Attachment 1. Historical Background of National Fish Hatcheries in Region One.

Station	Year Established	Final Year	Disposition
McCloud River, CA	1872	1882	Closed
Crooks Creek,CA	1879	1887	Moved to McCloud River, CA
Baird (formerly McCloud River), CA	1888	1937	Transferred to Bureau Of Reclamation
Clackamas, OR	1888	1943	Transferred to State of Oregon
Fort Gaston, CA	1889	1898	Replaced by Willamette Falls, OR
Korbel, CA	1893	1896	Closed
Redwood Lake, CA	1893	1898	Closed
Sandy River, OR	1895	1925	Closed
Battle Creek, CA	1896	1946	Closed
Olema (Bear Valley), CA	1897	1898	Closed
Salmon River, OR	1897	1900	Transferred to State of Oregon
Upper Clackamas, OR	1897	1931	Transferred to State of Oregon
Roque River, OR	1897	1932	Closed
Mill Creek, CA	1898	1948	Transferred to FWS Division of Research
Little White Salmon, WA	1898	-------	Operating
Willamette Falls, OR	1899	1942	Closed
Baker Lake, WA	1899	1942	Transferred to US Forest Service
Spring Creek, WA	1901	-------	Operating
Grants Pass, OR	1904	1906	Moved to Applegate Creek, OR
Phinney Creek, WA	1907	1918	Closed
Applegate, OR	1907	1959	Transferred to FWS Division of Research
Cazadero, OR	1908	1913	Closed
Illabot Creek, WA	1909	1927	Closed
Duckabush, WA	1911	1943	Transferred to US Forest Service
Quilcene, WA	1911	---------	Operating
Darrington, WA	1912	1919	Closed

Brinnon, WA	1913	1923	Closed - egg collection
Sultan, WA	1913	1933	Closed
Birdsview, WA	1913	1947	Transferred to State of Washington
Day Creek, WA	1914	1919	Closed
Quinault (Old), WA	1914	1947	Transferred to US Forest Service
St. Helens, OR	1917	1919	Closed
Paris, ID	1918	1921	Closed
Washougal River, WA	1919	1923	Closed
Salmon, ID	1921	1946	Transferred to Bureau of Land Management
Phalon, WA	1922	*	Authorized, but never operated
Snake River, OR	1924	1925	Moved to Salmon, ID
Ozette, WA	1926	1927	Closed
Wind River, WA	1926	1936	Transferred to State of Washington
Mt. Rainer, WA	1931	1942	Transferred to National Park Service
Hagerman, ID	1931	----------	Operating
Butte Falls, OR	1932	1943	Transferred ½ to State of Oregon; ½ to Bureau of Reclamation
Deschutes, OR	1932	*	Authorized, but never operated
Spokane, WA	1935	1942	Transferred to State of Washington
Yakima Fish Screen, WA	1935	1986	Closed
Delph Creek (Estacada), OR	1936	1954	Transferred to State of Oregon
Carson, WA	1937	----------	Operating
Leavenworth, WA	1938	----------	Operating
Clark Fork, ID	1939	1942	Transferred to State of Idaho
Sun Valley, ID	1940	1941	Closed
Warm River, ID	1940	1951	Transferred to State of Idaho
Entiat, WA	1940	----------	Operating
Winthrop, WA	1940	----------	Operating
Coleman, CA	1942	----------	Operating
Willard, WA	1951	----------	Operating

Eagle Creek, OR	1953	----------	Operating
Abernathy, WA	1957	1989	Operating
Lahontan, NV	1964	----------	Operating
Tehama-Colusa Spawning Channels, CA	1967	1989	Caretaker Status
Quinault, WA	1969	----------	Operating
Dworshak, ID	1969	----------	Operating
Kooskia, ID	1970	----------	Operating
Marble Bluff Fishway, NV	1974	----------	Operating
Warm Springs, OR	1974	----------	Operating
Makah, WA	1981	----------	Operating
Nisqually, WA	1991	----------	Operating
Livingston Stone, CA	1992	----------	Operating

Attachment 2. Statutory Mandates and Authorities.

Attachment 2.—Statutory Mandates and Authorities.

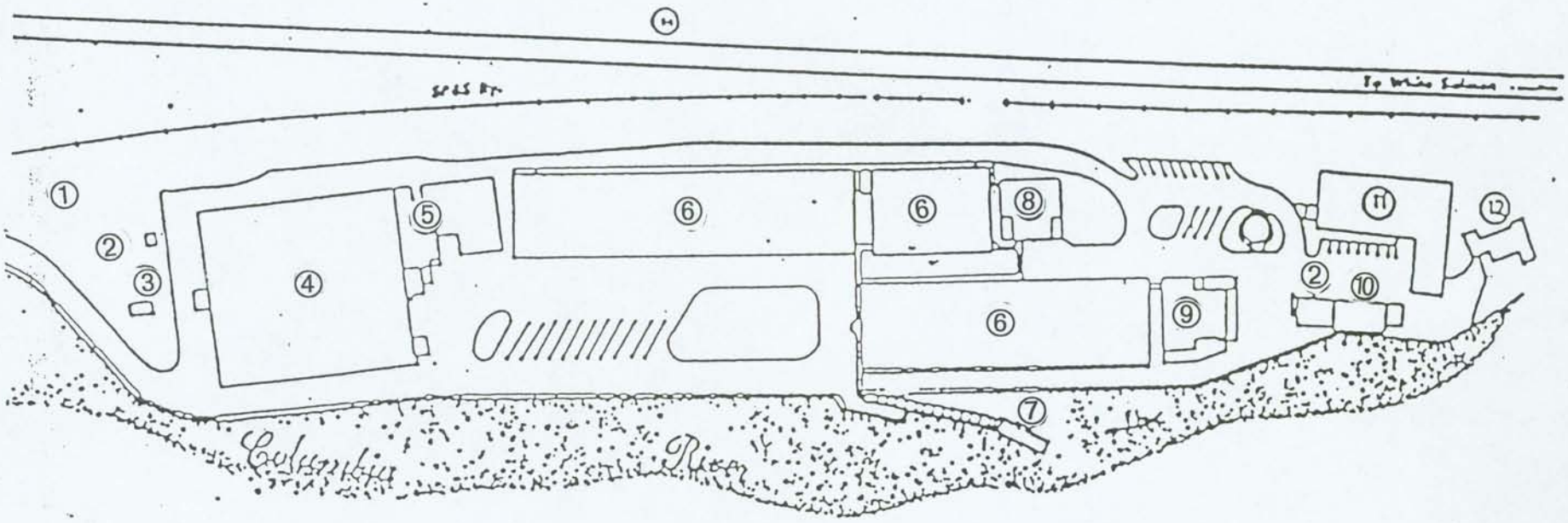
General Authorizations

- Anadromous Fish Conservation Act, as amended (16 U.S.C. 757a-757f).
- Department of Transportation Act (16 U.S.C. 1653f).
- Estuary Protection Act (16 U.S.C. 1221-1226).
- Federal Aid in Sport Fish Restoration Act of August 9, 1950, as amended (16 U.S.C. 777k).
- Federal Water Pollution Control Act Amendments, as amended (33 U.S.C. 1251-1365, 1281-1292, 1311-1328, 1341-1345, 1361-1376).
- Fish and Wildlife Act of 1956, as amended (16 U.S.C. 742a-742j).
- Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901-2911).
- Indian Self-Determination and Education Assistance Act of 1976 (25 U.S.C. 450-450n).
- Magnuson Fishery Conservation and Management Act of 1976 (16 U.S.C. 1801-1882).
- National Aquaculture Act of 1980, as amended (16 U.S.C. 2801-2810).
- Reorganization Plan No. 4 of 1970 (5 U.S.C. Appendix).
- Rivers and Harbors Act of 1899, as amended (33 U.S.C. 401 et seq.).
- Recreation Use of Conservation Areas Act (16 U.S.C. 460k-460k-4).
- Sikes Act, as amended (16 U.S.C. 670a-670o).
- Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. 1001-1009).
- Code of Federal Regulation, Wildlife and Fisheries, Title 50, Parts 1 to 199.
- Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 stat. 884) as amended.
- Federal Power Act (16 U.S.C. 791-828c; Chapter 285, June 10, 1920; 41 Stat. 1063) as amended.
- Federal Water Project Recreation Act (16 U.S.C. 460 (L) (12) - 460 (L) (21); P.L. 89-72.
- Fish and Wildlife Coordination Act (16 U.S.C. 661-667e; 48 Stat. 401) as amended.
- Fish and Wildlife Improvement Act (16 U.S.C. 7421; 92 Stat. 3110)
- Lacy Act Amendments of 1981 (P.L. 97-79; 95 Stat. 1073, 16 U.S.C. 3371-3378)
- Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 [Title I of P.L. 101-646 (104 Stat. 4761].
- Oil Pollution Act of 1990 [Public Law 101-380 33 U.S.C. 2701 et seq; 104 Stat. 484].
- Comprehensive Environmental Response Compensation and Liability Act (Superfund) (26 U.S.C. 4611-4682; P.L. 96-510, December 11, 1980; 94 Stat. 2797).
- National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, January1, 1970, 83 Stat. 852) as amended by P.L. 94-52.
- National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended.
- Emergency Relief Appropriations Act (49 Stat. 115).
- Reclamation Laws (54 Stat. 1198, 1199).
- Flood Control Act of 1962 (76 Stat. 1193).
- White Act (46 Stat. 371).
- Flood Control Act of 1944, as amended 1950 (58 Stat. 887).

Area-Specific Authorizations

- U. S. v. Oregon, "Belloni Decision" [302 F. Supp. 899 (1969); affirmed, 529 F. 2d 570 (1976)].
- U. S. v. Washington, "Boldt Decision" [384 F. Supp. 312 (1974); affirmed, 520 F. 2d 676 (1975); cert. denied, 423 U.S. 1086 (1976)].
- Water Resources Development Act of 1976 [Lower Snake River Compensation Plan (90 Stat. 2921)].
- Pacific Salmon Treaty Act of 1985, "U.S./Canada Pacific Salmon Treaty" (P.L. 99-5, 16 U.S.C. 3631, 03/15/1985).
- Salmon and Steelhead Conservation and Enhancement Act (16 U.S.C. 3301-3325).
- Yakima Fishery Enhancement Project (P.L. 98-360, P.L. 98-381, P.L. 98-386).
- Grand Coulee Dam Project (49 Stat. 1028).
- Grand Coulee Fish Management Project [Columbia Basin (Grand Coulee Dam) Act] - April 3, 1937.
- Chief Joseph Dam Project - [Oroville-Tonasket Unit, Washington (76 stat. 761) Section 3 of the Act of October 9, 1962] [Whitestone Coulee Unit, Washington (43 U.S.C. 616uu, 616vv-1-6163; 78 Stat. 704], as amended.
- Columbia Basin Project Act (16 U.S.C. 835 et seq., 57 Stat. 140) as amended.
- Chehalis River Fishery Resources Study and Restoration Act [Public Law 101-454 (104 Stat. 1054].
- Mitchell Act (16 U.S.C. 755-757; 52 Stat. 345).
- Pacific Northwest Electric Power Planning and Conservation (16 U.S.C. 839, P.L. 96-501, 94 Stat. 2697) as amended.
- First Deficiency Appropriation Act, "Central Valley Project" (49 Stat. 1622).
- Reclamation Projects Authorization and Adjustment Act of 1992, "Central Valley Project Improvement Act (106 Stat. 4714-4731).
- Pyramid Lake/Truckee-Carson Water Rights Settlement (P.L. 101-618, 104 Stat. 3289).
- Washoe Project Act (70 Stat. 775-777).

Attachment 3. Layout Diagram of Spring Creek National Fish Hatchery.



SPRING CREEK NATIONAL FISH HATCHERY

1 SEWAGE TREATMENT PLANT AREA
2 SERVICE BUILDING
3 PUMP PLANT
4 FILTER BEDS
5 MECHANICAL BUILDING
6 REARING PONDS
7 FISH LADDER
8 FOOD STORAGE BUILDING
9 SPAWNING BUILDING, VISITOR CENTER, OFFICES
10 STORAGE, GARAGE
11 INCUBATION BUILDING
12 LOWER COLUMBIA RIVER FISH HEALTH CENTER

Attachment 4. Spring Creek NFH – Operational Plan, Goals, and Standards, May 2000.

SPRING CREEK NATIONAL FISH HATCHERY

OPERATIONAL PLAN, GOALS AND STANDARDS

May 15, 2000

Written By:

The Spring Creek National Fish Hatchery Staff

and

The Spring Creek National Fish Hatchery
Evaluation Team

INDEX

I. HATCHERY OBJECTIVES

Mitigation

The Spring Creek National Fish Hatchery is legally mandated to mitigate for fish losses due to the construction of dams on the Columbia River. The Mitchell Act of 1938 and the Flood Control Act of 1950 provided funding for the reconstruction of the hatchery and for fish cultural operations.

Adult Contribution and Survival

In 1901 the U.S. Bureau of Sports Fisheries (now the U.S. Fish and Wildlife Service) began taking eggs from the Tule strain of fall chinook salmon (Oncorhynchus tshawytscha) that were historically spawned in the Big White Salmon River, a tributary of the Columbia River located one mile from the present location of the Spring Creek NFH. The original population of Tule fall chinook salmon has greatly diminished. Hatchery produced adults now contributing significant numbers of fish to the commercial, tribal and sport fisheries in the ocean and the Columbia River. Spring Creek will continue to provide for these fisheries, as well as maintain a target of 7,000 (including 4,000 female) adult escapement to the hatchery in order to maintain its production goals. Historically Spring Creek stock's survival rate was approximately 1.5% of the smolts released. In recent times the stock's survival rate has dropped below 1.0%. A major objective of the hatchery is to restore the stock to its former abundance.

Production

Spring Creek's maximum design capacity is for the production of 15.1 million smolts and production will be maintained at this level. Based on the assumption that raising healthy smolts will result in healthy adults, fish cultural practices will reflect the importance of monitoring fish health, disinfecting equipment and eliminating fish stress. The present practice of establishing improved fish cultural standards will be maintained. In addition, an investigation of alternative water sources and improved rearing techniques will be made.

Public Relations

The public provides Spring Creek with tax monies in order to produce salmon and keeping the public informed of hatchery programs is beneficial in maintaining these programs. An informed public will be more supportive in the future if our program is in jeopardy of losing funding. Spring Creek is especially interested in educating younger people since they are the future voters and will someday provide the support for environmental concerns.

Environmental Impacts

The U.S. Fish and Wildlife Service is accountable to the Endangered Species Act. Hatchery fish and wild fish interact in the marine and freshwater environments and because some of the wild populations are either threatened or endangered, Spring Creek has a responsibility to minimize the effects of hatchery practices on wild populations. We will continue to think about what we are doing that may impact these fish and modify practices that have adverse affects on the environment wild fish populations.

Genetic Integrity

The Tule fall chinook salmon is a unique stock which is indigenous to this area and it needs to be preserved. Present hatchery procedures mandate that every fish returning to the hatchery deserves the opportunity to contribute to the genetics of the stock. For example: jacks, or two year old precocious males, constitute 2% of the male spawning population. Additional measures will be taken to preserve the genetic integrity of this stock as they are developed.

Team Work

Working together, whether it's amongst ourselves as a hatchery crew or with other agencies, will ultimately result in sound biological management of the resource and its environment. The hatchery crew has been working as a4 team to identify standards for hatchery operations and will continue to improve those and write additional ones until all aspects of the operation have been considered. The recently formed Hatchery Evaluation Team will play a vital role in improving existing relations with other fisheries entities: the National Biological Survey (NBS), state fish and wildlife agencies, federal and tribal organizations, and public groups.

II. FIVE YEAR PRODUCTION PLAN AND GOALS

Goals addressed by the Hatchery Evaluation Team:

Production
Stock Integrity and Genetic Diversity
Interactions with Wild Stocks
Smolt Survival
Adult Contribution
Release Strategies
Defining Stock Quality Standards
Stock and Environmental Concerns
Hatchery Processes (Methods), Operations
Significance of Disease
Escapement
Communication and Public Relations
Monitoring and Evaluation

PRODUCTION

Tule Fall Chinook Salmon

Present	5 Year Goal
15.1 million smolts released. 300,000 smolts in lagoon. 1-4 million surplus unfed fry.	15 million smolts released or best numbers based on density study results. Final evaluation of lagoon reared fish for best capacity. Complete unfed fry/otolith mark study.

Spring Chinook Salmon

Present	5 Year Goal
150,000 yearlings released from Big White Salmon ponds. 500,000 "0" age released from Big White Salmon ponds.	Best numbers based on availability of fish and evaluations of fishery needs and rearing capabilities. (Goal of U.S. vs Oregon is 1.45 M smolts)

STOCK INTEGRITY AND GENETIC DIVERSITY

Tule Fall Chinook Salmon

Present	5 Year Goal
Original stock from White Salmon River. Input from Toutle River (1974) and Abernathy...Spring Creek stock. Bonneville SFH (BY87 and BY88), not pure Spring Creek stock. ≤2♀:1♂ for spawning. ≥2% of ♂'s used in spawning are jacks. Fertilize 1♀ with 1♂	Implement special studies suggested by the Regional Geneticist and approved by the team. Keep genetic diversity as wide as allowed. Protect stock integrity. Define effective population. Perform genetic evaluation of stock. Maintain standards on spawning ratio and % jacks used.

Spring Chinook Salmon

Present	5 Year Goal
70 - 100% Carson NFH stock. 0 - 30% Little White Salmon NFH stock. Fish received as swim-up fry.	Protect stock integrity. Define effective population. Implement special studies suggested by the Regional Geneticist and approved by the team.

