**Regional Information Report No. 5J13-02**

# An Evaluation of the Eklutna Salmon Hatchery for Consistency with Statewide Policies and Prescribed Management Practices

**by**

**Mark Stopha**

**January 2013**

**Alaska Department of Fish and Game** **Division of Commercial Fisheries**

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**Weights and measures (metric)**

| | |
|---|---|
| centimeter | cm |
| deciliter | dL |
| gram | g |
| hectare | ha |
| kilogram | kg |
| kilometer | km |
| liter | L |
| meter | m |
| milliliter | mL |
| millimeter | mm |

**Weights and measures (English)**

| | |
|---|---|
| cubic feet per second | $ft^3/s$ |
| foot | ft |
| gallon | gal |
| inch | in |
| mile | mi |
| nautical mile | nmi |
| ounce | oz |
| pound | lb |
| quart | qt |
| yard | yd |

**Time and temperature**

| | |
|---|---|
| day | d |
| degrees Celsius | °C |
| degrees Fahrenheit | °F |
| degrees kelvin | K |
| hour | h |
| minute | min |
| second | s |

**Physics and chemistry**

| | |
|---|---|
| all atomic symbols | |
| alternating current | AC |
| ampere | A |
| calorie | cal |
| direct current | DC |
| hertz | Hz |
| horsepower | hp |
| hydrogen ion activity (negative log of) | pH |
| parts per million | ppm |
| parts per thousand | ppt, ‰ |
| volts | V |
| watts | W |

**General**

| | |
|---|---|
| Alaska Administrative Code | AAC |
| all commonly accepted abbreviations | e.g., Mr., Mrs., AM, PM, etc. |
| all commonly accepted professional titles | e.g., Dr., Ph.D., R.N., etc. |
| at | @ |
| compass directions: | |
| east | E |
| north | N |
| south | S |
| west | W |
| copyright | © |
| corporate suffixes: | |
| Company | Co. |
| Corporation | Corp. |
| Incorporated | Inc. |
| Limited | Ltd. |
| District of Columbia | D.C. |
| et alii (and others) | et al. |
| et cetera (and so forth) | etc. |
| exempli gratia (for example) | e.g. |
| Federal Information Code | FIC |
| id est (that is) | i.e. |
| latitude or longitude | lat. or long. |
| monetary symbols (U.S.) | $, ¢ |
| months (tables and figures): first three letters | Jan,...,Dec |
| registered trademark | ® |
| trademark | ™ |
| United States (adjective) | U.S. |
| United States of America (noun) | USA |
| U.S.C. | United States Code |
| U.S. state | use two-letter abbreviations (e.g., AK, WA) |

**Mathematics, statistics**

| | |
|---|---|
| *all standard mathematical signs, symbols and abbreviations* | |
| alternate hypothesis | $H_A$ |
| base of natural logarithm | $e$ |
| catch per unit effort | CPUE |
| coefficient of variation | CV |
| common test statistics | (F, t, $\chi^2$, etc.) |
| confidence interval | CI |
| correlation coefficient (multiple) | R |
| correlation coefficient (simple) | r |
| covariance | cov |
| degree (angular ) | ° |
| degrees of freedom | df |
| expected value | $E$ |
| greater than | > |
| greater than or equal to | ≥ |
| harvest per unit effort | HPUE |
| less than | < |
| less than or equal to | ≤ |
| logarithm (natural) | ln |
| logarithm (base 10) | log |
| logarithm (specify base) | $\log_2$, etc. |
| minute (angular) | ' |
| not significant | NS |
| null hypothesis | $H_O$ |
| percent | % |
| probability | P |
| probability of a type I error (rejection of the null hypothesis when true) | α |
| probability of a type II error (acceptance of the null hypothesis when false) | β |
| second (angular) | " |
| standard deviation | SD |
| standard error | SE |
| variance | |
| population | Var |
| sample | var |

*REGIONAL INFORMATION REPORT NO. 5J13-02*

# AN EVALUATION OF THE EKLUTNA SALMON HATCHERY FOR CONSISTENCY WITH STATEWIDE POLICIES AND PRESCRIBED MANAGEMENT PRACTICES

by
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# ABSTRACT

The salmon hatchery program in Alaska is governed by policies, plans, and regulations that emphasize protection of wild salmon stocks. A rotational series of hatchery evaluations will examine the consistency of each hatchery with those policies and prescribed management practices. The evaluation includes a review of hatchery management plans and permits, an assessment of each hatchery program's consistency with statewide policies, and recommendations to address any deficiencies.

This report reviews the Eklutna Salmon Hatchery located along the Knik River, a system that drains into the Knik Arm of upper Cook Inlet. The hatchery is owned and operated by the Cook Inlet Aquaculture Association, a private nonprofit corporation, and has reared Chinook, pink, chum, coho, and sockeye salmon. The facility operated from 1982 until 1997, and remains permitted for hatchery operations by the Alaska Department of Fish and Game (ADF&G). Since 2007, the facility serves as a back-up incubation hatchery for the Trail Lakes Hatchery during low water periods at Trail Lakes Hatchery.

The facility initially raised chum salmon for the commercial fishery and coho salmon for the sport fishery, and switched from chum salmon to sockeye salmon in 1992. Chinook, chum, and sockeye salmon experienced periodic outbreaks of infectious hematopoietic necrosis virus at the facility, after which infected lots were sacrificed per ADF&G policy. Fish returning to the hatchery were harvested in commercial, subsistence, personal use, and recreational fisheries along their migration route. Chum, sockeye, and coho salmon were marked to estimate the hatchery component of the harvest to manage for wild stock returns to Cook Inlet.

The hatchery operated in accordance with State of Alaska hatchery regulations. Local donor stocks were used for releases from the hatchery, in accordance with the ADF&G genetic policy. Hatchery operations complied with ADF&G fish health policy. Management plans accurately described operations. Permits for transporting and releasing fish were acquired as required by ADF&G regulation.

Key Words: Eklutna Salmon Hatchery, hatchery evaluation, hatchery, Cook Inlet Aquaculture Association, basic management plan, annual management plan, fish transport permit, salmon hatchery

# INTRODUCTION

Alaska's constitution mandates that fish are harvested sustainably under Article 8, section 4: "Fish, forests, wildlife, grasslands, and all other replenishable resources belonging to the state shall be utilized, developed and maintained on the sustained yield principle, subject to preferences among beneficial uses."

Due in part to historically low salmon harvests in the early 1970s, Article 8, section 15 of Alaska's Constitution was amended in 1972 to provide tools for restoring and maintaining the state's fishing economy: "No exclusive right or special privilege of fishery shall be created or authorized in the natural waters of the State. This section does not restrict the power of the State to limit entry into any fishery for purposes of resource conservation, to prevent economic distress among fishermen and those dependent upon them for a livelihood and to promote the efficient development of aquaculture in the State." Alaska's salmon hatchery program was developed under this mandate and designed to supplement—not replace—sustainable wild stock production.

Alaska's modern salmon fisheries enhancement program began in 1971 when the Alaska Legislature established the Division of Fisheries Rehabilitation Enhancement and Development (FRED) within the Alaska Department of Fish and Game (ADF&G; FRED Division 1976). In 1974, the Alaska Legislature expanded the program, authorizing private nonprofit (PNP) corporations to operate salmon hatcheries: "It is the intent of this Act to authorize the private ownership of salmon hatcheries by qualified nonprofit corporations for the purpose of contributing, by artificial means, to the rehabilitation of the state's depleted and depressed

salmon fishery. The program shall be operated without adversely affecting natural stocks of fish in the state and under a policy of management which allows reasonable segregation of returning hatchery-reared salmon from naturally occurring stocks." (Alaska Legislature 1974).

The FRED Division and PNPs engaged in a variety of activities to increase salmon production. New hatcheries were built to raise salmon; fish ladders were constructed to provide adult salmon access to previously non-utilized spawning and rearing areas; lakes with waterfall outlets too high for adult salmon to ascend were stocked with salmon fry; log jams were removed in streams to enable returning adults to reach spawning areas; and nursery lakes were fertilized to increase juvenile salmon growth (FRED 1975). A combination of favorable environmental conditions, restricted fishing effort, abundance-based harvest management, habitat improvement, and hatchery production gradually boosted salmon catches from the low catches of about 30 million fish per year in the early 1970s to recent commercial salmon harvests (2002–2011) averaging 170 million fish per year (Figure 1, ADF&G 2012).

In Alaska, the purpose of salmon hatcheries is to supplement wild stock production for public benefit. Hatcheries are efficient in improving survival from the egg to fry or smolt stage. In natural production, survival of eggs to fry or smolt is highly variable. Estimates for pink salmon survival in two Southeast Alaska creeks ranged from less than 1% to 22%, with average survivals from 4% to 9% (Croot and Margolis 1991). Under hatchery conditions, egg to fry survival is usually 80% or higher.

Alaska hatcheries do not grow fish to adulthood, but incubate fertilized eggs and release resulting progeny. Juvenile salmon imprint on the release site and return to the release location as mature adults. Per state policy, hatcheries generally use stocks taken from close proximity to the hatchery so that any straying of hatchery returns will have similar genetic makeup as the stocks from nearby streams. In addition, Alaska hatcheries do not selectively breed. Large numbers of broodstock are used for gamete collection to maintain genetic diversity, without regard to size or other characteristic.

Hatchery production is limited by freshwater capacity and freshwater rearing space. Soon after emergence, all pink and chum salmon fry can be transferred from fresh water to salt water. Most Chinook, sockeye, and coho salmon, on the other hand, must spend a year or more in fresh water before fry develop to smolt and can tolerate salt water. These species require a higher volume of fresh water, a holding area for freshwater rearing, and daily feeding. They also have a higher risk of disease mortality due to the extended rearing phase. There are economic tradeoffs between the costs of production versus the value of fish at harvest. Although Chinook, sockeye, and coho salmon garner higher prices per pound as adults, chum and pink salmon are more economical to rear and generally provide a higher economic return.

