Regional Information Report No. 5J17-01

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

By

Mark Stopha

January 2017

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 BURNETT INLET SALMON HATCHERY FOR CONSISTENCY WITH STATEWIDE POLICIES AND PRESCRIBED MANAGEMENT PRACTICES

by

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2017

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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This document should be cited as
Stopha, M. 2017. An evaluation of the Burnett Inlet salmon hatchery for consistency with statewide policies and prescribed management practices. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J17-01, Anchorage.

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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 Burnett Inlet Salmon Hatchery, located about 25 miles south of Wrangell. The hatchery is operated by the Southern Southeast Regional Aquaculture Association, a private nonprofit corporation. The facility currently rears chum salmon *Oncorhynchus keta* and coho salmon *O. kisutch*.

The original broodstock for chum and coho were from area stocks from systems on Prince of Wales Island and systems near Ketchikan. Juvenile salmon are released from the hatchery and release sites in southern Southeast Alaska. The basic management plan for the hatchery should be updated with a description of current permit conditions and operations.

Key words: Burnett Inlet salmon hatchery, hatchery evaluation, hatchery, chum salmon, coho 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 authority 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 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 at improving survival from the egg stage to the fry or 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 (AS 16.40.210). In addition, *egg takes* or *egg collections* denote eggs that are fertilized with milt from a male from the same stock unless otherwise noted.

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 versus the value of fish at harvest. Although Chinook, sockeye, and coho salmon usually 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).

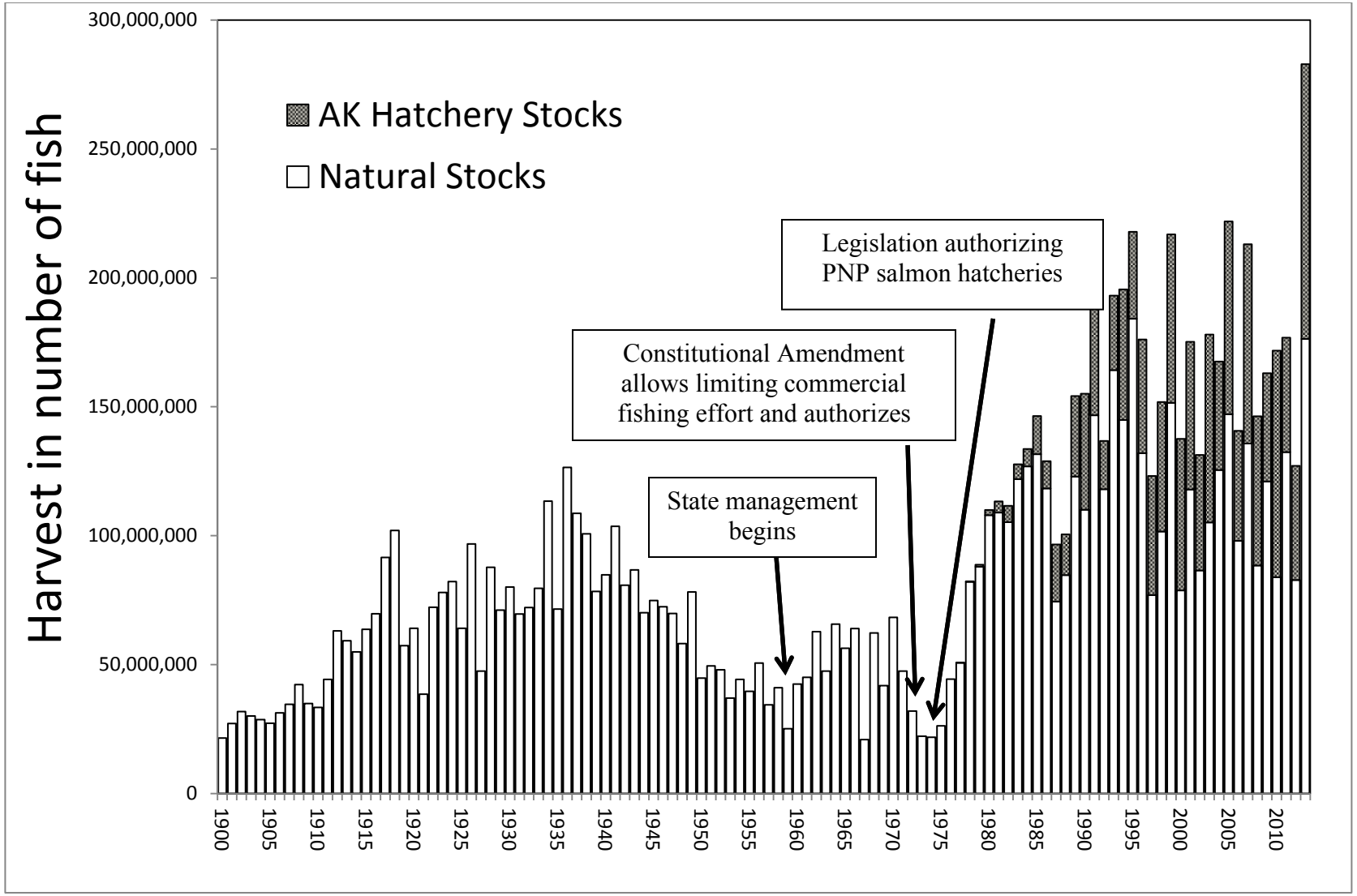

Figure 1.–Commercial salmon harvest in Alaska, 1900–2013.

Source: 1900–1976 from Byerly et al. (1999); 1977–2013 from Vercessi (2015).

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 (Alaska Seafood Marketing Institute 2011). Alaska's diminished influence on world salmon production means that Alaska's harvest volume has little effect on world salmon prices. Prices paid to fishermen have generally increased over the past decade (2004–2013) despite large fluctuations in harvest volume (ADF&G 2014; Stopha 2013a).

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

From 2004 to 2013, hatcheries contributed about a third of the total Alaska salmon harvest, in numbers of fish (White 2005–2011; Vercessi 2012–2014). With world markets currently supporting a trend of increasing prices for salmon, interest in increasing hatchery production by Alaska fishermen, processors, support industries, and coastal communities has increased as well. In 2010, Alaska salmon processors encouraged hatchery operators to expand pink salmon production to meet heightened demand (Industry Working Group 2010).

Alaska's wild salmon populations are sustainably managed by ensuring adequate numbers of adults spawn, and the wild harvest is arguably at its maximum, given fluctuations due to environmental variability and imperfect management precision. Unlike Pacific Northwest systems, such as the Columbia River, where habitat loss, dam construction, and urbanization led to the decline of salmon stocks to the point of endangered species listings, Alaska's salmon

[2] Exvessel value for hatchery harvest is the total harvest value paid by fish buyers to fishermen for all salmon from http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch (accessed 02/04/2012), multiplied by the hatchery percent of the commercial harvest in Farrington 2003, 2004; White 2005–2011; and Vercessi 2013.

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

habitat is largely intact. ADF&G, with the assistance and sacrifice of commercial, sport, personal use, and subsistence users, has been successful in recovery of several populations identified as *stocks of concern* through restricted fishing and intensive spawning assessment projects. Other than regulatory actions, such as reductions of salmon bycatch in other fisheries or changes in fishing methods that would allow more precise management of escapement, hatchery production is the primary opportunity to substantially increase the harvest.

Alaska's salmon fisheries are among the healthiest in the world. The 2013 season was a record harvest overall, with the 283 million fish commercial harvest comprised of the second highest catch for wild stocks (176 million 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 the rise in price of Alaska salmon was a message of the state's sustainable fisheries management to a growing audience of discriminating buyers. The Alaska Seafood Marketing Institute applied to the Marine Stewardship Council (MSC) for certification as a sustainably managed fishery. In 2000, the MSC certified the salmon fisheries managed by ADF&G as sustainably managed, and the state's salmon fisheries remained the only MSC-certified salmon fishery in the world for nearly a decade. Salmon fisheries elsewhere (Annette Islands Indian Reserve salmon; British Columbia pink and sockeye salmon; and Iturup Island, Russia, pink and chum salmon) were later certified for much smaller geographic areas, and in some cases, only for specific salmon species (MSC 2012). Alaska's certification was MSC's broadest and most complex, covering all 5 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 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 for increased hatchery production and 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, 2014a, 2014b, 2014c, 2015a, 2015b, 2015c, 2015d, 2015e, 2015f, 2016b, 2016c, 2016d) completed hatchery reviews for Trail Lakes, Port Graham, Eklutna, Solomon Gulch, Gulkana, Main Bay, Cannery Creek, Wally Noerenberg and Armin F. Koernig hatcheries in Prince William Sound, and the Macaulay, Sheep Creek, Snettisham, Sawmill Creek, Haines

Projects, Sheldon Jackson, Port Armstrong, Medvejie Creek, Hidden Falls, Whitman Lake, Port Saint Nicholas, and Klawock River hatcheries in Southeast Alaska. This report is for the Burnett Inlet Hatchery located on Etolin Island southwest of Wrangell, Alaska.

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 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 (Davis et al. 1985) 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, Davis et al. (1985) 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 (Davis et al. 1985), 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 interaction with, or impact on, significant or unique stock will occur, and which are not for the purposes of development, 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 Davis et al. (1985), 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

Guided by AS 16.05.092, The FRED Division built and operated several hatcheries across the state in the 1970s and gradually transferred operations of most facilities to PNP corporations. Regional aquaculture associations (RAAs), whose membership is comprised of the commercial salmon fishing permit holders 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 40.110–230). 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, 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 the following considerations: (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 makes the best use of the site's potential to benefit the common property fishery; (3) the harvest area size at the hatchery is sufficient in size to provide a segregated harvest of hatchery fish of acceptable quality for sale; (4) proposed donor sources can meet broodstock needs for the hatchery for the first cycle; (5) water sources for the hatchery are secured by permit and are of appropriate quality and quantity; and (6) the hatchery has a reasonable level of feasibility and 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 staff hold public meetings to define desired production goals by species, area, and time, and document these goals in comprehensive salmon plans (AS 16.10.375, 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 statute (AS 16.10.400–480) and regulation (5 AAC 40.110–990, 5 AAC 41.005–100): hatchery permit with basic management plan (BMP), annual management plan (AMP), fish transport permit (FTP), and annual report (Figure 2).

