

BI G CREEK HATCHERY



PROGRAM MANAGEMENT PLAN 2018

Big Creek Hatchery

INTRODUCTION

Big Creek Hatchery is located 16 miles east of Astoria, Oregon, 2 miles south of Knappa off Highway 30, and is approximately 3 miles upstream from Big Creek’s confluence with the Columbia River. The site is at an elevation of approximately 75 feet above sea level, at latitude 46.1461 and longitude -123.5792. The area of the site is 48.06 acres, owned by ODFW.

There are four water sources for the hatchery: Big Creek, Mill Creek and two springs. Current water rights total 36,158 gpm plus an additional 4.2 cfs reservoir water right. All water supplies are delivered by gravity but can be pumped for reuse if required.

The facility is staffed with 6.42 FTE’s.

Rearing Facilities at Big Creek Hatchery

Unit Type	Unit Length (ft)	Unit Width (ft)	Unit Depth (ft)	Unit Volume (ft ³)	Number Units	Total Volume (ft ³)	Construction Material	Age	Condition	Comment
Adult Holding Pond	80	29.5	2.76	6,514	1	6,514	concrete	1963	fair	Contains 7 pens.
Adult Holding Pond	95	36.5	4.58	15,881	1	15,881	concrete	1973	good	
Raceways	160	10	2.75	4,400	9	39,600	concrete	1953	fair	U-shaped.
Raceways	80	20	2.75	4,400	21	92,400	concrete	1953	poor	
Rearing Pond	85	30	4.75	12,113	1	12,113	concrete	1976	good	
Canadian Troughs	21	2.58	4.58	108	4	216	fiberglass	1988	good	
Deep Troughs	15.5	1.33	1.25	26	16	412	fiberglass	1978	good	
Shallow Troughs	15.5	1.42	0.58	13	48	613	fiberglass	1978	good	
Vertical Incubators					96			1978	good	6 stacks of 16 trays.

PURPOSE

Big Creek Hatchery began operation in 1941 as a state-funded facility. It was refurbished in 1957 under the Mitchell Act as part of the Columbia River Fisheries Development Program—a program to enhance declining fish runs in the Columbia River Basin. The facility is used for adult collection, egg incubation and rearing of Fall Chinook, Spring Chinook, Coho, Chum and Winter Steelhead.

PROGRAM TYPE

The ODFW Hatchery Management Policy defines hatchery programs as either harvest or conservation programs. Harvest programs operate to enhance or maintain fisheries without impairing naturally reproducing populations. Conservation programs operate to maintain or increase the number of naturally produced fish without reducing the productivity of naturally reproducing populations.

Big Creek Hatchery Fall Chinook, Coho and Steelhead programs are harvest programs, used to mitigate for fishing and harvest opportunities lost due to habitat loss and migration blockage resulting from the Columbia Basin hydropower system. The Chum Salmon program is a conservation program using supplementation to increase the number of naturally produced fish.

GOALS

Tule Fall Chinook: Produce adult Chinook Salmon for commercial and recreational harvests by releasing approximately 2.25 million sub-yearling smolts each year to supplement harvest in commercial and recreational fisheries. The harvest goal is ~0.5% of the returned adults with minimal harvest impacts to listed natural salmon migrating through the harvest area.

Coho: Produce 20,500 adult lower Columbia River Coho through releases of 735,000 yearling smolts annually into Big Creek to provide for harvest in lower Columbia River commercial and recreational fisheries, as well as supplement harvest to ocean commercial troll and recreational fisheries. The harvest goal is 15,000 adults to the combined fisheries and the harvests will be managed in a way that impact to listed natural salmon is minimal or within allowable limit.

Spring Chinook: Mitigate the spring Chinook catch loss in sport and commercial fisheries due to habitat and passage loss or degradation in the Columbia River Basin by providing high quality spring Chinook for harvest in the Select Area commercial and recreational fisheries.

Chum: Produce lower Columbia River chum to re-establish viable populations of naturally-produced chum salmon in tributaries located on the Oregon side of the Lower Columbia River.

Winter Steelhead: Provide adults for freshwater recreational harvest in Big Creek, Gnat Creek, and the Klaskanine River as mitigation for impacts due to the Columbia Basin Hydropower system

OBJECTIVES

Objective 1: Foster and sustain opportunities for sport, commercial, and tribal fishers consistent with the conservation of naturally produced native fish.

Fall Chinook:

Big Creek (13H) stock

Produce 2,250,000 age 0 smolts (28,125 pounds) for on-station release.

Produce 2,425,000 fingerlings (24,250 pounds) for transfer to Klaskanine Hatchery.

Provide 50,000 eggs for STEP programs.

Spring Chinook:

Clackamas (19H) stock

Receive 280,000 eyed eggs from South Santiam Hatchery

Produce 250,000 smolts (10,000 pounds) for transfer to Youngs Bay Net Pens (CCF).