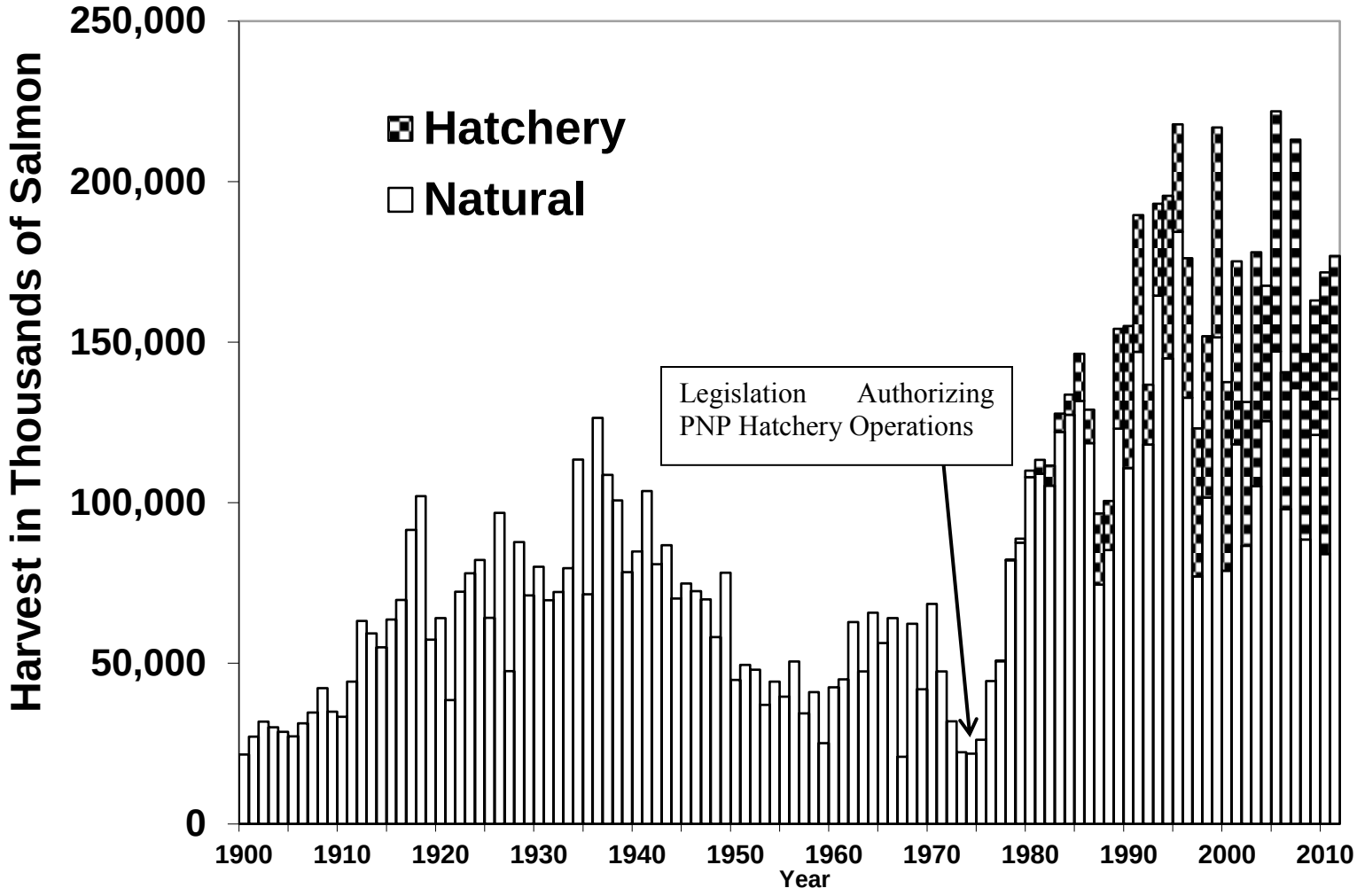


Figure 1.–Commercial salmon harvest in Alaska, 1900–2011.

Pink salmon, which have the shortest life cycle of Pacific salmon (two years), provide a quick return on investment and provide the bulk of Alaska hatchery production. From 2002 to 2011, pink salmon accounted for an average 71% of Alaska hatchery salmon returns by number, followed by chum salmon (21%), sockeye salmon (5%), coho salmon (2%) and Chinook salmon (<1%) (Farrington 2003, 2004; White 2005–2011; Vercessi 2012).

The salmon marketplace has changed substantially since the hatchery program began. As the first adult salmon were returning to newly built hatcheries in 1980, Alaska accounted for nearly half of the world salmon supply, and larger harvests in Alaska generally meant lower prices to fishermen. Some believed the increasing hatchery production in some parts of the state was depressing salmon prices in others (Knapp et al. 2007). By 1996, rapidly expanding farmed salmon production surpassed the wild salmon harvest for the first time (Knapp et al. 2007) and wild salmon prices declined precipitously as farmed salmon flooded the marketplace in the U.S., Europe, and Japan. Alaska responded to the competition by improving fish quality at harvest and implementing intensive marketing efforts to differentiate Alaska salmon from farmed salmon. By 2004, these efforts paid off through increasing demand and prices.

Today, Alaska typically accounts for just 12% to 15% of the global supply (ASMI 2011a). Alaska's diminished influence on world salmon production means that Alaska's harvest volume has little effect on world salmon prices. Prices paid to fishermen have generally increased over the past decade despite large fluctuations in harvest volume (ADF&G 2012). The exvessel value of hatchery harvest increased from $46 million in 2002 to $136 million in 2011[1]. First wholesale value also showed an increasing trend, with the value of hatchery fish increasing from $160 million in 2002 to $314 million in 2011[2]. Pink and chum salmon, on average, accounted for over 75% of the annual hatchery exvessel and first wholesale values from 2002 to 2011.

Over the past decade (2002–2011), hatcheries contributed an average 35% of the total Alaska salmon harvest, in numbers of fish (Farrington 2003, 2004; White 2005–2011, Vercessi 2012). With world markets currently supporting a trend of increasing prices for salmon, interest in increasing hatchery production by Alaska fishermen, processors, support industries, and coastal communities has increased as well. In 2010, Alaska salmon processors encouraged hatchery operators to expand pink salmon production to meet heightened demand (Industry Working Group, 2010).

Alaska's wild salmon populations are sustainably managed to ensure adequate numbers of adults spawn, and the wild harvest is arguably at its maximum, given fluctuations due to environmental variability and imperfect management precision. Other than regulatory actions, such as reductions of salmon bycatch in other fisheries or changes in fishing methods that would allow more precise management of escapement, hatchery production is the primary opportunity to substantially increase the harvest.

Part of the reason for the rise in price of Alaska salmon was a message of sustainable fisheries management to a growing audience of discriminating buyers. The ADF&G applied to the Marine Stewardship Council (MSC) for certification as a sustainably managed fishery. In 2000, the MSC

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[1] Exvessel value for hatchery harvest is the total harvest value paid by fish buyers to fishermen for all salmon from http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch (accessed 02/04/2012), multiplied by the hatchery percent of the commercial harvest in Farrington 2003, 2004; White 2005– 2011, and Vercessi 2012.

[2] First wholesale value is the price paid to primary processors for processed fish from ADF&G Commercial Operators' Annual Reports multiplied by the hatchery percent of the commercial harvest.

certified the salmon fisheries managed by ADF&G as sustainably managed, and the state's salmon fisheries remained the only MSC certified salmon fishery in the world for nearly a decade. Salmon fisheries elsewhere (Annette Islands Indian Reserve salmon, British Columbia pink and sockeye salmon, and Iturup Island, Russia, pink and chum salmon) were later certified for much smaller geographic areas, and in some cases, only for specific salmon species (MSC 2012). Alaska's certification was MSC's broadest and most complex, covering all five salmon species harvested by all fishing gear types in all parts of the state. Achievement of statewide certification was a reflection of the state's commitment to abundance-based fisheries management and constitutional mandate to sustain wild salmon populations.

MSC certified fisheries are reviewed every five years. When Alaska salmon fisheries were recertified in 2007 (Chaffee 2007), a condition of certification was to "Establish and implement a mechanism for periodic formal evaluations of each hatchery program for consistency with statewide policies and prescribed management practices. This would include a specific evaluation of each program relative to related policies and management practices." (Knapman et al. 2009).

ASMI changed to a new sustainable fishery certification under the Food and Agriculture Organization in 2011. The hatchery evaluations started under the MSC certification continued as an important systematic assessment of Alaska salmon fishery enhancement and its relation to wild stock production at a time of heightened interest for increased hatchery production and potential impacts on wild salmon production. ADF&G established a rotational schedule to review PNP hatchery programs and Musslewhite (2011a, 2011b) completed hatchery reviews for the Kodiak region in 2011. The hatchery reviews for Tutka Bay Lagoon Hatchery (Stopha and Musslewhite 2012), Trail Lakes Hatchery (Stopha 2012a) and Port Graham Hatchery (Stopha 2012b) have been completed for the Cook Inlet region. This report for the Eklutna Salmon Hatchery is the final for the Cook Inlet region. Reviews of PNP hatcheries in Prince William Sound, Southern Southeast Alaska, and Northern Southeast Alaska will follow.

# OVERVIEW OF POLICIES

Numerous Alaska mandates and policies for hatchery operations were specifically developed to minimize potential adverse effects to wild stocks. The design and development of the hatchery program is described in detail in McGee (2004): "The success of the hatchery program in having minimal impact on wild stocks can be attributed to the development of state statutes, policies, procedures, and plans that require hatcheries to be located away from significant wild stocks, and constant vigilance on the part of ADF&G and hatchery operators to improve the program through ongoing analysis of hatchery performance." Through a comprehensive permitting and planning process, hatchery operations are subject to continual review by a number of ADF&G fishery managers, geneticists and pathologists.

A variety of policies guide the permitting of salmon fishery enhancement projects. They include *Genetic Policy* (Davis et al. 1985), *Regulation Changes, Policies, and Guidelines for Fish and Shellfish Health and Disease Control* (Meyers 2010), and various fisheries management policies, such as the Sustainable Salmon Fisheries Policy (5 AAC 39.222). These policies are used by ADF&G staff to assess hatchery operations for genetic, health, and fishery management issues in the permitting process.

The State of Alaska ADF&G *Genetic Policy* (Davis et al. 1985; Davis and Burkett 1989) sets out restrictions and guidelines for stock transport, protection of wild stocks, and maintenance of genetic variance. Policy guidelines include banning importation of salmonids from outside the state for

enhancement (except transboundary rivers); restricting transportation of stocks between the major geographic areas in the state (Southeast Alaska, Kodiak Island, Prince William Sound, Cook Inlet, Bristol Bay, Arctic-Yukon-Kuskokwim, and Interior); requiring the use of locally adapted broodstock with appropriate phenotypic characteristics; maintaining genetic diversity by use of large populations of broodstock collected across the entire run; and limiting the number of hatchery stocks derived from a single donor stock.

The *Genetic Policy* also recommends the identification and protection of *significant and unique* wild stocks: "Stocks cannot be introduced to sites where the introduced stock may have significant interaction or impact on significant or unique wild stocks." Davis and Burkett (1989) suggest that regional planning teams (RPTs) are an appropriate body to designate those stocks. In addition, the *Genetic Policy* recommends the designation of watersheds to serve as wild stock sanctuaries to preserve genetic variability. "These sanctuaries will be areas in which no enhancement activity is permitted except gamete removal for broodstock development."

The *Alaska Fish Health and Disease Control Policy* (5 AAC 41.080) is designed to protect fish health and prevent spread of infectious disease in fish and shellfish. The policy and associated guidelines are discussed in *Regulation Changes, Policies, and Guidelines for Fish and Shellfish Health and Disease Control* (Meyers 2010). It includes regulations and guidelines for fish transports, broodstock screening, disease histories, and transfers between hatcheries. The *Alaska Sockeye Salmon Culture Manual* (McDaniel et al. 1994) also specifies practices and guidelines specific to the culture of sockeye salmon. As with the *Genetic Policy*, these regulations and guidelines are used by the principal pathologist and ADF&G geneticist to review hatchery plans and permits.

The *Alaska Policy for the Management of Sustainable Salmon Fisheries* (5 AAC 39.222) mandates protection of wild salmon stocks in the management of salmon fisheries. Other applicable policies include the *Policy for the Management of Mixed-Stock Salmon Fisheries* (5 AAC 39.220), the *Salmon Escapement Goal Policy* (5 AAC 39.223), and local fishery management plans (5 AAC 39.200). These regulations require biologists to consider the interactions of wild and hatchery salmon stocks when reviewing hatchery management plans and permits.

The guidance provided by these policies is sometimes very specific, and sometimes less so. For example, the *Alaska Fish Health and Disease Control Policy* mandates the use of an iodine solution on salmon eggs transported between watersheds—a prescribed practice that requires little interpretation. In contrast, several policies prioritize the protection of wild stocks from the potential effects of fisheries enhancement projects without specifying or mandating how to assess those effects. These less specific policies provide principles and priorities, but not specific direction, for decision making.

A key principle of Alaska policy is to protect wild salmon stocks. The initial rotation of these reports will assess the consistency of individual hatcheries with state policies by (1) confirming that permits have been properly reviewed using applicable policies, and (2) identifying information relevant to each program's consistency with state policies. Future reports may assess regional effects of hatcheries on wild stocks and fishery management.

# OVERVIEW OF HATCHERY PERMITS AND PLANS

The FRED Division built and operated several hatcheries across the state in the 1970s and 1980s, eventually operating 20 hatcheries in the mid-1980s. In 1988, legislation was passed that authorized contracting of state-built hatcheries to regional aquaculture associations for hatchery operations. In response to changing economics the FRED Division gradually transferred operations of most facilities to PNP corporations, and closed others. Regional aquaculture associations (RAAs) in Kodiak, Cook

Inlet, Prince William Sound, and Southeast Alaska are comprised primarily of commercial salmon fishing permit holders and operate most of the PNP hatcheries. Each RAA's board of directors establish goals for enhanced production, oversee business operations of the hatcheries, and work with ADF&G staff to comply with state permitting and planning regulations. RAAs may vote to impose a salmon enhancement tax on sale of salmon by permit holders in their region to finance hatchery operations. Independent PNP corporations, not affiliated with a RAA, also operate hatcheries in several areas of the state. Both the RAAs and independent PNP hatchery organizations may harvest salmon returning to their hatcheries or release sites to pay for operations. These salmon are referred to as the *cost recovery* harvest. Several organizations have tourist and educational programs that contribute to the financial support of their programs, as well.

