Regional Information Report No. 5J14-03

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

by

Mark Stopha

October 2014

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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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 Macaulay Salmon Hatchery operated by the Douglas Island Pink and Chum, Incorporated (DIPAC), a private nonprofit corporation. The facility is located in Gastineau Channel on the Juneau waterfront in Southeast Alaska, and currently rears chum salmon *Oncorhynchus keta,* coho salmon *O. kisutch,* and Chinook salmon *O. tshawytscha*. The facility was constructed by DIPAC in 1990.

The original broodstock for chum and coho salmon were from several area stocks. Chinook salmon broodstock originated from Andrew Creek, a tributary of the Stikine River. Juvenile salmon are released from the hatchery and release sites near Juneau and Skagway. The hatchery is permitted to collect up to 125 million chum, 50 million pink, 1.5 million coho and 1.25 million Chinook salmon eggs. From 2008 through 2012, adult runs averaged about 3.5 million chum, 33 thousand coho and 5 thousand Chinook salmon. Some projects were not properly permitted and egg takes for some projects regularly exceeded levels allowed by permit in earlier years, but all issues were later rectified. The basic management plan for the hatchery should be updated with a description of current permit conditions and operations.

Key words: Macaulay Salmon Hatchery, DIPAC, hatchery evaluation, hatchery, Douglas Island Pink and Chum, Incorporated

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 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 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 less than 27 million fish in 1973, 1974 and 1975, the lowest three years of catch 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 unutilized 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 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* survival in two Southeast Alaska creeks ranged from less than 1% 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 most 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 salmon and chum salmon *O. keta* fry can be transferred from fresh water to salt water. Most Chinook salmon *O. tshawytscha*, sockeye salmon *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, 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 at harvest, chum and pink salmon are more economical to rear in the hatchery and generally provide a higher economic return.

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

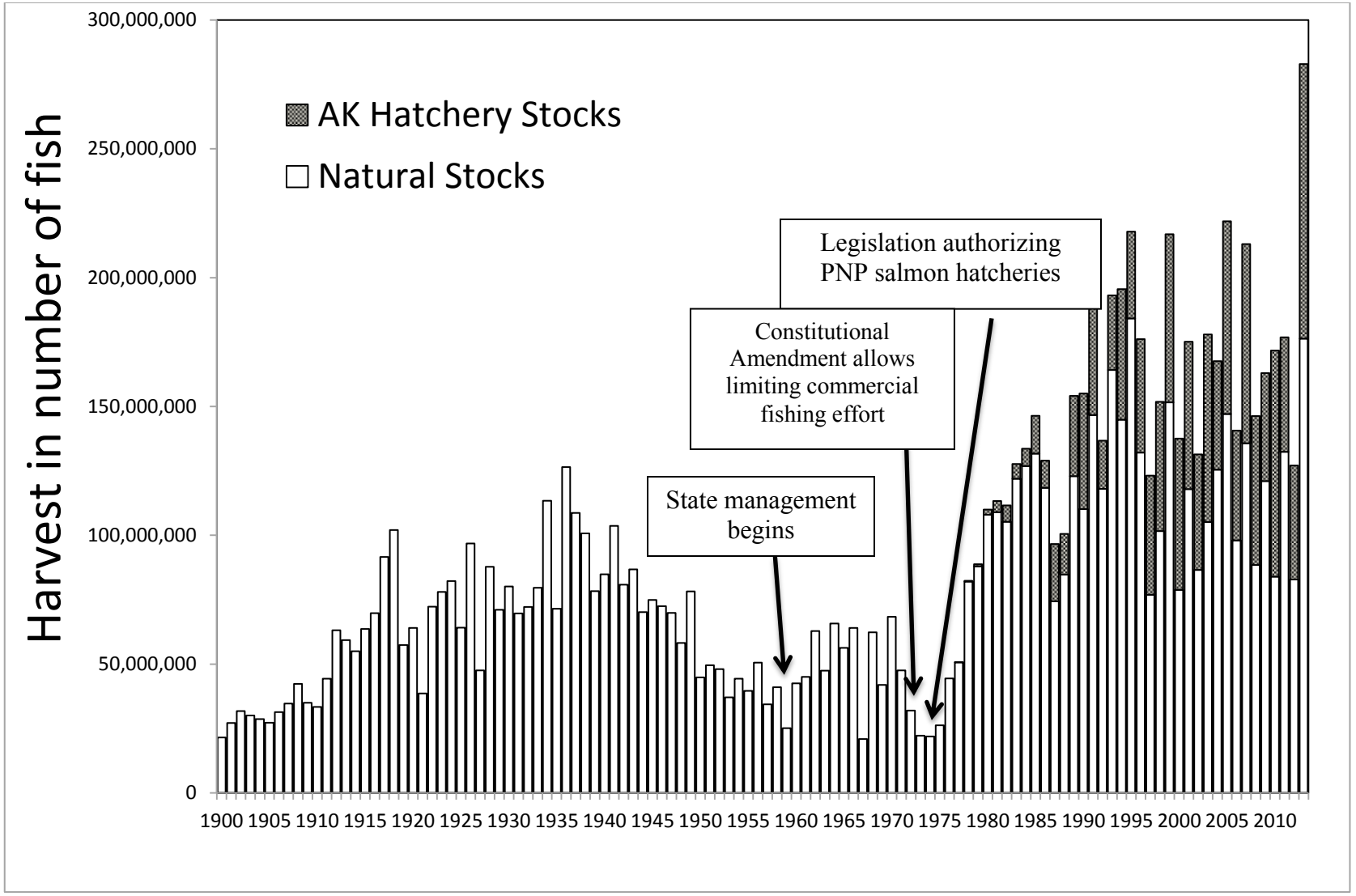

Figure 1.–Commercial salmon harvest in Alaska, 1900–2013.
Source: 1900–1976 from Byerly et al. (1999). 1977–2013 from Vercessi (2014).

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 of fish, followed by chum (20%), sockeye (4%), coho (2%) and Chinook (1%) salmon (Farrington 2003, 2004; 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% to 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) for all species of salmon despite large fluctuations in harvest volume (ADF&G 2014; Stopha 2013a; Figure 2).

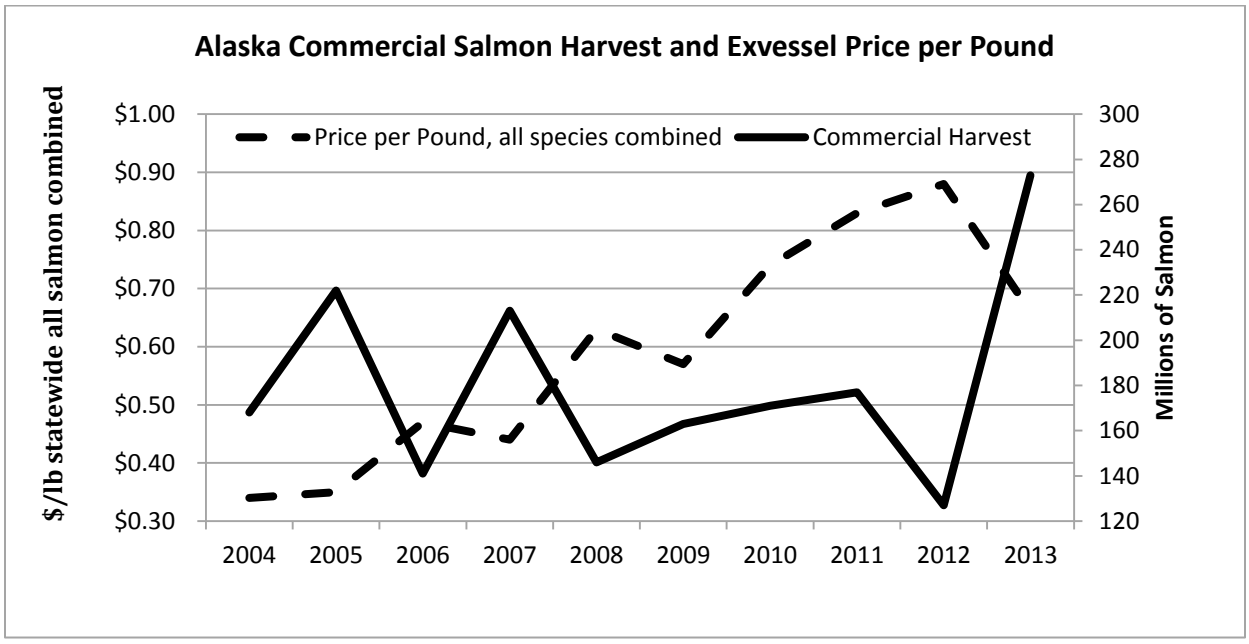

Figure 2.–Exvessel price of all salmon combined and the total Alaska commercial salmon harvest, 2004–2013.[2]

[2] See footnotes on following page for explanations of exvessel and wholesale value.

Exvessel value[3] 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[4] 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 (Figure 3). 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 (Stopha 2013a).

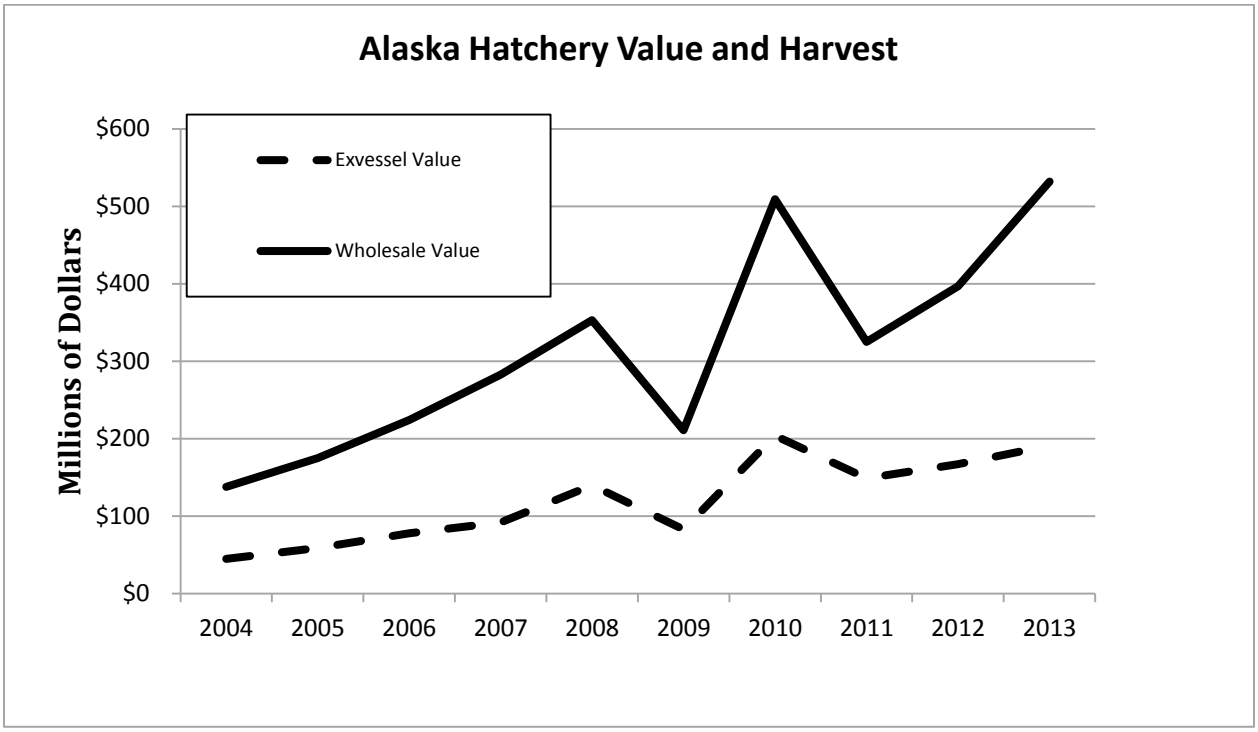

Figure 3.–Value of Alaska hatchery harvest, 2004–2013.

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

[3] The exvessel value for hatchery harvest was estimated as 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 2013.

[4] First wholesale value was estimated as is the total value paid to primary processors for all processed salmon and salmon roe from ADF&G Commercial Operators' Annual Reports 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. Alaska's salmon populations are considered among the healthiest in the world. 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.

The 2013 season was a record salmon harvest. The 283 million fish commercial harvest was comprised of the second highest catch for wild stocks (176 million fish) and the highest catch for hatchery stocks (107 million fish; Figure 1) in history. The 2013 season was the first year the hatchery harvest alone exceeded 100 million fish, which was greater than the total 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 Island, Alaska, Indian Reserve salmon; British Columbia, Canada, 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 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, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2014) completed reviews of the Trail Lakes, Port Graham and Eklutna hatcheries in Cook Inlet, the Solomon Gulch, Gulkana, Main Bay, Cannery Creek, Wally Noerenberg and Armin F. Koernig

hatcheries in Prince William Sound, and Snettisham Hatchery in northern Southeast Alaska. This report is for the Macaulay Hatchery located in Juneau. Following completion of reviews of hatcheries in the northern Southeast Alaska region, reviews of hatcheries in southern Southeast Alaska will begin.

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), *Regulation Changes, Policies, and Guidelines for Fish and Shellfish Health and Disease Control* (Meyers 2010), 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, Prince William Sound, 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 requires 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 non-sensitive 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 (A) hatchery stocks cannot be introduced to sites where the introduced stock may have interaction or impact on significant or unique wild stocks; (B) a watershed with a significant stock can only be stocked with progeny from the indigenous stocks; and (C) 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 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 Southeast Alaska, enhancement activities are generally prohibited in drainages on Forest Service lands, which make up the majority of land mass in the region. In this respect, the drainages represent de facto wild stock sanctuaries (Duckett et al. 2010). 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 *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 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* 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), comprised primarily of commercial salmon fishing permit holders, operate most of the PNP hatcheries in Kodiak, Cook Inlet, Prince William Sound, 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. RAAs may vote to impose a salmon enhancement tax on sale of salmon by permit holders 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 hatcheries or release sites to pay for operations. Several organizations have tourist and educational programs that contribute to the financial support of their programs as well.

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 staff 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 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 operate 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 4).

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/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 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.

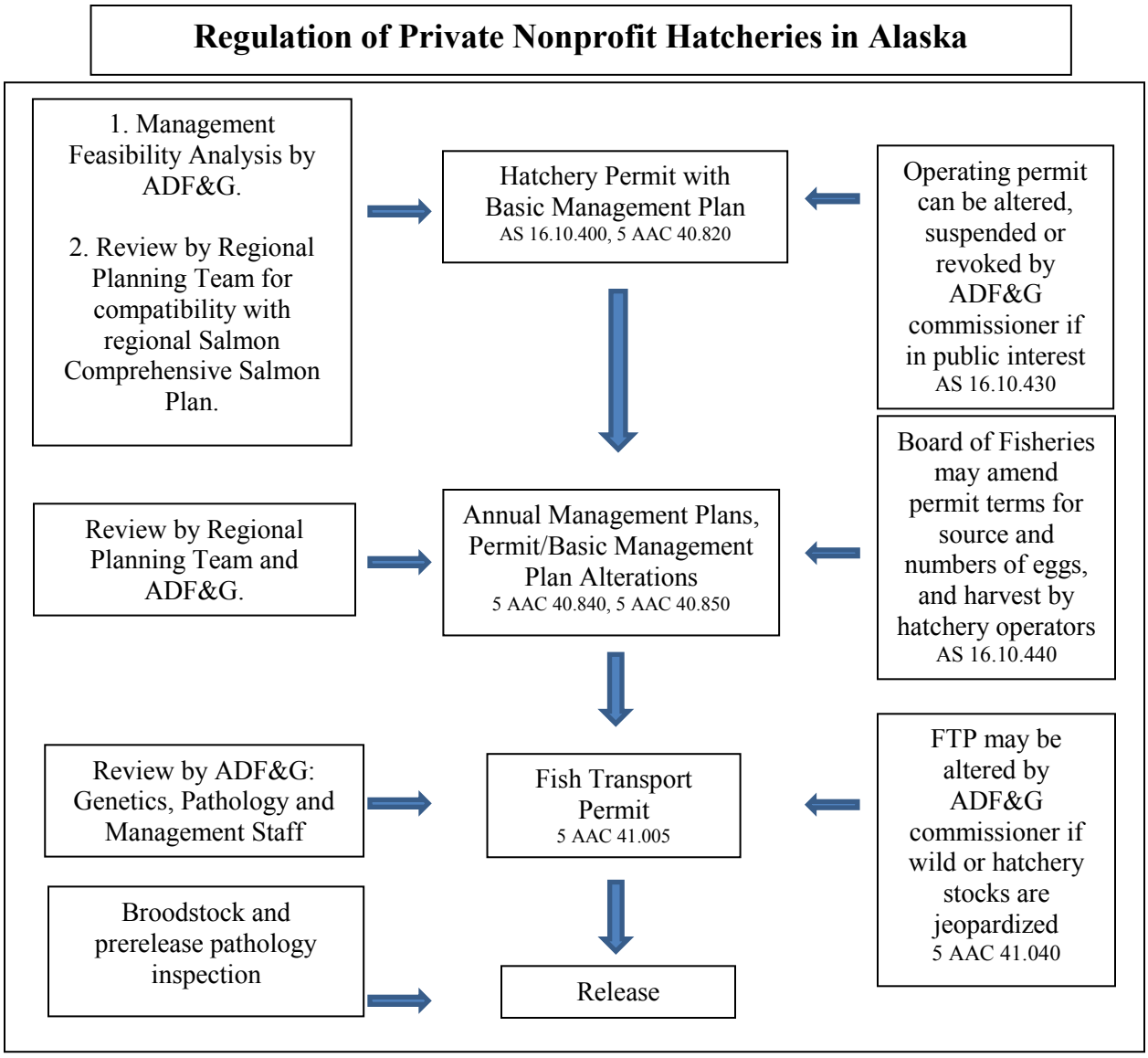

Figure 4.–Diagram of Alaska hatchery permitting process.

The AMP outlines operations for the current year and is in effect until superseded by the following year's AMP. 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 upcoming year's egg-take goals, fry or smolt releases, expected adult returns, harvest management plans, FTPs 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 ADF&G.

Each hatchery is required 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. Information for all hatcheries is compiled into an annual ADF&G report (e.g., Vercessi 2013) 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 cultured, stock lineages, releases, returns, and pathology.

MACAULAY SALMON HATCHERY OVERVIEW

Douglas Island Pink and Chum Incorporated (DIPAC) was incorporated as a nonprofit corporation in 1976. Their corporate mission statement states "The goal of Douglas Island Pink and Chum, Inc. is to sustain and enhance valuable salmon resources of the State of Alaska for the economic, social, and cultural benefit of all citizens, and to promote public understanding of Alaska's salmon resources and salmon fisheries through research, education, and tourism."[5] DIPAC constructed the Macaulay Salmon Hatchery (MSH), located on Gastineau Channel in Juneau (Figure 3), in 1990. Prior to MSH construction, DIPAC operated hatchery facilities at Kowee Creek (built in 1976 and no longer operated by DIPAC) and Sheep Creek (built in 1979 and still operated by DIPAC). All three facilities were located within a few miles of each other along Gastineau Channel on the Juneau waterfront. In addition, DIPAC currently operates the state-owned Snettisham Hatchery located about 30 miles southeast of Juneau. DIPAC is unique in Alaska in that it operates multiple hatcheries as an independent PNP hatchery corporation.

DIPAC began the application process for a PNP hatchery permit for MSH in 1984. The preliminary application was for a hatchery capacity of 250,000 Chinook, 10 million chum, and 100 million pink salmon eggs for release in Stephens Passage and Lynn Canal. The Phase II Northern Southeast Alaska Comprehensive Salmon Plan indicated that summer chum salmon would be the best species for enhancement in Lynn Canal because summer chum return timing provided temporal separation from wild Chinook, sockeye, coho and fall chum salmon runs. The water source for the hatchery was Salmon Creek Reservoir pipeline effluent that flowed to the hatchery after it passed through the turbines of the local electric utility, Alaska Electric, Light and Power (AEL&P).

ADF&G staff commented on the preliminary hatchery application. The FRED Division biologist indicated the water quality was adequate, but raised concerns that cold water could make growing smolts to a desired size difficult. He also noted that the water supply was dependent on the local electric utility and municipality, creating the potential for a water shortage. The biologist noted other potential issues, including fishery management, large number of fish transports, and fry imprinting at remote release sites, could be addressed with necessary analyses, planning, funding and implementation.[6]

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[5] From dipac.net/corp.htm accessed 5/11/2014.

[6] Memorandum from Ken Leon, ADF&G FRED Division Principal Biologist, to Jerry Madden, FRED Division., dated December 18, 1986. Unpublished document acquired from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

The FRED Division geneticist had no concerns with the broodstock sources for pink, coho, and chum salmon or the release sites. He indicated that Chinook salmon broodstock sources in the application, including Snettisham Hatchery/Andrews Creek and Little Port Walter Hatchery/Unuk River stocks, were not appropriate but did not state a reason for his opinion.[7]

The FRED Division fish pathologist made several suggestions for the hatchery design, including adequate separation of stocks, investigation of alternate water sources for recirculation in case of shut down of the main water source, installation of a depuration system in the recirculation system to sanitize water, installation of an emergency power diesel generator as backup during a power failure, installation of a degassing system to prevent gas bubble disease, and plumbing a seawater supply to incubators to treat for fungus.[8]

The Division of Commercial Fisheries Division regional supervisor cautioned that no capability existed at that time to evaluate hatchery contribution rates of pink salmon inseason. He recommended that the pink salmon permitted hatchery capacity at the time of 50 million eggs for middle-run northern Southeast Alaska pink salmon not be increased until inseason assessment was possible. He recommended any increase in pink salmon capacity be early-run or late-run stocks. He suggested appropriate early-run pink salmon stocks from the Nakina River (an early-run stock in a Canadian tributary to the Taku River), and stocks in upper Seymour Canal and Tenakee Inlet. Auke Creek was suggested as a late-run pink salmon stock.

The Division of Commercial Fisheries regional supervisor also indicated that coho production should be implemented incrementally to allow identification of contribution patterns in the fisheries, and suggested that early-run stocks from Admiralty Creek, Pavlof River, or other island streams would be most beneficial to the local sport fishery. Hatchery production of Chinook and chum salmon had not reached a level which would seriously complicate wild stock management. Chum salmon were not available in the immediate area in large numbers, and he suggested stock sources from Port Frederick near Hoonah or stocks from other area hatcheries.[9]

The RAA, the Northern Southeast Regional Aquaculture Association (NSRAA), raised several concerns. The proposed level of pink salmon production could affect wild stock harvest opportunity and make significant management errors more probable. (Note: these comments were made in the period before otolith thermal-marking technology allowed marking of 100% of releases). In addition, NSRAA staff believed, based on their experience of salmon hatchery releases from essentially the same site at Salmon Creek, harvest management could be a problem. When chum salmon entered the area from the north, the fish were poor in quality. In addition, NSRAA questioned the feasibility of conducting the hatchery harvest solely at the proposed SHA's.[10]

When the preliminary application was approved, DIPAC submitted a hatchery permit application for 50 million pink salmon eggs among all DIPAC hatcheries, and 100 million summer chum salmon eggs, 1 million coho salmon eggs, and 200,000 Chinook salmon eggs at MSH. Up to 40

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[7] Memorandum from Bob Davis, ADF&G FRED Division Geneticist, to Bob Burkett, FRED Division, dated December 8, 1986. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[8] Memorandum from Ted Meyers, ADF&G FRED Division Fish Pathologist, to Jerry Madden, FRED Division Fishery Biologist, dated December 11, 1986. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[9] Memorandum from Dave Cantillon, ADF&G Division of Commercial Fisheries Regional Supervisor, to Jerry Madden, PNP Coordinator, dated October 10, 1985. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[10] Memorandum from Pete Esquiro, NSRAA general manager, to Jerry Madden, PNP Coordinator, dated October 3, 1984. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

million MSH chum salmon fry were to be released at Amalga Harbor for cost-recovery harvest and up to 60 million MSH chum salmon fry released from the Sullivan Island area in Lynn Canal for common property commercial harvest.