Coho:

Big Creek (13H) stock

Produce 735,000 smolts (49,000 pounds) for on-station release.

Provide 625,000 eggs to Klaskanine Hatchery.

Provide 425,000 eggs to Cedar Creek Hatchery.

Provide 410,000 fingerlings to Oxbow.

Provide 920,000 eggs to Oxbow Hatchery.

Provide 1,900,000 eggs to Cascade Hatchery.

Provide 11,000 eggs for STEP programs.

Provide 8,000 eggs to US Fish & Wildlife Service for research.

Chum:

Big Creek (13H) stock

Produce up to 290,000 fish (1,933 pounds) for release into Big Creek.

Provide 110,000 eggs for remote site incubation.

Winter Steelhead:

Big Creek (13H) stock

Produce 60,000 smolts (10,000 pounds) for on-station release.

Produce 41,000 smolts (3,417 pounds) for transfer to Klaskanine Hatchery.

Produce 41,000 smolts (3,417 pounds) for transfer to Gnat Creek Hatchery.

Provide 2,200 eggs to STEP programs.

- Objective 2: Contribute toward the sustainability of naturally produced native fish populations through the responsible use of hatcheries and hatchery-produced fish.
- Objective 3: Maintain genetic resources of native fish populations spawned or reared in captivity.
- Objective 4: Restrict the introduction, amplification, or dissemination of disease agents in hatchery produced fish and in natural environments by controlling egg and fish movements and by prescribing a variety of preventative, therapeutic and disinfecting strategies to control the spread of disease agents in fish populations in the state.
- Objective 5: Minimize adverse ecological impacts to watersheds caused by hatchery facilities and operations.
- Objective 6: Communicate effectively with other fish producers, managers and the public.

CURRENT PRACTICES TO ACHIEVE OBJECTIVES

The sections that follow describe the current hatchery practices used at this facility. Because ODFW hatcheries are managed to maximize use of the hatchery rearing space, hatchery operations are dynamic and subject to annual change depending upon statewide program needs.

The Native Fish Conservation Policy, the Fish Hatchery Management Policy, the Fish Health Management Policy, and Hatchery Genetic Management Plans provide guidelines for the management of wild and hatchery fish in Oregon. These policies describe the brood collection, rearing, release, and health management strategies currently used at this facility.

Objective 1: Foster and sustain opportunities for sport, commercial, and tribal fishers consistent with the conservation of naturally produced native fish.

Adult Collection

Fall Chinook

Big Creek Tule (13) Stock: Adult fish arrive at the hatchery from late August through mid-October. Peak spawning occurs from mid-September to early October. The annual broodstock collection goal is 3,000 adults (including mortalities) to provide approximately 1,300 pairs for broodstock.

Spring Chinook:

Clackamas (19) Stock: No adults are collected at this facility. Please refer to the Clackamas Hatchery plan for information on adult collection,

Coho:

Big Creek (13) Stock: Entry of adults into the subbasin occurs from early September to November. Spawning occurs from October to November with a peak from late-October to early November. Adults are collected at the hatchery. The annual broodstock collection goal 2,000 pairs (4,000 fish).

Chum:

Big Creek (13) Stock: Adults arrive at the hatchery mid-November to mid-December and are collected at the hatchery. Adults are spawned from mid-November to mid-December. The annual collection goal is 180 pairs (360 fish). Excess adults are transported and released in Stewart and Graham creeks for natural spawning activity. Excess adults may also be transported and released above the intake in Big Creek.

Winter Steelhead:

Big Creek (13) Stock: Adults arrive at the hatchery from late November through late February. Peak spawning occurs from mid-January through mid-February. The collection goal is 60 pairs (120 fish), but additional adults may be collected as necessary to cover shortages resulting from, but not limited to, fecundity variation, early egg mortality, positive disease test, etc.

Objective 2: Contribute toward the sustainability of naturally produced native fish populations through the responsible use of hatcheries and hatchery-produced fish.

Rearing and Release Strategies

Rearing and release strategies are designed to limit the amount of ecological interactions occurring between hatchery and naturally produced fish. Fish are reared to sufficient size that smoltification occurs within nearly the entire population, which will reduce the retention time in downstream migration. Rearing on parent river water, or acclimation to parent river water for several weeks, is used to ensure strong homing to the hatchery, thus reducing the stray rate to natural populations. Various release strategies are used to ensure that fish migrate from the hatchery with least amount of interaction with native populations. The specific rearing and release strategies used at this hatchery are outlined below.

Fall Chinook:

Big Creek (13H) Stock:

Transfer 2,425,000 fingerlings at 100 fish/pound to Klaskanine Hatchery in mid-April for acclimation and release into the North Fork Klaskanine River at 80 fish/pound in mid-May. All fish are adipose-clipped and 50,000 are coded-wire tagged prior to transfer.

