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An Evaluation of the Haines Projects Hatchery Permit for Consistency with Statewide Policies and Prescribed Management Practices

by

Mark Stopha

June 2015

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

Symbols and Abbreviations

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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, χ^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

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AN EVALUATION OF THE HAINES PROJECTS HATCHERY PERMIT FOR CONSISTENCY WITH STATEWIDE POLICIES AND PRESCRIBED MANAGEMENT PRACTICES

by
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The Regional Information Report Series was established in 1987 and was redefined in 2006 to meet the Division of Commercial Fisheries regional need for publishing and archiving information such as project operational plans, area management plans, budgetary information, staff comments and opinions to Board of Fisheries proposals, interim or preliminary data and grant agency reports, special meeting or minor workshop results and other regional information not generally reported elsewhere. Reports in this series may contain raw data and preliminary results. Reports in this series receive varying degrees of regional, biometric and editorial review; information in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author or the Division of Commercial Fisheries if in doubt of the level of review or preliminary nature of the data reported. Regional Information Reports are available through the Alaska State Library and on the Internet at http://www.adfg.alaska.gov/sf/publications/

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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 each hatchery for consistency 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 found. Management plans and permits were examined to determine whether they were current, consistent with each other, and accurately described hatchery operations.

This report reviews the Haines Projects located in the Chilkat and Klehini river watersheds near Haines, Alaska. The Haines Projects operate under a private nonprofit hatchery permit issued to the Northern Southeast Regional Aquaculture Association, and include spring-fed streamside incubators for fall-run chum salmon *Oncorhynchus keta* and early to mid-run sockeye salmon *O. nerka*.

Gametes are collected from broodstock caught near each incubator site. Fertilized eggs are placed in the incubators and the fry volitionally leave the following spring. Egg to fry survival is estimated by counting dead eggs remaining after fry leave the incubators in the spring.

The number of eggs permitted for incubation is minimal compared to total production in the drainage, and returns from the fry releases do not impact fisheries management. Releases have been otolith marked in only a few years, and therefore success of project and contribution to the fishery is unknown. The sockeye and chum salmon incubator programs have been suspended by Northern Southeast Regional Aquaculture Association but remain permitted.

Key words: Haines Projects, Chilkat River, Chilkat Lake, Klehini River, hatchery evaluation, hatchery, chum salmon, sockeye salmon

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, Article 8, section 15 of Alaska's Constitution was amended by popular vote 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 natural 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).

Salmon fishery restoration efforts came in response to statewide annual salmon harvests of just 22 million fish in 1973 and 1974, among the lowest catches since 1900 (Figure 1). 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 nonutilized 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 the available feed for juvenile salmon (FRED 1975). A combination of favorable environmental conditions, limited fishing effort, abundance-based harvest management, habitat improvement and protection, and hatchery production gradually boosted salmon catches, with recent commercial salmon harvests (2004–2013) averaging 180 million fish.[1]

In Alaska, the purpose of salmon hatcheries is to supplement natural stock production for public benefit. Hatcheries are efficient in improving survival from the egg to fry or smolt stage. In natural production, estimates for pink salmon *Oncorhynchus gorbuscha* egg to fry survival in two Southeast Alaska creeks ranged from less than 1% up to 22%, with average survivals from 4% to 9% (Groot and Margolis 1991). Under hatchery conditions, egg to fry survival is usually 90% or higher.

Alaska hatcheries do not grow fish to adulthood, but incubate fertilized eggs and release resulting progeny as juveniles. 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. Also per state policy, 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. In this document, *wild* fish refer to fish that are the progeny of parents that naturally spawned in watersheds and intertidal areas. *Hatchery* fish are fish reared in a hatchery to a juvenile stage and released. *Farmed* fish are fish reared in captivity to market size for sale. Farming of finfish, including salmon, is not legal in Alaska (Alaska Statue 16.40.210).

Hatchery production is limited by freshwater capacity and freshwater rearing space. Soon after emergence, all pink and chum salmon *O. keta* fry can be transferred from fresh water to salt water. Most Chinook *O. tshawytscha*, sockeye *O. nerka*, and coho salmon *O. kisutch* must spend a year or more in fresh water before fry develop to the smolt stage and can tolerate salt water. These three species require a higher volume of fresh water for rearing. 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 at harvest, chum and pink salmon are more economical to rear in the hatchery setting and generally provide a higher economic return.

[1] Data from http://www.adfg.alaska.gov/index.cfm?adfg=CommercialByFisherySalmon.exvesselquery (accessed 08/12/14).

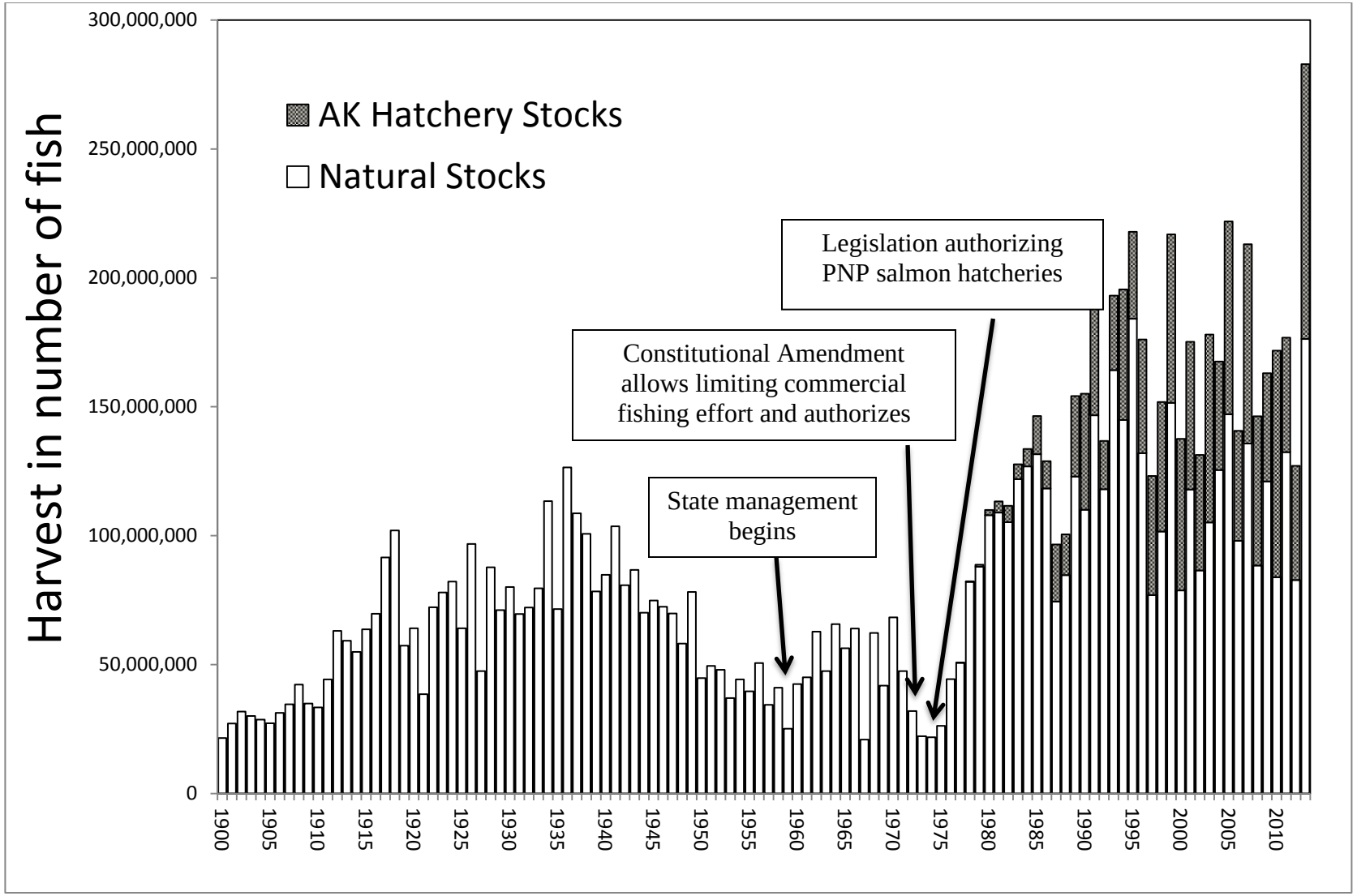

Figure 1.–Commercial salmon harvest in Alaska, 1900–2012.

Source: 1900–1976 from Byerly et al. (1999); 1977–2013 from Vercessi (2014).

Pink salmon 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 2004 to 2013, pink salmon accounted for an average 74% of Alaska hatchery salmon returns by number, followed by chum (20%), sockeye (4%), coho (2%) and Chinook salmon (<1%; White 2005–2011; Vercessi 2012–2014).

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 year-round supplies of high quality fresh farmed salmon flooded the marketplace in the U.S., Europe, and Japan.

The Alaska fishing industry responded to the competition by improving fish quality 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 12–15% of the global supply of salmon (Alaska Seafood Marketing Institute 2011). 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 (2004–2013) despite large fluctuations in harvest volume (ADF&G 2014, Stopha 2013a).

Exvessel value[2] of the commercial hatchery harvest increased from $45 million in 2004 to $191 million in 2013, with a peak value for the decade of $204 million in 2010. First wholesale value[3] also showed an increasing trend, with the value of hatchery fish increasing from $138 million in 2004 to a decadal high value of $532 million in 2013. Pink and chum salmon combined accounted for about 80% of both the exvessel value and the first wholesale value of the hatchery harvest from 2004 to 2013.

From 2004 to 2013, hatcheries contributed about a third of the total Alaska salmon harvest, in numbers of fish (White 2005–2011; Vercessi 2012–2014). 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 by ensuring adequate numbers of adults spawn, and the wild harvest is arguably at its maximum, given fluctuations due to environmental variability and imperfect management precision. Unlike Pacific Northwest systems, such as the Columbia River—where habitat loss, dam construction, and urbanization led to the decline of salmon stocks to the point of endangered species listings—Alaska's salmon

[2] 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 02/04/2014), multiplied by the hatchery percent of the commercial harvest in Farrington 2003, 2004; White 2005–2011; and Vercessi 2013.