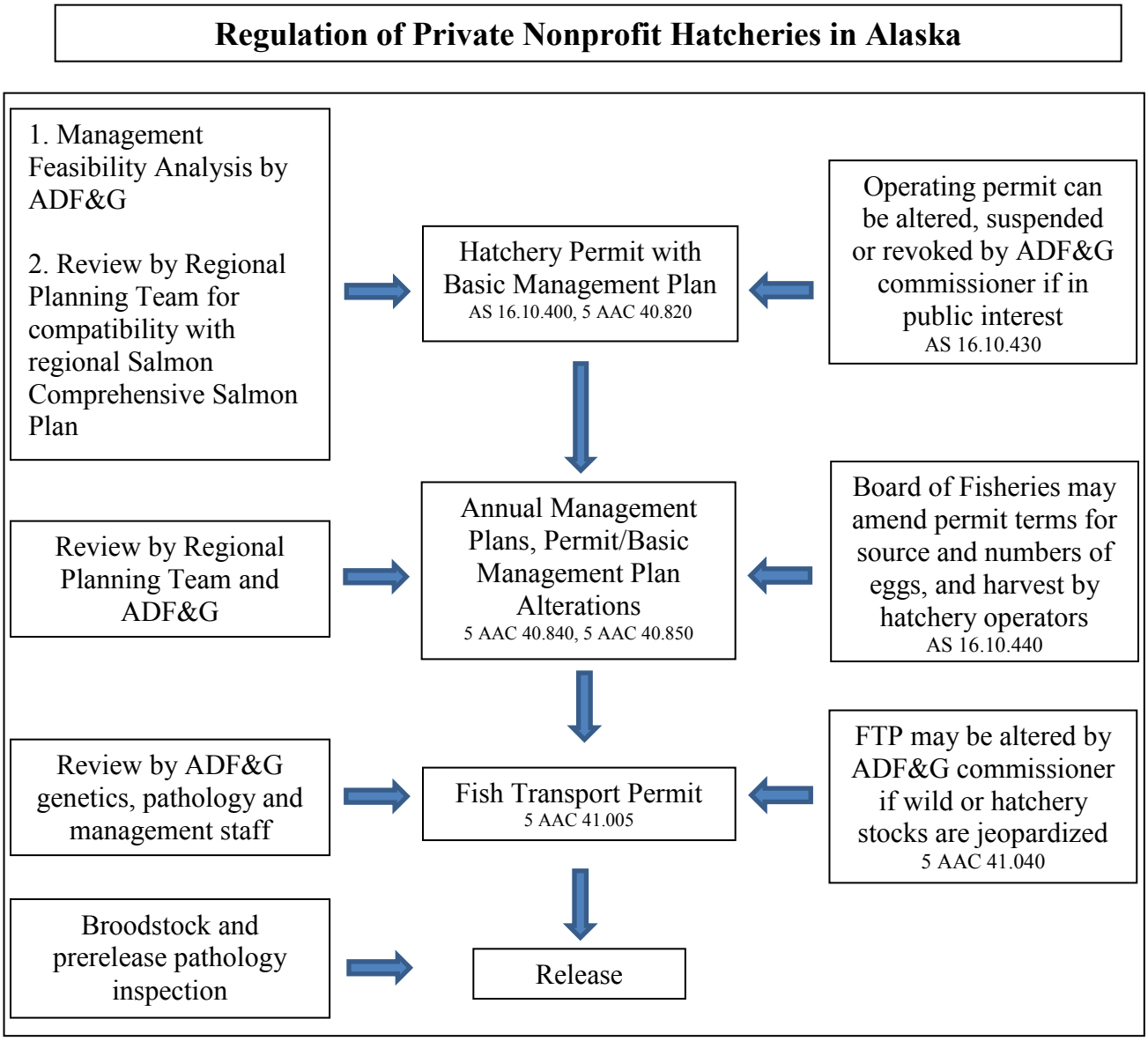

Figure 2.–Diagram of Alaska hatchery permitting process.

The hatchery permit authorizes operation of the hatchery, specifies the maximum number of eggs of each species that a facility can incubate, specifies the authorized release locations, and may

identify stocks allowed for broodstock. The BMP is an addendum to the hatchery permit and outlines the general operations of the hatchery. The BMP may describe the facility design, operational protocols, hatchery practices, broodstock development schedule, donor stocks, harvest management, release sites, and consideration of wild stock management. The BMP functions as part of the hatchery permit and the 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/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.

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. All references in this document referring to the ADF&G commissioner include the commissioner's delegates.

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 to the Alaska Legislature (e.g., Vercessi 2014).

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.

BURNETT INLET HATCHERY OVERVIEW

Burnett Inlet Hatchery is located on Etolin Island in Clarence Strait (Figure 3). The Southern Southeast Regional Aquaculture Association (SSRAA), a regional aquaculture association, operates Burnett Inlet Hatchery. The site was originally established by Alaska Aquaculture Incorporated in 1976, who operated the facility from 1978 to 1996, and produced pink, chum, coho and Chinook salmon during that period. SSRAA acquired the site in 1997. Burnett Lake is the water source for the hatchery. SSRAA holds a permit for water appropriation from the lake from the Alaska Department of Natural Resources.

SSRAA applied for a permit for the Burnett Inlet Hatchery in 1997. The preliminary application requested a hatchery capacity of 10 million sockeye and 2.5 million coho salmon eggs. At the time, SSRAA was producing sockeye salmon at Beaver Falls Hatchery, and intended to move sockeye production to Burnett Inlet Hatchery because of uncertain land leasing options with the landowner at Beaver Falls Hatchery. The sockeye salmon program used broodstock from returns to Salmon Lake, Hugh Smith Lake, and McDonald Lake.

No onsite sockeye salmon broodstock program was proposed at Burnett Inlet Hatchery. Broodstock would be collected each year from the 3 stocks listed above, eggs incubated and the fry reared short term in the hatchery, and then fry or presmolt would be planted in their system of origin.

SSRAA also intended to move the summer run coho salmon program at Whitman Lake Hatchery to Burnett Inlet Hatchery. The summer run coho salmon program used Reflection Lake stock broodstock from Whitman Lake Hatchery, Deer Mountain Hatchery, or Ward Lake. A summer run coho salmon broodstock program was proposed for Burnett Inlet Hatchery. Summer run coho salmon fry would also be released into Neck Lake on Prince of Wales Island (Figure 3).

A public hearing was held on July 1, 1997, in Wrangell. Only one person was listed on the attendance form for the hearing, and no testimony was found in the files. No hatchery management feasibility analyses or staff comments were found in the files.

ADF&G PNP Salmon Hatchery permit number 40 was issued to SSRAA for Burnett Inlet Hatchery in 1997. Permitted capacity was 2.7 million sockeye salmon and 2.5 million coho salmon eggs.

SSRAA's sockeye salmon program would move from Beaver Falls Hatchery to Burnett Inlet Hatchery. Sockeye salmon stock sources approved in the BMP included McDonald Lake, Hugh Smith Lake, and Salmon Lake. Sockeye salmon production goals in the BMP consisted of 1.5 million Hugh Smith Lake stock eggs and 1.2 million Salmon Lake stock eggs. McDonald Lake had no production goal. The BMP stated that sockeye fry plants would be secured from a wild stock system and returned to that system only, or to other watersheds as authorized by an FTP. Badger and Bakewell Lakes (Figure 3) were also listed as release sites for Hugh Smith Lake Fry. The 2 lakes are connected by a 3.5-mile stream. Bakewell Lake had a fish ladder constructed in the mid-1960s that allowed salmon to reach the barriered system.

The coho salmon program consisted of production of up to 2.5 million eggs. Up to 250,000 coho salmon smolt could be released from the hatchery site to establish a broodstock source. Remaining production was expected to produce about 1.8 million fry for release into Neck Lake. The initial egg sources would be from returns to Whitman Lake Hatchery (with Deer Mountain

Hatchery or Ward Lake serving as backup sources) until returns to Burnett Inlet Hatchery were sufficient to meet production needs.

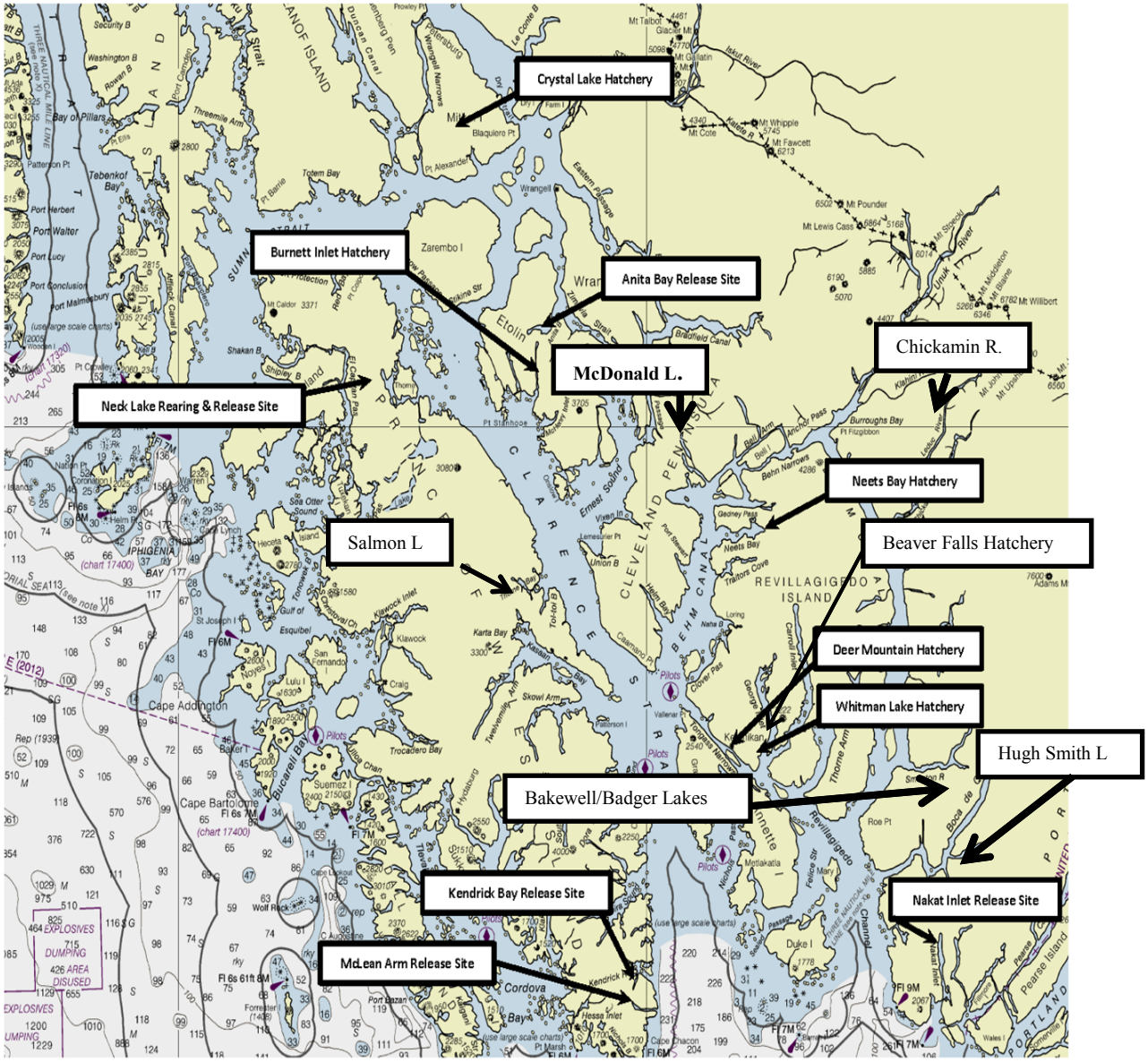

Figure 3.–Burnett Inlet Hatchery, release sites, and wild stock donor systems.

SSRAA programs are exceptionally integrated among the Whitman Lake, Neets Bay, Burnett Inlet, and Crystal Lake hatcheries.[4] Chum salmon returns to Neets Bay Hatchery[5] and coho and Chinook salmon returns to Whitman Lake Hatchery serve as broodstock for multiple SSRAA programs. Burnett Inlet incubates eggs collected from Whitman Lake and Neets Bay hatcheries for release from the hatchery and at other release sites.

[4] SSRAA owns Whitman Lake, Neets Bay and Burnett Inlet hatcheries. Crystal Lake Hatchery is owned by the state and operated by SSRAA.

[5] Burnett Inlet Hatchery will also provide broodstock in the near future as is discussed in this document.

In 2015, returns to SSRAA facilities, including harvest and broodstock, totaled about 3.1 million chum, 154,000 coho, 250,000 pink and 58,000 Chinook salmon (Stopha 2016a). Release and return information for SSRAA programs are available from the most current SSRAA annual management plan[6] and the most current Alaska Salmon Fisheries Enhancement Program annual report (e.g., Stopha 2016a).

This report is sectioned by species and release site. Hatchery permit/BMP, AMP, and FTP documents for Burnett Inlet 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.

FTPs for all egg takes and transfers are in place and current. Occurrences where permitting was not consistent in the past are discussed under the permitting history for each species and release site.

