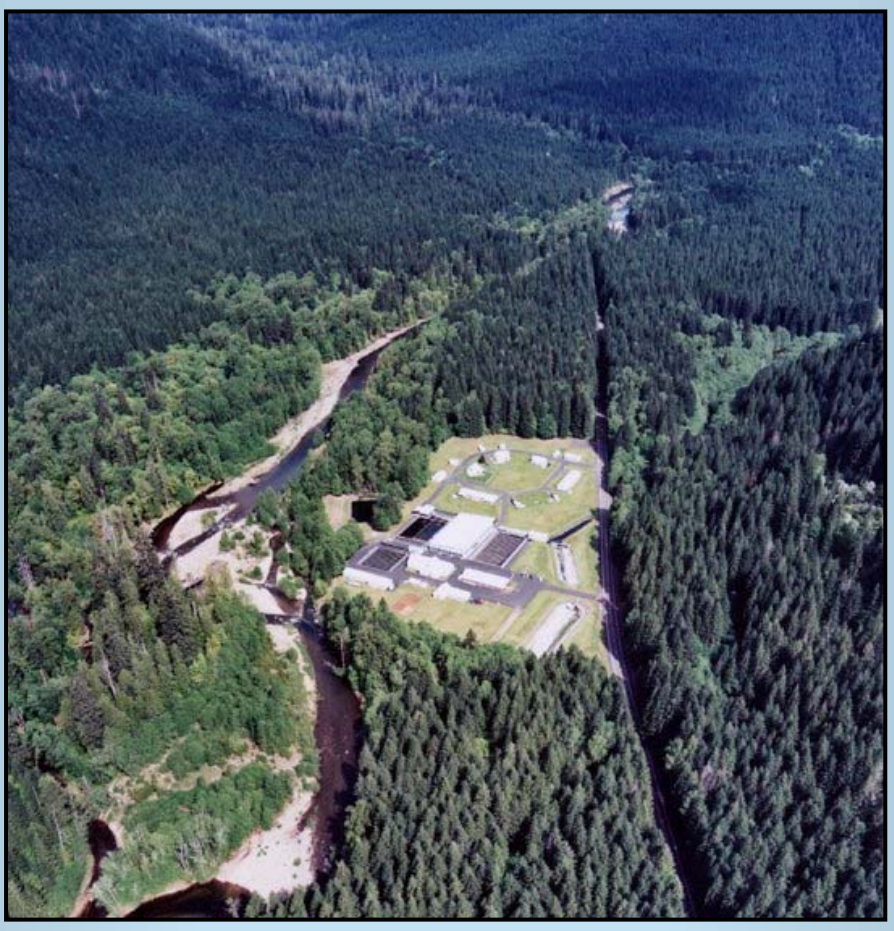
# Comprehensive Hatchery Management Plan

## Carson National Fish Hatchery



U.S. Fish and Wildlife Service
Planning Report: Number 1
October 2002

# COMPREHENSIVE HATCHERY MANAGEMENT PLAN

## Carson National Fish Hatchery

### Planning Report: Number 1

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**U.S. Fish & Wildlife Service, Region One**

**October 2002**

# Explanation of Purpose

## Carson National Fish Hatchery - Comprehensive Hatchery Management Plan

This Comprehensive Hatchery Management Plan (CHMP) for the Carson National Fish Hatchery (NFH) is an operational management plan which outlines policy, legal mandates, goals and objectives relevant to the overall management of the station. This document is a planning and reference tool and is not a decision-making or policy-making document.

Additional documents developed in separate processes are referenced in this CHMP and provide biological, policy, legal, and management analysis of the Carson NFH. These documents are the Biological Assessment and Biological Opinion on Artificial Production in the Columbia River Basin, the Federal Columbia River Power System Biological Opinion, the Hatchery and Genetic Management Plan, and the U.S. v Oregon Columbia River Fisheries Management Plan.

The correct citation for this plan is:

U.S. Fish and Wildlife Service (USFWS). 2002. Comprehensive Hatchery Management Plan for the Carson National Fish Hatchery. Planning Report Number 1, U.S. Fish and Wildlife Service, Carson National Fish Hatchery, Carson, Washington.

This Comprehensive Hatchery Management Plan for the Carson National Fish Hatchery (Planning Report: Number 1) addresses the Pacific Region's requirement to integrate U.S. Fish and Wildlife Service objectives and priorities with those of co-managers, other agencies, and resource programs; fulfill obligations under the Endangered Species Act and relevant fisheries conservation, mitigation, and management programs; identify and define in specifics what hatchery reforms are implemented to achieve objectives; and, provide a foundation for future program and budget development and review.

Submitted by: _____ 10/29/02

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Regional Director, Pacific Region — Date

## Acknowledgments

Dan Diggs and Doug DeHart coordinated the initial development of this plan, along with Chuck Dunn, Lee Hillwig, Ed Forner, Kate Benkert, Bob Semple, Larry Marchant, Ed Lamotte, Bob Wunderlich, Ron Wong, Ray Jones, Thomas Trock, Brian Cates, and Rich Johnson. Donna Allard provided assistance in the publication of this report.

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## Plan Overview

The U.S. Fish and Wildlife Service (Service) has recognized the need for a comprehensive hatchery planning process to assist in meeting the challenge of changes to hatchery management as required by the conservation status of most Pacific salmon and other anadromous and freshwater fish species. The development of plans, such as this one, will help to: 1) integrate Service objectives and priorities with those of co-managers, other agencies, and resource programs; 2) fulfill our obligations under the Endangered Species Act and relevant fisheries conservation, mitigation, and management programs; 3) identify and define in specifics what hatchery reforms we are implementing to achieve our objectives; and, 4) provide a foundation for future program and budget development and review. This plan recognizes and complies with all management plans and Biological Opinions affecting the Columbia River Basin in general and the Wind River in particular.

## Hatchery Purpose

Carson NFH was authorized by Special Act 50 Stat. 220, May 28, 1937, and placed into operation in December 1937 to mitigate for the effects of federal water projects, primarily Bonneville Dam. The hatchery was reauthorized by the Mitchell Act (16 USC 755-757; 52 Stat. 345) May 11, 1938 and amended on August 8, 1946, (60 Stat. 932) for conservation of fishery resources in the Columbia River Basin. The hatchery was remodeled in 1956 to establish a hatchery spring Chinook run in the Wind River, and is currently used for adult collection, egg incubation and rearing of spring Chinook. It also provides eggs for re-establishing spring Chinook runs in other Columbia River tributaries, as needed.

The following Hatchery Management Goals were adapted from the Mitchell Act, Endangered Species Act (ESA) Biological Opinions, U.S. v. Oregon agreements, and the Integrated Hatchery Operations Team - Operation Plans for Anadromous Fish Production Facilities in the Columbia River Basin Volume III - Washington, Annual Report for 1995 (IHOT 1996).

## Hatchery Goals [1]

Goal 1: Conserve Columbia River spring Chinook salmon in the area upstream of Bonneville Dam (as defined in the Mitchell Act of 1937).

Goal 2: Assure that hatchery operations support Columbia River Fish Management Plan (U.S. v Oregon) production and harvest objectives.

[1]Objectives, tasks and current practices to achieve goals are described in Chapter 3.

Goal 3: Minimize impacts to listed (ESA) and other native species, their habitat, and the environment.

Goal 4: Develop outreach to enhance public understanding, participation and support of Service and Carson NFH programs.

**Hatchery Benefits**

**Harvest Contribution**.—Spring Chinook salmon from Carson NFH have, over the years, supported successful sport and tribal fisheries in the Columbia and Wind rivers. Fisheries occur almost exclusively in the Columbia and Wind rivers with the majority of fish harvested in the freshwater sport fishery, followed by tribal treaty and Columbia River gill net fisheries (Refer to Chapter 3 for more discussion on harvest). For example in 2001, the sport catch in the Wind River was 11,956 fish, with tribal catch at 1,840, and escapement to the hatchery at 12,075 fish (WDFW, Southwest Region, Vancouver, WA, July 13, 2001 data).

**Economic Benefit.—** During times of good ocean and river conditions that result in healthy adult returns, significant economic activity is generated through harvest of Carson NFH spring Chinook salmon. For example in 2001, Washington Department of Fish and Wildlife estimated that 32,442 angler-days (one person fishing for at least part of one day) occurred on the Wind River as a direct result of a record return of Carson NFH adult spring chinook salmon.

In addition, the role of a Federal mitigation hatchery is to compensate for natural habitat lost to Federal hydro-projects. It follows then, that the economic benefit of the mitigation hatchery is interwoven into the economic benefit of the hydro-power project/s being mitigated for and that the hatchery can be characterized as an operating expense of the hydro-power project. The Service recognizes that mitigation hatcheries serve a significant role in supporting economically important fisheries.

**Planning Issues**

Several federal, state and tribal entities share responsibilities for development of sub-basin plans, hatchery production, harvest management, and ESA considerations. The CHMP recognizes and complies with all management plans and Biological Opinions affecting the Columbia River Basin in general and the Wind River in particular. Operations at Carson NFH pose a number of potential issues in the watershed.

**Marking.—**

- To help protect wild and naturally produced fish, the states of Washington, Oregon and Idaho are implementing selective sport and commercial fisheries (non-tribal) on marked hatchery fish.

- Columbia River Treaty Tribes generally disagree with the management strategy for mass marking and selective fisheries.

- The Service has not made any unilateral decisions on marking.

**Juvenile salmon distribution and production numbers.—**

- Juvenile salmon are released from the hatchery in the spring as yearling smolts to promote quick downstream migration from the hatchery.

- The Yakama Nation has expressed an opinion that juvenile fish from the hatchery should be released throughout the watershed.

**Water shortage (drought).—**

- During drought conditions the hatchery may need to make early releases of juvenile spring Chinook into the lower Wind River.

- Conservation groups are highly concerned about potential actions undertaken by the hatchery to address drought conditions and their impact to listed steelhead and resident cutthroat trout.

**Surplus adult salmon distribution.—**

- The Service, Yakama Nation, and other conservation groups would like to see plans developed to determine the number of salmon carcasses, if any, suitable for stream enrichment, both dead and alive.

**Fish passage and ladder management.—**

- The Yakima Nation would like an early closure (August 1 or earlier) of the ladder to the hatchery to allow adult salmon to spawn and die naturally in the Wind River allowing potential natural production and stream enrichment.

- Conservation groups are concerned about impacts from hatchery fish to listed steelhead and resident cutthroat trout.

- The Service is concerned about potential disease risks from allowing adult salmon to spawn and die above the hatchery water intakes.

**Negative impacts to listed and other aquatic resources and what actions are being taken to help recover listed and depressed populations**.—

- Concerns on present hatchery operations have been expressed by conservation groups, such as The Native Fish Society and Skamania Flyfishers. Of particular concern at Carson NFH is the potential impact to the Lower Columbia River Ecologically Significant Unit (ESU) of federally threatened steelhead.

**Insufficient operations and maintenance funding through the Mitchell Act**

- Mitchell Act Funding has been flat for over ten years, and may result in reductions in hatchery production programs, and preclude the Service's mitigation and tribal trust responsibilities.

# CHAPTER 1. INTRODUCTION/BACKGROUND

## Purpose of and Need for Plan

The Carson National Fish Hatchery (NFH) was placed in operation in December 1937 with the intent to mitigate for the loss of fall Chinook and coho salmon spawning grounds lost in the lower Wind River from the backwaters of the Bonneville Dam pool. Over the years the Carson NFH production program has included a variety of fish species: rainbow trout, yellowstone cutthroat, brook trout, coho salmon, sockeye salmon and kokanee, spring and fall Chinook. Since 1981 Carson NFH has focused almost exclusively on spring Chinook. Though not native to the Wind River system, spring Chinook adapted well to the Carson NFH environment, and the resulting program has emerged from that success. In the past, hatchery programs were allowed to evolve based on perceived needs and the capabilities of the facility. Today's hatchery programs are still dynamic and the origin of change is driven by public appeal, legislative mandates, judicial decrees, and ESA. The need to develop thoughtful planning processes based on sound policy and scientific information has never been greater.

The U.S. Fish and Wildlife Service (Service) has recognized the need for a comprehensive hatchery planning process to assist in meeting the challenge of changes to hatchery management required by the conservation status of most Pacific salmon and other anadromous and freshwater fish species. The development of plans, such as this one, will help to: 1) integrate Service objectives and priorities with those of co-managers, other agencies, and resource programs; 2) fulfill our obligations under the Endangered Species Act and relevant fisheries conservation, mitigation, and management programs; 3) identify and define in specifics what hatchery reforms we are implementing to achieve our objectives; and, 4) provide a foundation for future program and budget development and review.

The Service is committed to developing and maintaining a sound scientific and management underpinning for its programs. The Service has participated with State, Tribal and Federal partners in reviewing and assessing hatchery operations as they evolve to become, more than ever, part of the solution to fisheries restoration and recovery goals. The Service has involved our cooperators in defining and evaluating our respective roles, and the Service continues to reach out to the general public, individual constituent groups, and local governments to explain our programs and initiatives. The Service has put in place a system of program evaluation that utilize principles of adaptive management to integrate new information and expectations. All this and more is embodied in development of this plan. The journey of developing these plans, the research, analysis, thought, and outreach, is as important as the product itself. The Service looks into this process to stabilize and strengthen Service fish production programs in fisheries restoration and recovery efforts of the Nation.

## Description of Planning Process

The planning process began in February 2001 with establishment of the Carson CHMP Team, the core group responsible for drafting and revising the CHMP as it moves towards its anticipated completion in June 2002. The Team is composed of Service staff directly involved with the hatchery program. Additional coordination was provided by members from the Regional CHMP Steering Committee. The Steering Committee, composed of Service representatives from the Pacific Region, provided oversight to the CHMP process. In addition, the Steering Committee developed the general format and time line for completing the CHMP process, reviewed drafts of the Carson CHMP to ensure consistency with both the approved format and other CHMPs under development in Region 1, and ensured consistency with Regional and National goals of the Service Fishery Program.

## Composition of Planning Team

The planning team was made up of Service representatives from the following offices:

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**Review and Update of Plan**

Because the biological, sociological, economic, and political environment is constantly changing, the role and responsibilities of Carson NFH can also be expected to change. It was the intent from the beginning that the CHMP would itself be dynamic to reflect that nature. Therefore, it was necessary to include a process for reviewing and updating the plan on a periodic basis. Review and updating will take place at least once every five years and will be the responsibility of the HET.

**Fisheries Program Mission, Goals, and Priorities**

Our National Fish Hatcheries have authority for construction, operation, and maintenance that is contained in a variety of specific and general statutes. The remainder of the Fisheries Program is guided by a variety of general statutory mandates and authorities. Without the specific direction that would come from organic legislation, the Service has continually adjusted the priorities of the entire Fisheries Program, at the national level, to guide the Program and ensure that each Region within the Service is focusing their limited resources on the highest priorities of the Nation (Attachment 1: Map of U.S. Fish and Wildlife Service Pacific Region).

To provide long-term management direction for fishery resources, the Service in January 1985, issued its most complete description of priorities to date for the Fisheries Program in a document entitled, “Statement of Responsibilities & Roles” (U. S. Fish and Wildlife Service Fishery Resources Program, January 31, 1985). In May 1994, to incorporate those priorities within an ecosystem approach, the Service combined the fisheries resources and aquatic priorities of the Fisheries, Ecological Services and Refuges Programs into a single document titled, “Action Plan For Fishery Resource and Aquatic Ecosystems”. This document included a comprehensive ecosystem and watershed based conservation, restoration, and enhancement program. As the Fisheries Program further evolved to include a conservation perspective to the management of natural populations, a revision to the Fisheries Program priorities was announced in November 1997. The Director approved and announced the following six priorities for the Service’s Fishery Program:

- Recovery of listed and candidate aquatic species
- Restoration of interjurisdictional fisheries and aquatic ecosystems
- Management of interjurisdictional fisheries
- Fulfilling mitigation obligations
- Restoring depleted aquatic populations to preclude listing
- Providing fish and wildlife management assistance to tribes and on Fish and Wildlife Service land

Across the Nation, the Fisheries Program continues to be guided by these priorities, but there is an ongoing effort that, when completed, may revise these priorities. At the request of Congress and the Office of Management and Budget, the Service began development of a strategic plan for the National Fish Hatchery System in 2000. In 2001, the Service then began preparation of a strategic plan for the entire Fisheries Program. When completed, these documents will set the new direction for the Fisheries Program and the role of National Fish Hatcheries in implementing program priorities.

**National Fish Hatchery System - National/Regional Overview and Statutory Mandates/Authorities**

The Service's stewardship of the Nation's varied and valuable fishery resources dates from the appointment of Spencer Baird as Commissioner of Fish and Fisheries by President Ulysses S. Grant in 1871. That initial Federal involvement was in response to concern over the widespread decline in domestic food fish supplies. In 1872, Congress provided the first appropriation for the Fishery Program when it funded the introduction of shad, salmon, whitefish, and other food fishes into waters to which they were best adapted. A little later that year, "The propriety was strongly urged, at the Boston meeting, of sending some experienced fish-culturist to the west coast for the purpose of securing a large amount of spawn of the California salmon." Mr. Livingston Stone traveled to California and established a hatching-works on the McCloud River. This was the first salmon breeding unit in the United States, the first hatchery to be established with federal funds, and the beginning of the National Fish Hatchery System.

During the early years of the hatchery program, most National Fish Hatcheries were established under general authorizations for fisheries development as specified in appropriation acts. Then in the 1930's a series of acts provided authorizations for hatchery development. This permitted the National Fish Hatchery System to expand on a planned basis.

The Service has a 130-year history of leading Federal fishery conservation efforts in the Pacific Northwest. During this time, our Federal fishery resource involvement and responsibilities have grown, diversified, and undergone several modifications in response to continually changing needs. The program shifts and expansions evolved to address the circumstances of each era. Today, the Service is taking a holistic approach to fishery conservation. Present activities focus on a broad array of scientific fishery management and conservation efforts.

A historical background into the establishment and operation of National Fish Hatcheries in Region 1 is provided in Attachment 2 (Note: Region 1 is the Pacific Region and includes Washington, Oregon, Idaho, California, Nevada, Hawaii and the Pacific Territories). Since the establishment of the first salmon hatchery on the McCloud River, 67 hatcheries or fish facilities have been established in California, Idaho, Oregon, and Washington. Only 19 of those hatcheries, 2 fish facilities, and 1 technology center are in operation today. The remainder have either been closed or transferred to State or other Federal agencies.

The development of a broad range of statutory mandates and authorities under which the Service conducts its hatchery program along with numerous other fishery related activities conducted in cooperation with other Federal, State, Tribal, and private entities is documented in Attachment 3. Vested with significant legal responsibilities under State and international agreements, treaties and laws, the Service conducts an extensive conservation effort in order to help protect and restore native aquatic species and their habitats with the goal of preempting severe declines and potential listings under the Endangered Species Act (ESA).

