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An Evaluation of the Port St. Nicholas Salmon Hatchery for Consistency with Statewide Policies and Prescribed Management Practices

by

Mark Stopha

June 2016

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

Symbols and Abbreviations

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Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

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AN EVALUATION OF THE PORT ST. NICHOLAS SALMON HATCHERY FOR CONSISTENCY WITH STATEWIDE POLICIES AND PRESCRIBED MANAGEMENT PRACTICES

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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 Port St. Nicholas salmon hatchery located in Craig, Alaska. The hatchery was constructed in 2005 by the Prince of Wales Hatchery Association, a private nonprofit aquaculture association. The hatchery serves as a central incubation site for release of Chinook salmon *Oncorhynchus tshawytscha* into Port St. Nicholas and Coffman Cove on Prince of Wales Island. The hatchery is also permitted to release chum salmon *O. keta* from Port Asumcion on Baker Island but has yet to do so. No broodstock is collected from Port St. Nicholas salmon hatchery returns. Eggs will be received in perpetuity from approved facilities in the region.

A portion of the Chinook salmon releases are marked with coded wire tags and an adipose fin clip. Chum salmon will be thermal otolith marked. Chinook salmon are sampled in the commercial and sport fisheries to assess hatchery contribution. Streams near the release sites are monitored for Chinook salmon straying.

Since the hatchery permit was issued in 2004, the basic management plan for the hatchery should be updated with the hatchery permit amendments made since then, including the Coffman Cove Chinook salmon program and the chum salmon program.

Key words: Port Saint Nicholas salmon hatchery, Port St. Nicholas salmon hatchery, hatchery evaluation, hatchery, Chinook salmon, chum salmon

INTRODUCTION

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

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

Alaska's modern salmon fisheries enhancement program began in 1971 when the Alaska Legislature established the Division of Fisheries Rehabilitation Enhancement and Development (FRED) within the Alaska Department of Fish and Game (ADF&G; FRED Division 1976). In 1974, the Alaska Legislature expanded the program, authorizing private nonprofit (PNP) corporations to operate salmon hatcheries: "It is the intent of this Act to authorize the private ownership of salmon hatcheries by qualified nonprofit corporations for the purpose of contributing, by artificial means, to the rehabilitation of the state's depleted and depressed salmon fishery. The program shall be operated without adversely affecting natural stocks of fish in the state and under a policy of management which allows reasonable segregation of returning hatchery-reared salmon from naturally occurring stocks" (Alaska Legislature 1974).

Salmon fishery restoration efforts came in response to statewide annual salmon harvests of just 22 million fish in 1973 and 1974, among the lowest catches since 1900 (Figure 1). The FRED Division and PNPs engaged in a variety of activities to increase salmon production. New hatcheries were built to raise salmon, fish ladders were constructed to provide adult salmon access to previously nonutilized spawning and rearing areas, lakes with waterfall outlets too high for adult salmon to ascend were stocked with salmon fry, log jams were removed in streams to enable returning adults to reach spawning areas, and nursery lakes were fertilized to increase the available feed for juvenile salmon (FRED 1975). A combination of favorable environmental conditions, limited fishing effort, abundance-based harvest management, habitat improvement and protection, and hatchery production gradually boosted salmon catches, with recent commercial salmon harvests (2004–2013) averaging 180 million fish.[1]

In Alaska, the purpose of salmon hatcheries is to supplement natural stock production for public benefit without adversely affecting natural stocks (Duckett et al. 2010). Hatcheries are efficient in improving survival from the egg-to-fry or egg-to-smolt stage. In natural production, estimates for pink salmon *Oncorhynchus gorbuscha* egg-to-fry survival in 2 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 return to the release location as mature adults. Per state policy, hatcheries generally use stocks taken from close proximity to the hatchery so that any straying of hatchery returns will have similar genetic makeup as the stocks from nearby streams. Also per state policy, Alaska hatcheries do not selectively breed. Large numbers of broodstock are used for gamete collection to maintain genetic diversity, without regard to size or other characteristic. In this document, *wild* fish refer to fish that are the progeny of parents that naturally spawned in watersheds and intertidal areas. *Hatchery* fish are fish reared in a hatchery to a juvenile stage and released. *Farmed* fish are fish reared in captivity to market size for sale. Farming of finfish, including salmon, is not legal in Alaska (Alaska Statue 16.40.210).

Hatchery production is limited by freshwater capacity and freshwater rearing space. Soon after emergence, all pink and chum salmon *O. keta* fry can be transferred from fresh water to salt water. Most Chinook *O. tshawytscha*, sockeye *O. nerka*, and coho salmon *O. kisutch* must spend a year or more in fresh water before fry develop to the smolt stage and can tolerate salt water. These 3 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 and the value of fish at harvest. Although Chinook, sockeye, and coho salmon garner higher prices per pound at harvest, chum and pink salmon are more economical to rear in the hatchery setting and generally provide a higher economic return.