Release 2,250,000 age 0 smolts at a size of 80 fish/pound into Big Creek in mid-May. All fish are adipose-clipped, and 400,000 are coded-wire tagged.

Spring Chinook:

Clackamas (19H) Stock:

Transfer 250,000 smolts at a size of 22 fish/pound to Youngs Bay Net Pens in early November for further rearing and release into Youngs Bay in March at a size of 12 fish/pound. All fish are adipose-clipped and 25,000 are coded-wire tagged prior to transfer.

Coho:

Big Creek (13H) Stock:

Rear 735,000 smolts to a size of 15 fish/pound for volitional release into Big Creek starting in early May. All fish are adipose-clipped, and 50,000 are coded-wire tagged prior to release.

Chum:

Big Creek (13H) Stock:

Rear 290,000 fish to a size of 150 fish/pound for direct release into Big Creek in early April. During eyed egg stage and post hatching the production receives a unique thermal mark and just prior to release.

Winter Steelhead:

Big Creek (13H) Stock:

Rear 60,000 smolts to a size of 6 fish/pound for volitional release into Big Creek in early April. All fish are adipose-clipped prior to release.

Rear 41,000 fingerlings to a size of 12 fish/pound for transfer to Klaskanine Hatchery in late November/early December for acclimation and release at 6 fish/pound in mid-April. All fish are adipose-clipped prior to transfer.

Rear 41,000 fingerlings to a size of 12 fish/pound for transfer to Gnat Creek Hatchery in late November/early December for acclimation and release at 6 fish/pound in mid-April. All fish are adipose-clipped prior to transfer.

Objective 3: Maintain genetic resources of native fish populations spawned or reared in captivity.

Broodstock Selection and Spawning

Oregon's Native Fish Conservation Policy and Hatchery Genetic Management Plans outline broodstock selection and spawning protocols for some fish stocks. The following practices are currently being used at Big Creek Hatchery:

Fall Chinook

Big Creek Tule (13) Stock: Adults are collected throughout the run and spawned at a 1:1 male to female ratio when possible, but can be spawned at up to a 3:1 ratio if the situation warrants. Pairs of males and females are mated randomly to avoid any bias due to size or other external characteristics. Jacks are included at a low percentage. During years of low stock returns, however, Big Creek stock adults are also collected or spawned at a 1:1 ratio at Klaskanine Hatchery.

Spring Chinook:

Clackamas (19) Stock: No broodstock selection or spawning occurs at this facility. Please refer to the Clackamas Hatchery plan for further information.

Coho:

Big Creek (13) Stock: All adults are collected throughout the run at the trap and spawned at a 1:1 male to female spawning ratio if possible. Only hatchery fish are kept for broodstock; any wild Coho are transported above the intake and released. During years of low stock returns, however, Big Creek stock adults are also collected or spawned at a 1:1 ratio at Klaskanine Hatchery.

Chum:

Big Creek (13) Stock: All adults are collected throughout the run at the hatchery trap and spawned using a factorial cross (2M X 2F cross). If the production goal is achieved the excess adults are out planted. A percentage of fish returning to Big Creek may be transported above the intake and released.

Winter Steelhead:

Big Creek (13) Stock: The winter steelhead stock is primarily from Big Creek. During years of low stock returns, however, Big Creek stock adults are also collected at Klaskanine

Hatchery. Adults are collected throughout the run, and are spawned at a 1:1 male to female spawning ratio using a 5x5 matrix. Only hatchery fish are kept for broodstock: any wild steelhead are transported above the trap and released.

Objective 4: Restrict the introduction, amplification, or dissemination of disease agents in hatchery produced fish and in natural environments by controlling egg and fish movements and by prescribing a variety of preventative, therapeutic and disinfecting strategies to control the spread of disease agents in fish populations in the state.

Fish Health Management Programs—All Stocks

ODFW has adopted a Fish Health Management Policy that describes measures that minimize the impact of fish diseases on the state's fish resources. The primary objective of fish health management programs at ODFW hatcheries is to produce healthy smolts that will contribute to the fishery and return sufficient numbers of adults to continue propagation of the stocks and provide supplementation if desired. Equally important is to prevent the introduction, amplification or spread of fish pathogens that might negatively affect the health of both hatchery and naturally reproducing stocks.

ODFW has implemented both disease control and disease prevention programs at all of its facilities to achieve these objectives. These programs include the following standard elements:

Disease Control (Reactive)

- Perform necropsies of diseased and dead fish to diagnose the cause of loss.
- Prescribe appropriate treatments and remedies to disease. This includes recommending modifications in fish culture practices, when appropriate, to alleviate disease-contributing factors.
- Apply a disease control policy as stated in the Oregon Administrative Rules which dictates how specific disease problems will be addressed and what restrictions may be placed on movements of diseased stocks.
- Conduct applied research on new and existing techniques to control disease epizootics.