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

habitat is largely intact. ADF&G, with the assistance and sacrifice of commercial, sport, personal use and subsistence users, has been successful in recovery of several populations identified as *stocks of concern* through restricted fishing and intensive spawning assessment projects. 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.

Alaska's salmon fisheries are among the healthiest in the world. The 2013 season was a record harvest overall, with the 283 million fish commercial harvest comprised of the second highest catch for wild stocks (176 million) and the highest catch for hatchery stocks (107 million) in Alaska's history (Figure 1). The 2013 season was the first year the hatchery harvest alone exceeded 100 million fish. The 2013 hatchery harvest was greater than the entire statewide commercial salmon harvest in 1987 and every year prior to 1980 except for 6 years (1918, 1934, 1936, 1937, 1938, and 1941; Figure 1).

Part of the reason for the rise in price of Alaska salmon was a message of the state's sustainable fisheries management to a growing audience of discriminating buyers. The Alaska Seafood Marketing Institute applied to the Marine Stewardship Council (MSC) for certification as a sustainably managed fishery. In 2000, the MSC 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 et al. 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). The first of these evaluations was published by ADF&G in 2011 (Musslewhite 2011a).

The Alaska Seafood Marketing Institute changed to a new sustainable fishery certification under the Food and Agriculture Organization in 2011 (Global Trust Certification Ltd. 2011). The hatchery evaluations started under the MSC certification program continued as an important systematic assessment of Alaska salmon fishery enhancement and its relation to wild stock production—at a time of heightened interest in increased hatchery production and the potential impacts on wild salmon production. ADF&G established a rotational schedule to review PNP hatchery programs. Musslewhite (2011a, 2011b) completed hatchery reviews for the Kodiak region in 2011, Stopha and Musslewhite (2012) completed the hatchery review for Tutka Bay Lagoon Hatchery in Cook Inlet, and Stopha (2012a, 2012b, 2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2014a, 2014b, 2014c, 2014 In Prep[a], In Prep [b]) completed reviews of the Trail Lakes, Port Graham and Eklutna hatcheries in Cook Inlet and the Solomon Gulch, Gulkana, Main Bay, Cannery Creek, Wally Noerenberg and Armin F. Koernig hatcheries in

Prince William Sound, and the Macaulay, Sheep Creek, Snettisham, Medvejie and Hidden Falls hatcheries in northern Southeast Alaska. This report is for the Haines Projects located near Haines, Alaska. Following completion of reviews of hatcheries in the northern Southeast Alaska region, reviews of hatcheries in southern 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, pathologists, and the ADF&G commissioner.

A variety of policies guide the permitting of salmon fishery enhancement projects. They include *Genetic Policy* (Davis et al. 1985), Policies and guidelines for Alaska fish and shellfish health and disease control (Meyers 2014), and 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 (except U.S./Canada transboundary rivers); restricting transportation of stocks between the major geographic areas in the state (Southeast, Kodiak Island, PWS, Cook Inlet, Bristol Bay, Arctic-Yukon-Kuskokwim, and Interior); requiring the use of local 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: "Significant or unique wild stocks must be identified on a regional and species basis so as to define sensitive and nonsensitive areas for movement of stocks." In addition, the *Genetic Policy* suggests that drainages be established as wild stock sanctuaries where no enhancement activity is permitted except for gamete removal for broodstock development. The wild stock sanctuaries were intended to preserve a variety of wild types for future broodstock development and outbreeding for enhancement programs.

These stock designations are interrelated with other restrictions of the *Genetic Policy*, including (1) hatchery stocks cannot be introduced to sites where the introduced stock may have significant interaction or impact on significant or unique wild stocks; (2) a watershed with a significant stock can only be stocked with progeny from the indigenous stocks; and (3) fish releases at sites where no interaction with, or impact on, significant or unique stock will occur, and which are not for the purposes of developing, rehabilitation, or enhancement of a stock (e.g., releases for terminal harvest or releases in landlocked lakes) will not produce a detrimental genetic effect. Davis and Burkett (1989) suggest that regional planning teams (RPTs) are an appropriate body to designate significant and unique wild stocks and wild stock sanctuaries. To date, only the Cook

Inlet RPT has established significant stocks and wild stock sanctuaries. In addition, the Phase III Comprehensive Salmon Plan (described in the next paragraph) for Southeast Alaska includes a *stock appraisal tool*, which identifies criteria to be used for evaluating the significance of a wild stock that may potentially interact with hatchery releases.

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."

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 Meyers (2014). 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 ADF&G fish pathologists 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 (5 AAC 41.080) 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.

The initial rotation of these evaluation 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 gradually transferred operations of most facilities to PNP corporations. Regional aquaculture associations (RAAs), whose membership is comprised of the commercial salmon fishing permit

holders and representatives of other user groups interested in fisheries within the region, operate most of the PNP hatcheries in Kodiak, Cook Inlet, PWS, and Southeast Alaska. 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. RAA members may vote to impose a salmon enhancement tax on sale of salmon in their region to finance hatchery operations and enhancement and rehabilitation activities. Independent PNP corporations, not affiliated with an RAA, also operate hatcheries in several areas of the state. Both the RAAs and independent PNP hatchery organizations may harvest salmon returning to their release sites to pay for operations. Such harvests by hatchery operators are called *cost-recovery fisheries*, and are in contrast to *common property commercial fisheries*, which are fisheries open to all commercial fishing permit holders. Several organizations have tourist and educational programs that contribute to the financial support of their programs, as well.

RAAs do not receive a blanket permit for their hatcheries. Each hatchery is permitted separately. Application for a hatchery permit is an extensive process (5 AAC 40.110–40.230). An application consists of the goals of the hatchery, production goals and hatchery site information, water flow and chemistry data, land ownership and water rights, hatchery design, initial proposed broodstock for the hatchery, and a financial plan. ADF&G staff review the application with the applicant, address any deficiencies, and draft a fishery management feasibility analysis for the proposed hatchery. The RPT reviews the hatchery plan to determine if the hatchery operation is compatible with the regional comprehensive salmon plan. A public hearing is then held where the applicant describes the proposed hatchery plan. ADF&G staff present the basic management plan for the hatchery, including fish culture aspects of the proposed hatchery and management of the hatchery return. Public testimony and questions follow the presentations. ADF&G must respond in writing to any specific objections.

Following review by the RPT and the public hearing, the application is sent to the ADF&G commissioner for final consideration. By regulation (5AAC 40.220) the commissioner's decision is based on consideration of (1) the suitability of the site for making a reasonable contribution to the common property fishery, not adversely affect management of wild stocks, and not requiring significant alterations of traditional fisheries; (2) the hatchery making the best use of the site's potential to benefit the common property fishery; (3) the harvest area size at the hatchery being sufficient in size to provide a segregated harvest of hatchery fish of acceptable quality for sale; (4) proposed donor sources meeting broodstock needs for the hatchery for the first cycle; (5) water sources for the hatchery being secured by permit and are of appropriate quality and quantity; and (6) the hatchery having a reasonable level of operational feasibility and an acceptable degree of potential success.

Public participation is an integral part of the PNP hatchery system. 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. Hearings are held before a hatchery is permitted for operation. RPTs comprised of ADF&G and RAA representatives hold public meetings to define desired production goals by species, area, and time, and document these goals in comprehensive salmon plans (5 AAC 40.300). RPTs hold public meetings to review applications for new hatcheries and to make recommendations to the ADF&G commissioner regarding changes to existing hatchery operations, new hatchery production, and new hatchery facilities.

Alaska PNP hatcheries operate under four documents required in regulation: hatchery permit with basic management plan (BMP), annual management plan (AMP), fish transport permit (FTP), and annual report (Figure 2).

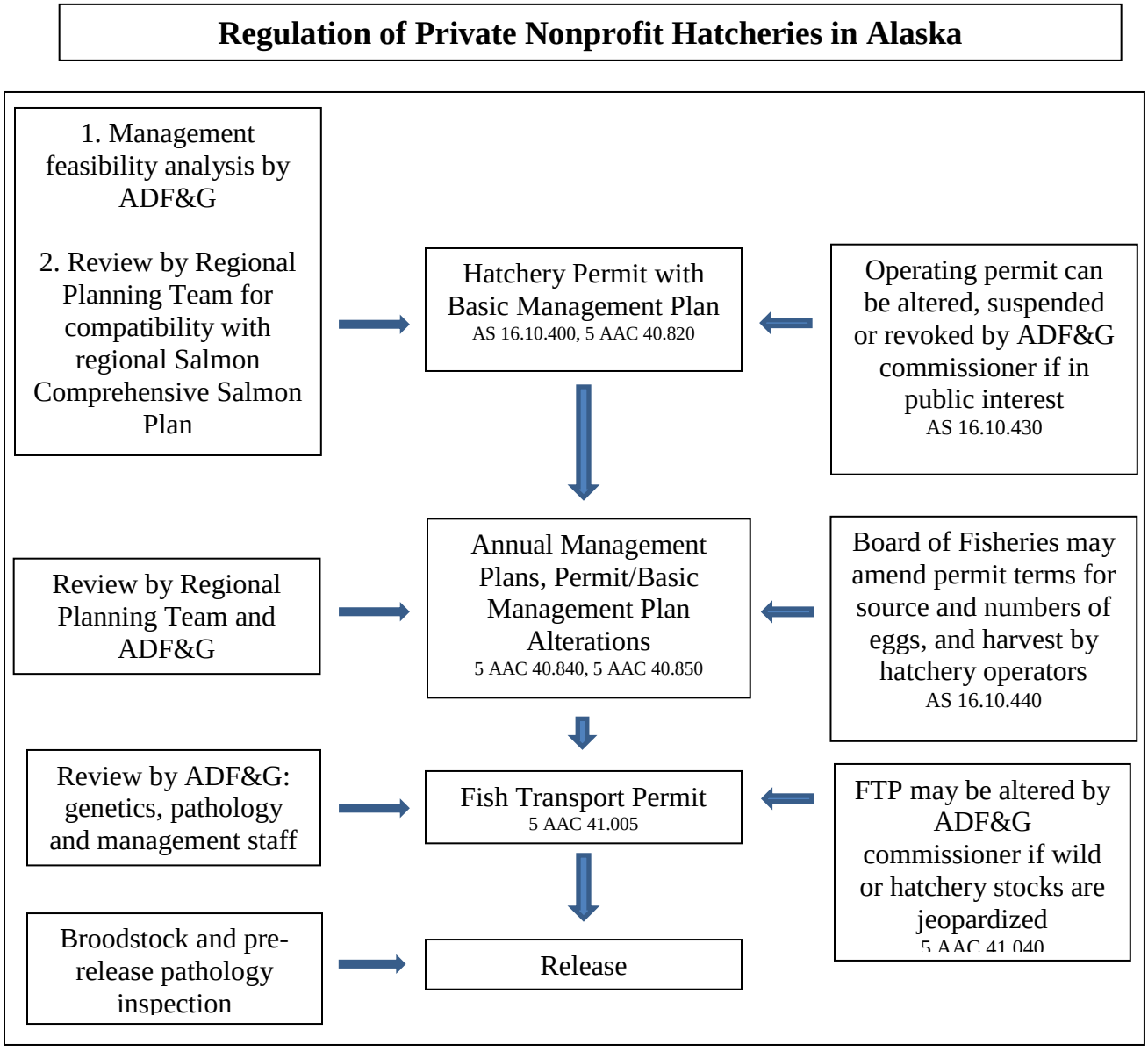

Figure 2.–Diagram of Alaska hatchery permitting process.