INTERACTIONS WITH WILD STOCKS

Tule Fall Chinook Salmon

Present	5 Year Goal
Smolt release - no jeopardy with wild stocks (NMFS, 1993). Adult returns - some straying, but these fish are indigenous stocks.	Acquire more data on interactions between wild stocks and tule fall chinook by reviewing current studies. Develop solutions to remedy potential adverse impacts.

Spring Chinook Salmon

Present	5 Year Goal
No viable spring chinook wild stock in White Salmon River (WDF, 1993). Releases - no jeopardy with wild stocks (NMFS, 1993). Evaluation of residualism of fingerling releases with marking study.	Conform to any established wild stock policies and ESA and CRFMP directives. Residualism studies evaluated.

SMOLT SURVIVAL IN THE HATCHERY

Tule Fall Chinook Salmon

Present	5 Year Goal
Egg to eye-up ≥ 94% Eye-up to ponding = 96-97% Ponding to release = 96-97.5%	Egg to eye-up, maintain index. Eye-up to ponding, maintain index. Ponding to release > 97.5% Maintain or improve standards.

Spring Chinook Salmon

Present	5 Year Goal
Ponding to release = 70-80% (disease and high predation).	Ponding to release ≥ 90%.

ADULT CONTRIBUTIONS - TOTAL

Tule Fall Chinook Salmon

Present	5 Year Goal
< 1.0%, varies with tag code.	1.5%, or improving trend.

Spring Chinook Salmon

Present	5 Year Goal
2 years of CWT's (1991 & 1992) and 1 year of ventral clips (1993). FRO coordination with tagging.	Ongoing tagging and evaluation incorporated into station program. Increasing contribution to sport and tribal fisheries.

RELEASE STRATEGIES

Tule Fall Chinook Salmon

Present	5 Year Goal
Pond - 3 scheduled releases: mid-March, mid-April, mid-May. Coordinated with OCRC and Fish Passage Center. Lagoon - May Unfed fry (swim-up stage) - December. Planning contribution study.	Pond - upgrade release equipment/techniques. Factors identified that affect contribution. CWT data used to consider options. Lagoon - finalize release number strategy. Unfed fry - begin evaluation of releases and contribution.

Spring Chinook Salmon

Present	5 Year Goal
August - "0" age Mid-April - yearlings	Factors identified that affect contribution. CWT data used to consider options. Finalize release number and strategy.

QUALITY STANDARDS

Tule Fall Chinook Salmon

Present	5 Year Goal
Hatchery staff has defined quality standards over the past two years.	Maintain, refine, and expand quality standards. Integrate LCRFHC in studies. Fish feeding standards better defined.

Spring Chinook Salmon

Present	5 Year Goal
None	Standards defined by staff and reviewed and approved through HET.

STOCK AND ENVIRONMENTAL CONCERNS

Tule Fall Chinook Salmon

Present	5 Year Goal
EPA samples taken. Rearing water quality checked weekly. Yearly water analysis of springs and well. Chemicals used: iodophor, HTH, freon, formalin, salt, MS-222, Pro-polyaqua.	Meet all present and proposed EPA standards. Continue to monitor water quality. Advance the use of INAD drugs. Have FDA approved/affordable anesthetic.

Spring Chinook Salmon

Present	5 Year Goal
EPA samples taken. No rearing water quality samples taken. Chemicals used: Formalin, erythromycin feed.	Meet all present and proposed EPA standards. Reduced dependency on chemicals used.

HATCHERY PROCESSES (METHODS), OPERATIONS

Tule Fall Chinook Salmon

Present	5 Year Goal
Procedures written, changes made. Staff and agency involvement through VISION.	Investigate new water sources. Maintenance standards developed. Ozone treatment capabilities of spring water and Columbia River water. Maintain, expand, and refine hatchery SOP's. Develop best possible rearing techniques to reduce stress and increase survival. HET functional and effective. NMFS and Corps participating.

Spring Chinook Salmon

Present	5 Year Goal
Staff and agency involvement through VISION.	Procedures defined by staff and reviewed and approved through HET. Maintenance standards developed. Maintain, expand, and refine hatchery SOP's. Investigate new water sources. HET functional and effective. NMFS and Corps participating.

SIGNIFICANCE OF DISEASE

Tule Fall Chinook Salmon

Present	5 Year Goal
Problems: ERM, coagulated yolk, occasional soft shell. BKD in adults and smolts?	ERM eliminated. Incorporated best disease management techniques and concerns of LCRFHC.
Monthly and pre-release check by LCRFHC. Goede Index done.	Evaluate fish health of smolts to adult survival.

Spring Chinook Salmon

Present	5 Year Goal
Problems: Some BKD, external parasites.	Incorporated best disease management techniques and concerns of LCRFHC.
Monthly and pre-release check by LCRFHC. Goede Index not done.	Initiate Goede Indexing.

ESCAPEMENT

Tule Fall Chinook Salmon

Present	5 Year Goal
Mitigation requirement is for 60,000 adults above Bonneville Dam (Tuss, 1982). 1989-1993 average return to the mouth of the Columbia is 29,000 adult BPH chinook salmon. To rack: 7,000 adults, of which 4,000 are ♀'s. Occasional trapping at north shore of Bonneville Dam.	Clarification of accountability to Corps and Mitchell Act. Evaluation completed to get best level of escapement to meet production goals and genetic diversity. North shore trapping eliminated.

Spring Chinook Salmon

Present	5 Year Goal
Terminal fishery, no escapement goals.	Terminal fishery significantly contributing to sport and tribal fisheries. Fishery impacts conforming to wild stock or ESA directives.

COMMUNICATION AND PUBLIC RELATIONS

Tule Fall Chinook Salmon & Spring Chinook Salmon

Present	5 Year Goal
Monthly hatchery team meetings and training. Contacts/Involvement with: Abernathy, NBS, FRO, Tribes, VISION Teams, other hatcheries. Public relations/Outreach: 3 cooperative agreements, Skamania Fair, educational (school) tours, national fishing week.	Continuing hatchery team meetings. Continued involvement with other offices and agencies. Improved communications between hatcheries. Full time position funded to assist in outreach activities. Continued outreach and cooperative agreements. Annual local fish culturists meeting established.

MONITORING AND EVALUATION

Tule Fall Chinook Salmon & Spring Chinook Salmon

Present	5 Year Goal
Hatchery uses Columbia River Information System (CRIS) database on a limited basis with backup from hatchery generated spreadsheets. Hatchery participates in and reviews ongoing studies conducted on the hatchery stock by either hatchery personnel or researchers from other offices (FRO, NMFS, etc.).	Integrate all data in CRIS database, with confidence in its' efficacy. HET will be active in reviewing ongoing studies of the hatchery stock. If studies are developed for the hatchery stock, study designs will closely follow the format described by the Fisheries Implementation Evaluation Team in its memo of June 4, 1993. A copy of this memo will be on file in the hatchery office.

Literature Cited

National Marine Fisheries Service. 1993. Endangered Species Act - Section 7 Consultation. Biological Opinion, 1993 Hatchery Operations and Juvenile Releases.

Tuss, C.A. 1982. John Day Fall Chinook Mitigation Evaluation, Spring Creek National Fish Hatchery, Broods 1972-1975. Final Report to U.S. Army Corps of Engineers. MOU No. DACW57-73-C-0064. 29p.

U.S. vs Oregon. 1988. Columbia River Fish Management Plan. Appendix B.

Washington Department of Fisheries. 1993. Salmon and Steelhead Stock Inventory.

WDF, 1994. Run Size Forecast of the Return of Columbia River Fall Chinook Salmon Stocks in 1994. Columbia River Laboratory Progress Report 94-07.

III. HATCHERY QUALITY STANDARDS

FEMALE DEAD IN POND's (DIP's) $\leq$ 2.0 %

Since every female that returns to the hatchery has the potential of producing 5,000 eggs, we recognize the importance of keeping them alive and healthy until spawning. Our goal is to keep all fish alive until spawning, but most especially to minimize the loss of females to less than 2.0 % of the total female return. Not including fish given away as food.

TOTAL DIP's $\leq$ 5.0 %

Once adults return to the hatchery, the staff will do everything feasible to keep them alive to attain our goal of less than 5.0 % die-off in the ponds. DIP's are removed daily in order to decrease the spread of parasites or fungus from a dead or dying fish to another live fish.

GREEN FEMALES $\leq$ 2.0 %

Spawning of green females will be kept to a minimum through quality evaluation of anaesthetized fish. The fewer number of green females sent to the spawners, the greater the overall spawning success. The goal of sending less than 2.0 % green females to the spawners does not include those females killed on the last day of spawning that are unlikely to ever become ripe. Wait on first spawn, use entry time as part of when to spawn first take.

SPAWNING RATIO OF FEMALES TO MALES $\leq$ 2:1

In years past a spawning ratio of 5 or 6 females to 1 male was considered the norm. We feel that the number of adults returning can and should support a lower ratio of at least 2 females to 1 male in order to maintain genetic diversity through a larger gene pool. Geneticists agree that by increasing the gene pool a healthier stock will result. The actual fertilization process will be done with one male and one female.

JACKS SPAWNED $\geq$ 2.0 %

Spawning jacks was once taboo-it was believed that jacks produced jacks. Geneticists believe this is untrue and that jacks can actually enhance a gene pool. In keeping with our belief that all fish that return to the hatchery have a right to be spawned, we will attempt to incorporate jacks into the spawning population at a rate of not less than 2.0 % of all spawned males.

EGG EYE-UP $\geq$ 95%

Percent eye-up is a measurement of how effective our techniques are in spawning the females and males, and their subsequent treatment in the incubation building through egg washing, maintaining adequate flows in the incubators, and prophylactically treating with iodophor for the control of fungus and soft-shell. We are always in the process of improving our techniques which we feel will ultimately influence the quality of the smolts we produce. By maintaining our goal of more than 95% eye-up we feel we have the best opportunity to produce a quality smolt for release. Treat egg take within 24 hours of spawn.

AMMONIA (NH_3) CONCENTRATION $\leq$ 0.3 ppm

Ammonia production is a problem inherent with fish production in a reuse system; however, ammonia levels and overall water quality do not have to become a limiting factor in quality smolt production at Spring Creek. Through weekly water analysis ammonia levels can be tracked in order to determine if changes are needed in fish cultural techniques. By adjusting feeding levels, cleaning ponds and filterbeds properly, and using beneficial bacteria in the system, ammonia levels can be maintained at or below 0.3 ppm for the entire system, as measured in the early morning before feeding commences.

DENSITY INDEX (D.I.) $\leq$ 0.28 FOR SYSTEM

The density index is the weight of fish in a pond or system divided by the average length multiplied by the cubic feet of rearing space. In a given pond, too high a density index can result in poor quality fish: eroded fins, stress

from competing for space and a resultant decrease in overall production for that pond. For Spring Creek's ponds it has been determined that maintaining a density index of less than 0.28 for the entire system and a D.I. of 0.30 for any one pond is important in attaining our goal of quality smolt production. We monitor this index on a bimonthly basis. In order to maintain low densities, fish are split after the March release.

FLOW INDEX (F.I.) $\leq$ 1.50 FOR SYSTEM

The flow index is the weight of fish in a pond or system divided by the average length multiplied by the gallons per minute flow in the rearing space. In a given pond, high flow indexes result in depleted oxygen and increased stress and, as stated before, this negatively influences our goal of producing quality smolts for release. At Spring Creek it has been determined that the flow index should never exceed 1.5 for the system. Throughout the production season, flow indexes are monitored bimonthly and changes are made accordingly: water flow is increased from 400 gpm to 550 gpm when the F.I. reaches 1.1 for the system, and increased to 700 gpm when the F.I. reaches 1.3.

WATER TEMPERATURE $\leq$ 51 °F

Due to problems observed with Enteric Redmouth Disease when water temperatures exceed 51 °F, we maintain water temperatures below that level, but not less than 46 °F. This can be accomplished by turning off the warmwater well in the last week of January and turning it back on if cold weather causes a drop in water temperature.

MORTALITIES FROM PONDING TO RELEASE $\leq$ 2.5 %

We believe that mortality after ponding is an indicator of fish health and resultant smolt quality at release. Through many actions before, during, and after ponding we can prevent high pond mortalities. All of these techniques are discussed further in the following procedural standards: quality spawning and incubation practices, removing cripples before ponding and incorporating the latest ideas to improve ponding techniques, disinfecting equipment, water supplies and holding facilities, cleaning ponds and filterbeds, monitoring fish health, reducing stress in the fish. By following current standards, and developing new ones, we can maintain our goal of less than 2.5 % mortality in the ponds.

GENETIC STANDARDS Ne $\geq$ 5000

We believe the Spring Creek Tule stocks genetic material has not been compromised since the hatchery's inception in 1901.

Outside influence has been minimal with only two incidents of outside stocks brought into the hatchery and crossed with Spring Creek stock. In 1974 tule stock from the Toutle River Hatchery and in 1987 & 1988 Tules from Bonneville Hatchery were mixed with our stock. Both of these either originated from the Spring Creek stock, as in the case of Toutle River Hatchery, or have been heavily influenced with strays from the Spring Creek stock, Bonneville Hatchery.

We believe over the years that the Effective Population size spawned each year has been significantly higher than most geneticists recommend. In fact, the Effective Population size, (Ne) has generally exceeded 2000. The Effective Population size will be determined by the following formula:

$$Ne = \frac{(4)\,(f)\,(m)}{f+m}$$

By maintaining a spawning ratio or $\leq$ 2 to 1, the Effective Population of each brood year should exceed 5000. We have decided to set the hatchery standards goal for Effective Population size to be $\geq$ 5000. If by some unforseen circumstance the run size becomes so low that a 5000 of better Ne could not be reached, we will maximize usage of females to get al least an Ne of 1000.

VI. HATCHERY INFORMATION MONITORING AND STUDY DESIGN

HATCHERY INFORMATION MONITORING

Hatchery quality standards, goals, and studies will be monitored and evaluated utilizing the Columbia River Information System (CRIS) database. CRIS reduces reporting requirements and eliminates repetitious data entry. The increased consistency and quality of the data facilitates transfer of information to other agencies and aids in evaluation of general goals and specific studies.

Information maintained by CRIS includes release, return, and production data organized by such parameters as take, pond, release group, and mark group. Other information such as water quality and fish health data will be incorporated into this database. Hatchery personnel and FRO personnel will coordinate data that is needed for input.

Standards for CRIS data transfer responsibilities are as follows:

Hatchery to Regional Office:

A hardcopy of a run summary within one week after the end of the spawning season.
A hardcopy of the hatchery production summary along with the monthly activity report.

Hatchery to FRO:

Fish removal database file within one week after the end of spawning. All records should be verified. Send the distribution data within one week after major distribution and within one week after the end of each quarter.
Egg transfer data within one week after completion of major egg transfers and within one week after the end of each quarter.
The lot history start file within one week after the end of each quarter.

FRO to Regional Office:

Quarterly fish and egg distribution report within three weeks after the end of each quarter.

FRO to Hatchery:

Hardcopy of the age composition data for each species sampled within one week after verification of data.
Hardcopy or database file listing mark and coded wire tag recoveries at the hatchery within one week of verification of data.

Reports and Responsibilities:

The capabilities of CRIS will be realized in data generated for annual, broodyear and special study reports.
Annual production reports will give yearly statistics on adult returns and juvenile releases.
Broodyear reports will evaluate hatchery goals and standards according to their performance for each broodyear.
Confounding factors (water quality, disease, etc.) will be taken into account.
Special studies will be proposed as needed to develop additional and/or reevaluate current hatchery goals and standards to meet management objectives of contribution, stock integrity, and minimizing impacts to wild fish.
Annual reports will be prepared by the hatchery with HET member input.
Broodyear reports will be prepared by FRO with HET member input.
Special studies will be prepared by the investigator with HET member and other appropriate entity review.

STUDY DESIGN

Guidelines for study plan development will closely follow those outlined by the Fisheries Implementation Evaluation Team in their memorandum dated June 4, 1993. A copy of this memo will be kept on file in the office of Spring Creek.

New studies that will always receive technical review by the Hatchery Evaluation Team will include:

All marking programs.
Release strategy changes which could affect watershed ecosystems.
Interagency/Interjurisdictional efforts.
In-hatchery studies which could result in recommendations for changes in hatchery management practices.

Steps in developing proposal will include:

HET members or other investigators brainstorm the issue.
Define the problem or question in simple terms.
Contact "experts" and conduct literature review.
List specific objectives and hypotheses to be tested.
List possible study approaches and assign tasks for proposal development.
Decide on feasibility of study and methods.
List measurements and statistical methods to test hypotheses.
Decide on data which is critical to meeting objectives.
Write proposal, select reviewers, and distribute proposal.

Appendix II and III of the aforementioned memo gives the format for study proposals and guidelines for development, approval, and funding of hatchery evaluations and special studies.

V. HATCHERY PROCEDURAL STANDARDS

A. SPAWNING STANDARDS

Pre-Spawning Preparation

By August 1 have chemicals and supplies on hand:

MS-222 (12 kilograms)
Pro-Polyaqua (5 gallons)
Iodine (24 gallons)
Salt (30 bags)

By the second week of August:

Prep ponds 28-44 for filling
Shovel out debris in the ponds
Remove every other cap from water nozzles
Put ladder in
Set troughs up in incubation building for egg washing
Put jump boards up
Put all pond screens in
Put counting shack in channel
Pull out planting pipe after spring water is flowing into filterbeds

By August 20:

Start filling filterbeds
Start water flow to ponds
Measure all the chemicals:
MS-222 = 30 bags of 400 grams each
Salt = 30 bags of 1.5 lbs each
Check the first aid kit
Move totes to the spawning area
Plug tote drain holes

Maintenance Crew:

Prep spawning building: check cables, grease bearings and run the lifts
check the electrical equipment
fill the crowder and forklift propane tanks
change the compressor oil
grease the wheels and bearings on the crowders
put the crowders in
grease, oil and do general maintenance on the egg cart
check the plastic pipes and chutes
and other things as discovered
URB tube in river

Adult Run

GOAL: Total count should be within 5% of total count at the end of spawning.