PERMITTED CAPACITY HISTORY SUMMARY

The Burnett Inlet Hatchery permit was issued with a permitted capacity of 2.7 million sockeye salmon eggs and 2.5 million coho salmon eggs. The first change in permitted capacity occurred in 2010, when a PAR was approved to add a 25 million summer chum salmon egg capacity to the hatchery permit for release at Anita Bay. The purpose of the permit alteration was to move some of SSRAA's summer chum salmon egg incubation from Neets Bay Hatchery to Burnett Inlet Hatchery.

The next change in hatchery capacity occurred in 2013, when a PAR was approved adding 6 million fall chum salmon egg capacity to the Burnett Inlet Hatchery permit. The permit alteration was to move the broodstock source for SSRAA's fall chum salmon programs from Neets Bay Hatchery to Burnett Inlet Hatchery. The permit alteration increased the permitted capacity for chum salmon at Burnett Inlet Hatchery to 25 million summer chum salmon eggs and 6 million fall chum salmon eggs.

Also in 2013, a PAR was approved to add production of 2.0 million fall run coho salmon eggs. SSRAA requested the increase to shift fall run coho salmon incubation from Whitman Lake Hatchery to Burnett Inlet Hatchery for release at Neets Bay. This increased permitted capacity of coho salmon from 2.5 million to 4.5 million eggs.

In 2015, a PAR was approved to increase summer chum salmon capacity by 6 million eggs. The increased production was to establish a broodstock source of summer chum salmon eggs at Burnett Inlet as a backup source for SSRAA projects. This brought the permitted chum salmon capacity at the hatchery to 31 million summer chum salmon eggs and 6 million fall chum salmon eggs.

Two PARs were approved in 2016. The first permit alteration increased summer chum salmon egg capacity by 19 million eggs, from 31 million eggs to 50 million eggs, to create a new broodstock and cost-recovery harvest location for summer chum salmon at Burnett Inlet. The

[6] 2014 Annual Management Plan, Southern Southeast Regional Aquaculture Association. Unpublished document obtained from Lorraine Vercessi, ADF&G PNP Coordinator, Juneau.

second permit alteration increased summer chum salmon capacity by 10 million eggs, from 50 million to 60 million eggs, to increase releases at Kendrick Bay.

The current permitted capacity at Burnett Inlet is now 2.7 million sockeye salmon eggs, 2.5 million summer coho salmon eggs, 2.0 million fall coho salmon eggs, 60 million summer chum salmon eggs and 6 million fall chum salmon eggs.

Although sockeye salmon capacity remains on the hatchery permit, the ADF&G fish pathologist has prohibited production of sockeye salmon at the hatchery while chum salmon are being produced there due to disease transmission concerns.

The permitting for each species and release site is reviewed below.

SOCKEYE SALMON PROGRAM

Donor Stocks

Sockeye salmon eggs were collected from wild stock donors. Fertilized eggs from Hugh Smith Lake and McDonald Lake (Figure 3) were incubated in the hatchery and the fry planted back to the system of origin.

In addition, McDonald Lake stock fry were released into Neck Creek (Figure 3) and from the hatchery to establish a hatchery broodstock.

The sockeye program at Burnett Hatchery ended in 2011 when it was replaced by a chum salmon program.

McDonald Lake Stock Releases

Neck Creek Release Site

In 1999, SSRAA submitted a PAR to begin a sockeye salmon smolt release at Neck Creek on Prince of Wales Island (Figure 3). Up to 500,000 eggs would be collected from McDonald Lake stock sockeye salmon, incubated at Burnett Inlet Hatchery and reared to the smolt stage, then transferred to a raceway below the impassable falls of Neck Creek for imprinting and release. Neck Lake had a resident kokanee population which was not found to have detectable levels of infectious hematopoietic necrosis virus (IHNV). No ADF&G staff comments were found in the files. The PAR was approved in 1999 (Appendix A). The permit alteration did not increase hatchery permitted capacity.

On the FTP for the project (FTP 99J-1030), the ADF&G geneticist recommended looking for strays in the adjacent system (108 creek), and if straying was evident there, to survey other nearby sockeye systems. Findings were to be reported to the ADF&G regional resource development biologist.

Smolt were released from the Neck Creek site from 2001 (brood year 1999) through 2006 (brood year 2004; FTP 99J-1030 and FTP 2002J-1011, Appendix C; Appendix B). Returns ranged from 13 adults in 2002 to almost 7,000 adults in 2000. The program was discontinued due to poor smolt to adult survival.[7]

[7] Bill Gass, SSRAA production manager, personal communication.

FTPs for egg takes and releases were in place for all egg takes and transports for the Neck Lake release site. The reported egg and release numbers were within permitted levels for nearly all years. The FTP, AMP, and hatchery permitted levels were also in agreement (Appendix C).

Burnett Inlet Release Site

In 2002, ADF&G requested that SSRAA discontinue taking eggs from McDonald Lake broodstock after 2006. At the time, SSRAA had 400,000 fry rearing at Burnett Inlet bound for Neck Creek for release. SSRAA submitted a PAR to use 40,000 of these fry for release from the hatchery to establish a broodstock return.

The ADF&G geneticist recommended in the FTP for the project (FTP 02J-1018) that the 40,000 fry taken for release from the hatchery should be sampled from throughout the entire lot of McDonald Lake stock sockeye salmon fry in the hatchery. He recommended that when eggs were collected from McDonald Lake broodstock in subsequent years, that the eggs be collected from spawners across the run, that spawning pairs be randomized to ensure genetic viability, and that eggs and milt be paired from like spawner types (e.g., inlet vs outlet spawners).

In 2003, SSRAA submitted a PAR to increase the annual releases from Burnett Inlet from 40,000 smolts to 1 million smolts and at Neck Creek from 500,000 smolts to 1 million smolts. The increase was requested to diversify SSRAA's production. The PAR would not increase the permitted capacity. Egg-take goals for the releases were to be met using Neck Creek returns until enough adults returned to the hatchery for broodstock.

At the RPT meeting, the SSRAA representative indicated that SSRAA wanted to increase production to 500,000 smolts at Burnett Hatchery since this was the capacity of the hatchery infrastructure at the time. Moving up to the full production of 1 million smolts from both the hatchery and Neck Lake would occur after capital improvements were made. ADF&G managers recommended a 250,000 smolt release from the hatchery and no increase from Neck Lake in order to assess impacts to fishery management. SSRAA agreed to the recommendation in part, but asked that in the future, the 750,000 juvenile total releases (500,000 smolt at Neck Creek and 250,000 smolt at Burnett Inlet Hatchery) could be split between the 2 sites in the manner that best worked for SSRAA in a given year. The release levels would be approved by ADF&G in the AMP. The commissioner approved the plan allowing for a 750,000 smolt release between the 2 sites. The permit alteration did not increase permitted capacity. There were no staff concerns to the project FTPs (FTP 04J-1005, FTP 04J-1006, FTP 04J-1007).

The last sockeye salmon releases from Burnett Inlet occurred when brood year 2008 fry were released in 2010. The program was discontinued because of poor adult returns.

FTPs for egg takes and releases were in place for all egg takes and transports for the Burnett Inlet release site. The reported egg and release numbers were within permitted levels for nearly all years. The FTP, AMP, and hatchery permitted levels were also in agreement (Appendix C).

McDonald Lake Release Site

In 2007, SSRAA submitted a PAR to take 450,000 sockeye salmon eggs from McDonald Lake broodstock, rear the offspring to fry or presmolt stage at the hatchery, and release resulting progeny from net pens into McDonald Lake from 2007 to 2009. The 450,000 eggs were in addition to the hatchery capacity of 2.7 million sockeye salmon eggs. The permit alteration

would expire December 31, 2011. SSRAA proposed the project at the behest of fishermen on the U.S. Northern Panel of the Pacific Salmon Treaty and the SSRAA Board of Directors.[8]

At the time, the McDonald Lake sockeye salmon stock was not meeting escapement goals, and ADF&G was curtailing fisheries in order to meet escapement. Curtailing of fisheries resulted in lost opportunity for fishermen to harvest other stocks. This project was intended to help identify and understand the migration paths of the McDonald Lake stock so that closures could be targeted to these areas. The project was also intended to supplement the spawning population and harvest of the stock.

The ADF&G members of the RPT voted against the PAR and the RAA members voted for the PAR. ADF&G staff argued that genetic stock identification could be used to assess migration corridors, that similar projects elsewhere had provided inconclusive results, and that the escapement goal could be altered to allow more fishing time if approved by the Board of Fisheries. Those in favor of the project argued that the economic losses from forgone harvest in mixed stock fisheries justified the project for the increased production, and they saw little downside regarding impacts to the McDonald Lake sockeye salmon stock. There was also concern that genetic stock identification would not occur in the near term or that results would be inconclusive.[9]

The commissioner approved the PAR, indicating that there were valid opinions on both sides, but that ADF&G staff arguments against the project were not persuasive.[10] The permit alteration allowed the collection of an additional 450,000 eggs from 2007 to 2009.

When the FTPs for the project (FTP 07J-1041, FTP 07J-1042) were reviewed, the ADF&G geneticist cautioned that gene frequencies can be modified by broodstock selection, mixing gene pools during fertilization, reducing the effective population size of the wild populations, and differential selection during incubation and rearing in artificial conditions. He recommended that gametes be taken throughout the run and a sliding egg-take scale be used for broodstock collection to reduce the effect on population size of the wild spawning population.

In 2009, McDonald Lake stock was listed as a *stock of management concern* by ADF&G because escapements were below goal for several years. ADF&G developed an action plan to rebuild the run, including management actions to reduce harvests of McDonald Lake sockeye salmon in southern Southeast Alaska commercial net fisheries (Bergmann et al. 2009). Following 3 years of improved escapements, the *stock of concern* designation was removed in 2012.

Smolts were released from 2009 to 2011. Thermally marked fish were recovered in the fisheries from 2011 to 2014. The marked fish recovered corroborated results from separate genetic stock identification and coded wire tag studies. The migratory timing results indicated that shifting the fisheries management action plan later by one week for the McDonald Lake stock could improve its effectiveness (Brunette et al. 2015).

FTPs for egg takes and releases were in place for all egg takes and transports for McDonald Lake stock sockeye salmon projects. The reported egg and release numbers were within permitted

[8] PAR application submitted by SSRAA dated 2/2/2007.

[9] Troy Thynes, ADF&G, personal communication.

[10] Supporting documentation for the 2007 PAR including RPT summary and letter from the ADF&G commissioner. Unpublished documents obtained from Sam Rabung, ADF&G Aquaculture Section Chief.

levels for nearly all years. The FTP, AMP, and hatchery permitted levels were also in agreement (Appendix C).

Hugh Smith Lake Stock Releases

The Hugh Smith Lake stocking program consisted of collecting eggs from broodstock at the lake, incubating and hatching eggs at Burnett Inlet Hatchery, and releasing fry back into the lake. According to the 1998 AMP, release levels of Hugh Smith fry were based on natural escapement and fry levels as determined by ADF&G staff.

In 1999, SSRAA carried out a study at Hugh Smith Lake to determine the feasibility of rearing and feeding fry to the presmolt stage in net pens for release into the lake, instead of releasing fed or unfed fry directly into the lake from the hatchery (fish resource permits P-99-052 and P-99-053). The study allowed up to 250,000 brood year 1998 fry to be pen-reared in 2 separate pens, with different times of release from each pen. Pen rearing in Hugh Smith Lake was expected to result in better survival to the smolt stage, and possibly higher marine survival.[11]

Based on the results of the 1999 study, SSRAA submitted a PAR in 2000 to increase and continue to rear fry in net pens in Hugh Smith Lake. SSRAA's PAR was approved for 3 years only, on the recommendation of the ADF&G fish pathologist, so that the project could be reviewed for any issues with IHNV.