The regional supervisor for the ADF&G Division of Sport Fish acknowledged that the permit application addressed many potential sport fishery issues, including remote release of chum salmon that would be caught by the commercial fleet, providing an area at the hatchery for sport fishing, increasing the number of chum salmon released in the SHA's to accommodate sport fishing, and releasing Chinook and coho salmon smolts for the sport fishery. He noted the need for the planned test fisheries in the proposed SHA at Amalga Harbor to determine impacts to wild fish stocks and crab.[11] In addition, the ADF&G Division of Sport Fish area management biologist commented that sport fisheries would benefit from the proposed hatchery production. He indicated that the proposed broodstock from Montana Creek was not an early-run stock as indicated on the application. He indicated that if an early-run stock was desirable, both Admiralty Creek and Pavlof River stocks would be candidates. He also indicated that dive and test fisheries would be necessary near the proposed Amalga Harbor SHA to assess crab and wild fish stocks that could be impacted by cost-recovery fishing.[12]

ADF&G Commercial Fisheries biologists commented that changing the focus of production at the hatchery from pink salmon to chum salmon would alleviate concerns over wild stock pink salmon management in upper Chatham Strait, and the maximum permitted capacity of 50 million pink salmon eggs between all DIPAC facilities was acceptable for wild pink salmon management. The chum salmon capacity of 110 million chum salmon eggs was also acceptable because wild chum salmon are harvested incidentally to targeted species in most fisheries that the hatchery chum salmon would be returning through, except for the Lynn Canal gillnet fishery, where the commercial harvest was managed for summer-run chum salmon stocks.[13] A tagging program was recommended to provide hatchery contribution estimates in the catch. The ADF&D Division of Commercial Fisheries area management biologist had reservations about the Amalga Harbor SHA. He indicated that hatchery returns may school outside the SHA and only move into the SHA when well-matured and perhaps lower in value. Allowing fishing in a larger area to access the hatchery returns was worrisome because of potential harvest of wild stocks. He also indicated concern that the area was a popular area for subsistence king and tanner crab fishing where the pot gear could interfere with cost-recovery fishing operations.[14] For the Sullivan Island release site, he indicated that fishery management would be based on sockeye salmon during the July period when the MSH chum salmon would be returning. He indicated MSH chum salmon would be caught during regular openings for sockeye salmon, and might cause a dispersion of gear and perhaps less pressure on the early Chilkat Lake and River sockeye stocks, which were trending at a low abundance at the time.

ADF&G Division of Habitat staff was concerned with maintenance of instream flow in Salmon Creek, the water source for the hatchery. The concern was addressed in a joint agreement among

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[11] Memorandum from Fran Van Hulle, ADF&G Division of Sport Fish Regional Supervisor, to Steve McGee, FRED Division fishery biologist, dated December 19, 1986. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[12] Memorandum from Mike Bethers, ADF&G Division of Sport Fish area management biologist, to Jerry Madden FRED Division fishery biologist, dated February 3, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[13] Memorandum from Dave Cantillion, ADF&G Division of Commercial Fisheries Region I Supervisor, and Don Ingledue, Area Management Biologist, to Jerry Madden FRED Division fishery biologist, dated February January 7, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[14] Ibid.

AEL&P, DIPAC, and the City and Borough of Juneau that assured an adequate supply of water to the creek.[15]

The Northern Southeast Regional Planning Team (NSERPT) determined that the hatchery would likely make a contribution to common property fisheries, was compatible with the region's comprehensive salmon plan, and was an appropriate use of the site. The NSERPT cautioned that the hatchery may not allow for protection of natural stocks of Upper Lynn Canal sockeye salmon or local summer chum salmon stocks, and that the magnitude of impacts would need further assessment to determine if suitable tradeoffs could be established. The NSERPT stated that MSH summer chum salmon returning to the Sullivan Island area, where a terminal harvest area was proposed for DIPAC releases, should be managed on the basis of upper Lynn Canal wild sockeye salmon stocks. At Amalga Harbor, the NSERPT recommended a test fishery to assess potential impacts of cost-recovery fishing. The NSERPT stated no concerns with releases of coho, Chinook or pink salmon. The NSERPT voted unanimously to recommend approval of the hatchery permit.[16]

The board of the RAA, the NSRAA, approved of the hatchery, with the provision that the release site at Sullivan Island be further evaluated.[17]

At the public hearing for the hatchery permit, there was an extensive discussion regarding impacts to wild stocks near the Amalga site and the proposed site near Sullivan Island in Lynn Canal. Chum salmon sale quality in terminal areas was also an issue, with a concern that DIPAC might not realize the economic returns they expected if the fish harvested for cost recovery were dark fish with pale meat. Hatchery chum salmon straying to wild chum salmon systems and impacts to Lynn Canal wild sockeye salmon stocks were also concerns. Another concern was that all the MSH chum salmon returns might not be harvested at Sullivan Island in years of low sockeye returns when only two days of fishing would be permitted in Lynn Canal. One gillnetter indicated there was only room for about three boats to fit in the cove by Sullivan Island, and that was not enough room to harvest a large volume of returning chum salmon.[18]

The ADF&G commissioner approved the permit application and DIPAC was issued hatchery permit number 25 for MSH on June 3, 1987. The permitted capacity was 111 million summer chum salmon eggs, 50 million pink salmon eggs (among all three DIPAC hatcheries), 1 million coho salmon eggs, and 200,000 Chinook salmon eggs. The BMP indicated that chum salmon releases would occur at MSH for broodstock and sport harvest, at Peterson Creek/Amalga Harbor for cost-recovery harvest, and near Sullivan Island for the commercial fishery. Taiya Inlet would also be investigated after a viable chum salmon program was established. Pink salmon would be released from the Sheep Creek Hatchery site for commercial, sport, and cost-recovery harvest, and from MSH for broodstock and sport harvest. Coho salmon were to be released for the sport and commercial fisheries from Peterson Creek/Amalga Harbor, Auke Creek, and Sheep Creek release sites, and for broodstock, sport and commercial harvest from

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[15] Memorandum from Jerry Madden, ADF&G Program Biologist, to Tom Kron, FRED Division acting director, dated February January 27, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[16] Letter from Mark LaRiviere, Northern Southeast Regional Planning Team Regional Planner, to ADF&G Commissioner Don Collinsworth dated February 27, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[17] Letter from Pete Esquiro, NSRAA General Manager, to Ladd Macaulay, DIPAC, dated March 12, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[18] Transcription by Judy Crondahl of taped public hearing of NSERPT hearing for MSH dated March 8, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

MSH. Chinook salmon were to be released for the sport and commercial fisheries from Peterson Creek/Amalga Harbor and Sheep Creek release sites, and for broodstock, sport and commercial harvest from MSH. The BMP indicated that each release site would be addressed individually to determine if natural stocks could be protected, if adequate utilization of the enhanced return occurred, and if the enhanced returns were of acceptable quality.

The Amalga Harbor site required other permits for hatchery activities, including a conditional use permit from the City and Borough of Juneau. After the Planning Commission held a public hearing on the site and approved it for use, a group of citizens opposed to use of the site appealed the decision to the City and Borough of Juneau Assembly. The objections included negative impacts to wild stocks at Peterson Creek, negative impacts to the recreational aspects of the area, and negative impacts to the sport fishery near Amalga Harbor and in Peterson Creek.[19] The City and Borough of Juneau Assembly acknowledged increased congestion at Amalga Harbor from increased usage from the Amalga Harbor release site, and acknowledged benefits of the operations at Amalga Harbor, including improvements to the commercial and sport fisheries, creation of a tourist attraction at MSH, and increased public use and enjoyment of the Amalga Harbor area.[20] The Assembly did not reverse the Planning Commission approval, and the project moved forward. The first release at Amalga was scheduled for 1989, but the DIPAC board decided to delay the release for a year to address public concerns.

The proposed release site at Boat Harbor was also controversial. One group indicated that the site was one of the few good anchorages in the area, and that a remote release site was not compatible in an Alaska Marine Park, in which Boat Harbor was located.[21] The Division of Parks was concerned with (1) user conflicts due to commercial fishing activity, litter, solid waste and sewage with increased pressure from fishing boats; (2) setting a precedent allowing an activity with potential impact to proceed without review; and (3) the smell, sight, bear presence and alteration of natural chemical balance from dead fish.[22] As part of the permit alteration issued in 7/6/1988, a scientific/educational permit was issued by ADF&G to DIPAC to conduct surveys and studies at Boat Harbor, St. James Bay, and Barlow Cove in cooperation with ADF&G to determine the impact of fish rearing, releases, and adult returns to those sites on wild stocks, traditional uses of the areas, and public use patterns at Boat Harbor.

DIPAC also considered Taiya Inlet near Skagway as a release site for chum salmon. Residents of Skagway commenting on the plan opposed it for several reasons. They were worried that a large volume of chum salmon carcasses could end up on their beaches, and that any cost-recovery harvest for chum salmon would also harvest Chinook salmon in Taiya Inlet. Water quality in the harbor was also a potential issue for the release site because bottom sediments contained heavy metals from mine tailings that rolled off ore trains and trucks.

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[19] Letter dated January 18, 1988 to Mr. Reed Stoops, City and Borough of Juneau Planning Commission chairman, from Robert Bosworth, Juneau Area State Parks Advisory Board chairman. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[20] Final Decision and Order in the matter of the appeal of the issuance of conditional use permit CU-23-88, January 24, 1989. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[21] Letter from Sitka Conservation Society to State of Alaska, Office of Management and Budget, Division of Governmental Coordination, dated January 17, 1989. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[22] Memorandum from Linda Kruger, Alaska Department of Natural Resources, Division of Parks and Outdoor Recreation Regional Manager, to Brad Sele, ADF&G FRED Division Regional Supervisor, dated April 7 1988. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

Several amendments have been added to the MSH hatchery permit since the hatchery permit was issued (Appendix A). For pink salmon, an approved permit alteration in October 1987 allowed 15 million pink salmon eggs to be incubated at a temporary site near the hatchery site until hatchery construction was complete. For coho salmon, the permitted capacity was increased from 1 million to 1.5 million eggs in 1993. For Chinook salmon, the permitted capacity was increased from 200,000 to 1.25 million eggs by a series of amendments from 1993 to 2010. For chum salmon, the permitted capacity was increased from 111 million to 125 million eggs by a series of amendments from 2002 to 2010. Other amendments provided for increased releases at some of the release sites and for addition of new projects.

The current permitted capacity for MSH is 125 million chum salmon, 50 million pink salmon, 1.5 million coho salmon and 1.25 million Chinook salmon eggs. The hatchery site serves as the primary broodstock collection site for chum, coho, and Chinook salmon. Cost recovery harvest of chum salmon occurs primarily at the Amalga Harbor release site and in Gastineau Channel near MSH in years of large returns.

MSH production contributes to area sport fisheries. The public dock at the hatchery and area along beaches adjacent to the hatchery, collectively known as the City and Borough of Juneau Wayside Park, is particularly important to anglers who do not have access to a boat.

Pink salmon are not currently produced at MSH. The last pink salmon eggs were taken in 2001 (Appendix C) and resulting fry released in 2002 (Appendix D). Pink salmon returns peaked in 1994 (Appendix D). DIPAC discontinued the pink salmon program because of the difficulty in acquiring both chum and pink salmon broodstock when they arrived at the same time at the facility. Chum salmon were a better economic return and contributed better to commercial fisheries, and therefore pink salmon were discontinued.[23]

Releases of fry transferred from SCH occurred from MSH in 1988, with release sites added at Amalga Harbor and Boat Harbor in 1989, Sheep Creek in 1990, and Limestone Inlet in 1992. From 1989 to 2001, SCH and MSH eggs were incubated together at MSH. The resulting fry were released at MSH, Boat Harbor, Amalga Harbor, and Limestone Inlet. Although both stocks were used, fry releases and returns were listed as MSH stock in the annual reports. Chum salmon egg takes steadily increased from about 12 million in 1988 to 123 million in 2012 (Appendix E). The largest releases were 115 million fry in 2007 and 114 million fry in 2012 and 2013 (Appendix F). The first chum salmon run over 1 million fish occurred in 1996, although in years prior to 1997, no commercial fishery estimate based on tagging was available because only a small fraction of the fry released were coded-wire-tagged until 1993, when all releases were otolith thermal marked. From 2006 to 2012, returns exceeded 3 million fish annually except 2010 (Appendix G).

Coho salmon egg takes ranged from 337,000 in 2010 to 1.6 million in 1995 (Appendix H). Releases were at numerous release sites from 1988 to 2005; since 2006, releases have been solely from MSH (Appendix I). Coho salmon annual returns have generally declined from a high of over 250,000 in 1991 to about 13,000 in 2012 (Appendix J).

Chinook salmon egg takes since 1994 have ranged from about 370,000 in 2001 to 734,000 in 2004 (Appendix K). Juvenile Chinook salmon were released from six release sites in recent

[23] Sam Rabung, ADF&G PNP Coordinator, personal communication.

years (Appendix L). Chinook salmon returns exceeded 10,000 fish in 2002 and 2004, and were less than 5,000 fish from 2010 to 2012 (Appendix M).

COMPREHENSIVE SALMON ENHANCEMENT PLAN

The NSERPT has developed three phases of Comprehensive Salmon Plans (CSP) to date. Phase I was issued in 1981 in conjunction with the Southern Southeast Regional Planning Team, and established the philosophy and goals for all of 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.

Chum salmon comprised most of MSH's production. According to the Phase I CSP, the highest Southeast Alaska chum salmon harvest in at the time of the issuance of the Phase I CSP in 1981 was 9,350,000 fish in 1918 (Joint Southeast Alaska regional planning teams 1981). 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 chum salmon in the late 1970s. The northern southeast Alaska chum salmon harvest showed a similar dynamic to the regionwide harvest (Figure 5). The Phase I CSP indicated a 15-year average chum salmon harvest of 1.7 million fish was the achievable long-term wild stock production. Some of the salient points of the Phase I document regarding MSH production included objectives to (1) increase Chinook and coho salmon for hand troll and sport fishing in the Juneau area; (2) produce summer chum salmon for gillnet in areas with little no current fishing pressure, especially in the Lynn Canal, Lower Stephens Passage and Gastineau Channel; (3) produce fall chum salmon in the Chilkat River area and Lower Stephens Passage gillnet harvest areas; and (4) produce chum salmon for seine harvest in lower Stephens Passage.

Salmon processors indicated 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 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 stocks occur naturally.

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 salmon 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.

For Phase II CSP planning, the RPTs for northern and southern Southeast Alaska developed separate plans. MSH is located in northern Southeast Alaska (NSE). The NSE CSP Phase II was issued in 1982. The purpose of the Phase II CSP was to identify and prioritize enhancement

opportunities within five sections of NSE.[24] MSH and release sites are located within the Lynn Canal and Stephens Passage units, and MSH returns are harvested in these two units, as well as in the Chatham Strait/Icy Strait, Outer Coastal and Frederick Sound units. 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.

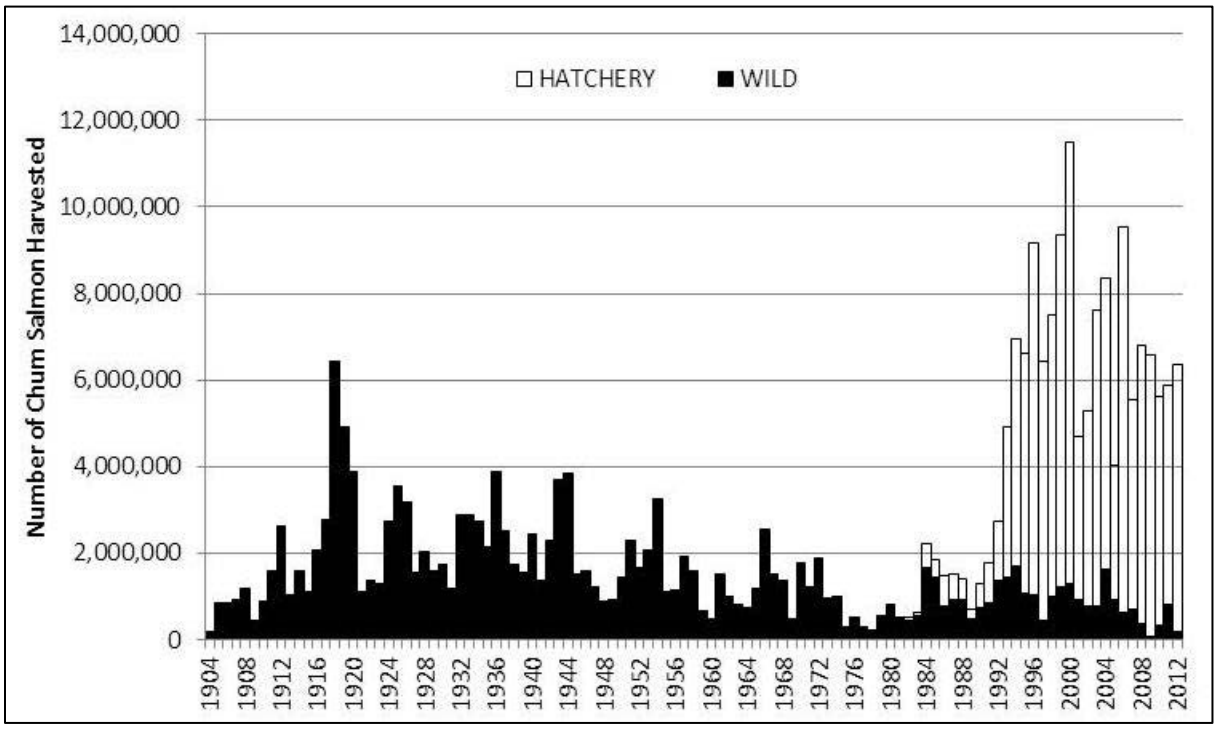

Figure 5.–Chum salmon commercial harvest, including hatchery cost recovery, in Northern Southeast Alaska, 1904–2012. Hatchery component includes contributions from all hatcheries.
Source: 1985–2012 ADF&G ZEPHYR database and hatchery database accessed 12/04/2013 by Lorraine Vercessi, ADF&G PNP Assistant Coordinator, Juneau. 1904–1984 data from Byerly et al. 2005.

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

[24] Northern Southeast Regional Planning Team (NSERPT). 1982. Comprehensive Salmon Plan, Phase II: Northern Southeast Alaska. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

hatchery enhancement activities during the five years of this first Phase II plan included investigation of stocking sockeye salmon in Canadian lakes in the Taku River drainage (part of the Stephens Passage Unit) and development chum salmon release sites in the Lynn Canal Unit.

Drift gillnet and hook and line (troll) are legal gears in Lynn Canal and Stephens Passage Units. Purse seining is also allowed in the MSH SHA at Amalga Harbor. A substantial salmon sport fishery occurs in the Lynn Canal and Stephens Passage units.

The gillnet fishery in northern Southeast Alaska is directed primarily toward major runs of sockeye and chum salmon to the Taku, Chilkat and Chilkoot systems. In Lynn Canal and Stephens Passage, early sockeye, mid-summer pink salmon, and fall chum salmon are the predominant wild stocks. Summer chum salmon was the only species recommended for hatchery production for the gillnet fishery in the first Phase II plan because returning chum salmon would have temporal separation from important wild Chinook sockeye, coho and fall chum salmon runs. Production of summer chum salmon would also extend the gillnet fishery season by providing returns during the slow summer period between sockeye and fall chum salmon runs. The Phase II CSP also recommended assessment and development of release site techniques.

Sockeye production was also important in the Phase II plan. At the time, technology was not fully developed for sockeye hatchery production to the smolt stage for release because of infectious hematopoietic necrosis virus (IHNV). Sockeye enhancement involved collecting eggs from wild broodstock, incubating and hatching the eggs in the hatchery, and returning the fry to the natal system of their parents. By 1996, hatchery techniques for sockeye salmon to smolt stage had been refined at Snettisham Hatchery, with a total return that year of about 486,000 fish (ADF&G 1996).

In 1985, significant changes in hatchery production occurred in Southeast Alaska due to the U.S./Canada Pacific Salmon Treaty (PST). From 1986 to 1992, $20 million of funding was made available for fishery enhancement projects to mitigate the harvest restrictions imposed on Southeast Alaska fishers by the PST. Enhancement from PST mitigation funds initially focused on hatchery production of Chinook salmon (NSERPT 1986) Sockeye, coho and chum salmon program funding was added in later years.

The Phase II plan was updated annually from 1986 to 1996. Additional MSH projects began with the 1988 Phase II update, when chum salmon projects included Kadashan River stock chum salmon releases from Boat Harbor, and the investigation of release sites from Skagway to the southern end of Admiralty Island. Chinook salmon projects included broodstock development of Andrew Creek stock at MSH, with initial incubation at Snettisham Hatchery. Coho salmon projects included collection of 1 million eggs from Sheep Creek Hatchery returns for incubation and release from MSH. Production goals for Southeast Alaska in the U.S./Canada PST Mitigation program of 100,000 Chinook, 20,000 sockeye and 1 million chum salmon were part of the 1988 Phase II update as well (NSERPT 1989).

The 1991 update included the option to use MSH for egg takes and smolt releases of the Tahini Chinook salmon stock in the Skagway/Haines area, and a long-term plan at MSH to replace the Andrew Creek Chinook salmon stock with the King Salmon River stock. The Limestone chum salmon release project was transferred from Snettisham Hatchery to MSH (NSERPT 1992).

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. Guidelines were developed for fishery supplementation, wild stock supplementation, and colonization. Four standards are to be documented in developing a fishery supplementation project: (A) release site has an adequate freshwater supply for adequate imprinting and is not in close proximity to significant wild stocks, (B) fish are adequately imprinted to the release site, (C) releases are marked and contribute to the harvest without jeopardizing the sustainability of wild stocks, and (D) the terminal area enables harvest or containment of all returning adults. The Phase III CSP also provides an extensive history of Southeast Alaska fisheries and salmon enhancement.

Projects for MSH 2004 Phase III CSP included (1) replacing the Andrews Creek stock from central Southeast Alaska with the Tahini River stock of northern Southeast Alaska, and (2) transfer of the Limestone Inlet chum salmon release program from Snettisham Hatchery to MSH in 1992.

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*. The Phase III CSP states that significance is more complex than simple production number because some of the region's most viable fisheries depend on aggregates of wild stocks, each of which is not very large. Diversity among wild stocks is a key factor in maintaining production capacity, and the potential to maximize harvest opportunities over time. The tool identified five stock characteristics of consideration: wildness, uniqueness, isolation, population size, population trend and the stock's economic and/or cultural significance (fishery support).

The Phase III plan provided a framework for assessment of new projects: "All projects will have an approved evaluation plan to assess impacts and measure success. This plan will describe how the project benefits will be measured and include a method for detecting negative or unintended impacts. An evaluation plan includes (A) fish identification (marking) method to be used; (B) mark–recovery plan for common property and terminal site harvests; (C) identification of potential ecological and genetic impacts that might warrant evaluation, a strategy to detect them, and criteria to determine when measured impacts would warrant project modification; (D) a description of how impacts to fishery management will be evaluated; and (E) a plan for dispersing information about the project. Proposals for new projects should document all evaluation agreements between the hatchery corporation or agency and the department, including any agreements for funding evaluation activities."

Two PARS were approved subsequent to the Phase III CSP assessment framework. A 2007 Chinook salmon project at Lutak Inlet near Haines allowed the collection of an additional 300,000 Tahini River stock Chinook salmon eggs from hatchery-reared returns to Pullen creek. The ADF&G geneticist requested a stipulation that hatcheries in Southeast Alaska look for Chinook salmon strays from the resulting releases at Pullen Creek when the FTP for this PAR (FTP 00J-1010) was amended in 2007.[25] A 2010 PAR was approved that increased the number of chum salmon eggs taken in years when there are concerns about gamete quality and subsequent incubation survival, such as in years when broodstock are exceptionally small or when water temperatures during egg takes are exceptionally high. Since increasing the egg take

[25] Chris Habicht, ADF&G Division of Commercial Fisheries geneticist, comments on application for amendment to FTP 00J-1010 dated April 27, 2007. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau, Alaska. Sampling of the harvest, escapement and of broodstock was already occurring.

to account for decreased incubation survival was not expected to increase the number of fry released, the geneticist was not concerned about additional assessment.[26]

PROGRAM EVALUATIONS

Hatchery permit/BMP, AMP, and FTP documents for MSH were reviewed to determine that, for each year of operation, they met the following guidelines:

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

The hatchery permit and BMP do not expire. The BMP should be updated when any permit amendments are approved through PARs.

Discrepancies among permitted activities and the activities carried out for chum salmon were primarily technical differences in the site of an egg take (e.g., the FTP indicated the egg take would be at Sheep Creek Hatchery, but actually occurred at MSH), or the life stage transferred (fry were transferred, when the FTP allowed for transfer of eggs). It appears that during the broodstock developmental years, the Sheep Creek and MSH facilities, which are near each other on Gastineau Channel (Figure 6), may have been considered part of the same complex by both ADF&G and MSH staff, since no correspondence could be found indicating deviation from sites designated in the FTPs. Both facilities shared an SHA and the same stocks were used at both facilities.

Other discrepancies for chum salmon production were found. Releases at Boat Harbor were authorized for Hidden Falls Hatchery stock from 1989 to 1999 under FTP 89J-1027, but MSH, SCH or MSH(SCH)[27] stock were released instead. There were also releases that occurred without an FTP, which were corrected with an appropriate FTP issued the following year for subsequent releases (e.g., FTP 90J-1049). Releases at Amalga Harbor from 1997 to 2000 significantly exceeded the level permitted by the authorizing FTP 88J-1118 (Appendix R).