Counting: Based on management decision: counting shifts begin and all males, females and jacks are counted. Counting will continue, if manpower is available and fish are running (>250 fish/day) even after spawning has begun.

Watchman: The night watchman will begin his shifts on or around September 1, or when the first fish comes in.

Ponding: Pond #44 should be held empty for a buck pool, unless a larger than normal run is expected, then fill first.
Pond #43 is to be filled with the first returning adults, and so on down the line.
500 adults per pond; however, if predicted run numbers are high, adults per pond may vary.
Pond numbers will not exceed 800 adults.

Spawning

In previous years spawning has started on September 15 or 16.

Guidelines for checking if fish are ready to spawn should be:

Check before the fish have been disturbed; the fish will be up in the water and not oriented toward the current; compare the oldest fish with other ponds, note that unripe fish normally swim in a circle going into the current.

General Rules:

Communication is the KEY! In order to limit exposure to anesthesia: if 30% or less of the females in the oldest pond are spawned on any given day then the next pond should not be spawned that day; give a pond at least one whole day before it's gone through again; don't overcrowd the channel and don't crowd out a pond right before break.

Specific jobs aside, everyone should be aware that help is needed with:

--morning preparation
--changing tubes
--moving and cleaning totes
--loading rendering truck
--crowding
--cleaning up each day, and
--gathering and accounting for DIP's.

On DIP's:

DIP's should be removed first thing in the morning, as well as whenever needed, and the numbers tallied on the clipboard by the buck table; check for marks; marked fish go to the FRO table; we are responsible for reporting the **total daily** DIP count to FRO. A person should be designated to relay the information.

Job Roles and Responsibilities

Lift Operator

Crowds fish to spawn building
Monitors water flow in channel
Backs crowder to relieve crowding fish during break
Responsible for providing a constant supply of anaesthetized fish for the checker, and for keeping in contact with the spawner so as to not overload the female table
Doesn't overload the lift-tries for 10-15 fish per lift
Keeps the fish in the anaesthetic for 2.5 to 3.5 minutes
If the spawner is swamped, delay lifts until space is available on the table

Checker

Responsible for sorting out ripe males and females
Keeps an accurate count of the fish numbers, the origin and destination of unripe fish
Kills ripe fish and sends them to the tailcutter and bucker
Ensures that 2% of male spawning population is comprised of jacks
Sends excess bucks to the other side of the sorting table
Communicates to the bucker the number of males available to him
Sends unripe males to pond #44, if being used for excess males
Keeps track of the spawning tubes and makes sure they get changed

Tailcutter

Responsible for cutting the females' tails and orienting the fish in the correct direction for the spawner
Puts the fish under the rinsing jets
Puts clothespins on the leaking females
Turns the table so the females are available to the spawner
Sorts the bucks to the bucking table
Periodically sorts the excess males on the checking table so the older fish will be used first making sure that all bucks are dead before putting them on the buck table
Communicates with the bucker to ensure a steady supply of bucks
Keeps knives sharp and wears a protective glove at all times
Keeps area clean, avoids spraying water in the direction of the eggs

Bucker

Responsible for spawning 1 male to 1 female in colander using the maximum number of males possible so spawning ratio (M:F) is less than 2:1
Sorts bucks to the bucking table
Drains ovarian fluid from the eggs until there is a slow drip and then adds the eggs to the colander
Adds adequate saline solution to the eggs and stirs
Rotates stocks of bucks and calls for additional fish as needed
Keeps count of used and green males, and jacks actually spawned
Disinfects, washes and replaces colanders as needed for the spawner
Communicates with the checker to ensure that 2% jacks are used
Communicates with the checker for numbers of bucks on the sorting table and communicates with the tailcutter to retrieve those bucks

Bucker Helper

POLICY: If there's an "outside" bucker there should be a member of the crew acting as bucker helper
Responsible for helping the bucker
Drains ovarian fluid until there is a slow drip
Adds the eggs to the colander with the bucker's knowledge
Disinfects, washes, and replaces colanders as needed for the spawner
Tallies green, bad, or bloody females
Places colander with fertilized eggs on saline table, adds 1 cup saline
Maintains accurate count on colanders places on saline table
Keeps time of fertilization 30 to 45 seconds
Communicates to egg driver when it's time to take the eggs over and if there are fewer than 3 females in bucket

Female Spawner

Responsible for spawning females
Communicates with lift operator on lift speed
Tries to maintain a timely pattern of spawning
Waits for the fish to bleed out
Points out bloody, green, or bad eggs to bucker or bucker helper
Makes decisions as to whether the eggs should be thrown away, or how much should be shaken
In years of high egg totals, throws out BB-sized eggs and counts the female as "bad"
If keeping small eggs, coordinates with bucker and egg washer to separate them into individual buckets and trays so that during shocking they can be thrown out if there are enough eggs
Changes knife blades

Egg Cart Driver

Responsible for driving eggs to incubation building and maintaining a line of communication between the egg washer and the spawning crew
Takes no more than 3 buckets at a time unless more are present, with no more than a 5 minute delay for additional buckets
After adding saline solution allow 45 seconds for fertilization
Places fertilized eggs from colander to bucket in egg hauling cart. Three colanders to bucket
Helps bucker by adding saline solution and stirring eggs
Disenfects colanders and places them on drying table
Takes eggs to hatchery washing troughs and helps unload, if necessary
Helps wash eggs if needed
Communicates with spawning crew if washer is swamped
Keeps the lid latched on egg cart
Adds oil and gas to the tractor at the end of the day

Saline Table Helper**

Moves egg and sperm from bucker table to saline table
Adds saline solution
After 30 to 45 seconds combines 3 colanders into one bucket
Helps egg cart driver load cart
Helps disinfect colanders

Egg Washer

Disinfects buckets
Responsibilities have already been covered in the incubation standards
Keeps the official female count
Communicates with the spawning crew through the egg cart driver

Egg Washer Helper**

Responsibilities will be covered in the incubation standards

Roving Helper**

If available, is responsible to help out where needed, all optional position
Asks if help is needed before jumping in
May rotate to various areas

** = Optional Positions

Post Spawning

Building: Several people should spend some time scrubbing everything down. Drains should be checked
Clean the grate under anesthetic tank in spawning building.

Ponds: Take all jumpboards down. Before disinfection, the ponds and channels should be checked to ensure that all fish and eggs are cleaned out. Ponds should be cleaned and then disinfected by introducing HTH at the 78".

Ladder: Shut off the water to the ladder and raise it as soon as possible after spawning is over.

B. INCUBATION PROCEDURES

Incubation Room Preparation

Flush main lines.
Block all sunlight.
Keep light off when not working.
Turn water on and adjust all incubators in one day.
Adjust all water with main valve. If not possible, adjust individually.
All employees should be knowledgeable of valves in hatchery.

Water Flows

Pre Eye-up	3 gpm
Eye-up to Hatch	5 gpm
Hatch to Button-up	7 gpm (up to 7 gpm)

Water Temperature

If temperature units need to be raised to meet a specific need, do so prior to hatching.

To Hatch	52°F at highest
Hatch to Button-up	50°F at highest

Green Egg Handling

Haul within 5 minutes after spawning.
Wash and tray 5 minutes after entering hatchery.
Wash twice unless excessive blood or foreign matter is present.
Disinfect spawning buckets in Argentyne prior to returning them to the spawning building.
Improve communication between incubation and spawning buildings to eliminate over-burdening egg washers, causing poor quality work.
Put no more than 7,500 eggs per tray (3 females into 2 trays). Divide evenly.
Mark all trays at beginning and end of each take. Tag trays that have only 1 or 2 females, or eggs that might be bad.
First treatment with iodophor within 24 hours of spawn.

Tray-Down to Eye-Up

Treat eggs with iodophor 3 times per week:
- 15 minute flow-through method using pump injection.
- Use Argentyne (or equivalent) at 15 to 20 ppm concentration.
- Treat tray stacks individually once hatching begins if there are wide time spreads between egg takes.

Check incubators every A.M. and P.M.
Add temperature units (TU's) daily in the morning.
Change thermograph every Monday morning.

Shocking and Salting Eggs

Wait until eggs are strongly eyed (550 TU's are attained or a strong eye can be seen visually).
Shock eggs by hand (pouring) or by using a shocking apparatus.
Wait 24 hours after shocking before starting salting process.

Putting Eggs Down

Wait 24 hours after salting.
Use a digital platform scale.
Sample all Takes:
- one sample for Takes less than 1,000,000 eggs.
- two samples for Takes larger than 1 million eggs.
- attempt to sample eggs from each basket in the Take.

Sample size will be the "put down" numbers.
Tray down no more than 4,500 eggs per tray, preferably 4000.
Pick all dead and blank eggs, keep an accurate count of pick-off.
Work weekends if necessary to carry out these quality work standards.

Eye-Up to Button-Up

Between putting eyed eggs down and ponding, pick trays one to three times to remove dead eggs, fry, and cripples
Keep an accurate count of all pick-off
Maintain morning and evening checks of incubators
Record TU's daily
Change thermograph every Monday morning

After Ponding

Start washing trays immediately after ponding fish.
Wash all trays by February 15th.
Check all screens in trays for holes or rough areas, repair or replace as necessary.
Scrub all troughs.
Clean and store all equipment.
Paint equipment as necessary.
Power wash water channels.
R&R broken valves and plumbing.

C. FEEDING AND CLEANING

Feeding

At Ponding:

Maintain a conversion factor of .85 (lbs. feed/lbs. growth) throughout production period.
Water Temperature should be maintained at 49-50°F.
Use Biodiet floating feeds: #2 and #3 starter. Feed 12-14 days on #2 and 8-10 days on #3.
Feed eight times per day.
For computer-generated feeding rates:
- Target a growth rate of 0.016 inches/month depending on temperatures.
- Use a condition factor figure of .28, adjust K-factor monthly to the actual measurement for each release starting February 1.

Waste feed can cause problems in the filterbed system. Feed ponded fry below calculated levels maximum two days; raise feed once the fish begin to actively feed.

After 3 Weeks:

Fish should be eating at least 1.0mm-sized Biodiet Moist or 1/32 Rangen soft moist pellet feed.
Change target growth rate in computer to 0.016 to .018 inches/month, depending on temperatures.
Try to maintain temperature between at 48-50°F.
If temperature drops (i.e. well stops functioning or there is unusually cold weather) lower target growth rate to 0.015, or 0.014 depending on temperature drop.
If necessary, raise the growth rate more rapidly than normal once the water temperature rises in order to get the fish up to size before release.

For All Releases:

Increase feeding rates by 10% two weeks prior to release. Keep a close watch on ammonia (NH_3) levels, especially for the March Release. Look for a drop in the condition factor to indicate smolting.
Target size for each release: 125 Fish Per Pound (FPP) for March, 65 FPP for April, 35-45 FPP for May.

After March Release:

Use a condition factor figure of 3.2 in the computer feeding formulas.
Raise target growth rate in computer to 0.020 and maintain this rate until all fish are released.
If there is surplus feed and need to accelerate growth the last two weeks, raise the growth rate to 0.022.

After April Release:

Use a condition factor figure of 3.4 in the computer feeding formulas.

Feed Quality:

Require quality feed and, if inferior feed is delivered, have it evaluated and returned.
Demand more stringent standards for nutritional quality, and dust and oil content.
Feed should be inspected and certified by a regional fish nutritionist.
Feed will not be held on station for longer than 60 days.

Number of Feeds Per Day:

Upon ponding, feed fish eight times per day until fish are on 1.0mm-sized feed.
Lower number of feedings based on weight of food per pond and number of fish in pond.
Feeding times are closely related to water temperature and flows.
The amount of ammonia (NH_3) will influence how many feedings must be used.
Increase feed amounts every three days, using the CRIS program.
Always feed your smallest fish.

Feeding Chart

Fish Feed Size and FPP*	Number of Feeds Per Day				
	8	7	6	5	4
Biodiet #2 Starter 1100-800	X				
Biodiet #3 Starter 800-550	X				
Biomoist 1.0 mm 550-400		X			
Abernathy 3/64 400-200		X	X		
Abernathy 4/64 200-75			X	X	
Abernathy 6/64 75-				X	X

*FPP = Fish Per Pound, these figures are the feed company's recommended feed sizes for the number of fish per pound

Cleaning

As fish begin to grow and become more active, pond cleaning can begin (usually 3 to 4 weeks).
If possible, ponds should be cleaned weekly.
On occasion, a week can be skipped due to fish planting, lack of man power, or if the bacteria are obviously working efficiently.
Take two or three days to clean all the ponds. Avoid cleaning ponds in the middle of the week to circumvent lieu days and backwashing activities.

Pond Cleaning Procedures:

Two people per pond, working in opposite directions.
Open #3 valve and close #2 valve, lower pond no lower than 2/3 normal depth.
Brush along pond walls, including center portion.
Brush remainder of pond bottom diagonally.
Move slowly and avoid fish.
Clean screens to prevent overflow.

Clean screens and flush #3 valves as needed.

D. WATER QUALITY AND EPA MONITORING

Spring Creek

Hatchery Water Supply:

There are several water sources available for use at Spring Creek, with accompanying water permits.
The following is a list of the sources, the permitted water use and permit numbers:

Unnamed Spring	1.5 CFS	Permit Number	10424
Unnamed Spring	12.0 CFS		6716
Unnamed Spring	12.0 CFS		11343
Unnamed Spring	.01 CFS		8398 (Domestic Use)
Well	2.67 CFS		G2-28217P
Columbia River	11.2 CFS		12045

At present all but the Columbia River permits are used.
Spring and well water are used in lieu of Columbia River water in order to eliminate the introduction of disease pathogens present in river water into the hatchery system.
Although Spring Creek possesses permits for a total of 25.51 CFS spring water, that flow is not available from the springs. In recent years the highest flow available has been 6.91 CFS.

Water Quality Testing:

In 1991 the U.S. Geological Survey conducted testing to determine if septic systems and fertilization of agricultural crops located on the bluff above the hatchery could influence hatchery water quality The study did determine that water quality at the hatchery could be adversely affected by these practices. It also determined that the age of the spring water (from 4 different springs) was, on average, 312 years old and the well water was 4,543 years old. This age is the number of years since the water was last in contact with the atmosphere.
Annually, a sample of the spring and well water are sent to a certified lab where they are tested for approximately 15 parameters.
A thermograph measures pond water temperatures continually.
A member of the staff will conduct the following tests weekly:

Test	Location
Ammonia (NH_3)	78" Pipeline, #3 Filterbed and Aeration Tower
Nitrite (NO_2)	78" Pipeline, #3 Filterbed and Aeration Tower
Nitrate (NO_3)	78" Pipeline, #3 Filterbed and Aeration Tower
pH	78" Pipeline, #3 Filterbed and Aeration Tower
Dissolved Oxygen	78" Pipeline, #3 Filterbed and Aeration Tower

The purpose of measuring these chemicals is twofold: ammonia and nitrite are detrimental to fish health in fairly low concentrations. In a reuse system, the presence of these chemicals is compounded. If levels reach hatchery standards, fish cultural activities will be modified in order to decrease the concentration of these chemicals, i.e. feeding levels will be lowered. Nitrifying bacteria are inoculated in the filterbeds of the reuse system in order to eliminate the majority of the ammonia and nitrite concentrations through oxidation to nitrates, which are not lethal to fish in low to moderate concentrations. These tests can help determine the efficacy of the bacteria.

Records Maintained of Water Quality:

Daily:

TU's in hatchery building during incubation period
% Saturation of Total Dissolved Gases in incubators
Temperature in ponds included in fish culture log
Flows in ponds

Weekly:

Filterbed measurements entered in computer database, graphs generated and held in production records.
Lagoon data entered in computer database, graphs generated and held in production records.

At each Release:

High and low records of water quality measurements are recorded and submitted with the Production Year Report and the Brood Year Report (see page 36).

EPA Requirements:

The EPA permit number for Big White is WA-000022-1.
Monitoring is to be done monthly for suspended solids and reported to the EPA quarterly.
Suspended solids may not exceed 15.0 mg/l over intake in an instantaneous grab sample.

Big White Substation

Pond Water Supply:

There is a single water source for the Big White Substation: the White Salmon River. Permit number 9029 provides for 30.0 CFS of inflow.

Water Quality Testing:

Thermograph records temperatures daily.

EPA Requirement:

The EPA permit number for Big White is WA-002553-4.
Monitoring is to be done monthly for settleable solids and reported to the EPA quarterly.
Settleable solids may not exceed 3.3 ml/l over intake in an instantaneous grab sample.