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

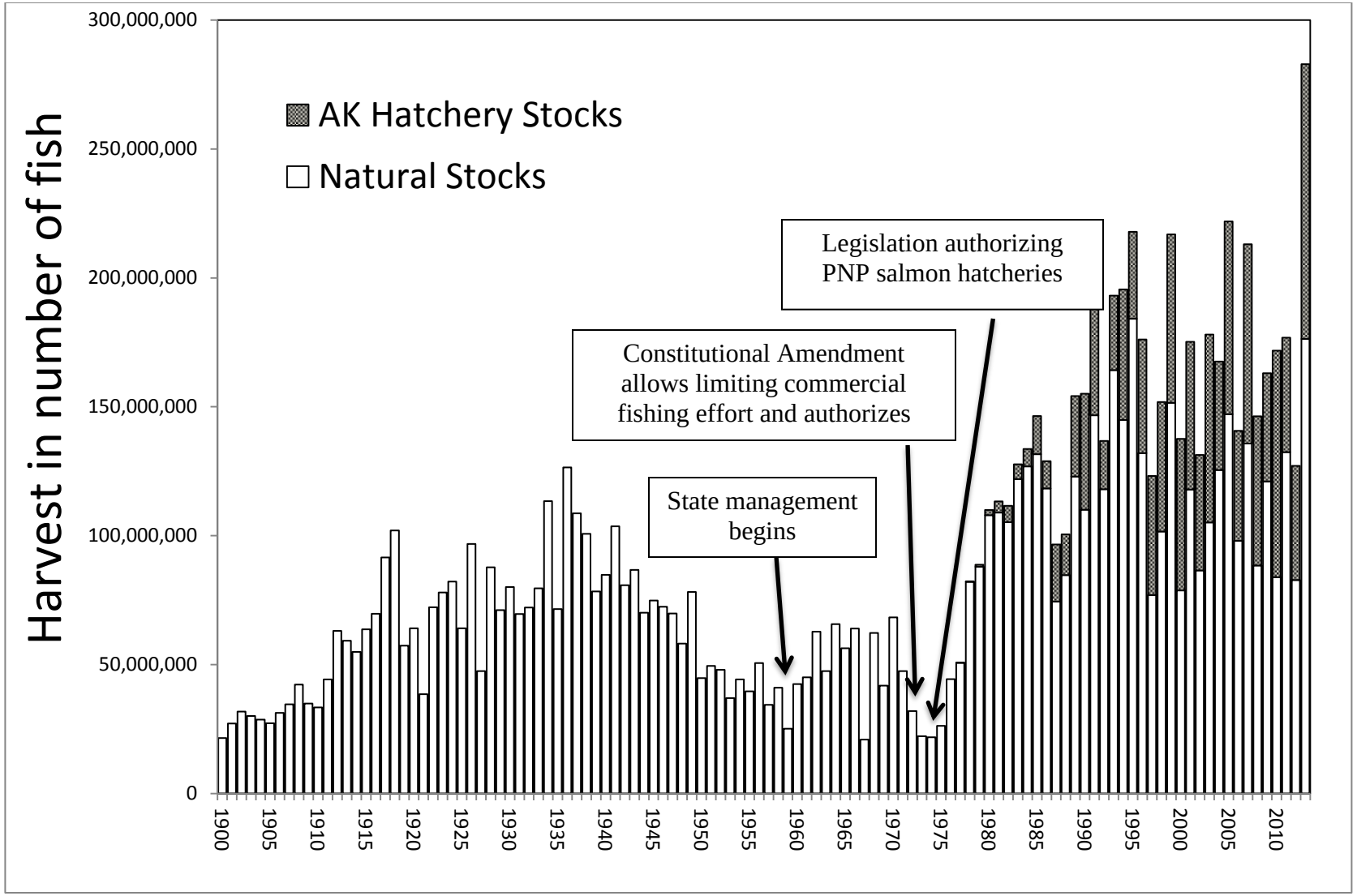

Figure 1.–Commercial salmon harvest in Alaska, 1900–2012.

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

Pink salmon have the shortest life cycle of Pacific salmon (2 years), provide a quick return on investment, and provide the bulk of Alaska hatchery production. From 2004 to 2013, pink salmon accounted for an average 74% of Alaska hatchery salmon returns by number, followed by chum (20%), sockeye (4%), coho (2%) and Chinook salmon (<1%; White 2005–2011; Vercessi 2012–2014).

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

Today, Alaska typically accounts for just 12% to 15% of the global supply of salmon (ASMI 2011). Alaska's diminished influence on world salmon production means that Alaska's harvest volume has little effect on world salmon prices. Prices paid to fishermen have generally increased over the past decade (2004–2013) despite large fluctuations in harvest volume (ADF&G 2014; Stopha 2013a).

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

From 2004 to 2013, hatcheries contributed about one-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 habitat is largely intact. ADF&G, with the assistance and sacrifice of commercial, sport, personal

[2] Exvessel value for hatchery harvest is the total harvest value paid by fish buyers to fishermen for all salmon from http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch, multiplied by the hatchery percent of the commercial harvest in Farrington 2003, 2004; White 2005–2011, and Vercessi 2013.

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

use, and subsistence users, has successfully recovered several populations identified as *stocks of concern* through restricted fishing and intensive spawning assessment projects. Other than regulatory actions—such as reducing salmon bycatch in other fisheries, or changing fishing methods to allow more precise management of escapement—hatchery production is the primary opportunity to substantially increase the harvest.

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

Part of the reason for Alaska salmon's rise in price was the message from the state's sustainable fisheries management to a growing audience of discriminating buyers. The Alaska Seafood Marketing Institute applied to the Marine Stewardship Council (MSC) for certification as a sustainably managed fishery. In 2000, the MSC certified the salmon fisheries managed by ADF&G as sustainably managed, and the state's salmon fisheries remained the only MSC-certified salmon fishery in the world for nearly a decade. Salmon fisheries elsewhere (Annette Islands Indian Reserve salmon; British Columbia pink and sockeye salmon; and Iturup Island, Russia, pink and chum salmon) were later certified for much smaller geographic areas, and in some cases, only for specific salmon species.[4] Alaska's certification was MSC's broadest and most complex, covering all 5 salmon species harvested by all fishing gear types in all parts of the state. Achieving statewide certification was a reflection of the state's commitment to abundance-based fisheries management and its constitutional mandate to sustain wild salmon populations.

MSC-certified fisheries are reviewed every 5 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 its potential impacts on wild salmon production. ADF&G established a rotational schedule to review PNP hatchery programs. Musslewhite (2011a, 2011b), Stopha and Musslewhite (2012) and Stopha (2012a, 2012b, 2013a, 2013b, 2013c, 2013d, 2013e, 2013f, 2013g, 2013h, 2014a, 2014b, 2015a, 2015b, 2015c, 2015d, 2015e, 2015f) completed hatchery reviews for the Kodiak, Cook Inlet, Prince William Sound region PNP hatcheries, and for the Macaulay, Sheep Creek, Snettisham, Haines Projects, Medvejie Creek, Sawmill Creek, Hidden Falls, Port Armstrong and Sheldon Jackson hatcheries in northern Southeast Alaska. This report is for the Port St. Nicholas Hatchery

[4] MSC (Marine Steward Ship Council). 2012. www.msc.org (Accessed February 6, 2012).

located near Craig, Alaska, on Prince of Wales Island in Southeast Alaska. Reviews of other PNP hatcheries in southern Southeast Alaska will follow.