For pink salmon, few discrepancies were found. No FTP was found that authorized egg takes and incubation at MSH in 1989, and apparently this was noticed and resolved as an FTP for this process was issued the following year (Appendix S).

For coho salmon, an FTP authorizing coho egg takes at MSH was not found until FTP 12J-1012 was issued. FTPs authorizing releases of coho salmon from MSH or Sheep Creek Hatchery that were progeny of coho salmon returns to MSH were not found until 1998 (FTP 98J-1013) and 1999 (FTP 99J-1003; Appendix T).

For Chinook salmon, in several years between 1994 and 2010, the number of eggs taken at MSH or received from other facilities significantly exceeded the level allowed in the FTPs that were current at the time. In addition, from 2002 to 2010, no FTP was found that permitted the take of Andrew Creek Chinook salmon eggs at MSH. FTP 88J-1041 was listed in the AMP as the active permit for collecting Andrew Creek stock eggs at MSH. However, this FTP was for transfer of Andrews Creek stock eggs from Crystal Lake Hatchery for incubation and release at MSH, and not for the take of eggs at MSH (Appendix U).

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[26] William Grant, ADF&G Division of Commercial Fisheries geneticist, comments on application for amendment to FTP 99J-1002, dated February 4, 2011. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau, Alaska.

[27] MSH(SCH) indicates fish that were SCH stock that were produced at MSH.

The 2012 AMP provides documentation of expected operations for the season, including egg-take and release goals, a listing of current FTPs, expected runs, hatchery run management, plans for otolith marking, and evaluation plans. Egg takes and fry releases reported in the 2012 annual report were in agreement with levels permitted in the FTPs and 2012 AMP. The AMP is consistent with the hatchery permit, FTPs and annual report, but the BMP should be updated to reflect amendments to the hatchery permit and current operations.

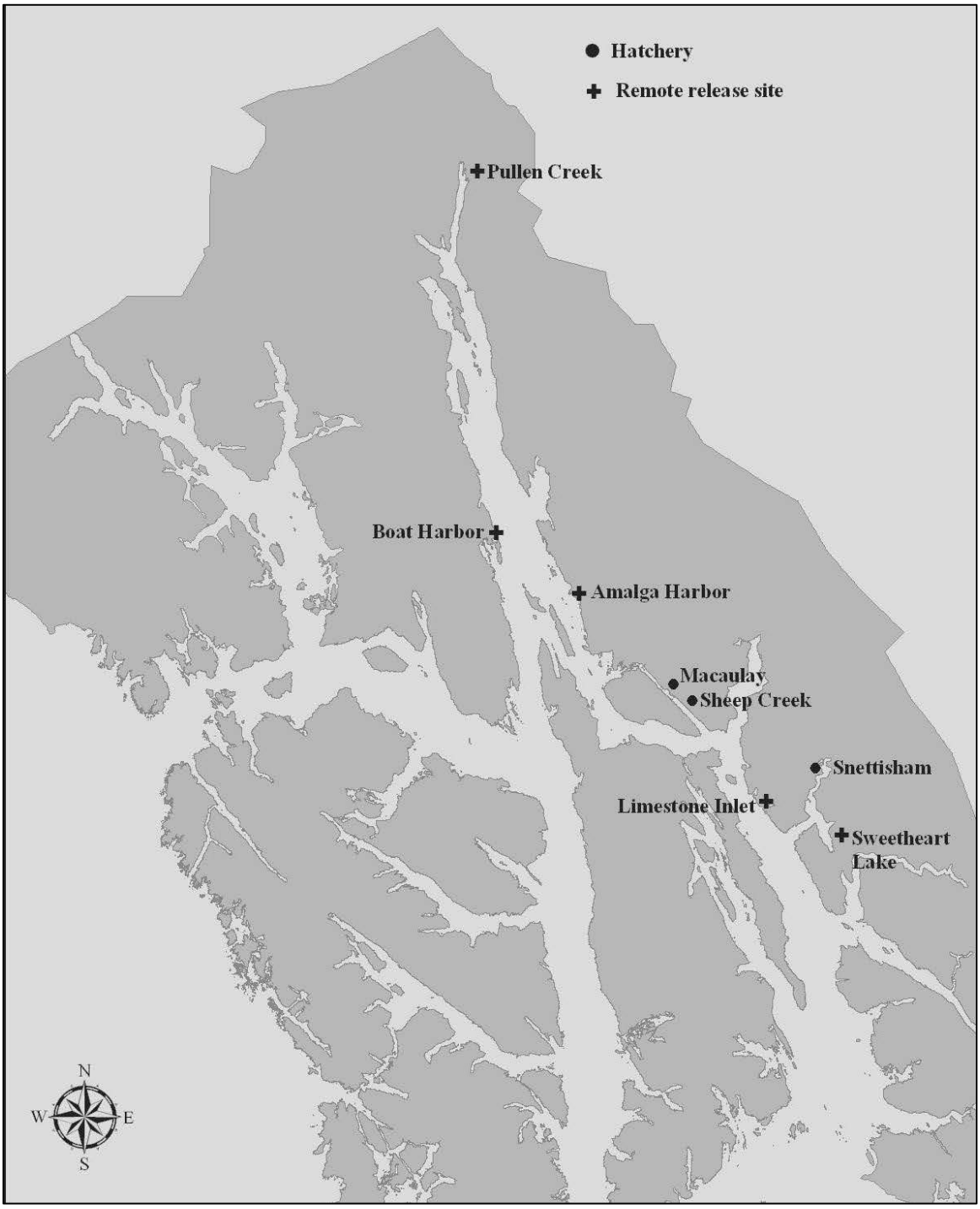

Figure 6.–Macaulay Salmon Hatchery and release sites near Juneau, Alaska.

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 were used to assess compliance of the MSH salmon program with each policy element in Tables 4–6.

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. 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.
Straying Impacts	Prevention of detrimental effects of gene flow from hatchery fish straying and interbreeding with wild fish.
III. Maintenance of genetic variance	
Maximum of three hatchery stocks from a single donor stock	A maximum of three hatchery stocks 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 for single year generations (coho and pink salmon) and fewer for species with overlapping generations (Chinook, sockeye and chum salmon). The policy also recognizes that small population sizes may be unavoidable with Chinook and steelhead.
Genetics review of FTPs (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)	
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 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.
Use of precautionary approach	Managers should use a conservative approach, taking into account any inherent uncertainty and risks.
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

The chum salmon broodstock at MSH originated from a conglomeration of stock origins, including Fish, Salmon, Kowee and Sawmill creeks near Juneau, and the Klehini River near Haines. These donor stocks represent the donor stocks to the Kowee, Sheep Creek, and Salmon Creek hatcheries. These hatchery sites are less than a mile from each other in Gastineau Channel in Juneau, and therefore all of these stocks were likely included in the broodstock of MSH due to intermingling of returning adults. Hidden Falls Hatchery-origin chum salmon, comprised of three Chatham Strait stocks (Kadashan, Seal Bay Cove and Clear River), were also reared at MSH but only released remotely at Boat Harbor and Limestone Inlet.

Pink salmon broodstock originated from Sheep Creek, near the hatchery, and the Kadashan River, near Tenakee.

The initial coho salmon broodstock originated from Montana and Steep creeks near Juneau. Because returning adults of this stock were smaller than desired, DIPAC switched to broodstock from Fish Creek, a Taku River tributary in hopes to produce larger-sized adults, with the first egg take there in 2011.[28] Several FTP applications for use of coho salmon stocks from south Baranof Island and for releases of coho salmon at Amalga Harbor were denied based on genetic concerns (Appendix Q).

Chinook broodstock was originally the Andrew Creek stock, a tributary to the Stikine River, acquired from Snettisham Hatchery. The Genetic Policy recommended that a donor stock not be used at more than three hatcheries. In 1993, MSH received the first transfer of King Salmon River stock eggs from Little Port Walter Hatchery in an attempt to transition to King Salmon River stock. During the transition period, DIPAC continued collecting Andrew Creek stock eggs to meet permitted capacity. MSH could not obtain enough King Salmon River stock eggs to meet permitted capacity due to poor ocean survival and lack of sufficient backup egg availability from Little Port Walter Hatchery, and the transition to the King Salmon River stock was abandoned in 1998. DIPAC began a new broodstock development program using the Tahini River (a tributary of the Chilkat River) stock in 1998, which was being produced in small number at Burro Creek Hatchery in Skagway. The original plan was to transition to the Tahini River stock for all Chinook salmon projects by 2010. However, production setbacks and the addition of another project would have delayed full transition to Tahini River stock until at least 2018. Andrew Creek stock continued to be used during the transition attempts to both the King Salmon River stock and the Tahini River stocks, and there was little evidence of straying with the Andrew Creek stock.[29] As a result, ADF&G decided in 2010 to rescind their directive for DIPAC to change the Chinook salmon broodstock at MSH, and to proceed with continued use of the Andrew Creek stock for the Juneau programs. The Tahini River stock continues to be used for the Pullen Creek and Lutak Inlet releases, and is a local stock to these projects.

The ADF&G geneticist requested that a stipulation be added to the 2007 amendment for FTP 00J-1010, which increased the Tahini River egg take from 300,000 to 600,000 eggs, to "look for

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[28] FTP 2008J-1003 dated 01/23/08. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau, Alaska.

[29] Annual sampling of Chinook salmon has occurred in the Taku River for Chinook salmon since 1982 and coho salmon since 1988. During that time, a total of 10 tagged Chinook hatchery salmon and 0 coho salmon have been recovered. The Chinook recoveries consisted of four from Snettisham Hatchery (two recovered in 1986 and one each in 1989 and 1994),one from MSH (2004), three from Little Port Walter Hatchery (1984, 1986 and 2004) and two from Hidden Falls Hatchery (1987 and 1997).

strays from this project in the racks of all SEAK hatcheries."[30] Although this was not added to the amendment, likely because it would affect all hatcheries in the region, hatcheries do routinely sample returns to the rack (i.e., the hatchery).[31] The FTP for the Lutak Inlet (FTP 07J-1043) stipulates that coded wire tagged Chinook salmon are sampled at the Chilkoot River weir, the Chilkat River fish wheel, and during stream surveys to monitor straying.

Hatchery chum salmon straying has been studied in the region. Piston and Heinl (2012) reported in a three-year study of hatchery chum salmon straying in Southeast Alaska: "The proportion of hatchery strays decreased as distance from release sites increased. The mean proportion of hatchery strays in the 12 sampled streams located within 50 km of the nearest release site was 28.3% (range: 3.4–87.5%), and all samples that were composed of more than 40% hatchery fish were from these streams. The mean proportion of hatchery strays from streams located 50–100 km from the nearest release site was 8.0% (range: 0.0–17.8%). For streams greater than 100 km from the nearest release site, the mean proportion of hatchery strays declined to 3.3% (range: 0.0–16.6%)."

In 2009, chum salmon escapement was sampled for hatchery strays in four streams in Stephens Passage and three streams in Lynn Canal. Two streams showed no strays, and the remaining streams showed strays in the samples of 16%, 25%, 38%, 77% and 87%. In 2010, sampling occurred in five streams in Stephens Passage and one stream in Lynn Canal, with strays in samples of 3%, 7%, 10%, 10%, 46% and 68% (Piston and Heinl 2012).

In 2012, ADF&G awarded the Prince William Sound Science Center a contract for a four-year study entitled *Interactions of Wild and Hatchery Pink and Chum Salmon in Prince William Sound and Southeast Alaska*.[32] The project will study the extent and annual variability in straying of hatchery chum salmon in Southeast Alaska, and the effects, if any, on productivity of wild salmon stocks due to straying of hatchery salmon.

ADF&G operates weirs and fish wheels and conducts foot surveys on numerous streams throughout southeast Alaska to monitor wild stock returns, and these projects also assist in monitoring for strays. Heads of fish that have the adipose fins missing are sent to the state tag lab for tag recovery and reading.

[30] Email from Chris Habicht, ADF&G geneticist, to Sara Larsen, ADF&G Permit Coordinator, dated Friday, April 27, 2007 9:46 a.m. Unpublished document obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau, Alaska.

[31] Sam Rabung, ADF&G PNP coordinator, personal communication.

[32] http://www.adfg.alaska.gov/index.cfm?adfg=fishingHatcheriesResearch.main, (Accessed 02/01/2013).

Table 4.–The current Macaulay Salmon Hatchery fishery enhancement program and its consistency with elements of the ADF&G *Genetic Policy* (see Table 1).

I. Stock Transport	
Use of appropriate local stocks	MSH used broodstock from local chum and coho salmon stocks. Local (Tahini River) stock for Chinook salmon was unsuccessful, and the Andrew Creek stock continues to be used for the Juneau Area. Tahini River stock Chinook salmon are still permitted and used for projects in the Haines and Skagway areas.
II. Protection of wild stocks	
Identification of significant or unique wild stocks	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*.
Establishment of wild stock sanctuaries	No wild stock sanctuaries are designated for northern Southeast Alaska by the RPT. Many streams in Southeast Alaska are on Forest Service land where enhancement activities are generally prohibited. This creates de facto wild stock sanctuaries (Duckett et al. 2010, p. 51).
Straying Impacts	Straying studies were conducted for chum salmon from 2008 to 2010. Studies are underway to examine hatchery–wild stock interactions.
III. Maintenance of genetic variance	
Maximum of three hatchery stocks from a single donor stock	Andrew Creek Chinook salmon stock is used at more than three facilities in Southeast Alaska. Other stocks (Tahini River and King Salmon River stocks) have been tried at the facility, but availability of sufficient broodstock prevented full development of these broodstocks. As a result, ADF&G has approved continued use of the Andrew Creek stock in the Juneau area, and Tahini River stock is still permitted for the Skagway and Haines areas. The coho and chum salmon stocks used at MSH are not used at other facilities, except that Hidden Falls hatchery chum salmon stocks contributed to the current MSH chum salmon stock.
Minimum effective population size	In 2012, about 83,230 chum salmon, 590 coho salmon and 198 Andrew Creek stock Chinook salmon broodstock were used to meet egg-take goals. No Tahini River stock Chinook salmon broodstock were used because an insufficient number of females were available.
Review by geneticist	The ADF&G geneticist reviewed the FTPs for the MSH programs.

Fish Health and Disease

FTPs for the MSH program were approved by the pathologist (Table 5). Pathology records showed no inconsistencies with fish health and disease policies. Appropriate salmon culture techniques are being used, and disease reporting and broodstock screening have occurred as required (Appendix V).

The hatchery was been inspected regularly since at least 1990, and no major chronic health issues have been identified at the facility. Inspectors commented that hatchery practices are of "the highest caliber."

Egg take and isolation measures are not well-described or cited in FTPs. In some instances, ADF&G staff may have contacted DIPAC staff directly with questions on specific procedures and measures.[33]

Table 5.–The current Macaulay Salmon Hatchery salmon fishery enhancement 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	Most MSH egg take FTPs read "Standard methods", "Standard Procedure", or "Standard" under "Description of proposed egg-take methods". The chum salmon egg take FTP for MSH reads "dry fertilization" under egg take methods. Therefore, it is not clear from the FTPs if eggs are disinfected at MSH.
Hatchery inspections	Hatchery inspections were conducted regularly from at least 1990 through 2013.
Disease reporting	There have been no chronic disease issues at the hatchery.
Pathology requirements for FTPs (5 AAC 41.010)	
Disease history	The disease history is complete.
Isolation measures	Same as for egg disinfection above. It is not clear from the FTPs what, if any, isolation measures are practiced.
Pathology review of FTPs	FTPs were reviewed and approved by the pathologist.

Fisheries Management

During the hatchery permit application phase for MSH, staff biologists and the NSERPT expressed concern for wild summer chum and sockeye salmon stocks in upper Lynn Canal that would be present at the same time that MSH chum salmon returned.[34,35] Public testimony during the hatchery permitting phase included concerns for local stocks in Peterson Creek, a popular sport fishing area, because a chum salmon release site was proposed at Amalga Harbor near the mouth of Peterson Creek.[36]

To address concerns for Peterson Creek stocks, a permit stipulation was added to the Fish Habitat permit requiring the use of an Escapement Control Device (ECD) starting in 1994, which was the first expected return year for hatchery chum returns to Amalga Harbor. The ECD was to be operated during about a four-week period to prevent upstream migration of chum salmon when large numbers of hatchery fish were present. This ECD is still operated on an annual basis in cooperation with DIPAC and the ADF&G Commercial Fisheries Division.[37] A similar ECD

[33] Email from Scott Kelley, ADF&G Acting Regional Supervisor to Jamie Barlow, ADF&G biologist, and Eric Presegard, DIPAC staff, dated Tuesday, July 17, 2001. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[34] Letter from Dave Cantillon, ADF&G Region I supervisor, and Don Ingledue, ADF&G area management biologist, to Jerry Madden, ADF&G PNP Coordinator dated January 7, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[35] Letter from Mark LaRiviere, Northern Southeast Regional Planning Team Regional Planner, to ADF&G Commissioner Don Collinsworth dated February 27, 1987. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[36] Letter from Robert Bosworth, Juneau Area State Parks Advisory Board Chairman, to Mr. Reed Stoops, City and Borough of Juneau Planning Commission Chairman, dated January 18, 1988. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau.

[37] Dan Teske, ADF&G area sport fish biologist, personal communication.

is operated at the mouth of Salmon Creek, adjacent to the MSH facility, to prevent upstream migration of chum salmon when large numbers of hatchery fish are present.

Escapement goals are established for Chilkat River fall chum and Chilkat Lake sockeye salmon, for Chilkoot River sockeye salmon, and for Peterson Creek coho salmon. In the past decade (2003 to 2012), the lower escapement goal has been met or exceeded for these species and systems in most years (Appendix X).

An escapement goal has been established for Taku River Chinook salmon (Der Hovanisian et al. 2011), and management targets have been established through the Pacific Salmon Treaty process for sockeye (Heinl et al. 2011) and coho (Shaul et al. 2011) salmon. Escapement goals for chum and pink salmon have not been established to date due to lack of quality escapement data. Catch and escapement data provide an index for general trends in the Taku River (Piston and Heinl 2011).

Beginning in 1991, all pink salmon from MSH were otolith thermal-marked, and by 1993, all species released from MSH were otolith thermal marked. In addition, a portion of Chinook and coho salmon released are also marked with coded wire tags and adipose clips. All species released by MSH are sampled in the fisheries to estimate wild and hatchery contribution.

The District 11 Taku/Snettisham and District 15 Lynn Canal drift gillnet fisheries harvest the majority of MSH chum salmon. Purse seine and troll gear harvest MSH chum salmon in mixed-stock fisheries along the MSH chum salmon migration route in Icy Strait and Chatham Strait. The District 11 drift gillnet fishery is managed based on returns to the Taku River of Chinook salmon in May and early June, sockeye salmon in June and July, and coho salmon in August and September. Taku River pink and chum salmon stocks are harvested incidentally to the other three salmon species. MSH chum salmon transit through the District 11 drift gillnet fishery, and like the Taku River pink and chum stocks, are harvested incidentally to the other three salmon species.

In District 11, the Limestone Inlet terminal harvest area is opened by Emergency Order for the drift gillnet fishery to target MSH chum salmon returning to this remote release site. The drift gillnet fishery in Stephens Passage adjacent to Limestone Inlet is managed with a goal to maximize the harvest of returning MSH Limestone chum salmon and minimize the incidental harvest of wild sockeye salmon bound for Speel Lake in Port Snettisham (Davidson et al. 2013).

A weir to monitor sockeye salmon escapement has been operated at Speel Lake since 1983. From about 1983 to 1992, ADF&G staff informally set an escapement goal of 10,000 sockeye salmon for the lake. In 1992, the goal was reduced to 5,000 fish based on accumulated stock-recruitment data and professional judgment (Riffe and Clark 2003). The current goal for Speel Lake sockeye (4,000–13,000) was established by Riffe and Clark (2003), and remained unchanged after escapement goal reviews in 2004 (Geiger et al. 2004), 2011 (Munro and Volk 2012) and 2012 (Munro and Volk 2013). The first MSH chum salmon returns to Limestone Inlet were in 1996. Since then, the Speel Lake sockeye salmon escapement goal (1996–2004) or lower end of the escapement goal (2004–present) was met in 14 of 17 years (Appendix W). Taku River escapement goals were established in 1986 (Munro and Volk 2013), and met in every year since then except 2008 (Appendix W).

Beginning in 2012, common property purse seine fisheries have been conducted within the Amalga Harbor SHA in District 11 to target returning chum salmon above DIPAC cost-recovery

harvest needs. Purse seine gear is also used for cost-recovery fisheries targeting chum salmon at the Amalga Harbor and MSH release sites.

In District 15, the Section 15-C (lower Lynn Canal) drift gillnet fishery targets MSH chum salmon originating from remote release sites at Amalga Harbor and the Boat Harbor Terminal Harvest Area. Time and area adjustments to the Section 15-C fishery are made to reduce the harvest rate on wild northbound sockeye salmon stocks while harvesting MSH chum salmon. The Boat Harbor Terminal Harvest Area is managed in accordance to 5 AAC 33.386. District 15: Boat Harbor Terminal Harvest Area Management Plan to target MSH chum salmon returning to this remote release site.

MSH coho and Chinook salmon are targeted in sport fisheries near Juneau, Skagway and Haines. MSH Chinook salmon that return to the designated terminal harvest area near the three release sites provide anglers with liberalized bag limits. Chinook salmon sport harvest is also allowed in fresh waters of the Juneau road system,[38] where no natal stocks exist. Liberalized bag limits have not been implemented for MSH coho salmon due to the numerous small coho salmon stocks natal to systems along the Juneau road system.

NOAA and DIPAC staff assessed wild stock and hatchery-produced juvenile chum salmon interaction in the rearing waters of MSH juvenile chum salmon. Orsi et al. (2004) concluded that interactions between hatchery and wild stocks of juvenile chum salmon occurred in Icy Strait, that the prey resources for juvenile chum salmon were large relative to the consumption demands of the combined hatchery and wild juvenile chum salmon numbers present, and that under their modeling assumptions, the current levels of hatchery production in southeastern Alaska did not represent a significant impact on the prey resource available in the Icy Strait study area.

Reese et al. (2009) concluded MSH and wild stock chum salmon were present at the same period in Taku Inlet, near the MSH and Limestone Inlet release sites, but direct indications of competitive effects on wild fry, such as poor condition or reduced growth rates, were not observed.

Sturdevant et al. (2011) indicated that DIPAC hatchery release strategies for MSH chum salmon released in the Taku Inlet area promoted early spatial segregation and prey partitioning between hatchery-produced and wild stock fish, limiting the probability of competition between the two stocks.

[38] Dan Teske, ADF&G area sport fish biologist, personal communication.

Table 6.–The current Macaulay Salmon Hatchery salmon fishery 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	NOAA and DIPAC have conducted several studies on the interaction between MSH and wild stock chum salmon juveniles.
Use of precautionary approach	ADF&G manages the salmon fishery to meet escapement goals.
Salmon Escapement Goal Policy (5 AAC 39.223)	
Establishment of escapement goals	Escapement goals are established for the Chilkat River chum salmon. Data is not yet available to establish chum salmon goals for the Taku River. Chinook salmon goals for the Chilkat and Taku rivers are established and have been met or exceeded in almost every year since 2000 (Skannes et al. 2013). Coho salmon goals for the Chilkat River, Auke Creek, Berners River, Montana Creek and Petersen Creek are established and have been met or exceeded in almost every year since 2000 (Skannes et al. 2013).
Mixed Stock Salmon Fishery Policy (5 AAC 39.220)	
Wild stock conservation priority	The Taku/Snettisham commercial gillnet salmon fishery is managed to maximize the harvest of MSH-produced chum salmon returning to the Limestone Inlet chum salmon release site while minimizing the incidental harvest of Port Snettisham wild sockeye salmon. Beginning in mid-August, the Taku/Snettisham commercial gillnet fishery is based on returns of wild Taku River coho and fall chum salmon. The Lynn Canal commercial gillnet salmon fishery is managed to maximize the harvest of MSH-produced chum salmon while conserving wild summer chum salmon stocks in Lynn Canal (Davidson et al. 2013).
Fisheries management review of FTPs (5 AAC 41.010 – 41.050)	
Review by management staff	The FTPs for the MSH program 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; brood stock 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 runs attributable to hatchery releases, on a form to be provided by the department." The completed report is due on December 15 and the MSH annual reports have been received for all years.

Alaska hatcheries are required to document the disposal of the carcasses of salmon used for broodstock (5 AAC 93.350). If the carcasses are disposed, the hatchery must record the number of males and females disposed each day, and whether the gametes were fertilized, unused, or used for roe sales. A maximum of 10% of the total number of females can be used for roe sales without utilizing the carcass; the proceeds from any excess must be surrendered to ADF&G. MSH carcass logs appear complete and timely.

RECOMMENDATIONS

1) The BMP for MSH should be updated to reflect current hatchery operations.