The Region 1 Fisheries Program consists of four major program activities: National Fish Hatcheries, Fish Health Centers, the Abernathy Fish Technology Center, and Fishery Resource Offices/Fish and Wildlife Offices. Successful implementation of the Service's hatchery activities requires close coordination and cooperation with the other three Fisheries Program activities. The Abernathy Salmon Technology Center provides state-of-the-art applied research in several fields including development of new fish diets for salmonid and sturgeon culture, use of genetic identification in the recovery and restoration of native stocks, and development of new and improved techniques to increase the efficiency of fish culture and captive brood stock operations. Fish Health Centers participate in Investigational New Animal Drug registration, provide diagnostic and veterinarian services on wild fish stocks and hatchery-reared fish, and supply health certifications for the export of fish and fish eggs. Fishery Resource Offices/Fish and Wildlife Offices participate in a wide variety of activities including coast-wide stock assessment and evaluation, coded-wire tagging of hatchery indicator stocks for the U.S./Canada Treaty, evaluation of hatchery production, and assessment of new approaches to produce "wild type" fish at culture facilities. These offices also participate in a broad range of other activities including habitat assessment and restoration, non-indigenous species coordination, natural production studies, harvest assessment, fish passage coordination, and endangered species listing and recovery activities.

**Regional Fishery Goals and Priorities**

The Pacific Region Fisheries Program is committed to focusing its priorities and resources toward the conservation, recovery, and restoration of native resident and interjurisdictional species. The Fisheries Program works with State, Federal, Tribal and other partners, as well as

on Service, Tribal, and other Federal lands, to ensure that its actions purposefully contribute to these objectives. Regional priorities are as follows:

**Implementing Hatchery Reform**.—National Fish Hatcheries are reforming hatchery practices to conform with their associated scientific foundations and management evaluations of those efforts. National Fish Hatcheries in the Pacific Region produce and release fish, and stocks of fish, as identified in approved Hatchery Genetic Managements Plans (HGMPs).

**Implementing Comprehensive Hatchery Management Plans**.—Implementation of the Comprehensive Hatchery Management Plan is a highly significant Regional priority. Comprehensive plans incorporate the rationale, authorities and supportive documentation for operation and management of National Fish Hatchery programs.

**Hatchery Evaluations**.—Monitoring and evaluation of hatchery production programs are a critical component of effective hatchery operations. Completion of hatchery management plans, including this one, will further identify research needs and assure quality.

**Hatchery Evaluation Teams**.—To foster and enhance communication in the hatchery production and evaluation process, active participation in Hatchery Evaluation Teams by Service programs, resource agencies, and public partners is a Fisheries Program priority.

**Habitat Restoration and Technical Assistance to Other Regional Programs**.—Providing technical assistance to other Regional programs on Service lands with Partners for Fish and Wildlife and other Service habitat restoration efforts is a high priority of the Fisheries Program.

**Tribal and Federal Lands**.—Providing support to Tribal Governments and Federal land management agencies for fish and wildlife resources on their lands has always been and continues to be a high priority.

**Fish Passage Improvement**.—An important part of the Fisheries Program is habitat restoration which re-establishes access to important historic habitats for fish. As such, emphasis is placed on fish passage improvement. A high priority is given to identifying and correcting fish passage problems at National Fish Hatcheries, other Service and non-Service lands.

**Endangered Species Act**.—The Fisheries Program promotes and initiates actions that ensure all Fisheries Stations in the Pacific Region are in compliance with the Endangered Species Act.

**Compliance With Court Agreements and Other Legal Obligations**.—The Fisheries Program complies with court agreements and other legal obligations, and enhancement efforts that contribute to the mitigation, conservation, restoration, and recovery of listed, candidate and imperiled fish species, both anadromous native fish and resident native fish, such as, bull trout, cutthroat trout, desert fishes, and others.

**Mitigation**.—The Fisheries Program implements artificial production to comply with mitigation responsibilities consistent with Congressional mandates and funding.

**Restoration and Recovery of Native Fishes**.—Restoration and recovery of native fishes is a Regional priority. Healthy stocks of native fish are indicators of clean water and healthy aquatic ecosystems. Healthy stocks of native fish also provide harvest opportunities for recreational, commercial, and tribal fishers.

**Ecosystem and Cross-program Approach**.—The Fisheries Program continues to work within an ecosystem and cross-program approach using the collective expertise of our employees and Programs in coordinated fashion.

**Make Full Use of Computer and Database Technology**.—It is an ongoing Regional priority to strengthen our staff capabilities and make full use of computer and database technology in order to increase program effectiveness and efficiency, and meet the needs of resource management agencies, tribes, and other Federal agencies.

**Outreach**.—Educational and outreach opportunities are pursued to enhance public understanding of program responsibilities, capabilities, and accomplishments, and will continue to be an important component of the Fisheries Program.

**Legal and Policy Guidance**

National Fish Hatchery programs in the Columbia River Basin are shaped by various policies, regulations, laws, agreements and legislative mandates. National Fish Hatchery managers and policy makers are constantly challenged with the complex task of implementing a comprehensive state-of-the-art hatchery program while complying with legal, regulatory, and legislative mandates which have different and sometimes conflicting purposes. For example, the Mitchell Act and subsequent amendments, Endangered Species Act and subsequent Biological Opinions, Treaty of 1855 with Columbia River Tribes, U.S. v Oregon court order of 1969 and subsequent Columbia River Fish Management Plan all guide production in the Columbia River. Chapters 2, 3 and 4 further discuss legal justification and operational guidance for Carson National Fish Hatchery.

# CHAPTER 2. HATCHERY AND RESOURCE DESCRIPTIONS

## Hatchery Overview

Carson NFH is located 13 miles northwest of the village of Carson in Skamania County, Washington. It lies in a heavily forested valley within the Gifford Pinchot National Forest at the confluence of Tyee Creek and Wind River (Map-Attachment 4). The hatchery sits on 20 acres of developed river-bottom at rivermile (RM)18 on the Wind River which enters the Columbia River 155 miles upstream from the Pacific Ocean and 10 miles upstream from Bonneville Dam. The hatchery is bounded by the Wind River on the west and by the steep slopes of 2,300 ft. Big Butte on the east. Ninety of the 225 $mi^2$ Wind River drainage are located upstream from the hatchery. Elevation of the basin ranges from 1,187 ft. mean sea level (MSL) at the hatchery, to nearly 5,000 ft. at Red Mountain, nine miles to the northeast.

Currently Carson NFH operates with a staff of seven. This includes the Hatchery Manager, Assistant Hatchery Manager, one Animal Caretaker, two Motor Vehicle Operators, one Maintenance Mechanic, and one Program Assistant. The hatchery also provides partial support to the Columbia River Basin Outreach Office, located at Willard NFH. Volunteers are utilized to assist with outreach activities and station operations when available.

## Hatchery Purpose

Carson NFH was authorized by Special Act 50 Stat. 220, May 28, 1937, and placed into operation in December 1937 to mitigate for the effects of federal water projects, primarily Bonneville Dam. The hatchery was reauthorized by the Mitchell Act (16 USC 755-757; 52 Stat. 345) May 11, 1938 and amended on August 8, 1946, (60 Stat. 932) for conservation of fishery resources in the Columbia River Basin. The hatchery was remodeled in 1956 to establish a hatchery spring Chinook run in the Wind River, and is currently used for adult collection, egg incubation and rearing of spring Chinook. It also provides eggs for re-establishing spring Chinook runs in other Columbia River tributaries, as needed.

## Facility and Site Descriptions

The hatchery has five buildings involved in fish production, five residences, and a large pond cover. Currently, there are no plans for new buildings; however, the hatchery would like to construct an outreach/visitor center near the main entrance. A description of hatchery buildings, their primary use, and improvements are listed in Attachment 5.

The hatchery's outdoor rearing units include 46 raceways, 2 rearing ponds and 2 adult holding ponds (see Attachment 6 for physical measurements of holding incubation and rearing units).

The physical layout of the hatchery is diagramed in Attachment 7 and an aerial photograph shows the hatchery in relation to the forest and Wind River in Attachment 8.

**Archeology / Cultural Resources**

The three wood-frame residences were constructed in 1937-38 the Civilian Conservation Corps (CCC). The houses are the only remaining intact cluster of CCC constructed houses in the area. The road leading to Tyee Springs is an abandoned railroad grade circa 1920 and is considered significant by the U.S.D.A. Forest Service. Finally, numerous large cedar stumps notched for spring boards are remnants of early logging techniques.

There are no recorded prehistoric sites in the immediate vicinity of the hatchery (Alex Bourdeau, U.S. Fish and Wildlife Service, personal communication). However, the Wind River Subbasin is part of the Yakama Indian Nation lands ceded to the United States in the Treaty of June 9, 1855. Within this area the tribe reserves the right to hunt and fish at all usual and accustomed places in common with citizens of the territory (WDFW 2000).

**Watershed/Ecosystem Setting**

**General Description**[2].—The Wind River Subbasin, located in southwestern Washington, originates in McClellan Meadows in the western Cascades on the Gifford Pinchot National Forest (Wind River Ranger District) and enters the Columbia River's Bonneville Reservoir at River Mile (RM) 155 near Carson, Washington (Map-Attachment 4). Wind River, a fifth order stream, drains approximately 225 $mi^2$ of Skamania County over a distance of approximately 31 miles. Principle tributaries to Wind River include Little Wind River, Bear, Panther, Trout, Trapper, Dry, Nineteenmile, Falls and Paradise creeks. The largest tributary, Panther Creek, enters at RM 4.3 and drains 18% of the Wind River subbasin (26,466 acres). Trout Creek, which drains 15% of the subbasin (21,732 acres), enters at RM 10.8.

Topography varies within the watershed; it is steep in the northwest and lower southeast, gentle in the northeast-McClellan Meadows area, and it is benchy in Trout Creek Flats and middle portions of the Wind River Valley. The mainstem of the Wind River drops 3,820 ft in 30.5 miles for an average gradient of 2.3%. Shipherd Falls, located at RM 2, is a series of four falls ranging from 8 to 12 ft that were a barrier to all anadromous salmonids except steelhead until the construction of a fish ladder in 1956.

**Geology**.—The Wind River Watershed has been shaped through 25 million years of volcanic activity and glacial action. Most of the watershed was formed 12 to 25 million years ago with some younger flows out of Indian Heaven and Trout Creek Hill being dated between 350,000 to

[2]Adapted from the Draft Wind River Subbasin Summary, November 15, 2000, prepared for the Northwest Power Planning Council (WDFW 2000).

three million. The majority of the watershed is in the older volcaniclastic material. These areas are more susceptible to erosion and mass failure due to weathering of the materials to silts and clays.

Glacial activity has had an effect on the landscape especially in the upper regions of the watershed by Indian Heaven, where volcanic flows have scoured and smoothed the land. Outwash and alluvial material from this time period have been eroding down through the Wind River Valley. Since the construction of Bonneville Dam, this material has been accumulating at the mouth of the Wind River. Other material that has been moving into the streams in the lower parts of the valley are flood deposits left from the Bretz Floods from ancient Lake Missoula. Sediment input has also resulted from large landslides in the watershed.

**Climate and Hydrology**.—The mean annual average precipitation in this watershed is 110 in at Stabler, Washington (elevation 800 ft). Approximately 80% of the precipitation occurs between October and April. The average ambient air temperature is 66EF during the summer and 40E F in the winter.

Stream flows in the watershed range from summer low flows to peak flows in the winter. Some streams only flow during high flow events and are dry the remainder of the year (ephemeral streams). Others such as the mainstem of the Wind River increase from an average daily flow of less than 250 $ft^3$ per second (cfs) during August and September to over 2,000 cfs in December and January. The largest stream flows typically occur in response to rain-on-snow events, when heavy rains combine with high air temperatures and high winds to cause widespread snowmelt. Low flows are maintained by late season snowmelt and areas of water retention or recharge.

**Fish and Wildlife**.—Listed and candidate species which may occur in the area of the hatchery are included in Attachment 9.

The only anadromous salmonids that historically ascended Shipherd Falls were winter and summer steelhead. It is probable that pacific lamprey also ascended the falls, but there is no data to verify this claim. Both steelhead and pacific lamprey have been and are important fisheries to the Yakama Nation. Steelhead provided sport fishing opportunities for decades until recent declines in the early 1990's.

Wind River native steelhead populations are depressed and Federally listed as Threatened under the Endangered Species Act (ESA). This stock is part of the lower Columbia River steelhead Ecologically Significant Unit (ESU). Although historical estimates are not well documented, historic run size has been estimated at 2,500 fish (WDFW 2000). The average number of summer steelhead spawners in the Wind River during 1991-96 was 222 fish, only 14% of the 1,557 escapement goal (NMFS 1999a).

The southwestern Washington/Columbia River coastal cutthroat trout ESU is proposed for listing as threatened under the ESA. Historically both resident and migratory (sea-run) cutthroat are known to exist in Wind River, but little is known of abundance or range. Sea-run cutthroat are probably limited to the lower Wind River and Little Wind River (2.2 river kilometers from mouth of Wind River) in terms of spawning area.

Bull trout in the Columbia River basin were Federally listed as Threatened in 1998. The Wind River Subbasin Summary (WDFW 2000) described the current status and distribution of bull trout in the Wind River. "Bull trout have been observed in the lower river below Shipherd Falls and managers believe these fish are part of an adfluvial population, which uses the Bonneville Pool. The WDFW has initiated a bull trout sampling project in the Columbia Gorge Province to determine the distribution of bull trout in the Wind River and other Washington tributaries. Until this project is completed, there is insufficient information to determine distribution, assess population status, or develop a recovery plan for these fish."

The current status of pacific lamprey is unknown. Native stocks of fall Chinook, coho and rainbow trout are also indigenous to Wind River but their population sizes are limited and largely unknown. Small populations of native trout and introduced brook trout are found throughout the Wind River basin. The fall Chinook and coho salmon production area was downstream of Shipherd Falls and has been impacted by backwaters from Bonneville Dam. Additional information on the historical and present information for fish and wildlife in the Wind River watershed can be found in WDFW (2000).

Spring Chinook salmon are non- native to the Wind River and natural spawners constitute a low productivity population in the Wind River and are not an ESA issue (Myers et al. 1998). In most years, spawning ground surveys have shown that the number of natural spawning spring Chinook in Wind River is relatively small compared to the total run (Attachment 10). Even though naturally spawning spring Chinook produce fry in the Wind River, very little smolt production has been observed (Dan Rawding, WDFW, unpublished data).

**Vegetation**.—Listed and candidate species which may occur in the area of the hatchery are included in Attachment 9.

Presently, vegetation is approximately 90% Douglas fir, western hemlock and grand fir. Prior to European settlement, the forest of the Wind River Basin contained either late-successional old growth or early-successional young growth. Currently, mid-successional stands dominate. Late-successional stands contain trees over 21 inches in diameter with multiple canopy layers. Mid-successional stands also contain trees with diameters over 21 inches but with a single canopy layer consisting of nine to 21 inch trees. Early-successional stands consist of trees from 0 to 9 inches. Circa 1850 was classified as follows: 6,700 acre non-forest, 40,700 acre early-successional, 12,485 acre mid-successional, and 83,556 acre late-successional. Current

classification is: 9,887 acre non-forest, 34,118 acre early-successional, 67,628 acre mid-successional, and 31,816 acre late-successional.

**Habitat Condition**.—Stream surveys, sub-basin assessments, and watershed analyses were used to evaluate factors limiting fish production in the Wind River. All watershed assessments indicate that fish production in the Wind River is primarily limited by habitat and water quality. Past riparian timber harvest, stream clean-outs, road building, and regeneration harvest within the rain on snow zone all have contributed to a decline in fish production. Alluvial reaches within the mainstem Wind River and tributaries, which contain the majority of steelhead spawning habitat, have been significantly impacted. Many of these reaches were initially disturbed over eighty years ago, yet habitat and water quality have not recovered and in some cases are getting worse. Habitat problems noted in the subbasin plan are mainly related to timber harvesting practices. Throughout the subbasin there continues to be a need to restore riparian vegetation to reduce water temperatures and peak flows, reduce sediment delivery to streams, and ensure continuous recruitment of large woody debris into the system.

**Current and Future Development**.—The Wind River Subbasin is part of the Yakama Nation lands ceded to the United States in the Treaty of June 9, 1855. Within this area the tribe reserves the right to hunt and fish at all usual and accustomed places in common with citizens of the territory. The upper portion of the basin is situated within the legislated boundary of the Gifford Pinchot National Forest (GPNF) and federal ownership accounts for 127,682 acres (89%) of the watershed. Non-federal ownership includes Washington Department of Natural Resources at 3,757 acres (2%), private timber interests at 8,122 acres (6%), and other private ownership at 3,943 acres (3%). Most of the first six miles of mainstem river and its drainage are outside GPNF, but a large portion of this area lies within the Columbia River Gorge National Scenic Area (CRGNSA). The remaining 25 mainstem miles consist primarily of U.S. Forest Service ownership. The President's Forest Plan (ROD) categorizes the Wind River Basin as a Tier 1, Key Watershed that provides habitat for anadromous salmonids.

The Wind River drainage has traditionally been managed for timber production; however, under the Northwest Forest Plan, much of the drainage has been designated as late successional reserves, wilderness areas (wilderness areas pre-dated the Forest Plan), riparian reserves, or reserved through other means. In addition to GPNF and DNR, there is limited amount of commercial timberland ownership in the lower valley. Those holdings within CRGNSA are regulated by their land use regulations as administered by Skamania County. Those outside the CRGNSA are regulated by the Washington State Forest Practices Regulations.

Urban development has been concentrated in Carson, Washington which is located at RM 2 and Stabler, Washington at RM7. There are individual dwellings throughout the first 12 miles of the river, with the majority located in the lower reaches. In addition, a number of vacation cabins are located near Government Mineral Springs along Trapper Creek. These cabins are privately

owned on leased lands from the USFS. Large-scale industrial activities are limited by lack of available land outside the National Forest and Scenic Area. The two major industrial uses in the watershed are a plywood mill on the east side of the river near the mouth and a lumberyard north of Carson. Both are owned and operated by WKO Company. A gold mine is operated near the Upper Wind River approximately one mile south (downstream) of the mouth of Paradise Creek. In addition, the USFS recently conveyed approximately 190 acres and infrastructure of former nursery land to Skamania County.

**History of Hatchery Stocks**

**Legal Authority**.—The Columbia River was the largest producer of salmon in the world. Cannery records reveal that catches in the late 1800s and early 1900s were in the millions. But this extraordinary harvest could not last, and it was recognized fairly early in the century that something must be done to preserve the salmon. Therefore, in 1938, Congress passed the Mitchell Act, which was intended to help remedy the decline, particularly from the negative effects from the construction of Bonneville Dam on the Columbia River near Portland. On August 8, 1946, the Act was amended (60 Stat. 932) by Congress to authorize the Secretary of Interior the transfer of funds to the states for specific projects to develop salmon resources (i.e. hatcheries). In 1947, the Columbia River Fisheries Development Program was formed to plan and coordinate the use of Mitchell Act funds. In 1956, Congress expanded the Mitchell Act to include the preservation of fisheries resources above McNary Dam. Administration of the Mitchell Act was shifted from the Department of the Interior to the Department of Commerce by the Reorganization Plan No. 4 of 1970 (84 Stat. 2090). The Act is currently administered by the NOAA Fisheries (also known as: National Marine Fisheries Service) which provides funding to the Service for operation and maintenance of the hatchery.

Construction of Carson NFH was authorized by the Special Act of May 28, 1937 (50 Stat., 220), to mitigate for fall Chinook salmon and coho salmon spawning grounds lost when the lower two miles of the Wind River were flooded by the backwaters of Bonneville Dam (Smith 1995). The hatchery was re-authorized under the Mitchell Act May 11, 1938 ( 52 Stat. 345).