WATER QUALITY MONITORING FOR _____ RELEASE

Date of Release _____

TEST	SOURCE	FLOW	HIGH
Water Temperature (°F)	Incubators	_____	_____
	Rearing Ponds	_____	_____
	Lagoon	_____	_____
	Columbia River Temperature at Release_____		
Dissolved Oxygen (mg/l O_2)	78" Pipeline	_____	_____
	#3 Filterbed	_____	_____
	Aerator Tower	_____	_____
	Incubators	_____	_____
	Lagoon	_____	_____
Ammonia (ppm NH_3)	78" Pipeline	_____	_____
	#3 Filterbed	_____	_____
	Aerator Tower	_____	_____
Nitrite (ppm NO_2)	78" Pipeline	_____	_____
	#3 Filterbed	_____	_____
	Aerator Tower	_____	_____
Nitrate (ppm NO_3)	78" Pipeline	_____	_____
	#3 Filterbed	_____	_____
	Aerator Tower	_____	_____
pH	78" Pipeline	_____	_____
	#3 Filterbed	_____	_____
	Aerator Tower	_____	_____
	Lagoon	_____	_____
Phosphates (mg/l PO_4^{3-})	Lagoon	_____	_____
BOD (mg/l O_2)	Lagoon	_____	_____

E. FISH HEALTH

Spring Creek

Spawning Season

Adult fish health sampling performed by the Lower Columbia Fish Health Center (LCRFHC):

66 Males: kidney, spleen, and gill tested for virus (3 fish pools)
Infectious Hematopoietic Necrosis (IHN)
Infectious Pancreatic Necrosis (IPN)
Viral Hemorrhagic Septicemia (VHS)
Erythrocytic Inclusion Body Syndrome (EIBS)

150 Females: ovarian fluids tested for virus (3 fish pools)
Infectious Hematopoietic Necrosis (IHN)
Infectious Pancreatic Necrosis (IPN)
Viral Hemorrhagic Septicemia (VHS)

30 of 150 females are then tested for:
Yersina ruckeri (ERM)
Aeromonas salmonicida (furunculosis)

20 of 150 females are then tested for:
Ceratomyxa shasta (whirling disease)

Handling of Adults

No chemical treatment in ponds.
Remove DIP's daily.
Use MS-222 to facilitate handling and thereby reduce stress in fish.
Use Pro-polyaqua in anesthetic tank to reduce handling stress on fish and possibly adult holding ponds.
No individual spawning to isolate BKD positive progeny.
Remove carcasses every other day.

Egg Handling

Fertilized Eggs:
Wash after fertilization to remove blood, body cavity parts and excess sperm that may enhance fungal growth.
Disinfect 3 days/week with iodophor to prevent fungal growth, as described in incubation procedures.
Record TU's daily. Start treatment within 24 hours of spawning.

Eyed Eggs:
Disinfect as above with iodophor to prevent fungal growth until 750 TU's are reached.
Pick dead eggs to reduce fungal growth.

Sac Fry:
No chemical treatments.
Cripples and dead fry picked to reduce fungal growth before ponding.

Ponded Fry and Fingerlings

Further fish health monitoring is performed by the LCRFHC:

At Ponding:
60 fish are sampled for virus (3 fish pools):
Erythrocytic Inclusion Body Syndrome (EIBS)
Viral Hemorrhagic Septicemia (VHS)
Infectious Hematopoietic Necrosis (IHN)
Infectious Pancreatic Necrosis (IPN)

Monthly:

10 fish are sampled for:
Virus (EIBS only)
Bacterial Diseases
Parasites
Anything unusual

At Release:

60 fish are sampled (3 fish pools) for:
Virus
Bacterial Diseases
Parasites
200 sampled by organosomatic indexing

Preventative Measures

Post-Spawning Disinfection:

Wash all pond walls and scrub pond bottoms.
Add 6-7 100-pound drums of HTH to filterbeds at the 78" pipeline.
Circulate water in ponds for 24 hours.
Pump water to lagoon and allow to dissipate before release to the Columbia.

Post-Release Disinfection:

Wash all pond walls and scrub pond bottoms.
Clean channels.
In June remove brush from springs and disinfect with HTH using tractor's pump. Divert water to settling basin for neutralization.
Disinfect filterbeds for ICH with 4 55-gallon barrels of formalin; filterbeds should be filled with warm well water (65 °F); allow formalin to circulate for 2-3 hours, then let stand for 5-10 days; drain formalin to lagoon and leave to break down before releasing water to the Columbia River.

In General:

Clean ponds when algae growth builds up.
Pick mortalities daily to prevent the spread of a disease.
Disinfect nets and brushes in Roccal.
Disinfect marking trailer or vehicles from other hatcheries before they come on this hatchery. For disinfecting distribution trucks use 1/2 ounce (dry weight) of HTH (70% available chlorine) per 25 gallons of water for 30 minutes. When using water with a pH higher than 6.0, add 1 fluid ounce of glacial acetic acid per 100 gallons of water.

Treatments

Yersina ruckeri--occasionally Enteric Redmouth disease outbreaks occur at the hatchery. Oxytetracycline is administered in a medicated feed at a rate of 1.75-2.75 grams per pound of feed for 10 days.

Ichthyophthiriasis (ICH)--formalin is injected into the water system at a very low concentration (10-20 ppm) to knock down the protozoan population. Treatments of 55 gallons of formalin are administered three days in one week to the filterbeds and repeated the next week. The intent is not to completely kill the organism as this would result in killing the nitrifying bacteria in the reuse system.

Big White Substation

Ponded Fry and Fingerlings

At Ponding:

Sixty fish are sampled for virus (3 fish pools)
Erythrocytic Inclusion Body Syndrome (EIBS)
Viral Hemorrhagic Septicemia (VHS)
Infectious Hematopoietic Necrosis (IHN)
Infectious Pancreatic Necrosis (IPN)

Monthly:

Ten juvenile fish are sampled for:
Virus (EIBS only)
Bacterial Diseases
Parasites
Anything unusual

At Release:

Sixty juvenile fish are sampled (3 fish pools) for:

Virus
Bacterial Diseases
Parasites

Preventative Measures

Post-Release Disinfection:

No disinfection due to poor condition of ponds (small fish can escape between ponds).

In General:

Clean ponds weekly.
Pick mortalities daily to prevent the spread of disease.
Disinfect marking trailer or vehicles from other hatcheries before they come on the property.

Treatments

Renibacterium salmoninarum--due to high outbreaks of BKD in the summer, erythromycin is administered in medicated feed following the protocols of INAD 4333. Fish are fed erythromycin at a concentration of 100 mg/kg of feed for 21 days. ELISA samples for BKD on 60 fish are taken before and after feeding the medication.

External parasites--during periods of high mortalities due to the presence of external parasites, fish health biologists may recommend treating the fish with formalin. A concentration of 1:5000 is used and the formalin is siphoned from a 55-gallon drum set up at the head of the raceway. This flow through treatment is done without reducing the raceway flow. A typical treatment would be 23-24 gallons of formalin with enough water added to fill the 55-gallon drum and siphoned over an hour long period.

F. FISH RELEASE

Six Weeks Prior to Release

Inform Fish Health of upcoming release date so they can plan their sampling schedule.

Week Before Release

Place smolt release tube in first ladder step and secure.
Inform public of release dates.

Day Before Release

Get list of pond numbers from computer for that release.
Mark ponds that will be released with engineering tape.
Put long extension bar and chain on Baker forklift. Check and fill propane tanks.
Use forklift to place one adult crowder in channel by Pond 1. Check propane tanks on crowder and test run.
Feed fish in release ponds one-half their daily feed in the morning. After the last morning feed, pull all walkways from the end furthest from the channel.
Remove metal covers from channel over the road (between north and south banks of ponds), and block access with vehicles.
Remove channel walkways.
Lift bird cage.
Check river level.
Track down and set out the following near the pond to be released first (i.e. Pond 44, 1 or 27):

-- 3 Pond Seines, check for holes and repair (pump room)
-- 1 Channel Seine, check for holes and repair (pump room)
-- 1 Wood-Framed Channel Crowder (pump room)
-- 1 Aluminum Pond Crowder with Center Wall Collar
-- 1 Extended C-Clamp
-- 1 Aluminum Brace
-- 1 Metal-Framed Damboard Puller, the smaller one
-- 1 Smolt Screen, for channel under road
-- 3 Aluminum Channel Dam Boards
-- 1 Metal-Framed Channel Crowder, for Ponds 21-27
-- 1 Smolt Diverter, place on adult fish crowder
-- 1 Bucket of Wedges and Hammer

-- 2 Buckets of Wet Sawdust, set up the day before
-- 1 Pickaroon
-- Shotgun and Noise Crackers
-- Several walkways

Release Jobs

6 People on Seines	1 Person on Valves
1 Person in Waders in Pond	1 Person on Forklift
1 Person on Crowder	(1 Person in Waders for Ponds 21-27)

Release Ponds 28-44

Make sure walkways are on hand at pond for personnel to use instead of jumping the channel.
Turn on channel water valve in spawning room to red pencil mark.
Place smolt screen in channel crossing the road.
Move fish crowder to first pond to be released.
Wedge wooden framed screen in channel behind fish crowder.
Remove metal walkway and wooden pond screen from damboard.
Move forklift into position and attach hook to aluminum damboard.
Shut off pond valve #2.
Shut off pond valve #1 while collared pond screen is put in place and secured with C-clamp and brace.
Turn pond valve #1 on again.
Pond seines go in the right side of pond, the "crooked leg" seine pole is used on the middle wall, under the walkway. Keep seine poles as close to wall as possible.
Shut off pond valve #1 as the seines approach the far intake.
As the third seine gets to the left side of the pond, the damboard is lifted slightly.
As the first seine reaches the mid-way point the damboard is lifted out.
After the third seine is out of the pond, the damboard is replaced as quickly as possible. The third seine should remain as close to the pond opening as possible.
Move the crowder down to the next pond as soon as possible, following seine #3 closely.
If possible, seal the ponds with sawdust as soon as they fill.
Move the forklift, fish crowder, pond screen, clamp and brace to the next pond to be released.
The seiners should move the fish down the channel past several ponds, as needed. Care should be taken to move fish down the channel only when there is sufficient water present. If the fish ball up, remove the seines. If necessary, don't move on to the next pond until channel is flushed.
Maintenance should be asked about valve settings after a pond has been emptied, in order to maintain the correct flow and water level in the aeration tower.
A short screen needs to be put in the channel to block stragglers from getting in spawning building.
After all ponds on the south bank have been released, flush ponds and seine stragglers out of the channel and place an aluminum channel damboard at the end of the channel. Shut off water valve in spawning room and move equipment to the north bank of ponds.

Release Ponds 1-20

Place smolt diverter screen on adult fish crowder; move crowder to pond 6 or 7.
Wedge small wooden channel screen in channel, directly behind pond 1's damboard.
Turn on channel water valve, near valves at pond 1.
Seining procedure is the same as ponds 28-44, except for using the damboard puller instead of the forklift.
After pond 1 has been released, move adult fish crowder into place.
After ponds 1-20 have been released, crowd and flush out stragglers and put aluminum damboard in channel at end of pond 20.
Adjust channel water valve (near pond 1) to provide sufficient water for stragglers in channel.

Release Ponds 21-27

Procedure is the same as before, except for using an aluminum channel screen with tension lock instead of adult fish crowder. One person will have to get in the channel with the screen to move it down the channel as the ponds are released.
Start at pond 27. There are no water valves for channel here. Shut mud valve in pit and turn off valve #2 and open valve #3 to run water from pond 27 to the channel.
After releasing ponds 21-27, seine and flush out stragglers from channel and put in aluminum damboard in channel at the end of pond 21.
Turn off valve #3 and open valve #2 in pond 27.

Aftermath

Use the buckets of wet sawdust to plug leaks in the aluminum damboards of ponds that have been released.
Check with maintenance crew as to which valves should be open or closed and check to make sure they are in the right position.
Check, clean and repair equipment for damage; put away.
Replace channel covers on road the next day.

Safety

Releasing fish is probably the most dangerous task at Spring Creek. Nearly all personnel are required for the task in a small working space. Narrow pond walls, rapid water flow, and a great deal of equipment make this procedure very hazardous. Personnel must be alert for themselves and others at all times. Awareness is the key to a safe release.

Hazards are:
1. Jumping across channels--don't do it!
2. Moving seines through pond openings.
3. Moving forklift to hook up damboards.
4. Moving adult fish crowder.
5. Replacing damboards.

G. BIG WHITE SUBSTATION

Big White Substation (Big White) Facilities

Location: The Big White substation is located approximately two miles upstream from the confluence of the White Salmon River and the Columbia River. The confluence is one mile upstream from Spring Creek.

Rearing Conditions:

2 Ponds:	10' wide x 250' long x 4' deep Designed originally to hold adult salmon and can be modified into one pond
Intake:	Located 1/4 mile upstream, piped to ponds
Water Source:	White Salmon River
Water Flow:	30 CFS
Water Temperatures:	Winter = 33-40°F Spring/Fall = 46-53°F Summer = 50-60°F

Operational Concerns:
Intake needs occasional cleaning due to fall leaves, salmon carcasses and fallen limbs.
High water fluctuations can occur due to uneven discharge from Condit Dam, located upstream from Big White. High flows can flood the ponds, low flows can leave the ponds without water. Good communication with dam operators is necessary to prevent loss of fish. Dam operators have been instructed to call when water flow is interrupted.
Silt content is high during spring run-off.
Animal predation may be a problem, especially during the winter.
Due to the age and condition of the ponds, and the isolated location, a lone caretaker must be particularly aware of safety precautions at the site.

Big White Fish-Rearing Program

Program purpose: Big White is a grow-out facility for approximately 500,000 spring chinook salmon spawned at the Little White Salmon (LWS) and Carson National Fish Hatcheries.

Program:
In mid-January, 1/2 million fry are shipped from LWS and/or Carson and ponded in the river-side pond.
Fry are raised in river-side pond; feed is administered by hand or via automatic feeders.
In mid-April, the previous year's 1-age fish are released into the White Salmon River.
Once the bank-side pond is empty, 150,000-160,000 fry are split into it from the river-side pond.
- Fish culture continues: feeding as before, mortalities picked daily and cleaning done weekly.

In August, 25,000 fish from each pond are right or left ventral clipped.
In mid-August, all fish from the river-side pond (approx. 350,000), are released into the White Salmon River, leaving 150,000 fish in the bank-side pond to overwinter and be released as 1-age fish in mid-April of the next year.

Cooperative Agreement

A cooperative agreement exists between the U.S. Fish and Wildlife Service and the White Salmon Steelheaders Club. Club members feed the fish on the weekends, and during the month of September when hatchery staff is involved in spawning.

H. SAMPLING PROCEDURES

Eggs

Upon egg eye-up, start shocking, wait 24 hours before salting and wait an additional 24 hours before traying. This time frame allows dead eggs to be identified easily, insures a cleaner environment for eggs, and minimizes inventory loss between eye-up and hatching.

Put salt loss in fresh water for 3 hours or overnight before weighing. Drain salt loss basket for 20 minutes. Weigh basket with salt loss on platform scale, weigh empty basket after loss has been discarded, and subtract from original weight. Total weight of salt loss times sample (see below) equals total eggs lost in salting for Take.

$$\frac{\#\ \text{Eggs}}{\text{WT of sample}} \pm \text{Eggs per pound}$$

$$\frac{4000\ \text{Eggs}}{\text{eggs/lbs}} \pm \text{WT per Tray}$$

Takes of 1,000,000 or less = 2 samples or trays
Takes of 1 to 2,000,000 = 3 samples or trays
Takes of 3 to 4,000,000 = 4 samples or trays
Takes of 4 to 5,000,000 = 5 samples or trays
Takes of 5 to 6,000,000 = 6 samples or trays

Average weight of samples and start trays down using this figure.
Pick off dead or blanks before putting trays in stacks.
After completing tray-down, between 2 to 4 weeks later, pick all stacks and record loss per stack as 2ne pick off. Clean tray lids and bottom of tray if necessary.
After hatching perform 3rd pick off, recording in the same manner.
After the 3rd pick off subtract losses from the original number and use it for ponding numbers.

Fry Sampling

When fry have "buttoned up" and are ready to be ponded, set up ponding/picking trough. Individuals will each start a stack, remove and count the crippled fry and dead eggs. The total pick off will be subtracted from the pond inventory and become the fry ponded number. In the mid-stack of each individual stack for the pond a spoonful or two of fry will be removed, weighed, and counted. Samples will be minimum of 0.75 lbs in size. Each pond will be sampled once.

Pond Fry Sampling

Fish should first be sampled 1 month after ponding.
Sample bi-weekly 15th and EOM, or as close today as possible. Use sample trailer and digital scale, use lb scale.
Use calibrated square tub on end of pond - three buckets of water.
Fish are dipped into the tub; minimum of 3 dip nets full of fish. Four or five dips from different areas of pond is best. While netting, close mouth of net to keep larger fish from escaping.
Use a small net or metal strainer for sample.
Kick sides of tub to homogenize fish.
Place net or strainer on bottom of square tub and lift straight up catching all the strata fish. Allow 15 seconds drain time before weighing on a tared digital scale. Record weight, count fish, and record numbers.
Size of sample will be dependent on the size of the fish. The larger the fish the heavier the sample.

Sample size: 1-2 lbs > 500 FPP
2-3 lbs > 250 FPP
3 lbs < 250 FPP

Split Ponds Sampling

Allow pond to be crowded.
Fill tub with water to lower line.
Use long handled sample net to get five nets full. One from each corner and middle. Homogenize fish in tub and place short handled net to bottom of tub and lift straight up. Allow 15 seconds to drain and weigh, count fish and calculate number per pound and pounds of fish to be split to another pond.

Special Studies

The hatchery will attempt to complete special study sampling according to study protocals.

VI. MAINTENANCE PROCEDURAL STANDARDS

A. OPERATIONAL PROCEDURES

1. Setting Up Hatchery For Adult Return

Set up filterbeds for water in the second or third week of August:
- Close all drain valves in pipe galley.
- Open all inlet water gates.
- Close all outlet water gates.
- Check backwash panel:
  - all air lines closed;
  - all filtered water lines open.
- If no water is needed at lagoon, open valve to river at lagoon waste water pit.
- Turn all waste water pump controls to "off" in chlorination building.