Salmon fishery enhancement efforts are guided by comprehensive salmon plans for each region. These plans are developed by the RPTs, which are composed of six members: three from ADF&G and three appointed by the regional aquaculture association Board of Directors (5 AAC 40.310). According to McGee (2004), "Regional comprehensive planning in Alaska progresses in stages. Phase I sets the long-term goals, objectives and strategies for the region. Phase II identifies potential projects and establishes criteria for evaluating the enhancement and rehabilitation potentials for the salmon resources in the region. In some regions, a Phase III in planning has been instituted to incorporate Alaska Board of Fisheries approved allocation and fisheries management plans with hatchery production plans."

Public participation is an integral part of the PNP hatchery system. Hearings are held before a hatchery is permitted for operation. RPTs comprised of ADF&G and RAA personnel hold public meetings to define desired production goals by species, area, and time in comprehensive salmon plans (5 AAC 40.300). RPTs review applications for new hatcheries to determine compatibility with the comprehensive salmon plan, and also make recommendations to the ADF&G commissioner regarding changes to existing hatchery operations, new hatchery production, and new hatchery facilities. Municipal, commercial, sport, and subsistence fishing representatives commonly hold seats on both RAA and independent PNP hatchery organization boards, providing broad public oversight of operations.

Alaska PNP hatcheries are operated under four documents required in regulation (5 AAC 40.110–990 and 5 AAC 41.005–100) and statute (AS 16.05.092): hatchery permit with basic management plan (BMP), annual management plan (AMP), fish transport permit (FTP), and annual report (Figure 2). The hatchery permit authorizes operation of the hatchery, specifies the maximum number of eggs of each species that a facility can incubate, specifies the authorized release locations, and may identify stocks used for broodstock. The BMP is an addendum to the hatchery permit and outlines the general operations of the hatchery. The BMP may describe the facility design, operational protocols, hatchery practices, broodstock development schedule, donor stocks, harvest management, release sites, and consideration of wild stock management. The BMP functions as part of the hatchery permit and the two documents should be revised together if the permit is altered. The permit and BMP are not transferrable. Permits remain in effect unless revoked or withdrawn.

Hatchery permits/BMPs may be amended through a permit alteration request (PAR). Requested changes are reviewed by the RPT and ADF&G staff and a recommendation is sent to the commissioner for consideration. If approved, the permit is amended to include the alteration. Reference to a *permit* or *hatchery permit* in this document also includes approved PARs to the hatchery permit unless otherwise noted.

The AMP outlines operations for the current year and is in effect until superseded by the following year's AMP. According the regulation, the AMP should "organize and guide the hatchery's operations, for each calendar year, regarding production goals, broodstock development, and harvest management of hatchery returns." (5 AAC 40.840). Typically, AMPs include the upcoming year's egg-take goals, fry or smolt releases, expected adult returns, harvest management plans, FTPs (described below) required or in place, and fish culture techniques. The AMP must be consistent with the hatchery permit and BMP.

An FTP is required for egg collections, transports, and releases (5 AAC 41.001–41.100). The FTP authorizes the individual specific activities described in the hatchery permit and management plans, including broodstock sources, gamete collections, and release sites. All FTP applications are reviewed by the ADF&G fish pathologist, fish geneticist, regional resource development biologist, Division of Commercial Fisheries regional supervisor, Division of Sport Fish regional supervisor, and deputy director of the Division of Commercial Fisheries before final consideration by the ADF&G commissioner. An FTP is issued for a fixed time period and includes both the specifics of the planned operation and any conditions added by ADF&G.

Each hatchery is required to submit an annual report documenting egg collections, juvenile releases, current year returns, and projected returns for the following year. Information for all hatcheries is compiled into an annual ADF&G report (e.g., Vercessi 2012) to the Alaska Legislature (AS 16.05.092).

The administration of hatchery permitting, planning, and reporting requires regular and direct communication between ADF&G staff and hatchery operators. The serial documentation from hatchery permit/BMP to AMP to FTP to annual report necessarily spans generations of hatchery and ADF&G personnel, providing an important history of each hatchery's species cultured, stock lineages, releases, returns, and pathology.

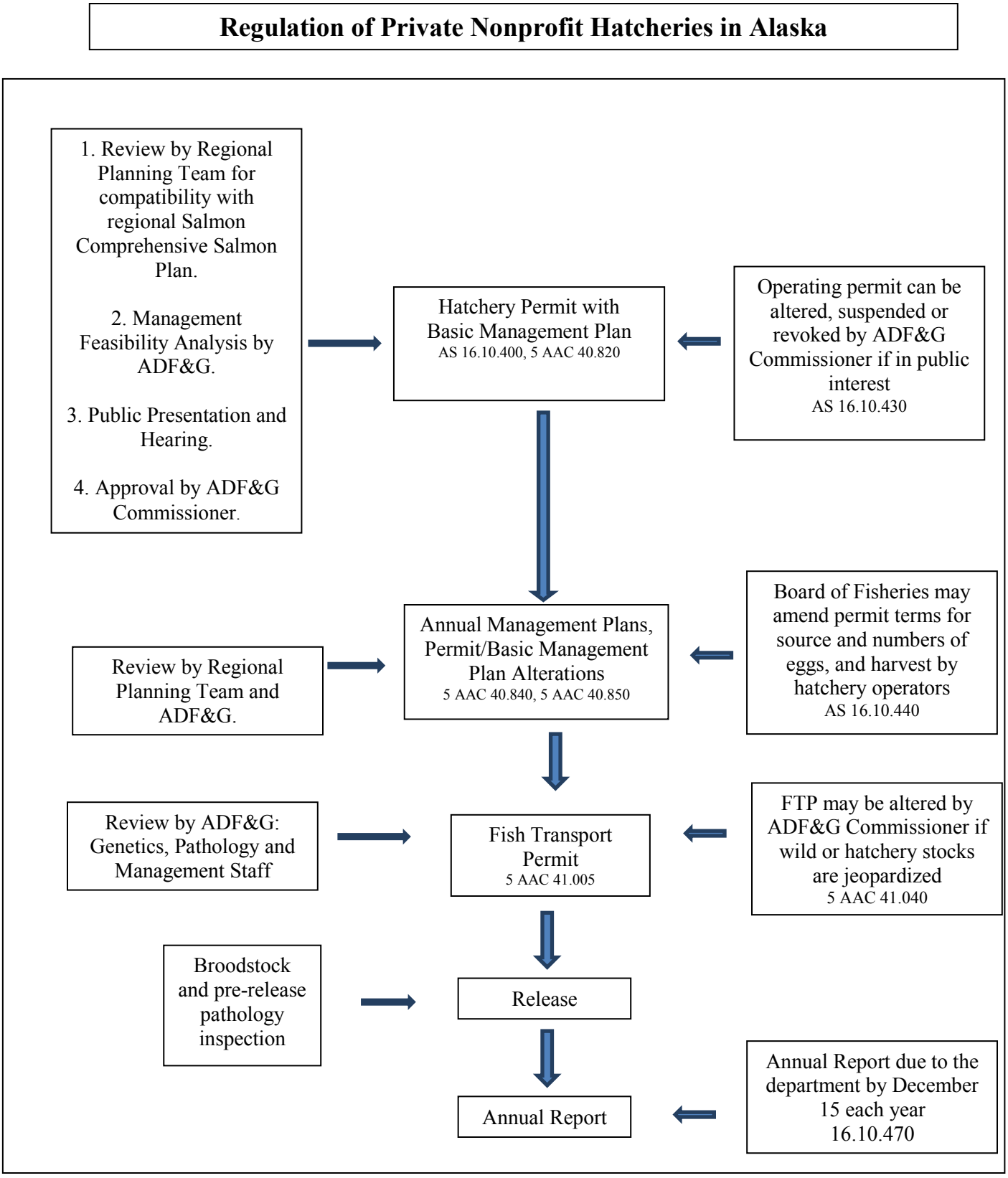


Figure 2.–Diagram of Alaska hatchery permitting process.

# EKLUTNA SALMON HATCHERY OVERVIEW

The Eklutna Salmon Hatchery (ESH) is located in Eklutna, Alaska, about 30 miles north of Anchorage, at the head of Knik Arm in Cook Inlet (Figures 1 and 2). The hatchery was built by the Cook Inlet Aquaculture Association (CIAA) along the tailrace of the Eklutna Hydroelectric Plant, which is supplied by water from Eklutna Lake. The tailrace empties into the Knik River (Figures 3 and 4).

CIAA submitted a hatchery permit pre-application to the ADF&G in July 1979 for a permitted capacity of 65 million chum salmon eggs. The presumptive donor stock for the hatchery was the nearby Matanuska River. The request was met with opposition from ADF&G biologists commenting on the project. Concerns arose over broodstock source because the Matanuska River chum salmon stock was not of sufficient size to supply the hatchery with eggs and still meet wild spawning needs. Other concerns included the potential impact to rearing capacity from adding an additional 50 million chum salmon fry to northern Cook Inlet, and assessing and harvesting the enhanced stock in complicated and contentious commercial and sport fisheries for other salmon species (Chinook, sockeye, and coho salmon) in Cook Inlet.[3,4,5,6,7] A revised application was submitted in November 1979 for a permitted egg capacity of 65 million chum salmon, 5 million Chinook salmon, and 5 million coho salmon. ADF&G staff reiterated concerns of the July 1979 application. Additional concerns were raised by ADF&G staff that a terminal harvest area was not available to harvest the returning hatchery fish without also harvesting significant numbers of wild salmon.[8]

A chronology of events from ADF&G files indicates that ADF&G management staff recommended to the ADF&G commissioner that hatchery production be reduced from the 65 million eggs for chum and pink salmon requested by CIAA in the permit application to 5 million chum salmon eggs, 5 million pink salmon eggs and 5 million coho salmon eggs.[9] In their review of the permit application, the Cook

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[3] Larry Engel , ADF&G Sport Fish Biologist, to Stan Kubik, ADF&G Division of Sport Fish, Anchorage. Comments on the Eklutna Chum Salmon Hatchery; 1979, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[4] Robert Lebida, ADF&G FRED Biologist, to Paul Krasnowski, FRED ADF&G Regional Project Manager, Anchorage. Comments on the CIAA- PNP hatchery permit – Eklutna; 1979, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[5] Bernard Kepshire, ADF&G FRED Biologist, to Paul Krasnowski, FRED ADF&G Regional Project Manager, F.R.E.D. Division, ADF&G, Anchorage. Comments on the CIAA application for 65 million eggs at Eklutna; 1979, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[6] Sid Logan, ADF&G Sport Fish Biologist to Russ Redick, ADF&G Sport Fish Regional Supervisor, Anchorage. Comments on the proposed chum salmon hatchery at Eklutna; 1979, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[7] Gary Sanders, ADF&G Commercial Fisheries Biologist to Ken Middleton, ADF&G Commercial Fisheries Regional Supervisor, Anchorage. Comments on the Eklutna Hatchery application; 1979, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[8] Steve Pennoyer, ADF&G Director of Commercial Fisheries Division and Rupe Andrews, ADF&G Director of Sport Fish, to Don Collinsworth, ADF&G Deputy Commissioner, Juneau. Comments on the Eklutna Hatchery proposal; April 21, 1980, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[9] Steve Pennoyer, ADF&G Director of Commercial Fisheries and Rupe Andrews, ADF&G Director of Sport Fish, to Don Collinsworth, ADF&G Deputy Commissioner, Juneau. Comments on the Eklutna Hatchery proposal; April 21, 1980, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

Inlet RPT recommended a permitted capacity of 20 million chum and/or pink salmon.[10] CIAA revised their application for 20 million chum salmon, and this application went to public hearing per state regulation (5 AAC 40.210).