Disease Prevention (Proactive)

- Routinely remove dead fish from each rearing container and notify ODFW Fish Pathology if losses are increasing. Monthly mortality records are submitted to Fish Pathology from each hatchery.
- Routinely perform examinations of live fish to assess health status and detect problems before they progress to clinical disease or mortality.

- Implement disease preventative strategies in all aspects of fish culture to produce a quality fish. This includes prescribing the optimal nutritional needs and environmental conditions in the hatchery rearing container based on historical disease events. It also involves the use of vaccines or antibiotics in order to avoid a disease problem.
- Use a disease prevention policy that restricts the introduction of stocks into a facility. This will help avoid new disease problems and fish pathogens not previously found at the site.
- Use sanitation procedures that prevent introduction of pathogens into and/or within a facility.
- Conduct applied research on new and existing disease prevention techniques.
- Utilize pond management strategies (e.g., Density Index and Flow Index guidelines) to help optimize the quality of the aquatic environment and minimize fish stress that can be conducive to infectious and noninfectious diseases. For example, a Density Index is used to estimate the maximum number of fish that can occupy a rearing unit based on the rearing unit's size. A Flow Index is used to estimate the rearing unit's carrying capacity based on water flows.

Fish Health Activities at Big Creek Hatchery

Health Monitoring

- All fish are given a health inspection no longer than 6 weeks before fish are released or transferred. This exam may be in conjunction with the routine monthly visit.
- Monthly health monitoring examinations of healthy and clinically diseased fish are conducted on each fish lot at the hatchery.
- Examinations for *Myxobolus cerebralis*, agent of whirling disease, are conducted annually on 60 fish held for a minimum of 180 days at the facility.
- At spawning, a minimum of 60 ovarian fluids and 60 kidney/spleen/pyloric caeca (based on a minimum sampling at the 5% incidence level) are examined for viral pathogens from each salmon lot. If prespawning mortality is above normal, necropsies are conducted on dead adult fish for bacteria, parasites and other causes of death.
- Whenever abnormal behavior is reported or observed, or mortality exceeds 0.1% per day over five consecutive days in any rearing container, the fish pathologist will examine the affected fish, make a diagnosis and recommend the appropriate remedial or preventative measures.
- Reporting and control of specific fish pathogens are conducted in accordance with the Fish Health Management Policy. Results from each examination mentioned above are reported on the ODFW Fish Health or Virus Examination forms.

- Fish culture practices will be reviewed as necessary with facility personnel. Where and when pertinent, nutrition, water flow and chemistry, loading and density indices, handling, disinfecting procedures, and treatments will be discussed.

Fish and Egg Movements

- Movements of fish and eggs are conducted in accordance with the Fish Health Management Policy.

Therapeutic and Prophylactic Treatments

- At spawning, eggs are bulk incubated and when a trough is full, iodophor is dripped through the trough at 1:600 for 15 minutes for disinfection.
- Juvenile fish are administered antibiotics orally as needed for the control of bacterial infections and for prevention of diseases.
- Formalin is dispensed into water for control of parasites and fungus on eggs and juveniles. Treatment dosage and exposure time varies with species, life stage and condition being treated.
- Only approved or permitted therapeutic agents are used for treatments:
 - FDA labeled and approved for use on food fish
 - Allowed by the FDA as an Investigational New Animal Drug
 - Obtained by extra-label prescription from a veterinarian
 - Allowed by the FDA as low regulatory priority or deferred regulatory status
 - Approved by the FDA through USFWS for fish listed under the federal Endangered Species Act.

Sanitation

- All eggs brought to the facility are surface-disinfected or water-hardened in buffered iodophor.
- Disinfection footbaths (or other means of disinfection) are provided at the incubation facility's entrance and exit areas while embryos are incubating in the facility.
- All equipment (e.g., nets, tanks, rain gear, boots) is disinfected with iodophor between uses with different fish/egg lots or different rearing containers.

- Dead fish are disposed of promptly and in a manner that prevents introduction of disease agents to the waters of the state.
- Rearing units are cleaned on a regular basis.
- Fish transport trucks are disinfected between the hauling of different fish lots.
- Rearing units are sanitized after removing fish and before introducing a new fish stock either by thorough cleaning and use of a disinfectant or by cleaning and leaving dry for an extended time.

Objective 5: Minimize adverse ecological impacts to watersheds caused by hatchery facilities and operations.

Environmental Monitoring

Primarily, environmental monitoring is conducted at ODFW facilities to ensure these facilities meet the requirements of the National Pollution Discharge Elimination Permit administered by the Oregon Department of Environmental Quality. It 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 to quantify water quality impacts resulting from changes in the watershed (e.g., logging, road building and urbanization). The following environmental parameters are currently monitored at all ODFW hatcheries:

- Total Suspended Solids (TSS) – measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- Settleable Solids (SS) – measured quarterly. Two composite samples are collected, one during normal operations and one during cleaning. Some facilities may take more samples because of multiple outfalls.
- pH – measured quarterly when settleable solids are measured.
- Total Ammonia and Total Phosphorus – measured quarterly during the first 12 months of the permit when settleable solids are measured.
- Water Temperatures – daily maximum and minimum water temperatures are measured within the hatchery. Temperature units are recorded for egg development in some hatcheries. Effluent and receiving stream temperatures are measured weekly from April to October.
- Dissolved Oxygen (DO) – measured only when conditions warrant (e.g., periods of low flows and high temperatures).