OVERVIEW OF POLICIES

Numerous Alaska mandates and policies for hatchery operations were specifically developed to minimize potential adverse effects on 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 2014), and fisheries management policies, such as the Sustainable Salmon Fisheries Policy (5 AAC 39.222). These policies are used by ADF&G staff to assess hatchery operations for genetic, health, and fishery management issues in the permitting process. Regional comprehensive salmon enhancement plans provide goals and objectives for enhancement planning, and are described in a later section.

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 US/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.

Genetic Policy also recommends the identification and protection of *significant and unique* wild stocks: "Significant or unique wild stocks must be identified on a regional and species basis so as to define sensitive and non-sensitive areas for movement of stocks." In addition, *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 in *Genetic Policy*, including (1) hatchery stocks cannot be introduced to sites where the introduced stock may have interaction or impact on significant or unique wild stocks; (2) a watershed with a significant stock can only be stocked with progeny from the indigenous stocks; and (3) fish releases at sites where no significant interaction with, or impact on, significant or unique stock will occur, and which are not for the purposes of developing, rehabilitation, or enhancement of a stock (e.g., releases for terminal harvest or releases in landlocked lakes) will not produce a detrimental genetic effect. Davis and Burkett (1989) suggest that regional planning teams (RPTs) are an appropriate body to designate significant and unique wild stocks and wild stock sanctuaries. To date, only the Cook

Inlet RPT has established significant stocks and wild stock sanctuaries. The Southeast Alaska RPT has issued 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 (Duckett et al. 2010).

Salmon fishery enhancement efforts are guided by comprehensive salmon plans for each region. These plans are developed by the RPTs, which are composed of 6 members: 3 from ADF&G and 3 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 2014). It includes regulations and guidelines for fish transports, broodstock screening, disease histories, and transfers between hatcheries. The *Alaska Sockeye Salmon Culture Manual* (McDaniel et al. 1994) also specifies practices and guidelines specific to the culture of sockeye salmon. As with *Genetic Policy*, these regulations and guidelines are used by ADF&G fish pathologists to review hatchery plans and permits.

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

The guidance provided by these policies is sometimes very specific, and sometimes less so. For example, the Alaska Fish Health and Disease Control Policy (5 AAC 41.080) mandates the use of an iodine solution on salmon eggs transported between watersheds—a prescribed practice that requires little interpretation. In contrast, several policies prioritize the protection of wild stocks from the potential effects of fisheries enhancement projects without specifying or mandating how to assess those effects. These less specific policies provide principles and priorities, but not specific direction for decision making.

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

OVERVIEW OF HATCHERY PERMITS AND PLANS

The FRED Division built and operated several hatcheries across the state in the 1970s and gradually transferred operations of most facilities to PNP corporations. Regional aquaculture

associations (RAAs), whose membership comprises the commercial salmon fishing permit holders in that region, 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. RAA membership may vote to impose a salmon enhancement tax on sale of salmon in their region to finance hatchery, enhancement, and rehabilitation activities. Independent PNP corporations, not affiliated with an RAA, also operate hatcheries in several areas of the state. Both the RAAs and independent PNP hatchery organizations may harvest salmon returning to their release sites to pay for operations. Such harvests by hatchery operators are called *cost-recovery* fisheries, and are in contrast to *common property* fisheries, which are fisheries open to all commercial fishing permit holders, as well as subsistence, personal use, and sport harvesters. Several organizations have tourist and educational programs that contribute to the financial support of their programs as well.

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

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

Public participation is an integral part of the PNP hatchery system. Hearings are held before a hatchery is permitted for operation. RPTs composed of ADF&G and RAA representatives hold public meetings to define desired production goals by species, area, and time; and document these goals in comprehensive salmon plans (5 AAC 40.300). RPTs hold public meetings to review applications for new hatcheries, and to make recommendations to the ADF&G commissioner regarding changes to existing hatchery operations, new hatchery production, and new hatchery facilities. 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 4 documents required in regulation (5 AAC 40.110–990 and 5 AAC 41.005–100) and statute (AS 16.05.092): hatchery permit with basic management plan (BMP), annual management plan (AMP), fish transport permit (FTP), and annual report (Figure 2).

The hatchery permit authorizes operation of the hatchery, specifies the maximum number of eggs of each species that a facility can incubate, specifies the authorized release locations, and may identify stocks 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 2 documents should be revised together if the permit is altered. The permit and BMP are not transferrable. Hatchery permits remain in effect unless relinquished by the permit holder or revoked by the ADF&G commissioner.

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

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

An FTP is required for egg collections, transports, and releases (5 AAC 41.001–41.100). The FTP authorizes specific activities described in the hatchery permit and management plans, including broodstock sources, gamete collections, and release sites. All FTP applications are currently reviewed by the ADF&G fish pathologist, fish geneticist, regional resource development biologist, and other ADF&G staff as delegated by the ADF&G commissioner. Reviewers may suggest conditions for the FTP. Final consideration of the application is made by the ADF&G commissioner or commissioner's delegate. An FTP is issued for a fixed time period and includes both the specifics of the planned operation and any conditions added by ADF&G.