Set up Ponds 1-27:
- Close all valves 1's, 2's, and 3's:
  - be sure they are tight and do not leak too much;
  - seal any leakage as well as possible.
- Install south dam board in channel on filterbeds. This will save water that leaks and will go to lift pumps located in front of the mechanical building.

Set up Ponds 28-44:
(Two ways to set them up).
- Method 1:
  - close all #1 and #3 valves and open #2's;
  - as the filterbeds fill, the water will back up the 78" line and into the ponds.
  - Note: This method takes longer to fill the filterbeds, but is faster when filling ponds.
- Method 2:
  - close all three valves on ponds;
  - let the filterbeds fill by themselves.

To fill filterbeds:
- Start one or two spring water pumps to the aerator tower.
- To balance the spring water:
  - adjust the valves above spring water pumps in mechanical building just before lines enter aerator tower;
  - watch spring water pit (SWPit) go up or down and adjust accordingly;
  - after adjusting SWpit, check the spring water box between ponds #20 and #21;
  - adjust so there is just a trickle over the dam in the spring water box (this is just right).
- Filterbeds will fill overnight with water that has:
  - overflowed to the aerator tower,
  - gone through the aerator pit,
  - gone through the bottom of the filterbeds, and
  - flowed up to the top of the filterbed outlet water gates.
- Dam boards are shorter in filterbeds #1 and #2, which allows the excess water to flow to the waste channel through these two filterbeds.

Meanwhile (Spring water is being pumped to aerator tower and ponds are empty):
- Pull planting pipe and store.
- Install cover over planting pipe that remains in ladder.
- Set up ladder.
- Close gate valve on the end of the 78" line in S.E. corner of annex.
- Fish crew is:
  - removing every other small fitting from header in ponds to increase flow in ponds 28-44,
  - setting up jump boards, and
  - installing counting shed.

To fill ponds 28-44 (Filterbeds are full):
- Start one small (100 hp) aerator pump--this will put about 4,000 gpm in aerator tower;
- Close all #2 valves;
- Start on pond #44 or #38 and open #1 valves on three ponds.
- When the three ponds are full (about 25-30 minutes):
  - open their #2 valves;
  - open 2 or 3 more #1 valves on the next ponds.

Repeat until all 17 ponds are full and all #2 valves are open.
Be sure all #3 valves are closed as tight as possible (without breaking anything).

While filling ponds:
Check aerator tower for overflow after 7 or 8 ponds are full.
Start additional pumps as needed.
Go from a small 100 hp to a large 150 hp, turning off the 100 hp pump once the larger one has started.
When the demand is more than the 150 hp will handle:
start a 100 hp pump and continue as before until two 150 hp pumps are running.
Two 150 hp pumps will run the 17 ponds wide open.
If 2 large aerator pumps are started be sure selector switch in gray panel is turned to emergency power instead of commercial power.

Once Ponds Are Full:
If the water level in ponds is too high or too low:
Adjust 78" line valve to raise or lower ponds to desired level, about 27-30% open.
Management decides on the pond level.
Seal pond gates:
open mud valve by pond #44;
seal gates with sawdust to stop all leakage possible;
close mud valve.
Ponds 1-27:
open mud valves by ponds 1 and 27;
try to keep ponds not in use dry;
if ponds leak:
check and tightly close all #2 valves,
if still leaking, open #3 valve on leaking pond.

Start Ladder (For the two ponds fish will go in first):
pull dam boards;
install fish weirs;
close #2 valves.
This will run about 2,000 gpm to ladder.
Remember there is a limited amount of water--DO NOT WASTE MORE THAN IS NEEDED TO RUN THE LADDER!

2. Incubation Building
Start on approximately September 10-12

Preparations before starting water to incubation building:
Open valves in spring water pit on pumps not running to let gravity flow water into deaerator pit.
By spring water box, between raceways #20 and 21:
-open valve in roadway;
-close large valve in box under cover marked "gravity feed to hatchery."
Open drain valve at east end of main incubation room (under gripstrut).
In Southwest end of the annex:
close the gate valve to the 78" line (this should already be closed);
open lines to the river.

Start water to incubation building:
Start one large deaerator pump (#3 or 4):
Selector switch in gray cabinet by deaerator pumps should be turned to emergency power instead of commercial power.
This large pump will:
pump about 1250 gpm to deaerator tower,
fill tower and run through the hatchery building,
flow out drain line in Hatchery Building and flush out the lines.
At the same time, turn off a spring water pump. With a deaerator pump running and 2 spring water pumps running the spring water will be depleted fairly rapidly.
Check spring water pit and adjust to desired level (adjustment is described in Section 1 under "to Fill Filterbeds").

Start incubators:
Start in main Hatchery Building first! (One large deaerator pump will run the whole hatchery at 3 gpm per incubator).
Flush out lines.
Remember! There is a limited amount of water; with the ladder running conserve as much water as possible.
To recirculate incubation water:
open valve on end of 78" line in incubation building; close lines to river.

Adjusting water at incubator start-up:

Open and adjust all needed incubators.
Start closing drainline to back water up in deaerator tower, this will take some time.
Adjust drain line until flow meter in tool room of mechanical building reads approximately 1150 gpm.
This will make some overflow in the deaerator tower.
Once adjustments are made, the incubators are ready for eggs.

Adjusting water for maximum capacity:

Two deaerator pumps are running.
Adjust to approximately 1800 gpm on flow meter:
Use two people:
one to open or close drain valve;
one to watch flow meter.
Use a telephone to communicate.

Increasing temperature in incubation building:

Close valve from well to the deaerator pit.
Open valve to filterbeds.
Start well:
set laser control on about #5;
let well run to filterbeds for about 30 minutes to flush out lines;
flow meter will read high, probably 1,000 gpm, but will start to fall as static level in well falls.
Open valve to the deaerator pit.
At this time:
lines and well water should be clean,
flow meter should be reading about 500 gpm.
Open pet-cock on top of well line at the deaerator pit to let out air.
Start closing valve to filterbeds; close until there is just a little water leaking to filterbeds--DO NOT CLOSE COMPLETELY!
Close pet-cock.
Monitor temperature gauge in mechanical building until desired temperature is reached:
If temperature is too high:
turn laser control down to adjust gpm on flow meter.
If temperature is too low:
turn laser control up to adjust gpm on flow meter.
Adjust spring water as before. When well water is added to the deaerator pit it will raise the level of the spring water pit also. Spring water will have to be conserved. Adjustments should hold through spawning time.

To evacuate water from the system when spawning is over:

install dam boards in ponds with fish traps in them;
open mud valve by pond #44 to run all leaking water away from the ladder;
pull the ladder;
turn off spring water pumps (usually one);
close valve on 78" line in hatchery;
open valves to river;
evacuate system.

3. Filterbeds/Backwashing

Development of operational procedures in progress.

5. Alarm System

Development of operation procedures in progress.

B. MAINTENANCE PROCEDURES

1. Pumps and Motors

Daily Pump and Motor Maintenance:
- Feel for vibrations.
- Check bearings for heat.
- Listen for strange or different noises:
  - If bearings are noisy, grease (see below).
- Check lubrication oil sight glass (if present).

Annual Pump and Motor Maintenance:
- Check packing around shaft for excessive leakage:
  - Tighten packing if needed. It should leak about 16 drops per minute with pump running.
  - Re-pack when all adjustment is out of packing gland:
    - (On most vertical pumps):
      - remove packing gland;
      - use a packing puller to remove first three rings of packing;
      - remove brass sleeve with (2) threaded sleeve removers (sleeves are stubborn sometimes and some lubrication helps);
      - remove the remaining 2 or 3 rings. Normally there are 6 rings of packing, but it is common to find only 5.
- Grease bearings (Remember! Over-greasing can cause more harm than not greasing enough):
  - Pull plugs.
  - Give 4 shots of a good quality grease.
  - Repeat if bearing noise has not stopped.
  - Once noise has stopped leave plugs out for 2 hours and recheck.
  - If bearing noise has stopped after 2 hours, re-install plugs. This method of greasing is not in the manual, but is most effective.
- Change oil in oil bath bearings. Use turbine oil only.
- Wipe down inside pumps with safety solvent.

Periodic Pump and Motor Maintenance:
- Outside pumps and motors:
  - wipe down with safety solvent (test the solvent first for paint and rubber damage);
  - paint as needed for good appearance.
- Inside pumps:
  - paint every 7 or 8 years, or as needed.
- Main water pumps:
  - keep numbers clear and in place.
- Aerator, deaerator and spring water pumps:
  - visually inspect impellers for tightness and wear;
  - adjust impeller as necessary;
  - take amperage reading on all three phases (check amp rating plate on motor); check for balance and load;
  - clean sight glass.

Periodic Pump and Motor Maintenance (cont.)
- Check for oil leaks:
  - at sight glass,
  - at plugs,
  - around shaft, and
  - under lower bearing.
- Use Megger on all lines.

Pulling Pumps and Motors:
- When necessary pull pumps and motors to rebuild:
  - Large (50, 100 or 150 hp) and hard to reach units must be pulled by a commercial crane.
  - Small and easily accessible pumps can be pulled with station equipment.
- Ensure that company rebuilding the unit knows what work is expected:
  - Pumps:
    - check suction bells, impeller(s), bowls, bearings, shafting, discharge bowl and stuffing boxes;
    - clean piping and housing.
  - Motors:
    - check fields for leakage; check bearings and shaft end bells; revarnish.

Check on transportation costs-sometimes the lowest bid is not the best.
Subsequent painting of pumps and motors before installation to be done by maintenance staff.

Refer to the manuals when necessary.

2. Heat Pumps

Daily (on heat pumps that are running):
visually check oil level in sight glass;
check condenser and cooler pressure;
enter data in log (will help determine changes in heat pump operation):
oil pressure,
oil temperature, and
amperage.

Annually:
Change oil and oil filter.
Change filters in capillary tubes.
Pressurize unit with dry nitrogen to 1 to 2 psi (any leak or open line forces freon gas out instead of sucking oxygen into unit).
After oil and freon filters have been changed:
pressurize unit with dry nitrogen to about 10 psi;
test for leaks;
if there are no leaks, evacuate nitrogen to 0 psi;
hook up vacuum pump to unit and run until there is about 1 inch of vacuum on unit;
seal up unit;
run unit.

During the Summer:
Evaporator Tubes:
there are about 480 copper evaporator tubes;
remove end bells and clean with a brush;
remove end drain plugs, water and grime will leak out.

Heat Exchangers:
heat exchanger tubes are stainless steel;
pull drain plug;
pull off end caps;
clean tubes with a wire brush;
using a new gasket, install end cap.

3. Spawning Equipment

Development of maintenance procedures in progress.

4. Building Heating and Cooling Systems

Development of maintenance procedures in progress.

5. Standby Generator

Development of maintenance procedures in progress.

6. Electrical Equipment

Development of maintenance procedures in progress.

7. Rotary Compressors

Development of maintenance procedures in progress.

8. Domestic Water System

Development of maintenance procedures in progress.

9. Air Compressors

Development of maintenance procedures in progress.

10. Paint Inventory

Development of paint inventory in progress.

VII. HATCHERY SAFETY STANDARDS

Station Safety Plan

A station safety plan is updated annually and posted in every building. Included in the document:

Emergency Action Directory--includes all pertinent telephone numbers for emergency services.
Fire Extinguisher Inventory--a complete listing of all fire extinguisher locations.
First Aid Equipment Inventory--a complete listing of all first aid kit locations.
Locations of other safety equipment, including safety goggles, face masks, gas masks and protective clothing.
Station Action Fire Plan--includes plans in the eventuality of a fire, search and rescue operation, or damage or injury to property or personnel.
Directives for:
- a two day response to employee safety hazard reports.
- Material Safety Data Sheets (MSDS's) are to be posted for all chemicals used on the station.
- Job Hazard Analysis (JHA) written for each job will be critiqued quarterly.
- an inspection of hatchery grounds for safety hazards will be performed quarterly.
- training for key personnel in health and safety monitoring will be available annually.
- maintenance of a log of occupational injuries and illnesses.
- an annual summary of injuries, which will be posted and retained 5 years.

Station Safety Officer

A station safety officer is appointed from within the hatchery staff and is responsible for:
- updating the hatchery crew on Regional safety issues
- informing the crew of reported or observed safety hazards
- conducting quarterly safety meetings where safety films are viewed and discussed, and new safety issues are brought up and discussed by the crew
- posting MSDS's and writing JHA's for all jobs
- inspecting safety equipment and purchasing replacement parts or new equipment
- writing and submitting accident reports
- maintaining a log of occupational injuries and illnesses
- inspecting fire extinguishers
- organizing safety training for personnel as needed
- annual hatchery safety inspection
- writing and/or editing station safety plans and reports
- installs and submits radon monitoring equipment for analysis
- other duties as necessary.

Hatchery Crew

The hatchery crew is responsible for:
- reporting hazardous working conditions or faulty equipment
- participating in quarterly safety meetings
- adhering to safety guidelines written in the station safety plan
- not risking personal injury.

Attachment 5. List of Listed and Proposed Endangered and Threatened Species, Candidate Species, and Species of Concern Which May Occur within the Vicinity of the Proposed Master Plan Improvements – Spring Creek NFH dated 8/11/1998.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
North Pacific Coast Ecoregion
Western Washington Office
510 Desmond Drive SE, Suite 102
Lacey, Washington 98503
Phone: (360) 753-9440 Fax: (360) 753-9008

August 11, 1998

Michelle Wilson
PALSA, L.L.C.
522 SW 5th Avenue, Suite 1003
Portland, OR 97204

FWS Reference: 1-3-98-SP-0416

Dear Ms. Wilson:

This is in response to your letter dated August 3, 1998, and received in this office on August 3, 1998. You have requested a list of listed and proposed threatened and endangered species, candidate species, and species of concern (Attachment A) that may be present within the area of the proposed Master Plan Improvements - Spring Creek National Fish Hatchery Recreational Site Project in Skamania County, Washington. This response fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act of 1973, as amended (Act). We have also enclosed a copy of the requirements for Army Corps of Engineers (COE) compliance under the Act (Attachment B).

Should the COE determine that a listed species is likely to be affected (adversely or beneficially) by the project, you should request section 7 consultation through this office. If the COE determines that the proposed action is "not likely to adversely affect" a listed species, you should request Service concurrence with that determination through the informal consultation process. Even if there is a "no effect" situation, we would appreciate receiving a copy for our information.

Candidate species are included simply as advance notice to Federal agencies of species which may be proposed and listed in the future. Species of concern are those species whose conservation standing is of concern to the Service, but for which further status information is still needed. Conservation measures for candidate species and species of concern are voluntary, but recommended. Protection provided to these species now may preclude possible listing in the future.

There may be other Federally listed species that may occur in the vicinity of your project which are under the jurisdiction of the National Marine Fisheries Service (NMFS). Please contact NMFS at (360) 753-9530 to request a species list.

In addition, please be advised that state regulations may require permits in areas where wetlands are identified. You should contact the Portland District of the U.S. Army Corps of Engineers for Federal permit requirements and the Washington State Department of Ecology for State permit requirements.

Your interest in endangered species is appreciated. If you have additional questions regarding your responsibilities under the Act, please contact Bobbi Barrera at (360) 753-6048, or John Grettenberger of this office, at the letterhead phone/address.

Sincerely,

James L. Michaels
for

Nancy J. Gloman
Acting Supervisor

BB/jko
Enclosures
SE/COE/1-3-98-SP-0416/Skamania
c: COE, Portland
WDFW, Region 5
WNHP, Olympia
FWS, Spring Creek NFH ✓

ATTACHMENT A X

LISTED AND PROPOSED ENDANGERED AND THREATENED SPECIES, CANDIDATE SPECIES AND SPECIES OF CONCERN WHICH MAY OCCUR WITHIN THE VICINITY OF THE PROPOSED MASTER PLAN IMPROVEMENTS - SPRING CREEK NATIONAL FISH HATCHERY RECREATION SITE PROJECT IN SKAMANIA COUNTY, WASHINGTON (T03N R10E S28)

FWS REF: 1-3-98-SP-0416

LISTED

Bald eagle (*Haliaeetus leucocephalus*) - Wintering bald eagles may occur in the vicinity of the project from about October 31 through March 31.

Bull trout (*Salvelinus confluentus*) - Columbia river population may occur in the vicinity of the project.

Peregrine falcon (*Falco peregrinus*) -spring and fall migrant peregrine falcon may occur in the vicinity of the project.

Major concerns that should be addressed in your Biological Assessment of the project impacts to listed species are:

1. Level of use of the project area by listed species.

2. Effect of the project on listed species' primary food stocks, prey species, and foraging areas in all areas influenced by the project.

3. Impacts from project construction (i.e., habitat loss, increased noise levels, increased human activity) which may result in disturbance to listed species and/or their avoidance of the project area.