Up to 500,000 sockeye salmon fry hatched from eggs collected from Hugh Smith Lake broodstock could be reared at Burnett Inlet Hatchery and released from net pens at Hugh Smith Lake, with further releases after 3 years based on results of fish disease considerations. The permit alteration did not change the permitted capacity at the hatchery. The fish were reared at the outlet of the lake to be as far from the spawning grounds as possible. The fish were released as presmolt in midsummer and expected to smolt in the year following their release and go to sea.[12]

The FTP for the project (FTP 00J-1006) permitted a transfer and release of 400,000 fry. The ADF&G fish pathologist noted the inherent risk of IHNV when sockeye salmon are reared in a water supply containing other sockeye salmon, and recommended a limit of 3 years for the FTP so that the program could be reviewed. The FTP was issued for 3 years (2000–2002), and fry were released for the project from 2000 to 2003. No FTP was found permitting the 2003 release, which was approved in SSRAA's 2003 AMP.

In 2003, the Alaska Board of Fisheries classified Hugh Smith Lake sockeye salmon as a *stock of management concern* and adopted an action plan to rebuild the run. The plan included fisheries restrictions when escapements were projected to be below the lower end of the escapement goal range. The restrictions could occur in the purse seine and gillnet fisheries that occurred near the entrance to Boca de Quadra, where the Hugh Smith Lake outlet is located. The action plan also included continued assessment of freshwater limnology, spawning escapement, and smolt emigration.

Escapements to Hugh Smith Lake were met in every year from 2003 to 2015 except for 2 years (2008 and 2013). The *stock of concern* status was removed in 2006. Freshwater limnology and

[11] Memorandum from C. Denton, ADF&G, to F. Rue, ADF&G, dated December 18, 1998. Recommendations from Southeast Regional Planning Teams.

[12] Steve Heinl, ADF&G fishery biologist, Ketchikan, personal communication.

smolt studies indicate that the freshwater environment was not a limiting factor in production. The most important factor in meeting escapement goals appears to be the changing fishing harvest patterns near Hugh Smith Lake, where purse seine and gillnet effort declined by over 50% from 1980 to 2006 (Heinl et al. 2007). Sampling of the marked hatchery returns from 2003 to 2007 indicated that the management measures in the action plan were appropriately timed and located to reduce harvest on Hugh Smith Lake stock sockeye salmon, although the hatchery releases appeared to have a later run timing that their wild cohorts (Brunette and Piston 2015).

The 2000–2003 stockings to Hugh Smith Lake significantly contributed to the harvest and escapement during the years of returns monitored, and provided the means to sample the commercial catch to define areas where commercial harvest restrictions would be effective in passing Hugh Smith Lake fish to meet escapement goals. The hatchery fish returning to Hugh Smith Lake appeared to have been largely unsuccessful in spawning, however (Piston et al. 2007).

The reported egg collections (FTP 98J-1002) were within permitted levels for all years. Releases under FTP 00J-1006 exceeded the limit set in the FTP for brood years 2000–2002 (Appendix D).

CHUM SALMON PROGRAM

Burnett Inlet Hatchery serves as an incubation facility for SSRAA release sites in southern Southeast Alaska. The hatchery itself also serves as a release site and broodstock source. The primary source of chum salmon broodstock for SSRAA's chum salmon programs is returns to Neets Bay Hatchery. Burnett Inlet Hatchery incubates eggs collected from Neets Bay Hatchery returns for release at other sites. Burnett Inlet Hatchery also recently began releasing summer and fall chum salmon fry from the hatchery to serve as another broodstock source for SSRAA chum salmon programs, and as planned will eventually provide eggs for offsite releases from returns to the hatchery.

Donor Stocks

The summer run chum salmon donor stock was from Carroll River (Figure 3). SSRAA collected summer chum salmon eggs from Carroll Creek from 1979 through 1982 for incubation at Whitman Lake Hatchery and release at Nakat Inlet. Nakat Inlet returns were used for broodstock beginning in 1982, along with a final year of Carroll River egg collections. Brood year 1982 fry were released at Nakat Inlet and in Neets Bay. Beginning in 1985, returns to Neets Bay were used for broodstock for SSRAA's summer run chum salmon programs for release at a number of release sites. In 2015, a summer run chum salmon broodstock program was approved at Burnett Inlet Hatchery as well.

The fall run stock was primarily from 2 systems in Cholmondeley Sound: Disappearance Creek and Lagoon Creek. The stock is collectively referred to as Cholmondeley Sound stock or Disappearance Creek stock (Figure 3).[13] Cholmondeley Sound stock eggs were collected from

[13] Initial donor sources approved with the hatchery permit were both fall run stocks: Disappearance Creek for release at Neets Bay and Walker Creek for release at Nakat Inlet. Chum salmon donor stock sources were added to the permit through permit alteration request (PAR) as SSRAA searched for systems that had a large enough return to allow for surplus broodstock to be taken to establish a hatchery stock (Letter from R. Skoog, ADF&G commissioner, to J. Milnes, SSRAA, April 21, 1978. Unpublished document obtained from Lorraine Vercessi, ADF&G PNP Coordinator, Juneau). In 1978, seine fleet skippers expressed concerned about the potential impact to their harvest of fall chum salmon caused by use of Disappearance Creek as a donor stock. As a result, a PAR was approved in 1978 adding fall run donor stocks added including Hetta Portage Stream for release at Kendrick Bay and 3 Walker Cove streams for release at Nakat Inlet or Neets Bay. No chum salmon eggs were

1979 to 1983, incubated at Whitman Lake, and released at Neets Bay. Beginning in 1983, Neets Bay returns were used as the broodstock for SSRAA's fall run chum salmon programs for release at a number of release sites. In 2013, a fall run chum salmon broodstock program was approved at Burnett Inlet Hatchery as well.

Anita Bay summer run chum salmon

In 2010, SSRAA submitted a PAR to add a 25 million summer chum salmon egg capacity to the Burnett Inlet Hatchery permit in order to move the incubation of eyed eggs for release at Anita Bay from Neets Bay Hatchery to Burnett Inlet Hatchery (FTP 10J-1028). By moving the egg incubation to Burnett Inlet, the Neets Bay Hatchery could use the vacated space to produce chum salmon for increased releases at Neets Bay and Kendrick Bay needed to address allocation imbalance among commercial fishing gears.

ADF&G staff at the regular spring 2010 RPT meeting recommended that all PARs for increased chum salmon production not be approved until more information was available from an ongoing straying study of hatchery fish in escapement index streams. The RPT voted to table the PAR because industry had not had time to review staff comments on the proposal. A second special spring meeting was held a few weeks later to discuss the Burnett Inlet Hatchery PAR. The RPT recommended approval of the PAR by a vote of 5-1, with the opposition vote citing the need for more time to evaluate management concerns and a commitment of money for long-term assessment of straying. The ADF&G commissioner approved the PAR.

FTPs for egg takes and releases were in place for all egg takes and transports for Anita Bay releases permitted through Burnett Inlet Hatchery. The reported egg and release numbers were within permitted levels for nearly all years. The FTP, AMP and hatchery permitted levels were also in agreement (Appendix E).

Burnett Inlet fall run chum salmon

In 2013, SSRAA submitted a PAR to add 6 million fall chum salmon egg capacity at Burnett Inlet. The PAR was to move the broodstock source for SSRAA's fall chum salmon programs from Neets Bay Hatchery to Burnett Inlet Hatchery. Neets Bay Hatchery had high holding mortality of broodstock and intermixing of fall chum and coho returns, which made separating broodstock difficult. Moving the broodstock program to Burnett Inlet Hatchery would address these problems, and provide additional fish for the common property fishery at Neets Bay. Fall chum salmon would continue to be released from Neets Bay and serve as a backup to returns to Burnett Inlet Hatchery.

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collected in 1978 due to poor escapements in the donor systems. A permit amendment in 1979 allowed the taking of up to 23 million chum salmon eggs in 1979 from either summer or fall run stocks (Appendix A). The permitted capacity of the hatchery remained at 26 million chum salmon eggs. The primary sources for summer run donor broodstock were the Keta and Carroll Creeks, with King Creek serving as a secondary source. Summer run chum salmon egg takes after 1979 would be restricted to the donor sources used in 1979. The primary source for fall run donor brood stock was the Karta River, with Disappearance Creek serving as a secondary source. The ADF&G commissioner encouraged SSRAA to consider using Disappearance Creek stock, despite SSRAA's reluctance due to the concerns of purse seiners mentioned earlier. Disappearance Creek had a weir in place, and the stock had a later run timing that the other approved donor stocks. ADF&G had a long track record of escapement and management data for the stock, and could manage the return as a single stock fishery such that the fishery could be closed by emergency order to increase escapement to the river for brood stock for the hatchery.

The ADF&G fish pathologist approved the program—contingent upon the permanent discontinuation of sockeye salmon culture at Burnett Inlet Hatchery due to IHNV transmission between the 2 species. He also required adequate separation of chum salmon and coho salmon at Burnett Inlet Hatchery to reduce the risk of coho salmon passing bacterial kidney disease to chum salmon. The ADF&G genetic staff had no concerns with the release.

The RPT recommended approval of the PAR by a vote of 5-1. The dissenting vote was concerned for increased production until some results from straying and fitness studies underway came back. In addition, the member was concerned about what unknown effects a new terminal fishery could have on nearby wild stocks. The ADF&G commissioner approved the PAR.

Neets Bay returns will be used for broodstock, with eyed eggs (FTPs 13J-1006) or fry (FTP 14J-1003) transferred to Burnett Inlet for release until sufficient returns to Burnett Inlet Hatchery provide broodstock needs.

FTPs for egg takes and releases were in place for all egg takes and transports for Burnett Inlet Hatchery fall run chum salmon releases. The reported egg and release numbers were within permitted levels for all years. The FTP, AMP and hatchery permitted levels were also in agreement (Appendix F).

Burnett Inlet summer run chum salmon

In 2015, SSRAA submitted a PAR for a summer chum salmon broodstock release from Burnett Inlet. The additional 6 million egg production was requested to provide a backup brood source of summer chum salmon to the returns at Neets Bay Hatchery. When Prince of Wales Island Hatchery Association received a permit alteration to release summer chum salmon fry at Port Asumcion using Carroll Inlet stock from Neets Bay Hatchery, SSRAA felt that Neets Bay Hatchery returns were at their limit for reliably providing the full production needs for SSRAA's programs and the new Prince of Wales Island Hatchery Association program. SSRAA requested another broodstock release at Burnett Inlet Hatchery as an additional brood source.

The ADF&G fish pathologist approved the program contingent upon the permanent discontinuation of sockeye salmon culture at Burnett Inlet Hatchery due to IHNV transmission between the 2 species. He also required adequate separation of chum salmon and coho salmon at Burnett Inlet Hatchery to reduce the risk of coho salmon passing bacterial kidney disease to chum salmon. The ADF&G genetic staff had no genetic concerns with the release.

The RPT unanimously recommended approval of the PAR, and the ADF&G commissioner approved the PAR. Neets Bay returns will be used for broodst

ock (FTP 15J-1002) until sufficient returns to Burnett Inlet provide the necessary broodstock.

COHO SALMON PROGRAM

Donor Stocks

Fall run coho salmon gametes were collected from broodstock in Indian Creek, a tributary of the Chickamin River (Figure 3) in 1978, 1979, and 1980. All eggs were incubated at Whitman Lake Hatchery. The offspring were released from Whitman Lake Hatchery and Neets Bay. Beginning in 1981, broodstock from returns to Whitman Lake Hatchery were used for egg takes.

Summer run coho salmon were originally from Reflection Lake (Figure 3), and produced at Deer Mountain Hatchery and Whitman Lake Hatchery.