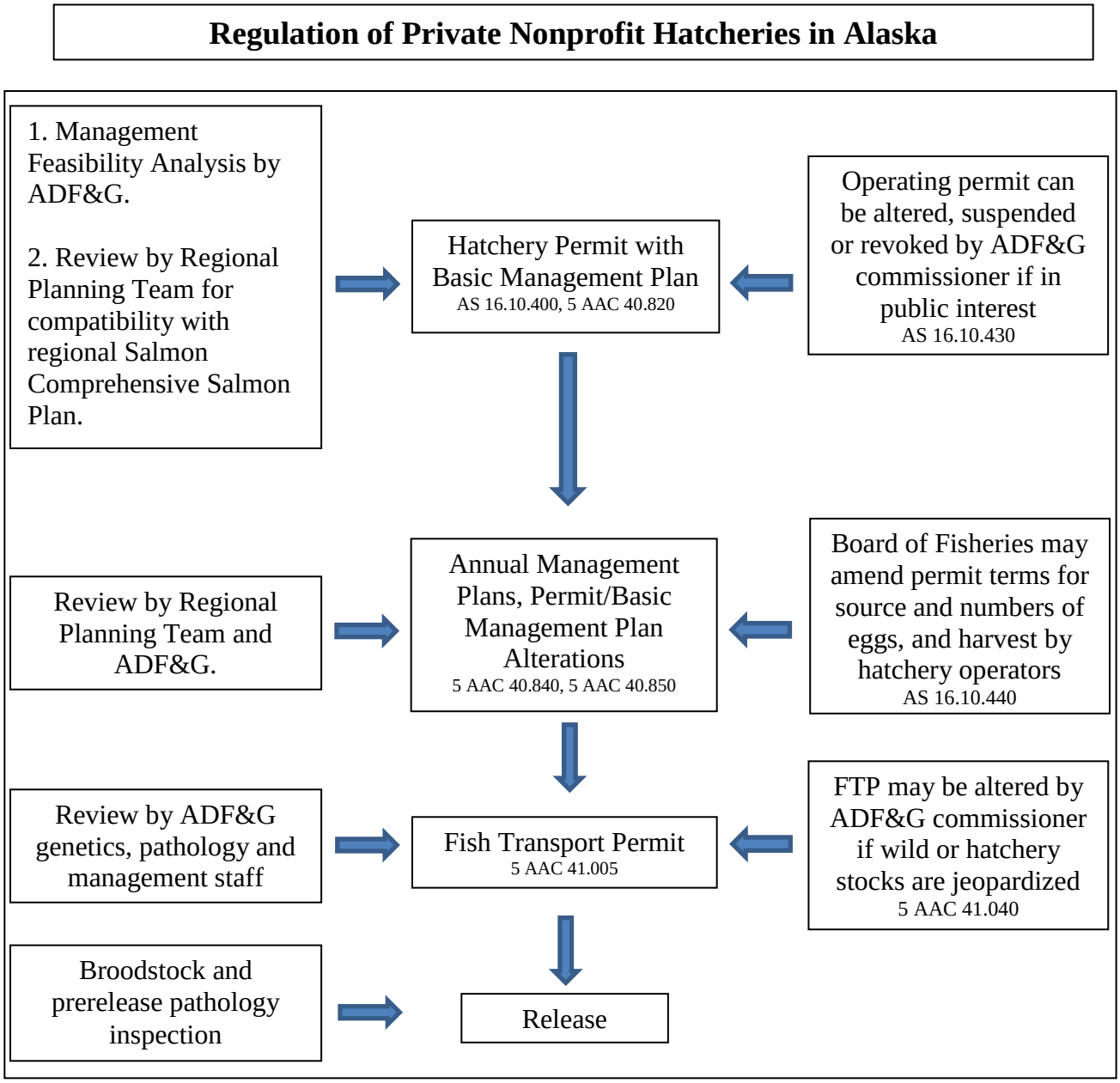

Figure 2.–Diagram of Alaska hatchery permitting process.

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 (AS 16.10.470). Information for all hatcheries is compiled into an annual ADF&G report (e.g., Vercessi 2014) to the Alaska Legislature (AS 16.05.092).

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

PORT ST. NICHOLAS HATCHERY OVERVIEW

The Prince of Wales Hatchery Association (POWHA), a private nonprofit hatchery association, operates Klawock River Hatchery and Port St. Nicholas Hatchery on Prince of Wales Island. The Klawock River Hatchery is near the community of Klawock, and the Port St. Nicholas Hatchery is near the community of Craig (Figure 3).

From the late 1990s to the mid-2000s, POWHA and the City of Coffman Cove investigated a Chinook salmon release program at Coffman Cove to improve Chinook salmon fishing near town (Figure 4). POWHA's Klawock River Hatchery permit was amended in 1999 to permit incubation of Chinook salmon eggs at the hatchery and release of smolt from Coffman Cove. Warm water and concerns of infectious hematopoietic necrosis virus (IHNV) at Klawock River Hatchery[5] caused POWHA to look for another suitable incubation location, resulting in the Port St. Nicholas Hatchery site. When POWHA received the hatchery permit for Port St. Nicholas Hatchery, the Chinook salmon capacity at Klawock River Hatchery was removed. No Chinook salmon eggs were ever incubated at Klawock River Hatchery.

Port St. Nicholas Hatchery is located at the City of Craig municipal water plant. The hatchery was constructed primarily with funds from the Pacific Coastal Salmon Recovery Fund and completed in 2007. The hatchery is owned by the City of Craig. The hatchery is operated by POWHA. The water source for the hatchery and the municipal water plant is North Fork Lake.

POWHA applied for a permit for the Port St. Nicholas Hatchery in October 2003. The application requested a hatchery capacity of 325,000 Chickamin River stock Chinook salmon eggs to be acquired annually in perpetuity from Whitman Lake Hatchery. Water usage for the hatchery fell under the City of Craig's Alaska Department of Natural Resources water use permit, and the City of Craig drafted a formal water use agreement to guarantee water to maintain the hatchery.

In the Management Feasibility Analysis, ADF&G staff indicated that the small size of the facility and small production capacity were too small to create any fishery management concerns. Returns to Port St. Nicholas were expected to primarily contribute to fisheries in the immediate area.

The Southern Southeast Regional Planning Team (SSERPT) reviewed the permit application and unanimously recommended issuance of the permit to the ADF&G commissioner.