- Air Temperatures – maximum and minimum temperatures are recorded daily at some stations, but there are no special monitoring requirements.
- Flow Logs – changes in water flows through the hatchery ponds are recorded weekly.

Objective 6: Communicate effectively with other fish producers, managers and the public.

Coordination/Communication within ODFW

Annual Fish Production Meetings: ODFW conducts meetings throughout the state to set annual fish production goals for all public hatcheries in Oregon. These meetings involve the participation of ODFW research, management and fish culture staff as well as representatives from applicable federal agencies and tribes.

Record Keeping: The following records are kept at all ODFW hatcheries:

- Anadromous Adult Transaction Report – details the collection and disposition of all adult fish handled at the facility.
- Mark Recovery Report – details sex, fish length and tag information from all marked adult fish that are captured.
- Egg and Fry Report – records all egg and fry movements, treatments, etc.
- Monthly Pondered Report – updates hatchery operations from the previous month (i.e., current number of fish, size, transfers or releases, feed conversion, mortality, medication, etc.).
- Monthly Progress Report – document summarizing operational activities for the hatchery and all satellite facilities (e.g., fish culture, fish health, fish distribution, maintenance and safety).
- Fish Loss and Treatment Report – records disease problems and daily mortality.
- Fish Loss Report/Investigation – when 1,000 or more juveniles or 10 or more adult fish are accidentally lost in a single accident.
- Predator Mortality Report – documents any fish predators that may die at the hatchery facility.
- Fish Liberation Reports – details information regarding all fish releases (e.g., fish numbers, size, location, method of release, marks, etc.).
- Coded–Wire Tag Release Reports – record of all juvenile fish released with coded-wire tags.

- Length Frequency Record – details fish lengths of all anadromous fish released (based on a sample of the releases).
- Chemical use, waste discharge monitoring, purchasing, budget, hazardous materials, safety, vehicles, equipment, maintenance and alarm logs.
- Visitor Log – some facilities record the daily visitor use of the facility; however, this is not a requirement.

Hatchery Management System (HMS): Computerized system to collect, report, summarize and analyze hatchery production data. This system is a tool to be used in production control at all hatchery management levels.

Interagency Coordination/Communication

Production Advisory Committee (PAC): The Columbia River PAC is comprised of representatives from the regulatory management agencies and tribes. This group meets monthly to discuss anadromous fish production issues and to provide an opportunity for communication among the anadromous fish hatchery managers.

Technical Advisory Committee (TAC): The Columbia River TAC is comprised of regulatory fish harvest technicians. This group provides management direction used in establishing hatchery fish production goals. TAC meets monthly.

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

In-River Agreements: State and tribal representatives meet annually to set Columbia River harvests as part of the *U.S. v. Oregon Agreement*. Periodic meetings are also held throughout the year to assess if targets are being met.