Burnett Inlet Hatchery release site summer coho salmon

In 1999, a summer run coho salmon broodstock program was moved from Whitman Lake Hatchery to Burnett Inlet Hatchery. The summer run coho salmon project was authorized under the Burnett Inlet Hatchery PNP hatchery permit and BMP issued in 1997. The program would begin a broodstock program at Burnett Inlet Hatchery and supply releases at Neck Lake.

The ADF&G regional resource biologist commented in the FTP application (FTP 97J-1028) that a coho stock from 108 Creek near (Neck Lake) had been released by the previous operator at Burnett Inlet Hatchery from 1986 to 1992. She also noted that near Burnett Inlet, there was a small (<100 fish) run of coho salmon in Navy Creek about 3.5 miles from the hatchery, as well as 2 very short (<0.73 mi) streams at the head of Burnett Inlet that were catalogued for coho and pink salmon but for which there was no recorded stream survey data. The ADF&G geneticist had no concerns for the release.[14]

Summer coho salmon were released from Burnett Inlet Hatchery from 1998 to 2015 (FTP 97J-1028, FTP 00J-1001, FTP 00J-1002). In 2015, a PAR was approved to return the summer run coho salmon broodstock program from Burnett Inlet Hatchery to Whitman Lake Hatchery. SSRAA was establishing a summer run chum salmon broodstock program at Burnett Inlet Hatchery. The summer run chum salmon return would overlap with the summer run coho salmon, and it was not feasible to separate and hold the 2 species for broodstock.

The reported egg and release numbers were within permitted levels for all years. The FTP, AMP, and hatchery permitted levels were also in agreement (Appendix G).

Neck Lake release site summer coho salmon

Summer run coho salmon (Reflection Lake ancestral stock) coho salmon are released from net pens in Neck Lake on Prince of Wales Island. Fry are transported to the lake from one of the SSRAA hatcheries.

The Neck Lake program began using Whitman Lake Hatchery as the incubation and rearing site. Brood year 1995 eggs were collected from Reflection Lake stock returns to Ward Lake and Deer Mountain Hatchery. In 1996, the Deer Mountain Hatchery annual report indicates only that "Reflection Lake" stock coho salmon were used for broodstock, and it was not specified if the eggs were collected from Deer Mountain Hatchery, Ward Lake, or Reflection Lake broodstock, or a combination of these sites. Brood year 1997 eggs were collected from Reflection Lake stock returns to Deer Mountain Hatchery. In 1998, brood stock from returns of summer run coho salmon to both Whitman Lake Hatchery and Deer Mountain Hatchery were used. Eggs during these years were incubated and reared to presmolts at Whitman Lake Hatchery, then transferred to net pens in Neck Lake for rearing and release (FTP 94J-1042).

The Neck Lake summer run coho salmon project was authorized under the Burnett Inlet Hatchery PNP hatchery permit and BMP issued in 1997. In 1999, a portion of brood year 1998 summer run coho salmon eyed eggs were transferred from Whitman Lake Hatchery to Burnett Inlet Hatchery, where they were incubated, reared, and transferred as fry to Neck Lake net pens (FTP-98J-1005). The remainder of brood year 1998 summer run coho salmon were incubated and reared to fry at Whitman Lake Hatchery, then transferred to Neck Lake net pens (98J-1006).

[14] Comments by biologist Carol Denton and geneticist J. Seeb, both ADF&G, on the FTP 97J-1028. Unpublished document obtained from Sam Rabung, ADF&G Aquaculture Section Chief, Juneau.

For brood years 1999 and 2000, coho salmon returns to Burnett Inlet and eyed eggs received from Whitman Lake Hatchery provided for releases at Neck Lake and Burnett Inlet Hatchery. Beginning with brood year 2001, returns to Burnett Inlet were sufficient to provide fry for the Burnett Inlet Hatchery and Neck Lake programs.

In 2015, SSRAA submitted a PAR to return the summer run coho salmon broodstock program from Burnett Inlet back to Whitman Lake Hatchery as described in the Burnett Inlet Hatchery release site summer run coho salmon section above.

SSRAA regularly exceeded permitted egg take numbers for its summer coho salmon program. Eyed eggs were later discarded by an equivalent number of green eggs to comply with permitted green egg levels (Appendix G). Coho salmon eggs are usually collected based on an estimated average fecundity and then counted later at the eyed-egg stage.

Neets Bay and Anita Bay fall run coho salmon release sites

In 2012, SSRAA submitted a PAR to move incubation of 2 million fall coho salmon eggs from Whitman Lake Hatchery to Burnett Inlet Hatchery. The resulting fry would be reared in Neck Lake and released at Neets Bay. No fall run coho salmon would be released from Burnett Inlet Hatchery.

The request was made because Burnett Inlet Hatchery was much closer to Neck Lake than Whitman Lake Hatchery for transporting fry. Eggs would continue to be collected at Whitman Lake Hatchery and transferred as eyed eggs to Burnett Inlet Hatchery. The PAR would increase permitted capacity at Burnett Inlet Hatchery from 2.5 million to 4.5 million eggs, but not increase production within SSRAA's fall run coho salmon program. The RPT unanimously recommended approval of the PAR. No staff comments were found in the files. The ADF&G commissioner approved the PAR in 2013.

When some of the releases intended for Neets Bay were shifted to Anita Bay in a PAR under the Whitman Lake Hatchery permit, some of the releases in the 2013 permit alteration at Burnett Inlet Hatchery would now go to Anita Bay instead of Neets Bay. As a result, a permit alteration was necessary to add Anita Bay as a release site to the Burnett Inlet Hatchery permit. In 2014, a PAR was approved to add Anita Bay as a fall coho salmon release site for the Burnett Inlet Hatchery permit. The RPT unanimously recommended approval and ADF&G staff had no concerns. The PAR was approved by the ADF&G commissioner.

COMPREHENSIVE SALMON ENHANCEMENT PLAN

Three phases of Comprehensive Salmon Plans (CSP) have been developed to date in Southeast Alaska. Phase I[15] set goals for salmon production in Southeast Alaska. The Phase II CSP[16] provided planning to achieve the goals of the Phase I CSP. The Phase III CSP (Duckett et al. 2010) focused on integrating hatchery production increases with natural production to sustainably manage fisheries.

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

[15] Comprehensive salmon enhancement plan for Southeast Alaska: Phase I, by the joint Southeast Alaska regional planning team, 1981. Unpublished document obtained from Lorraine Vercessi, ADF&G PNP Coordinator, Juneau.

[16] Comprehensive salmon plan, Phase II: Southern Southeast Alaska, by the Southern Southeast regional planning team, September 1983. Unpublished document obtained from Lorraine Vercessi, ADF&G PNP Coordinator, Juneau.

salmon and 9.7 million chum salmon. Some of the harvest objectives could be achieved by better management. The remainder of the harvest objectives could be achieved through increased hatchery production. The estimated hatchery production necessary to meet the long-term harvest objectives at the time was 134,000 Chinook, 1.4 million sockeye, 1.1 million coho, 14 million pink, and 4.6 million chum salmon. Neets Bay Hatchery operated in support of filling these desired production gaps.

Phase II CSP planning identified projects and plans to meet the Phase I harvest objectives, and the RPTs for northern and southern Southeast Alaska developed separate plans. The southern Southeast Alaska CSP Phase II was issued in 1983.[17] Subsequent Phase II CSP plan updates were issued yearly from 1984 through 1995, except for 1990. The Burnett Inlet Hatchery was permitted to SSRAA under the Phase II CSP.

The 1984 Phase II CSP was the first update mentioning projects that came to be related to Burnett Inlet Hatchery. The 1985 update noted potential sockeye salmon enhancement projects using Beaver Falls Hatchery as an incubation site to backstock fry to Hugh Smith and McDonald lakes. The 1985–1988 updates listed these projects as active and as high priority for the CSP. In 1987, the Hugh Smith Lake backstocking project was listed as being funded by Pacific Salmon Treaty funding. The 1993–1995 CSP updates noted that Neck Lake was being developed by SSRAA as a release site for coho salmon.

With the maturation of the salmon enhancement program, the harvest target objectives and programs in the Phase I and Phase II CSPs were replaced with objectives in the Phase III CSP[18] that supported an overriding goal to enhance the salmon fishery while minimizing the impact of enhancement on wild stocks. These new objectives included (1) minimizing the impact of hatchery stocks on wild stocks, (2) maintaining existing production potential for wild and enhanced stocks, (3) ensuring that increases in hatchery production are consistent with region-wide goals and allocation plans, and (4) updating the RPT process periodically to provide status reports and recommendations in a timely manner.

The Phase III CSP 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) 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.

The Phase III CSP provided a stock appraisal tool for assessing the "significance" of stocks; this tool assesses projects with regard to the significant stock references in ADF&G's *Genetic Policy* (Davis et al. 1985). 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

[17] Ibid.

[18] Phase III CSP was issued in 2004.

maintaining production capacity, and the potential to maximize harvest opportunities over time. The tool identified 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 also provided a framework for evaluating 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."

Only 1 new project was initiated to date since the 2004 Phase III CSP at Burnett Inlet Hatchery, which is the summer chum salmon release program from the hatchery started in 2015. ADF&G genetic staff had no genetic concerns with the release. A program to address the remainder of the evaluation plan in the previous paragraph was clearly addressed in SSRAA's PAR for the program. Releases were identified with a thermal otolith mark, sampling would occur in the fisheries, impacts to fishery management would be addressed through inseason data transfer of otolith recovery data to ADF&G managers, and the information about the project is available on SSRAA's website and the annual management plan.

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 identify the key elements of state policies used to assess compliance of the Burnett Inlet Hatchery salmon program with the policy elements. Discussion of application of the policies in hatchery operations follows each table.

Genetics

See Table 1.

Sockeye Salmon

Sockeye salmon releases at Hugh Smith Lake and McDonald Lake were stocked with fry hatched from eggs collected from wild broodstock from each system. Releases from Burnett Inlet Hatchery and Neck Creek used McDonald Lake wild stock and/or returns of McDonald Lake stock fish to Burnett Inlet Hatchery.

A review of the annual reports showed that sockeye egg collections were from less than 400 broodstock for almost all egg takes. The ADF&G geneticist provided guidelines for egg takes where low numbers of broodstock were required.

A review[19] of the ADF&G Mark, Age and Tag Lab report of otoliths recovered from sampling of escapement or inriver fisheries showed 5 strays. A brood year 1999 Neck Creek release was recovered in the Stikine River Canadian commercial fishery in 2005; a brood year 2003 Neck Creek release was recovered in the Hugh Smith Lake system in 2007; a brood year 2004 Burnett Inlet Hatchery release was recovered in the Stikine River Canadian test fishery in 2008; and a brood year 2003 Burnett Inlet Hatchery release was recovered in the Stikine River Canadian test fishery in both 2008 and 2009.

Chum Salmon

Summer run broodstock originated from Carroll River at the head of Carroll Inlet near Ketchikan (Figure 3). This stock is currently in production at Neets Bay Hatchery and Burnett Inlet Hatchery. A total of 117,148 returning adults were used for broodstock in 2015 at Neets Bay, with a portion of the eggs transferred to Burnett Inlet Hatchery.

The fall run chum salmon broodstock originated from Disappearance Creek and Lagoon Creek in Cholmondeley Sound on Prince of Wales Island (Figure 1). This stock is currently in production at Neets Bay and Burnett Inlet hatcheries. A total of 33,137 returning adults to Neets Bay were used for broodstock in 2015, with a portion of those eggs collected transferred to Burnett Inlet Hatchery.

Piston and Heinl (2012) conducted chum salmon straying studies of hatchery salmon from all Southeast Alaska hatcheries from 2008 to 2010, which was before Burnett Inlet Hatchery began releasing chum salmon. Additional chum salmon straying studies are underway, and the results have not been published to date.