DISCUSSION

Alaska hatchery and fisheries enhancement programs are governed by a comprehensive permitting system designed to protect wild stocks and provide increased harvest opportunities. The success of enhancement efforts depends on implementing that system and ensuring policies are followed.

DIPAC constructed MSH in response to poor salmon returns to northern Southeast Alaska and most of Alaska during the 1970s. Today, the combination of favorable environmental conditions, sustainable management of wild stock systems, and hatchery production supports healthy commercial salmon fisheries in northern Southeast Alaska.

With full utilization of virtually the entire hatchery run and strong demand for pink and chum salmon, there is heightened interest in increasing Alaska hatchery production. The processing industry has expanded infrastructure and markets for abundant salmon returns. The advent of otolith marking and additions to the time series of harvest, escapement, migration, and timing data have added to management precision for harvesting the MSH run and providing for adequate escapement to wild stock systems.

Straying of MSH chum salmon has been documented (Piston and Heinl 2012). Hatchery strays were included in escapement counts of wild systems and hatchery-produced fish may have spawned with wild stock fish. Garforth et al. (2012), in the first surveillance report for certification of Alaska's salmon fisheries under the FAO-based responsible fisheries management certification, indicated the need for hatchery and wild stock interaction study: "To evaluate whether or not fitness of natural-origin (wild) versus stray hatchery-origin salmon differ when spawning in the wild, survival of both types of fish and their relative spawning success needs to be documented."

A science panel composed of current and retired scientists from ADF&G, University of Alaska, aquaculture associations, and National Marine Fisheries Service, with broad experience in salmon enhancement and salmon management designed a long-term research project to potentially answer some of these questions. The initial four-year study entitled *Interactions of Wild and Hatchery Pink and Chum Salmon in Prince William Sound and Southeast Alaska* currently underway is funded by the state of Alaska and administered by ADF&G, with field work conducted by the Prince William Sound Science Center and Sitka Sound Science Center. The study will improve understanding of hatchery and wild stock interactions and provide Alaska-specific scientific guidance for assessing Alaska's hatchery program, including recommendations for escapement goals, fisheries management, hatchery production levels, and hatchery practices at MSH and other hatcheries in the state.

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APPENDIX

Appendix A.–History of Macaulay Salmon Hatchery PNP hatchery permit and alterations, 1987–2013.

Date	Description	Permitted Capacity in millions of eggs			
		Chum Salmon	Pink Salmon	Coho Salmon	Chinook Salmon
06/03/1987	PNP hatchery permit number 25 and BMP issued to DIPAC to operate the Gastineau Hatchery [renamed in 2000 as Macaulay Salmon Hatchery (MSH)]. Hatchery permitted for 111 million summer chum, 50 million pink, 1 million coho and 200,000 Chinook eggs.	111	50	1	0.2
10/12/1987	PAR approved to allow 15 million pink salmon eggs to be incubated at a temporary hatchery at nearby Salmon Creek until MSH construction is complete.	111	50	1	0.2
05/24/1988	PAR approved to rear and release 20,000 coho salmon from net pens in Tee Harbor or Culvert Creek. For 1988, the smolt could be supplied by Sheep Creek Hatchery, after which they would come from MSH. All releases to be coded-wire-tagged.	111	50	1	0.2
07/06/1988	PAR approved to allow expanded use of temporary hatchery at Salmon Creek to incubate up to 37.5 million pink and chum salmon eggs combined and 200,000 Chinook salmon eggs. Basic Management Plan (BMP) for MSH amended to add evaluation of Boat Harbor, St. James Bay and Barlow Cove as rearing and release site.	111	50	1	0.2
02/06/1989	PAR approved to rear and release 9 million MSH chum salmon fry from Boat Harbor.	111	50	1	0.2
03/17/1989	PAR approved to amend MSH BMP text to put in a barrier at Peterson Creek Lagoon to control chum, coho and Chinook salmon entering the lagoon.	111	50	1	0.2
02/24/1991	PAR approved to release 10 million MSH chum salmon fry at Sheep Creek.	111	50	1	0.2
05/22/1991	PAR approved to incubate up to 200,000 Chinook salmon eggs from the Chilkat River for release back to the Chilkat River.	111	50	1	0.2
05/22/1991	PAR approved to release 15 million MSH chum salmon fry in Limestone Inlet.	111	50	1	0.2
03/19/1992	PAR approved to increase Chinook salmon permitted capacity at MSH from 200,000 to 250,000, and mandated marking of a portion of releases.	111	50	1	0.25

-continued-

Date	Description	Permitted Capacity in millions of eggs			
		Chum Salmon	Pink Salmon	Coho Salmon	Chinook Salmon
07/14/1993	PAR approved to increase coho salmon permitted capacity at MSH from 1 million to 1.5 million, and mandated marking of a portion of releases.	111	50	1.5	0.25
06/27/1994	PAR approved to increase king salmon permitted capacity at MSH from 250,000 to 700,000, and mandated marking of a portion of releases.	111	50	1.5	0.7
06/03/1996	PAR approved to increase MSH chum salmon fry release at Boat Harbor from 9 million to 24 million and establishes Boat Harbor SHA and Limestone Inlet SHA.	111	50	1.5	0.7
06/09/1997	PAR approved to increase MSH chum salmon release from 40 million to 54 million at Amalga Harbor and from 12 million to 18 million at Gastineau Channel.	111	50	1.5	0.7
09/04/1997	PAR approved to rear up to 400,000 MSH coho salmon to the smolt stage at Sheep Creek and returned to MSH for release.	111	50	1.5	0.7
06/21/2001	PAR approved to transfer permitted capacity of 10 million chum salmon eggs from the Sheep Creek Hatchery permit to MSH permit. This increased MSH chum salmon capacity from 111 to 121 million eggs.	121	50	1.5	0.7
12/16/2002	PAR approved to increase MSH Chinook salmon permitted capacity from 700,000 to 950,000.	121	50	1.5	0.95
05/11/2007	PAR approved to allow up to 300,000 Tahini Chinook salmon eggs could be taken for incubation and rearing at MSH for the Haines Chinook Project. Chinook salmon permitted level remained at 950,000 eggs.	121	50	1.5	0.95
05/17/2010	PAR approved to increase MSH chum salmon permitted capacity from 121 million to 125 million eggs.	125	50	1.5	0.95
08/18/2010	PAR approved to rectify that the 2007 PAR was intended to increase MSH Chinook salmon permitted capacity from 950,000 to 1.25 million eggs.	125	50	1.5	1.25

Appendix B.–Macaulay Salmon Hatchery (MSH) pink salmon egg takes, 1987–2001.

Year	Eggs	Stock
1987	13,500,000	Sheep Creek
1988	7,800,382	Kadashan River
	9,933,565	Sheep Creek
1988 Total:	17,733,947	
1989	8,877,178	MSH
	1,340,803	Sheep Creek
1989 Total:	10,217,981	
1990	32,226,896	MSH
1991	32,090,672	MSH/Salmon Creek
	18,768,157	Sheep Creek[a]
1991 Total:	50,858,829	
1992	51,011,426	MSH
1993	9,631,335	MSH
1994	8,992,749	MSH
1995	9,028,003	MSH
1996	6,304,621	MSH
1997	9,414,808	MSH
1998	6,436,210	MSH
1999	1,826,917	MSH
2000	1,780,167	MSH
2001	1,767,150	MSH

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] Eggs taken at Sheep Creek Hatchery and transferred to MSH.

Appendix C.–Macaulay Salmon Hatchery (MSH) pink salmon releases, 1988–2002.

Year	Juvenile	Stock	Release Location
1988	9,323,496	Sheep Creek	Sheep Creek
	4,265,730	Sheep Creek	MSH
1988 Total:	13,589,226		
1989	6,133,177	Kadashan River	MSH
	8,899,120	Sheep Creek	MSH
1989 Total:	15,032,297		
1990	8,373,718	MSH	MSH
	1,295,847	Sheep Creek	MSH
1990 Total:	9,669,565		
1991	14,846,296	MSH	MSH
	16,258,086	MSH	Sheep Creek
1991 Total:	31,104,382		
1992	9,905,058	MSH	MSH
	20,321,587	MSH	Sheep Creek
	5,515,021	Sheep Creek	MSH
	11,314,824	Sheep Creek	Sheep Creek
1992 Total:	47,056,490		
1993	32,660,175	MSH	Sheep Creek
	15,768,972	MSH	MSH
1993 Total:	48,429,147		
1994	8,663,298	MSH	MSH
	260,384	MSH	Burro Creek
1994 Total:	8,923,682		
1995	8,539,515	MSH	MSH
1996	8,743,899	MSH	MSH
1997	5,901,486	MSH	MSH
1998	8,709,149	MSH	MSH
1999	5,670,018	MSH	MSH
2000	1,681,918	MSH	MSH
2001	1,723,910	MSH	MSH
2002	1,696,762	MSH	MSH

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

Appendix D.–Macaulay Salmon Hatchery pink salmon returns, 1989–2003.

Year	Return
1989	13,079
1990	58,893
1991	82,641
1992	961,474
1993	27,523 [a]
1994	3,027,870 [a]
1995	83,437 [a]
1996	23,164 [a]
1997	209,427
1998	171,261
1999	511,327
2000	140,511
2001	130,793
2002	115,107
2003	123,483

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] Does not include commercial harvest estimate, which is listed as "unknown" or not included on the annual report.

Appendix E.–Macaulay Salmon Hatchery (MSH) chum salmon egg takes, 1988–2012.

Year	Eggs	Stock
1988	11,973,000	Hidden Falls Hatchery[b]
1989	810,163	Salmon Creek
	18,228,663	Sheep Creek Hatchery[a]
1989 Total:	19,038,826	
1990	6,364,356	MSH
	64,263,063	Sheep Creek Hatchery[a]
1990 Total:	70,627,419	
1991	1,729,358	MSH
	60,026,873	Sheep Creek Hatchery[a]
1991 Total:	61,756,231	
1992	2,050,771	MSH
	58,947,853	Sheep Creek Hatchery[a]
	10,022,617	Hidden Falls Hatchery[b]
1992 Total:	71,021,241	
1993	14,022,951	MSH
	49,901,343	Sheep Creek Hatchery[a]
	10,253,292	Hidden Falls Hatchery[b]
1993 Total:	74,177,586	
1994	66,448,193	MSH
	21,660,357	Sheep Creek Hatchery[a]
1994 Total:	88,108,550	
1995	63,164,451	MSH
	35,734,227	Sheep Creek Hatchery[a]
1995 Total:	98,898,678	
1996	81,117,211	MSH
	17,284,079	Sheep Creek Hatchery[a]
1996 Total:	98,401,290	
1997	61,246,808	MSH
	55,494,322	Sheep Creek Hatchery[a]
1997 Total:	116,741,130	

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Year	Eggs	Stock
1998	66,037,124	MSH
	42,094,323	Sheep Creek Hatchery [a]
1998 Total:	108,131,447	
1999	72,859,523	MSH
	38,188,879	Sheep Creek Hatchery [a]
1999 Total:	111,048,402	
2000	77,309,283	MSH
	33,934,888	Sheep Creek Hatchery [a]
2000 Total:	111,244,171	
2001	89,925,841	MSH
	31,138,945	Sheep Creek Hatchery [a]
2001 Total:	121,064,786	
2002	108,939,504	MSH
2003	122,584,454	MSH
2004	131,111,332	MSH
2005	112,800,604	MSH
2006	123,143,303	MSH
2007	120,998,273	MSH
2008	121,944,851	MSH
2009	121,600,000	MSH
2010	120,740,000	MSH
2011	125,800,000	MSH
2012	123,420,000	MSH

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] Egg take at Sheep Creek Hatchery and eggs placed in MSH.

[b] Egg take at Hidden Falls and eggs placed in MSH.

Appendix F.–Macaulay Salmon Hatchery chum salmon releases, 1988–2012.

Key: MSH=Macaulay Salmon Hatchery. SCH=Sheep Creek Hatchery, HFH=Hidden Falls Hatchery.

Year	Juvenile	Stock[a]	Release Location
1988	7,640,211	MSH[b]	MSH
	586,723	SCH[b]	MSH
1988 Total:	8,227,148		
1989	504,940	HFH	MSH
	20,000	HFH	Amalga Harbor
	2,802,056	HFH	MSH
	8,508,356	HFH	Boat Harbor
	5,917,229	SCH[a]	MSH
	504,940	MSH	MSH
1989 Total:	13,627,387		
1990	323,121	MSH	MSH
	110,496	MSH	Sheep Creek
	88,668	MSH /SCH	Boat Harbor
	8,223,231	SCH	MSH
	2,812,058	SCH	Sheep Creek
	2,256,544	SCH	Boat Harbor
	3,040,576	HFH	MSH
	5,955,570	HFH	Boat Harbor
1990 Total:	22,810,264		
1991	780,553	MSH	MSH
	995,839	MSH	Sheep Creek
	3,167,320	MSH	Amalga Harbor
	283,374	MSH	Boat Harbor
	7,781,969	SCH	MSH
	9,928,333	SCH	Sheep Creek
	31,577,603	SCH	Amalga Harbor
	2,825,191	MSH/SCH	Boat Harbor
	2,764,062	HFH	MSH
	6,154,734	HFH	Boat Harbor
1991 Total:	66,258,978		

-continued-

Year	Juvenile	Stock	Release Location
1992	1,049	MSH	MSH
	250,808	MSH/SCH	MSH
	753,279	MSH	Amalga Harbor
	178,263	MSH/SCH	Limestone Inlet
	48,951	SCH	MSH
	11,708,268	SCH	MSH
	35,164,775	SCH	Amalga Harbor
	8,321,737	SCH	Limestone Inlet
	6,709,659	HFH	Boat Harbor
1992 Total:	63,136,789		
1993	395,881	MSH	MSH
	1,203,420	MSH	Amalga Harbor
	333,458	MSH	Limestone Inlet
	11,495,384	SCH	MSH
	34,944,031	SCH	Amalga Harbor
	9,682,717	SCH	Limestone Inlet
	9,545,177	HFH	Boat Harbor
1993 Total:	67,600,068		
1994	5,869,938	MSH/SCH	MSH
	31,912,325	MSH/SCH	Amalga Harbor
	5,833,126	MSH/SCH	Limestone Inlet
	14,635,458	MSH/SCH	Sheep Creek
	2,905,206	HFH	Amalga Harbor
	6,464,450	HFH	Boat Harbor
1994 Total:	67,620,503		
1995	34,472,077	MSH/SCH	Amalga Harbor
	15,703,316	MSH/SCH	Sheep Creek
	11,825,076	MSH	MSH
	11,411,420	MSH/SCH	Limestone Inlet
	8,931,491	MSH/SCH	Boat Harbor
1995 Total:	82,343,380		

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Year	Juvenile	Stock	Release Location
1996	34,979,646	MSH/SCH	Amalga Harbor
	19,569,902	MSH/SCH	Sheep Creek
	11,474,457	MSH/SCH	MSH
	15,421,245	MSH/SCH	Limestone Harbor
	8,536,780	MSH/SCH	Boat Harbor
1996 Total:	89,982,030		
1997	34,535,728	MSH/SCH	Amalga Harbor
	2,723,869	MSH	Sheep Creek
	10,616,086	MSH	Sheep Creek
	12,166,444	MSH/SCH	MSH
	12,983,190	MSH/SCH	Limestone Inlet
	7,759,020	MSH/SCH	Boat Harbor
1997 Total:	80,784,337		
1998	49,155,073	MSH/SCH	Amalga Harbor
	24,246,804	MSH/SCH	MSH
	13,993,898	MSH/SCH	Limestone Inlet
	7,211,676	MSH/SCH	Boat Harbor
1998 Total:	94,607,451		
1999	50,738,014	MSH/SCH	Amalga Harbor
	21,991,640	MSH/SCH	MSH
	14,473,858	MSH/SCH	Limestone Inlet
	9,262,694	MSH/SCH	Boat Harbor
1999 Total:	96,466,206		
2000	53,218,962	MSH/SCH	Amalga Harbor
	27,878,900	MSH/SCH	MSH
	15,100,000	MSH/SCH	Limestone Inlet
	9,010,000	MSH/SCH	Boat Harbor
2000 Total:	105,207,862		
2001	46,028,136	MSH/SCH	Amalga Harbor
	27,858,929	MSH/SCH	MSH
	15,144,122	MSH/SCH	Limestone Inlet
	14,883,720	MSH/SCH	Boat Harbor
2001 Total:	103,914,907		

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Year	Juvenile	Stock	Release Location
2002	17,452,832	MSH/SCH	Amalga Harbor
	28,142,018	MSH/SCH	MSH
	14,616,604	MSH/SCH	Limestone Inlet
	11,263,498	MSH/SCH	Boat Harbor
2002 Total:	71,474,952		
2003	34,878,279	MSH	Amalga Harbor
	34,798,606	MSH	MSH
	14,001,897	MSH	Limestone Inlet
	12,223,213	MSH	Boat Harbor
2003 Total:	95,901,995		
2004	36,042,133	MSH	Amalga Harbor
	34,221,606	MSH	MSH
	14,798,685	MSH	Limestone Inlet
	14,576,139	MSH	Boat Harbor
2004 Total:	99,638,563		
2005	25,285,887	MSH	Amalga Harbor
	11,505,258	MSH	Amalga Harbor
	17,672,298	MSH	MSH
	17,596,649	MSH	MSH
	8,759,659	MSH	Limestone Inlet
	6,245,512	MSH	Limestone Inlet
	7,436,401	MSH	Boat Harbor
	6,122,586	MSH	Boat Harbor
2005 Total:	100,624,250		
2006	9,436,227	MSH	Amalga Harbor
	10,497,634	MSH	Amalga Harbor
	14,711,087	MSH	Amalga Harbor
	5,850,219	MSH	MSH
	5,487,597	MSH	MSH
	11,755,354	MSH	Sheep Creek
	11,798,460	MSH	Sheep Creek
	6,700,292	MSH	Limestone Inlet
	7,445,800	MSH	Limestone Inlet
	6,765,472	MSH	Boat Harbor
	6,914,320	MSH	Boat Harbor
2006 Total:	97,362,462		

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Year	Juvenile	Stock	Release Location
2007	17,821,181	MSH	Amalga Harbor
	7,390,126	MSH	Amalga Harbor
	16,653,048	MSH	Amalga Harbor
	6,233,937	MSH	Amalga Harbor
	6,057,369	MSH	MSH
	5,915,135	MSH	MSH
	18,558,741	MSH	Sheep Creek
	6,181,381	MSH	Sheep Creek
	7,808,056	MSH	Limestone Inlet
	7,369,013	MSH	Limestone Inlet
	7,502,904	MSH	Boat Harbor
	7,398,957	MSH	Boat Harbor
2007 Total:	114,889,848		
2008	14,202,306	MSH	Amalga Harbor
	16,067,199	MSH	Amalga Harbor
	15,065,220	MSH	Amalga Harbor
	5,722,738	MSH	MSH
	5,129,751	MSH	MSH
	12,140,235	MSH	Sheep Creek
	12,245,007	MSH	Sheep Creek
	6,000,081	MSH	Limestone Inlet
	9,036,419	MSH	Limestone Inlet
	5,864,724	MSH	Boat Harbor
	8,854,723	MSH	Boat Harbor
2008 Total:	110,328,403		
2009	13,970,000	MSH	Amalga Harbor
	16,820,000	MSH	Amalga Harbor
	13,180,000	MSH	Amalga Harbor
	5,960,000	MSH	MSH
	5,910,000	MSH	MSH
	11,780,000	MSH	Sheep Creek
	5,940,000	MSH	Sheep Creek
	5,940,000	MSH	Sheep Creek
	6,130,000	MSH	Limestone Inlet
	9,090,000	MSH	Limestone Inlet
	7,110,000	MSH	Boat Harbor
	7,140,000	MSH	Boat Harbor
2009 Total:	108,970,000		

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Year	Juvenile	Stock	Release Location
2010	16,537,000	MSH	Amalga Harbor
	8,330,000	MSH	Amalga Harbor
	19,237,000	MSH	Amalga Harbor
	7,733,000	MSH	MSH
	7,020,000	MSH	Sheep Creek
	8,385,000	MSH	Sheep Creek
	7,033,000	MSH	Limestone Inlet
	7,024,000	MSH	Limestone Inlet
	13,651,000	MSH	Boat Harbor
2010 Total:	94,950,000		
2011	27,180,000	MSH	Amalga Harbor
	16,240,000	MSH	Amalga Harbor
	5,310,000	MSH	MSH
	5,340,000	MSH	MSH
	10,990,000	MSH	Sheep Creek
	10,950,000	MSH	Sheep Creek
	2,810,000	MSH	Limestone Inlet
	3,570,000	MSH	Limestone Inlet
	7,310,000	MSH	Limestone Inlet
	4,680,000	MSH	Boat Harbor
	6,180,000	MSH	Boat Harbor
2011 Total:	100,560,000		
2012	11,642,000	MSH	Amalga Harbor
	8,492,000	MSH	Amalga Harbor
	8,222,000	MSH	Amalga Harbor
	16,671,000	MSH	Amalga Harbor
	6,001,000	MSH	MSH
	5,942,000	MSH	MSH
	11,989,000	MSH	Sheep Creek
	12,040,000	MSH	Sheep Creek
	7,153,000	MSH	Limestone Inlet
	7,265,000	MSH	Limestone Inlet
	18,356,000	MSH	Boat Harbor
2012 Total:	113,773,000		

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] MSH/SCH denotes releases of both SCH and MSH stock fry to the same location.

[b] Fry transferred to MSH from Sheep Creek Hatchery. For MSH stock, eggs were collected in 1987 from returns to Salmon Creek where MSH is located, and the eggs were incubated at Sheep Creek Hatchery.

Appendix G.–Macaulay Salmon Hatchery (MSH) chum salmon returns, 1989–2012.

Year	Return		Harvest Location
1989	839		
1990	6,151		
1991	2,437		
1992	39,528		
1993	94,890	[a]	MSH
	96,000	[b]	Boat Harbor
	2,300	[b]	Limestone
1993 Total	193,190		
1994	172,534	[b]	MSH
	366,253	[a]	Amalga Harbor
	171,166	[b]	Boat Harbor
	55,534	[b]	Limestone Inlet
1994 Total	765,487		
1995	251,892	[b]	MSH
	422,182	[b]	Amalga Harbor
	169,876	[b]	Boat Harbor
1995 Total	843,950		
1996	450,074	[b]	MSH
	1,226,182		Amalga Harbor
	112,451	[a]	Boat Harbor
	265,897	[b]	Limestone Inlet
	493,083	[b]	Sheep Creek
1996 Total	2,547,687		
1997	173,722		MSH
	910,127		Amalga Harbor
	190,946		Boat Harbor
	103,282		Limestone Inlet
	173,270		Sheep Creek
1997 Total	1,551,347		
1998	309,561		MSH
	552,571		Amalga Harbor
	72,154		Boat Harbor
	118,370		Limestone Inlet
	201,198		Sheep Creek
1998 Total	1,253,854		

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Year	Return	Harvest Location
1999	262,224	MSH
	875,908	Amalga Harbor
	159,219	Limestone Inlet
	118,346	Boat Harbor
1999 Total	1,415,697	
2000	350,010	MSH
	1,720,755	Amalga Harbor
	276,487	Limestone Inlet
	226,317	Boat Harbor
2000 Total	2,573,569	
2001	173,247	MSH
	761,396	Amalga Harbor
	97,054	Limestone Inlet
	84,005	Boat Harbor
2001 Total	1,115,702	
2002	207,479	MSH
	1,603,813	Amalga Harbor
	106,597	Limestone Inlet
	143,912	Boat Harbor
2002 Total	2,061,801	
2002	207,479	MSH
	1,603,813	Amalga Harbor
	106,597	Limestone Inlet
	143,912	Boat Harbor
2002 Total	2,061,801	
2003	291,916	MSH
	2,156,336	Amalga Harbor
	68,312	Limestone Inlet
	103,147	Boat Harbor
2003 Total	2,619,711	

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Year	Return	Harvest Location
2004	291,802	MSH
	1,453,574	Amalga Harbor
	59,929	Limestone Inlet
	385,275	Boat Harbor
2004 Total	2,190,580	
2005	308,608	MSH
	360,349	Amalga Harbor
	26,872	Limestone Inlet
	127,826	Boat Harbor
2005 Total	823,655	
2006	1,886,947	MSH
	2,200,942	Amalga Harbor
	86,656	Limestone Inlet
	553,480	Boat Harbor
2006 Total	4,728,025	
2007	1,394,406	MSH
	1,140,200	Amalga Harbor
	112,618	Limestone Inlet
	417,959	Boat Harbor
2007 Total	3,065,183	
2008	1,421,403	MSH
	1,432,497	Amalga Harbor
	138,363	Limestone Inlet
	467,038	Boat Harbor
2008 Total	3,459,301	
2009	1,435,710	MSH
	1,473,653	Amalga Harbor
	188,424	Limestone Inlet
	428,697	Boat Harbor
2009 Total	3,526,484	

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Year	Return	Harvest Location
2010	831,395	MSH
	1,385,695	Amalga
	157,186	Limestone Inlet
	276,524	Boat Harbor
2010 Total	2,650,800	
2011	1,239,990	MSH
	1,959,037	Amalga
	225,477	Limestone Inlet
	561,571	Boat Harbor
2011 Total	3,986,075	
2012	1,234,997	MSH
	1,816,010	Amalga
	170,958	Limestone Inlet
	789,102	Boat Harbor
2012 Total	4,011,067	

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] Fishery contribution estimates included as provided by ADF&G Division of Commercial Fisheries, recorded in PNP Hatchery database.