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 allowed 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. Hatchery permits remain in effect unless relinquished by the permit holder or revoked by the ADF&G commissioner.

Hatchery permits and BMPs may be amended by the permit holder through a permit alteration request (PAR). Requested changes may be reviewed by the RPT and ADF&G staff and a recommendation is sent to the ADF&G commissioner for consideration. If no agreement is reached through the RPT, the PAR is sent to the commissioner without a recommendation. If approved by the commissioner, 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. It 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 current 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 specific activities described in the hatchery permit and management plans, including broodstock sources, gamete collections, and release sites. All FTP applications are currently reviewed by the ADF&G fish pathologist, fish geneticist, regional resource development biologist, and other ADF&G staff as delegated by the ADF&G commissioner. Reviewers may suggest conditions for the FTP. Final consideration of the application is made by the ADF&G commissioner or commissioner's delegate. An FTP is issued for a fixed time period and includes both the specifics of the planned operation and any conditions added by the ADF&G commissioner.

Each hatchery is required by law to submit an annual report documenting egg collections, juvenile releases, current year run sizes, contributions to fisheries, and projected run sizes for the following year (AS 16.10.470). Information for all hatcheries is compiled into an annual ADF&G report (e.g., Vercessi 2014) 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 spans generations of hatchery and ADF&G personnel, providing an important history of each hatchery's species produced, stock lineages, releases, returns, and pathology.

HAINES PROJECTS HISTORY

The Haines Projects program consists of spring-fed streamside incubators for fall-run chum salmon and early- to mid-run sockeye salmon near Haines (Figure 3). Each incubator consists of an outer box and a covered inner box of slightly smaller dimensions with a perforated bottom. Gravity fed water is introduced into the outer box, which then upwells through the substrate and eggs in the inner box. Water exits at the top edge of the outer box.[4] Fertilized eggs are placed in the incubators from broodstock collected near the site and fry emigrate volitionally from the

[4] Haines Projects BMP, p. 2. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

incubator in the spring. Survival is estimated by counting the number of dead eggs remaining after the spring fry emigration.

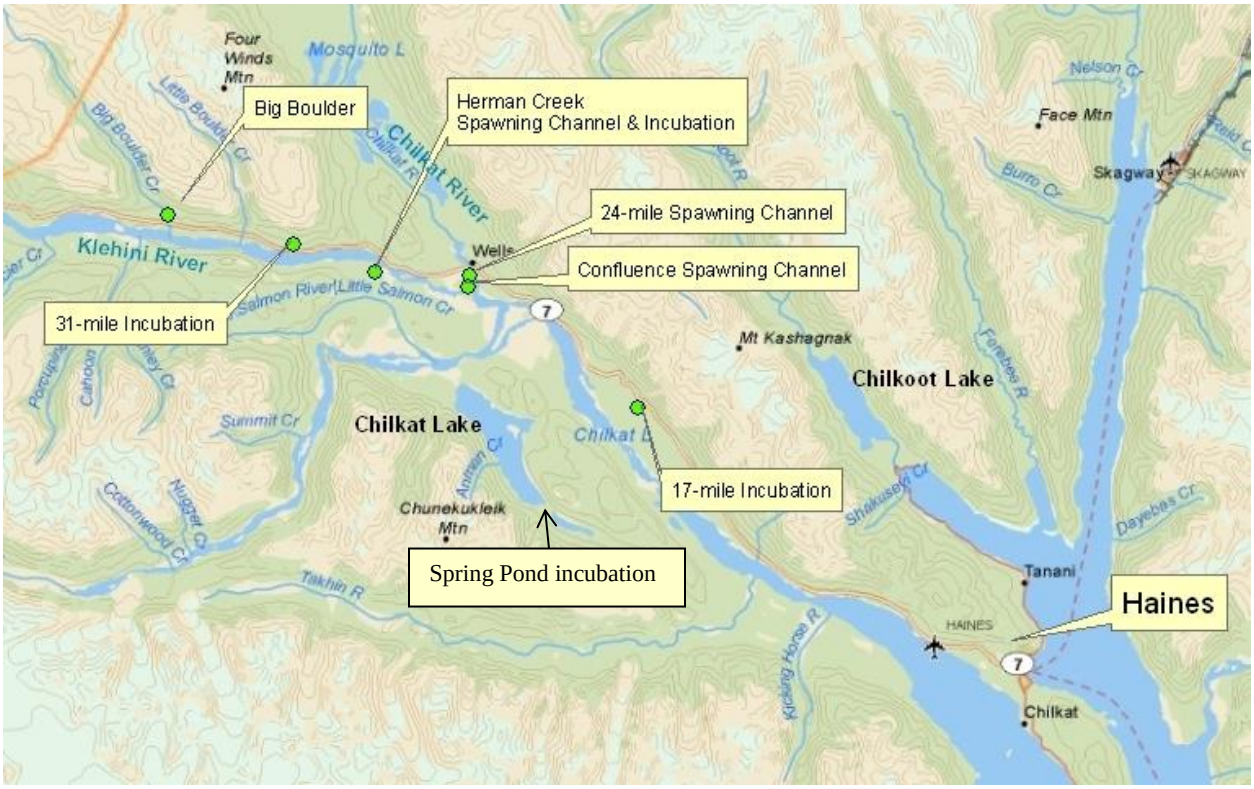

Figure 3.–Haines area chum salmon incubation projects at 31 Mile, 17 Mile and Herman Creek Spawning Channel.

Source: http://www.nsraa.org/?page_id=394 (accessed 12/9/2014).

Chum salmon projects began in 1984 on the Klehini River, a tributary of the Chilkat River near the community of Klukwan north of Haines. Northern Southeast Regional Aquaculture Association (NSRAA) was issued a scientific/educational permit[5] to evaluate a pilot project on a small tributary of the Klehini River located near Mile 31 of the Haines Highway. In 1989, a second incubation site was added at a tributary to the Klehini River at Mile 17 of the Haines Highway. In 1991, an additional site was added at Mile 30.5 Haines Highway. All sites used broodstock from the Klehini River. A similar streamside incubation project with sockeye salmon was conducted at Chilkat Lake beginning in 1988 with broodstock from Chilkat Lake tributaries.

By 1991, the streamside incubation projects had proven successful in producing fry and were permitted to incubate over a million eggs. At that time, ADF&G required NSRAA to submit an application for a PNP hatchery permit to continue the program as production projects supporting the commercial fishery.

[5] These permits are issued for projects such as classroom incubation projects in schools and for hatchery experimental and feasibility studies. The permittee does not require a PNP or other hatchery permit.

NSRAA staff submitted an application for a PNP hatchery permit in 1991. The application described the ongoing instream incubation projects and their goals of increasing sockeye and chum salmon production primarily for the Lynn Canal gillnet fleet. The application was for start-up production of 800,000 eggs at site Mile 31 and Mile 30.5 sites using Klehini River chum salmon broodstock, and 1 million sockeye salmon eggs at Chilkat Lake using broodstock from Chilkat Lake.

In the fishery management analysis, the ADF&G Haines area management biologist indicated that for sockeye salmon, the maximum benefit to the fleet would be production of early- and middle-run portions of the Chilkat Lake stock, as the late portion of the stock was already productive and generally meeting escapement needs. He also stated that limnology studies indicated that sockeye salmon rearing may be at a level which was half of capacity.[6] For chum salmon, he indicated that the project goal should be to bring fall-run chum salmon abundance to a level which would enable the Lynn Canal sockeye salmon commercial fishery to continue into the fall without time reductions due to chum salmon conservation concerns.[7]

A public hearing was held in Haines in May 1992. All public testimony was in favor of issuing the permit. The Northern Southeast Regional Planning Team (NSERPT) approved issuing the permit; the only concern was that the low level of production from the incubators would make such a minor contribution to fisheries that it would be impossible to evaluate the success of the program.[8]

The PNP hatchery permit was issued to NSRAA for the Haines Projects in September 1992 for a permitted capacity of 800,000 chum and 2 million sockeye salmon eggs (Appendix A). The sockeye salmon program included up to four sites, with three sites (Spring Pond and two other inlet streams to Chilkat Lake) permitted for up to 600,000 eggs each and the fourth site (Slide Creek) permitted for 200,000 eggs.

The sockeye salmon program began with two incubators at the Spring Pond site with a total 600,000 egg capacity (FTP 93J-1001, Appendix B). In 1996, another incubation box site to incubate up to 600,000 eggs at Garrison Creek on the southwest shore of Chilkat Lake was added by permit amendment (FTP 96J-1011). In 1997, a permit amendment was approved to increase sockeye salmon capacity at Spring Pond from 600,000 to 1.2 million eggs (FTP 97J-1021). This was the last permit amendment to date for sockeye salmon, and the overall sockeye salmon capacity for the Haines Projects permit remains at 2.0 million eggs.