According to written testimony and minutes of the public hearings, commercial fishermen, for the most part, supported the program. Most sport anglers in the Matanuska Valley did not support the program. The sport anglers were concerned that fishing time in the Cook Inlet commercial fisheries would be increased to harvest the returning hatchery chum salmon, and that these fisheries would also harvest increased numbers of coho salmon important to their fishery.

Following several public hearings, the ADF&G commissioner approved the hatchery permit in February 1982 with a permitted egg capacity of 20 million chum and/or pink salmon, 100,000 coho salmon and 100,000 Chinook salmon. The coho and Chinook salmon programs were intended to provide additional sport fishing opportunity to Matanuska Valley residents. Donor stocks for the chum salmon program were listed as the Matanuska, Knik, Little Susitna, and Susitna rivers. Chinook, pink, and coho salmon donor stocks were not identified. The permit included several stipulations, including limiting wild stock egg takes to no more than five years, allowing cost-recovery and broodstock harvest only in the fresh water tailrace of the power plant, and marking a portion of releases (Appendix A).

The ADF&G commissioner stated that the hatchery operation plan would address many of the concerns raised by ADF&G staff and the public. Donor stocks were to be from the local Knik and Matanuska rivers as much as possible, to minimize genetic issues from straying. The feasibility of conducting fry studies in Knik Arm was to be studied by CIAA and ADF&G to address carrying capacity concerns. To avoid harvesting wild fish in the Knik River, fish returning to the tailrace could not be harvested for cost recovery or broodstock until they were 100 yards upstream of the confluence of the Eklutna power plant tailrace and the Knik River. The 100-yard distance would also provide sport anglers an area to harvest returning fish.[11] A portion of the releases would be marked to estimate the hatchery harvests in the commercial and sport fisheries, and salmon in the Matanuska and Knik rivers spawning areas would be sampled for marks to assess hatchery straying.

The hatchery BMP specified that 2 million wild chum salmon eggs could be taken from donor streams for the first four years of operation, after which up to 20 million eggs were projected to be available from fish returning to the hatchery. Five million pink salmon eggs could be taken for two years from wild donor stocks, with up to 20 million pink salmon eggs taken at the hatchery after the second year of wild stock egg takes, less the number of chum salmon eggs taken. There were no specific stipulations for coho and Chinook salmon, but a statement was included that "sportsmen are not apt to derive harvest benefits if coho or Chinook smolt are released at Eklutna. Therefore, another release site(s) will have to be identified through the Sport Fish Division." This statement turned out to not be true. Not only did a sport fishery develop at Eklutna, the sport fishery remained after the hatchery closed. ADF&G continues to release Chinook and coho salmon smolt from its Anchorage hatcheries at Eklutna to support the sport fishery there.

In 1984, the first PAR was approved to add 1 million coho salmon eggs to the permitted capacity for release at remote sites. A second PAR approved in 1986 extended taking wild chum salmon

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[10] Sig Logan, Chairman, Cook Inlet Regional Planning Team to Ronald Skoog ADF&G Commissioner, Juneau. Comments on the proposed chum salmon hatchery at Eklutna. August 25, 1980, memorandum. Obtained from Sam Rabung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

[11] G. Fandrei, CIAA Executive Director, personal communication.

broodstock for 5 more years, and increased the permitted annual wild egg-take level from 2 to 3 million eggs.

In 1992, a PAR was approved to change the hatchery to a sockeye salmon production facility, removing pink, chum, and Chinook salmon from the permit/BMP. In 1993, the Big Lake sockeye salmon program was moved to ESH when the Big Lake Hatchery closed, and in 1996, ESH took over the lower Cook Inlet (LCI) lakes sockeye salmon projects from the Crooked Creek Hatchery when that facility closed.

In 1998, CIAA suspended operations at Eklutna. The Big Lake and LCI Lakes sockeye salmon programs were transferred to Trail Lakes Hatchery, and salmon release from the hatchery was suspended. ADF&G Division of Sport Fish continued the coho salmon releases with fish hatched at the Fort Richardson hatchery, as the Eklutna tailrace had become an established sport fishery in the area. A PAR was approved in 2007 to use ESH as an emergency backup facility to Trail Lakes Hatchery when water supplies are limited at Trail Lakes Hatchery.

According to AMPs and annual reports, chum salmon egg takes peaked at 6.8 million in 1988. Egg collections were from wild broodstock from four local rivers, and from fish returning to the tailrace. Pink salmon eggs were collected from wild Skwentna River broodstock in 1984 and 1985, and from returns to the hatchery in 1986. Coho salmon eggs of nearby Fish Creek were obtained from Big Lake Hatchery in 1983 and 1984, after which eggs were collected annually from hatchery returns until 1997. Sockeye salmon eggs from Meadow Creek and Tustumena Lake stocks were incubated at the hatchery for release elsewhere from 1993 to 1997 (Appendix C).

Annual reports indicated that chum salmon fry releases peaked in 1989 at 6.4 million and chum salmon returns peaked at about 114,000 fish in 1995. Coho salmon releases peaked in 1992 at 132,000 smolt and coho salmon returns peaked at about 12,000 fish in 1987. Sockeye salmon releases exceeded 13 million in 1997 and 1998, with the largest return of 195,000 sockeye salmon in 1997. Pink salmon were released for 3 years. Very few adult pink salmon returned, and the program was discontinued in 1987. Chinook salmon eggs were collected in one year (1984) from Moose Creek, but all fry were destroyed in 1985 due to infectious hematopoietic necrosis virus (IHNV; Appendices C and D).

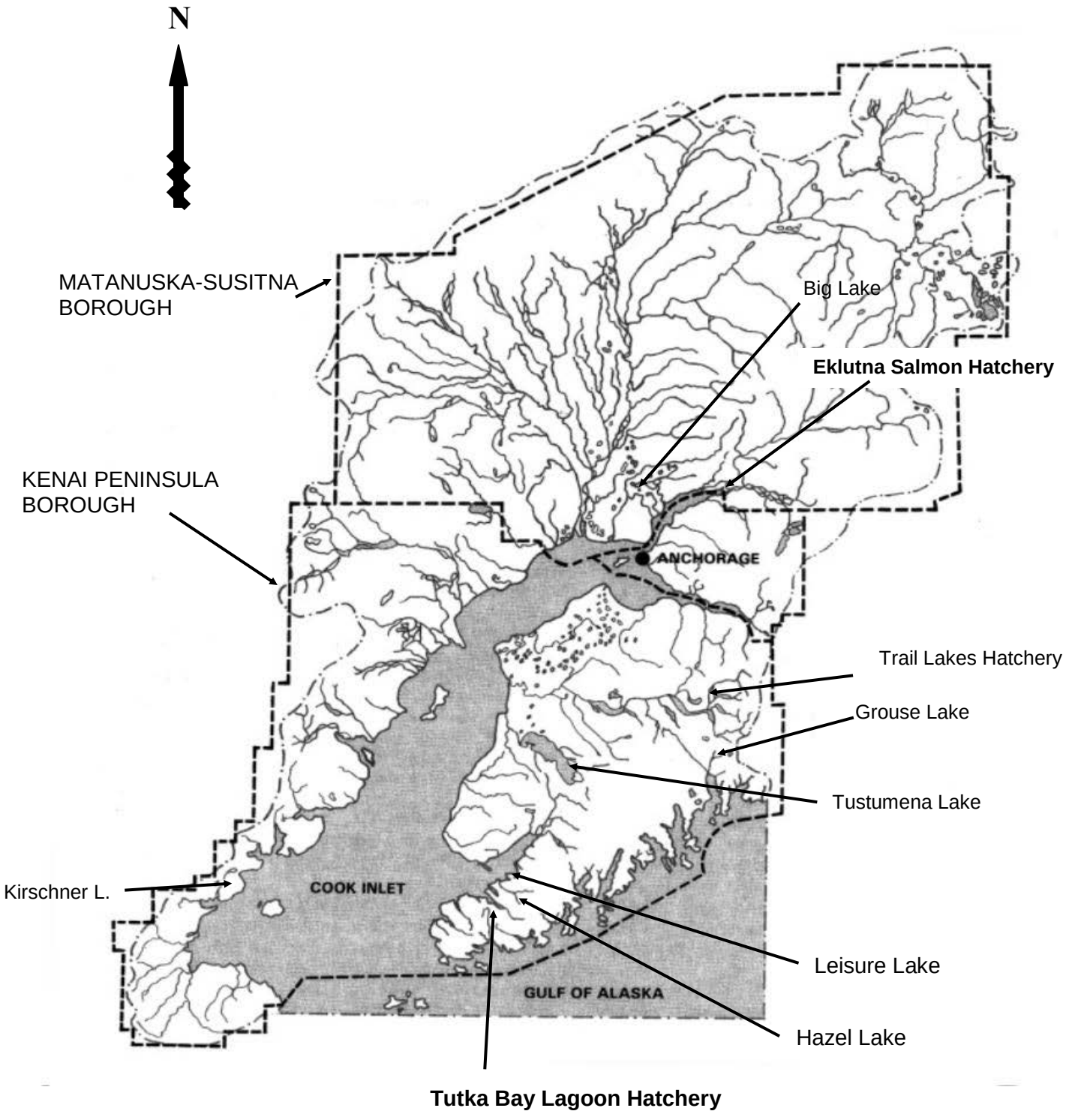


Figure 3.– Eklutna Salmon Hatchery and CIAA project locations.


Figure 4.–Location of Eklutna Salmon Hatchery.

# PROGRAM EVALUATIONS

## HATCHERY PERMITS AND OPERATING PLANS

Hatchery permit/BMP, AMP, and FTP documents for Eklutna Salmon Hatchery were reviewed to determine that they were consistent with each other for egg takes and releases, and were an accurate description of hatchery practices.

FTPs for some egg collections reported in annual reports appear to have been expired, including: the 1985 through 1987 pink salmon egg takes, the 1989 and 1995 coho salmon egg takes, and egg takes for all species from 1990 to 1992 (Appendix E). No FTP for the 1984 Chinook salmon egg take was found as well. The necessary FTPs were either not issued, or they were issued and not located by the author. In any event, the author found no correspondence by ADF&G that noticed CIAA regarding improper egg collections or juvenile releases.

## COMPREHENSIVE SALMON ENHANCEMENT PLAN

Knik River coho salmon and Matanuska River coho salmon are runs near ESH identified as significant stocks by the Cook Inlet Regional Planning Team (CIRPT) in the Cook Inlet Regional Salmon Enhancement Plan, Phase 2 (2007). The Little Susitna River pink salmon stock is the only area stock identified as a wild stock sanctuary/stock reserve. These stocks were identified by the RPT after the facility ceased operations.

## CONSISTENCY WITH POLICY

The policies governing Alaska hatcheries were divided into three categories for this review: genetics, fish health, and fisheries management. The key elements of the policies in each of those categories are summarized in Tables 1 through 3. These templates identifying the key elements of state policies were used to assess compliance of the ESH salmon program with each policy element in Tables 4 through 6.

