of above-average SARs, has lead to escapement levels far above the carrying capacity of the basin. In response, the WDFW developed a methodology using a sport fishery to reduce the number of hatchery fish on the spawning grounds with acceptable risks to the natural origin component (approved action on ESA Section 10 Permit #1395), reducing not only density-dependent effects but also genetic impacts.

Contribution of Adults to Recovery or Harvest

Returning adults from these programs are intended to increase naturally spawning populations. The hatchery programs have successfully contributed adults to the naturally spawning populations; however, harvest does occur in years of high abundance on summer Chinook. Harvest of steelhead has recently been authorized under Section 10 Permit 1395 as a method to reduce hatchery fish on the spawning grounds.

Summer/fall Chinook smolts released from the Carlton acclimation pond have averaged 0.19 return rate to adults, ranging from 0.02 to 0.81 for brood years 1989 through 1997.

Effects on Wild and Native Populations and Environment

Effects on the wild populations (target and non-target) will be assessed at the juvenile stage using smolt traps and when fish return as adults. The relative productivity of the spawning population will be monitored over time using smolt traps located within the Basin. Relationships between smolt production and spawner abundance (percent hatchery fish on the spawning grounds) will provide information related to reproductive potential of the stocks and habitat. Relationships in productivity between stocks would also provide some information regarding competition in the freshwater environment. Smolt traps also provide information regarding trends in other species not directly associated with hatchery programs (i.e., non-target taxa of concern).

Spawning ground surveys will not only be used to develop smolt-to-adult return rates (SARs) for hatchery and wild fish, but provide information on spawn timing and distribution. Biological data collected from carcasses will also provide data concerning age and size at maturity.

The reproductive rate of hatchery and wild steelhead will be assessed through a reproductive success study. Results will provide insights to the relative contribution of various parental crossed spawning in the natural environment (HxH, HxW and WxW). These data will be instrumental in directing the supplementation program broodstock collection, spawning protocols, release levels, parental origin of steelhead released, and adult management on the spawning grounds.

Comparisons of any of these parameters (juvenile or adult) between hatchery and wild fish would provide insight on the effects hatchery fish may have on wild populations. Any effects that are detected (greater than acceptable levels) would be addressed in subsequent changes in the respective hatchery program.

4.5.8 Restoration and Conservation Projects

Existing and past project efforts in the Methow subbasin span a broad range of habitat restoration work, education and awareness, improvements to irrigation systems, etc. These represent largely cooperative efforts of various combinations of local government, private organizations, private citizens, tribes and state agencies (See Appendix D).