In addition to the initial authorizations listed above, hatchery operations are authorized, sanctioned and influenced by the following treaties, judicial decisions and specific legislation:

Treaty with the Walla Walla, Cayuse, Umatilla Tribes, 06/09/1855;
Treaty with the Yakama, 06/09/1855;
Treaty with the Nez Perce, 06/11/1855;
Treaty with the Tribes of Middle Oregon, 06/25/1855;
Mitchell Act, 52 STAT. 345, 05/11/1938;
Mitchell Act (Amended), 60 STAT. 932, 08/08/1946;
U.S. v. Oregon (Sohappy v. Smith, “Belloni” decision:, Case 899), 07/08/1969;
Endangered Species Act of 1973, 87 STAT. 884, 12/28/1973;

Salmon and Steelhead Conservation and Enhancement Act, 94 STAT. 3299, 12/22/1980; and Pacific Salmon Treaty Act of 1985 (U.S./Canada Pacific Salmon Treaty), Public law 99-5, 16 U.S.C. 363, 03/15/1985.

**Production and Management History**.—A Washington State operated fish hatchery established at the mouth of the Wind River in 1899 was closed in 1938 when the hatchery grounds and buildings were flooded by the backwaters of Bonneville Dam. The state facility supported a significant fall Chinook salmon run taking a high of 20,357,000 eggs in 1917. The Service operated this facility for a two year period (1936-37). In 1938, it's final year of operation, 1,907,300 eggs were taken. A Special Use Permit issued by the U.S. Forest Service reserved 10 acres within the Gifford Pinchot National Forest for the purpose of establishing a fish cultural station (Attachment 11). Construction of Carson NFH began in June 1937 and production was launched in December of that same year with the arrival of 3,000,000 fall Chinook salmon eggs from the Little White Salmon NFH.

In 1953, protection was provided to the hatchery water supplies when approximately 220 acres were ".. withdrawn from all forms of appropriation under the public-land laws, including the mining laws but not the mineral-leasing laws, and reserved for use by the Fish and Wildlife Service of the Department of the Interior as the Carson Fish-Cultural Station". (Federal Register Volume 18, Number 204 Saturday, October 17, 1953). The area withdrawn was described in a letter from the Chief of Forest Service 05/27/53 as ". . .the hatchery site occupying around 20 acres, and the rights-of-way for a 3,385 ft and a 2,700 ft pipeline. The balance of the area lies between the pipelines and around the development." Primary jurisdiction of the withdrawn land, with the exception of the 20 acre developed hatchery site, remained with the Forest Service. Approximately 130 acres surrounding Tyee Springs were designated as Wildlife Special by the Forest Service providing additional protection from some U.S.D.A. Forest Service management activities.

Hatchery expansion began in 1952 and was nearly complete by the end of 1955. Prior to expansion, lack of outdoor facilities limited production to indoor rearing troughs. The expansion included the construction of 46 raceways, two adult holding ponds, a service building with space for an office, cold storage and a feed room, 3 duplex housing units, and a paint and oil house.

Fall Chinook salmon were the dominate species reared at Carson NFH from 1937 to 1964. Rainbow trout, black spotted trout (yellowstone cutthroat), brook trout, steelhead, spring Chinook salmon, coho salmon, sockeye salmon (shipped as eyed eggs), and kokanee were raised intermittently in large numbers from 1938 through 1981 at which time production was switched exclusively to spring Chinook salmon. Nearly all of the fall Chinook were released into Tyee Creek or the main stem Wind River as were most of the trout. Coho were primarily released in the Wind and Columbia Rivers.

Prior to completion of fish passage facilities at Shipherd Falls in 1954, Carson NFH had many false starts with Chinook salmon. Spring Chinook eggs were transferred from the Clackamas River, Oregon Camas Creek, Idaho, and a Willamette River hatchery, Oregon. All attempts to get Chinook salmon back to the hatchery to develop a hatchery brood stock failed until adequate passage was provided past Shipherd Falls. Attachment 12 documents historical releases, starting in 1938.

The fish ladder around Shipherd Falls is located approximately two miles from the mouth of the Wind River and was completed in 1955 as part of the Columbia River Fishery Development Program (Mitchell Act). Coincident to the construction of the fish ladder, was an extensive expansion of the hatchery. The goal of the expansion was to produce spring Chinook, fall Chinook, coho, blue-back (sockeye) salmon, and steelhead to artificially enhance natural production of the Wind River Basin. No more than half the fish of any run were to be artificially spawned with the exception of the blue-back (Lower Columbia Fisheries Development Program, Wind River Area, 1951). Although the expansion was completed, no serious attempts to raise other than spring Chinook materialized. A long-range cooperative federal/state program was implemented to trap upriver spring Chinook adults at Bonneville Dam and transport them to Carson NFH for stock development.

From 1955 thru 1964 approximately 500 spring Chinook salmon were trapped annually at Bonneville Dam on the Washington side of Columbia River and transported to the holding ponds at Carson National Fish Hatchery. Genetic data indicate that the Carson stock was derived from a mixture of upper Columbia and Snake River populations passing Bonneville Dam (Campton 2000 Draft). The adult fish were held and spawned, with their progeny reared and released at Carson. Although small numbers of spring Chinook were counted past the newly constructed Shipherd Falls fishway on Wind River in 1956,1957, and 1958, the first returns to Carson NFH did not occur until 1959 when 107 fish entered the hatchery (99 jacks, 2 adult females and 6 adult males). This run of spring Chinook has been maintained since then and continues to flourish. Annual returns to Carson NFH have averaged 3,797 since 1980 with over 10,000 returning in 1990, 2000 and 2001. Recent production and run data for spring Chinook salmon returning to Carson NFH is summarized and provided in Attachments 13 and 14.

Spring Chinook smolt production was reduced from 2.1 to 1.42 million beginning with brood year 1996. Pond density was reduced to the level suggested as optimum by Banks (1994) to result in a more “fit” smolt, thus increasing post-release survival. In combination with reduced densities, culling of eggs from adult fish with high titre Bacterial Kidney Disease (BKD), has nearly eliminated fingerling and smolt losses to this disease. As a result of these practices, prophylactic erythromycin treatments are no longer necessary during juvenile rearing.

Carson origin spring Chinook eggs, fry, and fingerlings have been transferred to a wide range of localities including Alaska (over 2 million eggs in the early 1970's), Oregon (22.9 million eggs from 1957 to 1993), Idaho (15.9 million eggs from 1960 to 1980), and several hatcheries in

Washington (29.7 million eggs from 1957 to1991). The strain has prospered at many locations, for example Leavenworth and Little White Salmon NFHs, Washington and Umatilla River, Oregon.

From 1960 to 1997, juvenile hatchery steelhead (Skamania stock) were outplanted in the Wind River from a State of Washington hatchery. Hatchery outplanting of Skamania stock summer steelhead was terminated by WDFW in 1997 because of possible genetic and ecological impacts from hatchery steelhead on wild steelhead.

**Biological Risks and Ecological Interactions Between Hatchery Spring Chinook Salmon and Wild (Listed) Summer Steelhead Trout**

All hatcheries must consider their potential for adversely affecting the aquatic community. To help assess potential impacts, the Service is developing Hatchery and Genetic Management Plans (HGMP) for National Fish Hatcheries in the lower Columbia River, including Carson NFH. These management plans are being drafted to assess our program and meet Endangered Species Act requirements identified by NOAA Fisheries. It is anticipated that these plans will be updated regularly and re-submitted to NOAA Fisheries and the Service.

In the December 1999 Draft HGMP, the Service assessed the potential impacts from hatchery operations including: water withdrawal and effluent discharge, brood stock collection, genetic introgression, juvenile fish releases, disease, competition, predation, residualism, and migration corridor and ocean impacts. Our assessment to date, with NOAA Fisheries concurrence, concludes that operation of Carson NFH will not jeopardize listed fish populations. However, we also recognize that more research is needed to more fully understand the impacts of hatchery operations, releases, and impact of natural spawning spring Chinook on steelhead in the Wind River (refer to Chapter 3 Monitoring and Evaluation discussion). In addition to completing documentation to comply with our ESA responsibilities, we must also meet our mitigation responsibilities under the Mitchell Act as well as meet our Tribal Trust and U.S. v Oregon obligations. In order to balance these sometimes conflicting mandates, we regularly meet with our co-managers to discuss operation and management of the hatchery.

The following information was primarily extracted from our December 1999 Draft HGMP and discusses biological risks and ecological interactions between hatchery spring Chinook salmon and wild (listed) summer steelhead trout (USFWS 1999):

The Carson NFH spring Chinook program may adversely affect listed populations, but impacts are substantially below the jeopardy threshold (NMFS 1999a). The 1999 Biological Assessment for the Operation of Hatcheries Funded by the NOAA Fisheries under the Columbia River Fisheries Development Program (NMFS 1999a) and the 1999 Biological Opinion on Artificial Propagation in the Columbia River Basin (NMFS 1999b) present a discussion of the potential effects of hatchery programs on listed salmon and steelhead populations. A discussion of

ecological interactions and biological risks relative to the Carson spring Chinook program follows:

**Hatchery Water Intake and Use**.—The primary water source for the Carson NFH is Tyee Creek which is not accessible to anadromous fish. During limited periods of the year, water may be drawn from the Wind River to adjust water temperatures for rearing and to supplement Tyee Creek withdrawals. Intake screening for the Wind River withdrawal pipe does not meet current NOAA Fisheries ESA screening standards. However, with the reduced production program at Carson NFH, water withdrawal from the Wind River for hatchery operations are significantly reduced and short-lived when it does occur, which is primarily late in the summer. Work is underway to bring this water intake structure into NOAA Fisheries ESA compliance. Until the Wind River water intake structure is upgraded, withdrawal of Wind River water for hatchery operations will be minimized. A temporary screen is utilized when withdrawal from the Wind River is necessary. Water withdrawals for hatchery operations are not expected to have a significant negative impact on natural spawning populations. Entry of listed species into the hatchery through the river intake structure has not been observed.

In 1998 the Washington State Legislature passed Engrossed Substitute House Bill 2496 authorizing the establishment of Water Resource Inventory Areas (WRIAs) to catalogue anadromous fish limiting factors in Washington streams. The Wind River water diversion and blockage of Tyee Creek by hatchery facilities is a medium impact limiting factor for salmon and steelhead in the Wind River (Washington Conservation Commission 1999). The Wind River diversion is listed because water withdrawal can exacerbate already low summer flows in the Wind River. However the report recognizes that "recent modification to withdrawal methods may have improved conditions" in the Wind River. For example, push up dams are no longer used for hatchery water withdrawal. Furthermore in 1995, the numbers of fish produced at the hatchery were reduced significantly cutting back hatchery demand for Wind River water. Tyee Creek is listed because hatchery facilities are a total blockage to fish passage. There is some question concerning the suitability of Tyee Creek for salmon and steelhead spawning prior to hatchery construction. Much of Tyee Creek may have been a swampy area with little spawning gravel and much of the stream was channeled to facilitate water collection.

Hatchery effluents meet established water quality standards and are diluted by the flow in the Wind River.

**Brood Stock Collection.—**Returning spring Chinook are collected for brood stock at the hatchery rack. Hatchery fish volitionally return to the hatchery using the hatchery's fish ladder, homing into Tyee Creek. There is no barrier dam in the Wind River at the hatchery. This is significant because the Wind River watershed upstream of the hatchery is an important spawning and rearing area for native summer steelhead trout (listed).

Natural spawning of spring Chinook occurs in the Wind River drainage (Pettit 1999a) but these fish are believed to be Carson NFH fish that do not return to the hatchery. Stray hatchery spring Chinook from other locations or returns from natural production from other areas are not known to occur at Carson NFH, however genetic testing would provide better information on the hatchery and natural spring Chinook populations in the basin.

**Genetic Introgression**.—Coded-wire tag recoveries show that Carson NFH spring Chinook stray into the Little White Salmon NFH and are caught in the Drano Lake sport and tribal fisheries. However, the Carson spring Chinook stock is also released from Little White Salmon NFH. Straying of Carson spring Chinook is not considered a major problem for other streams where spring Chinook are listed based on a general lack of Carson recoveries in other areas. Therefore, genetic introgression of spring Chinook released from Carson NFH with other listed spring Chinook stocks is not considered a significant problem. The Service is currently analyzing data to quantify the degree of straying of fish from our National Fish Hatcheries.

**Hatchery Production.—**Carson NFH spring Chinook releases are moderate in magnitude relative to other Columbia River spring Chinook production programs. Carson NFH releases have been reduced from a previous program level of over 2 million smolts to the current 1.42 million smolt level. Reduced production decreases density dependent effects and other potential ecological effects on other natural stocks. Juvenile out-migration trapping and PIT tag monitoring at Bonneville Dam (see Chapter 3 Monitoring and Evaluation discussion on PIT tagging) indicate that Carson spring Chinook exit the Wind River quickly after release, further reducing potential density dependent effects. The Service will continue to evaluate our release strategies and production numbers to minimize any negative effect upon the aquatic community, especially on listed species.

**Disease**.— Hatchery programs are routinely monitored to prevent and subsequently treat fish in response to disease outbreaks that occur. Most pathogens now enter hatcheries through returning adult fish, surface water supplies, and other mechanisms involving direct contact with naturally spawning fish. Crowding and stress decrease the physiological resistance of salmonid fishes to disease and increase the likelihood of infection (Salonius and Iwama 1993; Schreck et al. 1993). Consequently, concern exists that the release of hatchery fish may increase the risk of disease in naturally spawning populations.

Fish managers largely understand the kinds, abundance and virulence (epidemiology) of pathogens and parasites in hatchery fish. Recent studies suggest that the incidence of some pathogens in naturally spawning populations may be higher than in hatchery populations (Elliot and Pascho 1994). Indeed, the incidence of high ELISA titers for *Renibacterium salmoninarum*, the causative agent of Bacterial Kidney Disease (BKD), appears, in general, to be significantly more prevalent among wild smolts of spring/summer Chinook salmon than hatchery smolts (Congleton et al. 1995; Elliot et al. 1997). For example, 95% versus 68% of wild and hatchery smolts, respectively, at Lower Granite Dam in 1995 had detectable levels of *R. salmoninarum*

(Congleton et al. 1995). Although pathogens may cause significant post-release mortality among hatchery fish, there is little evidence that hatchery origin fish routinely infect naturally produced salmon and steelhead in the Pacific Northwest (Enhancement Planning Team 1986; Steward and Bjornn 1990). Many biologists believe disease-related losses often go undetected, and that the impact of disease on naturally spawning populations may be underestimated (Goede 1986; Steward and Bjornn 1990). Nevertheless, the Service is unaware of any studies or scientific literature which show hatchery fish infecting a naturally spawning population of salmon or steelhead in the Pacific Northwest, however more research is needed.

Carson NFH follows Integrated Hatchery Operations Team (IHOT 1995) and Pacific Northwest Fish Health Protection Committee protocols for disease sampling and treatment. The Lower Columbia River Fish Health Center is located nearby at Spring Creek NFH so fish health sampling, diagnosis, and treatment are readily available as fish health issues arise. Chapter 3 provides more detail on Fish Health practices. The fish health goal for Carson NFH is to release healthy fish that are physiologically ready to migrate. Carson spring Chinook are released directly into the Wind River at the hatchery site and only pass one mainstem Columbia River dam (Bonneville Dam) en route to the ocean. Carson spring Chinook have a much reduced potential for transmission of disease to other populations relative to other upriver programs which are subjected to the high density impacts and stresses of collection for transport and/or diversion through multiple bypass systems. Disease transmission is believed to be triggered by increased population density and unusual changes in environment such as would occur at transport collection facilities and juvenile bypass systems.

Our general conclusion at this time is that Carson NFH is, as are all federal hatcheries in the Columbia River Basin, currently taking extensive measures to control disease and the release of diseased fish. As a consequence, infection of natural fish by hatchery fish is being minimized. Based on the relative prevalence of BKD among hatchery and wild Chinook salmon (Elliot et al. 1997; Congleton et al. 1995), the crowding and handling of fish at transportation dams at the time of barging or bypass may have a greater likelihood of increasing the incidence of disease among naturally produced fish than direct infection from hatchery fish.

**Competition.—**The impacts from competition are assumed to be greatest in the spawning and nursery areas at points of highest density (release areas) and diminish as hatchery smolts disperse (USFWS 1994). Salmon and steelhead smolts actively feed during their downstream migration (Becker 1973; Muir and Emmett 1988; Sager and Glova 1988). Competition in reservoirs could occur where food supplies are inadequate for migrating salmon and steelhead. However, the degree to which smolt performance and survival are affected by insufficient food supplies is unknown (Muir et al.1994). On the other hand, the available data are more consistent with the alternative hypothesis that hatchery-produced smolts are at a competitive disadvantage relative to naturally produced fish in tributaries and free-flowing mainstem sections (Steward and Bjornn 1990). Although limited information exists, available data reveal no significant relationship between level of crowding and condition of fish at mainstem dams. Consequently, survival of

natural smolts during passage at mainstem dams does not appear to be affected directly by the number (or density) of hatchery smolts passing through the system at present population levels. While smolts may be delayed at mainstem dams, the general consensus is that smolts do not normally compete for space when swimming through the bypass facilities (Enhancement Planning Team 1986). The main factor causing mortality during bypass appears to be confinement and handling in the bypass facilities, not the number of fish being bypassed.

Juvenile salmon and steelhead, of both natural and hatchery origin, rear for varying lengths of time in the Columbia River estuary and pre-estuary before moving out to sea. The intensity and magnitude of competition in the area depends on location and duration of estuarine residence for the various species of fish. Research suggests, for some species, a negative correlation between size of fish and residence time in the estuary (Simenstad et al. 1982).

While competition may occur between natural and hatchery juvenile salmonids in, or immediately above, the Columbia River estuary, few studies have been conducted to evaluate the extent of this potential problem (Dawley et al. 1986). The general conclusion is that competition may occur between natural and hatchery salmonid juveniles in the Columbia River estuary, particularly in years when ocean productivity is low. Competition may affect survival and growth of juveniles and thus affect subsequent abundance of returning adults. However, these are postulated effects that have not been quantified or well documented.

The release of hatchery smolts that are physiologically ready to migrate is expected to minimize competitive interactions as they should quickly migrate from the release site. Carson spring Chinook are released into the Wind River at the hatchery site and migrate quickly into the mainstem Columbia River migration corridor en route to the ocean based on juvenile out-migrant trapping and PIT tag monitoring at Bonneville Dam (see Chapter 3), reducing potential competitive interactions within the Wind River basin. Because Carson spring Chinook releases occur “low” in the Columbia Basin system relative to many other upriver programs, there is reduced opportunity for competitive interactions.

**Predation.—**The Service presented information that salmonid predators are generally thought to prey on fish approximately one-third or less their size (USFWS 1994). Depending on species and population, hatchery smolts are often released at a size that is greater than their naturally-produced counterparts. In addition, for species that typically smolt at one year of age or older (e.g. steelhead and spring Chinook salmon), hatchery-origin smolts may displace younger year classes of naturally-produced fish from their territorial feeding areas. Both factors could lead to predation by hatchery fish on naturally produced fish, but these effects have not been extensively documented, nor are the effects consistent (Steward and Bjornn 1990). A primary concern is the potential impact of predation by residualized hatchery steelhead on naturally-spawning populations.

In general, the extent to which salmon and steelhead smolts of hatchery origin prey on fry from naturally reproducing populations is not known, particularly in the Columbia River basin. The available information, while limited, is consistent with the hypothesis that predation by hatchery-origin fish is, most likely, not a major source of mortality to naturally reproducing populations, at least in freshwater environments of the Columbia River basin (Enhancement Planning Team 1986). However, virtually no information exists regarding the potential for such interactions in the marine environment.