PROPOSED

None

CANDIDATE

The following candidate species may occur in the vicinity of the project:

Oregon spotted frog (*Rana pretiosa*)

SPECIES OF CONCERN

The following species of concern may occur in the vicinity of the project:

Long-eared myotis (*Myotis evotis*)
Long-legged myotis (*Myotis volans*)
Pacific lamprey (*Lampetra tridentata*)
Pacific Townsend's big-eared bat (*Corynorhinus townsendii townsendii*)
River lamprey (*Lampetra ayresi*)

ENT B

FEDERAL AGENCIES' RESPONSIBILITIES UNDER SECTIONS 7(a) AND 7(c) OF THE ENDANGERED SPECIES ACT OF 1973, AS AMENDED

ECTION 7(a) - Consultation/Conference

Requires:

1. Federal agencies to utilize their authorities to carry out programs to conserve endangered threatened species;

2. Consultation with FWS when a federal action may affect a listed endangered or threate species to ensure that any action authorized, funded, or carried out by a federal agency is likely to jeopardize the continued existence of listed species or result in the destructio adverse modification of critical habitat. The process is initiated by the federal agency aft has determined if its action may affect (adversely or beneficially) a listed species; and

3. Conference with FWS when a federal action is likely to jeopardize the continued existenc a proposed species or result in destruction or an adverse modification of proposed crit habitat.

SECTION 7(c) - Biological Assessment for Construction Projects *

Requires federal agencies or their designees to prepare a Biological Assessment (BA) for construction proj only. The purpose of the BA is to identify any proposed and/or listed species which is/are likely to be affecte a construction project. The process is initiated by a federal agency in requesting a list of proposed and li hreatened and endangered species (list attached). The BA should be completed within 180 days after tiation (or within such a time period as is mutually agreeable). If the BA is not initiated within 90 day receipt of the species list, please verify the accuracy of the list with our Service. No irreversible commitmen resources is to be made during the BA process which would result in violation of the requirements under Sec 7(a) of the Act. Planning, design, and administrative actions may be taken; however, no construction may be

To complete the BA, your agency or its designee should: (1) conduct an onsite inspection of the area to affected by the proposal, which may include a detailed survey of the area to determine if the species is pre and whether suitable habitat exists for either expanding the existing population or potential reintroduction of species; (2) review literature and scientific data to determine species distribution, habitat needs, and o biological requirements; (3) interview experts including those within the FWS, National Marine Fisheries Serv state conservation department, universities, and others who may have data not yet published in scien literature; (4) review and analyze the effects of the proposal on the species in terms of individuals populations, including consideration of cumulative effects of the proposal on the species and its habitat; analyze alternative actions that may provide conservation measures; and (6) prepare a report documenting results, including a discussion of study methods used, any problems encountered, and other relevant informat Upon completion, the report should be forwarded to our Endangered Species Division, 510 Desmond Drive Suite 102, Lacey, WA 98503-1273.

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* "Construction project" means any major federal action which significantly affects the quality of the hu environment (requiring an EIS), designed primarily to result in the building or erection of human-made struct such as dams, buildings, roads, pipelines, channels, and the like. This includes federal action such as perm nts, licenses, or other forms of federal authorization or approval which may result in construction.

Attachment 6. Fall Chinook Salmon Spawning and Distribution from the Big White and Spring Creek Stations during Brood Years 1901-1937.

FALL CHINOOK SALMON SPAWNING AND DISTRIBUTION FROM THE BIG WHITE AND SPRING CREEK STATIONS DURING BROOD YEARS 1901 TO 1937 PRE-BONNEVILLE DAM CONSTRUCTION

BROOD YEAR	BIG WHITE EGGS	SPRING CREEK EGGS	TOTAL	EGGS SHIPPED	UNFED & PRE-SMOLT FRY*	LOCATION	FINGERLINGS	LOCATION	TOTAL RELEASED
[redacted]									
1901					691,000	BW			691,000
1902	3,415,000				234,000	BW			2,258,390
					2,024,390	SC			
1903					1,866,000	BW			4,676,690
					2,810,690	SC			
1904				2,219,000	1,208,200	BW			5,950,800
					4,742,600	SC			
1905					1,928,214	SC			1,928,214
1906	7,714,000				6,678,415	BW			6,878,415
					200,000	SC			
1907	245,000	163,000	4,080,000		500,000	BW			2,169,000
					1,669,000	SC			
1908			5,654,000		4,304,184	SC	387,337	BW	5,282,325
							590,804	SC	
1909			3,739,000						0
1910			1,933,000						0
[redacted]11			6,681,000		1,350,000	BW			6,280,600
					4,930,600	SC			
1912			15,261,000		2950,000	BW			13,526,400
					10,576,40	SC			
					0				
1913			10,046,000		2,837,000	BW	477,948	BW	14,905,448
					11,500,50	SC	90,000	SC	
					0				
1914			11,908,000		2,274,500	BW	6,010,700	SC	14,713,500
					6,428,300	SC			
1915			13,209,000		2,490,861	BW	598,465	BW	19,746,110
					8,931,784	SC	8,025,000	SC	
1916			4,322,000		1,597,958	SC	387,290	BW	4,878,248
					2,713,000	BW	18,000	SC	
1917			15,051,000		1,100,000	BW	376,000	BW	18,960,357
							14,100,357	SC	
1918			10,687,700		2,000,000	BW	600,000	BW	9,102,000
							6,502,000	SC	
1919			16,042,000						0
[redacted]20			5,005,000				6,564,000	SC	6,564,000
1921			12,025,000				12,000,000	SC	12,000,000
1922			6,237,000				6,000,000	SC	600,000

* - PRE SMOLT FRY THOSE BETWEEN 500 TO 800 PER LB.

FALL CHINOOK SALMON SPAWNING AND DISTRIBUTION FROM THE BIG WHITE AND SPRING CREEK STATIONS DURING BROOD YEARS 1901 TO 1937 PRE-BONNEVILLE DAM CONSTRUCTION

BROOD YEAR	BIG WHITE EGGS	SPRING CREEK EGGS	TOTAL	EGGS SHIPPED	UNFED & PRE-SMOLT FRY*	LOCATION	FINGERLINGS	LOCATION	TOTAL RELEASED
1923			7,020,500						0
1924	7,420,000	7,000,000	14,420,000				9,138,800	SC	9138,800
1925	5,250,000	7,000,000	12,500,000						0
1926	7,040,000	6,138,000	13,178,000	2,941,000			7,781,000	SC	7,781,000
1927	14,703,000	5,088,000	19,791,000	8,523,000			7,959,000	SC	7,959,000
1928	11,216,000	4,356,000	15,572,000	6,886,000			7,860,000	SC	7,860,000
1929	4,389,000	1,456,000	5,845,000				5,000,000	SC	5,000,000
1930	8,050,000	4,087,000	12,137,000				1,620,000 6,700,000	BW SC	8,320,000
1931	11,433,000	6,881,000	18,314,000	8,934,000	450,000	?	7,764,000	?	8,214,000
1932	10,025,000	7,872,000	17,897,000	6,174,000	2,405,000	?	7,927,000	?	10,332,000
1933	5,060,000	3,166,000	8,226,000	2,000,000			1,250,000 3,858,000	BW SC	5,108,000
1934	3,900,000	1,450,000	5,350,000	202,860	1,000,000	BW	400,000 3,708,000	BW SC	5,108,000
1935	13,340,000	3,925,000	17,265,000	4,484,000			10,161,225	?	10,161,225
1936	15,310,000	2,155,000	17,465,000	7,200,000			8,051,200	?	8,051,200
1937	6,825,000	2,950,000	9,775,000	25,000	4,570,000	BW	1,662,000 2,750,000	BW SC	8,982,000

* - PRE SMOLT FRY THOSE BETWEEN 500 TO 800 PER LB.

Attachment 7. Fall Chinook Salmon Spawning and Distribution from the Big White and Spring Creek Stations during Brood Years 1938-1970.

FALL CHINOOK SALMON SPAWNING AND DISTRIBUTION FROM THE BIG WHITE AND SPRING CREEK STATIONS DURING BROOD YEARS 1938 - 1970 POST-BONNEVILLE DAM CONSTRUCTION

[redacted]	BIG WHITE EGGS	SPRING CREEK EGGS	TOTAL	EGGS SHIPPED	UNFED & PRE-SMOLT FRY*	LOCATION	FINGERLINGS	LOCATION	TOTAL RELEASED
1938	14,300,000	3,950,000	18,250,000	25,000	10,597,900	BW	396,800 3,072,000	BW SC	14,066,700
1939	13,768,000	5,812,000	24,580,000	6,318,000	10,522,000	BW	1,180,000 6,325,000	BW SC	18,027,000
1940	19,026,000	6,685,000	25,711,000	7,196,000	8,750,000	BW	2,713,000 5,001,000	BW SC	16,464,000
1941	10,650,000	14,230,000	24,880,000	7,665,755	5,994,000	BW	3,870,550 4,036,480	BW SC	13,901,030
1942	13,664,000	13,870,000	27,534,000	12,186,435	9,390,000	BW	2,041,720 4,130,325	BW SC	15,562,045
1943	24,000	7,369,500	7,393,500	249,480	2,648,000	BW	4,038,895	SC	6,686,895
1944	6,020,000	6,782,000	12,802,000	451,500	5,205,320 4,088,000	BW SC	1,821,620	SC	11,114,940
1945	10,724,000	6,662,000	17,386,000	1,250,000	9,178,000 3,065,000	BW SC	1,916,780	SC	14,159,780
1946	10,772,000	12,365,000	23,137,000	7,073,000	7,630,000 4,175,000	BW SC	2,008,110	SC	13,813,110
[redacted]	14,008,200	12,376,890	26,385,090	8,970,100	6,797,000 4,327,000	BW SC	2,029,100	SC	13,153,100
1948	8,302,000	18,222,400	26,524,400	10,459,000	5,872,000 7,312,000	BW SC			13,184,000
1949	3,006,000	25,725,400	28,731,400	10,011,700	14,171,700	SC	1,002,260 957,000	BW SC	16,130,960
1950	5,090,520	30,538,465	35,628,985	20,028,650	5,083,580 4,390,000	BW SC	3,413,790	SC	12,887,370
1951	5,926,396	27,654,498	33,580,894	18,191,820	6,060,000 1,028,000	BW SC	6,241,786	SC	13,329,786
1952	14,574,000	27,509,845	42,083,845	16,143,500	13,468,180 2,501,820	BW SC	6,911,991	SC	22,881,991
1953	1,289,700	27,041,760	28,331,460	11,695,880	4,832,000	SC	1,024,803 7,581,845	SC BW	13,438,648
1954	2,786,000	34,983,000	37,769,000	18,057,500	1,823,850 4,639,635	BW SC	9,523,614	SC	15,987,099
1955	464,000	29,322,906	29,787,306	94,199,20	5,009,160	SC	9,710,852	SC	14,720,012
[redacted]	1,000,000	30,681,000	31,681,000	5,465,000	3,899,850	SC	1,132,156 10,680,941	BW SC	15,712,947
1957	4,953,700	26,904,997	31,858,697	10,498,077	6,955,290	SC	4,399,920 7,962,480	BW SC	19,317,690

* - PRE SMOLT FRY THOSE BETWEEN 500 TO 800 PER LB.

FALL CHINOOK SALMON SPAWNING AND DISTRIBUTION FROM THE BIG WHITE AND SPRING CREEK STATIONS DURING BROOD YEARS 1938 - 1970 POST-BONNEVILLE DAM CONSTRUCTION

[redacted]	BIG WHITE EGGS	SPRING CREEK EGGS	TOTAL	EGGS SHIPPED	UNFED & PRE-SMOLT FRY*	LOCATION	FINGERLINGS	LOCATION	TOTAL RELEASED
1958	9,336,989	80,991,486	90,328,475	64,795,110	8,027,800	SC	3,982,473 7,891,692	BW SC	19,901,965
1959	7,193,208	70,320,478	77,513,686	55,149,040	5,832,145	SC	3,352,775 7,767,360	BW SC	16,952,280
1960	1,493,160	33,043,210	34,536,370	11,523,635	3,773,000	BW	3,352,775 7,917,619	BW SC	15,045,394
1961	980,606	30,232,434	31,213,040	14,487,818			3,455,780 9,732,272	BW SC	13,188,052
1962	2,405,800	30,934,356	33,340,176	17,715,000			2,420,436 9,897,506	BW SC	12,317,942
1963	284,400	36,413,800	36,698,200	22,082,500			2,472,147 7,658,902	BW SC	10,131,049
1964	2,782,550	36,701,144	39,483,694	22,571,584			2,041,438 6,608,427	BW SC	8,649,865
1965		16,715,600	16,715,600	4,066,380			1,062,670 8,240,275	BW SC	9,302,945
[redacted]		33,730,320	33,730,320	13,076,260	3,404,000	SC	1,076,660 8,926,514	BW SC	13,407,174
1967		18,736,000	18,736,000	1,553,000	536,700	SC	9,033,720	SC	9,570,420
1968		28,937,000	28,937,000	16,304,000			9,966,100	SC	9,966,100
1969		37,129,588	37,129,588	16,677,640			17,585,632	SC	17,585,632
1970		13,051,144	13,051,144	12,000			11,022,958	SC	11,022,958

* - PRE SMOLT FRY THOSE BETWEEN 500 TO 800 PER LB.

Attachment 8. Fall Chinook Salmon Spawning and Distribution from the Big White and Spring Creek Stations during Brood Years 1971-2002, Reuse System Era.

FALL CHINOOK SALMON SPAWNING AND DISTRIBUTION FROM THE BIG WHITE AND SPRING CREEK STATIONS DURING BROOD YEARS 1971-2002 - REUSE SYSTEM

BROOD YEAR	BIG WHITE EGGS	SPRING CREEK EGGS	TOTAL	EGGS SHIPPED	UNFED & PRE-SMOLT FRY*	LOCATION	FINGERLINGS	LOCATION	TOTAL RELEASED
1971		25,065,965	25,065,965	1,500			18,390,250	SC	18,390,250
1972*		15,495,049	27,605,049	37,500			20,287,536	SC	20,287,536
1973		25,646,079	256,46,029				16,726,972	SC	16,726,972
1974		28,794,000	28,794,000	9,000			1,898,616 18,074,429	BW SC	19,973,045
1975		52,893,456	52,893,456	20,109,600			1,960,400 17,551,649	BW SC	19,512,049
1976		41,504,265	41,504,265	11,949,494			2,899,422 18,351,122	BW SC	21,250,544
1977		33,285,000	33,285,000	2,457,460			3,138,958 19,510,044	BW SC	22,649,002
1978		31,764,965	31,764,965	6,673,594			3,028,687 20,720,985	BW SC	23,749,672
1979		29,390,574	29,390,574	5,894,700			2,199,000 15,817,893	BW SC	18,016,893
1980		42,880,042	42,880,042	11,725,159	3,349,198	SC	16,689,525	SC	20,038,723
1981		39,783,503	39,783,503	19,970,555			13,677,175	SC	13,677,175
1982		41,795,400	41,795,400	16,848,042			1,202,881 14,594,463	BW SC	15,797,344
1983		22,866,314	22,866,314	4,139,360			2,869,174 11,043,010	BW SC	13,912,184
1984*		20,040,000	20,040,000				13,905,414	SC	13,905,414
1985		13,547,590	13,547,590				10,594,893	SC	10,594,893
1986*	438,279	3,681,801	11,050,332				10,649,406	SC	10,649,406
1987*	475,584	1,310,646	11,605,988				8,850,899	SC	8,850,899
1988*		2,445,190	21,715,038				15,307,411	SC	15,307,411
1989*		7,876,632	12,201,380				10,200,000	SC	10,200,000
1990		20,720,416	20,720,416				12,591,188	SC	12,591,188
1991		33,304,686	33,304,686	8,786,637	5,350,704	SC	13,826,943	SC	19,177,647
1992		24,135,622	24,135,622		7,663,086	SC	14,311,420	SC	21,974,506
1993		20,383,826	20,383,826				15,607,896	SC	15,607,896
1994		26,197,875	26,197,875	7,732,033			15,990,014	SC	15,990,014
1995		23,309,109	23,309,109	4,397,734			15,653,081	SC	15,653,081
1996		16,220,012	16,220,012				14,316,616	SC	14,316,616
1997		24,247,737	24,247,737		6,928,619	SC	15,619,626	SC	22,548,245

1998	11,886,708	11,886,708				SC	10,592,076
1999	26,517,894	26,517,894	3,116,006	SC	15,807,262	SC	18,917,268
2000	11,755,238	11,755,238			10,569,810	SC	10,569,810
2001	30,975,272	30,975,272	3,041,402	SC	15,302,863	SC	18,344,262
2002	24,690,676	EST					

1972* - EGGS TRANSFERRED FROM TUTTLE RIVER HATCHERY

1984* - MAJOR OUTBREAK OF BACTERIAL GILL DISEASE ALL FISH RELEASED IN FEBRUARY

1986* - 5.8 MILLION EGGS COLLECTED FROM FISH TRAP AT NORTH SHORE OF BONNEVILLE DAM & 1.1 MILLION EGGS IMPORTED FROM LITTLE WHITE SALMON NFH

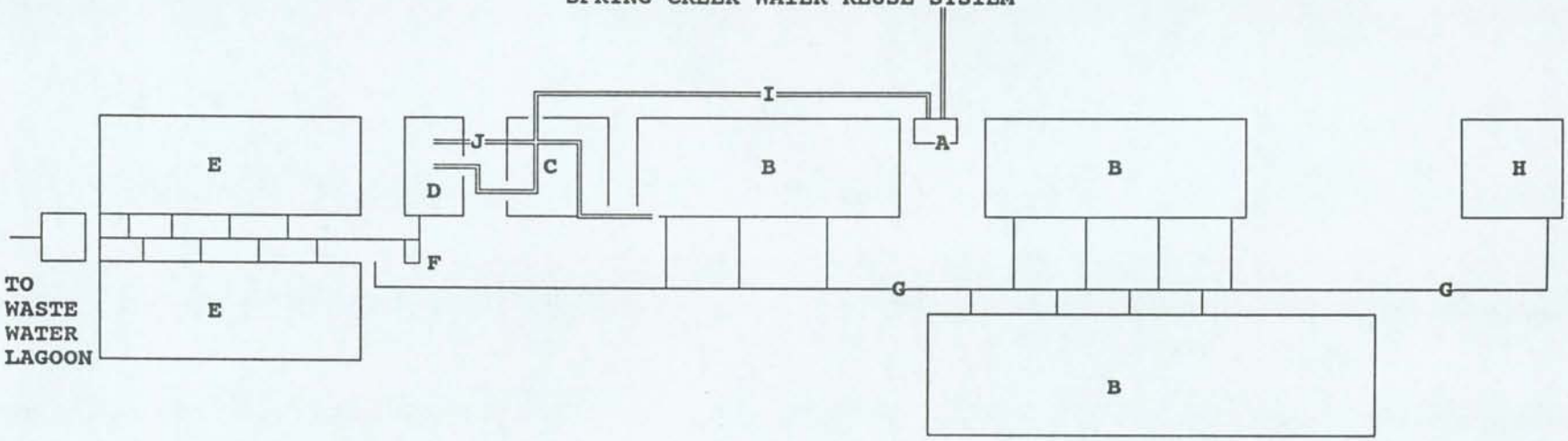
1987* - 2.3 MILLION EGGS FROM NST; 1.4 MILLION EGGS FROM ABERNATHY NFH & 6.1 MILLION EGGS FROM BONNEVILLE STATE HATCHERY.