In 1994, the Sweetheart Lake sockeye salmon stocking project was added to the Haines Project hatchery permit. This project entailed collecting gametes from broodstock from Crescent Lake in Port Snettisham, incubating the eggs in Snettisham Hatchery, and releasing fry to Sweetheart Lake, a barriered lake that empties into Port Snettisham. Apparently, this transfer to the Haines Project was a procedural placeholder to continue the program when the operation of Snettisham Hatchery was in the process of transfer from ADF&G to a private PNP hatchery operator. The

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[6] Memorandum from Ray Staska, ADF&G Area Management Biologist, to Steve McGee, ADF&G Fishery Biologist, PNP Program, regarding Chilkat Lake Incubation Box Facility for Sockeye dated Oct. 7, 1991. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[7] Memorandum from Ray Staska, ADF&G Area Management Biologist, to Steve McGee, ADF&G Fishery Biologist, PNP Program, regarding MFA Klehini River Incubation Facilities for chum salmon Oct. 17, 1991. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[8] Memorandum from Steve McGee, ADF&G Fishery Biologist, PNP Program, to Carl Rosier, ADF&G commissioner dated Sept. 4, 1992. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

project was removed from the Haines Projects permit in 1996 and added to the Snettisham Hatchery permit when it was issued to Douglas Island Pink and Chum, Inc. (DIPAC) the same year. The Sweetheart project is described in Stopha (2014a).

Initial chum salmon production was at the incubator site at Mile 31 of the Haines Highway (aka Mile 31 site). The chum salmon incubation site at Mile 17 of the Haines Highway (aka Mile 17 site) established in 1989 under a scientific/educational permit was added to the hatchery permit by an amendment in 1993 with a permitted capacity of an additional 500,000 eggs. This increased overall chum salmon permitted capacity to 1.3 million eggs.

In 2006, a permit amendment was approved to increase the Mile 17 site from 1.2 million eggs to 2.4 million eggs. A condition of the permit amendment was that 50% of the resulting fry from the incubators were to be otolith marked. In 2006, NSRAA thermal otolith marked brood year 2005 chum salmon fry in the Mile 17 incubation boxes. From 2007 to 2010, and from 2012 to 2013, broodstock was not available to achieve the full 2.4 million permitted capacity at Mile 17. During those years, NSRAA determined that it was not cost effective to mark the small numbers of fry released. [9]

NSRAA plans to collect otoliths from the commercial fishery and spawning grounds to assess hatchery-produced chum salmon survival. To date, NSRAA has not marked enough brood years for this assessment. Otolith marking was not required at the other chum salmon sites or for any of the sockeye salmon sites. Estimated contributions of returns to the commercial fishery for both species were based on assumed survival and harvest rates.

NSRAA suspended the sockeye salmon program in 2002[10] and the chum salmon program in 2015.[11] Both programs remain permitted.

CHILKAT LAKE SOCKEYE SALMON INCUBATORS

Sockeye salmon were released from the Spring Pond site incubators from 1993 to 1999, and from Garrison Creek incubators in 1996, under the Haines Projects permit (Appendix C). Beginning in 1994, a larger-scale lake-stocking program permitted through the Snettisham Hatchery was operated concurrently with the Haines Projects incubator project. Gametes were collected from Chilkat Lake sockeye salmon, incubated at Snettisham Hatchery, and the fry released back to Chilkat Lake.

By 2000, a combination of large adult returns and supplemental stocking of millions of fry appeared to severely deplete the plankton resources in the lake (Holder and Riffe 2004). As a result, ADF&G developed threshold levels of plankton abundance, smolt biomass, and average size of emigrating smolt to determine when egg takes and subsequent stocking would be allowed in Chilkat Lake.[12] Sockeye salmon fry releases were suspended after 1998 until these requirements are met.

Beavers colonized the Spring Pond site in 1999 and were removed in 2001. In 2003, a small number of eggs (45,000) were collected and incubated in the Spring Pond site to assess any lingering adverse impacts to incubation operations resulting from the beaver activity. Ninety-

[9] Notes attached to the 2008 Haines Projects annual report from NSRAA. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[10] 2005 Haines Projects AMP. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[11] Action item approved at March 2015 NSRAA Board meeting attended by the author.

[12] 2000 Snettisham Hatchery AMP. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

eight percent of the eggs survived to fry, indicating the site was functioning properly, and the fry were released from the site. No further sockeye salmon egg takes have occurred since 2003.

CHUM SALMON PROJECTS

31 Mile Incubation Site

From 1984 through 1992, chum salmon were collected from the Mile 31 creek tributary or the Klehini River near the mouth of the tributary. NSRAA staff had difficulty collecting chum salmon near the Mile 31 incubators because of the incursion of silty river water from the Klehini River into the Mile 31 Creek beginning in 1993. By that time, returns to the Herman Creek spawning channel located across the Klehini River from the Mile 31 creek tributary were fully utilizing the available spawning habitat. FTP 95J-1018 allowed use of surplus spawners to the Herman Creek spawning channel for egg collection for the Mile 31 incubators if broodstock could not be collected at the creek. The regional ADF&G resource biologist commented that if homing was somewhat precise for chum salmon, some genetic diversity may exist between the broodstock of the two locations, and if diversity was being compromised, at some point ADF&G would need to evaluate the trade-off for increased production.[13] The project has continued since then with no reported adverse effects.

Herman Creek spawning channel returns were used for broodstock at the Mile 31 site from 1995 to 2013, except that no eggs were incubated from 2001 to 2003, or in 2005, 2007 or 2010 due to lack of broodstock or issues with incubator operations. Annual egg takes averaged about 800,000 eggs, and releases about 674,000 fry during brood years 2008 to 2013—exclusive of 2010, when there were no egg takes (Appendix D).

Herman Creek Spawning Channel Incubator Site

NSRAA constructed the Herman Creek spawning channel along Herman Creek, a tributary of the Klehini River, in 1989, to increase spawning potential for Klehini River chum salmon runs (Parry and Seaman 1994). By 1993, returning chum salmon were fully utilizing the available spawning habitat. In 1996, incubators were installed at the spawning channel to test feasibility under a fish resource permit (P-96-90). When the incubators proved successful, the Haines Projects hatchery permit was amended in 1997 to add the Herman Creek spawning channel streamside incubators. Permitted capacity for the site was 1 million eggs (FTP 97J-1020). However, the AMPs issued since 2004 and the FTPs 06J-1033 and 11J-1017 issued for the project permit a capacity of 1.6 million eggs. Text in FTP 06J-1033 indicates that FTP 97J-1020 was approved for 1.6 million eggs, which was incorrect. It was approved for 1.0 million eggs. A PAR submitted in 2006 for the increase at Herman Creek was submitted but no approval of the request was found. Annual egg takes for Herman Creek incubators averaged about 1.5 million eggs and releases about 1.4 million fry during brood years 2008 to 2013 (Appendix E).

In review of the FTP for the fish resource permit for testing the incubators at Herman Creek with up to 50,000 eggs, the ADF&G geneticist wrote "The project will have genetic effects because a small portion of the run (it appears) is to be amplified. Repeated often enough, this results in inbreeding."[14] When the hatchery permit was amended the following year, a new FTP (97J-

[13] Comments on application for FTP 95J-1018 by Carol Denton, ADF&G resource biologist. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[14] Comments to FTP 96J-1007 application by ADF&G geneticist James Seeb. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

1020) was issued, and the geneticist had no concerns when the permitted egg take number was increased to 1 million eggs.

17 Mile Incubator Site

In 1993, the Mile 17 site was added to the Haines Project permit with a permitted capacity of 500,000 eggs. The site was developed as mitigation for loss of spawning habitat upstream of an improperly placed culvert.[15] Eggs were collected from broodstock from the 24 Mile spawning channel (FTP 95J-1018) and the Herman Creek Channel (1994 only). Annual egg takes and fry releases averaged about 1.1 million during brood years 2009 to 2013 (Appendix F).

The permitted capacity was increased by permit amendment from 500,000 eggs to 800,000 eggs in 2003, and from 1.2 million eggs to 2.4 million eggs in 2006. However, no permit amendment (nor amendment to FTP 95J-1018) was found permitting the increase from the 800,000 egg level in 2003 to the 1.2 million base level stated in the 2006 amendment. The NSERPT reviewed and approved the proposed amendment for such an increase,[16] but apparently the amendment was not subsequently approved and issued by the ADF&G commissioner.

COMPREHENSIVE SALMON ENHANCEMENT PLAN

RPTs in Southeast Alaska have developed three phases of Comprehensive Salmon Plans (CSP) to date. Phase I was issued in 1981, and established the philosophy and goals for Southeast Alaska. The mission statement of the plan was "To promote, through sound biological practices, activities to increase salmon production in Southeast Alaska for the maximum social and economic benefit of the users consistent with public interest." Harvest objectives were established in the Phase I CSP, and methods for bridging the gap between the harvest goal and the natural and enhanced production at the time were developed.

According to the Phase I CSP,[17] the highest Southeast Alaska chum salmon harvest at the time of the issuance of the Phase I CSP in 1981 was 9,350,000 fish in 1918. The highest average consecutive 30-year harvest of 5,200,000 chum salmon occurred between 1915 and 1944. After 1954, chum salmon runs declined sharply, with the regionwide harvest falling below one million in the late 1970s. The Northern Southeast Alaska chum salmon harvest showed a similar dynamic to the regionwide harvest (Figure 4).

The Phase I CSP indicated a 15-year average harvest of 1.7 million chum salmon was the achievable long-term wild stock production for this species. A salient point of the Phase I document with regard to the Haines Projects program was an NSRAA objective to increase production of fall chum salmon in the Chilkat River area.

Salmon processors indicated in the Phase I CSP an increasing demand for chum and pink salmon as an inexpensive frozen fish. Processors preferred chum salmon to pink and sockeye salmon because its relatively large size was ideal for processing salmon steaks. A special demand was expressed for fall chum salmon to fill a volume gap after the coho season waned. Chum salmon was the most preferred species for major hatchery production with respect to management

[15] 2014 Haines Projects AMP. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[16] Memorandum from Craig Farrington, PNP Coordinator to Kevin Duffy, ADF&G Commissioner dated August 25, 2004. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[17] Joint Southeast Alaska Regional Planning Teams. 1981. Comprehensive salmon enhancement plan for Southeast Alaska: Phase I. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

because they were less likely to disrupt management precision. Summer chum salmon would enter existing fisheries managed for sockeye and pink salmon, and fall chum salmon could generally be discretely managed and discretely harvested in most areas of Southeast Alaska, except where significant fall chum salmon stocks occur naturally.