There is little potential for Carson spring Chinook to prey on natural steelhead fry or parr in the Wind River. Based on time of spawning, steelhead fry would be emerging from the gravel after Carson Chinook had exited the river. In addition, much of the spawning and early rearing stage (egg to parr) production areas for natural populations of Wind River steelhead are in the tributaries and upper basin areas above Carson NFH. However, the life history rearing stage for steelhead, age-1 parr to age-2 smolt, does occur below the hatchery with the parr moving into the area as smolts vacate the area during their annual migration which peaks from May 10-15 (Dan Rawding, WDFW, personal communication). Mr. Rawding indicated that age-1 parr typically range in size from 80-100mm and age-2 smolts from 140-200mm so neither life history stage would be at a size susceptible to Carson spring Chinook predation. Out-migrant sampling conducted by WDFW indicates that steelhead smolts/pre-smolts are not drawn out of the Wind River system early by release of Carson spring Chinook. Available data indicate that Carson spring Chinook smolts exit the Wind River very quickly and that potential negative impacts on listed steelhead within the basin are likely to be negligible.

Carson spring Chinook releases may contribute to indirect predation effects on listed stocks by attracting predators (birds, fish, pinnipeds) and/or by providing a large forage base to sustain predator populations. Releasing large numbers of hatchery fish may lead to a shift in the density or behavior of non-salmonid predators, thus increasing predation on naturally reproducing populations. Conversely, large numbers of hatchery fish may mask or buffer the presence of naturally produced fish, thus providing sufficient distraction to allow natural juveniles to escape (Park 1993). Prey densities at which consumption rates are highest, such as northern pikeminnow in the tailraces of mainstem dams (Beamesderfer et al. 1996; Isaak and Bjornn 1996), have the greatest potential for adversely affecting the viability of naturally reproducing populations, similar to the effects of mixed fisheries on hatchery and wild fish. However, hatchery fish may be substantially more susceptible to predation than naturally produced fish, particularly at the juvenile and smolt stages (Piggins and Mills 1985; Olla et al. 1993).

Predation by birds and marine mammals (e.g. seals and sea lions) may also be significant source of mortality to juvenile salmonid fishes, but functional relationships between the abundance of smolts and rates of predation have not been demonstrated. Nevertheless, shorebirds, marine fish, and marine mammals (NMFS 1997) can be significant predators of hatchery fish immediately below dams and in estuaries (Bayer 1986; Ruggerone 1986; Beamish et al. 1992; Park 1993; Collis et al. 2001). Unfortunately, the degree to which adding large numbers of hatchery smolts affects predation on naturally produced fish in the Columbia River estuary and marine

environments is unknown, although many of the caveats associated with predation by northern pikeminnow in freshwater are true also for marine predators in saltwater.

**Residualism**.—Carson spring Chinook releases are not known to residualize in the Wind River. Available out-migrant trap and PIT tag monitoring information indicate a rapid exit of Carson spring Chinook from the Wind River (see Chapter 3 Monitoring and Evaluation discussion).

**Migration Corridor/Ocean.—** The Columbia River hatchery production ceiling called for in the Proposed Recovery Plan for Snake River Salmon of approximately 197.4 million fish (1994 release levels) has been incorporated by NOAA Fisheries into their recent hatchery biological opinions to address potential mainstem corridor and ocean effects as well as other potential ecological effects from hatchery fish. Although hatchery releases occur throughout the year, approximately 80 percent occur from April to June (NMFS 1999a) and Columbia River out-migration occurs primarily from April through August. Carson's spring Chinook production is typically released in April at the beginning of the normal hatchery and natural stock out-migration season. The total number of hatchery fish released in the Columbia River basin has declined by about 26 percent since 1994 (NMFS 1999c) reducing potential ecological interactions throughout the basin.

Ocean rearing conditions are dynamic. Consequently, fish culture programs might cause density-dependent effects during years of low ocean productivity, especially in near shore areas affected by upwelling (Chapman and Witty 1993). To date, research has not demonstrated that hatchery and naturally produced salmonids compete directly in the ocean, or that the survival and return rates of naturally produced and hatchery origin fish are inversely related to the number of hatchery origin smolts entering the ocean (Enhancement Planning Team 1986). If competition occurs, it most likely occurs in near shore areas when (a) upwelling is suppressed due to warm ocean temperatures and/or (b) when the abundance or concentration of smolts entering the ocean is relatively high. However, we are only beginning to understand the food-chain effects of cyclic, warm ocean conditions in the eastern north Pacific Ocean and associated impacts on salmon survival and productivity (Beamish 1995; Mantua et al. 1997). Consequently, the potential for competition effects in the ocean cannot be discounted (Emlen et al. 1990).

Alternatively, the hatchery program may be filling an ecological niche in the freshwater and marine ecosystem. A large number of species are known to utilize juvenile and adult salmon as a nutrient and food base (Groot and Margolis 1991; and McNeil and Himsworth 1980). Pacific salmon carcasses are also important for nutrient input back to freshwater streams (Cederholm et al. 1999). Reductions and extinctions of wild populations of salmon could reduce overall ecosystem productivity. Because of this, hatchery production has the potential for playing an important role in population dynamics of predator-prey relationships and community ecology. The Service speculates that these relationships may be particularly important (as either ecological risks or benefits) in years of low productivity and shifting climactic cycles.

**Harvest.—**Biological Assessments are completed by the management agencies to ensure risks to listed species are not jeopardized (NMFS 1999c).

**Cutthroat Trout.—**Since there is likely a small breeding population of coastal cutthroat trout in the lower Wind River, program fish from Carson NFH could potentially encounter out-migrants of sea-run cutthroat in the Wind or Columbia rivers. Time of out-migration of the sea-run cutthroat in the Columbia River may begin as early as March and peaks in mid-May (Trotter 1997) similar in time to the release of hatchery smolts. The size of the sea-run cutthroat trout smolts observed in other lower Columbia River tributaries, 100mm-260mm (USFWS Columbia River Fisheries Program Office, Vancouver, WA unpublished data), is very similar to the size of the yearling hatchery smolts released from Carson NFH. Instances of predation by hatchery smolts are thought to be low.

**Bull Trout.—**As previously mentioned, until WDFW completes surveys, the information base is insufficient to determine status and distribution of bull trout in the Wind River and potential impact from our hatchery program. However, hatchery juveniles may be providing a forage base benefit to adfluvial bull trout.

**Beneficial Uses (historic and present cultural and public uses, fishery benefits, harvest contribution, economic value)**

**Public Uses**.—The river's proximity to the Portland/Vancouver area makes it a popular recreation destination for cross country skiing, tubing, sledding, fishing, mineral prospecting, swimming, golfing, camping, hiking, picnicking, waterfall viewing, hunting, and berry picking. In addition, the Wind River Valley is a significant transportation corridor for travelers, including significant summer tourism traffic. Forest Road 30, which follows the river through much of its length, offers access to the upper Lewis River basin and to Mount St. Helens National Volcanic Monument (paragraph extracted from WDFW 2000).

Historically, public use of Carson NFH has been limited. The Forest Service had a developed campground located at Tyee Springs until 1951 when the improvements were relocated to other Forest Service campgrounds. The area surrounding Tyee Springs is very sensitive and not appropriate for public use. Not only is this source of nearly pure water critical to fish production, it is also the site of collection for potable domestic water for hatchery residents, hatchery visiting public and hatchery employees. Although visitors were welcomed, no record of any real effort to encourage visitation or to enhance the visitor's experience can be found until 1994 at which time nine interpretive signs were purchased and placed strategically around the hatchery grounds.

An annual Kid's Fishing Day Event and Open House were initiated in 1999 in the hopes of increasing both hatchery visibility within the local community and use by visiting public. It is

anticipated that improvements to the highway leading past the hatchery to the Mt. St. Helens National Monument will increase exposure to and use of the hatchery by visiting public.

**Harvest Contribution**.—Spring Chinook salmon from Carson NFH have, over the years, supported successful sport and tribal fisheries in the Columbia and Wind rivers. Fisheries occur almost exclusively in the Columbia and Wind rivers with the majority of fish harvested in the freshwater sport fishery, followed by tribal treaty and Columbia River gill net fisheries (Refer to Chapter 3 for more discussion on harvest). For example in 2001, the sport catch in the Wind River was 11,956 fish, with tribal catch at 1,840, and escapement to the hatchery at 12,075 fish (WDFW, Southwest Region, Vancouver, WA, July 13, 2001 data).

**Economic Benefit.—**When attempting to estimate the benefits of an anadromous fish hatchery, environmental conditions outside the hatchery are cyclic and beyond the control of hatchery administrators (e.g. ocean conditions). This environmental variability can subsequently affect post-release survival of juveniles and number of adult returns. During times of good ocean and river conditions that result in healthy adult returns, significant economic activity is generated through harvest of Carson NFH spring Chinook salmon. For example in 2001, Washington Department of Fish and Wildlife estimated that 32,442 angler-days (one person fishing for at least part of one day) occurred on the Wind River as a direct result of a record return of Carson NFH adult spring chinook salmon.

In addition, the role of a Federal mitigation hatchery is to compensate for natural habitat lost to Federal hydro-projects. It follows then, that the economic benefit of the mitigation hatchery is interwoven into the economic benefit of the hydro-power project/s being mitigated for and that the hatchery can be characterized as an operating expense of the hydro-power project. The Service recognizes that mitigation hatcheries are extremely important in supporting economically important fisheries.

**Cultural Values**.—The Yakama Nation share the in-river harvest of spring Chinook salmon returning to Carson NFH and is the primary beneficiary of surplus spring Chinook salmon which have entered the hatchery holding ponds. The cultural significance of these fish to the tribes is best characterized by the following quotations:

*"For the Yakama people salmon is seen as one of the gifts from the Creator. Since the beginning of time the Yakama people have relied upon salmon as well as the roots, berries, deer, elk and herbal medicines still important today. When the Yakama people were placed on this part of Mother Earth they were told by the Creator that He was going to give us some gifts. Those gifts came in the form of salmon and other natural resources.*

*He also instructed the Yakama people on how to care for the resources and warned that if any of the resources disappear, then we too as people, would disappear. That is why the Yakama people continually care for the salmon, the deer, the elk, the roots, the berries and the herbal*

*medicines. We are also taught at a very young age that the we are not here on Mother Earth to live and go away. Our Yakama elders tell us that we are only borrowing the water, the salmon, the Yakama language and everything else and we are preparing for the up and coming generations. It's like remembering the future."* Carol Craig, Yakama Nation Fisheries Resource Management, Public Information Officer, personal communication.

*"Salmon was presented to me and my family through our religion as our brother. The same with the deer. And our sisters are the roots and berries. And you would treat them as such. Their life to you is just as important as another person would be.*" Margeret Saluskin,Yakama Nation, Columbia River Inter-Tribal Fish Commission Web-Page.

# CHAPTER 3. HATCHERY AND RESOURCE MANAGEMENT

## Hatchery Goals, Objectives, and Tasks [3]

The following Hatchery Management Goals were adapted from the Mitchell Act, Endangered Species Act (ESA) Biological Opinions, U.S. v. Oregon agreements, and the Integrated Hatchery Operations Team - Operation Plans for Anadromous Fish Production Facilities in the Columbia River Basin Volume III - Washington, Annual Report for 1995 (IHOT 1996):

Goal 1: Conserve Columbia River spring Chinook salmon in the area upstream of Bonneville Dam (as defined in the Mitchell Act of 1937).

Objective 1: Successfully maintain a brood stock of spring Chinook salmon at Carson NFH without the need for out-of-basin egg or fish transfers to the hatchery (achieve a minimum 0.1% smolt to adult return back to the hatchery)

Task 1: Implement measures to efficiently manage and conserve water use at the hatchery.

Task 2: Implement measures for brood stock management to maintain integrity and genetic diversity of Carson hatchery stock, as identified in the HGMP.

Task 3: Implement management practices for incubation strategies and procedures at the hatchery.

Task 4: Implement management practices for hatchery rearing strategies.

Task 5: Implement management practices for release strategies at the hatchery.

Task 6: Maximize survival at all life stages using disease control and prevention techniques. Prevent introduction, spread or amplification of fish pathogens.

Objective 2: Conduct monitoring and evaluation to ensure goal #1 is achieved.

Task 1: Conduct hatchery evaluation studies to investigate alternative strategies to improve water management, brood stock management (electroanesthesia), incubation, rearing (NATURES) and release strategies (volitional).

[3]Tasks and current practices to achieve objectives are described in this chapter.

Support research on physiology, diet, fish health, and genetics (unfunded), and other Columbia River projects.

Task 2: Biosample returning adults.

Task 3: Hold Hatchery Evaluation Team meetings each spring and fall to review progress.

Task 4: Complete a Station Development Plan (Engineering) to identify facility needs in addressing the needs of hatchery conservation goals (unfunded).

Task 5: Monitor health and disease status of fish, following the Service Fish Health Policy and Integrated Hatchery Operation Team (IHOT) Guidelines.

Goal 2: Assure that hatchery operations support Columbia River Fish Management Plan (U.S. v Oregon) production and harvest objectives.

Objective 1: Collect sufficient brood stock to produce 1.42 million smolts for on-station release into the Wind River.

Task 1: Collect between 1,000 to 1,400 brood stock, depending on pre-spawning mortality and fecundity.

Task 2: Work with co-managers to manage adult fish returning in excess of brood stock need.

Objective 2: Contribute to a meaningful harvest for sport, tribal and commercial fisheries from March through July of each year in the Columbia and Wind Rivers (achieve a 10-year average of 0.5% smolt to adult survival, harvest plus escapement).

Task 1: Work with states and tribes to establish meaningful fisheries (through U.S. v. Oregon forums).

Task 2: Mass mark juvenile hatchery fish prior to release to enable state agencies to implement selective fisheries.

Objective 3: Meet tribal trust responsibilities.

Task 1: Follow pertinent Laws, Agreements, Policies and Executive Orders on Consultation and Coordination with Native American Tribal Governments.

Task 2: Hold an annual coordination meeting between the Service and Yakama Nation to identify and report on issues of interest and coordinate management.

Objective 4: Communicate and coordinate effectively with co-managers in the Columbia River Basin.

Task 1: Participate in U.S. v Oregon Production Advisory Committee (PAC) and Technical Advisory Committee (TAC) meetings.

Task 2: Develop technical reports for PAC and TAC.

Task 3: Discuss management issues for Carson NFH at an annual coordination meeting each February between the Service, WDFW, NOAA Fisheries, and Yakama Nation.

Task 4: Hold Hatchery Evaluation Team meetings each spring and fall to review progress.

Objective 5: Conduct monitoring and evaluation to ensure goal #2 is achieved.

Task 1: Coded-Wire-Tag production lots of fish.

Task 2: Biosample returning adults.

Task 3: Produce an annual report on stock assessment and contribution to fisheries.

Task 4: Compare survival, life history, fisheries contribution, and fish health parameters at Carson NFH to other National Fish Hatcheries producing spring Chinook salmon in the Columbia River.

Task 5: Determine natural production potential for spring Chinook salmon in the Wind River (unfunded).

Goal 3: Minimize impacts to listed (ESA) and other native species, their habitat, and the environment.

Objective 1: Minimize interactions with other fish populations by implementing state-of-the-art fish culture technology.

Task 1: Draft and implement actions identified in a Hatchery and Genetic Management Plan.

Task 2: Release juvenile fish that are ready to migrate downstream (smolts).

Task 3: Mass mark all production fish to identify them from naturally produced fish.

Task 4: Support projects for restoration of ESA listed steelhead (threatened) in the Wind River (unfunded).

Task 5: Investigate the hatchery's role in recovery of ESA listed steelhead (threatened) in the Wind River (unfunded).

Task 6: Upgrade hatchery intake to meet NOAA Fisheries screening criteria for steelhead in the Wind River (unfunded).

Task 7: Manage hatchery ladder within acceptable impacts to listed and native fish.

Task 8: Monitor interactions between hatchery and wild fish in the Wind River (see Objective 2 below).

Objective 2: Conduct monitoring and evaluation to ensure goal #3 is achieved.

Task 1: Conduct environmental monitoring to ensure that hatchery operations comply with water quality standards and to assist in managing fish health.

Task 2: Develop a study plan for in-stream evaluation of hatchery and wild fish interactions and reproductive success (unfunded).

Task 3: Develop a study plan to assess physiological status of juveniles prior to release (unfunded) and determine downstream migration rates (PIT tagging).

Task 4: Assess straying (rates and where) of hatchery fish from Carson NFH (funds pending per HGMP development).

Task 5: Monitor health and disease status of fish, following the Service Fish Health Policy and IHOT guidelines.

Goal 4: Develop outreach to enhance public understanding, participation and support of Service and Carson NFH programs.

Objective 1: Increase visibility of Carson NFH.

Task 1: Coordinate with other federal, state, and local information/public affairs offices to incorporate information about Carson NFH.

Task 2: Facilitate interagency cooperation with existing and new programs in the Lower Columbia River Gorge.

Task 3: Coordinate with NOAA Fisheries to host special events, such as National Fishing and Boating Week and National Wildlife Refuge Week activities, and open houses at the hatchery.

Task 4: Interact with Regional Office, CRFPO, and NOAA Fisheries outreach coordinators and actively seek to integrate Lower Columbia River fisheries outreach activities with the Regional and National Outreach Strategies.

Task 5: Increase public use of the hatchery facilities by inviting special interest groups to tour the hatchery.

Objective 2: Provide information and education about the Service programs and Carson NFH to internal and external audiences.

Task 1: Continue existing and develop new cooperative agreements and partnerships with public, private and home school groups.

Task 2: Maintain website for the Carson NFH to inform cyber-visitors of the Carson NFH programs, history and general information.

Task 3: Staff the hatchery on weekends with Information and Education assistance during peak adult fish returns (May - June) to give tours, answer questions, and disseminate general information.

Task 4: Develop a strong working relationship with the local media (newspaper, radio, other Gorge publications) and provide regular news releases and articles regarding agency issues and station activities.

Objective 3: Develop forums for public participation (or input) into Carson NFH issues.

Task 1: Regularly participate in Wind River Watershed Technical Advisory and Council meetings.

Task 2: Hold an annual meeting with local conservation groups each Spring to discuss Carson NFH, Wind River, and other issues of concern.

Objective 4: Conduct monitoring and evaluation to ensure goal #4 is achieved.

Task 1: Evaluate use and/or exposure of program materials and exhibits as they help support goals of the Information and Education program.

Task 2: Distribute teacher evaluations of our education programs to assure education goals are met.

**Current Practices to Achieve Goals, Objectives, and Tasks**

**Water Use and Management**.—Carson NFH holds the following certificates of water right:

| Source | Certificate No. | Date | Flow ($ft^3/s$) | Use |
|---|---|---|---|---|
| Tyee Creek | 5856 | Jan. 12, 1953 | 53 | Fish propagation year-round |
| Tyee Springs | 5854 | Jan. 12, 1953 | 2 | Fish propagation and domestic supply |
| Wind River | 7378 | Sept. 28, 1950 | 40 | Fish propagation year-round |

The main water source for the hatchery is Tyee Creek, while the Wind River is used as a secondary supply. Incubation and domestic water is provided by Tyee Springs. All water is supplied by gravity flow and all rearing units receive single-pass water with the exception of the lower earthen dirt pond which receives second use water from the upper earthen pond. Carson NFH does not have a mechanical water reuse system.