1988* - 5.7 MILLION EGGS FROM NST; 13.6 MILLION EGGS FROM BONNEVILLE STATE HATCHERY

1989* - 4.3 MILLION EGGS FROM NST

Attachment 9. Spring Creek Water Reuse System.

SPRING CREEK WATER REUSE SYSTEM



1.) Water is supplied from six springs across Highway 14. Flow fluxuates from 1800 to 3000 G.P.M.

2.) Spring water (A) is diverted to Mechanical Building (C) where it is pumped into the Aeration Tower (D).

3.) Filter Beds (E) and Rearing Ponds (B) are filled with 3 million gallons. Aerator Pumps (F) are started.

4.) The Aerator Pumps (F) pump the filtered water into Aeration Tower (D) where water is mechanically re-aerated and flows by gravity to Rearing Ponds (B).

5.) From the ponds, water moves by gravity through the 78" line (G) to the Filter Beds.

6.) Filter Beds work on a down flow system. Water flows down through the Filter Beds and is collected into the Aeration Pit (F).

A. SPRING WATER DISTRIBUTION BOX
B. REARING PONDS
C. MECHANICAL BUILDING
D. AERATION TOWER
E. BIOLOGICAL FILTER
F. UNDERGROUND AERATION PIT AND AERATOR PUMPS
G. 78" WATER RETURN LINE
H. INCUBATION BUILDING
I. SPRING WATER SUPPLY LINE
J. POND WATER SUPPLY LINE

Attachment 10. Recommended Spawning Protocols for Pacific Salmon and Steelhead at U.S. Fish and Wildlife Service Hatcheries. Donald E. Compton author. Dated 12/1/02.

Recommended Spawning Protocols for Pacific Salmon and Steelhead at U.S. Fish & Wildlife Service Hatcheries

Donald E. Campton, Geneticist
U.S. Fish & Wildlife Service
Abernathy Fish Technology Center
1440 Abernathy Creek Road
Longview, WA 98632

(Updated December 1, 2002)

The mating of hatchery fish should strive to achieve two principal objectives: (1) maximize the effective number of breeders and (2) prevent natural selection for reproductive fitness in the artificial spawning environment. These objectives can be achieved if steps are taken to ensure that every selected adult has an equal probability of producing progeny. To achieve this goal, male and female hatchery fish can be mated in one of three, principal ways: pairwise (1 male:1 female), nested (e.g. 1 male to 2 or more females), or factorial (e.g. 2 x 2 spawning matrix).

Each of the spawning protocols described below represents a potential trade-off between maximizing the genetic/genotypic diversity of the progeny and ease of implementation. For example, simple pairwise mating between males and females is relatively easy to implement, but poor quality gametes from a particular male or female will result in a lost genetic contribution from two adults and not just the adult with poor gametes. Such pairwise spawning protocols should thus be implemented only in relatively large hatchery programs where hundreds, and perhaps at least 1,000, adults are spawned each year. Conversely, factorial mating designs (a.k.a. *matrix spawning*) will maximize the genetic contribution of each parent and the genotypic diversity of their progeny, but such protocols are very difficult to implement on large scales. Factorial spawning protocols are, thus, best reserved for small programs, particularly captive broodstock programs or similar programs where genetic conservation is the principal goal of the program. The various protocols are described briefly below.

Pairwise spawning: Pairwise mating of males and females is a production-oriented method that strives for equal genetic contribution by each parent to the progeny gene pool. This relatively straightforward method is recommended for large

broodstock programs where the number of males and female parents available for spawning each exceeds more than one-half of the desired effective number of breeders each year. These production types of programs typically spawn at least 500 males and 500 females each year. These programs are considered large enough such that losses of fertilized eggs (i.e. progeny) from single-pair matings (i.e. due to poor egg or sperm quality from a particular parent) are not considered a significant loss from a genetic management perspective. Under this spawning protocol, the genetic contribution from both parents will be loss if either parent has poor quality gametes. Hence, programs implementing strict pairwise spawning must be of sufficient size to absorb at least a 10-20% egg loss (or more) without dropping below the desired effective number of breeders.

Overlapping pairwise spawning: One variation of pairwise spawning is *overlapping* pairwise spawning. Under this protocol, milt from each of two males is added sequentially to the eggs of two females in an overlapping fashion. Approximately 30 seconds after the milt and eggs from a "primary" male and one female are combined, the milt from a second male is added to the first female's eggs as "back-up" in case the primary male has poor sperm quality. This second male then becomes the primary male for the next female spawner. The process is repeated until all males and females are spawned. At least 30 seconds should be allowed for the sequential addition of sperm between the primary and secondary males to minimize the potential effects of sperm competition (see below). This protocol is also recommended for "production" programs but where the total number of spawners may be less than 1,000 adults and the sex ratio is approximately equal.

Nested spawning: A nested design, or modified nested design, may be required if a shortage of one sex (or skewed sex ratio) precludes the use of strict pairwise mating or overlapping pairwise mating for achieving the desired effective number of breeders. Primary and secondary males may be implemented as described above for overlapping pairwise mating, but some modification may be necessary if the sex ratio is skewed (e.g. 40% males, 60% females). In such situations, some individuals from the least abundant sex are mated with two or more individuals of the more abundant sex. The general guideline is that the number of male and female spawners should be maximized, and individuals of the more abundant sex NOT excluded from spawning because of a lower number of adults of the other sex. Surpluses of one sex can compensate genetically for shortages of the other sex for achieving the desired effective number of breeders. However, as the sex ratio becomes more skewed, the total number of spawners necessary for achieving the desired effective number of breeders (Ne) will increase proportionately according to the formula: $Ne = 4NmNf/(Nm+Nf)$ where Nm = number of male spawners and Nf = number of female spawners. If Nm = Nf, then Ne = Nm + Nf.

Factorial spawning: Factorial spawning, commonly referred to as *matrix spawning*, will maximize the number of family groups and the *genotypic diversity* of the resulting progeny. The basic protocol is to first split the eggs from each of 2 to 5 females into 2 to 5 aliquots of approximately equal size, and then use 2-5 males to

fertilize the eggs of each female in a "checkerboard" or *matrix* fashion (e.g. 2x2, 3x3, etc.) This type of mating protocol can be very labor intensive and is usually impractical for large broodstock programs. Consequently, it is usually reserved for comparatively small, conservation broodstock programs where maximizing genotypic diversity among progeny is a high priority goal. In such situations, factorial mating can increase the effective population size above the total number of parents by reducing the variance in family size that results from variation in egg quality or sperm potency among individual parents.

Modified matrix spawning: The overall genetic objectives of matrix spawning (as described above) can be achieved by a modified version that substantially reduces the labor involved. In modified matrix spawning, eggs from 2 to 5 females are first pooled, mixed, and then apportioned into 2 to 5 aliquots, each with approximately equal numbers of eggs. Each aliquot is then fertilized by a different male. This spawning protocol can potentially maximize the number of pairwise spawning combinations with only a small amount of extra effort compared to pairwise or modified pairwise spawning. This approach has two drawbacks, though: (1) potential vertical transmission of pathogenic organisms from female parents to their progeny may preclude modified matrix spawning where fertilized eggs from female spawners must be segregated prior to pathogenic tests of female spawners (e.g. ELISA tests of adult, female spring chinook salmon for *Renibacterium* sp. prior to mixing of progeny), and (2) pedigrees of individual families cannot be maintained where such information is necessary (or highly desired) in conservation broodstock programs.

Sperm competition: Regardless of which mating protocol is used, milt from two or more males should not be combined in a single container of eggs except as described above for *overlapping pairwise mating.* Mixing milt from two or more males can substantially reduce the genetic contribution of one or more males due to sperm competition. Several studies have shown that when milt from two or more males are mixed simultaneously with unfertilized eggs, the eggs are often fertilized predominantly by one male (Gharrett and Shirley 1985; Withler 1988; Withler and Beacham 1994). Such *sperm competition* is common among internally fertilized animals where multiple males may mate with a single female (e.g. insects). Such sperm competition under hatchery conditions contrasts with male-dominance competition under natural conditions where males physically compete for female mates (e.g. fishes, mammals). Sperm competition under hatchery conditions not only reduces the effective number of breeders, but it can also impose an unknown amount of *domestication* or *artificial selection* in the hatchery environment for traits that may be correlated with sperm viability. For example, sperm competition resulting from pooling milt from two or more males can indirectly select for younger age at maturity (or smaller adult size) if sperm viability is negatively correlated with age at reproduction (e.g. as occurs in mammals and birds). Sperm competition can thus change the genetic composition of a hatchery population in unknown and potentially undesirable ways after several generations (i.e. if the milt of multiple males is pooled during spawning). The pooling of gametes from multiple males and females simultaneously in a single container (bucket) is the historical (or traditional) method of spawning salmonid fishes but is now recognized as

highly undesirable. Alternatively, one of the methods described above is now recommended. The exact method chosen will depend on the size of the program (i.e. total number of adult spawners) and the goals of the hatchery program.

Literature cited

Gharrett, A.J., and S.M. Shirley. 1985. A genetic examination of spawning methodology in a salmon hatchery. Aquaculture 47: 245-256.

Withler, R.E. 1988. Genetic consequences of fertilizing chinook salmon (*Oncorhynchus tshawytscha*) eggs with pooled milt. Aquaculture 68: 15-25.

Withler, R.E., and T.D. Beacham. 1994. Genetic consequences of the simultaneous or sequential addition of semen from multiple males during hatchery spawning of chinook salmon (*Oncorhynchus tshawytscha*). Aquaculture 126: 11-23.

Attachment 11. Spring Creek NFH Fish Health Quality Goals 1980-1992.

SPRING CREEK NATIONAL FISH HATCHERY QUALITY GOALS
DATED May 20th 2000

BROOD YEAR	ADULT CAPTURE (>7,000)	FEMALE DIP % (<= 2.0 %)	TOTAL DIP % (<= 5.0%)	GREEN FEMALE % (<= 2.0%)	F:M SPAWN RATIO (<= 2)	JACK SPAWN % (=> 2.0%)	EFFECTIVE POPULATION SIZE (=> 5,000)	EGG TAKE (MILLION) (>17.8)	% EYE-UP (= >95.0%)	% PONDED	NH3 (ppm) (<= 0.30)	D.I.* (<= 0.28)	F.I.* (<= 1.50)
1980	27021	15.10	15.60	29.10	6.56	0.00	4658	44.74	77.20		0.460	0.35	1.86
1981	30524	22.60	19.10	16.00	3.23	0.00	8272	40.65	81.70		0.295	0.26	1.36
1982	27447	32.10	35.90	19.40	4.11	0.00	7080	27.09	79.70		0.616	0.32	1.71
1983	10408	15.40	15.20	4.70	3.33	0.00	4353	22.87	85.70	84.90	0.533	0.33	1.73
1984	9507	1.10	3.80	6.40	4.71	0.00	3392	20.47	80.10	79.27	0.428	0.22	1.19
1985	5481	2.10	4.60	6.30	5.09	0.00	1916	13.54	85.90	84.89	0.325	0.29	1.26
1986	3389	3.80	7.10	3.30	3.92	0.00	1533	11.05	91.80	88.86	0.330	0.27	1.48
1987	3741	5.20	8.70	7.00	4.95	0.00	1664	11.61	81.96	77.69	0.412	0.27	1.50
1988	7448	4.80	7.90	2.90	5.86	0.00	2378	21.72	80.16	77.89	0.162	0.26	1.43
1989	4893	1.80	2.90	2.30	2.29	6.40	2821	12.20	93.00	86.50	0.269	0.31	1.52
1990	11434	22.10	18.10	1.60	3.33	N/A	3586	20.72	91.70	85.80	0.286	0.34	1.45
1991	13955	2.60	4.50	0.90	1.58	9.00	9499	33.30	95.50	90.10	0.309	0.30	1.50
1992	9169	2.30	4.40	0.40	1.74	N/A	6868	24.14	96.30	93.30	0.310	0.27	1.39
1993	8498	2.10	4.90	1.20	1.47	2.50	6795	20.45	96.11	87.00	0.320	0.28	1.44
1994	10989	1.35	2.65	0.94	1.35	3.30	9064	26.20	95.43	91.10	0.250	0.31	1.44
1995	10254	4.35	7.52	1.60	1.93	2.90	6730	23.31	93.10	90.90	0.34	0.29	1.42
1996	7934	5.74	11.62	0.97	1.55	4.02	5727	16.22	93.18	90.50	0.26	0.28	1.40
1997	8792	0.80	2.09	0.91	1.88	2.82	7451	24.25	96.63	94.30	0.17	0.31	1.39
1998	10179	2.14	2.28	0.90	1.55	5.87	4396	11.89	95.73	92.60	0.30	0.29	1.50
1999	14640	0.56	1.53	0.63	1.96	1.80	8228	26.52	97.35	94.80	0.41	0.31	1.50
2000	11347	11.15	12.00	0.29	1.48	4.84	3878	11.76	94.42	92.40	0.29	0.30	1.44
2001	48702	4.65	6.54	0.02	1.51	3.38	9978	30.98	91.94	88.10	0.55	0.30	1.41
2002													
AVE.=	13443	7.45	9.04	4.90	2.97	2.34	5467	22.53	89.76	87.94	0.35	0.29	1.47
Avg 1980-90	12845	11.46	12.63	9.00	4.31	0.64	3787	22.42	84.45	83.23	0.37	0.29	1.50
Avg 1991-presen	14042	3.43	5.46	0.80	1.64	4.04	7147	22.64	95.06	91.37	0.32	0.29	1.44
Avg last 5 yr	18732	3.86	4.89	0.55	1.68	3.74	6786	21.08	95.21	92.44	0.34	0.30	1.45

* = Highest average density and flow indexes attained in production year, as measured the day before release.

% POND MORTS (<= 2.5%)	Goedes Index Number March (<=20)	Goedes Index Number April (<=20)	Goedes Index Number May (<=20)	MILLIONS RELEASED	UNFED FRY RELEASED	SIZE AT RELEASE (#/LB) MARCH (<125)	SIZE AT RELEASE (#/LB) APRIL (<90)	SIZE AT RELEASE (#/LB) MAY (<60)	TOTAL SURVIVAL ALL REL GRPS (0.5%)	Total Survival March 0.8325	Total Survival April 1.5700	Total Survival May 1.5080	Ave 72-79
5.30				16.70	3349198	92	72	65	0.1883	0.1156	0.2443	0.2535	
10.50				13.70		110	78	49	0.3716	0.2425	0.3743	0.6963	
8.20				15.80			87	79	0.9775		0.9775		
8.30				13.90			74	64	0.1462		0.1462		
12.90				13.90					0.0465	0.0465			
7.90				10.60		124	69	39	0.1292	0.2583	0.0806	0.0512	
2.83	24.53	72.00	55.09	10.60		83	61	37	0.4333	0.4616	0.7361	0.0879	
1.80		35.53	46.08	8.80			67	35	0.3093		0.4607	0.2046	
9.50	33.77	20.63	41.90	15.31		116	68	37	0.5157	0.5865	0.5615	0.4343	
3.10	45.44	50.00	91.56	10.23		108	63	36	0.5120	0.4328	0.6477	0.4538	
2.30	29.01	35.61	44.38	14.35		123	67	42	0.1372	0.1040	0.1299	0.1781	
4.50	37.45	43.41	49.31	15.90	3292304	112	53	36	0.1514	0.1221	0.3191	0.0057	
3.70	38.99	43.54	52.07	14.30	7663086	137	91	50	0.1606	0.2551	0.1134	0.2819	
2.80	23.21	29.59	24.21	15.40		128	83	42	0.2612	0.1575	0.3527	0.1302	
1.20	38.27	36.37	22.14	15.65		114	78	45	0.0743	0.0890	0.0630	0.0888	
2.51	43.22	27.96	28.93	16.44		124	77	45	0.0444	0.0692	0.0305	0.0323	
2.02	19.34	20.36	21.11	14.55		120	69	43	0.4655	0.3413	0.5022	0.5557	
1.91	25.80	16.80	20.00	15.62	6928619	112	61	40	0.0677	0.0736	0.0904	0.0395	
3.72	28.20	31.04	32.99	10.59		116	75	60	0.2787	0.2157	0.3460	0.2747	
2.82	22.22	20.75	19.82	16.07	3116006	122	68	39					
2.69	17.69	84.40		10.57		120	68						
2.08	49.60	63.10	33.19	16.12	3041402	118	101	49					
4.66	31.78	39.44	38.85	13.87	4,565,103	116	73	47	0.28	0.22	0.34	0.24	Avg
6.60	33.19	42.75	55.80	13.08		108	71	48	0.3424	0.2810	0.4359	0.2950	Avg 1980-90
2.72	31.27	37.94	30.38	14.66		120	75	45	0.1929	0.1724	0.2302	0.1824	Avg 1991-96
2.64	28.70	43.22	26.50	13.79	4362009	118	75	47					

Attachment 12. FIS Deferred Maintenance – Five Year Plan (Fiscal Years 2003-2007), Spring Creek NFH Maintenance Projects.