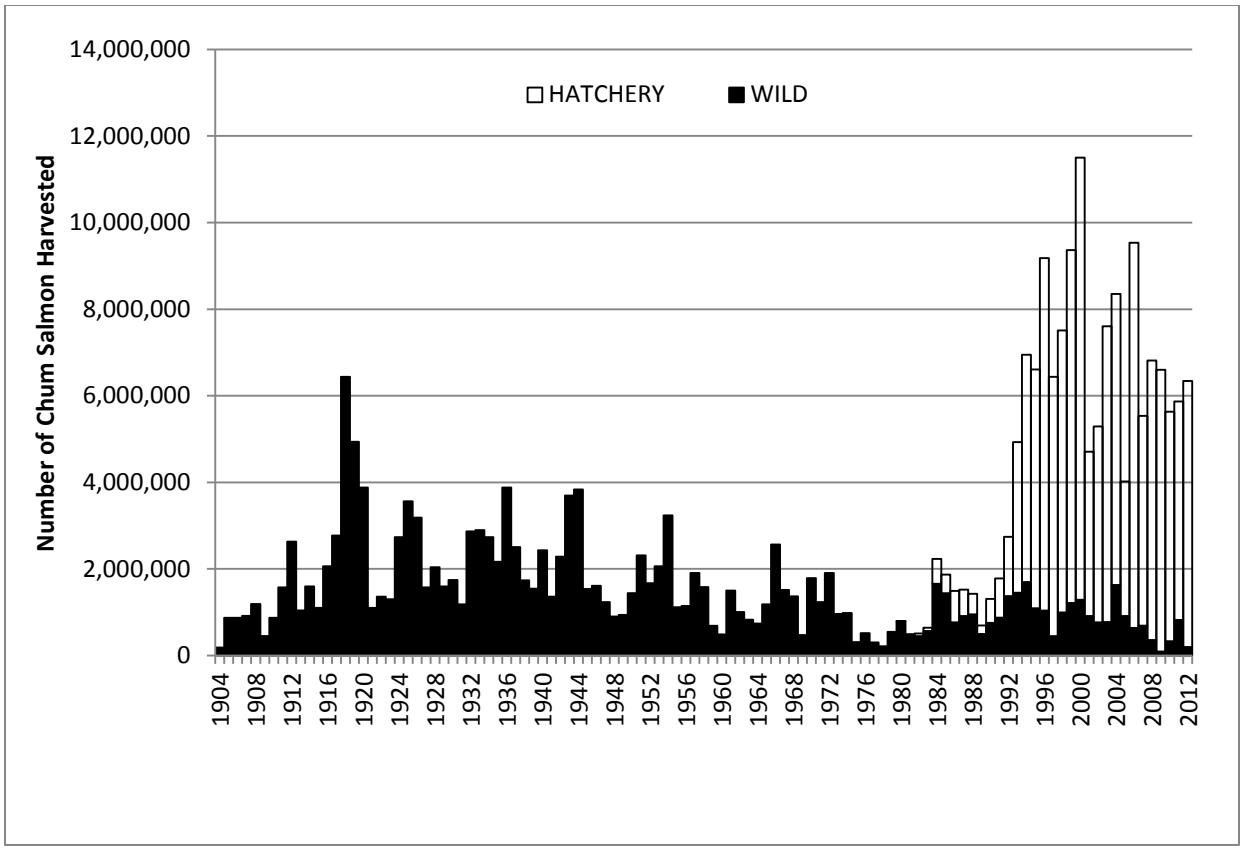

Figure 4.–Chum salmon commercial harvest, including hatchery cost recovery, in Northern Southeast Alaska, 1904-2012. Hatchery component includes contributions from all hatcheries.

Source: 1985–2012 data from ADF&G database accessed 12/04/2013, by Lorraine Vercessi, ADF&G PNP Assistant Coordinator, Juneau. 1904–1984 data from Byerly et al. (1999).

The long-range (year 2000) harvest objectives for the Phase I CSP were to increase the harvest in Southeast Alaska by 537,000 Chinook, 2.1 million sockeye, 2.65 million coho, 30.0 million pink, and 9.7 million chum salmon. Gaps at the time between the increases available by better management and the current hatchery capacity were 134,000 Chinook, 1.4 million sockeye, 1.1 million coho, 14 million pink, and 4.6 million chum salmon.

Instream incubation was listed as a low-cost, low-intervention enhancement tool. Where adequate water, suitable stream bottoms, and a protected area for incubation units occurred, instream incubation units were considered for bolstering fry production of indigenous stocks, as they could circumvent genetic and pathology concerns associated with transport of eggs or fry. The Phase I CSP indicated that instream incubators may have excellent potential for chum salmon, but their application was relatively unproven at the time.

For Phase II CSP planning, the RPTs for northern and southern Southeast Alaska developed separate plans. The Haines Project sites are is located in northern Southeast Alaska (NSE). The NSE CSP Phase II was issued in 1982 (NSERPT 1982). The purpose of the plan was to identify and prioritize enhancement opportunities within five defined geographical units of NSE: Outer Coastal Unit, Icy Strait/Chatham Strait Unit, Frederick Sound Unit, Stephens Passage Unit and Lynn Canal Unit. The Haines Project sites are within the Lynn Canal unit, and Haines Project returns are harvested primarily in the Lynn Canal and Stephens Passage units (Figure 5). The Phase II CSP was to provide direction to the efforts of the many government agencies and private groups involved with salmon (e.g., ADF&G, U.S. Forest Service, National Marine Fisheries Service, RAAs and independent hatchery PNP operators), and to prevent and resolve conflicts over the use and development of the region's salmon resources. Haines Projects were implemented in support of the Phase II plan goals.

The Phase II CSP identified gaps between the harvest objectives and current harvests for Lynn Canal and Stephens Passage. For the Lynn Canal unit, the harvest gap included 5,000 Chinook, 100,000 sockeye, 50,000 coho, 500,000 pink and 700,000 chum salmon. For Stephens Passage unit, the gap included 0 Chinook, 160,000 sockeye, 25,000 coho, 500,000 pink and 100,000 chum salmon. These targets were to "provide an equitable distribution of production to serve user needs, while considering the limitations imposed by the availability of opportunities and requirements for effective management of wild and enhanced stocks. It is the accepted principle throughout this plan that mixed stock harvests will be managed on the basis of wild run strength, and the unit targets will direct enhancement to areas where it is believed that enhanced stocks can be harvested without ill effects on wild stocks or their management." Recommended projects for the first five years of the Phase II plan included creation/improvement of chum spawning habitat on the Chilkat River, limnology studies of Chilkat Lake to estimate carrying capacity and limiting factors for sockeye salmon, and spawning channel construction along the Chilkat and Klehini River side channels.

Beginning in 1986, the Phase II plan was updated annually through 1996 (NSERPT 1986, 1987, 1989–1997). NSRAA staff held meetings during 1989 to discuss enhancement projects. A sockeye salmon project was proposed near Juneau at Turner Lake using Chilkat River sockeye salmon as broodstock. Haines residents said they would prefer rehabilitation efforts occur on the Chilkat River, instead (NSERPT 1990). Rehabilitation and enhancement of the Chilkat River sockeye stock was recommended as a priority project beginning the following year (NSERPT 1992), and the Chilkat Lake incubation project was included as part of this project in 1992 (NSERPT 1993). Although chum salmon habitat rehabilitation along the Haines Highway was recommended in the Phase II CSP and subsequent updates, the streamside incubation boxes were not specifically mentioned as a mitigation tool.

The Phase III CSP (Duckett et al. 2010) was issued in 2004 and provided *best practice* guidelines for enhancement planning to provide a systematic approach to project formulation and the decision-making process. The Phase III CSP also provides an extensive history of Southeast Alaska fisheries and salmon enhancement.