The public hearing for the hatchery was held in Craig in June 2004. All verbal and written testimony was in favor of the hatchery.[6]

The ADF&G deputy commissioner approved the permit application and issued ADF&G PNP Salmon Hatchery permit number 43 to POWHA in June 2004 (

[5] Remarks by John Bruns, Klawock River Hatchery Manager, from 2006 spring meeting, Southeast Alaska Regional Planning Team minutes. Unpublished document electronic file obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

[6] Memo from S. McGee, ADF&G, to D. Bedford, ADF&G Commissioner, dated June 23, 2004. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

Appendix A). The facility was permitted for 385,000 green or 308,000 eyed Chinook salmon eggs. The BMP allowed Chickamin River stock Chinook salmon eggs to be acquired annually in perpetuity from Whitman Lake Hatchery in Ketchikan. Chickamin River is located north of Ketchikan (Figure 4). Coffman Cove, on the eastern side of Prince of Wales, is accessible by road from Craig (Figure 4), and was identified as a possible release site. The Chickamin River and the Unuk Rivers are the nearest major Chinook salmon systems to Craig and Coffman Cove (Figure 4). The BMP requires POWHA to operate a weir at the Port St. Nicholas Creek from May to August each year so that returning fish cannot ascend the creek.

Figure 3.–Port St. Nicholas Hatchery and release sites at Port St. Nicholas and Port Asumcion.

The first PAR for the Port St. Nicholas Hatchery permit occurred in 2006 (

Appendix A). POWHA requested an additional 385,000 Unuk River Chinook salmon stock eggs for release at Coffman Cove. POWHA requested a 2-phase program implementation. The first phase would be to incubate the eggs at Port St. Nicholas Hatchery, induce accelerated development to smolt, and transfer the smolt to net pens at Coffman Cove for imprinting and release as zero-check smolt the following spring. Survivals of the Unuk River stock releases from Coffman Cove would be compared with the Chickamin River stock releases from Port St. Nicholas.

Phase 2 would be construction of a rearing facility at the Coffman Cove water plant to rear smolt for a year before release. Phase 2 would be considered after an assessment of Phase 1. The SSERPT recommended approval of the PAR by the ADF&G commissioner. The ADF&G deputy commissioner approved the PAR. The amendment permitted POWHA to incubate up to 385,000 Unuk River stock Chinook salmon eggs at Port St. Nicholas Hatchery and release the resulting progeny from net pens in Coffman Cove. A fish weir at Coffman Cove Creek was required to restrict passage of returning Chinook salmon up the creek. According to POWHA's PAR application, the eggs would come from the Deer Mountain Hatchery, with Port Armstrong Hatchery as a backup source.

Figure 4.–Port St. Nicholas Hatchery, Coffman Cove release site, Chickamin and Unuk rivers.

In 2010, POWHA submitted 2 PARs. One PAR was to change the primary stock for the Coffman Cove release site from Unuk River to Chickamin River stock, and to use the Unuk River stock as a backup to the Chickamin River stock. By this time, the "Phase II" hatchery site at Coffman Cove was no longer being pursued by POWHA and the City of Coffman Cove as it was proving successful to use the Port St. Nicholas Hatchery as a central incubation site for both Coffman Cove and Port St. Nicholas releases. POWHA indicated that Whitman Lake Hatchery, the source of the Chickamin River stock eggs, was a more reliable source for eggs than acquiring Unuk River eggs from Deer Mountain or Port Armstrong hatcheries. Use of Chickamin River stock for both release sites would be more beneficial in terms of efficiency, pathology and genetic considerations, and availability of eggs for their programs.[7] The SSERPT and ADF&G PNP coordinator recommended approval. The ADF&G deputy commissioner approved the amendment.[8]

The second PAR was to exempt POWHA from installing the Coffman Cove creek weir for 2010 only. This was requested since few Coffman Cove Chinook salmon releases were expected in 2010. ADF&G staff supported the PAR, and the ADF&G deputy commissioner approved the 1-year amendment.[9]

In 2011, POWHA submitted a PAR to allow use of Andrew Creek Chinook salmon stock for 1 year only for the Port St. Nicholas and Coffman Cove release sites. This request was due to the loss of nearly all of the brood year 2010 Chickamin stock Chinook salmon at Port St. Nicholas hatchery. The RPT and ADF&G staff recommended approval, and the commissioner approved the 1-year amendment.[10]

In 2014, POWHA submitted a PAR to add 20 million summer chum salmon eggs to the permitted capacity of Port St. Nicholas Hatchery. Eyed-eggs would be provided in perpetuity by the Southern Southeast Regional Aquaculture Association (SSRAA) or Tamgas Creek Hatchery. SSRAA hatcheries and Tamgas Creek Hatchery use local stocks from southern Southeast Alaska. Eggs would be incubated and reared at Port St. Nicholas Hatchery, then transferred for short-term rearing and release at Port Asumcion (Figure 3). Returns from the release that were not harvested in common property fisheries would be harvested by POWHA for cost recovery.

ADF&G genetics staff recommended approval, stating there were no native chum salmon stocks near the release site. ADF&G pathology staff indicated there were no fish health concerns with the PAR. The SSRAA RPT representative recommended amending the permitted level to 8 million eggs because SSRAA had no short-term availability for providing the full 20 million egg

[7] PAR application submitted by POWHA dated 1-27-10. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

[8] Memo from B. White, ADF&G, to D. Bedford, ADF&G, dated April 22, 2010. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

[9] Memo from S. Rabung, ADF&G, to D. Lloyd, ADF&G, dated July 12, 2010. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau

[10] Memo from B. White, ADF&G, to D. Bedford, ADF&G, dated March 21, 2011. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

request. The 8 million eggs would provide a large enough return to evaluate the program and provide some cost-recovery harvest. In addition, provisions were added by amendment for straying, requiring that POWHA harvest any significant aggregations of fish remaining in the terminal harvest area once common property fisheries cease or are no longer feasible. In addition, releases would be otolith marked and returns sampled in the terminal area to monitor the harvest of wild stocks.[11]

The SSERPT and ADF&G PNP coordinator recommended the PAR for approval as amended for 8 million eggs and with the conditions stated in the previous paragraph. The ADF&G directors of the Divisions of Sport Fish and Commercial Fisheries[12] approved the PAR. To date, no FTP has been approved for the project so the stock origin has not been determined.

COMPREHENSIVE SALMON ENHANCEMENT PLAN

Three phases of Comprehensive Salmon Plans (CSP) have been developed to date in Southeast Alaska. Phase I[13] and Phase II[14] CSPs provided planning focused on increasing salmon production with specific harvest targets for each salmon species. The Phase III CSP (Duckett et al. 2010) focuses on integrating hatchery production increases with natural production to sustainably manage fisheries.