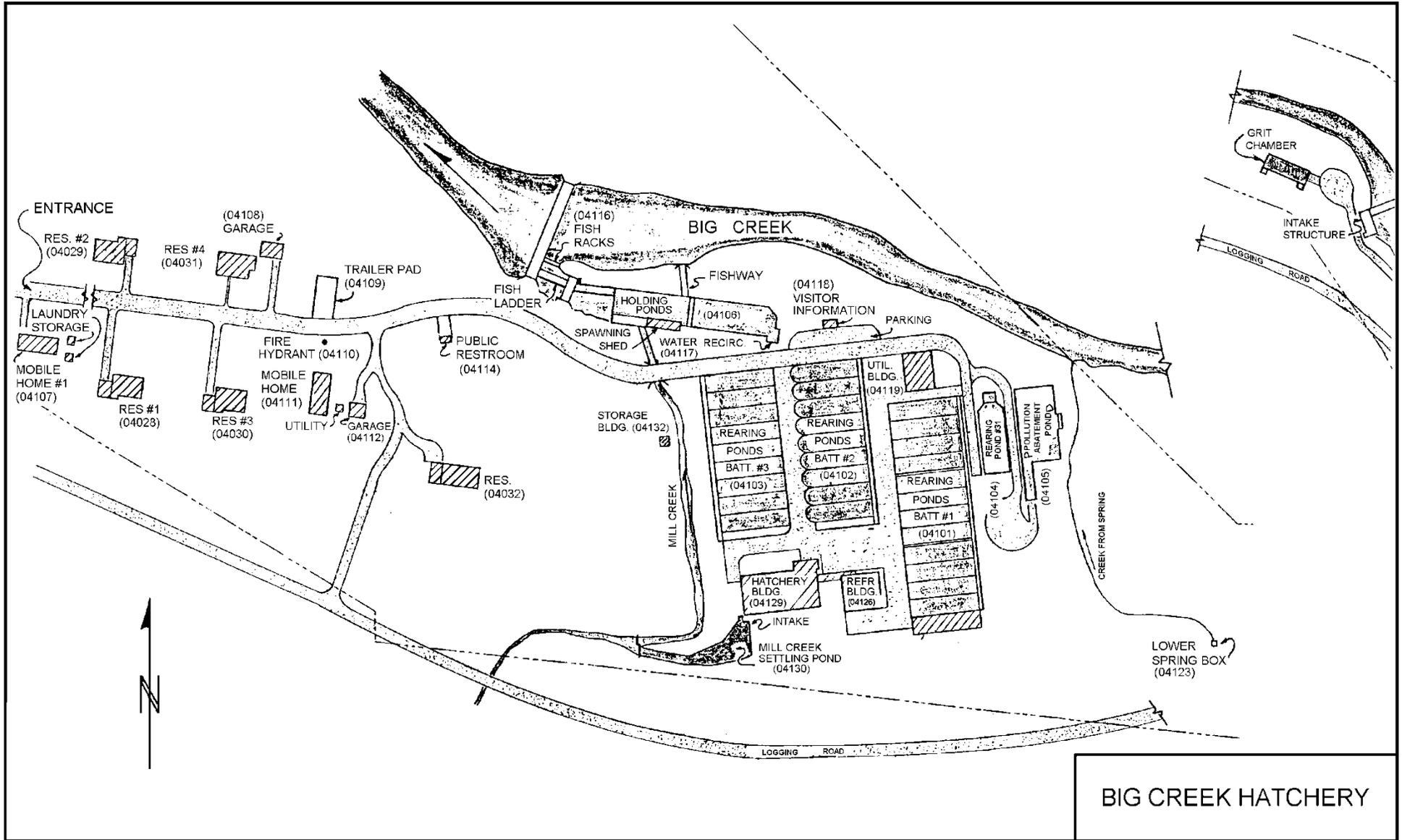
In-Season Communications: Communication with PAC, the Columbia River Inter-Tribal Fish Commission, Washington Department of Wildlife, Washington Department of Fisheries, U.S. Fish and Wildlife Service and Idaho Department of Fish and Game takes place each year to coordinate proper fish and egg transfers in an effort to meet basin-wide goals at all facilities, where applicable.

Streamnet ([www/streamnet.org](http://www.streamnet.org)): Hatchery return data are input into StreamNet, a cooperative information management and data dissemination project focused on fisheries and aquatic related data and data related services in the Columbia River basin and the Pacific Northwest. StreamNet is funded through the Northwest Power and Conservation Council's Fish and Wildlife Program by the Bonneville Power Administration and are administered by the Pacific States Marine Fisheries

Commission. The data are maintained and disseminated through the Pacific States Marine Fisheries Commission (PSMFC).