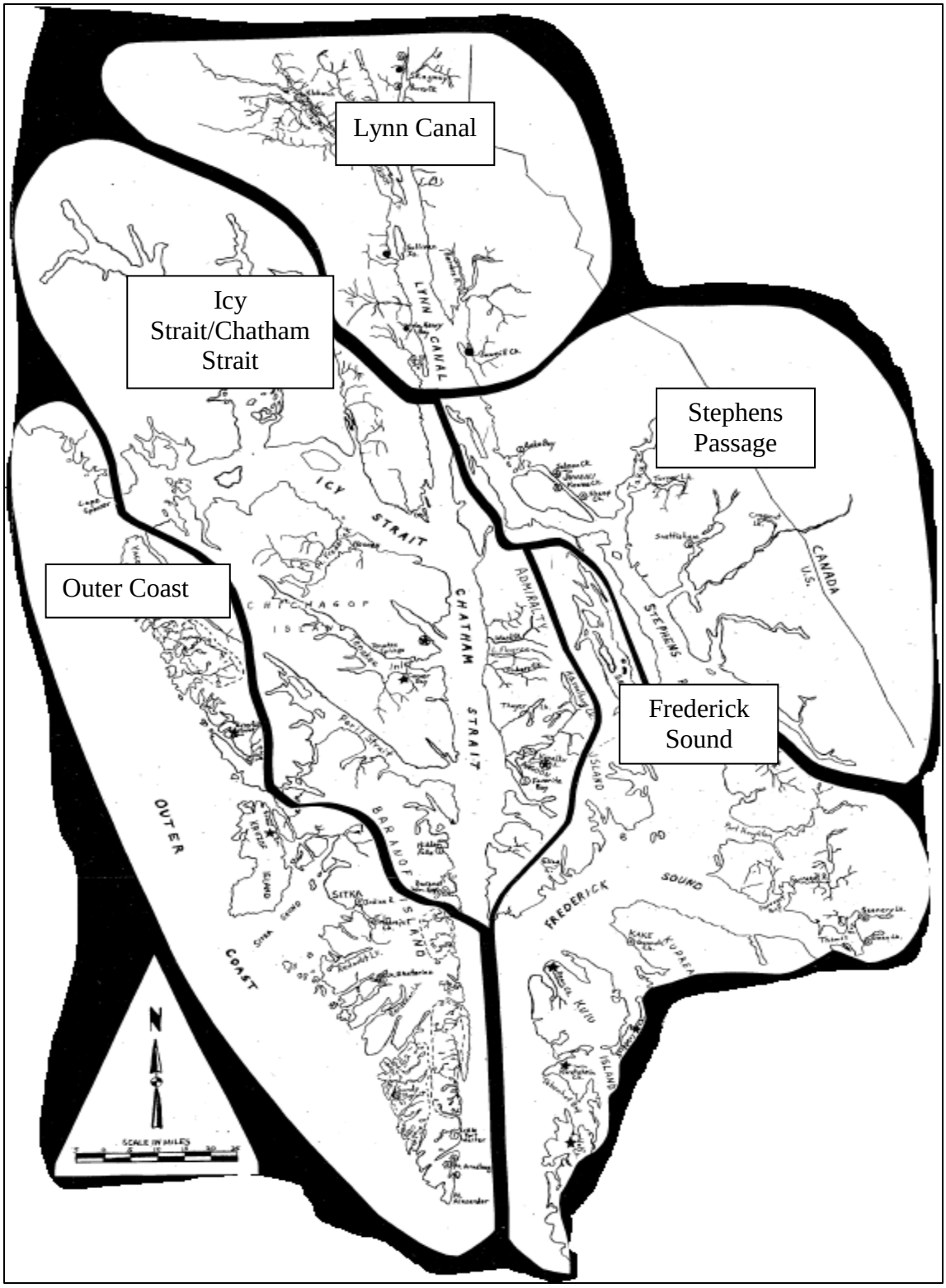

Figure 5.–Commercial fishing units for northern Southeast Alaska as described in the Phase II CSP. From Northern Southeast Regional Planning Team (1982).

Guidelines were developed in the Phase III Plan for fishery supplementation, wild stock supplementation, and colonization. The Haines Projects is a wild stock supplementation program, and five standards for wild stock supplementation projects were developed in the Phase III CSP: (A) the project objective relative to the wild stock is clearly defined, (B) wild stock characteristics are preserved in the supplemental production, (C) imprinting strategy for supplemental production mimics the process in the wild as much as possible, (D) enhanced/wild juvenile interactions are anticipated and impacts on wild fish are minimized, and (E) hatchery-incubated fish are marked and identifiable in the fisheries and in the freshwater spawning habitat.

The Haines Projects appears to meet all but one of these standards. The project objective is to perpetually enhance the productivity of the Chilkat and Klehini river chum salmon populations. Wild stock characteristics are preserved by targeting one spawning population at each egg take and timing the egg take using adequate broodstock (as approved by the ADF&G geneticist) to assure that the genetic composition of the supplemental production mimics the wild stock. Effective imprinting is addressed through incubation and hatching in the natal watershed. Impacts to naturally produced fry are minimized by limiting production of hatchery-produced fry to much less than the number of wild fry in the drainage. Most of the releases are not marked and therefore not identifiable in the fisheries and spawning habitat.

PROGRAM EVALUATIONS

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 1–3. These templates identifying the key elements of state policies used to assess compliance of the Haines Projects program with each policy element in tables 4, 5 and 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.
Stock rehabilitation and enhancement	A watershed with a significant wild stock can only be stocked with progeny from the indigenous stock. Gametes may be removed, placed in a hatchery, and subsequently returned to the donor system. However, 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.
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)	
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 5 AAC 41.080(d) must be immediately reported to the ADF&G Fish Pathology Section.
Pathology requirements for Fish Transport Permits (FTPs) (5 AAC 41.005–41.060)	
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 recommend to the commissioner terms or conditions to the permit to protect fish health. Transports of fish between regions are discouraged.

Table 3.–Key elements of Alaska fisheries management policies and regulations relevant to salmon hatcheries and fishery 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 effects and interactions of introduced or enhanced salmon stocks on wild stocks should be assessed. Wild stocks should be protected from adverse impacts from artificial propagation and enhancement efforts.
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

Indigenous stocks were used for all projects (Table 4). The *Genetic Policy* states that gametes may be removed, placed in a hatchery and subsequently returned to the donor system, but that not more than one generation of separation from the donor system to stocking of the progeny will be allowed. It cannot be determined if this criteria of the *Genetic Policy* is being met because releases are not marked in most years.

Table 4.–The Haines Projects program and its consistency with elements of the ADF&G *Genetic Policy* (see Table 1).

Use of appropriate local stocks	All Haines Projects sites used indigenous broodstock.
A watershed with a significant wild stock can only be stocked with progeny from the indigenous stock.	The Phase III CSP provided a stock appraisal tool for assessing the significance of stocks for assessment of projects with regard to the significant stock references in the *Genetic Policy*.
Stock rehabilitation and enhancement	Indigenous stocks are used. Most releases have not been marked and therefore it is not known if F_1 adult returns are used for broodstock for subsequent egg takes.
Establishment of wild stock sanctuaries	No wild stock sanctuaries have been designated by the RPT in the Chilkat River drainage.
Review by geneticist	The ADF&G geneticist reviewed the FTPs.

Fish Health and Disease

FTPs for the Haines Projects program were approved by the pathologist. Appropriate salmon culture techniques were used and disease reporting and broodstock screening occurred as required (Table 5).

Table 5.–The Haines Projects program and its consistency with elements of the Alaska policies on fish health and disease (see Table 2).

Fish Health and Disease Policy (5 AAC 41.080); amended by Meyers (2010)	
Egg disinfection	Eggs are disinfected as necessary according to ADF&G regulations and guidelines.
Hatchery inspections	Incubator sites have not been visited by pathology staff to date.
Disease reporting	There are no chronic disease issues for this program.
Pathology requirements for FTPs (5 AAC 41.010)	
Disease history	Samples were submitted as requested by the fish pathologist for disease history.
Isolation measures	Isolation procedures were described on the FTP.
Pathology review of FTPs	FTPs were reviewed by the pathologist.

Fisheries Management

Chum salmon escapement to the Chilkat River drainage has been estimated since 1992. Average escapement has been about 240,000 fish (Gray et al. 2014). Supplemental production from the Haines Project sites comprises a tiny portion of the total returns to the Chilkat River drainage. Although the releases are not marked, there is no cost recovery harvesting for the program, and the small number of fry released does not impact fisheries management (Table 6).[18]

Table 6.–The Haines Projects 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	Haines Projects use wild stock returns for broodstock and do not impact fisheries management.
Salmon Escapement Goal Policy (5 AAC 39.223)	
Establishment of escapement goals	Escapement goals are established for the Chilkat River drainage chum salmon stocks and for Chilkat Lake sockeye salmon.
Mixed Stock Salmon Fishery Policy (5 AAC 39.220)	
Wild stock conservation priority	Salmon fisheries are managed to achieve escapement goals or targets.
Fisheries management review of FTPs (5 AAC 41.010 – 41.050)	
Review by management staff	The FTPs for the Haines Projects program were reviewed by fisheries management staff.

CONSISTENCY IN PERMITTING

Hatchery permit/BMP, AMP, and FTP documents for Haines Projects operations were reviewed to determine that they met the following guidelines:

- They are current.
- They are consistent with each other.
- They are an accurate description of current hatchery practices.

The hatchery permit and BMP do not expire. The BMP should be updated to reflect the current permitted projects.

For the sockeye salmon projects, the FTP for the Garrison Creek egg take was issued the year after the first egg take occurred (Appendix G).

For the chum salmon projects, for the mile 31 project, no FTP was found that authorized the egg take in the Klehini River at the Mile 31 site in 1992 or 1993. The first FTP for egg takes at Herman Creek was belatedly issued a year after the first egg take in 1994 (Appendix H).

For the Herman Creek spawning channel incubator project, a permit amendment is needed. Currently, the permitted capacity under the PNP permit is 1 million eggs for the Herman Creek

[18] Memorandum from Steve McGee, ADF&G Fishery Biologist, PNP Program to Carl Rosier, ADF&G commissioner dated Sept. 4, 1992. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

incubation site (1997 hatchery permit amendment). However, 1.6 million eggs have been permitted under the AMP and the FTPs since 2006. Although the NSERPT approved[19,20] the increase from 1.0 million to 1.6 million eggs in 2004, a permit amendment was not subsequently issued by the ADF&G commissioner. (Appendix I)

Likewise, for the Mile 17 incubators, the NSERPT approved an increase from 800,000 eggs to 1.2 million eggs in 2004 but a permit amendment was not subsequently issued by the ADF&G commissioner nor was the FTP amended for the increase. The increase was permitted in AMPs from 2004 to 2007. In addition, the project FTP (95J-1019) lapsed from 2009 to 2010. No FTP was found for egg takes in 1993 or 1994 (Appendix J).

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 completed report is due on December 15 and the Haines Projects annual reports were received for all years.

RECOMMENDATIONS

1. The BMP should be updated to reflect current practices and production.
2. A hatchery permit amendment is needed for the Herman Creek spawning channel incubator project. Currently, the permitted capacity under the PNP permit is 1 million eggs (1997 hatchery permit amendment). However, 1.6 million eggs have been permitted under the AMP and the FTPs issued since 2006. Although the NSERPT approved[21,22] the increase from 1.0 million to 1.6 million eggs in 2004, a permit amendment was not subsequently acted upon by the ADF&G commissioner to approve or deny the PAR. It is not known if the permit was submitted to the commissioner and not acted upon, or never submitted to the commissioner.
3. Permitted capacity at the Mile 17 site increased from 800,000 (2003 permit amendment) to 2.4 million eggs (2006 permit amendment). However, the 2006 permit amendment reads that the permit seemingly increased from 800,000 to 1.2 million eggs in the intervening years. The NSERPT reviewed and approved the proposed amendment for such an increase at the same meeting it approved the Herman Creek spawning channel incubator increase above,[23] and again the amendment was not subsequently acted upon by the ADF&G commissioner to approve or deny the PAR. It is not known if the permit was submitted to the commissioner and not acted upon, or never submitted to the commissioner. This issue should be reviewed to determine if any action is needed to amend the permit to account for the gap.
4. For the Mile 17 site, the marking requirement stated in the 2006 permit amendment has not been implemented most years because it is not cost effective when less than 1.2 million eggs are available for incubation.[24] ADF&G and NSRAA should determine if the permit should be

[19] 2004 Haines Projects AMP. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[20] Memorandum from Craig Farrington, PNP Coordinator to Kevin Duffy, ADF&G Commissioner dated August 25, 2004. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[21] 2004 Haines Projects AMP. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[22] Memorandum from Craig Farrington, PNP Coordinator to Kevin Duffy, ADF&G Commissioner dated August 25, 2004. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[23] Memorandum from Craig Farrington, PNP Coordinator to Kevin Duffy, ADF&G Commissioner dated August 25, 2004. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[24] 2009 Haines Projects AMP. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

amended to require marking only when some threshold level of egg numbers are incubated, or determine if all releases be marked, regardless of the release size.