Coho Salmon

Fall run broodstock originated from Indian Creek, a tributary of the Chickamin River that empties into Behm Canal (Figure 3). This stock is currently in production only at Whitman Lake Hatchery. Burnett Inlet incubates eggs transferred from returns to Whitman Lake Hatchery, and then transfers fry for release at Neck Lake. No fall run coho salmon are released from Burnett Inlet Hatchery.

Summer run coho salmon eggs were obtained from Deer Mountain Hatchery. The stock originated from Reflection Lake, which empties into Behm Canal (Figure 3). This stock is currently in production only at Burnett Inlet Hatchery, and this production is transferring to Whitman Lake Hatchery.

Southeast Alaska hatchery coho salmon straying is routinely monitored at hatcheries but not at most wild stock systems where weirs or intensive sampling programs are used for wild coho salmon stock assessment. Wild stock juvenile coho salmon are coded-wire-tagged on most of these systems. A portion of the returns returning to these systems are therefore expected to be marked, so fish are not sacrificed for tag or otolith removal to avoid sacrificing large numbers of wild stock fish. Generally, systems are sampled for strays only during dedicated straying studies. A review of the ADF&G Mark, Tag and Age Lab database showed no Burnett Inlet Hatchery coho salmon released from the hatchery recovered at other hatcheries or escapement projects. One brood year 2010 coho salmon released at Neck Lake was recovered at Burnett Hatchery in

[19] http://mtalab.adfg.alaska.gov/OTO/reports/MarkSummary.aspx (Accessed 3/15/16 for years 1994–2015).

2013. Shaul (2010) provided a review of wild and hatchery coho salmon recovered as strays in spawning escapements in Southeast Alaska.

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

I. Stock Transport	
Use of appropriate local stocks	This element addresses Section I of ADF&G's *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.
	Local stocks are used at Burnett Inlet Hatchery.
II. Protection of wild stocks	
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.
	No significant stocks have been recommended in Southeast Alaska by the RPT. The Phase III CSP denotes guidelines for significant stock determination.
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.
	Targeted harvest of hatchery returns at release sites is necessary to minimize straying.
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.
	Donor stocks to Burnett Inlet Hatchery broodstocks are not used as stocks at more than two other hatcheries.
Minimum effective population size	The policy recommends a minimum effective population size of 400.
	All current Burnett Inlet Hatchery programs use well over the 400 fish minimum for broodstock.
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 add terms or conditions to the permit to protect wild or enhanced stocks.
	The ADF&G geneticist reviewed the FTPs.

Fisheries Management

See Table 2.

Burnett Inlet Hatchery release sites are located at the hatchery, Anita Bay, Neck Lake, and Whitman Lake. Releases are marked so that they can be identified in the catch or spawning escapement.

Management plans are in place at all release sites to protect overharvest of wild stocks (e.g., Gray et al. 2015a; Gray et al. 2015b; Skannes and Hagerman 2015). Purse seine fisheries are managed for wild sockeye, pink, and fall run chum salmon stocks. Gillnet fisheries are managed for wild sockeye and coho salmon stocks. Except for targeted openings for hatchery chum salmon in the terminal harvest areas directly in front of the hatchery release sites, hatchery chum salmon returns to Burnett Inlet Hatchery and Anita Bay salmon are caught primarily in purse seine and drift gillnet fisheries managed for other salmon species.

Sockeye salmon returns to Neck Lake and Burnett Inlet Hatchery were accounted for in the commercial harvest through sampling of otoliths to assess hatchery contribution.

Southeast Alaska chum salmon escapement index streams are grouped into stock groups by area and run timing based on marine tagging and genetic studies (Eggers and Heinl 2008). Burnett Inlet Hatchery summer run chum salmon are harvested primarily in the Southern Southeast summer run chum salmon index area. The escapement goal is a lower-bound sustainable escapement goal, rather than a range, because summer run chum salmon are harvested during periods managed for pink and sockeye salmon, and therefore cannot be managed to fall within a lower and upper range. Escapement levels have been well above the current escapement goal since 1984, with the exception of 2008–2010 and 2013 (Figure 4).

For fall run chum salmon, Burnett Inlet Hatchery returns would be intermingled with returning fall run chum salmon stocks in Southern Southeast Alaska. The Cholmondeley Sound index grouping area is the only fall run chum salmon stock in Southern Southeast Alaska that supports a directed commercial fishery and is, therefore, the only fall run stock that has been monitored for spawning abundance. Naturally spawning chum salmon returning to Cholmondeley Sound are managed inseason based on return strength, and an escapement range has been established (Eggers and Heinl 2008). Escapements have been within or above the escapement goal range in most years since 1984 (Figure 5). In addition, hatchery strays were estimated to represent less than 1% of the escapement at Disappearance Creek (one of primary spawning streams in Cholmondeley Sound) based on otolith sampling conducted from 2008 to 2010, which indicates that fall run hatchery production has had little effect on the department's ability to manage Cholmondeley Sound chum salmon (Piston and Brunette 2011).

Coho salmon released from Burnett Inlet Hatchery and Neck Lake are harvested primarily during the summer gillnet fishery managed for sockeye salmon in Clarence Strait (). Regional wild coho salmon management is supported by long-term tagging of several wild indicator stocks in the region. The harvest is sampled for coded wire tags, providing inseason estimates of hatchery and wild stock abundance to guide management. Coho salmon escapement for the southern Southeast Alaska coho salmon indicator stock (Hugh Smith Lake) has been met or exceeded in every year except one from 1982 to 2014 (Skannes et al. 2015). The escapement goal for the Ketchikan area survey index, which includes an aggregate of 14 streams on the mainland near Neets Bay, has been met annually since 1990 (Heinl et al. 2014).

Table 2.–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 director of the Division of 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.

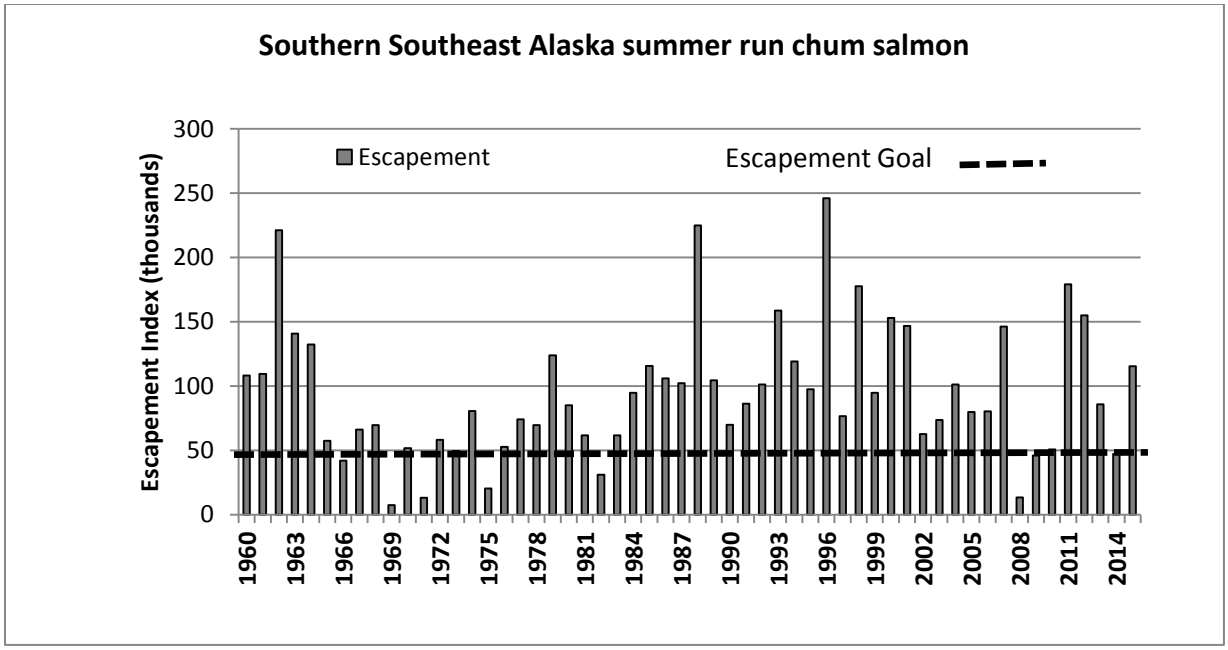

Figure 4.–Southern Southeast Alaska summer run chum salmon escapement index.

Source: Andrew Piston, ADF&G fishery biologist, Ketchikan, AK.

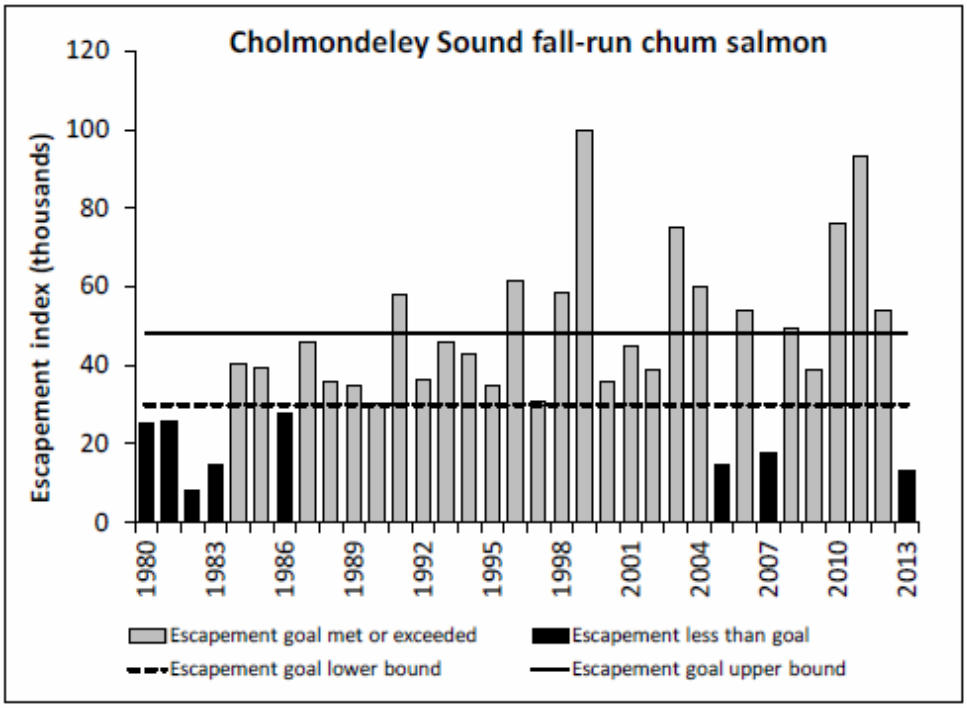

Figure 5.–Cholmondeley Sound fall run chum salmon escapement index.

Source: Heinl et al. (2014).

Fish Health and Disease, all species

See Table 3.

FTPs for the Burnett Inlet Hatchery program were approved by the pathologist. Pathology records showed no inconsistencies with fish health and disease policies.

The hatchery was inspected regularly from 1984 to 1999 and again in 2015. The inspector remarked in the 2015 report that the fall chum salmon appear to perform well at the site, which is perhaps due to the high tidal exchange that provides good flushing of the pens. A few coho salmon juveniles in the hatchery exhibited signs of bacterial cold water diseases. Parasitic nematode infestation was an issue at Neck Lake but did not appear to significantly impact survival. The inspector reported that hatchery staff followed standard best practices of fish culture as evidenced by high survival rates. Fish are carefully monitored for pathology issues. The hatchery was clean and organized and the infrastructure well built and maintained. The inspector suggested not using Neck Lake for rearing fish over the next few seasons, or at least reducing the density of fish that rear there, to improve the parasitic nematode issue.