With the maturation of the salmon enhancement program, the harvest target objectives in the Phase I and Phase II CSPs were replaced with objectives in the Phase III CSP that supported an overriding goal to enhance the salmon fishery while minimizing the potential impact of enhancement on wild stocks. These objectives included (1) minimizing the impact of hatchery stocks on wild stocks, (2) maintaining existing production potential for wild and enhanced stocks (3) assuring that increases in hatchery production are consistent with regionwide goals and allocation plans, and (4) updating the RPT process periodically to provide status reports and recommendations in a timely manner. Like the Phase I and II CSPs, the Phase III CSP objectives covered a 20-year horizon.

The Phase III CSP *best practice* guidelines for enhancement planning provided 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) the release site has an adequate freshwater supply for 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. These standards were to meet the Policy for the Management of Sustainable Salmon Fisheries (5 AAC 39.222) developed by the Alaska Board of Fisheries and ADF&G.

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[11] Memo from F. Pryor, ADF&G, to C. Campbell, ADF&G, dated April 23, 2014. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau

[12] Directors had delegated authority from ADF&G commissioner to approve hatchery permit alterations.

[13] Joint Southeast Alaska regional planning teams. 1981. Comprehensive salmon enhancement plan for Southeast Alaska: Phase I. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

[14] Southern Southeast regional planning team. 1983. Comprehensive salmon plan, Phase II: Northern Southeast Alaska. Unpublished document obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

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 *Genetic Policy*. The Phase III CSP states that significance is more complex than a 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 the following 6 stock characteristics of consideration: wildness, uniqueness, isolation, population size, population trend, and the stock's economic and/or cultural significance.

The Phase III CSP 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."

The Port St. Nicholas Hatchery was permitted in June 2004 as the 20-year planning under the Phase II CSP (issued in September 1983) was coming to a close and the Phase III CSP (issued in December 2004) was nearing completion. The hatchery release would benefit the southern Southeast Alaska outer coastal troll fishery and the west coast Prince of Wales Island sport fishery, 2 fisheries recommended for increased Chinook salmon harvest in the Phase II CSP. Chinook salmon production on the west coast of Prince of Wales Island at Klawock was given a lower priority over other potential sites due to the lack of local broodstock, and because returns to sites on the west coast of Prince of Wales Island would likely benefit only fisheries on the outer coast of southern Southeast Alaska, whereas hatcheries further inland would pass through multiple fisheries before reaching their release sites. Production from Port St. Nicholas Hatchery would also contribute towards the Southeast Alaska regionwide Chinook salmon harvest goal of 537,000 fish, which was well below the target harvest at the time the hatchery was permitted (Pryor et. al 2005).

The review and assessment of the Port St. Nicholas Hatchery program by ADF&G, the RPT, and the public during the permitting process and development of the BMP, and all additional projects, including the Coffman Cove release site and addition of chum salmon to the permit, demonstrated application of the policies and guidelines outlined in the Phase III CSP.

PROGRAM EVALUATIONS

CONSISTENCY WITH POLICY

The policies governing Alaska hatcheries were divided into 3 categories for this review: genetics, fish health, and fisheries management. The key elements of the policies in each of those categories are summarized in Tables 1–3. These templates identifying the key elements of state policies used to assess compliance of the Port St. Nicholas Hatchery salmon program with the policy elements. Discussion of application of the policies in hatchery operations follows each table.

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

I. Stock Transport	
Use of appropriate local stocks	This element addresses Section I of *Genetic Policy*, covering stock transports. The policy prohibits interstate or interregional 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 can 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 protecting significant wild stocks from harmful interactions with introduced stocks. Stocks cannot be introduced to sites where they may significantly impact significant or unique wild stocks. The Phase III CSP denotes guidelines for significant stock determination. No significant stocks have been recommended in Southeast Alaska by the RPT.
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. No wild stock sanctuaries have been established in Southeast Alaska.
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 3 hatchery stocks should be derived from a single donor stock. Offsite releases, such as for terminal harvest, should not be restricted by this policy if the release sites are selected so that they do not impact significant wild stocks, wild stock sanctuaries, or other hatchery stocks.
Minimum effective population size	The policy recommends a minimum effective population size of 400. It also recognizes that small population sizes may be unavoidable with Chinook and steelhead.
Genetics review of Fish Transport Permits (5 AAC 41.010–41.050)	
Review by geneticist	Each application is reviewed by the geneticist, who then makes a recommendation to either approve or deny the application. The geneticist may also recommend adding terms or conditions to the permit to protect wild or enhanced stocks.

Genetics

POWHA Chinook salmon ancestral stocks are from the Chickamin and Unuk rivers (Figure 4). These 2 mainland rivers are the nearest significant Chinook salmon stocks to the release sites. There are no known Chinook salmon runs on Prince of Wales Island. The Unuk River stock is used at Port Armstrong and Little Port Walter hatcheries. The Chickamin River stock is used at Whitman Lake Hatchery in Ketchikan.

Weirs on the Port St. Nicholas and Coffman Cove creeks are operated during the summer to prevent Chinook salmon from straying into the streams. In addition, POWHA staff are required to conduct weekly stream walks of the Port St. Nicholas Creek during the summer to remove any Chinook salmon that get above the weir. Port St. Nicholas Creek has impassable falls about one-half mile upstream from the creek mouth.

An ADF&G geneticist reviewed the hatchery FTPs. The original FTP authorizing the transfer of Chickamin River stock Chinook salmon eggs from Whitman Lake to Port St. Nicholas Hatchery for incubation, rearing, and release was issued in 2005 (FTP 05J-1015, Appendix B). The geneticist indicated that because weirs would prevent returns from entering the streams, adult returns might seek other systems to stray. He recommended that fish be monitored in other streams, such as Klawock River and Cable Creek.