5. Returns to the chum salmon incubation program have not been assessed through a consistent marking program. Return assessment is necessary to determine if the program is successful in supplementing natural production in the Chilkat and Klehini river systems and meeting the goals of the Phase II Comprehensive Salmon Plan. NSRAA should continue to explore cost-effective marking options for these projects.

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APPENDICES

Appendix A.–History of Haines streamside incubator project hatchery permit and permit alterations, 1992–2014.

Date	Description	Permitted Capacity in millions of Eggs	
		Chum Salmon	Sockeye Salmon
09/14/1992	PNP hatchery permit number 34 and BMP issued to NSRAA to operate the streamside incubation box projects for chum and sockeye salmon at mile 30/31 of the Haines Highway near Haines, Alaska. Hatchery permitted for 800,000 chum salmon and 2 million sockeye salmon.	0.8	2.0
07/14/1993	PAR approved to allow a new site at mile 17 of the Haines Highway to incubate up to 500,000 chum salmon eggs in addition to those at Mile 30/31.	1.3	2.0
06/27/1994	PAR approved to add Sweetheart Lake sockeye salmon project to Haines Projects permit BMP. Up to 3 million eggs could be collected at Crescent Lake, incubated at Snettisham Hatchery, and up to 1.5 million fry released into Sweetheart Lake.	1.3	5.0
06/3/1996	PAR approved to remove Slide Creek as a permitted streamside incubation box location on Chilkat Lake and replace it with "Garrison Creek". NSRAA allowed to incubate up to 600,000 sockeye salmon eggs at the Garrison Creek location. Removed Sweetheart Lake project from the hatchery permit.	1.3	2.0
6/9/1997	PAR approved to add two incubators to the Spring Pond site for incubation of up to an additional 600,000 sockeye salmon eggs at this site, but not increasing the overall sockeye salmon capacity of 2 million eggs. Also approved adding 4 incubators to the Herman Creek spawning channel for incubation of up to 1 million fall chum salmon eggs and to increase chum salmon egg capacity from 1.3 million to 2.3 million eggs.	2.3	2.0
5/21/2003	PAR approved to increase chum salmon egg capacity at the 17-mile incubation site from 500,000 to 800,000 eggs. This increased total chum salmon capacity under the permit from 2.3 million to 2.6 million eggs. Production at 17 mile was to remain at 800,000 eggs until an evaluation of fry to adult survival was completed.	2.6	2.0
6/9/2006	PAR approved to increase chum salmon egg capacity at the 17-mile incubation site from 1.2 million to 2.4 million eggs. This increased total chum salmon capacity under the permit from 2.6 million to 3.8 million eggs. Minimum of 50% of releases required to be marked. No permit amendment was found for the increase from the 800,000 egg level in 2003 to the 1.2 base level stated in the 2006 amendment. The NSRPT reviewed and approved the proposed amendment for such an increase.[a]	3.8	2.0

[a] Memorandum from Craig Farrington, PNP Coordinator to Kevin Duffy, ADF&G Commissioner dated August 25, 2004. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

Appendix B.–Summary of Fishery Transport Permits (FTPs) for the Haines Projects.

FTP No.	Issued	Exp.	FTP summary and reviewer comments.
84J-1054	1984	1992	Collect up to 50,000 eggs from Klehini River chum salmon and place eggs in streamside incubation box along small tributary of the Klehini River. Fry would be enumerated and released into the small tributary. In 1985, egg number was increased from 50,000 to 100,000 eggs. In 1987, egg number increased from 100,000 to 1 million eggs and expiration date extended until 1992. In 1990, egg number reduced from 1 million to 850,000 eggs and expiration date reduced to 1990. In 1991, egg number reduced from 850,000 to 800,000 eggs and expiration date extended to 1991. In 1992, expiration date extended to 1992.
85J-1070	1985	1986	Collect up to 100,000 eggs from adult chum salmon returns to the spawning channel off the Chilkat River near 26 mile of the Haines Highway. Eggs to be placed in streamside incubators, and resultant fry counted and released in the spawning channel.
90J-1018	1990	1991	Collect up to 50,000 eggs from adult sockeye salmon returns to Chilkat Lake. Eggs to be placed in streamside incubators, and resultant fry will volitionally migrate from the incubator into the stream. In 1991, egg number increased from 50,000 to 400,000 eggs and permit expiration date extended to 1991.
91J-1037	1991	1992	Allows transport of up to 200,000 eggs from the 24 mile spawning channel to the 17 Mile incubation site. In 1992, expiration date extended from 1991 to 1992.
93J-1001	1993	1998	Collect up to 600,000 eggs from adult sockeye salmon returns to Chilkat Lake inlet stream 115-32-3001 (Spring Pond). Eggs to be placed in streamside incubators and resultant fry will volitionally migrate from the incubator into the stream.
95J-1018	1995	1999	Allows transport of up to 800,000 eggs from chum salmon from the Herman Creek spawning channel to the 31-mile Creek incubation site. In 1999, expiration date extended from 1999 to 2004, and in 2004, extended to 2009.
95J-1019	1995	1999	Allows transport of up to 500,000 eggs from chum salmon from the 24-mile NSRAA Spawning Channel to the 17-mile Creek incubation site. In 2004, egg number increased from 500,000 eggs to 800,000 eggs, and increased in 2007 to 2.4 million eggs. In 1999, expiration date extended from 1999 to 2004, and in 2004, extended to 2009 and in 2011, extended to 2021. It appears the FTP lapsed from 2010 to 2011.
96J-1011	1996	2001	Allows collection of up to 600,000 eggs from sockeye salmon collected from the spawning area near the mouth of an unnamed creek (aka, "Garrison Creek", a Chilkat Lake tributary) for incubation in the streamside incubators at "Garrison Creek".
97J-1020	1997	2006	Allows collection of up to 1 million eggs from chum salmon from the Herman Creek spawning channel for incubation in the Herman Creek streamside incubators. In 2001, expiration date extend from 2001 to 2006.
97J-1021	1997	2006	Allows collection of up to 1.2 million eggs from sockeye salmon from the Spring Pond (Chilkat Lake tributary) site for incubation in the streamside incubators there. In 2001, expiration date extend from 2001 to 2006.
06J-1033	2006	2010	Allows collection of up to 1.6 million eggs from chum salmon from the Herman Creek spawning channel for incubation in the Herman Creek streamside incubators. In 2001, expiration date extend from 2001 to 2006. Replaces FTP 97J-1020.
11J-1017	2006	2010	Allows collection of up to 1.6 million eggs from chum salmon from the Herman Creek spawning channel for incubation in the Herman Creek streamside incubators. In 2001, expiration date extend from 2001 to 2006. Replaces FTP 06J-1033.
11J-1019	2011	2021	Allows collection of up to 800,000 eggs from chum salmon from the Herman Creek spawning channel and transport to the 31-mile Creek streamside incubators for incubation and release. In 2001, expiration date extend from 2001 to 2006. Replaces FTP 95J-1018.

Appendix C.–Sockeye salmon egg collections and releases from the Chilkat Lake incubators. Fry were released in the spring of the year following the egg take.

Brood Year	Site	Egg Take	Release
1992	Spring Pond	408,000	201,753
1993	Spring Pond	600,000	594,000
1994	Spring Pond	598,500	550,700
1995	Spring Pond	602,000	289,500
	Garrison Cr	10,000	6,138
1996	Spring Pond	602,000	572,350
	Garrison Cr.	14,000	Release data not reported
1997	Spring Pond	108,500	96,500
	Garrison Cr.	10,500	Release data not reported
1998	Spring Pond	461,000	431,670
2003	Spring Pond	45,180	44,276

Source: Data from annual reports submitted by NSRAA for the Haines Projects.

Appendix D.–Chum salmon egg collections and releases for the Mile 31 incubation site. Fry were released in the spring of the year following the egg take.

Brood Year	Broodstock	Incubation/ Release Site	Egg Take	Release
1992	31 Mi	31 Mi	668,800	643,952
1993	31 Mi	31 Mi	820,000	807,500
1994	No egg take			
1995	Herman Cr. Channel	31 Mi	15,000	14,250
1996	Herman Cr. Channel	31 Mi	180,000	171,000
1997	Herman Cr. Channel	31 Mi	255,000	240,400
1998	Herman Cr. Channel	31 Mi	400,000	373,360
1999	Herman Cr. Channel	31 Mi	395,000	334,540
2000	Herman Cr. Channel	31 Mi	322,500	286,375
2001	No egg take			
2002	No egg take			
2003	No egg take			
2004	Herman Cr. Channel	31 Mi	593,598	563,918
2005	No egg take			
2006	Herman Cr. Channel	31 Mi	821,395	492,837
2007	No egg take			
2008	Herman Cr. Channel	31 Mi	803,292	664,982
2009	Herman Cr. Channel	31 Mi	794,881	605,150
2010	No Egg Take			
2012	Herman Cr. Channel	31 Mi	801,331	700,254
2013	Herman Cr. Channel	31 Mi	805,961	723,628

Source: Data from annual reports submitted by NSRAA for the Haines Projects.

Appendix E.–Chum salmon egg collections and releases for the Herman Creek Channel incubators. All broodstock collected from the Herman Creek spawning channel. Fry were released in the spring of the year following the egg take.