Table 3.–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.
	FTPs reviewed by the pathologist, who could make recommendations as necessary.
Hatchery inspections	According to AS 16.10.460, inspection of the hatchery facility by department inspectors shall be permitted by the permit holder at any time the hatchery is operating.
Disease reporting	The occurrence of fish diseases or pathogens listed in 5 AAC 41.080(d) must be immediately reported to the ADF&G Fish Pathology Section.
Pathology requirements for Fish Transport Permits (FTPs) (5 AAC 41.005–41.060)	
Disease history	Applications for FTPs require either a complete disease history of the stock or a broodstock inspection and certification if the disease history is not available.
	Disease histories completed as requested by the ADF&G pathologist.
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.
	Applications reviewed by the pathologist for compliance.
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.

RECOMMENDATIONS

The BMP for Burnett Inlet Hatchery should be updated to reflect the current hatchery operations.

ACKNOWLEDGEMENTS

ADF&G staff Steve Heinl, Andrew Piston, Troy Thynes, Craig Schwanke, Judy Lum, Pat Fowler, Kelly Piazza, Sam Rabung, and Lorraine Vercessi reviewed this document.

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APPENDIX

Appendix A.–Burnett Inlet Hatchery permit and permit alterations, 1997–2016.

Date	Description	Green Eggs Sockeye Salmon	Coho Salmon	Chum Salmon
1997	PNP hatchery permit number 40 and BMP issued to SSRAA for Burnett Inlet Hatchery. Hatchery permitted for 2.7 million sockeye and 2.5 million coho salmon eggs.	2.7	2.5	
1999	PAR approved for up to 500,000 sockeye salmon fry released to Neck Lake. Permitted capacity did not change.	2.7	2.5	
2000	PAR approved for up to 500,000 sockeye salmon fry released to Hugh Smith Lake. Permitted capacity did not change.	2.7	2.5	
2002	PAR approved for up to 40,000 sockeye salmon fry released from hatchery to develop a broodstock. Permitted capacity did not change.	2.7	2.5	
2003	PAR approved to increase hatchery release from 40,000 to 250,000 sockeye salmon fry to develop a broodstock. Permitted capacity did not change.	2.7	2.5	
2007	PAR approved to collect 450,000 green eggs from McDonald Lake brood stock and release resulting progeny back to the lake, from 2007 to 2009. Permitted capacity increased by 450,000 eggs for the effective period.	3.15	2.5	
2010	PAR approved to add 25 million chum salmon egg capacity to Burnett Inlet Hatchery.	2.7	2.5	25
2013	PAR approved to increase coho salmon production from 2.5 million to 4.5 million eggs.	2.7	4.5	25
2014	PAR approved to add Anita Bay as a remote release site for coho salmon. Did not change capacity.	2.7	4.5	25
2015	PAR approved to increase chum salmon production from 25 million eggs to 31 million eggs. PAR also further defined 2013 permit alteration for coho salmon such that the 4.5 million egg capacity consisted of 2.0 million fall run stock and 4.5 million summer run stock	2.7	4.5	31

Appendix B.–Summary of fish transport permits for Burnett Inlet.

Key: WLH=Whitman Lake Hatchery, NBH=Neets Bay Hatchery, BIH=Burnett Inlet Hatchery.

FTP No.	Issued	Expiration	FTP summary and reviewer comments
97J-1028	1997	1998	Collect adult Deer Mt. Hatchery/Reflection Lake stock coho salmon, transfer to WLH, collect gametes, incubate at WLH to eyed stage, transfer to BIH for rearing and release of up to 250,000 smolts. This was to transfer summer coho program from WLH to BIH.
98J-1002	1998	2008	Collect up to 1.5 million wild sockeye eggs from Hugh Smith Lake stock for incubation at BIH and release at Hugh Smith Lake. Egg take level contingent on escapement level to Hugh Smith Lake system.
98J-1003	1998	2008	Collect up to 1.5 million wild sockeye eggs from Hugh Smith Lake stock for incubation at BIH and release at Bakewell/Badger Lake. Egg take level contingent on escapement level to Hugh Smith Lake system.
98J-1004	1998	2008	Collect up to 1.2 million wild sockeye eggs from Salmon Lake stock for incubation at BIH and release at Salmon Lake. Egg take level contingent on escapement level to Salmon Lake system.
98J-1005	1998	2008	Transfer up to 2.5 million Ward Lake/Reflection Lake stock coho salmon eyed eggs from WLH to BIH for incubation at BIH and release at Neck Lake.
99J-1018	1999	2004	Transfer up to 2.2 million Ward Lake/Reflection Lake stock coho salmon fry from BIH to Neck Lake or release.
99J-1030	1999	2001	Collect up to 500,000 green sockeye salmon eggs from McDonald Lake stock for incubation at BIH and release at Neck Creek.
00J-1001	2000	2025	Collect up to 2.5 million Burnett Inlet/Reflection Lake stock coho salmon for incubation at BIH and release at Neck Lake. Permit expiry date extended from 2010 to 2015 in 2010. Permit expiry date extended from 2015 to 2025 in 2015.
00J-1006	2000	2002	Transfer up to 400,000 Hugh Smith Lake stock sockeye fry from BIH to Hugh Smith Lake. Eggs were collected from Hugh Smith Lake under a fish resource permit.
00J-1012	2000	2002	Move up to 500 adult Neck Lake/Reflection Lake stock coho salmon to BIH for egg take. Resulting smolts will be released at Neck Lake.
02J-1011	2002	2007	Collect up to 500,000 green sockeye salmon eggs from McDonald Lake stock for incubation at BIH and release at Neck Creek.
02J-1017	2003	2007	Collect up to 450,000 eggs from Hugh Smith Lake, incubate and rear at BIH and transfer up to 400,000 Hugh Smith Lake stock sockeye fry to Hugh Smith Lake.
02J-1018	2003	2012	Rear and release to 40,000 McDonald Lake sockeye salmon eggs fry from BIH to establish a broodstock.
02J-1019	2003	2006	Move up to 400 adult Neck Creek/McDonald Lake stock sockeye salmon to BIH for egg take. Resulting smolts will be released at Neck Creek.
04J-1002	2004	2009	Renewal of 99J-1018. Transfer up to 2.2 million Ward Lake/Reflection Lake stock coho salmon fry from BIH to Neck Lake or release.
04J-1004	Withdrawn		Increase sockeye salmon releases from BIH and Neck Creek from 540,000 to 750,000 annually from egg takes at BIH and Neck Creek. FTP withdrawn to make separate FTPs.

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FTP No.	Issued	Expiration	FTP summary and reviewer comments
04J-1005	2004	2008	Collect up to 1 million Neck Creek/McDonald Lake stock sockeye salmon eggs at BIH and release up to 750,000 smolts at BIH. Release up to 750,000 smolt at BIH, not to exceed combined release of 750,000 smolt between BIH and Neck Creek.
04J-1006	2004	2008	Release up to 750,000 smolt at Neck Creek, not to exceed combined release of 750,000 smolt between BIH and Neck Creek.
04J-1007	2004	2008	Collect up to 1 million Neck Creek/McDonald Lake stock sockeye salmon eggs at Neck Creek and release up to 750,000 smolts at BIH. Release up to 750,000 smolt at BIH, not to exceed combined release of 750,000 smolt between BIH and Neck Creek.
07J-1041	2007	2009	Collect up to 450,000 green sockeye salmon eggs from McDonald Lake stock for incubation at BIH for brood years 2007 to 2009.
07J-1042	2009	2011	Transfer progeny of up to 450,000 green sockeye salmon eggs from BIH to McDonald Lake stock for release at McDonald Creek. Releases from 2009-2011.
07J-1045	2008	2002	Collect up to 450,000 eggs from Hugh Smith Lake sockeye, incubate and rear at BIH, and transfer and release resulting progeny at Hugh Smith Lake.
08J-1019	2008	2013	Collect up to 1 million Neck Creek/McDonald Lake stock sockeye salmon eggs at BIH and release up to 750,000 smolts at BIH. Release up to 750,000 smolt at BIH, not to exceed combined release of 750,000 smolt between BIH and Neck Creek.
09J-1001	2009	2014	Collect up to 200,000 WLH/Indian Creek coho salmon eggs at WLH to eyed stage (this FTP), then transfer to BIH for rearing, then release from Neets Bay (FTP 09J-1002).
09J-1002	2010	2015	Collect up to 200,000 WLH/Indian Creek coho salmon eggs at WLH to eyed stage, then transfer to BIH for rearing, then release from Neets Bay.
09J-1003	2009	2014	Renewal of 04J-1002. Transfer up to 2.2 million Ward Lake/Reflection Lake stock coho salmon fry from BIH to Neck Lake or release.
10J-1028	2010	2015	Collect up to 25 million NBH/Carroll River summer chum salmon eggs at NBH, transferred at eyed stage to BIH, and release fry at Anita Bay. FTP issued under BIH permit.
13J-1002	2013	2023	Transport eyed eggs from WLH to BIH and transport resultant fry to Neck Lake and release the smolt at Neets Bay. FTP 11J-1024 allows transfer from WLH to Neck Lake and release at Neets Bay. FTP issued to WLH.
13J-1006	2013	2023	Collect up to 6 million NBH/Cholmondeley Sound fall chum salmon at NBH for incubation then transfer of eyed eggs to BIH for rearing and release. FTP issued to BIH.
14J-1003	2014	2024	Transfer resultant fry of up to 6 million NBH/Cholmondeley Sound fall chum salmon eggs from NBH to BIH for rearing and release. FTP issued to NBH.
14J-1004	2014	2024	Transport eyed eggs from WLH to BIH and transport resultant fry to Neck Lake and release the smolt at Neets Bay. FTP 11J-1024 allows transfer from WLH to Neck Lake and release at Neets Bay. FTP issued to WLH.

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FTP No.	Issued	Expiration	FTP summary and reviewer comments
14J-1011	2014	2024	Transport up to 600,000 fall run coho salmon smolts from Neck Lake to Anita Bay for release.
15J-1002	2015	2025	Egg take of up to 6.0 million Carroll River stock summer run chum salmon eggs at NBH, transfer to BIH for incubation and release. FTP issued to WLH.
15J-1018	2015	2018	Transport up to 222,000 BIH/Reflection Lake stock eyed eggs from BIH to Whitman Lake Hatchery from 2015 to 2018 to transfer the existing summer run coho salmon program from BIH to WLH.

Appendix C.–Comparison of permitted and reported McDonald Lake stock sockeye salmon egg takes and releases (in millions) permitted to Burnett Inlet Hatchery, by release site, in hatchery permit, basic management plan, annual management plan, fishery transport permits, and annual reports.

Key: FTP=Fish Transport Permit; AMP=Annual Management Plan; AR=Annual Report; ML=McDonald Lake; NC=Neck Creek; BIH=Burnett Inlet Hatchery; NS=Not Specified.