Table 1.–Key elements of the ADF&G *Genetic Policy*.

| | |
|---|---|
| I. Stock Transport | |
| *Use of appropriate local stocks* | This element addresses Section I of the *Genetic Policy*, covering stock transports. The policy prohibits interstate or inter-regional stock transports, and uses transport distance and appropriate phenotypic characteristics as criteria for judging the acceptability of donor stocks. |
| II. Protection of wild stocks | |
| *Identification of significant or unique wild stocks* | Significant or unique wild stocks must be identified for each region and species as stocks most important to that region. The Regional Planning Teams should establish criteria for determining significant stocks and recommend such stock designations. |
| *Interaction with or impact on significant wild stocks* | Priority is given to protection of significant wild stocks from harmful interactions with introduced stocks. Stocks cannot be introduced to sites where they may impact significant or unique wild stocks. |
| *Use of indigenous stocks in watersheds with significant wild stocks* | A watershed with a significant wild stock can only be stocked with progeny from the indigenous stocks. The policy also specifies that no more than one generation of separation from the donor system to stocking of the progeny will be allowed. |
| *Establishment of wild stock sanctuaries* | Wild stock sanctuaries should be established on a regional and species basis. No enhancement activities would be allowed, but gamete removal would be permitted. The guidelines and justifications describe the proposed sanctuaries as gene banks of wild type variability. |
| III. Maintenance of genetic variance | |
| *Maximum of three hatchery stocks from a single donor stock* | A maximum of three hatchery broodstocks can be derived from a single donor stock. Offsite releases, such as for terminal harvest, should not be restricted by this policy if the release sites are selected so that they do not impact significant wild stocks, wild stock sanctuaries, or other hatchery stocks. |
| *Minimum effective population size* | The policy recommends a minimum effective population size of 400. It also recognizes that small population sizes may be unavoidable with Chinook and steelhead. |
| *Use of all segments of donor stock run timing* | To ensure all segments of the run have the opportunity to spawn, sliding egg take scales for donor stock transplants will not allocate more than 90% of any segment of the run for broodstock. |
| Genetics review of Fishery Transport Permits (5 AAC 41.010 – 41.050) | |
| *Review by geneticist* | Each application is reviewed by the geneticist, who then makes a recommendation to either approve or deny the application. The geneticist may also add terms or conditions to the permit to protect wild or enhanced stocks. |

Table 2.–Key elements of Alaska policies and regulations pertaining to fish health and disease.

| | |
|---|---|
| Fish Health and Disease Policy (5 AAC 41.080; amended by Meyers (2010)) | |
| *Egg disinfection* | Within 48 hours of taking and fertilizing live fish eggs or transporting live fish eggs between watersheds, all eggs must be treated with an iodine solution. This requirement may be waived for large scale pink and chum salmon facilities where such disinfection is not effective or practical. |
| *Hatchery inspections* | According to AS 16.10.460, inspection of the hatchery facility by department inspectors shall be permitted by the permit holder at any time the hatchery is operating. |
| *Disease reporting* | The occurrence of fish diseases or pathogens listed in 5AAC 41.080(d) must be immediately reported to the ADF&G Fish Pathology Section. |
| Pathology requirements for Fishery Transport Permits (FTPs) (5 AAC 41.010 – 41.050) | |
| *Disease history* | Applications for FTPs require either a complete disease history of the stock or a broodstock inspection and certification if the disease history is not available. |
| *Isolation measures* | Applications must list the isolation measures to be used during transport, including a description of containers, water source, depuration measures, and plans for disinfection. |
| *Pathology review of FTPs* | Each application is reviewed by the pathologist, who then makes a recommendation to either approve or deny it. The pathologist may also add terms or conditions to the permit to protect fish health. Transports of fish between regions are discouraged. |
| Sockeye Salmon Culture Policy | |
| *Alaska Sockeye Salmon Culture Manual* | The Sockeye Salmon Culture Policy is designed to control the occurrence of infectious hematopoietic necrosis virus (IHNV) in Alaska. The policy specifies the use of a virus-free water supply; rigorous disinfection procedures; compartmentalization of eggs and fry; and immediate destruction of infected fish, followed by disinfection. The *Alaska Sockeye Salmon Culture Manual* prescribes procedures and fish culture practices developed to control IHNV. |

Table 3.–Key elements of Alaska fisheries management policies and regulations relevant to salmon hatcheries and enhancement.

| | |
|---|---|
| Sustainable Salmon Fishery Policy (5 AAC 39.222) | |
| I. Management principles and criteria | |
| *Assessment of wild stock interaction and impacts* | As a management principle, the effect of enhanced stocks on wild stocks should be assessed. Wild stocks should be protected from adverse impacts from enhanced stocks. |
| Salmon Escapement Goal Policy (5 AAC 39.223) | |
| *Establishment of escapement goals* | Management of fisheries is based on scientifically-based escapement goals that result in sustainable harvests. |
| Mixed Stock Salmon Fishery Policy (5 AAC 39.220) | |
| *Wild stock conservation priority* | The conservation of wild stocks consistent with sustained yield is the highest priority in management of mixed-stock fisheries. |
| Fisheries management review of FTPs (5 AAC 41.010 – 41.050) | |
| *Review by management staff* | All proposed FTPs are reviewed by the regional supervisors for the Divisions of Commercial Fisheries and Sport Fish, the deputy director of Commercial Fisheries, and the local Regional Resource Development Biologist before consideration by the commissioner of ADF&G. Department staff may recommend approval or denial of the permit, and recommend permit conditions. |

## Genetics

### *Chinook, Chum, and Pink Salmon*

Wild Chinook, chum, and pink salmon donor stocks from systems near ESH were used for the initial broodstock for the hatchery.

### *Sockeye Salmon*

Tustumena Lake stock sockeye salmon was used at several release sites in Cook Inlet when the Crooked Creek Hatchery projects were moved to ESH in 1996, causing concern among some ADF&G staff for overuse of a single stock in so many projects. CIAA subsequently reduced the number of projects that used Tustumena Lake stock from eight to three.

### *Coho Salmon*

Initially, Fish Creek stock coho salmon eggs from Big Lake Hatchery were used at ESH. Fish Creek is located about 20 miles southwest of ESH.

Table 4.–The Eklutna Salmon Hatchery salmon enhancement program and its consistency with elements of the ADF&G *Genetic Policy*. (See Table 1).

| | |
|---|---|
| I. Stock Transport | |
| *Use of appropriate local stocks* | Moose Creek, a local stock, was the donor source for the single Chinook salmon egg collection. |
| | Matanuska, Susitna, Little Susitna, and Talkeetna rivers and Birch and Chunilna Creeks were permitted sources of chum salmon broodstock for the ESH, and are local stocks. |
| | Skwentna and Susitna rivers were the permitted source of pink salmon broodstock for the ESH, and are local stocks. |
| | Fish and Moose creeks were the permitted source of coho salmon broodstock for the ESH, and are local stocks. |
| | Sockeye salmon eggs were hatched at ESH and released elsewhere. The Tustumena Lake stock was at one time used in eight projects in Cook Inlet, raising concerns among some ADF&G staff that too many projects were using this single stock. The sockeye salmon enhancement projects using Tustumena Lake stock were subsequently reduced to three release sites. |
| II. Protection of wild stocks | |
| *Identification of significant or unique wild stocks* | Knik River coho salmon and Matanuska River coho salmon are stocks near ESH identified as significant stocks by the Cook Inlet Regional Planning Team (CIRPT) in the Cook Inlet Regional Salmon Enhancement Plan, Phase 2 (2007). These designations of significant stocks were published after the facility suspended operations. |
| *Interaction with or impact on significant wild stocks* | Straying was addressed with harvest of returning fish to the tailrace and to terminal areas below barriered lakes. Straying studies were required as a condition of the original permit through coded-wire-tagging and carcass sampling for marks on the Knik and Matanuska rivers. However, the author found no reports or evidence that these studies occurred. |
| *Use of indigenous stocks in watersheds with significant wild stocks* | The designation of significant stocks was published after the facility suspended operations. The ESH BMP indicated donor stocks should be selected based on the run timing of the donor sources and donor stocks located within 50 miles of Eklutna when possible. Donor stocks were to be inspected by the Pathology Section before introduction into the hatchery. Chinook, chum, pink, and coho salmon donor wild stocks were from nearby creeks and rivers. |
| *Establishment of wild stock sanctuaries* | Designations of wild stock sanctuary/reserve were published after the facility suspended operations. The Little Susitna River pink salmon stock is the only area stock identified as a wild stock sanctuary/stock reserve in the Cook Inlet Regional Salmon Enhancement Plan, Phase 2 (2007), and was not used at the hatchery. |

Table 4. Page 2 of 2.

| | |
|---|---|
| III. Maintenance of genetic variance | |
| *Maximum of three hatchery stocks from a single donor stock* | Although Tustumena Lake sockeye salmon stock was not used at more than three hatcheries in compliance with the *Genetic Policy*, up to eight sockeye salmon projects were simultaneously using Tustumena Lake sockeye salmon stock for releases. This became a concern among some ADF&G staff, and the number of projects using Tustumena stock was reduced to three.<br><br>Pink and chum salmon broodstocks used at ESH were not used for any other hatchery broodstocks. The Fish Creek coho salmon stock was also used at Big Lake Hatchery. |
| *Minimum effective population size of 400* | Well over 400 fish are necessary to meet egg-take goals for the pink, chum, and sockeye salmon projects. The author did not find any minimum requirement for the coho salmon egg collections, which would have required about 30 to 40 females. CIAA collected more broodstock than required for the coho egg takes, and later discarded surplus eggs. |
| *Use of no more than 90% of any run segment of donor stock so all segments of donor stock run can spawn* | ADF&G required guidelines for "insuring the reproductive viability" of the donor stocks. Some sites had minimum spawning escapement levels that had to be met before broodstock was taken. Where no spawning escapement goals were set, ADF&G required that where a weir or other enumeration method was possible, no more than 20% of the fish present could be used for broodstock; where enumeration was not possible because of low visibility from glacial water, etc., the site could only be used once per life cycle of chum salmon (once every four years). For pink salmon, no more than half of the spawning population available at permitted sites could be used for broodstock. |
| Genetics review of FTPs (5 AAC 41.010 – 41.050) | |
| *Review by geneticist* | The geneticist indicated that the Matanuska River was the preferred wild stock chum salmon source for ESH, but if that stock was not acceptable due to pathology concerns, then use of nearby stocks was acceptable.<br><br>The geneticist approved the pink and coho salmon programs without comment. |

## Fish health and disease

During the initial startup of the hatchery, the state pathologist advised against the use of Matanuska River chum salmon as broodstock due to a high incidence of bacterial kidney disease (BKD) in samples from the stock. The pathologist wrote that if it was necessary to use the Matanuska River stock, a program for controlling the disease would need to be established. In addition, several incubator lots of chum salmon were destroyed due to IHNV in 1984 and 1985. The source of the IHNV was thought to be from the Eklutna Lake water source for the hatchery.[12]

Chum salmon culture was suspended when sockeye salmon culture began, per the *Alaska Sockeye Salmon Culture Manual* which requires that sockeye salmon not be cultured in the same facility as other species known to have had IHNV (McDaniel et al. 2004). Several incubator lots of sockeye salmon were destroyed due to IHNV in 1993 and 1995 (Table 5).

Table 5.–The Eklutna Salmon Hatchery salmon enhancement program and its consistency with elements of the Alaska policies on fish health and disease. (See Table 2).

| | |
|---|---|
| Fish Health and Disease Policy (5AAC 41.080) | |
| *Egg disinfection* | The AMP calls for all eggs to be disinfected before loading into incubators. |
| *Hatchery inspections* | Hatchery inspections were conducted regularly from 1980 through 2007 (Appendix F). |
| *Disease reporting* | In 1984, chum salmon fry contracted Trichodina and bacterial gill disease. IHNV incidence in Chinook, chum, and sockeye salmon. Bacterial cold water disease reported in coho salmon. |
| Pathology requirements for FTPs (5AAC 41.010) | |
| *Disease history* | Tissue and fluid samples from donor stocks were sent to the ADF&G pathologist for analysis when requested. |
| *Isolation measures* | Chum salmon were held in separate compartments until IHNV analysis complete. Chum, pink, and coho salmon eggs from each stock were isolated from each other through placement in separate incubator stacks discharging into separate raceways. Sockeye salmon were to be cultured according to the *ADF&G Sockeye Salmon Culture Policy*. |
| *Pathology review of FTPs* | All FTPs for ESH programs were reviewed by the pathologist. |

[12] Don Collinsworth, ADF&G Commissioner, to Tom Mears, Executive Director, CIAA. November 14, 1985, letter. Obtained from Sam Raybung, ADF&G Private Nonprofit Hatchery Coordinator, Juneau.