When the FTP was amended in 2014, the ADF&G geneticist reviewing the application questioned if fish counting weirs in the area had monitored for marked Chinook salmon as suggested by the geneticist in the original FTP application.[15] In response to the question, ADF&G FTP permitting staff indicated that, according to the AMP, the purpose of the weir at Port St. Nicholas River was for cost recovery.[16] However, a review of the AMP, BMP, and the original FTP language indicate that the weir *was* to prevent Chinook salmon from entry into the river.

ADF&G genetics staff had similar comments on FTPs for Coffman Cove Chinook salmon releases (FTP 06J-1029 and FTP 06J-1030). The geneticist noted that when POWHA submitted the PAR for adding the Coffman Cove release site to the PNP permit, they proposed to do a 5-year straying study. The geneticist stated that POWHA would need to coordinate with the Division of Sport Fish to look for strays in systems routinely surveyed.

A straying study has not been required or implemented to date. The requested study was not added as a condition on the permit amendment or as a requirement of the FTP. Actions the geneticist requested for stream monitoring, however, are occurring in the region, although not as a formal study. Southeast Alaska has a regionwide wild stock Chinook and coho salmon tagging and escapement monitoring program. ADF&G staff manning escapement weirs and fish wheels regularly attempt to capture Chinook salmon with missing adipose fins so that their tags can be examined for stock origin.[17] Fin-clipped Chinook salmon that return to hatchery facilities are sampled to determine their origin as well. Tag recoveries are entered into a publicly accessible database at http://mtalab.adfg.alaska.gov/. Two Port St. Nicholas Hatchery release strays have

[15] This study request was also discussed by ADF&G staff commenting on an FTP (08J-1017) that allowed POWHA to use Chickamin River stock for 1 year, in place of Unuk River stock, and the ADF&G Regional Resource biologist indicated that the AMP would be the appropriate permit to outline a straying study requirement.

[16] M. Morris, Permit coordinator response to W.Grant, ADF&G geneticist dated 9/22/2014 on review of an amendment for FTP 05J-1015.

[17] E. Jones, ADF&G biologist, personal communication.

been recorded to date.[18] One Port St. Nicholas release was seen at the Whitman Lake Hatchery, the origin of the Port St. Nicholas Hatchery eggs. A second fish was recovered at the ADF&G Unuk River escapement project. This fish was from a Port Armstrong Hatchery/Unuk River stock egg that was incubated and reared at Port St. Nicholas Hatchery and released from the Coffman Cove net pen site.

Locally, the Klawock River Hatchery operates a weir on the Klawock River. The weir is installed in mid-July or later—well after Chinook salmon would be expected to ascend the river. In reviewing Klawock River escapement surveys from 2008 to 2014, no Chinook salmon were noted. Beginning in 2014, the U.S. Forest Service began installing the weir earlier (July 1) to monitor the sockeye salmon escapement to the river; the earlier installation will provide more seasonal coverage for monitoring Chinook salmon.

For the chum salmon program, the ADF&G geneticist expressed no concerns because there are no wild chum salmon populations near the release site. POWHA is required to harvest hatchery-produced chum salmon remaining in the terminal area after common property fisheries cease to prevent straying.

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

Fish Health and Disease Policy (5 AAC 41.080)	
Egg disinfection	Within 48 hours of taking and fertilizing live fish eggs or transporting live fish eggs between watersheds, all eggs must be treated with an iodine solution. This requirement may be waived for large-scale pink and chum salmon facilities where such disinfection is not effective or practical.
Hatchery inspections	According to AS 16.10.460, inspection of the hatchery facility by department inspectors shall be permitted by the permit holder at any time the hatchery is operating.
Disease reporting	The occurrence of fish diseases or pathogens listed in 5 AAC 41.080(d) must be immediately reported to the ADF&G Fish Pathology Section.
Pathology requirements for Fish Transport Permits (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.

[18] Agency Report from ADF&G Mark, Tag and Age Laboratory website http://mtalab.adfg.alaska.gov/CWT/reports/agency.aspx (accessed June 3, 2016).

Fish Health and Disease

FTPs are approved for all operations, include isolation measures, and were reviewed and approved by an ADF&G fish pathologist. All eggs are disinfected. Disease histories and disease occurrence were submitted as required. ADF&G fish pathology staff inspected the facility in 2013. The inspection reported noted that the facility was clean, well organized, and well run. ADF&G staff recommended adding a degassing system to the raceways to protect fish from bas bubble disease due to supersaturation.[19]

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. ADF&G staff may recommend approval or denial of the permit, and recommend permit conditions.

Fisheries Management

Port St. Nicholas Hatchery returns are harvested primarily in the Southeast Alaska commercial troll fishery and the local sport fishery. ADF&G management staff comments on permitting documents indicate the relatively small number of fish returning to either release site (Appendix

[19] Hatchery Inspection Report dated 8/29/13 by J. Ferguson, ADF&G. Unpublished document received from T. Meyers, ADF&G fish pathologist.

C) poses no impact to management of wild stock fisheries in the area. Wild stock protection is implemented through weirs at the release sites and monitoring at escapement projects in the region.

CONSISTENCY IN PERMITTING

Hatchery permit/BMP, AMP, and FTP documents for Port St. Nicholas Hatchery operations were reviewed to determine that they met the following guidelines:

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

The hatchery permit and BMP do not expire. The BMP should be updated when any permit amendments are approved through PARs. FTPs for all egg takes and transfers are in place and current.

RECOMMENDATIONS

The BMP should be updated to add the chum salmon program and Coffman Cove Chinook salmon program.

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APPENDIX

Appendix A.–Port St. Nicholas Hatchery permit and permit alterations, 2004–2014.