[b] Does not include commercial harvest estimate, which is listed as "unknown" on the annual report.

Appendix H.–Macaulay Salmon Hatchery (MSH) coho salmon egg takes, 1989–2012.

Year	Eggs	Stock
1989	1,446,384	MSH (Steep Creek)[a]
1990	1,119,670	MSH (Montana Creek)
1991	1,093,219	MSH (Montana Creek)
1992	1,073,486	MSH (Steep Creek)
1993	1,122,828	MSH (Montana Creek)
1994	965,816	MSH (Montana Creek)
1995	1,613,762	MSH (Steep Creek)
1996	1,371,600	MSH (Montana Creek)
1997	871,585	MSH (Montana Creek)
1998	896,996	MSH (Montana Creek)
1999	925,022	MSH (Montana Creek)
2000	862,126	MSH (Montana Creek)
2001	933,184	MSH (Montana Creek)
2002	824,139	MSH (Montana Creek)
2003	610,200	MSH (Montana Creek)
2004	864,054	MSH (Montana Creek)
2005	760,583	MSH (Montana Creek)
2006	842,321	MSH (Montana Creek)
2007	600,616	MSH (Montana Creek)
2008	379,000 [b]	Fish Creek (Taku River)
2009	388,000	Fish Creek (Taku River)
2010	337,000	Fish Creek (Taku River)
2011	575,400	MSH (Fish Creek (Taku River)
2012	1,422,000	MSH (Fish Creek (Taku River)

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] MSH(Steep Creek) indicates Steep Creek stock fish produced at MSH.

[b] An additional 9,000 MSH stock coho salmon eggs were collected for ADF&G and Juneau Douglas High School programs in 2008 and not part of the MSH production.

Appendix I.–Macaulay Salmon Hatchery (MSH) coho salmon releases, 1988–2012.

Year	Juvenile	Stock	Release Location
1988	49,659	MSH (Steep Creek)	MSH
1989	100,763	MSH (Montana Creek)	Mendenhall Ponds
	36,850	MSH (Montana Creek)	MSH
1989 Total:	137,613		
1990	546,255	MSH (Montana Creek)	MSH
	533,218	MSH (Montana Creek)	Sheep Creek
1990 Total:	1,079,473		
1991	506,819	MSH (Steep Creek)	MSH
	505,287	MSH (Steep Creek)	Sheep Creek
1991 Total:	1,012,106		
1992	582,739	MSH (Montana Creek)	Sheep Creek
	398,360	MSH (Montana Creek)	MSH
	1,719	MSH (Montana Creek)	Twin Lakes
1992 Total:	982,818		
1993	563,143	MSH (Montana Creek)	Sheep Creek
	477,999	MSH (Montana Creek)	MSH
	4,796	MSH (Montana Creek)	Twin Lakes
	2,000	MSH (Steep Creek)	Picnic Creek, Lena Cove
1993 Total:	1,047,938		
1994	380,282	MSH (Steep Creek)	MSH
	563,357	MSH (Steep Creek)	Sheep Creek
	2,000	MSH (Montana Creek)	Picnic Creek, Lena Cove
1994 Total:	945,639		
1995	422,482	MSH (Montana Creek)	MSH
	611,362	MSH (Montana Creek)	Sheep Creek
	4,370	MSH (Montana Creek)	Twin Lakes
1995 Total:	1,038,214		
1996	347,512	MSH (Montana Creek)	MSH
	511,456	MSH (Montana Creek)	Sheep Creek
	4,506	MSH (Montana Creek)	Twin Lakes
1996 Total:	863,474		

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Year	Juvenile	Stock	Release Location
1997	8,265	MSH (Montana Creek)	Twin Lakes
	425,899	MSH (Steep Creek)	MSH
	575,554	MSH (Steep Creek)	Sheep Creek
1997 Total:	1,009,718		
1998	823,659	MSH (Montana Creek)	MSH
1999	783,622	MSH (Montana Creek)	MSH
2000	805,963	MSH (Montana Creek)	MSH
2001	770,656	MSH (Montana Creek)	MSH
2002	813,225	MSH (Montana Creek)	MSH
2003	783,928	MSH (Montana Creek)	MSH
	5,816	MSH (Montana Creek)	Twin Lakes
2003 Total:	789,744		
2004	4,034	MSH (Montana Creek)	Twin Lakes
	5,152	MSH (Montana Creek)	Twin Lakes
	50,039	MSH (Montana Creek)	Twin Lakes
	567,282	MSH (Montana Creek)	MSH
2004 Total:	626,507		
2005	222,004	MSH (Montana Creek)	MSH
	174,731	MSH (Montana Creek)	MSH
	50,039	MSH (Montana Creek)	Twin Lakes
	102,881	UAF[a]	Sheep Creek
2005 Total:	549,655		
2006	461,724	MSH (Montana Creek)	MSH
	133,407	MSH (Montana Creek)	MSH
2006 Total:	595,131		
2007	290,273	MSH (Montana Creek)	MSH
	275,691	MSH (Montana Creek)	MSH
2007 Total:	565,964		
2008	260,176	MSH (Montana Creek)	MSH
	476,335	MSH (Montana Creek)	MSH
2008 Total:	736,511		

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Year	Juvenile	Stock	Release Location
2009	559,000	MSH (Montana Creek)	MSH
2010	328,000	Fish Creek (Taku River)	MSH
2011	349,000	Fish Creek (Taku River)	MSH
2012	307,000	Fish Creek (Taku River)	MSH

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau),and ADF&G PNP hatchery database (not publicly available).

[a] Egg take for this release was conducted under a Fish Resource Permit, No. P-03-007. The number of eggs collected for this release was unknown.

Appendix J.–Macaulay Salmon Hatchery (MSH) coho salmon returns, 1989–2012.

Year	Return to MSH
1989	10,083
1990	7,108[a]
1991	240,618
1992	175,671
1993	115,313
1994	176,051
1995	62,969
1996	69,832
1997	51,501
1998	104,387
1999	120,353
2000	89,774
2001	83,441
2002	108,871
2003	84,612
2004	70,953
2005	40,612
2006	28,326
2007	25,295
2008	44,070
2009	33,879
2010	43,873
2011	31,446
2012	12,678

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau),and ADF&G PNP hatchery database (not publicly available).

[a] An additional estimated 26,400 jacks were reported.

Appendix K.–Macaulay Salmon Hatchery (MSH) Chinook salmon egg takes, 1989–2012.

Year	Eggs	Stock
1989	39,924	Snettisham Hatchery (Andrew Creek)[a]
	11,000	Snettisham Hatchery (Andrew Creek)[b]
1989 Total:	50,924	
1990	115,180	MSH (Andrew Creek) [c]
	48,124	Crystal Lake Hatchery (Andrew Creek)[d]
1990 Total:	270,327	
1991	171,820	MSH (Andrew Creek)
	83,068	Crystal Lake Hatchery (Andrew Creek) [d]
	76,823	Tahini River
	49,554	Big Boulder Creek
1991 Total:	381,265	
1992	133,913	Crystal Lake Hatchery (Andrew Creek) [d]
	128,896	MSH (Andrew Creek)
	26,685	Big Boulder Creek
1992 Total:	289,494	
1993	[e]	MSH (Andrew Creek)
	208,524	Little Port Walter Hatchery (King Salmon River) [f]
	30,454	Big Boulder Creek
1993 Total:	238,978	
1994	[g]	Crystal Lake Hatchery (Andrew Creek) [d]
	429,545	Little Port Walter Hatchery (King Salmon River) [f]
1994 Total:	429,545	
1995	363,000	MSH(Andrew Creek) [h]
	284,690	Little Port Walter Hatchery (King Salmon River) [f]
1995 Total:	647,690	
1996	576,739	MSH(Andrew Creek) [i]
	135,887	Little Port Walter Hatchery (King Salmon River) [f]
1996 Total:	712,626	
1997	791,460	Andrew Creek
1998	316,240	Andrew Creek
	381,607	Crystal Lake Hatchery (Andrew Creek) [d]
	91,000	Burro Creek Hatchery (Tahini River) [j]
1998 Total:	788,847	

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Year	Eggs	Stock
1999	787,991	Crystal Lake Hatchery (Andrew Creek) [d]
	33,863	Burro Creek Hatchery (Tahini River) [j]
1999 Total:	821,854	
2000	541,987	Crystal Lake Hatchery (Andrew Creek) [d]
	121,799	Burro Creek Hatchery (Tahini River) [j]
2000 Total:	663,786	
2001	214,652	Medvejie Hatchery (Andrew Creek) [k]
	159,045	Hidden Falls Hatcher (Andrew Creek) [l]
	104,995	MSH (Tahini River)
2001 Total:	478,692	
2002	720,449	MSH (Andrew Creek)
	154,246	MSH (Tahini River)
2002 Total:	874,695	
2003	851,005	MSH (Andrew Creek) [m]
	290,327	MSH (Tahini River)
2003 Total:	1,141,332	
2004	790,083	MSH (Andrew Creek) [n]
	82,633	MSH (Tahini River)
2004 Total:	872,716	
2005	668,839	MSH (Andrew Creek)
	262,927	MSH (Tahini River)
2005 Total:	931,766	
2006	368,033	MSH (Andrew Creek)
	335,772	Crystal Lake Hatchery (Andrew Creek) [d]
	74,201	MSH (Tahini River)
2006 Total:	778,006	
2007	267,581	MSH (Andrew Creek)
	378,956	Crystal Lake Hatchery (Andrew Creek) [d]
	356,878	MSH (Tahini River) [o]
2007 Total:	1,352,415	

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Year	Eggs	Stock
2008	650,000	MSH (Andrew Creek) [p]
	281,000	MSH (Tahini River) [q]
2008 Total:	931,000	
2009	703,000	MSH (Andrew Creek) [r]
	335,000	MSH (Tahini River) [s]
2009 Total:	1,038,000	
2010	814,000	MSH (Andrew Creek) [t]
	220,000	MSH (Tahini River)
2010 Total:	1,034,000	
2011	668,000	MSH (Andrew Creek) [u]
	59,000	MSH (Tahini River)
2011 Total:	727,000	
2012	299,000	MSH (Andrew Creek)
	539,000	MSH (Andrew Creek) [v]
2012 Total:	838,000	

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] According to the annual report, most eggs were from fish reared at Snettisham Hatchery and released at Sheep Creek Hatchery.

[b] Eyed eggs transferred to MSH from Snettisham Hatchery.

[c] At eyed stage, an additional 67,056 eggs transferred to Snettisham Hatchery.

[d] Eggs transferred to MSH from Crystal Lake Hatchery.

[e] 255,554 eggs taken as backup and not needed and sold as bait.

[f] Eggs transferred to MSH from Little Port Walter Hatchery.

[g] 1,075,269 eggs collected. 464,360 eggs taken for transfer to NSRAA and remainder (611,909) taken as backup and not needed and discarded.

[h] An additional 1.25 million eggs taken as back up and not needed and discarded.

[i] An additional 51,681 eggs taken as back up and not needed and discarded.

[j] Eggs or alevin transported from Burro Creek Hatchery to MSH.

[k] Eggs taken at Medvejie Hatchery and transferred to MSH.

[l] Eggs taken at Hidden Falls Hatchery and transferred to MSH.

[m] An additional 983,515 eyed eggs transferred to Crystal Lake Hatchery.

[n] An additional 840,249 eyed eggs transferred to Crystal Lake Hatchery.

[o] An additional 300,000 eyed eggs shipped to Hidden Falls Hatchery and 49,000 excess eggs discarded.

[p] Excess 154,284 eggs discarded.

[q] Excess of 5,600 eggs discarded and 246,000 eyed eggs sent to Hidden Falls Hatchery for Lutak Inlet project.

[r] Additional 597,000 eyed eggs sent to Crystal Lake Hatchery.

[s] Additional 326,000 eyed eggs sent to Hidden Falls Hatchery.

[t] Additional 423,000 eyed eggs sent to Crystal Lake Hatchery.

[u] Additional 260,000 eyed eggs sent to Crystal Lake Hatchery.

[v] Eggs received from Hidden Falls Hatchery.

Appendix L.–Macaulay Salmon Hatchery (MSH) Chinook salmon releases, 1989–2012.

Year	Juvenile	Stock	Release Location
1989	11,000	Snettisham Hatchery (Andrew Creek)	MSH
1990	101,476	Snettisham Hatchery (Andrew Creek)	MSH
1991	43,596	Snettisham Hatchery/MSH (Andrew Creek)	MSH
1992	191,765	MSH/Crystal Lake Hatchery(Andrew Creek)	MSH
	1,545	MSH/Crystal Lake Hatchery(Andrew Creek)	MSH
	62,579	Tahini River	Tahini River
	44,820	Big Boulder Creek	Big Boulder Creek
1992 Total:	300,701		
1993	207,536	MSH(Andrew Creek)	MSH
	24,057	Big Boulder Creek	Big Boulder Creek
1993 Total:	231,593		
1994	241,366	MSH(Andrew Creek	MSH
	28,062	Big Boulder Creek	Big Boulder Creek
	3,379	Snettisham Hatchery (Andrew Creek)[a]	Twin Lakes
1994 Total:	272,807		
1995	6,216	Snettisham Hatchery (Andrew Creek)[a]	Twin Lakes
	196,549	Snettisham Hatchery (Andrew Creek)[a]	Fish Creek
	193,464	Snettisham Hatchery (Andrew Creek)[a]	Auke Bay
	4,370	Snettisham Hatchery (Andrew Creek)[a]	Twin Lakes
	158,681	Little Port Walter (King Salmon River)	MSH
	28,529	Little Port Walter (King Salmon River)	Sheep Creek
1995 Total:	587,809		
1996	3,983	MSH(Andrew Creek)	Twin Lakes
	64,456	Little Port Walter (King Salmon River)	MSH
	35,423	Little Port Walter (King Salmon River)	Sheep Creek
	109,274	Little Port Walter (King Salmon River)	Fish Creek
	106,255	Little Port Walter (King Salmon River)	Auke Creek
1996 Total:	319,391		

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Year	Juvenile	Stock	Release Location
1997	179,164	MSH(Andrew Creek)	Fish Creek
	176,193	MSH(Andrew Creek)	Auke Creek
	171,908	Little Port Walter (King Salmon River)	MSH
	44,664	Little Port Walter (King Salmon River)	Sheep Creek
	4,009	Little Port Walter (King Salmon River)	Auke Bay
	4,000	Little Port Walter (King Salmon River)	Fish Creek
	1,521	Little Port Walter (King Salmon River)	Twin Lakes
1997 Total:	581,459		
1998	10,574	King Salmon River	Twin Lakes
	114,337	King Salmon River	MSH
	97,948	MSH(Andrew Creek)	MSH
	174,230	MSH(Andrew Creek)	Auke Bay
	179,059	MSH(Andrew Creek)	Fish Creek
	4,029	MSH(Andrew Creek)	Twin Lakes
1998 Total:	580,177		
1999	10,153	MSH(Andrew Creek)	Twin Lakes
	221,443	MSH(Andrew Creek)	MSH
	173,207	MSH(Andrew Creek)	Auke Bay
	183,701	MSH(Andrew Creek)	Fish Creek
	2,250	MSH(Andrew Creek)	Twin Lakes
1999 Total:	590,754		
2000	10,680	MSH(Andrew Creek)	Twin Lakes
	208,586	MSH(Andrew Creek)	MSH
	56,929	MSH(Andrew Creek)	Auke Bay
	166,670	MSH(Andrew Creek)	Fish Creek
	91,681	Burro Creek Hatchery (Tahini River)	Skagway
2000 Total:	534,546		
2001	2,947	MSH(Andrew Creek)	Twin Lakes
	5,972	MSH(Andrew Creek)	Twin Lakes
	5,765	MSH(Andrew Creek)	Twin Lakes
	213,232	MSH(Andrew Creek)	MSH
	157,393	MSH(Andrew Creek)	Auke Bay
	183,252	MSH(Andrew Creek)	Fish Creek
	3,941	MSH(Andrew Creek)	Twin Lakes
	31,863	Burro Creek Hatchery (Tahini River)	Skagway
2001 Total:	604,365		

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Year	Juvenile	Stock	Release Location
2002	4,928	MSH(Andrew Creek)	Twin Lakes
	5,408	MSH(Andrew Creek)	Twin Lakes
	213,716	MSH(Andrew Creek)	MSH
	85,040	MSH(Andrew Creek)	Auke Bay
	178,525	MSH(Andrew Creek)	Fish Creek
	3,890	MSH(Andrew Creek)	Twin Lakes
	95,386	Burro Creek Hatchery (Tahini River)	Skagway
2002 Total:	586,893		
2003	5,551	MSH(Andrew Creek)	Twin Lakes
	4,628	MSH(Andrew Creek)	Twin Lakes
	120,891	MSH(Andrew Creek)	MSH
	121,670	MSH(Andrew Creek)	Fish Creek
	58,793	MSH (Tahini River)	Skagway
2003 Total:	311,533		
2004	177,423	MSH(Andrew Creek)	MSH
	70,252	MSH(Andrew Creek)	Sheep Creek
	171,895	MSH(Andrew Creek)	Fish Creek
	104,949	MSH(Andrew Creek)	Auke Creek
	3,000	MSH(Andrew Creek)	Twin Lakes
	128,688	MSH (Tahini River)	Skagway
2004 Total:	656,207		
2005	3,019	MSH(Andrew Creek)	Twin Lakes
	7,811	MSH(Andrew Creek)	Twin Lakes
	222,218	MSH(Andrew Creek)	MSH
	101,968	MSH(Andrew Creek)	Sheep Creek
	178,429	MSH(Andrew Creek)	Fish Creek
	86,065	MSH(Andrew Creek)	Auke Creek
	4,002	MSH(Andrew Creek)	Twin Lakes
	219,260	MSH (Tahini River)	Skagway
2005 Total:	822,772		

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Year	Juvenile	Stock	Release Location
2006	4,002	MSH(Andrew Creek)	Twin Lakes
	8,799	MSH(Andrew Creek)	Twin Lakes
	211,218	MSH(Andrew Creek)	MSH
	104,804	MSH(Andrew Creek)	Sheep Creek
	184,864	MSH(Andrew Creek)	Fish Creek
	95,184	MSH(Andrew Creek)	Auke Creek
	3,498	MSH(Andrew Creek)	Twin Lakes
	67,973	MSH (Tahini River)	Skagway
2006 Total:	680,342		
2007	3,498	MSH(Andrew Creek)	Twin Lakes
	10,316	MSH(Andrew Creek)	Twin Lakes
	90,767	MSH(Andrew Creek)	Auke Creek
	183,225	MSH(Andrew Creek)	Fish Creek
	101,093	MSH(Andrew Creek)	Sheep Creek
	147,723	MSH(Andrew Creek)	MSH
	4,038	MSH(Andrew Creek)	Twin Lakes
	83,815	MSH (Tahini River)	Skagway
	84,320	MSH (Tahini River)	Skagway
2007 Total:	708,795		
2008	10,172	MSH(Andrew Creek)	Twin Lakes
	84,447	MSH(Andrew Creek)	Auke Creek
	275,425	MSH(Andrew Creek)	Fish Creek
	147,062	MSH(Andrew Creek)	MSH
	5,133	MSH(Andrew Creek)	Twin Lakes
	51,495	MSH (Tahini River)	Skagway
2008 Total:	573,734		
2009	10,200	MSH(Andrew Creek)	Twin Lakes
	87,000	MSH(Andrew Creek)	Auke Creek
	289,000	MSH(Andrew Creek)	Fish Creek
	217,000	MSH(Andrew Creek)	MSH
	5,200	MSH(Andrew Creek)	Twin Lakes
	276,000	MSH (Tahini River)	Skagway
2009 Total:	884,400		

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Year	Juvenile	Stock	Release Location
2010	4,100	MSH(Andrew Creek)	Twin Lakes
	5,800	MSH(Andrew Creek)	Twin Lakes
	89,000	MSH(Andrew Creek)	Auke Creek
	282,000	MSH(Andrew Creek)	Fish Creek
	223,000	MSH(Andrew Creek)	MSH
	500	MSH(Andrew Creek)	Glacier Lake
	500	MSH(Andrew Creek)	Moraine Lake
	500	MSH(Andrew Creek)	Crystal Lake
	258,000	MSH (Tahini River)	Skagway
2010 Total:	863,400		
2011	2,200	MSH(Andrew Creek)	Twin Lakes
	90,000	MSH(Andrew Creek)	Auke Creek
	221,000	MSH(Andrew Creek)	Fish Creek
	194,000	MSH(Andrew Creek)	MSH
	7,900	MSH(Andrew Creek)	Twin Lakes
	2,500	MSH(Andrew Creek)	Twin Lakes
	129,000	MSH (Tahini River)	Skagway
	93,000	MSH (Tahini River)	Lutak Inlet
2011 Total:	739,600		
2012	1,500	MSH(Andrew Creek)	Dredge Lake
	7,500	MSH(Andrew Creek)	Twin Lakes
	279,000	MSH(Andrew Creek)	Fish Creek
	213,000	MSH(Andrew Creek)	MSH
	90,000	MSH(Andrew Creek)	Auke Creek
	2,100	MSH(Andrew Creek)	Twin Lakes
	3,200	MSH(Andrew Creek)	Twin Lakes
	195,000	MSH (Tahini River)	Skagway
2012 Total:	791,300		

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

[a] Fry transferred to MSH from Snettisham.

Appendix M.–Macaulay Salmon Hatchery (MSH) Chinook salmon returns, 1992–2012.

Year	Return to MSH	Return to Skagway	Return to Lutak
1992	181		
1993	722		
1994	3,232		
1995	5,204		
1996	6,376		
1997	4,625		
1998	2,546		
1999	3,560		
2000	4,523		
2001	7,750		
2002	10,350		
2003	8,533	656	
2004	11,108	449	
2005	5,935	429	
2006	2,502	559	
2007	3,536	952	
2008	5,213	1,090	
2009	6,429	576	
2010	4,115	597	
2011	2,861	604	
2012	3,767	386	14

Sources: Annual reports submitted by DIPAC (unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau), and ADF&G PNP hatchery database (not publicly available).

Appendix N.–Summary of fish transport permits for Macaulay Salmon Hatchery chum salmon.
Key: MSH=Macaulay Salmon Hatchery, SCH=Sheep Creek Hatchery, KCH= Kowee Creek Hatchery.