Tyee Springs (also known as Siouxon Springs) is located about one-half mile north of the hatchery and is the source for Tyee Creek. This almost pure water is not only the sole source of potable domestic water, it is also the source of all water used to incubate eggs and larva and operate the spawning facility.

In response to repeated failure to pass Washington Department of Health (DOH) fecal coliform standards, and because the springs were classified as “ground water under the influence of

surface water" by DOH, the Tyee Springs intake was modified in 2000 to eliminate surface water influence. The existing perforated collection pipe was removed and a replacement pipe located closer to the spring pool bank. The existing bank was then extended to cover the collection pipe and approximately 2,400 square feet of the spring pool was filled in.

Domestic water and water to the nursery and spawning building share a common pipeline from the spring to the hatchery. Domestic water and water to the spawning building is then split off, passed through an ultraviolet filter, and pumped to a concrete holding tank for gravity distribution.

Tyee Creek flows year-round, although water volume fluctuates seasonally with the greatest flow in the winter and the lowest flow in late summer. Tyee Creek water remains clear except during the most severe storms and then quickly recovers, is always oxygen saturated, and a near constant 44° F. The creek is also relatively pathogen free, with the biggest concern coming from a feral brook trout population which may be a source of bacterial kidney disease.

In contrast to Tyee Creek and Tyee Springs, the temperature of Wind River water fluctuates from near freezing in the winter to the mid-sixties during the late summer months, and has a tendency to become muddy with increased flow. It is suspected of harboring a much higher pathogen load (primarily IHN virus) than Tyee Creek due to the presence of adult spring Chinook from May to August, steelhead, and other resident fish populations year-round. Wind River water use is generally limited to late September well after naturally spawning Chinook carcasses have decomposed. Wind River is usually confined to the earthen ponds because it can be hydraulically isolated from the rest of the rearing units.

**Screening.—**The Wind River intake structure is located approximately one-half mile upstream of the hatchery. In order to bring the Wind River intake into compliance with NOAA Fisheries fish screening criteria, two 3/32" mesh screens have been temporarily placed over the existing intake grill. The screens must be removed each winter and replaced each summer and require constant attention to ensure that the small openings do not clog with pine needles, small rocks and other detritus. There are plans to permanently replace the intake structure and bring it into compliance with the ESA screening criteria in 2005.

**Conveyance System to Hatchery and Ponds.—**Wind River water flows to the hatchery through a 36" pipeline and then to the adult ponds, the raceways or the upper earthen pond. The route of the water is determined by manipulating valves or dam boards.

The configuration of the water conveyance is such that it is possible to send second use water to the middle bank and to the adult ponds which is rarely, if ever, done. Water is routinely reused from the upper earthen to the lower earthen pond. Studies are underway to determine if there are any deleterious effect on fish receiving second use water.

**Effluent Treatment and Monitoring**.—Raceway cleaning effluent is sent to a pollution abatement pond where solids are removed prior to discharge to the Wind River. Cleaning effluent and total discharge (normal operation) effluent are monitored weekly for suspended and settleable solids. Environmental Protection Agency standards have never been exceeded for either cleaning effluent discharge or total discharge since monitoring began in the early 1980s.

The east adult holding pond is used to overwinter spring Chinook smolts. This pond is too large to clean using standard draw down and brushing techniques, nor can effluent from this pond be directed to the pollution abatement pond. So, starting in 2000, a trash pump has been used to periodically vacuum fish waste that typically collect in slack water along the pond sides. A 2 ½ inch fire hose is used to direct the pumped fish waste to the drains in the spawning building and then to the pollution abatement pond.

The earthen ponds present another challenge because they cannot be brushed or vacuumed. While a large percentage of fish waste is self digested, there always remains some which escapes when fish are released. Beginning in 2002, a solution of beneficial bacteria has been added to the culture water in hopes of increasing the digestion rate. Preliminary observations suggest that the pond is cleaner after treatment. The hatchery will continue to monitor the effects of beneficial bacteria on accumulated fish waste.

**Brood Stock Management**

The following performance measures have been established at the hatchery:

| Performance Measure | Hatchery Goal | 5-Year Average | Range |
|---|---|---|---|
| Spawning Population[1] | 1,000 | 980 | 894 - 1,131 |
| Fish release (millions)[2] | 1.42 | 1.32 | 0.91 - 2.2 |
| Egg transfers (thousands)[2] | 0 | 3 | 0 - 9 |
| Fish transfers (thousands)[2] | 0 | 183 | 0 - 419 |
| Adults passed upstream[3] | -- | | |
| Percent survival juvenile to adult[4] | 0.50 | 0.34 | 0.05 - 0.97 |
| Smolt size at release (fish/lb)[2] | 18 | 17.90 | 13 - 24 |

[1]females plus males (including jacks) spawned, five year average and range from calendar years 1997-2001
[2]five year average and range from calendar years 1998-2002
[3]volitional passage upstream and into hatchery
[4]includes all adult recoveries (fisheries plus hatchery), five year average and range from completed brood years 1992-1996

Carson NFH is currently a single species facility rearing only Carson strain spring Chinook salmon. Brood stock collection at the hatchery is managed to maintain the genetic integrity of the stock. The Service ensures that adult brood stock are randomly collected for spawning across the run in proportion to the rate at which they return. To accomplish this, two adult holding ponds are utilized. The west pond, is designated as the "keep" pond and the east pond is designated as the "excess" pond. Fish are trapped weekly into the "keep" pond at the historical rate of return for that week. For example, if records indicate that 10% of the total run returns the second week of May, then 10% of the number needed to meet the spawning goal is trapped that week. The "keep" pond is then closed and subsequently returning adults are trapped into the excess pond. This process is repeated throughout the run. Adjustments are made as the season progresses as indicated by shifts in return rate.

Adult spring Chinook return to the hatchery from May through August. Prior to 2001, the ladder was kept open throughout the return. In 2001, the ladder was closed on August 1 as a negotiated settlement in order to provide natural stream enrichment and potential natural production from late returning hatchery spawners. The action taken in 2001 will occur in 2002 as well, until another agreement is reached with our co-managers. This issue is discussed in more detail in the section "Special Concerns Over Broodstock Management".

The adult brood stock remain in the west holding pond until removed for spawning. The first spawn date is usually scheduled for mid-August and all spawning is usually completed by the end of the month. The holding ponds are supplied with Tyee Creek water so the temperature remains at 44E to 46E F. The volume of the pond is such that density is not a concern. However, pond loading is managed to meet or exceed one gallon of inflow per fish on the "keep" side and one-half gallon of inflow per fish on the "surplus" side. The adults are injected with erythromycin 60 days prior to spawning and again 30 days prior to spawning to control bacterial kidney disease. The adults are also treated three times weekly with formalin to control external parasites.

Eggs are taken each Wednesday to allow time between egg takes for fish to develop viable eggs and to coordinate sampling by the Lower Columbia River Fish Health Center. The adults are crowded to the lift system on the morning of the spawn day and hoisted in small numbers to the anesthetic vat. Once the fish are anaesthetized, they are sorted for ripeness. Unripe fish are returned to the holding pond and held there until the following week. Ripe fish are killed with a guillotine and bled prior to spawning.

**Surplus Adult Returns**.—More fish enter the hatchery than are needed for brood stock. Brood stock excess to hatchery needs are transferred to the Bureau of Indian Affairs for distribution to the Yakama Nation for Ceremonial and Subsistence (C&S) use, other tribes for C&S use, or the Bureau of Federal Prisons for inmate rations. Surplus fish or spawned carcasses may also be available for stream enrichment. Adult spring Chinook held for brood stock must be treated (injected) with erythromycin to control bacterial kidney disease infection. Erythromycin has not

been cleared for use on food fish by the Federal Drug Administration, therefore, carcasses previously injected with erythromycin cannot be used for human consumption and must be buried on site. Prespawn mortalities are unfit for human consumption and, in accordance with the Pacific Northwest Fish Health Protection Committee's draft Salmon and Steelhead Carcass Distribution Protocols, cannot be used for stream enrichment outplants and must be buried on site as well.

**Spawning Protocol**.—The goal mentioned earlier of maintaining the genetic integrity of the Carson strain by applying as much randomness to brood stock collection and selection as possible is continued through the spawning process. Fish are randomly selected and randomly mated as close to a 1:1 male/female spawning ratio as possible. It is nearly impossible to attain a strict 1:1 ratio, however, because the sex ratio of returning adults is typically skewed 60/40 in favor of the females. There are times when, simply by chance, insufficient numbers of males come across the spawning table to exactly match the desired 1:1 spawning ratio. The actual ratio attained is usually 1.0 males : 1.1 females (i.e. some males are used more than once). When culling excess eggs (non BKD detected parent) or when removing eggs for off-station transfers, a portion of eggs from each mating is removed rather than a complete family unit. Jack size fish (usually age three males) are randomly included in the spawning population. Should an extraordinary number of jacks return, the number included in the spawning population will be limited to 5% of the total number of males used per our Regional genetics guidelines.

To achieve a spawning population of 1,000 fish, up to 1,400 spring Chinook brood stock are retained based on the following assumptions:

1. 1,420,000 smolt release goal
2. 18% loss green egg to smolt
3. 20% BKD cull
4. 4,200 eggs/ female
5. 5% prespawn mortality
6. 60/40 female:male ratio at return

**Other Acceptable Stocks**.—If brood stock numbers are insufficient to meet hatchery production objectives, the hatchery will rear fewer fish. In case of a natural or man-made disaster, Carson stock from Little White NFH or Leavenworth NFH Complex would be acceptable for use at this facility.

**Upstream Passage**.—Since there is no barrier dam at the hatchery, fish are not prevented from passing upstream of the hatchery. Hatchery fish volitionally enter the hatchery, homing to Tyee Creek. Wild steelhead pass on their own volition upstream of the hatchery. Few steelhead home into Tyee Creek. For example, for the last four years, only three steelhead have been observed swimming into the hatchery ladder.

**Special Concerns Over Brood Stock Management**.—Co-managers are involved in brood stock management decisions through participation in Hatchery Evaluation Team meetings, through direct contact with the Columbia River Fisheries Program Office, or through other regional forums. For example, discussions with NOAA Fisheries, Yakama Nation and Washington Department of Fish and Wildlife biologists led to the recent (2001 and 2002) decision to close the fish ladder on August 1 unless more than 2,350 remained in the river. The purpose of this action was to increase the number of naturally spawning spring Chinook and to increase marine nutrient contribution to the Wind River ecosystem. The number 2,350 is based on the highest historical spawning escapement observed in 1971. There is a concern that excess adults left in the river serve as a source of pathogens, creating the potential for disease transmission to native and hatchery fish as well as concern over in-stream competition of juvenile fish for food and space. Discussions and evaluation of this action will continue.

Biologists with WDFW have made inquiries on rearing captive brood summer steelhead should the native population reach dangerously low levels. To address this issue a feasibility report was prepared for the Wind River Restoration Team (Smith 1995). No further actions have transpired.

**Incubation Strategies and Procedures**

The eggs from each female are individually incubated until the eyed stage at which time dead eggs are removed. Viable eggs are counted and moved into vertical stack incubators for hatching and larval development. All incubation takes place in $44^0$ F Tyee Springs water. Eggs from females with high levels of Bacterial Kidney Disease are discarded unless needed to meet production goals. The first take of eggs hatches in mid-October.

**Rearing Strategies**

Fry are moved outside to the covered middle bank of 18 raceways for first feeding in early January. The remaining 28 raceways contain yearling fish at this time. Starter feeds from two manufacturers are used in combination (BioProducts and Moore-Clarke[4]). Implementation of this protocol has nearly eliminated losses due to gut fungal (*Phoma sp.)* infections. The practice of alternating feed from two manufacturers has been continued throughout the rearing cycle with excellent results. The pond cover provides protection from predators and from the elements for the early feeding fry. Anecdotal evidence from the first year of use suggests that the pond cover improves both survival and feed conversion of early fry.

In May, the fry, fingerlings by now, are spread across all 46 raceways. This occurs after the April smolt release and raceways are cleaned. The large earthen ponds and the adult holding pond are generally filled in late fall after fall rains have recharged Tyee Springs providing sufficient flow to support these rearing units. The upper and lower earthen ponds are allowed to

[4]Reference to trade-names and products does not signify endorsement by the Service.

set fallow over the summer, drying them out and reducing the chance of spreading disease from one brood year to the next. A persistent flagtail infection in the upper earthen pond was virtually eliminated after allowing the pond to remain fallow over the summer. Use of the adult pond for rearing juveniles must be delayed until after spawning season.

Mid-May is the optimal time to mark fish at this facility for a variety of reasons: (1) The fingerlings are 100 fish/pound or larger, a good size for marking; (2) Marking at this time facilitates spreading or "splitting" of fingerlings to empty raceways (it is a simple matter to direct fish processed through the marking trailer to the appropriate raceway or pond);and (3) Marking at a later date could negatively impact fish health through additional handling when the fish are growing rapidly.

"NATURES" rearing is the practice of employing techniques such as the addition of substrate, coloration, and cover to rearing units in order to mimic natural environs. The earthen ponds provide a NATURES rearing opportunity at the hatchery. Terrestrial vegetation, 2 to 3 feet tall, grows in these ponds during the summer fallow period providing excellent cover when the ponds are re-filled. Shade cloth placed over the upper earthen pond in 2001 to provide protection from the sun also seemed to work very well. Fish in this pond utilized nearly the entire pond after the shade cloth was hung rather than crowding into small areas shaded by the central walkway as they did prior to placement of the shade cloth. NOAA Fisheries biologists have proposed a full scale production test of NATURES rearing techniques at Carson NFH but have not been received funding. The production ponds were upgraded in 2002. The ponds were coated with Lifelast[4] polyurethane and colored to approximate Wind River substrate. The middle bank of raceways are also enclosed which provide shade.

Beginning with brood year 1997, rearing space has been managed so that density indices (the ratio of weight of fish to rearing unit volume and fish length) at no time exceed 0.25 (Banks 1994). In order to achieve the low indices, total production was reduced from over 2 million to 1.42 million smolts. The results have been very encouraging. For example, prophylactic erythromycin treatments to control BKD are no longer given to fingerlings, and losses to BKD have declined dramatically. Reduced production numbers have also led to minimal use of Wind River water for production and, hopefully, minimal introduction of pathogens.

The raceways are brushed twice weekly for cleaning from first ponding until the fish are switched from a crumble feed to an extruded pellet at about 450 fish to the pound. The raceways are then brushed once weekly until the fish are released. The adult pond is vacuumed twice, once about mid-way to release and once just prior to release.

**Release Strategies**

Smolts are mass released directly into the Wind River at 18 fish/pound or larger to minimize interaction with other fish populations. As discussed in Chapter 2, there are no native spring Chinook stocks in the Wind River above Shipherd Falls. However, steelhead listed as threatened under the Endangered Species Act are present throughout the Wind River drainage. Releasing fish at 18 fish/pound or larger helps ensure that the released fish are functional smolts which actively migrate through the Wind River corridor, reducing competition with listed steelhead. Rearing the smolts almost exclusively on Tyee Springs water minimizes straying of adults, further reducing competition with native steelhead.

Smolts are released around the third week of April to coincide with normal spring migration and spill at Bonneville Dam. It is likely that the fish are functional or near functional smolts at this time as evidenced by their rapid migration to the mouth of the Wind River (smolt trap data) and detection at Bonneville Dam. Detecting PIT tagged fish at Bonneville Dam bypass facilities provide an indication of travel time for releases from Carson NFH. For example, in 1999 the average travel time to Bonneville Dam for a release date of April 29, 1999 from Carson NFH was 10.2 days (n=1,800 detected). The quickest time was less than 24 hours (0.8 days) and the slowest was 94.3 days (Columbia River Fisheries Program Office, Vancouver, WA unpublished data). Since releases from the hatchery are targeted during Bonneville Dam spill schedules, most PIT tagged fish released from Carson NFH go undetected at Bonneville Dam's fish bypass facilities with most fish utilizing the spillway.

**Fish Health Management Program**

The primary objective of fish health management programs at Service hatcheries is to produce healthy smolts that will contribute to the program goals of that particular stock. Equally important is to prevent the introduction, amplification or spread of certain fish pathogens which might negatively affect the health of both hatchery and naturally reproducing stocks.

**Fish Health Policy**.—The Lower Columbia River Fish Health Center (FHC) in Underwood, WA provides fish health care for Carson NFH under the auspices of the published policy 713 FW in the Fish and Wildlife Service Manual (FWM). In addition to this policy, the 1994 annual report "Policies and Procedures for Columbia Basin Anadromous Salmonid Hatcheries", by the Integrated Hatchery Operations Team (IHOT 1995) provide further fish health guidelines as approved by northwestern state, federal, and tribal entities. The directives of these two documents more than meet the requirements of Washington's state and tribal fish health entities which follow the directives in the Co-Managers' Salmonid Disease Control Policy of 1998.

The documents mentioned above provide guidance for preventing or minimizing diseases within and outside of the hatchery. In general, movements of live fish into or out of the hatchery must be approved in the U.S. v Oregon Production Advisory Committee forum (Objective 6) and be

noted on the State of Washington Brood Document for the hatchery. If a fish transfer or release is not on the Brood Document, permits from the Washington Department of Fish and Wildlife, the Service, and any other states through which the fish travel must be obtained and approved by co-managers. Fish health exam and certification must be done prior to any releases or transfers from the hatchery to minimize risks from possible disease transmittance.

**Fish Health Examinations**.—Monthly examination: A pathologist from the FHC visits once per month to examine fish at the hatchery. From each stock and broodyear of juveniles, fish are randomly sampled to ascertain general health. Based on pathological signs, age of fish, concerns of hatchery personnel, and the history of the facility, the examining pathologist determines the appropriate tests. This usually includes a necropsy with an external and internal exam of skin, gills, and internal organs. Kidneys (and other tissues, if necessary) will be checked for the common bacterial pathogens by culture and by a specific test for bacterial kidney disease (BKD). Blood is checked for signs of anemia or other infections, including viral anemia. Additional tests for virus or parasites are done if warranted. The pathologist will also examine fish which are moribund or freshly dead to ascertain potential disease problems in the stocks.

Diagnostic Examination: This is done on an as-needed basis as determined by the pathologist or requested by hatchery personnel. Moribund, freshly dead fish or fish with unusual signs or behavior are examined for disease using necropsy and appropriate diagnostic tests. A pathologist will normally check symptomatic fish during a monthly examination.

Ponding Examination: The first health exam of newly hatched fish occurs when approximately 50% of the animals are beyond the yolk sac stage and begin feeding. Sixty fish will be sampled and tested for virus.

Pre-release Examination: At two to four weeks prior to a release or transfer from the hatchery, 60 fish from the stock of concern are necropsied and tissues taken for testing of listed pathogens. The listed pathogens, defined in Service policy 713 FW (Fish and Wildlife Service Manual) include infectious hematopoietic necrosis virus (IHNV), infectious pancreatic necrosis virus (IPNV), viral hemorrhagic septicemia virus (VHSV), *Renibacterium salmoninarum, Aeromonas salmonicida, Yersinia ruckeri*, and *Myxobolus cerebralis*.