## Fisheries management

Fisheries management where ESH fish would be caught was based on wild stock returns only. Representative numbers of ESH chum, Chinook, and coho salmon were marked with coded-wire tags to evaluate returns in the harvest. Releases of sockeye salmon were not marked, but the number released was limited to allow for management of wild stocks in the fisheries. Due to the location of the hatchery, cost recovery was restricted to the hatchery tailrace to avoid harvest of wild stocks (Table 6).

Table 6.–The Eklutna Salmon Hatchery salmon enhancement program and its consistency with elements of Alaska fisheries management policies and regulations. (See Table 3).

| | |
|---|---|
| Sustainable Salmon Fishery Policy (5 AAC 39.222) | |
| I. Management principles and criteria | |
| *Assessment of wild stock interaction and impacts* | Representative numbers of chum, sockeye, and coho salmon releases were marked with coded-wire tags. Tags were recovered in the harvest through a sampling program. |
| *Use of precautionary approach* | ADF&G manages the harvest based on wild stock returns only. Chum and coho salmon were required to be marked and then sampled in the harvest so that biologists could separate the hatchery component of the harvest. Releases of sockeye salmon were not marked. The original sockeye salmon program was proposed to be much larger, but the number released was limited to allow for management of wild stocks in the fisheries. Broodstock collected from wild stocks was contingent on first meeting escapement needs prescribed by ADF&G. |
| Salmon Escapement Goal Policy (5 AAC 39.223) | |
| *Establishment of escapement goals* | Escapement goals were not established in all systems where broodstock was taken. Broodstock collected from wild stocks was contingent on first meeting escapement needs prescribed by ADF&G. Fish returning to the hatchery were only harvested in the hatchery tailrace, and therefore did not impact spawning escapements to the Matanuska River. |
| Mixed Stock Salmon Fishery Policy (5 AAC 39.220) | |
| *Wild stock conservation priority* | Chum and coho salmon were required to be marked and then sampled in the harvest so that biologists could separate the hatchery component of the harvest. Releases of sockeye salmon were not marked, but the number released was limited to allow for management of wild stocks in the fisheries. Broodstock collected from wild stocks was contingent on first meeting escapement needs prescribed by ADF&G. |
| Fisheries management review of FTPs (5 AAC 41.010 – 41.050) | |
| *Review by management staff* | All FTPs were reviewed by fisheries management staff. |

# OTHER REQUIREMENTS

## ANNUAL REPORTING AND CARCASS LOGS

All hatcheries are required to submit an annual report to ADF&G that summarizes their production and activities for the year (AS 16.10.470). The annual report must include "information pertaining to species; broodstock source; number, age, weight, and length of spawners; number of eggs taken and fry fingerling produced; and the number, age, weight, and length of adult returns attributable to hatchery releases, on a form to be provided by the department." The completed report is due on December 15. Annual reports were received for all years of operation from ESH.

## SUMMARY

Although ESH is not operating at this time, the facility remains permitted. The facility appeared to be operating within ADF&G guidelines and policies when operations were suspended.

ADF&G Sport Fish Division currently uses the Eklutna facility to short-term rear and release coho and Chinook salmon from its Anchorage facilities. The current statewide stocking plan calls for stocking 150,000 Chinook salmon smolt and 120,000 coho salmon smolt annually at Eklutna.

## RECOMMENDATIONS

When ESH suspended operations in 1998, the permitted sockeye salmon egg capacity was 2 million eggs for releases directly from ESH, 6 million eggs for the Big Lake projects, and 10 million eggs for the LCI Lakes projects. The sockeye salmon projects for the Big Lake and LCI Lakes projects were transferred to Trail Lakes Hatchery, and onsite sockeye salmon releases were suspended.

The coho salmon permitted capacity in 1998 was 160,000 eggs for releases from the hatchery. ADF&G Division of Sport Fish continued coho salmon releases at Eklutna with juveniles hatched at the Fort Richardson Hatchery.

In 2008, the ESH BMP was amended so that ESH could serve as a backup rearing facility for up to 2.54 million sockeye salmon smolts from Trail Lakes Hatchery if the water supply at Trail Lakes Hatchery ran low. CIAA's PAR specifically requested no change in permitted egg capacity at ESH, which CIAA listed at 20 million sockeye salmon eggs and 1.1 coho salmon eggs. CIAA's listed capacities, however, appear to be the available incubation capacity, and not permitted capacity.

It is unclear what the current permitted capacity is at Eklutna. If the hatchery resumes operations, an updated BMP and associated PAR approvals will be required to address hatchery production based on the enhancement needs of the day.

# ACKNOWLEDGEMENTS

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# APPENDIX

Appendix A.–History of Eklutna Salmon Hatchery Permit and Permit Alteration Requests, 1982–2008.

| Date | Description | Permitted Capacity (green eggs) Pink/Chum | Coho | Chinook |
|---|---|---|---|---|
| 2/5/1982 | Original permit number 17 issued to CIAA. Permitted total of 20 million chum and/or pink salmon eggs combined, 100,000 coho salmon eggs, and 100,000 Chinook salmon eggs. Broodstock sources for chum salmon were the Matanuska, Knik, Little Susitna, and Susitna rivers. Sources for other species not identified. BMP indicated pink and chum salmon would be released from the hatchery, with coho and Chinook salmon released at offsite release sites. Allowed 2 million eggs from wild chum salmon broodstock for first four years, and up to 20 million eggs starting the fifth year collected from hatchery returns. Allowed 5 million eggs from wild pink salmon broodstock for first two years, and up to 20 million eggs starting the third year collected from hatchery returns. All species except pinks salmon would have a portion of releases tagged for fishery management of wild stocks and assessment of straying to spawning rivers, with tagging and assessment costs paid by CIAA. | 20 million | 100 thousand | 100 thousand |
| 6/7/1984 | PAR approved to incubate up to 100,000 coho salmon eggs for release from the hatchery, and increase from 100,000 to 1 million the number of coho salmon eggs incubated at Eklutna for release at remote release sites. Cover letter for PAR approval required all coho salmon releases from the hatchery to be marked. | 20 million | 1.1 million | 100 thousand |
| 1/16/1986 | PAR approved to extend taking wild chum salmon broodstock for 5 more years, and to increase egg-take level from wild broodstock from 2.0 to 3.0 million eggs per year. | 20 million | 1.1 million | 100 thousand |

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| Date | Description | Permitted Capacity (green eggs) | | | |
|---|---|---|---|---|---|
| | | Pink/Chum | Coho | Chinook | Sockeye |
| 2/11/1987 | PAR approved to reduce number of coho salmon marked from releases from the Eklutna Salmon Hatchery tailrace from 100% of releases to a representative number determined in consultation with ADF&G. | 20 million | 1.1 million | 100 thousand | |
| 6/12/1992 | PAR approved to add 2.0 million sockeye salmon eggs for release from the hatchery. Original request was for 8.5 million sockeye salmon eggs. However, ADF&G reviewers commented that there was not enough information provided in the document with regard to marking, fisheries management, etc. No more than 1.0 million sockeye salmon smolts could be released from the hatchery annually. Increase coho salmon egg take from 100,000 to 160,000 for release at the hatchery, in addition to the 1.0 million coho salmon egg-take limit for off-site releases. Pink, chum and Chinook salmon production was removed from the BMP, but not specifically removed in the PAR approval. | | 1.16 million | | 2.0 million |
| 07/14/1993 | PAR approved to move Big Lake Hatchery sockeye salmon program to ESH. Up to 9.0 million eggs taken annually at Big Lake for incubation at Eklutna and stocking up to 3.0 million fry in Big Lake, 2.0 million fry to Meadow Creek, and 1.0 million smolt limit release from the hatchery. | | 1.16 million | | 9.0 million |

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| Date | Description | Permitted Capacity (green eggs) | | | |
|---|---|---|---|---|---|
| | | Pink/Chum | Coho | Chinook | Sockeye |
| 11/1/1996 | PAR approved to incubate an additional 10.0 million sockeye salmon eggs for projects formerly permitted under the Crooked Creek Hatchery. Resulting fry used to stock lakes in the lower Cook Inlet, including Chenik, Kirschner, Ursus, Leisure, Bruin, Hazel, and Upper and Lower Paint River lakes. The updated BMP reduced the egg take for the Big Lake/Meadow Creek/Eklutna releases from 9.0 million to 8.0 million, but this was not stated in the notice of permit alternation. | | 1.16 million | | 18.0 million |
| 4/22/1997 | PAR approved to allow for sockeye salmon smolt in excess of the 1.0 million release limit at Eklutna to be released at Grouse Lake. | | 1.16 million | | 18.0 million |
| 1/06/2008 | In 1998, Eklutna suspended operations and moved the sockeye and coho salmon projects to the CIAA Trail Lakes Hatchery (TLH). The BMP was amended in 2008 to remove language describing operation of suspended projects, and establish Eklutna Hatchery as a temporary rearing facility for TLH smolt projects when water supplies at TLH are limited. The permitted capacity in the amended BMP was 2.56 million sockeye smolt transferred from TLH if needed. | | Uncertain | | Uncertain |

Appendix B.–Broodstock sources and egg collection numbers for the Eklutna Salmon Hatchery salmon projects, 1983–1997.

| Year | Salmon Species | Eggs | Source |
|---|---|---|---|
| 1983 | Chum | 1,050,000 | Matanuska River |
| | | 171,000 | Skwentna River |
| | | 60,000 | Little Susitna River |
| | | 258,000 | Chulitna River |
| | Coho | 52,000 | Fish Creek stock from Big Lake Hatchery |
| 1984 | Chum | 1,690,000 | Matanuska River |
| | | 497,000 | Skwentna River |
| | | 164,000 | Eklutna Hatchery Tailrace |
| | Pink | 445,000 | Skwentna River |
| | Coho | 150,000 | Fish Creek stock eggs transferred from Big Lake Hatchery |
| | Chinook | 96,000[a] | Moose Creek |
| 1985 | Chum | 1,715,000 | Eklutna Hatchery Tailrace |
| | | 1,640,000 | Matanuska River |
| | | 428,000 | Skwentna River |
| | Pink | 84,000 | Skwentna River |
| | Coho | 187,000 | Eklutna Hatchery Tailrace |
| 1986 | Chum | 3,156,000 | Matanuska River |
| | Pink | 53,000 | Eklutna Hatchery Tailrace |
| | Coho | 75,000 | Eklutna Hatchery Tailrace |
| 1987 | Chum | 3,019,000 | Matanuska River |
| | Coho | 125,000 | Eklutna Hatchery Tailrace |
| 1988 | Chum | 3,100,000 | Matanuska River |
| | | 3,780,000 | Eklutna Hatchery Tailrace |
| | Coho | 112,000 | Eklutna Hatchery Tailrace |
| 1989 | Chum | 4,259,000 | Eklutna Hatchery Tailrace |
| | Coho | 104,000 | Eklutna Hatchery Tailrace |
| 1990 | Chum | 3,050,000 | Eklutna Hatchery Tailrace |
| | Coho | 136,000 | Eklutna Hatchery Tailrace |
| 1991 | Chum | 3,965,000 | Eklutna Hatchery Tailrace |
| | Coho | 149,000 | Eklutna Hatchery Tailrace |
| 1992 | Coho | 73,000 | Eklutna Hatchery Tailrace |
| 1993 | Sockeye | 9,000,000 | Meadow Creek (Big Lake) |
| | Coho | 100,000 | Eklutna Hatchery Tailrace |
| 1994 | Sockeye | 7,755,000 | Meadow Creek (Big Lake) |
| | Coho | 100,000 | Eklutna Hatchery Tailrace |
| 1995 | Sockeye | 8,000,000 | Meadow Creek (Big Lake) |
| | Coho | 98,000 | Eklutna Hatchery Tailrace |
| 1996 | Sockeye | 8,000,000 | Meadow Creek (Big Lake) |
| | | 4,127,000 | Tustumena Stock eggs transferred from Crooked Creek Hatchery |
| | Coho | 100,000 | Eklutna Hatchery Tailrace |
| 1997 | Sockeye | 8,000,000 | Meadow Creek (Big Lake) |
| | | 4,041,000 | Tustumena Lake (Bear Creek) |

*Source*: Data from annual reports submitted by CIAA.