National Fish Hatchery System, U. S. Fish and Wildlife Service, Department of the Interior

Proj. No.	DOI Score	Region	Facility or Unit Name	State	Cong. Dist.		Ranking Category CHS CRP CM C&O	Total $
9999	300	1	Spring Creek NFH	WA	03	"COMPLETED" Remove/replace w/ above ground tanks. Underground tanks are out of compliance, with imminent deadline violation. Gas tank in place-needs barrier wall to protect river. Above ground generator diesel tank on hand but not on line, needs pad, day tank, properly designed protections. The old underground diesel tank is still in operation.	0 0 0 100	57,000
13255.1995002	4	153					CI CURRENT 9999.999 PREVIOUS CHG?	
1,203,950	R						57000	
570	87000							
4087	650	1	Spring Creek NFH	WA	03	"COMPLETED" Rehabilitate spring water collection system for domestic water supply. System needs to be updated to protect the health of employees and their families. Half open collection box leaves springs open to bird droppings, amphibians, or human transmitted pathogens. New pressure tank needed to provide proper pressure in residences.	50 0 0 50	9,350
13255.1995003	1	63					CI CURRENT 2004.087 PREVIOUS CHG?	
1,203,950	Q						9350	
214	9350							
9999	490	1	Spring Creek NFH	WA	03	Resurface 1/2 mile entrance road. Entrance road in disrepair with large potholes, cracks and asphalt breaking up. Road is used by thousands of visitors for river access and hatchery entrance. Vehicles drive on wrong side of the road to avoid sections of road. Lewis and Clark inspired visitation is expected to increase use. Vehicle accidents may be caused by conditions.	0 30 70 0	94,000
13255.1999002	4	999					CI CURRENT 9999.999 PREVIOUS CHG?	
1,203,950	R						94000	
320	94000							
9999	700	1	Spring Creek NFH	WA	03	"COMPLETED" Replace deteriorated 25 year old forklift which has become unreliable with heavy loads. Occasionally, if the load is heavy, the hydraulics do not hold and the load will actually began to come down. This equipment is not safe for employees who operate and work around. Lift is used to unload fish feed and move large loads of processed salmon carcasses.	50 0 50 0	22,000
13255.1999004	1	72					CI CURRENT 9999.999 PREVIOUS CHG?	
1,203,950	E						22000	
780	22000							
4085	670	1	Spring Creek NFH	WA	03	"NO LONGER NEEDED" Rehab flat, non-draining (accumulates up to 3" rain), leaking roof in office/visitors complex. Currently past replacement schedule. Roof leaks and contributes to further damage to facility . High winds, heavy rains take toll on building. Station rears chinook salmon, important resource to Tribes that aided Lewis and Clark on their journey.	0 90 10 0	76,000
13255.1999005	7	60					CI CURRENT 2004.085 PREVIOUS CHG?	
1,203,950	R						76000	
104	76000							
7048	550	1	Spring Creek NFH	WA	03	"COMPLETED" Replace gaskets on 18 rotating gates - during years of drought hatchery water supply drops - water leaking through gates is critical to water quality and the environment in hatchery's reuse system. Deteriorating water quality in 90% reuse system puts stress on fish may cause catastrophic fish losses.	0 50 50 0	176,000
13255.1999006	3	124					CI CURRENT 2007.048 PREVIOUS CHG?	
1,203,950	R						176000	
440	17600							

National Fish Hatchery System, U. S. Fish and Wildlife Service, Department of the Interior

GO2entr

Proj. No.	DOI Score	Region	Facility or Unit Name	State	Cong. Dist.		Ranking Category CHS	CRP	CM	C&O	Total $
6126	400	1	Spring Creek NFH	WA	03	Rehab Big White substation of hatchery complex - Phase 1 (design). Age /wear of facilities dictate rehab of substation, incorporating proper sized ponds, water delivery systems, electrical systems, etc. Worn systems affect ability of crew to properly propagate Pacific salmon. Because of changes in river geomorphology, ponds are under water during flooding events.	0	0	100	0	81,000
13255.1999009		12	143				CI				
1,203,950	R						CURRENT	PREVIOUS	CHG?		
444	81000						2006.126				
											81000
3062	700	1	Spring Creek NFH	WA	03	Enclose biological filter beds for water supply reuse system that is partial water supply essential for salmon production. This will allow for more efficient operation by retaining heat and promoting bacteria growth. Thus improving water quality, health and growth of salmon smolts. Restoration and management of interjurisdictional salmon populations affected.	0	100	0	0	351,000
13255.1999011		11	603				CI				
1,203,950	R						CURRENT	PREVIOUS	CHG?		
440	35100						2003.062				
											351000
7028	580	1	Spring Creek NFH	WA	03	Replace existing radio alarm system to meet new Service standards. System is used to alert off duty employee about potential problems ocurring in the reuse system. If alarm system fails the loss of fish production could occur.	0	60	40	0	22,000
13255.2000001		8	602				CI				
1,203,950	R						CURRENT	PREVIOUS	CHG?		
218	22000						2007.028				
											22000
9999	550	1	Spring Creek NFH	WA	03	"COMPLETED" Replace 1989 pickup with over 90,000 miles. Vehicle essential to hauling fish cultural supplies, moving fish, and general maintenance task. Constant repairs becoming expensive and vehicle is not always usable when it is needed. Restoration of Pacific salmon program impacted.	0	50	50	0	20,000
13255.2000002		5	149				CI				
1,203,950	E						CURRENT	PREVIOUS	CHG?		
778	20000						9999.999				
											20000
9999	440	1	Spring Creek NFH	WA	03	"COMPLETED" Replace 1991 Dodge Van Wagon with over 80,000 miles.	20	0	0	80	20,000
13255.2000003		9	603				CI				
1,203,950	E						CURRENT	PREVIOUS	CHG?		
777	20000						9999.999				
											20000
9999	440	1	Spring Creek NFH	WA	03	Replace 1994 Ford Aerostar Van Wagon with over 72,000 miles.	20	0	0	80	21,000
13255.2000004		10	999				CI				
1,203,950	E						CURRENT	PREVIOUS	CHG?		
777	21000						9999.999				
											21000

National Fish Hatchery System, U. S. Fish and Wildlife Service, Department of the Interior

GO2entr

Proj. No.	DOI Score	Region	Facility or Unit Name	State	Cong. Dist.		Ranking Category CHS CRP CM C&O	Total $
2028	760	1	Spring Creek NFH	WA	03	"DONE WITH FY02 FUNDS" Replace 44 12" pond valves, 44 8" pond values with actuators. Worn condition of current valves decreases pond water flows, affects quality of fish produced (Pacific salmon restoration). Failure to rehab/replace will result in great risk to program and of higher costs long term. Extensive corrosion risks stressing workers backs when operating valves.	20 80 0 0	103,000
13255.2000005	11	8					CI	
1,203,950	R						CURRENT 2002.028	PREVIOUS CHG? 103000
440	10300							
7072	520	1	Spring Creek NFH	WA	03	The feed storage building floor has a false floor covered with plywood. Underneath is a four foot crawl space. This area has been inhabitated by mice which have been difficult to control. Due to health concerns the floor needs to be replaced with a solid floor thus eliminating this area where mice breed. Space needs to be filled with concrete.	20 0 80 0	94,000
13255.2001002	999	128					CI	
1,203,950	R						CURRENT 2007.072	PREVIOUS CHG? 94000
110	94000							
3031	820	1	Spring Creek NFH	WA	03	The electrical panel has been abandoned except for one breaker. The remainder of the panel is a home for mice. Efforts to eliminate the mice have failed. The panel needs to be removed and area cleaned. This is a health priority for the facility.	70 0 30 0	26,000
13255.2001003	999	999					CI	
1,203,950	R						CURRENT 2003.031	PREVIOUS CHG? 26000
110	26000							
9999	350	1	Spring Creek NFH	WA	03	"COMPLETED" Old roof in need of replacement. Last replaced in 1986.	0 0 50 50	800
13255.2001004	999	999					CI	
1,203,950	Q						CURRENT 9999.999	PREVIOUS CHG? 800
105	8000							
9999	350	1	Spring Creek NFH	WA	03	"COMPLETED" Old roof in need of relacement. Last replaced in 1986.	0 0 50 50	800
13255.2001005	999	999					CI	
1,203,950	Q						CURRENT 9999.999	PREVIOUS CHG? 800
105	8000							
9999	375	1	Spring Creek NFH		03	"COMPLETED" Replace twelve year old electic cart use to transport fish food. Vehicle is constantly in disrepair,	0 0 75 25	6,000
13255.2001006	999	999					CI	
1,203,950	E						CURRENT 9999.999	PREVIOUS CHG? 6000
785	6000							

National Fish Hatchery System, U. S. Fish and Wildlife Service, Department of the Interior

GO2entr

Proj. No.	DOI Score	Region	Facility or Unit Name	State	Cong. Dist.		Ranking Category CHS	CRP	CM	C&O	Total $
9999	300	1	Spring Creek NFH		03	Paint interior of residence. Last painted in 1989.	0	0	0	100	6,000
13255.2001007		999	999				CI				
1,203,950	Q						CURRENT	PREVIOUS	CHG?		
105	6000						9999.999	6000			
9999	300	1	Spring Creek NFH	WA	03	Asphalt access road to quarters is in disrepair and needs to be repaved.	0	0	0	100	18,000
13255.2002001		999	999				CI				
1,203,950	Q						CURRENT	PREVIOUS	CHG?		
321	18000						9999.999	18000			
9999	0	1	Spring Creek NFH	WA	03	Replace 1983 Hyster forklift - 2 to 4 ton capacity- unit is in constant disrepair	0	0	0	0	18,000
13255.2002002		999	999				CI				
1,203,950	E						CURRENT	PREVIOUS	CHG?		
780	18000						9999.999	0			
999	0	1	Spring Creek NFH	WA	03	Replace existing shingled roof with metal roof. Last replaced in 1986.	0	0	0	0	9,000
13255.2003001		999	999				CI				
1,203,950	Q						CURRENT	PREVIOUS	CHG?		
105	9000							0			
999	0	1	Spring Creek NFH	WA	03	Replace existing shingle roof with metal roof on residence #5. Last replaced in 1986	0	0	0	0	9,000
13255.2003002		999	999				CI				
1,203,950	Q						CURRENT	PREVIOUS	CHG?		
105	9000							0			

Attachment 13. Memorandum to Fishery Project Leaders – Subject: Occupancy of Government Quarters at Spring Creek NFH.

April 10, 1998

Memorandum

To: Employees
Spring Creek NFH

From: Project Leader
Spring Creek NFH

Subject: Occupancy of Government Quarters at Spring Creek National Fish Hatchery

The intent of having hatchery personnel in government quarters is for security and operations of the hatchery during non-working hours. Quick response time to emergency situations and the knowledge to respond to those emergencies is needed. Employees living in government quarters allows for the quickest response time.

The policy for the hatchery will be to have at least three of the four residences in required occupancy status. The preferred positions for required occupancy will be the Lead Maintenance position, the Lead Fish Culturist and the Assistant Manager. Other employees may request residence, if vacant quarters are available, and may request required status. The required occupancy will be included on position descriptions. These preferred positions will always have priority for housing and other employees living in station housing may be asked to vacate.

Employees must request to be removed from required status and follow procedures outlined in the U.S. Fish and Wildlife Policy on Required Occupancy in Government Furnished Quarters. This procedure requires approval of Project Leader and Regional Director. These decisions will be decided on a case by case basis.

Attachment 14. Memorandum to Employees of Spring Creek NFH – Subject: Surplus Fish as Government Property. Dated 7/10/2001.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE. 11th Avenue
Portland, Oregon 97232-4181

IN REPLY REFER TO
AFR

JUL 10 2001

Memorandum

To: Fishery Project Leaders

From: Regional Director, Region 1
Portland, Oregon

Subject: Surplus Fish as Government Property

The Hatchery system in Region 1 is currently enjoying success with increasing returns of adult fish. This success is due in no small part to the dedication of Service Fisheries employees who have worked tirelessly to ensure the Hatchery system produces quality fish. However, it is important that all Service employees honor the public trust placed in them as stewards of the Nation's resources and administrators of public property.

With this memorandum I want to emphasize that 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. Should you have any questions regarding this policy, please contact the Assistant Regional Director, Fishery Resources, through your supervisor.

Attachment

Attachment 15. Memorandum from ARD Fisheries Region 1 – Subject: Guidance on the use of anesthetics, drugs, and other chemicals. Dated 11/9/00.

United States Department of the Interior

FISH AND WILDLIFE SERVICE
911 NE. 11th Avenue
Portland, Oregon 97232-4181

IN REPLY REFER TO:
AFR

NOV - 9 2000

Memorandum

To: Region 1 Fisheries Project Leaders

From: Assistant Regional Director, Fishery Resources

Subject: Guidance on Clove Oil and Other Fisheries Use Drugs and Chemicals

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 (see attached copy) from the FDA concerning the use of compounds in the recovery of threatened and endangered species, but there are certain restrictions even in those situations.

This document is intended to review the use of aquatic animal drugs for Fisheries Projects and provide guidance on their proper use in food animals. Attached are summaries of drugs and chemicals that are approved for aquatic animal use, considered Low Regulatory Priority for use in aquiculture, on the deferred regulatory list for aquiculture, and INAD permitted chemicals. Also attached are the FDA criteria for veterinary extra label use of approved human and animal drugs and a glossary of terms commonly used by FDA and others involved with the use of drugs and chemicals.

Region 1, working closely with the National INAD Office (NIO) 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.

The use of clove oil as an anesthetic in food fish has been declared illegal by the Center for Veterinary Medicine (CVM) of the FDA. Until notified otherwise by the CVM, a fish is a food fish if it is reasonably likely that it will be consumed directly or indirectly by humans for food. Non-food fish salmon, steelhead, or trout are those to be rendered, buried, or released to the wild where they are not subject to harvest in legal fisheries. If a fish to be treated is not a food fish, then clove oil can be used as an anesthetic. However, juvenile fish cannot be anesthetized using

clove oil because of possible residual effects[1] (this excludes listed fish which are not harvested in legal fisheries as adults). If fish anesthetized with clove oil are rendered, the rendering plant operator who receives the fish must be notified in writing of this treatment; the same is true for MS-222 if its established 21-day withdrawal period is not observed. If the fish is outplanted, the Service must be assured that it will not be harvested in a legal fishery. These situations will be treated on a case-by-case basis and will need written approval from the Assistant Regional Director, Fishery Resources. Please notify your supervisor if you feel you have a non-food fish that would be appropriate for clove oil treatment.

The Service believes that its mission and goals can be achieved within the existing framework of allowable drug and chemical use, but recognizes the pressing needs for additional safe and effective drugs to facilitate recovery and restoration efforts. The Service continues to support the efforts of the National INAD Office, fisheries professionals, and the FDA by supplying data and working towards the registration and labeling of new chemotherapeutic compounds.

Attachment 1: Letter from FDA on the use of drugs in Threatened and Endangered Species
Attachment 2: Form TE-1, "Guide for Reporting Shipment/Receipt of Unapproved Drugs for Use on Threatened and Endangered Fish Species," and Form TE-2, "Chemical Use Log for the Use of Unapproved Drugs on Threatened and Endangered Fish Species."
Attachment 3: List of FDA Approved Compounds for Use in Aquatic Animals
Attachment 4: FDA Compliance Policy Guide 1240.4200: Drug use in Aquiculture Enforcement Priorities. Includes the lists of compounds FDA considers to be of Low Regulatory Priority, Deferred Regulatory Priority, and High Regulatory Priority for enforcement
Attachment 5: List of FDA INAD Permitted compounds and their sponsors
Attachment 6: FDA Compliance Policy Guide 1240.4210 Extralabel Use of Approved Drugs in Aquiculture
Attachment 7: Glossary of terms frequently encountered in chemotherapeutic compound registration and use.
Attachment 8: Clove oil fact sheet
Attachment 9: FDA Compliance Policy Guide 1240-4260: Classification of Aquaculture Species/Population as Food or Nonfood Animal
Attachment 10: Use of Unapproved Drugs in Culturing Endangered and Threatened Fish Species (02/06/96)
Attachment 11: Use of Unapproved Drugs in Culturing Endangered and Threatened Fish Species (03/04/96)

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[1]If a drug is not covered by an INAD exemption permit it has no established withdrawal period, or more precisely, the drug must be considered to be present in a residual form into adulthood when it is subject to harvest in a legal fishery. On the other hand, juvenile fish exposed to MS-222 or drugs under an INAD exemption permit that have an FDA-specified withdrawal time could be stocked immediately following treatment, as this period of time would elapse before the fish could be legally harvested.

cc:
Fisheries Line Supervisors (Dunn, Johnson, Hillwig, Zylstra)
Ed Forner, Chief, Hatcheries
Dave Erdahl, USFWS, Bozeman, Montana
Joy Evered, USFWS, Olympia FHC