Adult Certification Examination: At spawning, tissues from adult fish are collected to ascertain viral, bacterial, and parasite infections and to provide a brood health profile for the progeny. The FHC tests for all of the listed pathogens, except *Myxobolus cerebralis*, and including *Ceratomyxa shasta*. The minimum number of samples collected is defined by 713 FW. At Carson NFH, all brood females are tested for *R. salmoninarum* (causative agent of BKD), with an identifying fish health number corresponding to each female's eggs so that selective culling and/or segregation is possible. This is done to reduce/control BKD, a vertically-transmitted disease. Progeny from females with high levels of BKD are culled (if not needed to make

production goals) or segregated from progeny at lower risk. The FHC provides results from testing within four weeks to allow management decisions.

**Chemotherapeutant Use**.—Erythromycin injections for brood stock are critical to the control of bacterial kidney disease which is caused by a vertically transmitted bacterium (*Renibacterium salmoninarum*) that can reside in the ovarian and seminal fluids. In addition, erythromycin injections control the mortality and reduce horizontal transmission of BKD between adults in the brood pond. The injection schedule is set to maximize the number of adults injected, with a goal of two injections for the early arriving adults and one injection for the later arrivals. To reduce bacterial numbers in the reproductive fluids and to deposit the drug inside the ova, erythromycin must be injected at a dosage of 20 mg drug/kg of fish at 30 days prior to spawning. At Carson NFH, the first injection is scheduled on about June 12th and the second injection on about July 12th. Except for fish arriving too close to the time of spawning for safe handling and injection, all spring Chinook salmon adults kept for broodstock will be injected. Injections were formerly done under INAD 6430 (Investigational New Animal Drug regulation) but now require a prescription from a veterinarian. The injected drug is Erythro-200 or Erythro-100 (200 mg/ml or 100 mg/ml, respectively, of active erythromycin base in PEG, ethly actate and ethyl alcohol), to be injected in the dorsal sinus at 20 mg drug/kg of body weight.

Since 1998 (brood year 97 juveniles) prophylactic medicated feedings to control BKD in juveniles has been deemed unnecessary. The reduced levels of BKD in the juveniles is attributed to lowered densities ($\leq$ 0.25 density index and < 1.0 flow index) during rearing, regular cleaning and maintenance of individual equipment (nets, etc.) for each pond, erythromycin injection of the adults, culling/segregation of progeny from highly infected females, and the use of Tyee Springs water for rearing. Should prophylactic feeding be necessary, as determined by the FHC, juveniles are to be fed at a daily dosage of 100 mg/kg of fish for a minimum of 21 days unless contraindicated by drug toxicity or needed feeding rate adjustments. The time and number of treatments will be dictated by circumstances. As of 2001, there is a temporary INAD 4333 that allows feeding of Aquamycin 100 (erythromycin thiocyanate in a wheat flour base) and prescription by a veterinarian is not required.

Formalin treatment of adults held for brood stock are used to control external pathogens three times per week prior to spawning.

Salmonid egg hardening and disinfection treatment with a polyvinylpyrrolidone iodine compound (approximately 1% iodine) is required by 713 FW policy to minimize/prevent transmittance of viral and bacterial pathogens. The eggs shall be disinfected in 50 ppm iodine in water buffered by sodium bicarbonate (at 0.01%) for 30 minutes during the water-hardening process. Eggs received at the hatchery must be disinfected before they are allowed to come in contact with the station's water, rearing units or equipment. Specifics are provided in 713 FW policy.

**Other Fish Health Precautions**.—Unless knowledge regarding vertical transmittance of BKD proves otherwise, eggs from female brood stock with high levels of BKD (a cut-off point selected by the NFH and FHC managers based on results from the Enzyme-Linked Immunosorbent Assay or ELISA) will not be used in production unless egg production is low. If the number of brood females is low, progeny from highly infected females shall be segregated into rearing units apart from the rest of the production and absolute fastidiousness maintained as to using equipment that is disinfected and/or dedicated to these rearing units.

Where feasible, a yearly draw down, pressure wash, and drying of the dirt ponds is recommended to reduce problems induced by fungus, bacteria and parasites. If necessary, a formalin treatment may be applied to the surface.

Returning spring Chinook salmon that are allowed to remain in the Wind River upstream of the hatchery can serve as a reservoir of pathogens for the fish in the hatchery. Because of this, the standard practice is to rear juveniles on Tyee Creek water. Returning spring Chinook salmon have a relatively high incidence of infectious hematopoietic necrosis virus (IHNV), ranging from 41 to 88% and in 1988 to 1995 when water from the river was used for rearing, the juveniles in the hatchery experienced small to large epizootics of IHNV. In addition, the juveniles also succumbed to furunculosis which is found in about 1/3 of dying spring Chinook salmon adults. The risk from bacterial kidney disease in the juveniles is also enhanced, with evidence from this and other hatcheries that horizontal transmission occurs when infected adults are in the water supply. Since 1996 Wind River water is no longer used for rearing, there have been no isolations of IHNV, no detection of furunculosis, and a reduced incidence of BKD in the juveniles. A precautionary consideration might be to remove all spring Chinook salmon adults from the Wind River prior to spawning to reduce the potential of infecting native steelhead that could also serve as a reservoir of infection.

Drugs and chemicals for treating fish are used on an "as needed" basis. Formalin treatments for adult brood stock are given to control external parasites and as a fungicide on eggs. Studies are currently (2001) underway to determine if egg antifungal treatments are truly necessary. It is becoming increasingly difficult to comply with OSHA, safety and fire codes and regulations. Minimizing chemical and drug use will not only reduce impacts on the local environment but will make compliance with the various safety regulatory agencies much easier, as well as reduce risks to employees. Towards that end, an electro-anesthesia system should be in place by the BY 2002 spawning season. Use of this device will virtually eliminate the need for the anaesthetic MS-222[4] reducing one more chemical at the hatchery.

Tank trucks and tagging trailers are disinfected before being brought onto the station and after use at the hatchery.

Abernathy Fish Technology Center provides quarterly feed quality analysis to prevent disease and meet nutritional requirements of fish.

**Monitoring, Evaluation, and Coordination**

The Columbia River Fisheries Program Office (CRFPO) provides monitoring, evaluation, and coordination services concerning Carson NFH production. The CRFPO staff monitors hatchery returns, biological characteristics of the hatchery stock, fish marking, tag recovery, and other aspects of the hatchery program. They maintain the database that stores this information and serve as a link to databases maintained by other entities. The CRFPO also cooperates with the hatchery, fish health center, Abernathy Fish Technology Center, and co-managers to evaluate fish culture practices, assess impacts to native species, and coordinate hatchery programs both locally and regionally. These activities are described in the following section:

**Database Management.—**The Fisheries Information System (FIS) is a national database system for the Service's Fisheries Program. Each Service field office contributes to this database. The FIS consists of five different databases, two of which, Fish and Egg Distribution databases document production accomplishments from all National Fish Hatcheries. This database is discussed further in Chapter 4.

Information from and about Carson NFH is connected to the broader fisheries community of the West Coast of the North American Continent through the U.S. Fish & Wildlife Service Columbia River (information) System (CRiS). The following information is recorded in files that are components of the CRiS database: adult, jack and mini-jack returns to the hatchery; age, sex, length, mark and coded-wire tag information for returning fish that are sampled; egg development and disposition; the origin of fish raised at the hatchery; and fish transfers and releases. Carson NFH maintains files containing information generated at the hatchery (brood stock management, incubation, rearing, and release). Staff from CRFPO maintain files containing information on marked juvenile fish and on sampled adult fish (adult bio-samples).

Use of CRiS database files and programs achieves the following multiple purposes: 1) reduces the amount of effort expended to meet reporting requirements, 2) increases the quality and consistency of data, 3) facilitates development of software usable at all stations, 4) provides a platform on which to build effective evaluation tools which can be used by hatcheries, fisheries management and regional offices, and 5) facilitates the exchange of information with other agencies. For example, release and recovery information is reported to both the Regional Mark Information Center and the StreamNet databases.

Computer programs that are components of the CRiS database are used to transform data into formats required by other agencies. These formats can be either electronic or printed. Other CRiS programs combine data from the hatchery, CRFPO, and from databases maintained by other agencies into other formats to accomplish reporting, monitoring, and evaluation.

**Marking/Tagging Program**.—Juvenile fish are fin clipped, coded-wire tagged and/or PIT tagged at Carson NFH by CRFPO to monitor and evaluate fish cultural techniques, survival and

fishery contribution. Presently all spring Chinook salmon are fin clipped at Carson NFH to identify hatchery fish in selective fisheries and to measure the impact on wild anadromous and resident stocks of fish in Wind River. This action is in compliance with recommendations of the Biological Opinions of NMFS's 1999 Artificial Propagation in the Columbia River Basin and the 2000 Reinitiating of Consultation on Operation of the Federal Columbia River Power System, under the Endangered Species Act-Section 7 Consultation.

**Bio-sampling and Reporting**.—State and tribal coast-wide sampling of sport, tribal, and commercial fisheries and hatchery rack return sampling, by CRFPO and the hatchery staff, provides total recovery and survival estimates for each brood year released.

Coded-wire tag recovery information is used to evaluate the relative success of individual brood stocks and compare performance between years and hatcheries. This information is used by salmon harvest managers to develop plans to allow the harvest of excess hatchery fish while protecting threatened, endangered, or other stocks of concern.

Until 2001, snouts were removed from all adipose fin-clipped fish to recover coded-wire tags. A percentage of unmarked fish were sampled for length, sex, and scales (age). The percentage of fish sampled was set high enough that at least 500 fish were sampled. CRFPO personnel did all sampling except during the period of returns from the WDFW mark evaluation study beginning with brood year 1989. These samples, and a subset of fish sampled for coded-wire tags, were used to determine the age composition of fish returning to the hatchery (Attachment 15). Starting with brood year 2000 all production fish were adipose fin clipped. All returning fish are now checked for coded-wire tags by passing them through a tag detection unit. Mass marking will allow selective fisheries and will help us determine production of wild or feral spring Chinook salmon in the Wind River.

**Hatchery Evaluation Studies**.—Hatchery evaluation is the use of replicable, statistically defensible studies to guide management decisions. The hatchery evaluation vision action plan developed in 1993 for Region 1 Fisheries describes hatchery evaluation in greater detail (USFWS 1993). The purpose of hatchery evaluation is to simply determine what works and doesn't work through planning, implementing, documenting, monitoring, analyzing, and reporting.

Past studies include National Marine Fisheries Service's (NOAA Fisheries) coded-wire tagging of Willard stock coho and Carson stock spring Chinook salmon reared at Carson NFH in the late 1970's and early 80's. This study evaluated imprinting and homing mechanisms of fish released at various locations in the Columbia River basin (Slatick 1988). Abernathy Fish Technology Center has also conducted hatchery evaluation studies at the hatchery. For example, brood years 1982 to 1985 spring Chinook from Carson were marked and coded-wire tagged for a rearing density study (Banks 1994). As a result of this study, rearing densities in hatchery raceways were reduced. The guidelines being implemented as a result of the density study are to keep the

rearing density index at 0.25 or lower with a flow index greater than 1.0. The present production goal at Carson NFH is 1.42 million smolts.

A study to evaluate survival of spring Chinook from the effects of fin clipping and coded-wire tagging was completed as part of a three brood year (1989-91), three hatchery investigation (Carson NFH, Oregon's South Santiam, and Washington's Cowlitz hatcheries). The results and conclusions of this study are forthcoming.

**Stock Assessment and Contribution to Fisheries**.—Routine coded-wire tagging of production fish under the Bonneville Power Administration (BPA) funded "Stock Assessment" program began with fish from brood year 1988 (Pastor 1999). A representative group of 75,000 fish continues to be adipose fin clipped and coded-wire tagged to assess survival and fisheries contribution. All release information, including marked to unmarked ratios, is reported by CRFPO to the Pacific States Marine Fisheries Commission (PSMFC). Mark and tag information from sampled fish, recovered in the various fisheries and at the hatchery, are also reported.

As assessed by CRFPO, the average survival for 12 brood years with complete coded-wire tag recovery information (1982-95) is estimated to be 0.23% with a standard deviation of 0.18%. The minimum survival was 0.022% for brood year 1991 and maximum was 0.59% for brood year 1992 (Attachment 16). A more optimistic outlook is appearing for returns in 2000, 2001and 2002 (brood years 1996, 1997 and 1998) with over 1% survival expected for brood year 1997. As previously mentioned, the marking program has also made it possible for CRFPO to determine contribution rates to various fisheries (Attachment 17). Since brood year 1980, an average 74% of adults returned to the hatchery with remaining recoveries of Carson spring Chinook salmon occurring almost exclusively in the Columbia River Basin. The majority of fish were harvested in the freshwater sport fishery, followed by tribal treaty and subsistence fishery, and the Columbia River gill net fishery. A very small percentage may also be picked up in the Alaska, Washington, Oregon, California and British Columbia commercial fisheries.

**Juvenile Monitoring.—**Juvenile fish at Carson NFH are monitored on a routine basis by the hatchery staff to determine the condition factor of fry, fingerling and yearling fish. Samples are taken monthly for Bio-analysis by the Lower Columbia River Fish Health Center (LCRFHC) to determine the health condition of fry, fingerling, yearling and smolts prior to release. Sampling of fingerling fish for tag retention and fin mark quality, prior to release, is conducted by CRFPO. Length measurements are recorded for all PIT tagged fish by CRFPO.

Use of passive integrated transponder (PIT) tags began with brood year 1995 fish at Carson NFH. PIT tagging at Carson NFH is part of a larger comparative survival study conducted by the Fish Passage Center, Portland, Oregon. Carson NFH serves as a lower river hatchery to compare survival and passage to upper Columbia River and Snake River facilities. Up to 15,000 juvenile fish at Carson NFH have been PIT tagged each year by CRFPO for this study.

**ESA Assessments, Ecological Interactions, and Natural Production Studies.—**The Service completes Biological Assessments and Hatchery and Genetic Management Plans to comply with the Endangered Species Act (ESA). These assessments and plans help guide production, considering the potential impacts on the biological community.

To comply with ESA, the Service initiated a Biological Assessment for the hatchery back in 1993 and subsequently initiated a Hatchery and Genetic Management Plan (HGMP) for Carson NFH in 1999 (USFWS 1999). This initial draft HGMP followed an older format and was produced under consultation with NOAA Fisheries to meet our ESA Section 7 obligations. The Service and NOAA Fisheries agreed that we would complete a more thorough HGMP once the format was finalized by NOAA Fisheries and the Service. The Service is now in the process of completing this more detailed HGMP and anticipate having it completed by fall of 2002. This document, considered a "phase I draft", will describe current operations at the hatchery and will comply with ESA obligations, covering both NOAA Fisheries and Service trust species. It is anticipated that the phase I drafts for all hatcheries, including Carson, will be distributed to the co-managers and other interested parties and will serve as the focus for a collaborative, phase II part of the process. Collaboration meetings should begin in late 2002 and continue through the first half of 2003. Drafts for any proposed new project/programs will be developed by appropriate proponents and also discussed and reconciled during phase II. This process will produce phase II draft plans which will be provided to subbasin planning processes and the appropriate technical recovery team (TRT) for consideration and interaction with those groups. For HGMPs that involve unreconciled differences, the phase II options could create "scenarios" that can be presented to the TRT for consideration and advice. The phase II draft plans will be completed and set aside (parked) until all HGMPs relevant to an Evolutionarily Significant Unit (ESU) are completed, allowing for ESU-wide considerations and feedback with the TRT/Recovery Planning processes. The HGMP collaborators will incorporate TRT advice as appropriate to ensure consistency with broader recovery objectives. This step culminates in Phase III drafts, which become final and ready to implement after approval by NOAA Fisheries and the Service.

Of special concern in the Wind River is wild (listed) summer steelhead trout production. Natural production of juvenile, smolt and adult steelhead is monitored by WDFW, USFS and USGS. The Service is developing study proposals to assess the effects of hatchery spring Chinook salmon on the aquatic community in the Wind River, especially on the listed summer steelhead population. The Lower Columbia River Fish Health Center can also help assess the status of wild fish health in the watershed.

Additional monitoring needs have also been identified in the Draft Wind River Subbasin Summary (WDFW 2000). These fish and wildlife needs are: 1) determine abundance, distribution, survival and status of fish and wildlife native to the watershed including steelhead, coastal cutthroat, fall chinook, bull trout, coho, lamprey, and crawfish; 2) determine genetic and life history types of native fish and wildlife and the strength of their current expression relative

to historical and desired future conditions; 3) assess effect of natural escapement of hatchery spring Chinook and feral brook trout on natural production of steelhead; 4) determine if high infestations of the ciliated protozoan *Hydropolaria lwoffi* lowers survival of juvenile steelhead and determine if degree and distributions of infestations in juvenile steelhead is related to water quality, habitat conditions, or other environmental stressors; 5) determine the effectiveness of habitat restoration projects on achieving the desired physical change and measure response of wild steelhead populations to these changes; 6) assess effect of operations of Bonneville and The Dalles dams on the fish and wildlife production capacity and migration corridor of the portion of the Wind River that is inundated with the impounded waters; 7) assess straying (rates and where) of hatchery fish from Carson NFH.

**Environmental Monitoring**.—Environmental monitoring is conducted at Service facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination System (NPDES) permit and is also used in managing fish health. On a short-term basis, monitoring helps identify when changes to hatchery practices are required. Long-term monitoring provides the ability for our cooperators to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following parameters are currently monitored at this hatchery:

- Total Suspended Solids (TSS)--- 1 to 2 times per week on composite effluent, maximum effluent and inflow samples. Once per month on pollution abatement pond inflow and effluent samples.

- Settleable Solids (SS)—1 to 2 times per week on inflow and inflow samples. Once per week on pollution abatement pond inflow and effluent samples.

- In-hatchery Water Temperatures—maximum and minimum daily.

- In-hatchery Dissolved Oxygen—as required by stream flow or weather conditions.

**Coordination/Communication**.—The hatchery holds Hatchery Evaluation Team (HET) meetings each spring and fall. These meetings include representatives from Carson NFH, CRFPO and LCRFHC. Topics of concern include reports on current activities and accomplishments, present management programs, and future plans or studies that might affect, or be affected by hatchery operations. Other aspects include survival, life history, fisheries contribution, and fish health parameters at Carson NFH and how it compares to other National Fish Hatcheries producing spring Chinook salmon in the Columbia River. These meetings have evolved into combination HET/Coordination meetings. Cooperators (NOAA Fisheries, WDFW, YN) are invited to all HET meetings and are especially encouraged to attend when significant hatchery management decisions are scheduled. The fall HET meeting reviews adult returns with emphasis on production decisions for the next year. Production is also coordinated with the co-

managers through the Production Advisory Committee (see below) and with concurrence of the Regional Office and NOAA Fisheries.

**Fish and Egg Transfers**.—All fish and egg requests and transfers are coordinated through Carson NFH, LCRFHC, and CRFPO. Any request for fish and/or eggs, either in or out of Carson NFH, will be in writing and a National Fish Hatchery Planned Release or Transfer Schedule will be prepared by the requester. All transfers of fish and/or eggs require a fish health certification from LCRFHC prior to transfer. All fish and egg transfers are made in accordance with the co-managers fish disease control policy and the Service's fish health policy and implementation guidelines. If the fish and/or eggs are determined to be healthy the LCRFHC arranges for all appropriate state permits involving the transport. The transfer schedule is signed by the Carson NFH manager and LCRFHC and sends the document and permits to the CRFPO for approval. These requests and permits are kept on file at the CRFPO for future reference.