[a] All fish destroyed.

Appendix C.–Juvenile releases of salmon from the Eklutna Salmon Hatchery, 1984–1998. Data from annual reports submitted by CIAA.

| Year | Chum Salmon | Pink Salmon | Coho Salmon | Sockeye Salmon |
|---|---|---|---|---|
| 1984 | 928,000 | | 45,000 | |
| 1985 | | 282,000 | 43,000 | |
| 1986 | 1,600,000 | 31,000 | 101,000 | |
| 1987 | 2,700,000 | 38,000 | 148,000 | |
| 1988 | 2,700,000 | | 73,000 | |
| 1989 | 6,100,000 | | 51,000 | |
| 1990 | 3,200,000 | | 54,000 | |
| 1991 | 2,500,000 | | 21,000 | |
| 1992 | 3,100,000 | | 132,000 | |
| 1993 | | | 108,000 | 869,000 |
| 1994 | | | 62,000 | 5,000,000 |
| 1995 | | | 61,000 | 6,200,000 |
| 1996 | | | 69,000 | 5,000,000 |
| 1997 | | | 69,000 | 8,768,000 |
| 1998 | | | 108,000 | 9,564,000 |

*Note*: Numbers rounded.

Appendix D.–Adult returns of salmon to Eklutna Salmon Hatchery. Return includes all harvest and broodstock.

| Year | Chum Salmon | Pink Salmon | Coho Salmon | Sockeye Salmon |
|---|---|---|---|---|
| 1984 | 1,300 | | 560 | |
| 1985 | 3,200 | | 1,400 | |
| 1986 | 24,400 | 270 | 1,900 | |
| 1987 | 4,900 | | 11,600 | |
| 1988 | 12,400 | | 7,500 | |
| 1989 | 7,800 | | 1,900 | |
| 1990 | 50,400 | | 3,000 | |
| 1991 | 27,400 | | 2,200 | |
| 1992 | 3,100 | | 960 | |
| 1993 | 39,100 | | 2,800 | |
| 1994 | 76,600 | | 5,600 | 20 |
| 1995 | 114,100 | | 1,400 | 9,000 |
| 1996 | 23,700 | | 3,900 | 1,900 |
| 1997 | 1,900 | | 1,800 | 195,000 |
| 1998 | 330 | | 1,400 | 7,000 |
| 1999 | | | 3,000 | 42,100 |
| 2000 | | | | 8,900 |

*Note*: Data from annual reports submitted by CIAA.
*Note*: Numbers rounded.

Appendix E.–Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fish transport permits, and annual reports for the Eklutna Salmon Hatchery salmon projects, 1983–2008.

| Year | Salmon Species | Basic Management Plan Eggs | Annual Management Plan Eggs | Fish Transport Permit FTP No. | Fish Transport Permit Expiration | Fish Transport Permit Egg Collection or Juvenile Release | Annual Report Egg Collection or Juvenile Release |
|---|---|---|---|---|---|---|---|
| 1983 | Chum | 20 million total chum and/or pink | 2.0 million | 82A-0015 | 1985 | 2.0 million eggs | 1.5 million eggs |
| | | | | 82A-0016 | 1985 | 2.0 million eggs | |
| | | | | 82A-0018 | 1985 | 2.0 million eggs | |
| | | | | 82A-0019 | 1985 | 2.0 million eggs | |
| | | | | 82A-1049 | 1985 | 5.0 million eggs | |
| | | | | 82A-1050 | 1986 | 2.0 million eggs | |
| | Pink | | 5.0 million | 82A-1047 | 1984 | 2.0 million eggs | |
| | | | | 82A-104 | 1984 | 2.0 million eggs | |
| | Coho | 100,000 | 100,000 | 82A-1017 | 1983 | 100,000 eggs | 52,000 eggs[a] |
| | | | | 83A-1044 | 1985 | 100,000 eggs | |
| | Chinook | 100,000 | 100,000 | ??? | | | |
| 1984 | Chum | 20 million total chum and/or pink | 2.0 million | 82A-0015 | 1985 | 2.0 million eggs | 2.4 million eggs |
| | | | | 82A-0016 | 1985 | 2.0 million eggs | |
| | | | | 82A-0018 | 1985 | 2.0 million eggs | |
| | | | | 82A-0019 | 1985 | 2.0 million eggs | |
| | | | | 82A-1049 | 1985 | 5.0 million eggs | |
| | | | | 82A-1050 | 1986 | 2.0 million eggs | |
| | Pink | | 5.0 million | 82A-1047 | 1984 | 2.0 million eggs | 445,000 eggs |
| | | | | 82A-1048 | 1984 | 2.0 million eggs | |
| | Coho | 1.1 million | 150,000 | 83A-1044 | 1985 | 100,000 eggs | 150,000 eggs[a] |
| | | | | 84A-1019 | 1987 | 30,000 smolt | |
| | Chinook | 100,000 | 100,000 | No FTP Found | | | 96,000 eggs |
| 1985 | Chum | 20 million total chum and/or pink | 2.0 million | 82A-0015 | 1985 | 2.0 million eggs | 3.8 million eggs |
| | | | | 82A-0016 | 1985 | 2.0 million eggs | |
| | | | | 82A-0018 | 1985 | 2.0 million eggs | |
| | | | | 82A-0019 | 1985 | 2.0 million eggs | |
| | | | | 82A-1049 | 1985 | 5.0 million eggs | |
| | | | | 82A-1050 | 1986 | 2.0 million eggs | |
| | Pink | | 5.0 million | FTP expired | | | 84,000 eggs |
| | Coho | 1.1 million | 100,000 | 83A-1044 | 1985 | 100,000 eggs | 187,000 eggs |
| | | | | 84A-1019 | 1987 | 50,000 smolt | |
| | Chinook | 100,000 | 0 | | | | |

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| Year | Salmon Species | Basic Management Plan Eggs | Annual Management Plan Eggs | Fish Transport Permit FTP No. | Expiration | Egg Collection or Juvenile Release | Annual Report Egg Collection or Juvenile Release |
|---|---|---|---|---|---|---|---|
| 1986 | Chum | 20 million total chum and/or pink | 3.0 million | 86A-1001 | 1989 | 3.0 million eggs | 3.2 million eggs |
| | | | | 86A-1002 | 1989 | 3.0 million eggs | |
| | | | | 86A-1003 | 1989 | 3.0 million eggs | |
| | | | | 86A-1004 | 1989 | 3.0 million eggs | |
| | Pink | | 17.0 million | FTP expired | | | 53,000 eggs |
| | Coho | 1.1 million | 50,000 | 84A-1019 | 1987 | 50,000 smolt | 75,000 eggs |
| | Chinook | 100,000 | 0 | | | | |
| 1987 | Chum | 20 million total chum and/or pink | 3.0 million | 86A-1001 | 1989 | 3.0 million eggs | 3.0 million eggs |
| | | | | 86A-1002 | 1989 | 3.0 million eggs | |
| | | | | 86A-1003 | 1989 | 3.0 million eggs | |
| | | | | 86A-1004 | 1989 | 3.0 million eggs | |
| | Pink | | 17.0 million | ??? | | | |
| | Coho | 1.1 million | 50,000 | 84A-1019 | 1987 | 50,000 smolt | 125,000 eggs |
| | Chinook | 100,000 | 0 | | | | |
| 1988 | Chum | 20 million total chum and/or pink | 20 million | 86A-1001 | 1989 | 3.0 million eggs | 6.9 million eggs |
| | | | | 86A-1002 | 1989 | 3.0 million eggs | |
| | | | | 86A-1003 | 1989 | 3.0 million eggs | |
| | | | | 86A-1004 | 1989 | 3.0 million eggs | |
| | Pink | | 20 million less any taken from chum | | | | |
| | Coho | 1.1 million | 100,000 | 88A-1049 | 1988 | 72,000 fingerlings | 112,000 eggs |
| | Chinook | 100,000 | 0 | | | | |
| 1989 | Chum | 20 million total chum and/or pink | 20 million | 86A-1001 | 1989 | 3.0 million eggs | 4.3 million eggs |
| | | | | 86A-1002 | 1989 | 3.0 million eggs | |
| | | | | 86A-1003 | 1989 | 3.0 million eggs | |
| | | | | 86A-1004 | 1989 | 3.0 million eggs | |
| | Pink | | 0 | | | | |
| | Coho | 1.1 million | 100,000 | FTP expired | | | 104,000 eggs |
| | Chinook | 100,000 | 0 | | | | |

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| Year | Salmon Species | Basic Management Plan Eggs | Annual Management Plan Eggs | Fishery Transport Permit FTP No. | Expiration | Egg Collection or Juvenile Release | Annual Report Egg Collection or Juvenile Release |
|---|---|---|---|---|---|---|---|
| 1990 | Chum | 20 million total | 20 million | FTP expired | | | 3.0 million eggs |
| | Pink | chum and/or pink | 0 | FTP expired | | | 136,000 eggs |
| | Coho | 1.1 million | 100,000 | | | | |
| | Chinook | 100,000 | 0 | | | | |
| 1991 | Chum | 20 million total chum and/or pink | 20 million | FTP expired | | | 4.0 million eggs |
| | Pink | | 0 | | | | |
| | Coho | 1.1 million | 100,000 | FTP expired | | | 149,000 eggs |
| | Chinook | 100,000 | 0 | | | | |
| 1992 | Coho | 1.16 million | 100,000 | FTP expired | | | 73,000 eggs |
| | Sockeye | 2.0 million | 1.77 million | | | | |
| 1993 | Coho | 1.16 million | 100,000 | FTP expired | | | 100,000 eggs |
| | Sockeye | 9.0 million | 2 million | 93A-0028 | 1998 | 2.0 million eggs | 9.0 million eggs |
| | | | | 93A-0193 | 1998 | 7.0 million eggs | |
| 1994 | Coho | 1.16 million | 100,000 | FTP expired | | | 100,000 eggs |
| | Sockeye | 9.0 million | 9 million | 93A-0028 | 1998 | 2.0 million eggs | 7.8 million eggs |
| | | | | 93A-0193 | 1998 | 7.0 million eggs | |
| 1995 | Coho | 1.16 million | 100,000 | FTP expired | | | 100,000 eggs |
| | Sockeye | 9.0 million | 9 million | 93A-0028 | 1998 | 2.0 million eggs | 8.0 million eggs |
| | | | | 93A-0193 | 1998 | 7.0 million eggs | |
| | | | | 95A-0064 | 2005 | 1.67 million Smolt | |
| 1996 | Coho | 1.16 million | 160,000 | 96A-0028 | 2006 | 160,000 eggs | 100,000 eggs |
| | Sockeye | 18.0 million | 9 million | 93A-0028 | 1998 | 2.0 million eggs | 8.0 million eggs (plus 4.1 |
| | | | | 93A-0193 | 1998 | 7.0 million eggs | million eggs transferred from |
| | | | | 95A-0064 | 2005 | 1.67 million smolt | Crooked Creek Hatchery) |
| | | | | 96A-0077 | 1996 | 7.0 million eggs | |
| | | | | 96A-0080 | 2007 | 1.25 million fry | |
| | | | | 96A-0081 | 2007 | 2.5 million fry | |
| | | | | 96A-0088 | 2007 | 2.0 million fry | |

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| Year | Salmon Species | Basic Management Plan Eggs | Annual Management Plan Eggs | Fishery Transport Permit FTP No. | Expiration | Egg Collection or Juvenile Release | Annual Report Egg Collection or Juvenile Release |
|---|---|---|---|---|---|---|---|
| 1997 | Coho | 1.16 million | 0 | 96A-0028 | 2006 | 160,000 eggs | 100,000 eggs |
| | Sockeye | 18.0 million | 12.2 million | 93A-0028 | 1998 | 2.0 million eggs | 12.0 million eggs |
| | | | | 93A-0193 | 1998 | 7.0 million eggs | |
| | | | | 95A-0064 | 2005 | 1.67 million smolt | |
| | | | | 96A-0077 | 1996 | 7.0 million eggs | |
| | | | | 96A-0080 | 2007 | 1.25 million fry | |
| | | | | 96A-0081 | 2007 | 2.5 million fry | |
| | | | | 96A-0088 | 2007 | 2.0 million fry | |
| 2008 | Sockeye | 2.54 million smolt | 2.54 million smolt | 07A-0061 | 2011 | 1.54 million smolt | |
| | | | | 08A-0024 | 2010 | 1.0 million smolt | |

[a] Eggs transferred from Big Lake Hatchery to ESH.