Neck Creek Release Site

Brood Year	Hatchery Permit Egg Limit	FTP Egg Limit	FTP No	AMP Egg Limit	AR Egg Take	FTP Release Limit	FTP No	AMP Release Limit	AR Release
1999	2.7	0.5	99J-1030	0.5	0.479	0.5	99J-1030	0.44	0.443
2000	2.7	0.5	99J-1030	0.5	0.506	0.5	99J-1030	0.46	0.461
2001	2.7	0.5	99J-1030	0.5	0.442[a]	0.5	99J-1030	0.36	0.356
2002	2.7	0.5	99J-1030	0.5	0.288[a]	0.5	99J-1030	0.14	0.139
2003	2.7	0.5	02J-1011	0.5	0.617	0.5	02J-1011	0.18	0.486
2004	2.7	0.5	02J-1011	0.5	0.443[a]	0.5	02J-1011	0.134	0.137

Burnett Inlet Release Site

Brood Year	Hatchery Permit Egg Limit	FTP Egg Limit	FTP No	AMP Egg Limit	Egg Take Location	AR Egg Take	FTP Release Limit	FTP No	AMP Release Limit	AR Release
2001	2.7	0.5	99J-1030	0.5[a]	ML	0.442[a]	0.04	02J-1018	0.04	0.038
2002	2.7	0.5	99J-1030	0.5[a]	ML	0.288[a]	0.04	02J-1018	0.04	0.029
2003	2.7	1.0	04J-1007	0.5[a]	NC	0.265	0.750	04J-1007	0.5	0.176
2004	2.7	0.5	02J-1011	0.5[a]	NC	0.443[a]	0.750	04J-1007	0.2	0.196
2005	2.7	0.5	02J-1011	0.75	NC	0.835	0.750	04J-1007	0.69	0.695
2006	2.7	1.0	04J-1007	0.75	NC	0.115	0.750	04J-1007	0.1	0.107
2008	2.7	1.0	04J-1007		NC	0.065[b]	0.750	04J-1007	0.056	0.056
		1.0	04J-1005		BIH		0.750	04J-1005		

McDonald Lake Release Site

Brood Year	Hatchery Permit Egg Limit	FTP Egg Limit	FTP No	AMP Egg Limit	AR Egg Take	FTP Release Limit	FTP No	AMP Release Limit	AR Release
2007	2.7	0.45	07J-1041	NS	0.329	0.45	07J-1042	0.28	0.276
2008	2.7	0.45	07J-1041	0.45	0.192	0.45	07J-1042	0.161	0.160
2009	2.7	0.45	07J-1041	0.45	0.375	0.45	07J-1042	0.3	0.323

[a] Eggs for release at both Neck Creek and Burnett Inlet Hatchery.

[b] Includes 32,000 Neck Creek returns and remainder returns to Burnett Inlet.

Appendix D.–Comparison of permitted and reported Hugh Smith Lake stock sockeye salmon egg takes and releases (in millions) permitted to Burnett Inlet Hatchery, by release site, in hatchery permit, basic management plan, annual management plan, fishery transport permits and annual reports.

Key: FTP=Fish Transport Permit; AMP=Annual Management Plan; AR=Annual Report.

Brood Year	Hatchery Permit Egg Limit	FTP Egg Limit	FTP No.	AMP Egg Limit or Goal	AR Egg Take	FTP Release Limit	FTP No.	AMP Release Limit	AR Release
1998	2.7	1.5	98J-1002	1.5	0.314	P-99-052 and P-99-053	[a]	0.2	0.203
1999	2.7	1.5		0.65	0.466	0.4	00J-1006	0.4	0.380
2000	2.7	1.5	98J-1002	0.5	0.544	0.4	00J-1006	0.4	0.445
2001	2.7	1.5	98J-1002	0.45	0.539	0.4	00J-1006	0.4	0.465
2002	2.7	1.5	98J-1002	0.45	0.551		[b]	0.4	0.424

[a] An FTP could not be found for this release authorized by fish resource permits. The fish resource permits were for a release of up to 240,000 presmolt.

[b] FTP 00J-1006 expired in 2002.

Appendix E.–Permitted and reported egg takes and releases of summer chum salmon, in millions and rounded, from the Anita Bay release site. From 2000 to 2010, the project was permitted under the Whitman Lake Hatchery and Neets Bay Hatchery. Eggs were collected at Neets Bay Hatchery, incubated at Whitman Lake Hatchery and/or Neets Bay Hatchery, and resulting fry released at Anita Bay. In 2011, the project was transferred to Burnett Inlet Hatchery. Eggs were collected at Neets Bay, incubated at Burnett Inlet Hatchery, and resulting fry released at Anita Bay. Numbers of eggs and releases in millions.

Key: IL=Incubation Location; ET=Egg Take FTP=Fish Transport Permit; AMP=Annual Management Plan; AR=Annual Report; CR=Carroll River stock, NBH=Neets Bay Hatchery; BIH=Burnett Inlet Hatchery.

Brood Year	IL	Hatchery Permit ET[a]	Egg Source	FTP Egg Take	FTP No. Egg Take	AMP Egg Take[a]	AR Egg Take	FTP Release	FTP No. Release	AMP Release	AR Release
2011	BIH	25	NBH/CR	25	10J-1028	135	22.7	25	10J-1028	22	22
2012	BIH	25	NBH/CR	25	10J-1028	135	22.4	25	10J-1028	22	22
2013	BIH	25	NBH/CR	25	10J-1028	135	23.1	25	10J-1028	22	23
2014	BIH	25	NBH/CR	25	10J-1028	135	23.5	25	10J-1028	22	23

[a] Egg take number is for all release sites, including Anita Bay.

Appendix F.–Permitted and reported egg takes and releases of fall run chum salmon, in millions and rounded, from the Burnett Inlet Hatchery Bay release site. Eggs were collected at Neets Bay Hatchery, incubated, and released at Burnett Inlet Hatchery.

Key: IL= Incubation Location; NBH=Neets Bay Hatchery; ET=Egg Take; FTP=Fish Transport Permit; AMP=Annual Management Plan; AR=Annual Report.

Brood Year	IL	Hatchery Permit ET[a]	Egg Source	FTP Egg Take	FTP No. Egg Take	AMP Egg Take[b]	AR Egg Take[b]	FTP Release No.	FTP No.	AMP Release[c]	AR Release
2013	NBH	6.0	NBH	6.0	13J-1006	35	21	5.0	14J-1003	5.0	4.9
2014	NBH	6.0	NBH	6.0	13J-1006	35	27	5.0	14J-1003	5.0	4.7

[a] Egg take number is for all release sites, including Anita Bay.

[b] Egg take number is for all release sites, including Burnett Inlet.

[c] Total release from Anita Bay.

Appendix G.–Comparison of permitted and reported summer run coho salmon (Reflection Lake stock) egg takes and releases (in millions) permitted to Burnett Inlet Hatchery, by release site, in hatchery permit, basic management plan, annual management plan, fishery transport permits and annual reports. Eggs or fry were transferred from Whitman Lake Hatchery for releases for brood years 1995–1998, after which eggs were collected from returns to Burnett Inlet Hatchery.

Key: FTP=Fish Transport Permit; AMP=Annual Management Plan; AR=Annual Report, NF=Not Found.

Burnett Hatchery Release Site

Brood Year	Hatchery Permit Egg Limit	FTP Egg Limit	FTP No.	AMP Egg Limit or Goal	AR Egg Take[a]	FTP Release Limit	FTP No	AMP Release Limit	AR Release
1997	2.5					2.5	98J-1005[b]	0.200	0.179
1998	2.5					2.5	98J-1005[c]	0.200	0.164
1999	2.5	2.5	00J-1001	2.0[d]		2.5	00J-1001	0.200	[e]
2000	2.5	2.5	00J-1001	2.0[f]	2.5	2.5	00J-1001	0.200	0.236
		2.0	94J-1042		0.267				
2001	2.5	2.5	00J-1001	0.500	3.0	2.5	00J-1001	0.200	0.251
2002	2.5	2.5	00J-1001	0.500	2.8	2.5	00J-1001	0.200	0.190
2003	2.5	2.5	00J-1001	0.300	2.036	2.2	00J-1001	0.200	0.229
2004	2.5	2.5	00J-1001	0.300	3.1	2.2	00J-1001	0.200	0.223
2005	2.5	2.5	00J-1001	0.300	2.1	2.2	00J-1001	0.200	0.205
2006	2.5	2.5	00J-1001	0.250	2.2	2.2	04J-1002	0.200	0.168
2007	2.5	2.5	00J-1001	0.250	2.3	2.2	04J-1002	0.200	0.214
2008	2.5	2.5	00J-1001	0.250	3.046	2.2	04J-1002	0.200	0.211
2009	2.5	2.5	00J-1001	0.250	2.449	2.2	04J-1002	0.200	0.216
2010	2.5	2.5	00J-1001	0.250	2.956	2.2	04J-1002	0.200	0.231
2011	2.5	2.5	00J-1001	0.250	2.673	2.2	04J-1002	0.200	0.229
2012	2.5	2.5	00J-1001	0.250	2.754	2.2	04J-1002	0.200	0.235
2013	4.5	2.5	00J-1001	0.200	2.513	2.2	04J-1002	0.200	0.234
2014	4.5	2.5	00J-1001		3.189				
2015	4.5	2.5	00J-1001		2.432				

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Neck Lake Release Site

Brood Year	Hatchery Permit Egg Limit	FTP Egg Limit	FTP No.	AMP Egg Limit or Goal	AR Egg Take[a]	FTP Release Limit	FTP No	AMP Release Limit	AR Release
1998	2.5	2.0	94J-1042	2.0	2.387[h]	2.0	94J-1042	1.6	1.637[i]
		1.5	95J-1022			1.5	95J-1023		
						1.8	98J-1005		
1999	2.5		NF[j]	2.0	1.9	2.2	99J-1018	1.6	1.7
		2.5	98J-1005		0.5[k]	2.0	94J-1042		
2000	2.5	2.5	00J-1001	2.5	2.2	2.2	99J-1018	1.6	1.9
2001	2.5	2.5	00J-1001	2.5	3.0	2.2	99J-1018	1.6	1.7
2002	2.5	2.5	00J-1001	2.0	2.8	2.2	04J-1002	1.6	1.527
2003	2.5	2.5	00J-1001	2.0	2.036	2.2	04J-1002	1.6	1.472
2004	2.5	2.5	00J-1001	2.0	3.1	2.2	04J-1002	1.6	1.645
2005	2.5	2.5	00J-1001	2.25	2.1	2.2	04J-1002	1.6	1.704
2006	2.5	2.5	00J-1001	2.25	2.2	2.2	04J-1002	1.6	1.737
2007	2.5	2.5	00J-1001	2.25	2.3	2.2	04J-1002	1.6	1.767
2008	2.5	2.5	00J-1001	2.25	3.046	2.2	04J-1002	1.6	1.860
2009	2.5	2.5	00J-1001	2.25	2.449	2.2	04J-1002	1.75	1.799
2010	2.5	2.5	00J-1001	2.25	2.956	2.2	04J-1002	1.70	1.729
2011	2.5	2.5	00J-1001	2.25	2.673	2.2	04J-1002	1.70	1.714
2012	2.5	2.5	00J-1001	2.25	2.754	2.2	04J-1002	1.70	1.797
2013	4.5	2.5	00J-1001	2.5[l]	2.513	2.2	04J-1002	1.7	1.634
2014	4.5	2.5	00J-1001	2.5[l]	3.189				
2015	4.5	2.5	00J-1001	2.5[l]	2.432				

[a] Egg takes for both Neck Lake and Burnett Inlet releases. Eggs collected at Deer Mountain Hatchery.

[b] FTP 98J-1005 is for transfer of eggs from Whitman Lake Hatchery to Burnett Inlet Hatchery for release.

[c] This FTP was for shipment of eggs, but fry were shipped from Whitman Lake Hatchery, not eggs.

[d] Egg takes for both Neck Lake and Burnett Inlet releases.

[e] The 2001 AMP indicates that 180,000 brood year 1999 smolt were to be released in 2001. However, no record of a release was found on the 2001 Annual Report.

[f] Egg takes for both Neck Lake and Burnett Inlet releases.

[g] Egg takes for both Neck Lake and Burnett Inlet releases.

[h] Eggs from both Ward Lake and Deer Mountain Hatchery returns combined.

[i] Fry originating from Ward Lake and Deer Mountain Hatchery and reared at Whitman Lake and Burnette Inlet Hatcheries.

[j] FTP for egg takes from returns to Burnette Inlet not issued till 2000.

[k] Eggs transferred from Whitman Lake.

[l] Goal for egg collections for release at Burnett Inlet and Neck Lake.