**Interagency Coordination/Communication**.—As part of the U.S. v Oregon Columbia River Management Plan, the Technical Advisory and Production Advisory Committees are comprised of harvest and production assessment biologists, including representatives from the Service, Tribes, NMFS, and states of Oregon, Washington and Idaho. These groups provide management direction used in establishing hatchery fish production goals and harvest rates.

The Integrated Hatchery Operations Team (IHOT) was comprised of representatives from fish management agencies, including CRFPO and tribes. IHOT developed a series of regional hatchery policies and operational plans. The IHOT group has since been replaced by the Artificial Production Review process funded by the Northwest Power Planning Council. The Service is represented by our Regional Office staff.

Pacific Northwest Fish Health Protection Committee (PNFHPC) is comprised of representatives from U.S. and Canadian fish management agencies, including LCRFHC, tribes, universities, and private fish operations. The group meets twice a year to monitor regional fish heath policies and to discuss current fish health issues in the Pacific Northwest.

At the Carson NFH Annual Coordination Meeting (February) the Service discusses management issues for Carson NFH, on an annual basis with representatives from WDFW, NOAA Fisheries, and the Yakama Nation.

**Ocean Fisheries Management.—**Carson NFH spring Chinook salmon are not recovered in ocean fisheries in significant numbers and do not influence ocean fishery management decisions.

**Freshwater Fisheries Management**.—Washington, Oregon, and the four treaty tribes (Yakama, Warm Springs, Umatilla and Nez Perce), that are parties to the Columbia River Fish

Management Plan (U.S. v. Oregon), prepare harvest strategies based on run size predictions made by their respective fishery agencies. They then jointly present their findings to the Columbia River Compact through the Technical Advisory Committee (TAC). The Columbia River Compact, created by Congress, has the authority to approve or reject sport and commercial fishery proposals for the main stem Columbia River. In their deliberations, the Compact will consider the findings of the TAC. If those findings are in compliance with the management plan, brood stock goals and ESA guidelines, and the run size prediction shows a harvestable surplus, the Compact will set seasons for non-tribal and/or tribal fisheries in the main stem Columbia River.

If a harvestable surplus is predicted for the Wind River, the State of Washington and Yakama Nation will set regulations for terminal area non-tribal sport and/or tribal subsistence fisheries. Fishing regulations are established to also provide adequate escapement for hatchery production and meet ESA guidelines.

**Public Outreach Activities**

The Columbia River Gorge Information and Education (I&E) Office services the Carson and Spring Creek National Fish Hatcheries and the Lower Columbia River Fish Health Center. The Office shares/distributes its time and staffing between these stations. The I&E program is mainly funded by the Spring Creek NFH with assistance from the Carson NFH and the Lower Columbia River Fish Health Center.

The goal of the Columbia River Gorge I&E Office outreach program is to increase the visibility of the Fish and Wildlife Service facilities in the Columbia River Gorge and to provide information about Service programs to internal and external audiences. Staff and volunteers show how Service programs benefit the public and the environment in keeping with the Service's mission "To conserve, protect, and enhance the Nation's fish and wildlife and their habitats for the continuing benefit of people."

Recognizing that it is increasingly important for all staff to be involved in gaining or retaining public support for our programs, the I&E program will strive to insure that staff are well-informed about policies, procedures, and issues; and that staff are willing and able to interact with our various publics. Program efforts will include providing information to staff, partners, and volunteers and, through them, to members of the community and other publics. Outreach will be used as a management tool, providing support to the Service, the public, and our hatchery programs.

**On Station**.—On station activities include tours of the facility to predominantly local schools. Some special interest groups schedule special tours to better understand hatchery operations. On site educational efforts include an Outdoor Learning Day each May introducing Camas, WA 5$^{th}$ graders to various elements of the hatchery and general stewardship of the outdoors. Columbia

River Day Camp is held each August as a joint effort with various agencies introducing Vancouver children to the hatchery and outdoors. Students from both Carson Elementary and Stevenson High School raise spring Chinook salmon in their classrooms and visit the hatchery annually to release their fish and tour the facility. Annual festivals include an Open House each June and an annual Disabled Fishing Day and Kid's Fishing Day each September. Additional information and education assistance is provided at the hatchery on weekends during peak adult fish returns (May - June) to give tours, answer questions, and disseminate general information.

**Off station.—**Outreach efforts include an array of activities that occur throughout the Pacific Region. Examples include various festivals, classroom participation at local schools, stream adoption, participation in other National Fish Hatchery events, and county fairs (Hood River and Skamania counties and the Trout Lake Community Fair).

The hatchery maintains a 5-hole miniature golf course, Migration Golf, which depicts the life cycle of salmon. This very popular activity is requested throughout the year. The Service chooses events which will reach a broad audience. The Service rotates events we attend each year. The Service does not have adequate funding or staffing to attend all events for which the golf course is requested. The golf course is an excellent tool to tell the hatchery and wild salmon story and is a great asset to the Carson NFH.

Visitors can visit Carson NFH through the World Wide Web at http://gorgefish.fws.gov/Carson to inform cyber-visitors of Carson NFH programs. Additional biological information on spring Chinook salmon at the hatchery can be viewed at http://columbiariver.fws.gov/

**Partnerships/Cooperators.—**A bulleted list of particular events and partnerships follows:

- Carson Elementary School - Carson NFH provides spring Chinook salmon for Salmon-In-The- Classroom activities annually, classes then tour the hatchery and release their fish in December each year.

- Clark County Community College - partnership with U.S. Army Corps of Engineers, National Park Service, and the Vancouver Water Resources Education Center to provide a Mature Learning class to discuss and explain the history and stewardship of Columbia River anadromous fish.

- Clark Public Utility - Carson NFH provides the Migration Golf Course for the annual Clark County Home and Garden Idea Fair.

- Columbia Gorge Center - Coordinate an Annual Accessible Fishing Day, participating adults are from various group homes in Hood River and The Dalles, OR.

- Columbia River Gorge Visitor's Association - the Information and Education staff attends this monthly meeting; being members of the Association, the hatchery is featured as a paying member; our name, address, website and calendar of events appear in the annual *Gorge Guide*; main fulfillment publication for the Association.

- The Discovery Center and Museum - cooperative effort with outreach activities including joint booth for Hood River and Skamania County Fairs, we provide guest speakers at special speaker series for the museum, Columbia River Day Camp, Bass Lake Field Day, assistance with Carson NFH Annual Kid's Fishing Day.

- Dorothy Fox Elementary School, Camas, WA - provide an Outdoor Learning Experience for 25 urban students to gain a better understanding and sense of stewardship at the Carson NFH.

- Friends of Northwest Hatcheries - continue to strengthen and expand the partnership with the Friends of Northwest Hatcheries. Carson NFH signed an official MOU with the Friends Group and the Regional Director in fall 2000.

- Portland Public Schools, Metropolitan Learning Center - teacher Jennifer Rasor brings classes to the hatchery for tours on a regular basis, they are working cooperatively on a forest restoration project in the Gifford Pinchot National Forest, which surrounds the hatchery.

- Port of Skamania County - cooperative effort with the adoption of Kanaka Creek, Stevenson, WA; annual trash pick up, tree planting, water quality testing, and macro-invertebrate inventory.

- Skamania County Saddle Club - hold our annual Carson NFH Open House in conjunction with the Camp Howe Cowboy Breakfast; joint publicity for our events.

- Stevenson High School - donation of spring Chinook salmon for raising Salmon-In-The-Classroom. Information/Education staff lead fish dissections to reinforce internal and external anatomy.

- Underwood Conservation District - cooperative effort with the adoption of Kanaka Creek, Stevenson, WA; annual trash pick up, tree planting, water quality testing, and macro-invertebrate inventory; cooperate in various activities and events annually.

- U.S. Army Corps of Engineers, Bonneville Lock and Dam - cooperative effort with outreach activities including joint booth at Oregon Dept of Fish and Wildlife Free Fishing Clinic, joint county fair booth, Columbia River Day Camp, Bass Lake Field Day, assistance with Carson NFH Annual Kid's Fishing Day.

- U.S. Forest Service - cooperative effort with outreach activities including fishing day events, fishing day camp activities.

- Water Resources Education Center - Carson NFH participates in the Annual Sturgeon Festival at the Water Resources Education Center, the Migration Golf course has been utilized at this event; they are a cooperator in the Columbia River Day Camp.

- Wind River Middle School - cooperative partnership with Carson students and the Port of Skamania County in the adoption of Kanaka Creek, Stevenson, WA.

- Wind River Technical Advisory Committee.

- Wind River Watershed Council.

- NOAA Fisheries - funding agency via Mitchell Act and ESA trust responsibilities.

- Bonneville Power Administration.

- Columbia River Inter-Tribal Fisheries Commission - provides coordination and technical assistance to Columbia River treaty tribes.

- Private land owners in Wind River watershed.

- Washington Department of Ecology and U.S. Environmental Protection Agency - water quality and effluent discharge permits.

- U.S. *v* Oregon parties - co-managers of Columbia River fisheries, including Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation, Nez Perce Tribe, Confederated Tribes of the Warm Springs Reservation of Oregon, Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife, Idaho Fish and Wildlife, NOAA Fisheries, U.S. Fish and Wildlife Service.

- Yakama Nation and Washington Department of Fish and Wildlife - co-managers of Wind River fisheries.

**Special Concerns**

**Planning Issues.—**Several federal, state and tribal entities share responsibilities for development of subbasin plans, hatchery production, harvest management, and ESA considerations. Recent actions have centered around correcting those factors contributing to the decline of Wind River's aquatic resources. The agencies involved include the U.S. Forest Service, U.S. Fish and Wildlife Service, NOAA Fisheries, U.S. Geological Survey, Bonneville

Power Administration, the Washington Department of Fish and Wildlife, Underwood Conservation District, and the Yakima Nation. As previously mentioned, private land owners, the public and watershed groups play an important role in managing the Wind River watershed.

This plan will recognize and comply with all management plans and Biological Opinions affecting the Columbia River Basin in general and the Wind River in particular. Operations at Carson NFH pose a number of potential issues in the watershed. The primary issues center around marking, water use, juvenile distribution and production numbers, surplus adult distribution, impacts to listed and other aquatic resources, actions being taken to help recover listed and depressed populations, and funding for operations, maintenance and evaluation.

**Marking.—**To help protect wild and naturally produced fish, the states of Washington, Oregon and Idaho are implementing selective sport and commercial fisheries (non-tribal) on marked hatchery fish. This selective fisheries management strategy requires that all hatchery produced fish targeted for harvest be mass marked. Mass marking of hatchery fish is being implemented for steelhead trout and coho salmon and most recently for spring Chinook salmon. Mass marking of fall Chinook salmon has not yet been implemented because of technical, logistic, and funding limitations, except for special cases.

Tribal managers generally disagree with the management strategy for mass marking and selective fisheries.

The Service has not made any unilateral decisions on marking but has undertaken actions to comply with ESA Biological Opinions. The Service will continue to coordinate actions with the states and tribes through U.S. v Oregon and NOAA Fisheries to comply with ESA actions and coordinate with the Pacific States Marine Fisheries Commission mark committee. In addition, the federal agencies are beginning discussion of a comprehensive marking strategy for the Columbia River Basin as identified by Action 174-1in the Federal Columbia River Power System Biological Opinion. The federal agencies (NOAA Fisheries lead) are meeting with the states and tribes to begin this effort.

This comprehensive marking plan should:
a) improve our ability to assess and monitor the status of naturally-producing (especially ESA listed) populations
b) monitor and evaluate hatchery programs, including hatchery reforms and stray rates
c) maintain critical harvest management and stock assessment information
d) monitor mark-selective fishery regimes established by the states
e) improve regional and watershed based marking decisions
f) be consistent with recovery plan goals
g) be coordinated through U.S. v Oregon, Pacific States Marine Fisheries Commission and U.S. - Canada forums

**Juvenile Salmon Distribution and Production Numbers**.—Juvenile salmon are to be released from the hatchery in the spring as yearling smolts to promote quick downstream migration from the hatchery, through the Wind and Columbia Rivers to the estuary and ocean. This release strategy is agreed to by the WDFW, Service and NOAA Fisheries.

The Yakama Nation would like to see juvenile fish from the hatchery scatter planted throughout the watershed.

**Water Use (Drought)**.—In summer of 2001, a drought year, we anticipated having extremely low and insufficient water supply for raising 1.42 million juveniles to full-term smolts. An interim plan by Service, NOAA Fisheries, WDFW, and YN was to have an emergency release from 10 ponds, distributing 250,000 juveniles in the lower Wind River, if the hatchery water supply dropped to critically low levels during summer. Although this plan was agreed to by the fisheries managers, some conservation groups were highly concerned about this potential action and its impact to listed steelhead and resident cutthroat trout. Fortunately water supply was adequate and an emergency early release was not necessary.

**Surplus Adult Salmon Distribution**.—In most years more fish return to the hatchery than are needed for brood stock. Most of these surplus fish are still in very good condition and are distributed to the Yakama Nation for ceremonial and subsistence use. Fish beyond Yakama tribal needs can be distributed to other tribes, as requested. Fish beyond tribal needs are distributed to federal prison programs. Fish not suitable for food are typically buried. Plans are underway to determine the number, if any, suitable for stream enrichment, both dead and alive.

**Fish Passage and Ladder Management**.—In 2001, Service, NOAA Fisheries, WDFW and YN agreed to shut the ladder to the hatchery on August 1, allowing fish to spawn and die naturally for stream enrichment and allowing potential natural production of spring Chinook salmon in the Wind River. Approximately 300 salmon are estimated to have remained in the river to spawn near the hatchery because of this action. This was a compromise agreement for one year. Future plans will be negotiated and ecological risks (and benefits) to native steelhead (ESA listed) and trout will be evaluated.

**Negative Impacts to Listed and Other Aquatic Resources and What Actions are Taken to Help Recover Listed and Depressed Populations**.—All hatcheries must consider their potential for adversely affecting the aquatic community and Carson NFH is no exception. Of particular concern is the potential impact to the Lower Columbia River Ecologically Significant Unit (ESU) of threatened steelhead, which the Wind River steelhead population is a part of. To meet our ESA obligations, we are proceeding with actions to comply with the March 1999 Biological Opinion on hatcheries. These actions are identified in Chapter 4. The Service is developing a Hatchery and Genetic Management Plan (HGMP) to help assess our impacts from hatchery operations. More in-stream research is also needed to assess the impacts of both hatchery releases and naturally spawning spring Chinook on listed steelhead in the Wind River.

We will work towards going beyond the assessment stage and work towards taking actions which help recover listed and depressed populations, including identification of actions the hatchery can take (hatchery reform). Implementing measures identified by the HGMP, this CHMP, and in Biological Opinions will require additional resources. The following chapter identifies these projects and funding needs.

**Insufficient Operations and Maintenance Funding Through the Mitchell Act.—**Mitchell Act Funding has been flat for over ten years. Increased demands on hatchery programs, as required by ESA Biological Opinions, have strained hatchery budgets. Without increases in Mitchell Act reductions in production programs will need to be made. However, reducing hatchery production may allow the hatchery may allow the Service to meet some ESA requirements, but will not uphold mitigation and tribal trust responsibility.

The Service is currently working with NOAA Fisheries and other co-managers to address current budget shortfalls.

# CHAPTER 4. IMPLEMENTATION

Implementation of the Carson NFH program requires input to reimbursable and Service budget processes, as well as compliance with Service policies, legal mandates, and other environmental and human resource laws. This chapter intends to outline these processes and discuss the policy and planning documents which provide guidance to Carson NFH in regards to policy, budget, safety, grounds and facilities maintenance.

## Budget Overview

Carson National Fish Hatchery receives 100% of it's operations budget from reimbursable Mitchell Act funds, which are administered by the NOAA Fisheries. Operation budget needs are identified each year and negotiated with NOAA Fisheries to determine the final fiscal year allocation (see following section on Mitchell Act). However, Deferred Maintenance and most construction funding is through the Service. Some funding for special studies can also be derived from reimbursable sources other than Mitchell Act. Current budget and number of full-time personnel for the Carson NFH are provided in Attachment 18. Additional Mitchell Act funding is provided to the CRFPO, LCRFHC, and Abernathy Fish Technology Center for support services to the hatchery. In past years approximately 5% of operational funds did come from the Service. However, those funds are now directed to stations where the Service has the primary funding responsibility.

**Budgetary Needs and Strategies**.—Funding for unmet needs such as construction, program changes, and quarters maintenance is identified through the Maintenance Management System (MMS), the Fisheries Operational Needs System (FONS), and Regional Quarters Overhead funds and allocated through a competitive process. Access to FONS and MMS files is through the Fisheries Information System (FIS) database. The FIS database consists of five modules which address out-year budgeting (FONS), resource oriented accomplishments that occurred over a fiscal year (Accomplishments Module), Congressionally mandated reporting requirements that describe yearly production at NFH (Fish and Egg Module), activities related to endangered species (Imperiled Species Module), and deferred maintenance needs (Maintenance Management System).

**Fisheries Operational Needs System (FONS)**.—The FONS was established in 1999 as a planning, budgeting, and communication tool to enhance identification of funding and staffing needs for the fishery program. FONS projects are used in budget requests to the Department of Interior and the Office of Management and Budget. Attachment 19 outlines the Regional and National budget formulation, and provides a time step through the process. In FY 2002, an additional project will be submitted to evaluate ecological interactions between wild steelhead and hatchery spring Chinook salmon in the Wind River (Attachment 20). Additional projects will be submitted as needs arise. Several other Service field offices support Carson NFH. Those include Columbia River Fisheries Program Office (Vancouver, Washington), Lower Columbia

River Fish Health Center, and Abernathy Fish Technology Center. Projects included in the FY 2002 FONS database by these stations that support Carson NFH resource needs are listed in Attachment 21.

**Maintenance Management System (MMS).—**The Maintenance Management System (MMS) is an inventory of deferred maintenance projects, which are maintenance projects that can be put off or do not occur on an annual basis. The MMS is the primary vehicle used to address maintenance requirements above $5,000. The database is updated annually then forwarded to the WO for consolidation and submission into the budgetary process. Projects submitted for consideration are too numerous to list here and can be found in Attachment 22. Recent MMS funding has been directed toward correcting Health and Safety discrepancies. New projects which will be submitted in FY 2002 are: Replace windows in hatchery duplex quarters units to bring them into compliance with fire code requirements for window size and height from the floor; radon mitigation in the nursery; and addition of a formalin injection system in the nursery which will enable placement of the formalin barrel outside the building in an approved formalin storage unit.

**Five-Year Construction Plan**.—Fisheries Construction projects are entered into the RMIS, the same web-based database, developed for Refuges, as is used for the RPI. Scores and Regional priorities are assigned and the information is used in the WO to develop the Five-year Construction Plan. This plan, after it has been approved by the Department and OMB, is submitted as part of the Service Budget to Congress. The out-years of this plan are subject to revision each year.

Construction funds are similar to MMS funds but are reserved for new construction and maintenance to existing buildings above $500,000. A project to relocate the Wind River intake and bring it into compliance with NOAA Fisheries screen criteria has been approved for FY 2005.

**Five-Year Maintenance Plan**.—The Deferred Maintenance projects entered into the database are prioritized by the WO, at least partially, based on the priority established by the Field Office and Regional Office priorities. This plan is reviewed by the Department and the approved plan is part of the basis of our MMS budget request to Congress (see previous discussion on MMS).