Appendix F.–Summary of Fish Transport Permits for Eklutna Salmon Hatchery.

| FTP Number | Issued | Expiration | Summary and reviewer comments. |
|---|---|---|---|
| 82A-1015 | 1982 | 1985 | Incubate up to 2 million chum salmon eggs at ESH returning to the hatchery from earlier plants of Matanuska River origin fry and release resultant fry to Eklutna tailrace. |
| 82A-1016 | 1982 | 1985 | Incubate the lesser amount of either 2 million eggs or those eggs taken from up to 20 percent of the adult return of chum salmon to the Skwenta River at ESH and stock resultant fry to Eklutna tailrace. |
| 82A-1017 | 1982 | 1983 | Incubate up to 100 thousand Fish Creek coho salmon eggs at ESH and stock resultant fry to Cottonwood Creek as smolts. |
| 82A-1018 | 1982 | 1985 | Incubate the lesser amount of either 2 million eggs or those eggs taken from up to 20 percent of the adult return of chum salmon to the Susitna River at ESH and stock resultant fry to Eklutna tailrace. |
| 82A-1019 | 1982 | 1985 | Incubate the lesser amount of either 2 million eggs or those eggs taken from up to 20 percent of the adult return of chum salmon to the Matanuska River at ESH and stock resultant fry to Eklutna tailrace. |
| 82A-1047 | 1983 | 1985 | Incubate up to 5 million Skwentna River pink salmon eggs at ESH and stock resultant fry to Eklutna tailrace. |
| 82A-1048 | 1983 | 1985 | Incubate up to 5 million Susitna River pink salmon eggs at ESH and stock resultant fry to Eklutna tailrace. |
| 82A-1049 | 1983 | 1986 | Incubate the lesser amount of either 2 million eggs or those eggs taken from up to 20 percent of the adult return of chum salmon to the Susitna River (Willow Creek) at ESH and stock resultant fry to Eklutna tailrace. |
| 82A-1050 | 1982 | 1986 | Incubate up to 2 million Little Susitna River chum salmon eggs at ESH and stock resultant fry to Eklutna tailrace. |
| 83A-1044 | 1983 | 1985 | Incubate up to 100 thousand Moose Creek coho salmon eggs at ESH and stock resultant fry to Moose Creek as smolts. |
| 83A-1050 | 1984 | 1990 | Incubate up to 100 thousand Moose Creek Chinook salmon eggs at ESH and stock resultant fry to Moose Creek as smolts. |
| 84A-1019 | 1984 | 1987 | Release up to 30 thousand 1982 brood year Fish Creek coho salmon smolts at ESH. |
| 86A-1001 | 1986 | 1990 | Incubate the lesser amount of either 3 million eggs or those eggs taken from up to 20 percent of the adult return of chum salmon to the Matanuska River at ESH and stock resultant fry to Eklutna tailrace. |
| 86A-1002 | 1986 | 1990 | Incubate up to 3 million of chum salmon eggs from Birch Creek and slough at ESH and stock resultant fry to Eklutna tailrace. |
| 86A-1003 | 1986 | 1990 | Incubate up to 3 million of chum salmon eggs from Chunilna Creek (a Talkeetna River tributary) at ESH and stock resultant fry to Eklutna tailrace. |

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| FTP Number | Issued | Expiration | Summary and reviewer comments. |
|---|---|---|---|
| 88A-1049 | 1988 | 1988 | Release up to 72,000 coho salmon smolt to McRoberts Creek, (a tributary of Jim Creek). This release was so that surplus smolt could be released. Only 50 thousand smolt were allowed to be released from ESH, and no fry releases were allowed. A total of 120 thousand eggs were collected for genetic diversity for the 50 thousand smolt release, and surplus eggs normally were destroyed. This project allowed utilization of the surplus eggs for a remote release. |
| 93A-0028 | 1993 | 1998 | Transport of up to 1.77 million sockeye salmon eggs from Big Lake to Eklutna Salmon Hatchery for incubation, rearing and release as Age I smolt from ESH. The FTP was amended in June 1993 to increase the allowable egg take to a maximum of 2.0 million. No more than 1 million sockeye salmon smolt could be released from ESH each year. |
| 93A-0193 | 1993 | 1998 | Transport of up to 7.0 million sockeye salmon eggs from Big Lake to Eklutna Salmon Hatchery for incubation and short-term rearing. Fry will be returned to Big Lake for release. |
| 95A-0064 | 1995 | 1995 | Transport and release up to 1.67 million Age 1 Big Lake origin sockeye salmon smolts surplus to the Eklutna release goal (1.0 million) at Grouse Lake near Seward. |
| 96A-0028 | 1995 | 2006 | Collect up to 160 thousand Eklutna/Big Lake origin coho salmon eggs, rear fry and release up to 100 thousand smolts annually into the ESH tailrace. A sample of releases would be marked with coded-wire tags. |
| 96A-0077 | 1996 | 1996 | A one-time transport of approximately 7.0 million sockeye salmon eggs of Tustumena Lake origin from Crooked Creek Hatchery (CCH) to ESH. This FTP provided transition of some Lower Cook Inlet projects from CCH to ESH when CCH operations were suspended. |
| 96A-0078 | Denied | | Transport sockeye salmon eggs of Tustumena Lake origin to ESH, incubate and stock up to 500 thousand fry in Bruin Lake. FTP denied because CIAA board of directors suspended project after FTP application was submitted. |
| 96A-0079 | Denied | | Transport sockeye salmon eggs of Tustumena Lake origin to ESH, incubate and stock up to 3 million fry in Chenik Lake. FTP denied because CIAA board of directors suspended project after FTP application was submitted. |
| 96A-0080 | 1996 | 2007 | Transport sockeye salmon eggs of Tustumena Lake origin to ESH, incubate and stock up to 1.25 million fry in Hazel Lake. |
| 96A-0081 | 1996 | 2007 | Transport sockeye salmon eggs of Tustumena Lake origin to ESH, stock up to 250,000 fry in Kirschner Lake. |
| 96A-0083 | Denied | | Transport sockeye salmon eggs of Tustumena Lake origin to ESH, incubate and stock up to 1 million fry in Paint River Lakes. FTP denied because CIAA board of directors suspended project after FTP application was submitted. |
| 96A-0084 | Denied | | Transport sockeye salmon eggs of Tustumena Lake origin to ESH, and stock up to 500,000 fry in Ursus Lake. FTP denied because CIAA board of directors suspended project after FTP application was submitted. |
| 96A-0088 | 1996 | 2007 | Transport sockeye salmon eggs of Tustumena Lake origin to ESH, and stock up to 2 million fry in Leisure Lake. |

Appendix G.–Pathology Inspection Report summaries for Eklutna Salmon Hatchery, 1981 to 2007.

| Year | Observations and Issues | Recommendations |
|---|---|---|
| 1981 | Samples from Matanuska River chum salmon tested positive for BKD. | State pathologist recommended against using this stock as a brood source. |
| 1981 | Samples from Susitna River chum salmon tested negative for BKD. | Due to the absence of BKD, the state pathologist indicated this stock may be used a possible brood source. |
| 1982 | Samples from Jim Creek coho chum salmon tested positive for BKD. | State pathologist recommended against using this stock as a brood source. |
| 1982 | Samples from Willow Creek pink salmon tested negative for BKD. | Due to the absence of BKD, the state pathologist indicated this stock may be used a possible brood source. |
| 1985 | Chum and Chinook salmon at Eklutna Hatchery test positive for IHNV in February 1985. | State pathologist ordered destruction of all stocks of chum and king salmon in the hatchery. |
| 1985 | Chum and Chinook salmon at Eklutna Hatchery IHNV outbreak report in March 1985. | Destruction of all stocks of chum and king salmon in the hatchery and topical disinfection. |
| 1985 | IHNV management program drafted for the Eklutna Salmon Hatchery in July 1985. | Minimize access of adult fish upstream of hatchery water intake; attempt to locate source of 1984 IHN infestation, including sampling kokanee and other fish in the fresh water above the hatchery, and sockeye salmon in the Knik River; follow sockeye salmon manual procedures for chum salmon egg takes; reduce crowding of broodstock returns at the hatchery; and use well water instead of lake water for short-term fry rearing. |
| 1985 | Excessive siltation in hatchery causing potential for suffocating incubating salmon eggs in August 1985. | Retrofit plumbing if siltation did not reside on its own. |
| 1985 | Screen chum salmon eggs at Eklutna Hatchery for IHNV, which test positive for IHNV in September 1985. | State pathologist ordered destruction of all chum salmon eggs and chums salmon remaining in the tailrace. |
| 1987 | ADF&G FRED Division visit to assure hatchery would have a good marking plan and release strategy for coho salmon smolts. | Assessed loading options from hatchery to tanker trucks, and planned to sample scales for later stock separation. |

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| Year | Observations and Issues | Recommendations |
|---|---|---|
| 1988 | Evaluate the taking of chum salmon eggs from returns. | Three-year-olds (brood year 1985) showed the lowest IHNV in their parents and should be used for broodstock. Five-year-olds should be avoided due to IHNV in their parents. |
| 1989 | Hatchery Inspection. Hatchery clean and well organized. | Change pen enclosure material to reduce abrasion to rearing fish. |
| 1992 | Hatchery Inspection. Wood used in raceway areas cannot be disinfected. Footbaths in use but size and location make them difficult to use. | Replace wood planking for material that can be disinfected. Size and locate footbaths for increased use. |
| 1992 | Sockeye salmon laboratory examination due to undiagnosed mortality in hatchery. | All 1992 sockeye salmon lost to IHNV. Disinfect raceways after mortality picking. Replace wood planks at end of raceways. |
| 1994 | Hatchery Inspection. Hatchery has switched from chum to sockeye salmon production. For rearing sockeye salmon, should replace wood around rearing tanks, footbaths should be larger and better located, and small mammals need to be kept out of raceways. | Low-level fungal infestation. Pick mortalities and keep raceways clean to avoid additional infections. Replace wood planks that support incubators over raceways. Properly size and find better location for footbaths. The 1992 sockeye salmon IHNV outbreak may have been spread by small mammals and birds. Need some type of fence/wall where animals access the raceways. Put bird netting over raceways. Other improvements already made. |
| 1996 | Hatchery Inspection. Fall floods inundated motor control pad for water wells and wells shut off for a period of time. As a result, all raceways of pre-smolts contracted IHNV and were destroyed in the fall. Hypalon raceways leaking and could transmit virus between raceways. Sockeye salmon smolts should be reared in an enclosed raceway. | Smolt contracted IHNV previous fall and had to be destroyed when motor control pad was flooded, making well inoperable. So, lake water was used, which is known to carry IHNV. Recommend protecting motor control pad and enclosing outside smolt raceways. Replace hypalon raceways with aluminum. |
| 2007 | Hatchery Inspection. Fish diagnosed with external flavobacteriosis and bacterial coldwater disease. Recent history of gas bubble disease. Wood around raceways. Hypalon lined raceways worn and growing algae. Dog walking around outdoor rearing units. Fish food stored indoors and outdoors on pallets. | Replace wood around raceways, store fish food away from scavengers, replace hypalon liners in raceways, monitor for cause of supersaturation, restrict access of dogs to hatchery rearing areas. |