FTP Number	Issued	Expiration	FTP summary and reviewer comments
88J-1036	1988	1991	Net pen imprint 3 million chum salmon fry, green eggs or eyed eggs of Hidden Falls/Kadashan River stock for release at MSH saltwater net pens. Brood year 1987 chum salmon eggs would be transported from Hidden Falls for incubation and hatching at Snettisham Hatchery, and fry transported to MSH. In brood year 1988 and beyond chum salmon eggs would be transported directly from Hidden Falls Hatchery to MSH.
88J-1037	1988	1988	Transfer 9 million chum salmon fry from SCH to MSH saltwater net pens for release.
88J-1047	1988	1998	Collect up to 111 million chum salmon eggs from King Salmon River broodstock for incubation, rearing and release at MSH.
88J-1048	1988	1998	Collect up to 111 million chum salmon eggs from King Salmon River broodstock for incubation and rearing at MSH and release from Peterson Creek (Amalga Harbor) saltwater net pens.
88J-1049	1988	1998	Collect up to 111 million chum salmon eggs from King Salmon River broodstock for incubation and rearing at MSH and release from SCH saltwater net pens.
88J-1053	1988	1998	Collect up to 111 million chum salmon eggs from MSH/Salmon Creek broodstock for incubation, rearing and release at MSH.
88J-1054	1988	1998	Collect up to 40 million chum salmon eggs from MSH/Salmon Creek broodstock for incubation and rearing at MSH and release at Peterson Creek (Amalga Harbor) saltwater net pens.
88J-1055	1988	1998	Collect up to 50 million chum salmon eggs from MSH/Salmon Creek broodstock for incubation and rearing at MSH and release at SCH saltwater net pens.
88J-1056	1988	1998	Collect up to 111 million chum salmon eggs from Neka River broodstock for incubation, rearing and release at MSH.
88J-1057	1988	1998	Collect up to 40 million chum salmon eggs from Neka River broodstock for incubation and rearing at MSH and release from saltwater net pens at Peterson Creek (Amalga Harbor).
88J-1058	1988	1998	Collect up to 50 million chum salmon eggs from Neka River broodstock for incubation and rearing at MSH and release from saltwater net pens at SCH.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
88J-1074	1988	1999	Collect up to 3 million chum salmon eggs from Kadashan River for incubation and rearing at KCH and release at MSH. Unclear if this FTP issued to KCH or MSH.
88J-1075	1988	1993	Collect up to 3 million chum salmon eggs from Kadashan River for incubation and rearing at MSH and release at MSH.
88J-1088	1988	1998	Collect up to 11 million eggs from MSH/Salmon Creek, incubate and rear at SCH, and release at MSH. Permit appears issued to SCH.
88J-1089	1988	1998	Collect up to 11 million eggs from SCH, incubate at SCH, and release at MSH. Permit appears issued to SCH.
88J-1118	1988	1998	Collect up to 40 million eggs from SCH, incubate at MSH, and release at Peterson Creek (Amalga Harbor). Permit appears issued to SCH.
88J-1119	1988	1999	Transfer 4 million chum salmon eggs from Hidden Falls/Kadashan River stock for incubation and rearing at MSH and release from Peterson Creek (Amalga Harbor) saltwater net pens.
89J-1027	1988	1999	Transport up to 9 million chum salmon fry incubated at MSH from Hidden Falls/Kadashan River stock chum salmon eggs transferred from Hidden Falls hatchery to MSH to Boat Harbor for release. Permit amended in 1994 to extend expiration date from 1993 to 1999. Apparently this permit also provides both for the transfer of up to 9 million eggs from Hidden Falls to MSH, and for transfer of the resulting fry from MSH to Boat Harbor.
90J-1041	1990	1999	Collect up to 10 million chum salmon eggs from MSH for incubation and rearing at KCH and release at SCH.
90J-1042	1990	1999	Collect up to 10 million chum salmon eggs from MSH for incubation and rearing at KCH and release at MSH.
90J-1043	1990	1999	Collect up to 10 million chum salmon eggs from SCH for incubation and rearing at KCH and release at MSH.
90J-1044	1990	1999	Collect up to 10 million chum salmon eggs from SCH for incubation and rearing at KCH and release at SCH.
90J-1049	1990	1999	Collect up to 40 million chum salmon eggs at SCH for incubation at MSH and release at SCH.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
90J-1071	1991	1999	Transfer up to 15 million chum salmon fry from MSH to Limestone Inlet for release.
91J-1065	1992	1992	Transfer up to 6 million chum salmon fry from Hidden Falls to Boat Harbor for release.
94J-1001	1994	1999	Transfer up to 4 million chum salmon fry from Hidden Falls Hatchery to Peterson Creek (Amalga Harbor) saltwater net pens.
98J-1012	1998	2002	Release of up to 9 million chum salmon fry from the Aurora Basin saltwater net pen site near MSH, which replaced the SCH, releasing MSH and SCH stock chum salmon.
98J-1028	1998	2002	Transfer of up to 16 million Hidden Falls Hatchery/Kadashan River chum salmon eggs for incubation at MSH and rearing and release at Limestone Inlet. This FTP was issued as a contingency in the event insufficient broodstock returned to MSH and egg take goals could not be met.
99J-1001	1999	2023	Transfer up to 54 million chum salmon fry from MSH for rearing and release at Amalga Harbor. Permit was amended in 2003 to extend the expiration date from 2003 to 2013, and amended again in 2013 to extend expiration date from 2013 to 2023. For the 2013 amendment, the Division of Sport Fish stated concerns for increased traffic at Amalga boat launch and potentially increased harvest of wild fish at Amalga Harbor when a common property commercial purse seine fishery operated there. Prior to 2011, only cost-recovery fishing occurred on DIPAC returns to Amalga Harbor, but when DIPAC paid off their loan debt, the area was open to common property purse seining.
99J-1002	1999	2021	Updated and replaced FTP 88J-1053. Collect up to 111 million chum salmon eggs from MSH and SCH broodstock for incubation, rearing and release at MSH and remote release sites and release up to 27 million fry at MSH. FTP had incorrect permit number (number 8 instead of the correct number 25). FTP amended in 2001 to increase egg take from 111 million to 121 million and increase release at MSH from 27 million to 36 million, which was requested when SCH and MSH consolidated operations. Permit amended in 2003 to extend expiration date from 2003 to 2013. In 2011, the permit was amended to increase the egg collection number from 121 million to 125 million, and to extend the expiration date from 2013 to 2021.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
00J-1003	2000	2023	Updated and replaced FTP 90J-1071. Permit allowed the rearing and release of up to 15 million MSH chum salmon fry from the Limestone Inlet release site. In 2004, permit amended to extend expiration date from 2004 to 2009. In 2009, permit amended to extend expiration date from 2009 to 2019.
00J-1011	2000	2019	Updated and replaced FTP 89J-1027. FTP had incorrect hatchery permit number (number 8 instead of the correct number 25). Permit allowed the rearing and release of up to 9 million MSH chum salmon fry from the Boat Harbor release site. In 2001, the permit was amended to increase the release number from 9 million to 15 million fry. In 2004, permit extended until 2009 and increase number from 15 million to 24 million fry. In 2009, permit extended to 2019. In 2013, a technical amendment was added for clarity, only.
01J-1011	2001	2006	Allowed 30 million chum salmon egg take of Amalga Harbor returns if insufficient broodstock returned to MSH.
02J-1001	2002	2023	Permit allowed the rearing and release of up to 24 million MSH chum salmon fry from Gastineau Channel/Sheep Creek Delta saltwater net pens. Permit was amended in 2007 to extend expiration date from 2007 to 2017.
02J-1015	2002	2023	Allows use of up to 32 million Hidden Falls/Kadishan River chum salmon eggs for incubation and release from Limestone Inlet (15 million) and Boat Harbor (15 million) as a contingency in the event sufficient broodstock does not return from MSH releases to achieve egg take goals. Permit was amended in 2007 to extend expiration date from 2007 to 2017.
10J-1005	2010	2013	Allows transport of 120 adult Chinook salmon from Pullen Creek in Skagway to MSH in Juneau for holding until ripe.
10J-1006	2010	2020	Allows 650,000 egg collection from MSH/Andrew Creek Chinook salmon returning to MSH for incubation and rearing at MSH and release from MSH saltwater net pens.
10J-1016	2010	2023	Allows for the transfer of 300,000 Pullen Creek/Tahini River stock Chinook salmon juveniles from MSH to Pullen Creek for release. Amended in 2013 for extension of expiration date from 2013 to 2023.
10J-1027	2010	2020	Allows for the stocking of Glacier, Moraine and Crystal Lakes in Juneau with up to 4,000 subcatchable and catchable MSH/Andrew Creek stock Chinook salmon.
11J-1001	2011	2021	Allows for the transport of 300,000 Pullen Creek/Tahini River Chinook juveniles from MSH to Lutak Inlet for imprinting and release.

Appendix O.–Summary of fish transport permits for Macaulay Salmon Hatchery pink salmon.

FTP Number	Issued	Expiration	FTP summary and reviewer comments
87J-1052	1988	1998	Collect up to 15 million even-year pink salmon eggs from pink salmon returns to SCH for incubation at MSH and SCH and release MSH or SCH. In 1988, the FTP was amended to increase the egg take from 15 million to 40 million eggs.
88J-1076	1988	1989	Collect up to 20 million even-year pink salmon eggs from Kadashan River for incubation and rearing at MSH and release at SCH.
88J-1077	1988	1989	Collect up to 20 million even-year pink salmon eggs from Kadashan River for incubation, rearing and release at SCH.
88J-1078	1988	1989	Collect up to 20 million even-year pink salmon eggs from Kadashan River for incubation, rearing and release at MSH.
88J-1079	1988	1989	Collect up to 20 million even-year pink salmon eggs from Kadashan River for incubation and rearing at SCH and release at MSH.
88J-1080	1988	1989	Collect up to 8 million even-year pink salmon eggs from Kadashan River for incubation and rearing at KCH and release at MSH.
90J-1038	1990	1999	Collect up to 10 million pink salmon eggs from MSH for incubation and rearing at KCH and release at MSH.
90J-1039	1990	1999	Collect up to 10 million pink salmon eggs from SCH for incubation and rearing at KCH and release at MSH.
90J-1040	1990	1999	Collect up to 10 million pink salmon eggs from MSH for incubation and rearing at KCH and release at SCH.
90J-1045	1990	1999	Collect up to 10 million pink salmon eggs from MSH for incubation and rearing at SCH and release at MSH.
90J-1046	1990	1999	Collect up to 40 million pink salmon eggs from MSH for incubation, rearing and release at SCH.
90J-1047	1990	2004	Collect and incubate up to 40 million pink salmon eggs from MSH for release at SCH. FTP expiration date extended in 1999 to 2004.
90J-1048	1990	2004	Collect and incubate up to 10 million pink salmon eggs from MSH for release at MSH. FTP expiration date extended in 1999 to 2004.

Appendix P.–Summary of fish transport permits for Macaulay Salmon Hatchery (MSH) Chinook salmon.

FTP Number	Issued	Expiration	FTP summary and reviewer comments
88J-1041	1988	2013	Allows transfer of 200,000 Chinook salmon eggs (Andrew Creek Stock) from Crystal Lake Hatchery to MSH when MSH hatchery returns fall short of meeting broodstock needs for egg, for incubation, rearing and release at MSH. Permit amended in 1998 to extend permit through 2013, and increased maximum egg transfer number from 200,000 to 650,000 eggs.
88J-1042	1988	1998	Allows transfer of up to 96,000 Chinook salmon eggs (Andrew Creek Stock) from Crystal Lake Hatchery to MSH for incubation and hatching at MSH, then transfer to saltwater netpens at Sheep Creek hatchery for release. Pathologist required family tracking as stipulation of FTP.
88J-1043	1988	1998	Allows transfer of up to 96,000 Chinook salmon eggs (Andrew Creek Stock) from Crystal Lake Hatchery to MSH for incubation and hatching at MSH, then transfer to saltwater netpens at Peterson Creek (Amalga Harbor) for release. Pathologist required family tracking as stipulation of FTP.
88J-1059	DENIED		Transfer up to 200,000 Tahini River stock Chinook salmon smolt from Hidden Falls Hatchery for rearing and release from MSH. ADF&G denied permit until such time that ADF&G determined the best use for the Tahini River stock in northern southeast Alaska.
89J-1047	1989	1999	Transfer up to 200,000 Crystal Lake/Andrew Creek stock Chinook salmon eggs from SCH for rearing at Snettisham Hatchery and release from MSH.
89J-1048	1989	1999	Collect up to 200,000 eggs from Crystal Lake/Andrew Creek stock Chinook salmon stock returning to MSH for incubation, rearing and release at MSH.
91J-1045	1991	1999	Transport 100,000 Tahini River Chinook salmon eggs to MSH for rearing and incubation for fry release back into the Tahini River.
91J-1046	1991	1999	Transport 100,000 Big Boulder Creek Chinook salmon eggs to MSH for rearing and incubation for fry release back into Big Boulder Creek.
91J-1047	1991	1999	Transport 100,000 Kelsall River drainage Chinook salmon eggs to MSH for rearing and incubation for fry release back into Kelsall River drainage.
92J-1037	1992	1999	Transport 50,000 Little Boulder Creek Chinook salmon eggs to MSH for rearing and incubation for fry release back into Little Boulder Creek.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
92J-1055	1992	1994	Transport and release 1,000 post-smolt DIPAC/Andrews Creek stock Chinook salmon into Twin Lakes.
93J-1015	1993	1994	Transfer 60,000 Hidden Falls Hatchery/Andrews Creek stock swim-up fry Chinook Salmon from Hidden Falls to MSH for rearing and release. Transfer was to replace accidental loss of fry during incubation at MSH.
93J-1020	1993	2001	Transport 250,000 Little Port Walter Hatchery/King Salmon River Chinook Salmon eggs from Little Port Walter Hatchery to MSH for rearing and release. This was to switch the MSH Chinook salmon program from Andrews Creek stock to King Salmon River stock. Permit was amended in 1995 to increase the number of eggs from 250,000 to 700,000 eggs.
95J-1020	1995	1999	Release up to 50,000 King Salmon River stock Chinook Salmon smolt annually from net pens at the Sheep Creek saltwater net pens from eggs received from Little Port Walter Hatchery that were incubated and reared at MSH.
95J-1046	1996	1999	Release up to 200,000 King Salmon River stock Chinook Salmon smolt annually from net pens at Auke Bay saltwater net pens from eggs received from Little Port Walter Hatchery that were incubated and reared at MSH.
95J-1047	1996	1999	Release up to 200,000 King Salmon River stock Chinook Salmon smolt annually from net pens at Fish Creek saltwater net pens from eggs received from Little Port Walter Hatchery that were incubated and reared at MSH.
97J-1001	1997	1999	Release up to 200,000 MSH/Andrew Creek stock Chinook salmon smolt annually from net pens at Auke Bay saltwater net pens. Permit amended to extend the expiration date in 1999 from 1999 to 2004, in 2004 for extension from 2004 to 2009, and in 2009 for extension from 2009.
97J-1002	1997	2019	Release up to 200,000 MSH/Andrew Creek stock Chinook Salmon smolt annually from net pens at Fish Creek saltwater net pens. Permit amended to extend the expiration date in 1999 from 1999 to 2004, in 2004 for extension from 2004 to 2009, and in 2008 for extension from 2009 to 2019 and increased release from 200,000 to 300,000 smolt.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
98J-1014	1998	2002	Release of up to 45,000 Chinook salmon smolt from the Aurora Basin saltwater net pen site, which replaced the Sheep Creek Hatchery net pens.
98J-1029	1998	2002	Transfer of up to 650,000 Hidden Falls Hatchery/Andrews Creek Chinook Salmon eggs for incubation rearing and release at MSH. This FTP was issued as a contingency in the event insufficient broodstock returned to MSH and egg take goals could not be met.
98J-1031	1998	2021	Stock up to 15,000 post-smolt MSH/Andrew Creek Chinook Salmon into Twin Lakes. FTP was amended in 2002 to extend the permit from 2002 to 2011, and amended in 2011 to extend the permit to 2021.
98J-1032	1998	2006	Collect up to 100,000 eggs from Burro Creek Hatchery/Tahini River stock Chinook Salmon to MSH for incubation and rearing, and release resulting smolt back at Burro Creek or Pullen Creek. This FTP issued under Burro Creek Hatchery permit #8.
00J-1009	2000	2023	Collect up to 100,000 Chilkoot River/Tahini River stock Chinook salmon eggs at the Chilkoot River weir, incubate and rear at MSH, and release resulting smolt at Pullen Creek.
00J-1010	2000	2020	Collect up to 100,000 Pullen Creek/Tahini River stock Chinook salmon eggs from Pullen Creek, transfer for incubation and rearing at MSH, and release of resulting progeny at MSH and Pullen Creek. In 2003, the permit was amended to increase the number of eggs from 100,000 to 250,000. In 2006, the permit was amended to increase the number of eggs from 250,000 to 300,000. In 2007, the permit was amended to increase the number of eggs from 300,000 to 600,000. In 2010, the permit was amended to increase the number of eggs from 600,000 to 1.25 million and to extend the expiration date from 2010 to 2020. Also, in 2010, the Pullen Creek release site was removed from the FTP, and a separate FTP (10J-1016) for transfer of the smolt to Pullen Creek and release of the smolt at Pullen Creek was issued.
01J-1015	2001	2005	Allows transport of 650,000 Medvejie Hatchery/Andrew Creek Chinook salmon stock eggs from Medvejie Hatchery to MSH as a contingency in the event insufficient broodstock are available at MSH to meet egg take goals.
04J-1003	2004	2013	Allows release of 200,000 MSH/Andrew Creek Chinook salmon smolt from the Gastineau Channel/Sheep Creek net pens.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
06J-1035	2006	2013	Allows transport of 650,000 Crystal Lake Hatchery/Andrew Creek stock Chinook salmon eggs from Crystal Lake Hatchery to MSH as a contingency in the event insufficient broodstock are available at MSH to meet egg take goals. Permit was amended in 2011 to extend expiration date from 2011 to 2021.
07J-1044	2007	2012	Allows collection of up to 300,000 Chinook Salmon eggs from Pullen Creek for incubation to eyed stage at MSH, then transported to Hidden Falls Hatchery for rearing to the smolt stage.
08J-1002	2008	2018	Allows transport of 650,000 Medvejie Hatchery/Andrew Creek stock Chinook salmon eggs from Medvejie Hatchery to MSH as a contingency in the event insufficient broodstock are available at MSH to meet egg take goals. Update to FTP 01J-1015.
08J-1021	2008	2013	Allows transfer of up to 1.4 million MSH/Andrew Creek Chinook eggs collected at MSH from MSH to Crystal Lake Hatchery. In 2008, the FTP expiration date was extended from 2008 to 2013. The FTP replaced 03J-1010.
09J-1017	2009	2012	Allows transport of 650,000 Hidden Falls Hatchery/Andrew Creek stock Chinook salmon eggs from Medvejie Hatchery to MSH as a contingency in the event insufficient broodstock are available at MSH to meet egg take goals. Update to FTP 98J-1029.
10J-1005	2010	2013	Allows transport of 120 adult Chinook salmon from Pullen Creek in Skagway to MSH in Juneau for holding until ripe.
10J-1006	2010	2020	Allows 650,000 egg collection from MSH/Andrew Creek Chinook salmon returning to MSH for incubation and rearing at MSH and release from MSH saltwater net pens.
10J-1016	2010	2023	Allows for the transfer of 300,000 Pullen Creek/Tahini River stock Chinook salmon juveniles from MSH to Pullen Creek for release. Amended in 2013 for extension of expiration date from 2013 to 2023.
10J-1027	2010	2020	Allows for the stocking of Glacier, Moraine and Crystal Lakes in Juneau with up to 4,000 sub-catchable and catchable MSH/Andrew Creek stock Chinook salmon.
11J-1001	2011	2021	Allows for the transport of 300,000 Pullen Creek/Tahini River Chinook juveniles from MSH to Lutak Inlet for imprinting and release.

Appendix Q.– Summary of fish transport permits related to Macaulay Salmon Hatchery coho salmon. Key: MSH=Macaulay Salmon Hatchery, SCH=Sheep Creek Hatchery, KCH= Kowee Creek Hatchery.

FTP Number	Issued	Expiration	FTP summary and reviewer comments
87J-1063	DENIED		FTP application requested collection of up to 56,000 coho salmon eggs from KCH for incubation at SCH and release at Peterson Creek (Amalga Harbor). Denied due to genetic concerns at Peterson Creek (Amalga Harbor), which had an indigenous stock, and escapement of returning adults from the proposed release, which were from ancestral Montana and Steep Creek stock.
87J-1064	1988	1998	FTP allowed collection of up to 56,000 coho salmon eggs from KCH for incubation at SCH and release at MSH.
87J-1065	1988	1998	FTP allowed collection of up to 56,000 coho salmon eggs from KCH for incubation at SCH and release at SCH.
87J-1066	1988	1998	FTP allowed collection of up to 1 million coho salmon eggs at KCH for incubation and release at MSH.
87J-1067	DENIED		FTP application requested collection of up to 1 million coho salmon eggs at KCH for incubation at MSH and release at Peterson Creek (Amalga Harbor). Denied due to genetic concerns at Peterson Creek (Amalga Harbor), which had an indigenous stock, and escapement of returning adults from the proposed release, which were from ancestral Montana and Steep Creek stock.
87J-1068	DENIED		FTP application requested collection of up to 1 million coho salmon eggs at Sashin Creek, Little Port Walter for incubation at MSH and release at Sheep Creek Hatchery. Denied due to genetic concerns that proposed stock was from a substantial distance from the incubation and release site and due to pathology concerns.
87J-1069	DENIED		FTP application requested collection of up to 1 million coho salmon eggs at Sashin Creek, Little Port Walter for incubation at MSH and release at Peterson Creek. Denied due to genetic concerns that proposed stock was from a substantial distance from the incubation and release site and due to pathology concerns.
87J-1070	DENIED		FTP application requested collection of up to 1 million coho salmon eggs at Sashin Creek, Little Port Walter for incubation at MSH and release at MSH. Denied due to genetic concerns that proposed stock was from a substantial distance from the incubation and release site and due to pathology concerns.
87J-1071	1988	1998	FTP allowed collection of up to 1 million coho salmon eggs at SCH for incubation, rearing and release at MSH.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
87J-1072	1988	1998	FTP allowed collection of up to 1 million coho salmon eggs at SCH for incubation and rearing at MSH and release at SCH.
87J-1073	DENIED		FTP application requested collection of up to 1 million coho salmon eggs at SCH for incubation and rearing at MSH and release at Peterson Creek (Amalga Harbor). Denied due to genetic concerns at Peterson Creek, which had an indigenous stock, and escapement of returning adults from the proposed release, which were from ancestral Montana and Steep Creek stock.
88J-1038	1988	1988	Transfer 50,000 coho presmolts from SCH to MSH saltwater net pens for release.
88J-1044	1988	1998	Allows collection of up to 300,000 coho salmon eggs from Montana Creek broodstock for incubation and rearing at MSH, then transfer to saltwater net pens at SCH for release.
88J-1045	1988	1998	Allows collection of up to 300,000 coho salmon eggs from Montana Creek broodstock for incubation, rearing and release at MSH.
88J-1046	DENIED		Allows collection of up to 300,000 coho salmon eggs from Montana Creek broodstock for incubation and rearing at MSH, then transfer to saltwater net pens at Peterson Creek (Amalga Harbor) for release. Permit denied because of a significant wild stock of coho salmon in Peterson Creek that could be impacted by introduction of Montana Creek stock coho salmon.
88J-1050	1988	1998	Allows collection of up to 56,000 coho salmon eggs from Sheep Creek Hatchery for incubation and rearing at Sheep Creek Hatchery and release from MSH saltwater net pens.
88J-1051	1988	1998	Allows collection of up to 56,000 coho salmon eggs from Sheep Creek Hatchery for incubation and rearing at Sheep Creek Hatchery and release from Peterson Creek saltwater net pens.
88J-1052	1988	1998	Allows collection of up to 56,000 coho salmon eggs from Sheep Creek Hatchery for incubation and rearing at Sheep Creek Hatchery and release from Sheep Creek saltwater net pens.
88J-1061	1988	1995	Allows release of up to 20,000 Steep Creek stock coho salmon presmolts at the Auke Village recreation area.
89J-1062	1989	1989	Transport 100 coho presmolts to the NMFS Auke Bay Laboratory for fish marking research.

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FTP Number	Issued	Expiration	FTP summary and reviewer comments
89J-1063	1989	1989	Allows transport of 100,000 coho presmolts incubated at Sheep Creek Hatchery, reared at MSH, for release at Dredge Lake to reduce overcrowding in MSH raceways. According to a memo from region ADF&G staff to ADF&G PNP Coordinator, DIPAC was taking more eggs than they were permitted, and this was resulting in overcrowding of resulting fry. Memo encouraged PNP Coordinator to remind DIPAC staff of their permitted capacity levels.
89J-1064	1989	1994	Allows transport of 50,000 coho presmolts that were incubated and reared at MSH for release at Burro Creek. Regional Commercial Fisheries regional supervisor commented concerns about using four different stocks of coho salmon to produce a single run at Burro Creek.[a]
92J-1054	1992	1999	Allows transport and release of 1,000 postsmolt DIPAC/Mendenhall River stock coho salmon into Twin Lakes that were incubated and reared at MSH. Permit amended in 1993 to increase number for release from 1,000 to 5,000 postsmolt. Permit again amended in 1993 to extend expiration date from 1994 to 1999.
98J-1013	1998	2002	Allows release of up to 600,000 MSH and Montana Creek stock coho salmon smolt from the Aurora Basin saltwater net pen site, which replaced the Sheep Creek net pens.
99J-1003	1999	2013	Allows release of 1 million MSH/Montana Creek and Steep creek stock coho smolt from MSH. Amended in 2003 to extend expiration date to 2013. This permit mistakenly reads that it replaced permit 88J-1071, but that permit was for a sockeye project. It replaced 87J-1071.
04J-1012	2004	2004	Allows release of 120,000 MSH/Montana Creek coho salmon smolt to Twin Lakes. Permit amended in 2004 to extend permit expiration date from May 2004 to June 2004.
05J-1018	2005	205	Allowed release of 100,000 coho salmon smolt from Sheep Creek Hatchery.
08J-1003	2008	2012	Allows collection of up to 500,000 eggs annually from Fish Creek coho salmon.
12J-1012	2011	2021	Allows for collection of 1.5 million eggs from MSH/Fish Creek stock coho returns at MSH for incubation, rearing and release from MSH.

[a] Scott Marshall, ADF&G Division of Commercial Fisheries Regional Supervisor, comments on FTP application for FTP 89J-1064.

Appendix R.–Comparison of permitted and reported chum salmon egg takes in hatchery permit, basic management plan, annual management plan, fish transport permits and annual reports for Macaulay Hatchery, 1988–2012.