**Mitchell Act and Other Reimbursable Funding Processes**.—As stated previously, 100% of Carson NFH operations is derived through Mitchell Act, which is administered by the NMFS. Bonneville Power Administration (BPA) provides funding to mark 75,000 fish with a coded-wire tag for stock assessment as outlined in Chapter 3. This funding is negotiated yearly with the Fish and Wildlife Service submitting budget proposals to NOAA Fisheries and BPA for there consideration. A final budget agreed to which reflects the needs of the production program which is derived through other forums.

The increased demands on hatchery programs, as required by ESA Biological Opinions, are inadequately funded through the Mitchell Act. Either Mitchell Act support needs to be increased or alternative funding sources need to be identified. If additional support is not secured in the near future, hatchery programs may need to reduce production or possibly close. Reducing production may meet ESA requirements but it does not uphold our federal mitigation or tribal trust responsibility.

**ESA Compliance and Needs**.—The 1999 NOAA Fisheries Biological Opinion on Artificial Propagation in the Columbia River Basin lists a host of measures which either must, in the case of Reasonable and Prudent Alternatives, be complied with or, in the case of Conservation Recommendations, should be implemented (NMFS 1999b). Several actions require additional resources. Two of the Conservation Recommendations (CRs) discussed below have work proposals developed but are not currently funded.

CR 4. Evaluate NATURES type rearing strategies. A proposal to evaluate NATURES type rearing strategies on a production level has been submitted by the NOAA Northwest Fisheries Science Center Resource Enhancement and Utilization Technologies Division and is being considered for funding by the Northwest Power Planning Council. Should this study receive funding, nearly all raceway rearing units at Carson NFH will be involved. Variables to be looked at are: substrate, in water structure (suspended Christmas trees), shade, and possibly predator avoidance training.

CR 6. Monitor and evaluate ecological interaction. Little data describing the ecological interaction of hatchery Chinook smolts with Endangered Species Act listed Wind River summer steelhead are available. To procure funding to fill this data gap will be pursued via the FONS system will be initiated with the FY 2002 FONS submissions. This will be a shared project with the Columbia River Fisheries Program Office.

Additional Conservation Recommendations are: minimize inter-basin stock transfers, emphasize juveniles that are ready to migrate to the ocean and spend a minimum amount of time in the freshwater environment, improve homing and reduce straying, assess carrying capacity and density-dependent effects (unfunded), monitor and evaluate predation (unfunded), conduct spawning ground surveys, assess use of hatchery carcasses for nutrient input (needs development), use most appropriate brood stock for reintroduction into historic or vacant habitats, develop cost-effective externally distinguishable marks to identify hatchery origin fish, modify hatchery programs to conservation / enhancement role (to be identified in HGMP), adopt strategies to separate returning hatchery fish from listed naturally spawning fish, continue adaptive management to improve smolt quality, and continue to coordinate hatchery programs to meet ESA concerns. In addition, a host of measures are associated with an Incidental Take Statement. Reasonable and Prudent Measures are: provide projected hatchery releases to NOAA Fisheries annually, manage programs to minimize potential inbreeding of hatchery and listed fish, monitor and evaluate artificial propagation programs (partially funded), reduce potential

negative impacts to listed salmon and steelhead from hatchery operations, and NOAA Fisheries shall conduct the proposed actions in such a way as to minimize adverse genetic and demographic effects on naturally-produced listed steelhead (to be identified in HGMP). Terms and Conditions include: provide to NOAA Fisheries projected hatchery releases and annual report of releases and returns, mark a representative sample of hatchery salmon and steelhead released to allow M&E (partially funded), develop protocols for fishery augmentation/mitigation programs to reduce potential for interbreeding and genetic introgression (to be identified in HGMP), insure water intakes are properly screened and comply with NOAA Fisheries intake structure criteria (unfunded), implement PNFHPC and IHOT guidelines, monitor effluent for compliance with NPDES permits, and the NOAA Fisheries shall minimize the number of hatchery adults remaining to potentially spawn with wild fish through removal of hatchery fish at sufficiently high harvest and/or trapping.

**Service and Station Guidance**

Each Service hatchery operates under a variety of guidance and policies. This section is provided to describe some of the more important policy and guidance documents that are available at the hatchery.

**Quarters Policy**.—The Service administers a variety of field offices and National Fish Hatcheries. At many of these hatcheries, including Carson NFH, government owned residences are available to employees on a required occupancy basis. The determination of whether an employee must occupy government furnished quarters as a condition of employment is made on a station-by-station, position-by-position basis. In making a determination, supervisors will consider: the dependability of the water supply, adequacy of the alarm and call back systems, response time needed to take emergency corrective actions, and the adequacy of the security provided to protect fish, facilities, and equipment. Attachment 23 is a copy of the current quarters policy.

**Required On-Station Housing**.—The current Quarters Plan for Carson NFH is dated November 20, 2001 (Attachment 24). The intent of having personnel living in government quarters at Carson NFH is to provide station security and operations during non-duty hours. Mechanical systems to regulate water flows must be maintained immediately to prevent loss of valuable fish stocks. Additional security protection of government owned property is provided by occupants especially when anadromous brood stock are present. The isolated setting of Carson NFH combined with potential inaccessibility during severe snowstorms precludes adequate protection by other than required housing.

**Overtime/Compensatory Time/Standby**.—Regulations governing overtime, compensatory time, and standby are described in the U. S. Fish and Wildlife Service Administrative Manual. Premium pay is discussed in Part 225 FW of the Manual with specific discussions on overtime regulations in Chapter 7.8, callback overtime in Chapter 7.13, Compensatory time in Chapter 7.18, and standby in Chapter 7.22.

**Distribution of Surplus Fish/Eggs**.—Guidance was provide in a July 2001 memorandum from the Regional Director (Attachment 25). The guidance states: "Live fish entering a National Fish Hatchery (Hatchery), whole fish carcasses or their parts, are Government property and cannot be converted for personal use, even temporarily on loan. Misuse of Government property may result in disciplinary action ranging from a written reprimand to removal from the Service. The attached Standards of Ethical Conduct for Employees of the Executive Branch, contained in 5 CFR 2635.704, specifically address use of Government property. Please review and be acquainted with these standards. Also, please ensure that all your employees read and understand this memorandum.

It is important that you first consider all possible uses of hatchery fish that are consistent with the Service Mission. Surplus fish must be disposed of using prescribed government contracting procedures. Furthermore, you must comply with other Service and FDA policies related to the disposition of carcasses and parts that have been treated with chemicals making them unfit for human consumption."

**Drugs and Anesthetics**.—Guidance on the use of anesthetics, drugs and other chemicals was provided in a November 9, 2000 memorandum from the Assistant Regional Director for Fisheries in Region 1 (Attachment 26). Hatcheries and other Fisheries offices within Region 1 may at times have legitimate and necessary reasons to use certain drugs and chemicals to achieve their goals and complete the mission and objectives of the Service. During the capture, rearing, or monitoring of fish species, several drugs and chemicals are used for anesthesia, disease treatments, or to increase the survival of the animals. Some of these compounds are already registered and labeled for fisheries use. Others may be legally used under the prescription and supervision of a veterinarian, or within the protocols of an existing Investigational New Animal Drug (INAD) exemption permit issued by the Food and Drug Administration (FDA). The Service has existing correspondence from the FDA concerning the use of compounds in the recovery of threatened and endangered species, but there are strict considerations and limits even in those situations. Region 1, working closely with the National INAD Office and through appropriate consultation with FDA, will fully comply with all regulations and agreements for the use of aquatic drugs and chemicals. The inappropriate use of compounds on fish or aquatic animals intended for human or animal consumption is prohibited. If you have questions regarding the use of chemicals or drugs, please contact your servicing Fish Health Center, or your supervisor.

**Employee Training**.—Regulations governing employee training are described in the U. S. Fish and Wildlife Service Administrative Manual. Career development is discussed starting in Part 230 FW of the Manual.

**Service Required Planning Documents**

Daily operations of Carson NFH are guided by a number of plans and reports designed to promote health and safety, station development, emergency situations, employee training, and other actions. Some of the more significant ones are described in the following section:

**Safety and Health Plan**.—Regulations safety are described in the U. S. Fish and Wildlife Service Administrative Manual. Safety program discussions start in Part 240 FW of the Manual.

**Fire Management Plan**.—Department and Service policy require that "every area with burnable vegetation must have an approved Fire Management Plan" and field stations cannot conduct prescribed fire operations, including trash burning, without an approved Fire Management Plan that includes such activities. All Service facilities developed plans and had them approved in FY2001, but they must be amended before any controlled burning can be conducted.

**Integrated Pesticide Management Plan**.—It is Service policy to eliminate unnecessary use of pesticides by implementing integrated pest management techniques and by selecting crops and other vegetation that are beneficial to fish and wildlife but do not require pesticides. The ultimate goal is to eliminate pesticide use on Service lands and facilities and to encourage pest management programs that benefit trust resources and provide long-term, environmentally sound solutions to pest management problems on sites which are off Service lands (Attachment 27).

When pesticides are used, they must be part of a pest management program that includes strategies to reduce and eventually eliminate their use. The program must be set forth in an Integrated Pest Management Plan which must include consideration of target specificity of the pesticide (insecticide, fungicide, herbicide, etc.), risk to nontarget organisms, incidental reduction of food resources for trust species, persistence, control and prevention of the spread of fish and wildlife diseases, and other environmental hazards.

**Station Development Plan**.—The Station Development Plan considers future growth and construction needs of the facility that are necessary to meet goals and objectives. The plan is an opportunity to work with the Service's Engineering Department to thoughtfully lay out a course of action to maintain the facility in proper operating condition. It is also a necessary precursor to get construction projects on the five-year construction list (see previous discussion).

Station Development Plans were completed for many stations in the early to mid-80s. Most are in need of revision and 1 to 3 stations will be updated each year as funds and personnel availability allow. The Carson NFH Station Development Plan was written in 1981. A new plan needs to be written to include new and much needed station improvements. For example, (1) The earthen ponds need to be lined with "Gunnite" or some similar product to prevent weed growth during the summer when the ponds are fallow. The use of herbicides to prevent weed growth is becoming increasingly more difficult if not impossible due to environmental restrictions, leaving only hand pulling to remove the weeds. Structure would be added to more closely mimic the natural environment; and (2) The recently constructed cover over the middle bank of raceways should be extended to cover the upper bank.

**Monitoring and Evaluation Plan**.—Monitoring and evaluation of production programs are outlined in Hatchery and Genetic Management Plans (HGMPs) which can be found at the hatchery, the Columbia River Fishery Program Office, or through the Fishery Program Office in Portland. A more detailed discussion of this plan can be found in Chapter 3.

**Distribution of Surplus Fish**.—In this exercise the hatchery works cooperatively with the Service's Columbia River Fishery Program Office, Lower Columbia River Fish Health Center, and co-managers to plan beneficial uses of fish surplus to hatchery needs in years of large adult returns. The plan should consider all possible uses of adult carcasses and live fish in excess of hatchery needs, and should be coordinated with co-managers when necessary to achieve mutually satisfying solutions. A plan should be developed in years where surpluses are anticipated, and should be developed well in advance of spawning operations. These plans can be obtained from the hatchery, the Columbia River Fisheries Program Office (Vancouver, Washington), or through the Fishery Program Office in Portland

**Small Water Systems Management Plan (Drinking Water)**.—The Safe Drinking Water Act (SDWA) is becoming an issue in Spring, 2002. The Act delegates safe drinking water control to the states and we must meet state requirements to provide drinking water to the public as well as our employees and their families. The EPA recently indicated that they believe that a significant number of the Service's systems do not fully comply with the SDWA. They have requested that we audit our compliance with state regulation. This process has already been started using the services of a contractor. Facilities in the State of Washington have been surveyed and the other states will be done in the next one to two years. Deficiencies discovered in water systems will be corrected as they are detected.

**Continuity of Operation Plan.—**The continuity of Operations Plan provides guidance for Carson NFH staff to ensure that essential operations and activities continue during and after an emergency situation. The plan is developed in accordance with DOI, MRPS Bulletin 98-01, Continuity of Operations Planning - Guidance and Schedules, dated March 27, 1998, and 380 DM 6, Vital Records Program. This plan is current and located at the hatchery in the administrative files.

**Spill Prevention, Control and Counter Measure Plan**.—A Spill Prevention, Control, and Countermeasure Plan (SPCC) is prepared in accordance with the provisions of Title 40 of the Code of Federal Regulations, Part 112. An SPCC plan establishes procedures, methods, and equipment used at the Carson hatchery to comply with U. S. Environmental Protection Agency (EPA) oil spill prevention control and countermeasures standards, and inspection reporting, training and record keeping requirements. An SPCC is required at Carson NFH because it stores petroleum fuel in above ground storage tanks greater than 660 gallons. The CCC for Carson is current (April 1999) and can be located in the hatchery administrative files, or the Fisheries Program Regional Office in Portland.

**Outreach Plan.—**An outreach plan (see Chapter 3) describes the hatchery's strategy for telling the Service, Carson National Fish Hatchery, and the Columbia River Basin resource story to the public. Further, this plan describes outreach tools and facilities needed to implement this strategy. The plan should be cited when describing unmet outreach needs in the FONS database (see Fish and Wildlife Service Budgeting Process).

**Watershed/Sub-basin Plan**.—These documents are part of the Northwest Power Planning Council process to address fisheries and aquatic issues related to subbasin and recovery planning in the Columbia River basin and in facilitating implementation of recovery actions.

National attention has been focused on the Columbia River basin with listings of salmon and steelhead, bull trout and other aquatic species. Endangered Species Act (ESA) consultations and recovery planning for listed species are having a major impact on management of fishery resources, the economy and cultural values in the basin. Consultations include the operation of the Federal Columbia River Power System, hatchery operations, harvest actions, habitat planning and project specific activities. Planning processes include the development of an All H Paper which is a conceptual recovery plan for salmon, steelhead and other aquatic species in the Columbia River basin, and various state and local government recovery planning efforts in Washington, Oregon, Idaho and Montana. The Pacific Northwest Electric Power Planning and Conservation Act resulted in the establishment of the Northwest Power Planning Council and ultimately the development of its Columbia Basin Fish and Wildlife Program, a comprehensive program to enhance and restore the salmon and steelhead runs and other fish and wildlife resources of the Columbia River basin. The Northwest Power Planning Council is leading a major subbasin assessment and planning effort which will provide key building blocks for aquatic species restoration in the basin. At the same time the Service has initiated recovery planning for bull trout and NOAA Fisheries for salmon and steelhead. Each of these recovery plans will rely on subbasin planning as major building blocks for recovery of listed species. In addition, Implementation Plans have been developed by the Corps of Engineers, Bonneville power Administration, and the Bureau of Reclamation that require implementation of significant habitat actions for listed salmon.

There are over 30 different agencies, Indian tribes, councils or commissions with fisheries responsibilities or interests operating in the Columbia River basin. The effective management and restoration of Columbia River basin salmon and steelhead and other aquatic resources depends to a large extent on the ability of these agencies to communicate effectively, resolve differences, develop unified subbasin plans, and work together in a spirit of cooperation in various interagency forums to solve regional and river basin problems.

**National Pollution Discharge Elimination System**.—Carson NFH is currently in compliance with required National Pollution Discharge Elimination System (NPDES) permit requirements for discharge from the hatchery. However, an Environmental Compliance Audit conducted June 25, 2001 found that two storm drains installed as part of a repaving project in 1999 did not meet current NPDES standards. Funds are being sought through the MMS system to correct this deficiency by connecting both drains to the existing pollution abatement pond.

**Hazardous Waste.—**Carson NFH is currently, to the best of our knowledge, in compliance with all hazardous waste treatment and control regulations. Efforts have been made to reduce dependence on products resulting in hazardous waste to the greatest extent possible.

**Investigative New Animal Drugs (INAD)—**No drugs requiring an Investigative New Animal Drug use permit have been used in recent years. Prophylactic treatments with erythromycin to combat bacterial kidney disease have been discontinued pending demonstrated need such as a BKD epizootic. Should erythromycin treatment become necessary, all INAD procedures will be followed.

**Monitoring and Reporting**

**Fisheries Information System (FIS)**.—The FIS is a multifaceted database system consisting of five modules which address unmet management needs (out-year budgeting), accomplishments, deferred maintenance, and other national reporting requirements. This system was previously referenced in "Budgetary Needs and Strategies section. The following paragraphs provide a more detailed description of the modules and their reporting requirements.

**Fisheries Operational Needs System (FONS)**.—FONS was described earlier in this Chapter under "Fish and Wildlife Service Budgeting Process". This database is available through the hatchery or the Fisheries Program Regional Office in Portland.

**Accomplishment Module**.—The Fisheries Accomplishment Module was established as a planning, budgeting, and communication tool to enhance identification of Fisheries Program accomplishments. These data are used in budget documents presented to the Department, OMB, and Congress. The data structure is a "flip-side" of the FONS Module data structure (see previous Fish and Wildlife Service Budgeting Process). This module is used to describe all accomplishments, regardless of funding source. This database is available through the hatchery or the Fisheries Program Regional Office in Portland.

**Fish and Egg Distribution.—**This information is used in the Fish and Egg Distribution Report. The report describes the mission of the National Fish Hatchery System, a component of the Fisheries Program of the Fish and Wildlife Service, and it's varied accomplishments. The report contains detailed information regarding species, numbers, and pounds of fish produced. It also describes the general purpose of the production program and if it involves listed species. Copies of the report can be obtained by writing the Division of Fish Hatcheries, U. S. Fish and Wildlife Service, 4401 N. Fairfax Drive, Room 810, Arlington, Virginia 22203.

**Imperiled Species Module**.—The Imperiled Species Module was designed to capture and report on imperiled species work performed by any Fisheries office. For the purpose of this database an imperiled species is any species or population that is 1) Federally listed under the ESA as threatened or endangered, 2) petition, proposed, or a candidate for Federal listing, or 3) a State-listed or species of special concern. Reporting occurs annually, generally in November.

**Maintenance Management System (MMS)**.—MMS was described earlier in this Chapter under "Fish and Wildlife Service Budgeting Process". This database is available through the hatchery or the Fisheries Program Regional Office in Portland.

**Station Guides**.—The Station Guide provides an overview of the hatchery program and layout. It describes the station location, layout plan, easements or permits in place, water supply, quarters, office and other buildings. The Guide also provides a brief history of the hatchery. This summary document is useful for providing a quick snap-shot to Service employees and parties interested the hatchery program and facility layout. The Guide is kept current and generally updated annually. Copies can be obtained from the hatchery or the Fisheries Program Regional Office in Portland.

**Real Property Inventory.—**The Real Property Inventory (RPI) provides an annual update on Service real property (anything fixed to the ground or a building). The RPI was maintained by the Realty Branch until automated in the Spring of 1999. The update function was "pen-and ink changes to a paper file". This was changed to an automated system using FileMaker Pro software in FY1999. It was converted to a web-based data base in FY2001. This method of updating the database is expected to continue until FY2003 or FY2004 when it will probably be converted to Maximo/SAMMS, also a web-based database.

**Columbia River information System (CRiS) Reports.—**This database is used at Columbia River Basin hatcheries to record information related to hatchery operations, marking and tagging, juvenile releases, adult returns, etc. The CRiS also is useful in providing summary reports of this data. The utility and purpose of this database is described in greater detail in Chapter 3 under Monitoring, Evaluation and Coordination.

**Energy Use Report.—**This is an annual report that summarizes electricity, heating and cooling energy, and gasoline used at the hatchery.

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