Date	Description	Chinook salmon eggs	Chum salmon eggs
06/25/2004	PNP hatchery permit number 43 and BMP issued to POWHA for Port St. Nicholas Hatchery in Craig. Hatchery permitted for 385,000 green or 308,000 eyed Chinook salmon eggs. BMP stated that Chinook salmon donor source was Chickamin River stock eggs from Whitman Lake Hatchery. Operational requirements included tagging a portion of releases and operation of a weir to prevent returning Chinook salmon from ascending the Port St. Nicholas Creek.	385,000	
06/09/2006	Permit alteration added 385,000 Unuk Stock Chinook salmon eggs to permitted capacity. All progeny are for release at Coffman Cove. Required operation of a weir to prevent returning Chinook salmon from ascending the Coffman Cove Creek. Permitted capacity now 770,000 Chinook salmon eggs.	770,000	
05/11/2010	Permit alteration allowed Chickamin River stock Chinook salmon eggs to be used as a backup to Unuk Stock Chinook salmon eggs for release at Coffman Cove. Permitted capacity unchanged.	770,000	
07/12/2010	For 2010 only, weir was not required at Coffman Cove Creek since few returns were expected. Permitted capacity unchanged.	770,000	
03/21/2011	Permit alteration allowed use of Andrew Creek stock Chinook salmon to be used at Port St. Nicholas and Coffman Cove release sites after water shut off at the hatchery killed nearly all production. Permitted capacity unchanged.	770,000	
06/02/2014	Permit alteration added 8 million summer run chum salmon to the permit. All chum salmon released at Port Asumcion. Conditions included marking of chum salmon and removal of unharvested chum salmon at release site. Permitted capacity now 770,000 Chinook and 8 million chum salmon eggs.	770,000	8,000,000

Appendix B.–Summary of fish transport permits for Port St. Nicholas Hatchery.

FTP No.	Issued	Expiration	FTP summary and reviewer comments..
05J-1015	2005	2024	Transfer of up to 385,000 green eggs or 308,000 eyed eggs of Chickamin River stock Chinook salmon eggs from Whitman Lake Hatchery to Port St. Nicholas Hatchery for release of 250,000 smolts into the Port St. Nicholas River. Permit amended in 2006 to add that release could be 250,000 smolts or 300,000 fry, and allowed fry transport dates from February through April. Permit amended in 2010 to extend expiration date from 2010 to 2014 and changed release numbers of fry and smolts above to "resultant progeny." Permit amended in 2011 increasing permitted egg number from 385,000 to 770,000. Permit amended in 2014 to extend expiration date from 2014 to 2024.
06J-1029	2006	2010	Transfer of up to 385,000 green eggs or 308,000 eyed eggs of Unuk River stock Chinook salmon eggs from Deer Mountain or Port Armstrong hatcheries to Port St. Nicholas Hatchery for release of 250,000 smolts into Coffman Cove.
06J-1030	2006	2010	Transfer of up to 250,000 juvenile Unuk River stock Chinook salmon from Port St. Nicholas Hatchery to net pens in Coffman Cove for rearing and release.
08J-1017	2008	2009	Transfer of up to 385,000 green eggs or 308,000 eyed eggs of Unuk River stock Chinook salmon eggs from Whitman Lake Hatchery to Port St. Nicholas Hatchery for release of 250,000 smolts into Coffman Cove.
10J-1021	2010	2015	Transfer of up to 250,000 juvenile Chickamin River stock Chinook salmon from Port St. Nicholas Hatchery to net pens in Coffman Cove for rearing and release.
10J-1025	2010	2020	Transfer up to 250,000 juvenile Unuk River stock Chinook salmon from Port St. Nicholas Hatchery to net pens in Coffman Cove for rearing and release. This is renewal of 06J-1030.
11J-1005	2011	2012	Transfer of up to 400,000 brood year 2010 Andrew Creek stock Chinook salmon fry from Medvejie Hatchery to Port St. Nicholas for rearing. Part of the transferred fry would be released as smolts into Port St. Nicholas Bay and the remainder at Coffman Cove under a separate FTP.
11J-1006	2011	2012	Transfer of up to 60,000 brood year 2010 Andrew Creek stock Chinook salmon fry from Port St. Nicholas Hatchery to Coffman Cove net pens for rearing and release.
12J-1014	2012	2017	Transfer of up to 770,000 Chickamin stock Chinook salmon smolt from Port St. Nicholas Hatchery to net pens in Port St. Nicholas Bay for rearing and release.
12J-1016	2010	2020	Transfer of up to 385,000 green or 308,000 eyed Unuk stock Chinook salmon eggs from Port Armstrong Hatchery to Port St. Nicholas Hatchery for incubation and then transfer to Coffman Cove net pens for rearing and release of up to 250,000 smolts.
12J-1017	2010	2020	Transfer of up to 385,000 green or 308,000 eyed Unuk stock Chinook salmon eggs from Deer Mountain Hatchery to Port St. Nicholas Hatchery for incubation and then transfer to Coffman Cove net pens for rearing and release of up to 250,000 smolts.

Appendix C.–Port St. Nicholas Hatchery Chinook salmon production.

Key: PSN= Port St. Nicholas release site; CC= Coffman Cove release site.

			Release		Return	
Brood Year	Stock	Eggs	PSN	CC	PSN	CC
2005	WLH/Chickamin	281,660[a]	208,882		970	
2006	WLH/Chickamin	312,947	192,132		825	
	PAH/Unuk	308,000		98,421		92
2007	PAH/Unuk	285,017		230,263	168	0
	WLH/Chickamin	312,000	252,175			
2008	WLH/Chickamin	307,039	303,818			
	WLH/Chickamin	259,609		247,436		488
2009	PAH/Unuk	195,130		176,462	677	306
	WLH/Chickamin	260,459	152,628			
2010	WLH/Chickamin	400,000	[b]		465	504
	MCH/AC	421,388[c]	96,737	160,496		
2011	WLH/Chickamin	320,000	3,085[d]		11	
2012	WLH/Chickamin	330,000	246,358	67,808		34
2013	WLH/Chickamin	319,000	174,459	48,796		
2014	WLH/Chickamin	318,620				
2015	WLH/Chickamin	150,000				

Source: Egg numbers from annual hatchery reports. Release and return numbers from 2016 Port St. Nicholas Hatchery annual management plan. Unpublished documents obtained from Sam Rabung, ADF&G PNP coordinator, Juneau.

Note: Returns reflect complete returns for a brood year. Returns from brood years 2011 and later are incomplete.

[a] This is the number of fry transferred from Whitman Lake Hatchery to Port St Nicholas Hatchery.

[b] All alevin died due to water valve shut off.

[c] Fry from Medvejie Creek Hatchery.

[d] Most alevin died due to water valve shut off.