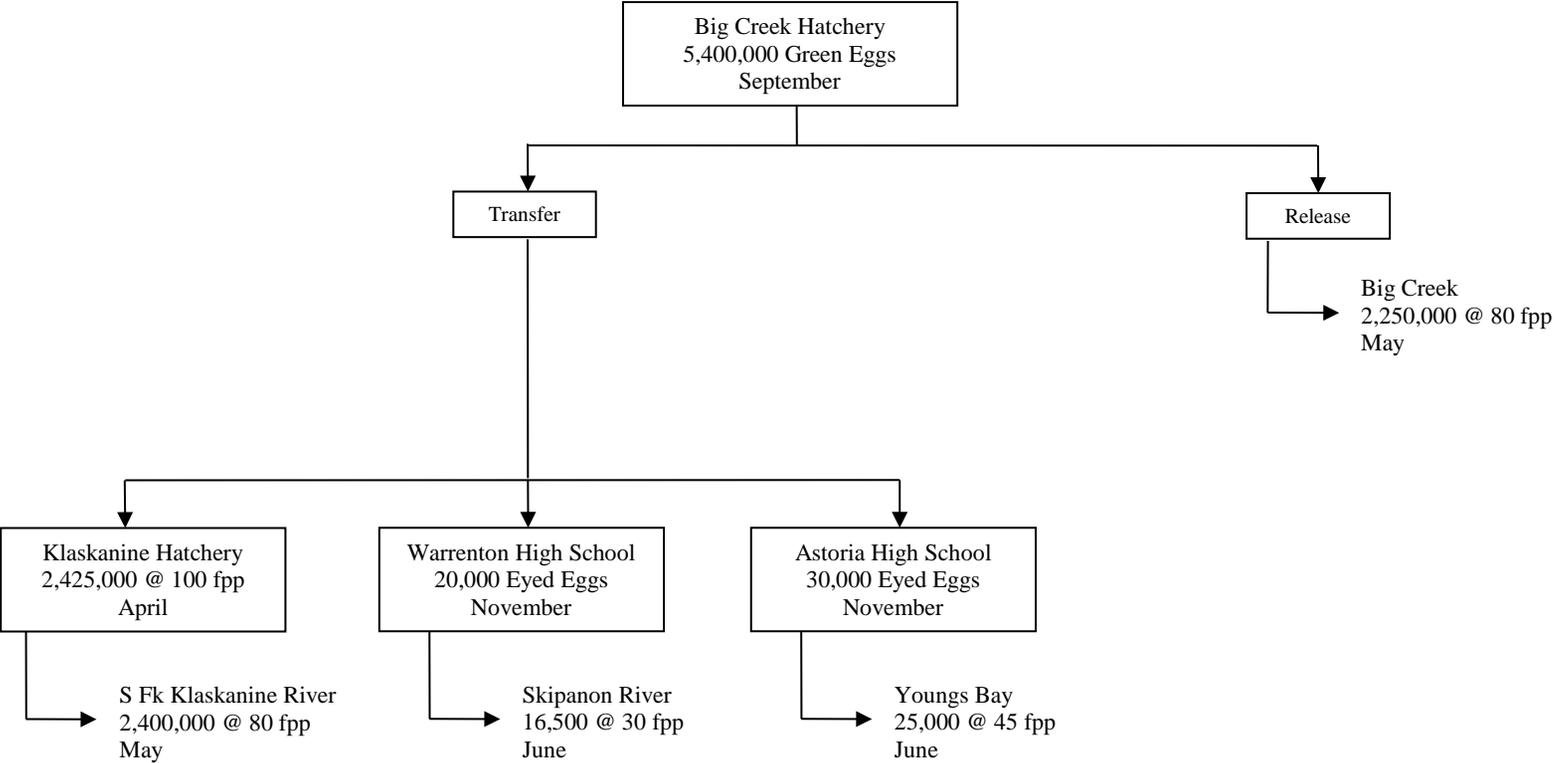
Communication with the General Public

Big Creek Hatchery receives approximately 5,000 visitors per year.