Brood Year	Egg Take	Release
1996	10,000	9,600
1997	142,500	140,120
1998	1,002,500	951,000
1999	977,500	918,850
2000	980,100	915,100
2001	125,000	122,600
2002	430,000	276,000
2003	337,000	211,412
2004	1,627,562	813,781
2005	933,831	915,155
2006	1,621,280	972,768
2007	1,472,778	1,399,139
2008	1,609,217	1,520,922
2009	1,608,470	1,505,623
2010	1,262,835	1,170,091
2011	1,609,803	1,541,034
2012	1,603,743	1,448,435
2013	1,601,408	1,467,459

Source: Data from annual reports submitted by NSRAA for the Haines Projects.

Appendix F.–Chum salmon egg collections and releases for the 17 mile incubator site. Fry were released in the spring of the year following the egg take.

Brood Year	Broodstock	Release Site	Egg Take	Release
1992	24 Mi Channel	17 Mi	50,000	47,256
1993	24 Mi.	17 Mi	187,500	178,125
1994	Herman Cr. Channel	17 Mi	400,000	394,504
	24 Mi	17 Mi	500,000	493,131
1995	24 Mi	17 Mi	500,000	470,000
1996	24 Mi	17 Mi	30,000	28,200
1997	24 Mi	17 Mi	500,000	482,840
1998	No egg take			
1999	24 Mi	17 Mi	370,000	335,000
2000	24 Mi	17 Mi	496,600	471,770
2001	24 Mi	17 Mi	442,500	431,500
2002	24 Mi	17 Mi	197,500	193,350
2003	24 Mi	17 Mi	482,500	472,850
2004	17 Mi	17 Mi	1,252,440	1,227,391
2005	17 Mi	17 Mi	1,183,380	863,867
2006	17 Mi	17 Mi	1,324,418	397,325
2007	17 Mi	17 Mi	229,421	217,950
2008	17 Mi	17 Mi	152,500	water failure
2009	17 Mi	17 Mi	549,916	544,972
2010	17 Mi	17 Mi	2,420,194	2,271,647
2011	17 Mi	17 Mi	1,201,245	1,164,527
2012	17 Mi	17 Mi	386,518	380,851
2013	17 Mi	17 Mi	1,213,054	1,196,567

Source: Data from annual reports submitted by NSRAA for the Haines Projects.

Appendix G.–Comparison of permitted and reported sockeye salmon egg collections in hatchery permit, basic management plan (BMP), annual management plan (AMP), fish transport permits (FTP) and annual reports for the Haines Projects, 1992–2003. The first AMP was issued in 1993. Resulting fry leave the incubators volitionally.

Brood Year	Hatchery Permit/ BMP Egg Take	AMP Egg Take	FTP for Egg Take	Incubation and Release Location	FTP Exp. Year	FTP Egg Level	Egg Take from Annual Report
1992	600,000		93J-1001	SP	1998	600,000	408,000
1993	600,000	600,000	93J-1001	SP	1998	600,000	600,000
1994	600,000	600,000	93J-1001	SP	1998	600,000	598,500
1995	600,000	600,000	93J-1001	SP	1998	600,000	602,000
	600,000	17,500	[a]	GC		600,000	10,000
1996	600,000	600,000	93J-1001	SP	1998	600,000	602,000
1997	600,000	1,200,000	93J-1001	SP	1998	600,000	108,500
1998	600,000	1,200,000	93J-1001	SP	1998	600,000	461,000
2003	600,000	600,000	97J-1020	SP	2006	1,200,000	45,180

Note: SP = Spring Pond, GC = Garrison Creek.

[a] Issued under a Fish Resource Permit P-96-90 to test feasibility. Program was added to PNP permit the following year.

Appendix H.–Comparison of permitted and reported chum salmon egg collections in hatchery permit, basic management plan (BMP), annual management plan (AMP), fish transport permits (FTP) and annual reports for the Mile 31 incubation site for the Haines Projects, 1992–2013. The first AMP was issued in 1993. Resulting fry leave the incubators volitionally.

Brood Year	Hatchery Permit/ BMP Egg Take	AMP Egg Take	Egg Take Site	FTP for Egg Take	FTP Exp. Year	FTP Egg Level	Egg Take from Annual Report
1992	800,000		31 Mi				668,800
1993	800,000	800,000	31 Mi		1999		820,000
1994	800,000	800,000					No Egg Take
1995	800,000	800,000			1999		15,000
1996	800,000	800,000	HC	95J-1018	1999	800,000	180,000
1997	800,000	800,000	HC	95J-1018	1999	800,000	255,000
1998	800,000	500,000[a]	HC	95J-1018	1999	800,000	400,000
1999	800,000	500,000	HC	95J-1018	1999	800,000	395,000
2000	800,000	500,000	HC	95J-1018	1999	800,000	322,500
2004	800,000	500,000	HC	95J-1018	2004	800,000	593,598
2006	800,000	800,000	HC	95J-1018	2009	800,000	821,395
2008	800,000	800,000	HC	95J-1018	2009	800,000	803,292
2009	800,000	800,000	HC	95J-1018	2009	800,000	794,881
2011	800,000	800,000	HC	11J-1019	2009	800,000	801,331
2012	800,000	800,000	HC	11J-1019	2009	800,000	805,961
2013	800,000	800,000	HC	11J-1019	2021	800,000	805,193

Note: HC = Herman Creek.

[a] New water system installed in 1995 to replace earlier unsuccessful water intake. Incubators filled to less than capacity until permanent solution to water flow determined. See 1997 AMP.

Appendix I.–Comparison of permitted and reported chum salmon egg collections in hatchery permit, basic management plan (BMP), annual management plan (AMP), fish transport permits (FTP) and annual reports for the Herman Creek Spawning Channel incubation site for the Haines Projects, 1996–2013. The first AMP was issued in 1993. Resulting fry leave the incubators volitionally.

Brood Year	Hatchery Permit/ BMP Egg Take	AMP Egg Take	Egg Take Site	FTP for Egg Take	FTP Exp. Year	FTP Egg Level	Egg Take from Annual Report
1996	50,000[a]		HC	96J-1007	1996	50,000	10,000
1997	1,000,000		HC	97J-1020	2001	1,000,000	142,500
1998	1,000,000	1,000,000	HC	97J-1020	2001	1,000,000	1,002,500
1999	1,000,000	1,000,000	HC	97J-1020	2001	1,000,000	977,500
2000	1,000,000	1,000,000	HC	97J-1020	2001	1,000,000	980,100
2001	1,000,000	1,000,000	HC	97J-1020	2001	1,000,000	125,000
2002	1,000,000	1,000,000	HC	97J-1020	2001	1,000,000	430,000
2003	1,000,000	1,000,000	HC	97J-1020	2001	1,000,000	337,000
2004	1,000,000	1,600,000	HC	97J-1020	2006	1,000,000	1,627,562
2005	1,000,000	1,600,000	HC	97J-1020	2006	1,000,000	933,831
2006	1,000,000	1,600,000	HC	06J-1033	2010	1,600,000	1,621,280
2007	1,000,000	1,600,000	HC	06J-1033	2010	1,600,000	1,472,778
2008	1,000,000	1,600,000	HC	06J-1033	2010	1,600,000	1,609,217
2009	1,000,000	1,600,000	HC	06J-1033	2010	1,600,000	1,608,470
2010	1,000,000	1,600,000	HC	06J-1033	2010	1,600,000	1,262,835
2011	1,000,000	1,600,000	HC	11J-1017	2021	1,600,000	1,609,803
2012	1,000,000	1,600,000	HC	11J-1017	2021	1,600,000	1,603,743
2013	1,000,000	1,600,000	HC	11J-1017	2021	1,600,000	1,601,408

Note: HC = Herman Creek.

[a] Issued under a Fish Resource Permit P-96-90 to test feasibility. Program was added to PNP permit the following year.

Appendix J.–Comparison of permitted and reported chum salmon egg collections in hatchery permit, basic management plan (BMP), annual management plan (AMP), fish transport permits (FTP) and annual reports for the Mile 17 incubation site for the Haines Projects, 1992–2013. The first AMP was issued in 1993. Resulting fry leave the incubators volitionally.

Brood Year	Hatchery Permit/ BMP Egg Take	AMP Egg Take	Egg Take Site	FTP for Egg Take	FTP Exp. Year	FTP Egg Level	Egg Take from Annual Report
1992			Mi 24	91J-1037	1992	200,000	50,000
1993	500,000	500,000	Mi 24				187,500
1994	500,000	500,000	HC				400,000
			24 Mi				500,000
1995	500,000	500,000	Mi 24	95J-1019	1999	500,000	500,000
1996	500,000	500,000	Mi 24	95J-1019	1999	500,000	30,000
1997	500,000	500,000	Mi 24	95J-1019	1999	500,000	500,000
1999	500,000	500,000	Mi 24	95J-1019	1999	500,000	370,000
2000	500,000	500,000	Mi 24	95J-1019	2004	500,000	496,600
2001	500,000	500,000	Mi 24	95J-1019	2004	500,000	442,500
2002	500,000	500,000	Mi 24	95J-1019	2004	500,000	197,500
2003	500,000	500,000	Mi 24	95J-1019	2004	500,000	482,500
2004	800,000	1,200,000	Mi 17	95J-1019	2004	800,000	1,252,440
2005	800,000	1,200,000	Mi 17	95J-1019	2009	800,000	1,183,380
2006	2,400,000	1,200,000	Mi 17	95J-1019	2009	800,000	1,324,417
2007	2,400,000	1,200,000	Mi 17	95J-1019	2009	800,000	229,421
2008	2,400,000	2,400,000	Mi 17	95J-1019	2009	2,400,000	152,500
2009	2,400,000	2,400,000	Mi 17	95J-1019	2009	2,400,000	549,916
2010	2,400,000	2,400,000	Mi 17				2,420,194
2011	2,400,000	2,400,000	Mi 17	95J-1019	2021	2,400,000	1,201,245
2012	2,400,000	2,400,000	Mi 17	95J-1019	2021	2,400,000	386,851
2013	2,400,000	2,400,000	Mi 17	95J-1019	2021	2,400,000	1,213,054

Note: HC = Herman Creek.