Numbers are in millions and rounded. Egg take numbers on annual reports do not specify egg take by release site, only the total number of eggs taken by each stock and egg take location. Therefore, the sum of eggs permitted to be taken is the sum of the FTP permitted egg takes by stock and location. For example, a total of 12 million eggs were permitted from Hidden Falls Hatchery in 1988 from 2 FTPs for release at Macaulay Salmon Hatchery and Boat Harbor, and 12.2 million eggs were actually collected.

Key: MSH=Macaulay Salmon Hatchery (including Salmon Creek Hatchery), BH=Boat Harbor, HFH=Hidden Falls Hatchery, SCH=Sheep Creek Hatchery, AH=Amalga Harbor, SH=Snettisham Hatchery, LI=Limestone Inlet, T=Thane.

Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Egg Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1987	111		88J-1088	MSH	SCH				MSH	88J-1088	1998	11	7.6
			88J-1037	SCH	SCH				MSH	88J-1037	1988	9	0.6
1988	111	22.5	88J-1036	HFH[a]	MSH	1991	3	12.2					
			89J-1027	HFH[a]	MSH	1993	9						
				HFH[a]	MSH				AH	88J-1119	1999	4	0.020
				HFH[a]	MSH				MSH	88J-1036	1991	3	1.084
				HFH[a]	MSH				BH	89J-1027	1999	9	8.5
1989	111	111	88J-1053	MSH	MSH	1998	111	0.810					
			88J-1118	SCH	MSH	1999	40	18.2					
				MSH	MSH				SCH	88J-1055	1998	50	0.110
				MSH	MSH				MSH	88J-1053	1991	111	0.323
				MSH	MSH				BH[b]	None		9	0.089
				SCH	MSH				MSH[c]	None			8.2
				SCH	MSH				SCH	90J-1049	1999	40	2.8
				SCH	MSH				BH[b]	None			2.3
				HFH	MSH				MSH	88J-1036	1991	3	3.0
				HFH	MSH				BH	89J-1027	1999	9	6.0

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Egg Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1990	111	61	88J-1053	MSH	MSH	1998	111	6.4					
			90J-1049	SCH	MSH	1999	40	64.3					
			88J-1118	SCH	MSH	1998	40						
				MSH	MSH				MSH	88J-1053	1998	111	0.781
				MSH	MSH				SCH	88J-1055	1998	50	0.996
				MSH	MSH				AH	88J-1054	1998	40	3.2
				MSH	MSH				BH[d]	None			0.283
				SCH	MSH				MSH[e]	None			7.8
				SCH	MSH				SCH	90J-1049	1999	40	9.9
				SCH	MSH				AH	88J-1118	1998	40	31.6
				SCH	MSH				BH[d]	None			2.8
				HFH	SH				MSH	88J-1036	1991	3	2.8
				HFH	SH				BH	91J-1065	1992	6	6.2
1991	111	111	88J-1088	MSH	MSH	1998	11	1.7					
			90J-1049	SCH	MSH	1999	40	60.0					
			88J-1118	SCH	MSH	1998	40						
				MSH	MSH				MSH	88J-1053	1998	111	0.251
				MSH	MSH				AH	88J-1054	1998	40	0.753
				MSH	MSH				LI	90J-1071	1999	15	0.178
				SCH	MSH				MSH[e]	None			11.7
				SCH	MSH				LI	90J-1071	1999	15	9.9
				SCH	MSH				AH	88J-1118	1998	40	33.3
				HFH	HFH				BH	91J-1065	1992	6	6.7

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Egg Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1992	111	111	88J-1053	MSH	MSH	1998	111	2.1					
			90J-1049	SCH	MSH	1999	40	58.9					
			88J-1118	SCH	MSH	1998	40						
			89J-1027	HFH	MSH	1993	9	10					
				MSH	MSH				MSH	88J-1053	1998	111	0.396
				MSH	MSH				AH	88J-1054	1998	40	1.2
				MSH	MSH				LI	90J-1071	1999	15	0.334
				SCH	MSH				MSH[f]	None			11.5
				SCH	MSH				LI	90J-1071	1999	15	9.7
				SCH	MSH				AH	88J-1118	1998	40	35.1
				HFH	MSH				BH	89J-1027	1999	9	9.5
1993	111	111	88J-1053	MSH	MSH	1998	111	14.0					
			90J-1049	SCH	MSH	1999	40	49.9					
			88J-1118	SCH	MSH	1998	40						
			89J-1027	HFH	MSH	1993	9	10.3					
				MSH/SCH	MSH				MSH	88J-1053	1998	111	5.9
				MSH/SCH	MSH				AH	88J-1054	1998	40	31.9
				MSH/SCH	MSH				LI	90J-1071	1999	15	5.8
				MSH/SCH	MSH				SCH	90J-1049	1999	40	14.6
				HFH	MSH				BH	89J-1027	1999	9	6.5
				HFH	MSH				AH	88J-1119	1999	4	2.9

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1994	111	111	88J-1053	MSH	MSH	1998	111	66.4					
			90J-1049	SCH	MSH	1999	40	21.7					
			88J-1118	SCH	MSH	1998	40						
				MSH/SCH	MSH				MSH	88J-1053	1998	111	11.8
				MSH/SCH	MSH				AH	88J-1054	1998	40	34.5
				MSH/SCH	MSH				LI	90J-1071	1999	15	11.4
				MSH/SCH	MSH				SCH	90J-1049	1999	40	15.7
				MSH/SCH	MSH				BH[g]	None	1999	9	8.9
1995	111	111	88J-1053	MSH	MSH	1998	111	63.2					
			90J-1049	SCH	MSH	1999	40	35.7					
			88J-1118	SCH	MSH	1998	40						
				MSH/SCH	MSH				MSH	88J-1053	1998	111	11.5
				MSH/SCH	MSH				AH	88J-1054	1998	40	35.0
				MSH/SCH	MSH				LI	90J-1071	1999	15	15.4
				MSH/SCH	MSH				SCH	90J-1049	1999	40	19.6
				MSH/SCH	MSH				BH[h]	None	1999	9	8.5
1996	111	111	88J-1053	MSH	MSH	1998	111	81.1					
			90J-1049	SCH	MSH	1999	40	17.3					
			88J-1118	SCH	MSH	1998	40						
				MSH/SCH	MSH				MSH	88J-1053	1998	111	12.2
				MSH/SCH	MSH				AH	88J-1054	1998	40	34.5
				MSH/SCH	MSH				LI	90J-1071	1999	15	13.0
				MSH/SCH	MSH				SCH	90J-1049	1999	40	13.1
				MSH/SCH	MSH				BH[h]	None	1999	9	7.8

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1997	111	111	88J-1053	MSH	MSH	1998	111	61.3					
			90J-1049	SCH	MSH	1999	40	55.5					
			88J-1118	SCH	MSH	1998	40						
				MSH/SCH	MSH				MSH	88J-1053	1998	111	24.2
				MSH/SCH	MSH				AH	88J-1054	1998	40	49.2
				MSH/SCH	MSH				LI	90J-1071	1999	15	14.0
				MSH/SCH	MSH				BH[h]	None	1999	9	7.2
1998	111	111	88J-1053	MSH	MSH	1998	111	66.0					
			90J-1049	SCH	MSH	1999	40	42.1					
			88J-1118	SCH	MSH	1998	40						
				MSH/SCH	MSH				MSH	99J-1002	2021	27	22.0
				MSH/SCH	MSH				AH	99J-1001	2023	54	50.7
				MSH/SCH	MSH				LI	90J-1071	1999	15	14.5
				MSH/SCH	MSH				BH[h]	None	1999	9	9.3
1999	111	111	99J-1002	MSH	MSH	2021	125	72.9					
			90J-1049	SCH	MSH	1999	40	38.2					
				MSH/SCH	MSH				MSH	99J-1002	2021	27	27.9
				MSH/SCH	MSH				AH	99J-1001	2023	54	53.2
				MSH/SCH	MSH				LI	00J-1003	2023	15	15.1
				MSH/SCH	MSH				BH	00J-1011	2019	9	9.0

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2000	111	111	99J-1002	MSH	MSH	2021	111	77.3					
			99J-1002	SCH	MSH	2021	111	33.9					
				MSH/SCH	MSH				MSH	99J-1002	2021	36	27.9
				MSH/SCH	MSH				AH	99J-1001	2023	54	46.0
				MSH/SCH	MSH				LI	00J-1003	2023	15	15.1
				MSH/SCH	MSH				BH	00J-1011	2019	15	14.9
2001	121	121	99J-1002	MSH	MSH	2021	121	89.9					
			99J-1002	SCH	MSH	2021	121	31.1					
				MSH/SCH	MSH				MSH	99J-1002	2021	36	28.1
				MSH/SCH	MSH				AH	99J-1001	2023	54	17.5
				MSH/SCH	MSH				LI	00J-1003	2023	15	14.6
				MSH/SCH	MSH				BH	00J-1011	2019	15	11.3
2002	121	121	99J-1002	MSH	MSH	2021	121	108.9					
				MSH	MSH				MSH	99J-1002	2021	36	34.8
				MSH	MSH				AH	99J-1001	2023	54	34.9
				MSH	MSH				LI	00J-1003	2023	15	14.0
				MSH	MSH				BH	00J-1011	2019	15	12.2
2003	121	121	99J-1002	MSH	MSH	2021	121	122.6					
				MSH	MSH				MSH	99J-1002	2021	36	34.2
				MSH	MSH				AH	99J-1001	2023	54	36.0
				MSH	MSH				LI	00J-1003	2023	15	14.8
				MSH	MSH				BH	00J-1011	2009	24	14.6

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2004	121	121	99J-1002	MSH	MSH	2021	121	121.0					
				MSH	MSH				MSH	99J-1002	2021	36	35.2
				MSH	MSH				AH	99J-1001	2023	54	36.8
				MSH	MSH				LI	00J-1003	2023	15	15.0
				MSH	MSH				BH	00J-1011	2009	24	13.6
2004	121	121	99J-1002	MSH	MSH	2021	121	121.0					
				MSH	MSH				MSH	99J-1002	2021	36	11.3
				MSH	MSH				AH	99J-1001	2023	54	34.7
				MSH	MSH				LI	00J-1003	2023	15	14.1
				MSH	MSH				BH	00J-1011	2009	24	13.7
				MSH	MSH				T	02J-1001	2023	24	23.6
2006	121	121	99J-1002	MSH	MSH	2021	121	123.1					
				MSH	MSH				MSH	99J-1002	2021	36	12.0
				MSH	MSH				AH	99J-1001	2023	54	48.1
				MSH	MSH				LI	00J-1003	2023	15	15.2
				MSH	MSH				BH	00J-1011	2009	24	14.9
				MSH	MSH				T	02J-1001	2023	24	24.7
2007	121	121	99J-1002	MSH	MSH	2021	121	121.0					
				MSH	MSH				MSH	99J-1002	2021	36	10.8
				MSH	MSH				AH	99J-1001	2023	54	45.3
				MSH	MSH				LI	00J-1003	2023	15	15.0
				MSH	MSH				BH	00J-1011	2009	24	14.7
				MSH	MSH				T	02J-1001	2023	24	24.3

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2008	121	121	99J-1002	MSH	MSH	2021	121	121.9					
				MSH	MSH				MSH	99J-1002	2021	36	11.9
				MSH	MSH				AH	99J-1001	2023	54	44.0
				MSH	MSH				LI	00J-1003	2023	15	15.2
				MSH	MSH				BH	00J-1011	2019	24	14.2
				MSH	MSH				T	02J-1001	2023	24	23.7
2009	121	121	99J-1002	MSH	MSH	2021	121	121.6					
				MSH	MSH				MSH	99J-1002	2021	36	7.7
				MSH	MSH				AH	99J-1001	2023	54	44.1
				MSH	MSH				LI	00J-1003	2023	15	14.1
				MSH	MSH				BH	00J-1011	2019	24	13.7
				MSH	MSH				T	02J-1001	2023	24	15.4
2010	125	121	99J-1002	MSH	MSH	2021	121	120.7					
				MSH	MSH				MSH	99J-1002	2021	36	10.7
				MSH	MSH				AH	99J-1001	2023	54	43.4
				MSH	MSH				LI	00J-1003	2023	15	13.7
				MSH	MSH				BH	00J-1011	2019	24	10.9
				MSH	MSH				T	02J-1001	2023	24	21.9
2011	125	125	99J-1002	MSH	MSH	2021	125	125.8					
				MSH	MSH				MSH	99J-1002	2021	36	11.9
				MSH	MSH				AH	99J-1001	2023	54	45.0
				MSH	MSH				LI	00J-1003	2023	15	14.4
				MSH	MSH				BH	00J-1011	2019	24	19.4
				MSH	MSH				T	02J-1001	2023	24	21.9
2012	125	125	99J-1002	MSH	MSH	2021	125	123.4					

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[a] A total of 12 million eggs or fry authorized for transfer from HFH to MSH for two release sites in 1988 and 1989.
[b] FTP found for release of Hidden Falls Hatchery/Kadashan stock chum at BH, but not MSH and Sheep Creek stocks.
[c] FTP found for transfer of fry from SCH to MSH for release of fry at MSH, but not transfer of eggs from SCH to MSH for release at MSH.
[d] FTP found for release of Hidden Falls Hatchery/Kadashan stock chum at BH, but not MSH/Salmon Creek and Sheep Creek stocks.
[e] FTP found for transfer of fry from SCH for release at MSH, but not transfer of eggs from SCH to MSH.
[f] FTP found for transfer of fry from SCH for release at MSH, but not transfer of eggs from SCH to MSH.
[g] FTP found for release of Hidden Falls Hatchery/Kadashan stock chum at BH, but not MSH/Salmon Creek and Sheep Creek stocks.
[h] FTP found for release of Hidden Falls Hatchery/Kadashan stock chum at BH, but not MSH/Salmon Creek and Sheep Creek stocks.

Appendix S.–Comparison of permitted and reported pink salmon egg takes in hatchery permit, basic management plan, annual management plan, fish transport permits and annual reports for Macaulay Hatchery, 1988–2012.

Numbers are in millions and rounded. Egg take numbers on annual reports do not specify egg take by release site, only the total number of eggs taken by each stock and egg take location. Therefore, the sum of eggs permitted to be taken is the sum of the FTP permitted egg takes by stock and location.

Key: MSH=Macaulay Salmon Hatchery (including Salmon Creek Hatchery), BCH=Burro Creek Hatchery, SCH=Sheep Creek Hatchery, KR=Kadashan River.

Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Egg Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1987	50	50	87J-1052	SCH	MSH	1998	15	13.5	SCH	87J-1052	1998	40	4.3
				SCH	MSH				MSH	87J-1052	1998	40	9.3
1988	50	50	87J-1052	SCH	MSH	1998	40	9.9	MSH	87J-1052	1998	40	8.9
			88J-1078	KR	MSH	1989	20	7.8	MSH	88J-1078	1989	20	6.1
1989	50	50	None	MSH	MSH			8.9	MSH	90J-1047	1999	40	8.3
			87J-1052	SCH	MSH	1998	40	1.3	MSH	87J-1052	1998	40	1.3
1990	50	50	90J-1047	MSH	MSH	1999	40	32.2	MSH	87J-1052	1998	40	14.8
				MSH	MSH				SCH	87J-1052	1998	40	16.3
1991	50	50	90J-1047	MSH	MSH	1999	40	32.1	SCH	90J-1047	1999	40	20.5
				MSH	MSH				MSH	90J-1048	1998	10	9.9
			87J-1052	SCH	MSH	1998	40	18.8	SCH	87J-1052	1998	40	11.3
				SCH	MSH				MSH	87J-1052	1998	40	5.5
1992	50	50	90J-1047	MSH	MSH	1999	40	51.0	SCH	90J-1047	1999	40	32.7
			90J-1048	MSH	MSH	1998	10		MSH	90J-1048	1999	10	15.8
1993	50	50	90J-1047	MSH	MSH	1999	40	9.6	BCH	91J-1017	1995	10	0.260[a]
			90J-1048	MSH	MSH	1999	10		MSH	90J-1048	1999	10	8.7
			87J-1052	SCH	MSH	1998	40	0.3					
1994	50	50	90J-1048	MSH	MSH	1999	10	9.0	MSH	90J-1048	1999	10	8.5
										94J-1002	1994	0.25	0.26

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Egg Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1995	50	10	90J-1048	MSH	MSH	1999	10	9.0	MSH	90J-1048	1999	10	8.7
1996	50	9	90J-1048	MSH	MSH	1999	10	6.3	MSH	90J-1048	1999	10	5.9
1997	50	9	90J-1048	MSH	MSH	1999	10	9.4	MSH	90J-1048	1999	10	8.7
1998	50	9	90J-1048	MSH	MSH	1999	10	6.4	MSH	90J-1048	1999	10	5.7
1999	50	6	90J-1048	MSH	MSH	1999	10	1.8	MSH	90J-1048	1999	10	1.7
2000	50	1.5	90J-1048	MSH	MSH	Expired	10	1.8	MSH	90J-1048	Expired	10	1.7
2001	50	1.8	90J-1048	MSH	MSH	Expired	10	1.8	MSH	90J-1048	Expired	10	1.7

[a] 0.25 million MSH fry transferred to Burro Creek Hatchery for a brood stock release. The FTP 91J-1017 was for an egg transfer, but fry were transferred instead.

Appendix T.–Comparison of permitted and reported coho salmon egg takes in hatchery permit, basic management plan, annual management plan, fish transport permits and annual reports for Macaulay Hatchery, 1988-2012.

Numbers are in millions and rounded. Egg take numbers on annual reports do not specify egg take by release site, only the total number of eggs taken by each stock and egg take location.

Key: MSH=Macaulay Salmon Hatchery (including Salmon Creek Hatchery), SCH=Sheep Creek Hatchery, SC=Steep Creek, MC=Montana Creek, MP=Mendenhall Ponds, TL=Twin Lakes, BC=Burro Creek, LC = Lena Cove, LI=Lutak Inlet.

Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1985				MC	SCH	Not Found		0.056	SCH				0.023
									SCH				0.039
1986			86J-1072	SC	SCH	1989	0.060	0.077	MSH	88J-1038	1988	0.050	0.050
1987			None[a]	MC	MSH		0.300	0.66					
1988	1.0	1.0	87J-1071	SCH/MC	SCH	1998	1.071	1.0	MP	89J-1063	1989	0.01	0.01
									MSH	87J-1071	1998	1.0	0.546
									SCH	87J-1072	1998	1.0	0.533
1989	1.0	1.0	None[b]	MSH/SC	MSH			1.446	MSH	None[c]	1998		0.507
									SCH	None[d]			0.505
1990	1.0	1.0	None[c]	MSH/MC	MSH			1.120	BC	89J-1064	1994	0.050	0.046
									MSH	None[c]	1998		0.398
									TL	92J-1054	1994	1.0	0.002
1991	1.0	1.0	None[c]	MSH/MC	MSH		1.0	1.1	SCH	None[d]			0.563
									MSH	None[c]			0.478
									TL	92J-1054	1999	.005	0.005
1992	1.0	1.0	None[b]	MSH/SC	MSH		1.0	1.1	LC	88J-1061	1995	0.020	0.002
									SCH	None[c]			0.380
									MSH	None[c]			0.563
				MSH/MC	MSH				SCH	None[d]			0.583

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1993	1.5	1.0	None[e]	MSH/MC	MSH	1998	1.0	1.1	LC	None[f]			0.002
1994	1.5	1.5	None[e]	MSH/MC	MSH			0.966	SCH	None[e]			0.511
									MSH	87J-1071	1998		0.348
									TL	92J-1054	1999	0.005	0.005
									TL	92J-1054	1999	0.005	0.008
1995	1.5	1.5	None[e]	MSH/SC	MSH			1.614	SCH	None[e]			0.576
									MSH	87J-1071	1998		0.426
1996	1.5	1.5	None[e]	MSH/MC	MSH			1.372	MSH	87J-1071	1998		0.824
									SCH	None[e]			0.611
									MSH	None[e]			0.422
									TL	92J-1054	1999	0.005	0.004
1997	1.5	1.5	None[e]	MSH/MC	MSH			0.872	MSH	99J-1003	2003	1.0	0.784
1998	1.5	1.0	None[e]	MSH/MC	MSH			0.897	MSH	99J-1003	2003	1.0	0.806
1999	1.5	1.0	99J-1003	MSH/MC	MSH	2003	1.0	0.925	MSH	99J-1003	2003	1.0	0.771
2000	1.5	1.0	99J-1003	MSH/MC	MSH	2003	1.0	0.862	MSH	99J-1003	2003	1.0	0.813
2001	1.5	0.900	99J-1003	MSH/MC	MSH	2003	1.0	0.933	MSH	99J-1003	2003	1.0	0.784
									TL	92J-1054	2004	0.005	0.006
									TL	04J-1012	2004	0.120	0.009

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2002	1.5	0.900	99J-1003	MSH/MC	MSH	2003	1.0	0.897	MSH	99J-1003	2003	1.0	0.567
2003	1.5	0.900	99J-1003	MSH/MC	MSH	2003	1.0	0.610	TL	04J-1012	2004	0.120	0.050
									MSH	99J-1003	2003	1.0	0.222
									MSH	99J-1003	2003	1.0	0.175
2004	1.5	0.500	99J-1003	MSH/MC	MSH	2013	1.0	0.643	MSH	99J-1003	2003	1.0	0.595
2005	1.5	0.600	99J-1003	MSH/MC	MSH	2013	1.0	0.761	MSH	99J-1003	2003	1.0	0.566
2006	1.5	0.600	99J-1003	MSH/MC	MSH	2013	1.0	0.842	MSH	99J-1003	2003	1.0	0.737
2007	1.5	0.600	99J-1003	MSH/MC	MSH	2013	1.0	0.601	MSH	99J-1003	2003	1.0	0.559
2008	1.5	0.554	08J-1003	FC	MSH	2013	0.5	0.379	MSH	08J-1003	2012	0.5	0.328
2009	1.5	0.500	08J-1003	FC	MSH	2013	0.5	0.388	MSH	08J-1003	2012	0.5	0.349
2010	1.5	0.500	08J-1003	FC	MSH	2013	0.5	0.337	MSH	08J-1003	2012	0.5	0.307
2011	1.5	0.770	08J-1003	FC	MSH	2013	0.5	0.550					
2012	1.5	1.2	08J-1003	FC	MSH	2013	0.5	1.422					

[a] FTP 88J-1045 permitted egg takes in Montana Creek not issued until 1988.
[b] FTP 88J-1061 was for Steep Creek stock coho salmon incubated and reared at SCH to be released at Lena Cove. However, the coho salmon were reared and incubated at MSH, not SCH.
[c] FTPs not found for egg takes at MSH and release at either SCH or MSH.
[d] FTP not found for MSH coho return egg take and incubation and release at SCH.
[e] Could not find an FTP for MSH coho returns egg take, incubation and release at either MSH or SCH.
[f] FTP 88J-1061 was for Steep Creek stock coho salmon incubated and reared at SCH to be released at Lena Cove. However, the coho salmon were reared and incubated at MSH, not SCH.

Appendix U.–Comparison of permitted and reported Chinook salmon egg takes in hatchery permit, basic management plan, annual management plan, fish transport permits and annual reports for Macaulay Hatchery, 1988–2012.

Numbers are in millions and rounded.

Key: MSH=Macaulay Salmon Hatchery (including Salmon Creek Hatchery), AC=Andrew Creek, SH=Snettisham Hatchery, SCH=Sheep Creek Hatchery, CLH=Crystal Lake Hatchery, BB=Big Boulder, TR=Tahini River, LPW=Little Port Walter, HF= Hidden Falls, TL=Twin Lakes, FC=Fish Creek, AB=Auke Bay, BCH=Burro Creek Hatchery, PC= Pullen Creek, MH=Medvejie Hatchery, CL=Crystal Lake, ML=Moraine Lake, GL= Glacier Lake.

Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1987				CLH/AC	SH				MSH	89J-1047	1999	0.200	0.011
1988				CLH/AC	SH				MSH	89J-1048	1999	0.200	0.101
1989	0.200	0.200	89J-1048	MSH/AC	MSH	1999	0.200	0.040	MSH	89J-1048	1999	0.200	0.044
			89J-1047	SCH/AC	MSH	1999	0.200	0.011					
1990	0.200	0.200	88J-1041	CLH/AC	MSH	1998	0.200	0.165	MSH	89J-1048	1999	0.200	0.192
			89J-1048	MSH/AC	MSH	1999	0.200	0.115					
1991	0.200	0.200	89J-1048	MSH/AC	MSH	1999	0.200	0.172	MSH	89J-1048	1999	0.200	0.208
			88J-1041	CLH/AC	MSH	1998	0.200	0.083					
			91J-1046	BB	MSH	1999	0.100	0.050	BB	91J-1046	1999	0.100	0.045
			91J-1045	TR	MSH	1999	0.100	0.077	TR	91J-1045	1999	0.100	0.063
				CLH/AC	SH				TL	92J-1055	1994	0.001	0.003
1992	0.250	0.250	89J-1048	MSH/AC	MSH	1999	0.200	0.134	MSH	89J-1048	1999	0.200	0.174
			88J-1041	CLH/AC	MSH	1998	0.200	0.118	TL	92J-1055	1994	0.001	0.006
			91J-1046	BB	MSH	1999	0.100	0.027	BB	91J-1046	1999	0.100	0.024
			93J-1015	HF/AC	HF	1994	0.060	0.072[a]	MSH	93J-1015	1994	0.060	0.068

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1993	0.250	0.250	89J-1048	MSH/AC	MSH	1999	0.200	0.256[b]	TL	92J-1055	1994	0.001	0.005
									TL	92J-1055	1994	0.001	0.004
									FC	None[c]			0.197
									AB	None[c]			0.193
			93J-1020	LPW/KSR	MSH	2001	0.250	0.209	SCH	95J-1020	1999	0.050	0.029
									MSH	93J-1020	2001	0.700	0.159
			91J-1046	BB	MSH	1999	0.100	0.030	BB	91J-1046	1999	0.100	0.028
1994	0.700	1.450[d]	89J-1048	MSH/AC	MSH	1999	0.200	0[e]					
			93J-1020	LPW/KSR	MSH	2001	0.250	0.430	FC	95J-1047	1999	0.200	0.107
									AB	95J-1046	1999	0.200	0.106
									SCH	95J-1020	1999	0.050	0.035
									MSH	93J-1020	2001	0.700	0.064
1995	0.700	0.600	89J-1048	MSH/AC	MSH	1999	0.200	0.363[f]	FC	97J-1002	1999	0.200	0.179
									AB	97J-1001	1999	0.200	0.176
			93J-1020	LPW/KSR	MSH	2001	0.250	0.285	TL	None[g]		0.001	0.0015
									FC	95J-1047	1999	0.200	0.004
									AB	95J-1046	1999	0.200	0.004
									SCH	95J-1020	1999	0.050	0.045
									MSH	93J-1020	2001	0.700	0.172
									TL	None[g]			0.011

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
1996	0.700	0.600	89J-1048	MSH/AC	MSH	1999	0.200	0.628	FC	97J-1002	1999	0.200	0.179
									AB	97J-1001	1999	0.200	0.174
									MSH	89J-1048	1999	0.200	0.098
									TL	98J-1031	2002	0.015	0.004
									TL	98J-1031	2002	0.015	0.010
			93J-1020	LPW/KSR	MSH	2001	0.250	0.128	MSH	93J-1020	2001	0.700	0.114
1997	0.700	0.600	89J-1048	MSH/AC	MSH	1999	0.200	0.791[h]	FC	97J-1002	1999	0.200	0.184
									AB	97J-1001	1999	0.200	0.173
									MSH	89J-1048	1999	0.200	0.221
									TL	98J-1031	2002	0.015	0.003
									TL	98J-1031	2002	0.015	0.011
1998	0.700	0.600	89J-1048	MSH/AC	MSH	1999	0.200	0.316	FC[i]	97J-1002	2004	0.200	0.167
			88J-1041	CLH/AC	MSH	1998	0.650	0.382	AB[i]	97J-1001	2004	0.200	0.057
									MSH[i]	89J-1048	1999	0.200	0.209
									TL	98J-1031	2002	0.015	0.015
			98J-1032	BCH/TR	MSH	2006	0.100	0.100	PC	00J-1010	2010	0.100	0.092
1999	0.700	0.650	88J-1041	CLH/AC	MSH	1998	0.650	0.788	FC	97J-1002	2004	0.200	0.183
									AB	97J-1001	2004	0.200	0.157
									MSH	88J-1041	2013	0.650	0.213
									PC	00J-1010	2010	0.100	0.032
									TL	98J-1031	2002	0.015	0.004
									TL	98J-1031	2002	0.015	0.010
			98J-1032	BCH/TR	MSH	2006	0.100	0.034	PC	00J-1010	2010	0.100	0.032

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2000	0.700	0.750	88J-1041	CLH/AC	MSH	1998	0.650	0.542	TL	98J-1031	2011	0.015	0.014
									FC	97J-1002	2004	0.200	0.179
									AB	97J-1001	2004	0.200	0.085
									MSH	88J-1041	2013	0.650	0.213
									TL	98J-1031	2011	0.015	0.010
			98J-1032	BCH/TR	MSH	2006	0.100	0.122	PC	00J-1010	2010	0.100	0.095
2001	0.700	0.665	01J-1015	MH/AC	MSH	2005	0.650	0.215	FC[j]	97J-1002	2004	0.200	0.122
			98J-1029	HFH/AC	MSH	2002	0.650	0.159	MSH[j]	88J-1041	2013	0.650	0.121
			98J-1032	BCH/TR	MSH	2006	0.100	0.105	PC	98J-1032	2006	0.250	0.059
2002	0.700	0.665	89J-1048	MSH/AC	MSH	EXPIRED		0.735	TL	98J-1031	2011	0.015	0.003
									FC	97J-1002	2009	0.200	0.172
									MSH	88J-1041	2013	0.650	0.177
									AB	97J-1001	2009	0.200	0.105
									SCH	04J-1003	2013	0.200	0.070
									TL	98J-1031	2011	0.015	0.011
			98J-1032	BCH/TR	MSH	2006	0.100	0.154	PC	98J-1032	2006	0.250	0.129
2003	0.950	0.950	89J-1048	MSH/AC	MSH	EXPIRED		1.835	TL	98J-1031	2011	0.015	0.004
									FC	97J-1002	2009	0.200	0.178
									MSH	88J-1041	2013	0.650	0.222
									AB	97J-1001	2009	0.200	0.086
									SCH	04J-1003	2013	0.200	0.102
									TL	98J-1031	2011	0.015	0.013
			00J-1010	PC	MSH	2010	0.250	0.290	PC	00J-1010	2010	0.250	0.219

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2004	0.950	0.950	89J-1048	MSH/AC	MSH	EXPIRED		1.630	FC	97J-1002	2009	0.200	0.185
									MSH	88J-1041	2013	0.650	0.211
									AB	97J-1001	2009	0.200	0.095
									SCH	04J-1003	2013	0.200	0.105
									TL	98J-1031	2011	0.015	0.004
									TL	98J-1031	2011	0.015	0.014
			00J-1010	PC/TR	MSH	2010	0.250	0.83	PC	00J-1010	2010	0.300	0.068
2005	0.950	0.900	89J-1048	MSH/AC	MSH	EXPIRED		0.669	TL	98J-1031	2011	0.015	0.005
									FC	97J-1002	2009	0.200	0.183
									MSH	88J-1041	2013	0.650	0.148
									AB	97J-1001	2009	0.200	0.091
									SCH	04J-1003	2013	0.200	0.101
									TL	98J-1031	2011	0.015	0.010
			00J-1010	PC/TR	MSH	2010	0.250	0.263	PC	00J-1010	2010	0.600	0.168
2006	0.950	0.950	89J-1048	MSH/AC	MSH	EXPIRED		0.367	TL[k]	98J-1031	2011	0.015	0.005
			88J-1041	CLH/AC	MSH	2013	0.650	0.336	FC[k]	97J-1002	2019	0.300	0.275
									MSH[k]	88J-1041	2013	0.650	0.147
									AB[k]	97J-1002	2009	0.200	0.084
									TL[k]	98J-1031	2011	0.015	0.010
			00J-1010	PC/TR	MSH	2010	0.250	0.075	PC	00J-1010	2010	0.600	0.051

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2007	1.250	0.950	89J-1048	MSH/AC	MSH	EXPIRED		0.268	TL[k]	98J-1031	2011	0.015	0.005
			88J-1041	CLH/AC	MSH	2013	0.650	0.379	FC[k]	97J-1002	2019	0.300	0.289
									MSH[k]	88J-1041	2013	0.650	0.217
									AB[k]	97J-1001	2019	0.300	0.087
									TL[k]	98J-1031	2011	0.015	0.010
			00J-1010	PC/TR	MSH	2010	0.250	0.300	PC	00J-1010	2010	0.600	0.276
2008	1.250	0.950	89J-1048	MSH/AC	MSH	EXPIRED		0.809[l]	FC	97J-1002	2019	0.300	0.282
									MSH	88J-1041	2013	0.650	0.223
									AB	97J-1001	2019	0.300	0.089
									GL	10J-1027	2020	0.004	0.0005
									ML	10J-1027	2020	0.004	0.0005
									CL	10J-1027	2020	0.004	0.0005
									TL	98J-1031	2011	0.015	0.002
			00J-1010	PC/TR	MSH	2010	0.250	0.281[m]	PC	10J-1016	2013	0.300	0.258
2009	1.250	0.950	89J-1048	MSH/AC	MSH	EXPIRED		0.649[n]	FC	97J-1002	2019	0.300	0.221
									MSH	88J-1041	2013	0.650	0.194
									AB	97J-1001	2019	0.300	0.090
									TL	98J-1031	2021	0.015	0.008
									TL	98J-1031	2021	0.015	0.003
									TL	98J-1031	2021	0.015	0.008
									DL	98J-1031	2021	0.015	0.002
			07J-1044	PC/TR	MSH/HF	2012	0.300	0.335[o]	PC	10J-1016	2013	0.300	0.129
									LI	11J-1027	2021	0.300	0.093

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Brood Year	Hatchery Permit Egg Take	AMP	FTP for Egg Take	Egg Source	Incubation Location	FTP Expiration Year	FTP Permitted Level	Egg Take from Annual Report	Release Site	FTP for Release	FTP Expiration Date	FTP Permitted Fry/Smolt Release Level	Release Number from Annual Report
2010	1.250	1.250	10J-1006	MSH/AC	MSH	2020	0.650	0.650[p]	FC	97J-1002	2019	0.300	0.279
									MSH	88J-1041	2013	0.650	0.213
									AB	97J-1001	2019	0.300	0.090
									TL	98J-1031	2021	0.015	0.002
									TL	98J-1031	2021	0.015	0.003
									TL	98J-1031	2021	0.015	0.005
									DL	98J-1031	2021	0.015	0.002
			00J-1010	PC/TR	MSH	2020	0.250	0.220	PC	10J-1016	2013	0.300	0.195
2011	1.250	1.250	10J-1006	MSH/AC	MSH	2020	0.650	0.650[q]	FC	97J-1002	2019	0.300	0.280
									MSH	88J-1041	2013	0.650	0.206
									AB	97J-1001	2019	0.300	0.088
									TL	98J-1031	2021	0.015	0.002
			00J-1010	PC/TR	MSH	2020	0.250	0.059	PC	10J-1016	2013	0.300	0.050
2012	1.250	1.250	10J-1006	MSH	MSH	2020	0.650	0.299					
			09J-1017	HF	MSH	2012	0.650	0.539					

[a] 0.072 fry transferred to MSH from HF.

[b] 256,000 Andrew Creek stock eggs collected sold for bait after 209,000 King Salmon River stock eggs received from LPW.

[c] AMP indicated up to 250,000 eggs to be received from LPW, and up to 1.2 million Andrew Creek stock eggs from MSH returns to be taken for transfer to NSRAA's Medvejie Hatchery.

[d] 1.075 million Andrew Creek stock eggs were taken at MSH, with 611,709 eggs taken as a contingency for MSH and the remainder taken and transferred to NSRAA. When King Salmon River stock eggs were transferred to MSH from LPW, the Andrew Creek stock eggs at MSH were removed and sold as bait eggs.

[e] Of the 1.255 million eggs (Andrew Creek stock) taken, half were taken as a back-up source to the King Salmon River (KSR) Chinook salmon eggs anticipated to be transferred from LPW. The other half were taken as a back-up source for CLH, which ultimately were not needed at CLH. About 279,000 KSR stock eggs were received from LPW, and 363,000 eyed Andrews Creek stock eggs were retained for the BY95 production. All remaining eggs were destroyed.

[f] FTP 95J-1046 and 95J-1047 provided for release of King Salmon River stock from AB and FC, respectively; however, the actual releases were of Andrews Creek stock. FTPs for releases of Andrews Creek stock at AB and FC were later issued in 1997.

[g] The FTP for TL releases was for Andrew Creek stock, but this release was of King Salmon River (from LPW) stock.

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[h] About 791,000 Andrew Creek stock eggs collected at MSH as a backup to King Salmon River stock eggs anticipated to be transferred from LPW. No King Salmon River stock eggs were available from LPW. About 111,000 of the Andrew Creek stock eggs collected were destroyed because of bacterial kidney disease, leaving about 680,000 brood year 1997 eggs for production.

[i] Releases of MSH/AC and CLH/AC smolts combined.

[j] Both MH/AC and HFH/AC smolt released.

[k] MSH/AC and CLH/AC smolt released.

[l] An additional 0.154 million eggs taken and culled after picking.

[m] An additional 0.243 million eggs taken and transferred to HF.

[n] An additional 0.597 million eggs were taken and transferred to CLH.

[o] An additional 0.326 million eggs were taken and transferred to HF.

[p] An additional 0.423 million eggs taken and transferred to CLH. 0.150 million eggs culled due to bacterial kidney disease.

[q] An additional 0.260 million eggs taken and transferred to CLH. 0.005 million eggs culled due to bacterial kidney disease.

Appendix V.–Summary of ADF&G pathology inspections at MSH.

Year	Inspection Notes
1990	Mechanical problems with incubators in November resulted in fry deaths with gill hyperplasia and fungus in survivors of chum salmon. Fry were ponded immediately in saltwater, which relieved both the fungus and gas bubble disease. No major issues with pink, coho or Chinook salmon. New hatchery appears well designed and well managed with good fish culture practices evident. Gas supersaturation problem is being addressed by hatchery staff. Recommend developing a better degassing system for hatchery water and continuing plans to take chum fry out of incubators prior to complete yolk sac absorption to reduce pinheading in saltwater netpens.
1991	Saprolegnia infection to some degree in chum salmon hatchlings, and treated with formalin drip to keep under control. Pinheading in early fry stages of Chinook salmon resulted in loss of about 5%. Problem apparently associated with early ponding (mid-late February) at cold water temperatures causing delay in first feeding. Confirmed infection in Chinook salmon of Phoma and bacterial kidney disease (BKD) in a small number of mortalities. No problems for coho pink salmon. MSH an impressive state-of-the-art facility. Fish culture practices are of the highest caliber. Pinheading reduced from last year through manual dumping of incubators and getting fish on feed while they still had 5% yolk. Installation of negative pressure chambers on incoming water lines eliminated gas bubble disease. Recommend routine inspection of fish mortalities for BKD.
1993	Phoma infection in Chinook salmon. Small amount of fungus on chum salmon alevins. No issues with coho and pink salmon. Fish culture practices continue to be of the highest quality. Oxygen generator purchased for use on coho salmon to increase rearing densities. Hatchery staff have begun using the Goede fish health assessment/condition procedure to monitor fish health, and this is an extremely valuable tool for both disease control and assessing smolt fitness.
1995	Bacterial gill disease in Chinook salmon. Chronic fungal infections in chum salmon alevins. Occasional Trichodina infestation in coho salmon. DIPAC equipment and procedures are the most current available in the science of fish culture. Proper disinfection and cleanliness in all areas of the facilities. Hatchery staff attentive to disease problems.
1997	BKD, bacterial gill disease and Phoma in Chinook salmon. Chronic BKD, periodic Trichodina and Coldwater disease in coho salmon. Hatchery a model facility in responsible fish culture with high staff awareness and good hygiene and disease prevention. Recommended reducing fish stress by addressing gas supersaturation and not exceeding fish rearing densities that would exacerbate or precipitate disease. Also recommended a proactive program to control BKD in Chinook salmon by reducing fish stress, injection of broodstock with erythromycin, separate family incubation of eggs, and consider water depuration of incubation and early rearing water for coho and Chinook salmon to reduce Rs exposure from carrier brook trout in the water supply.
1999	BKD and gas bubble disease in Chinook salmon. No disease issues with other species. MSH continues to be a state-of-the-art facility, maintaining fish health and good fish culture practices.
2002	Severe mechanical gill hyperplasia and drop-out for chum salmon. Coho salmon showed higher than normal mortality from pinheading three weeks after ponding. Intestinal Saprolegnia, minor cold water disease, and Costia in Chinook salmon. Facility clean and well organized.
2012	First inspection since 2002. Facility well developed hatchery run by knowledgeable staff who are conscientious about fish health and behavior. Facility is clean, organized and a quintessential representation of good fish culture in Alaska.

Appendix W.–Speel Lake and Taku River sockeye salmon escapement and the return of Macaulay Salmon Hatchery and Sheep Creek Hatchery chum salmon to the Limestone Inlet release site, 1983–2012.

Year	Speel Lake Sockeye Salmon Escapement	Speel Lake Sockeye Salmon Escapement Goal	Limestone Inlet MSH/SCH Chum Salmon Return	Chum Salmon return to MSH	Chum Salmon return to SCH	Taku River Sockeye Salmon Escapement	Taku River Sockeye Salmon Escapement Goal
1983	10,484	10,000					
1984	11,424	10,000				113,796	
1985	14,483	10,000			208	109,563	
1986	11,062	10,000			2,549	100,106	71,000–80,000
1987	35,927	10,000			4,400	82,136	71,000–80,000
1988	1,903	10,000			37,720[a]	79,674	71,000–80,000
1989	15,039	10,000		839	33,592[b]	95,263	71,000–80,000
1990	34,463	10,000		6,151	180,783[b]	96,099	71,000–80,000
1991	359	10,000		2,437	173,510[b]	129,493	71,000–80,000
1992	15,623	5,000		39,528	283,918[c]	137,514	71,000–80,000
1993	34,823	5,000		18,512[a]	63,278[b]	108,625	71,000–80,000
1994	3,834	5,000		143,143[a]	132,978[b]	102,579	71,000–80,000
1995	7,668	5,000		79,964[a]	104,993[b]	113,739	71,000–80,000
1996	16,215	5,000	147,297[a]	239,074[a]	493,083[b]	92,626	71,000–80,000
1997	6,906	5,000	103,282	173,722	173,270[c]	71,086	71,000–80,000
1998	26,155	5,000	118,370	309,561	201,198[c]	74,451	71,000–80,000
1999	22,115	5,000	159,219	262,224	291,210[c]	98,241	71,000–80,000
2000	9,426	5,000	276,487	349,680	450,861[c]	75,498	71,000–80,000
2001	12,735	5,000	97,054	173,247	55,301[c]	144,286	71,000–80,000
2002	5,016	5,000	106,597	207,479		109,337	71,000–80,000
2003	7,014	5,000	68,312	291,916		160,366	71,000–80,000
2004	7,813	4,000–13,000	59,929	291,802		106,688	71,000–80,000
2005	7,549	4,000–13,000	26,872	308,608		120,053	71,000–80,000

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Year	Speel Lake Sockeye Salmon Escapement	Speel Lake Sockeye Salmon Escapement Goal	Limestone Inlet MSH/SCH Chum Salmon Return	Chum Salmon return to MSH	Chum Salmon return to SCH	Taku River Sockeye Salmon Escapement	Taku River Sockeye Salmon Escapement Goal
2006	4,165	4,000–13,000	86,656	1,886,947		146,151	71,000–80,000
2007	3,099	4,000–13,000	112,618	1,394,406		87,763	71,000–80,000
2008	1,763	4,000–13,000	138,363	1,421,403		68,059	71,000–80,000
2009	3,689	4,000–13,000	188,424	1,435,710		71,811	71,000–80,000
2010	5,640	4,000–13,000	157,186	831,395		87,259	71,000–80,000
2011	4,777	4,000–13,000	225,477	1,239,990		112,187	71,000–80,000
2012	5,681	4,000–13,000	170,958	1,234,997		112,564	71,000–80,000

Sources: Speel Lake escapement goal from Riffe and Clark (2003). Taku River escapement goal from Munro and Volk (2013). Weir escapement counts 1983–2002 from Geiger et al (2004). 2003 escapement from Munro and Volk (2012) and 2004-2012 escapements from Munro and Volk (2013). Total MSH chum salmon return to Limestone Inlet from annual reports submitted by DIPAC, unpublished documents obtained from Sam Rabung, ADF&G PNP Coordinator, Juneau.

[a] Return value does not include commercial harvest estimate.

[b] No commercial harvest estimate – sport harvest, brood stock, escapement and cost recovery only.

[c] No commercial harvest estimate for purse seine or troll gear – commercial gillnet harvest, sport harvest, brood stock, escapement and cost recovery only.

Appendix X.–Spawning escapements and escapement goals for Chilkat Lake sockeye and chum salmon, Chilkoot Lake sockeye salmon and Peterson Creek coho salmon, and the total return of MSH chum salmon, 1989–2012.

Year	Chilkat River Chum Salmon Escapement	Chilkat River Chum Salmon Escapement Goal Range	Chilkat Lake Sockeye Escapement[a]	Chilkat Lake Sockeye Salmon Escapement Goal Range[b]	Chilkoot Lake Sockeye Escapement Weir Count	Chilkoot Lake Sockeye Salmon Escapement Goal Range[c]	Peterson Creek Coho Salmon Escapement	Peterson Creek Coho Salmon Escapement Goal Range	MSH Total Chum Salmon Return
1989									839
1990			60,231	52,000–106,000	73,324	50,500–91,500	324		6,151
1991			52,889	52,000–106,000	90,638	50,500–91,500	410		2,437
1992			97,740	52,000–106,000	67,071	50,500–91,500	403		39,528
1993			209,730	52,000–106,000	51,827	50,500–91,500	112		18,512
1994	30,296		153,540	52,000–106,000	37,416	50,500–91,500	318		268,137
1995	61,123		184,541	52,000–106,000	7,209	50,500–91,500	277	100–350	347,844
1996	58,523		262,852	52,000–106,000	50,739	50,500–91,500	263	100–350	1,725,004
1997	87,667		238,803	52,000–106,000	44,254	50,500–91,500	186	100–350	1,378,077
1998	129,800		211,114	52,000–106,000	12,335	50,500–91,500	102	100–350	1,052,656
1999	283,333		236,374	52,000–106,000	19,284	50,500–91,500	272	100–350	1,415,697
2000	269,667		131,322	52,000–106,000	43,455	50,500–91,500	202	100–350	2,573,239
2001	312,000		131,687	52,000–106,000	76,283	50,500–91,500	106	100–350	1,115,702
2002	206,000		137,566	52,000–106,000	58,361	50,500–91,500	195	100–350	2,061,801
2003	166,000		113,000	52,000–106,000	74,459	50,500–91,500	203	100–350	2,619,711
2004	310,000		119,000	52,000–106,000	77,660	50,500–91,500	284	100–350	2,190,580
2005	202,000		84,000	52,000–106,000	51,178	50,500–91,500	139	100–350	823,655
2006	704,000		73,000	80,000–200,000	96,203	50,500–90,000	439	100–250	4,728,025
2007	331,000		68,000	80,000–200,000	72,678	50,500–90,000	226	100–250	3,065,183
2008	451,000		71,735	80,000–200,000	33,117	50,500–90,000	660	100–250	3,459,301
2009	337,000	75,000–170,000	150,033	70,000–150,000	33,705	38,000–86,000	123	100–250	3,526,484
2010	91,000	75,000–170,000	61,906	70,000–150,000	71,657	38,000–86,000	467	100–250	3,526,484
2011	368,000	75,000–170,000	63,628	70,000–150,000	65,915	38,000–86,000	138	100–250	2,650,800
2012	284,000	75,000–170,000	107,723	70,000–150,000	118,166	38,000–86,000	190	100–250	4,011,067

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Sources: Chum salmon escapement goal from Eggers and Heinl (2008). Sockeye salmon escapement goals for Chilkoot and Chilkat systems from McPherson (1990). Sockeye salmon escapement numbers for Chilkoot River and Chilkat River 1990–2002 from Geiger et al. (2004), 2003 escapement number from Munro and Volk (2011), and escapement numbers for 2005–2012 from Munro and Volk (2012). Peterson Creek coho salmon escapement numbers from Skannes et al. (2013). Coho escapement goals 1994–2005 from Clark (1995) and escapement goals from 2006–2012 from Clark (2005).

[a] Chilkat Lake sockeye salmon escapement data in table above are weir counts for 1990–1993, mark–recapture estimates for 1994–2007, and DIDSON counts for 2008-2012.

[b] Chilkat Lake sockeye salmon escapement goals: biological escapement goal 52,000–160,000 (1990–2005), sustainable escapement goal 80,000–200,000 (2006–2008, based on mark–recapture estimates), biological escapement goal 70,000–150,000 (2009–2012). See Heinl et al. (2011).

[c] Chilkoot Lake sockeye salmon escapement goal: biological escapement goal 50,500–91,500 (1990–2005), sustainable escapement goal 50,000–90,000 (2006–2008), sustainable escapement goal 38,000–86,000 (2009–2012).