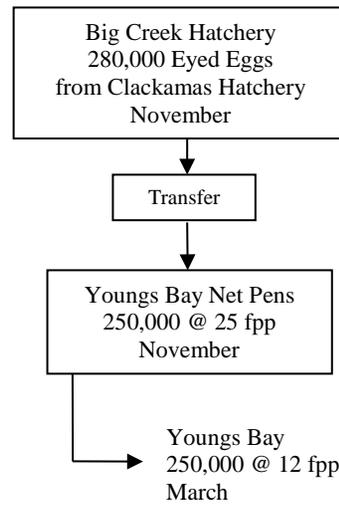


BIG CREEK HATCHERY

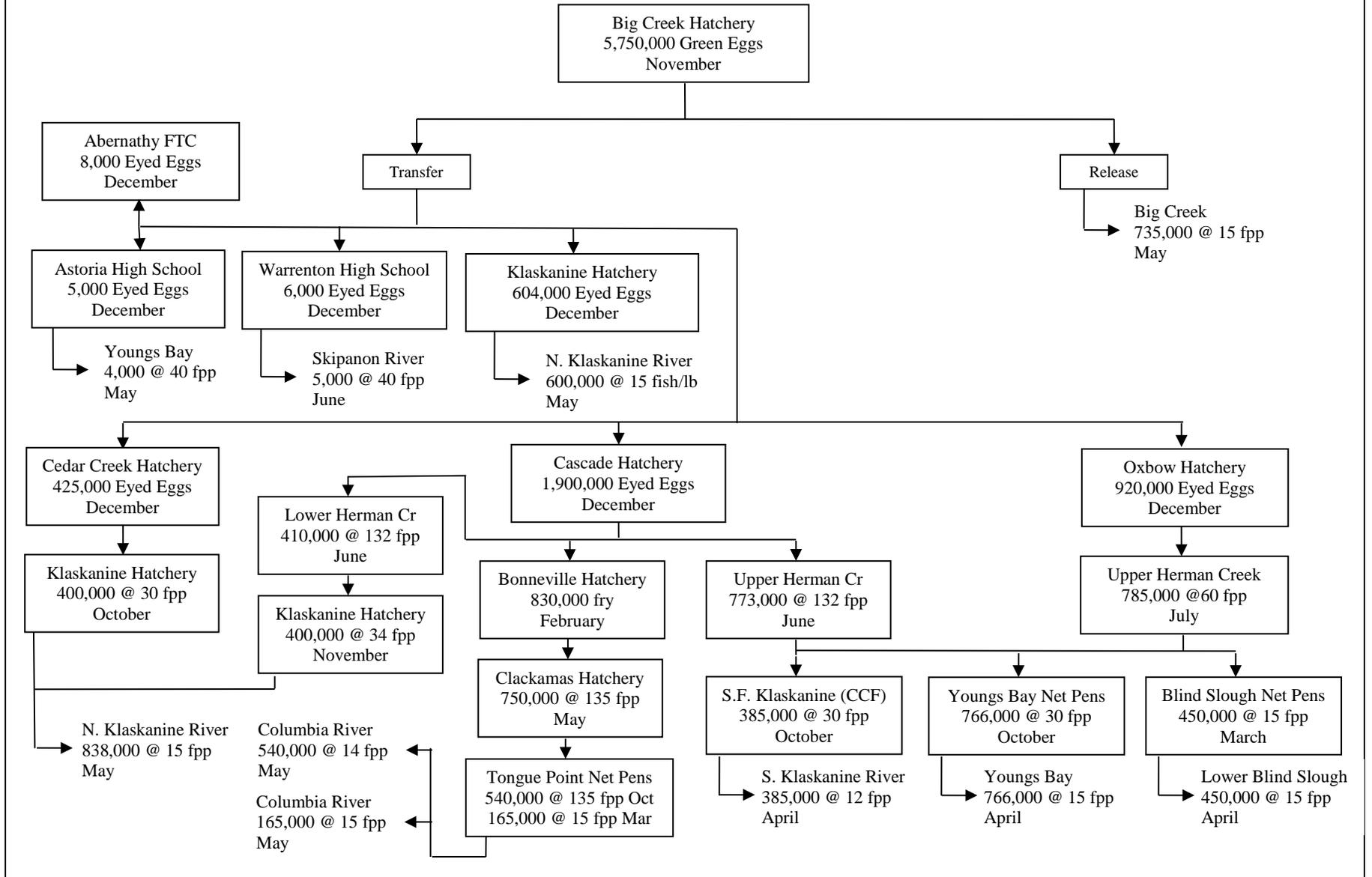
Big Creek Hatchery Fall Chinook Salmon – Stock 13H (Big Creek)



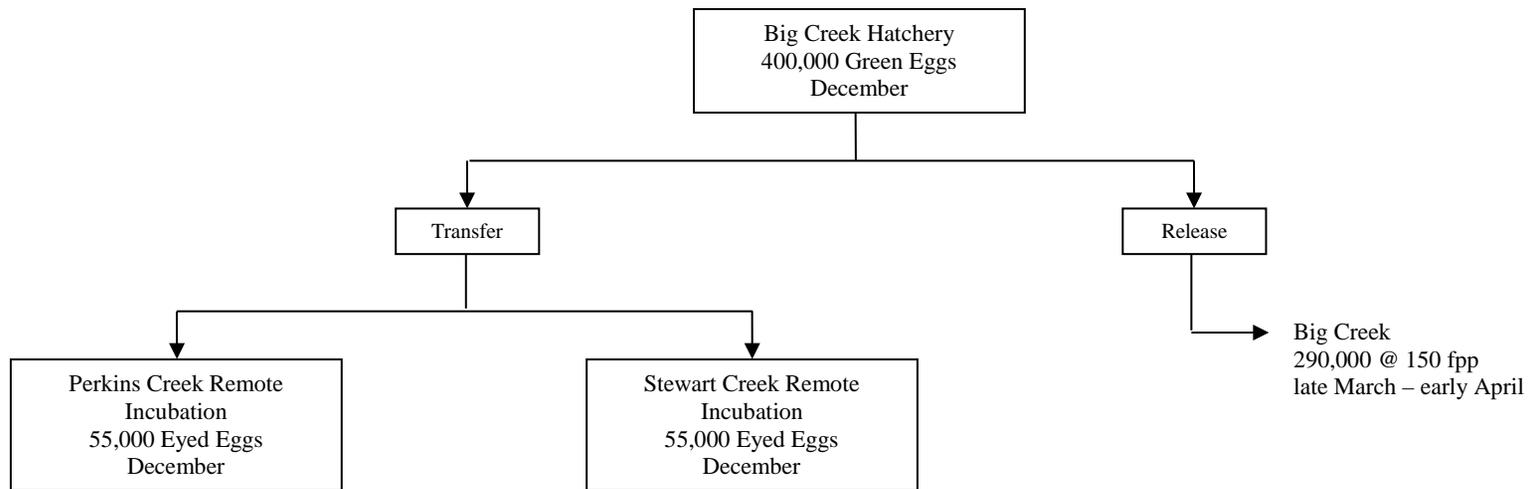
**Big Creek Hatchery
Spring Chinook Salmon – Stock 19H (Clackamas River)**



Big Creek Hatchery Coho Salmon – Stock 13H (Big Creek)



Big Creek Hatchery Chum Salmon – Stock 13H (Big Creek)



Big Creek Hatchery Winter Steelhead – Stock 13H (Big Creek)

