Regional Information Report No. 5J12-21

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

by

Mark Stopha

October 2012

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

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used without definition in the following reports by the Divisions of Sport Fish and of Commercial Fisheries: Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, Special Publications and the Division of Commercial Fisheries Regional Reports. All others, including deviations from definitions listed below, are noted in the text at first mention, as well as in the titles or footnotes of tables, and in figure or figure captions.

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

REGIONAL INFORMATION REPORT NO. 5J12-21

AN EVALUATION OF THE TRAIL LAKES SALMON HATCHERY FOR CONSISTENCY WITH STATEWIDE POLICIES AND PRESCRIBED MANAGEMENT PRACTICES

by
Mark Stopha
Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau

Alaska Department of Fish and Game
Division of Commercial Fisheries
333 Raspberry Road, Anchorage, AK 99518

October 2012

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/

Mark Stopha,
Alaska Department of Fish and Game, Division of Commercial Fisheries,
1255 W. 8th St. P. O. Box 115526, Juneau, AK 99811-5526, USA

This document should be cited as:
Stopha, M. 2012. An evaluation of the Trail Lakes salmon hatchery for consistency with statewide policies and prescribed management practice . Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J12-21, Anchorage.

TABLE OF CONTENTS

Page

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

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 Trail Lakes Hatchery operated by the Cook Inlet Aquaculture Association. The Trail Lakes Hatchery is a central incubation facility located on the Kenai Peninsula near Seward, Alaska. Gametes are collected offsite, incubated at the hatchery, and progeny released at freshwater and saltwater locations in Cook Inlet and Resurrection Bay, Alaska. No fry are released directly from the hatchery.

Current projects include stocking juvenile sockeye salmon in lakes with barriers to adult migration (e.g., waterfalls), lakes with limited spawning area relative to available rearing habitat, and saltwater net pens for short-term rearing and imprinting prior to release. Coho salmon juveniles are stocked into Bear Lake, which drains into Resurrection Bay.

Administrative and typographic errors were found in a small number of permits and additional review processes have been implemented to improve permit evaluations. The hatchery is otherwise operating in general accordance with Alaska policies and prescribed practices for genetics, fish health, and fisheries management. Estimates of the enhanced fish harvest should be improved to evaluate returns to each project.

Key words: Trail Lakes Hatchery, hatchery evaluation, hatchery, Cook Inlet Aquaculture Association

INTRODUCTION

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

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

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

Salmon restoration efforts came in response to statewide annual salmon harvests of 30 million fish, among the lowest catches since 1900 (Figure 1, ADF&G 2012). The FRED Division and PNPs engaged in a variety of activities to increase salmon production. New hatcheries were built to raise salmon, fish ladders were constructed to provide adult salmon access to previously non-utilized spawning and rearing areas, lakes with waterfall outlets too high for adult salmon to ascend were stocked with salmon fry, log jams were removed in streams to enable returning adults to reach spawning areas, and nursery lakes were fertilized to increase juvenile salmon growth (FRED 1975). A combination of favorable environmental conditions, limited fishing effort, abundance-based harvest management, habitat improvement, and hatchery production gradually boosted salmon catches, with recent commercial salmon harvests (2002–2011) averaging 170 million fish (Vercessi 2012).

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

Alaska hatcheries do not grow fish to adulthood, but incubate fertilized eggs and release resulting progeny. Juvenile salmon imprint on the release site and return to the release location as mature adults. Per state policy, hatcheries generally use stocks taken from close proximity to the hatchery so that any straying of hatchery returns will have similar genetic makeup as the stocks from nearby streams. 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. Fish farming of salmon is not currently legal in Alaska; it is prohibited under Alaska Statue 16.40.210.

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

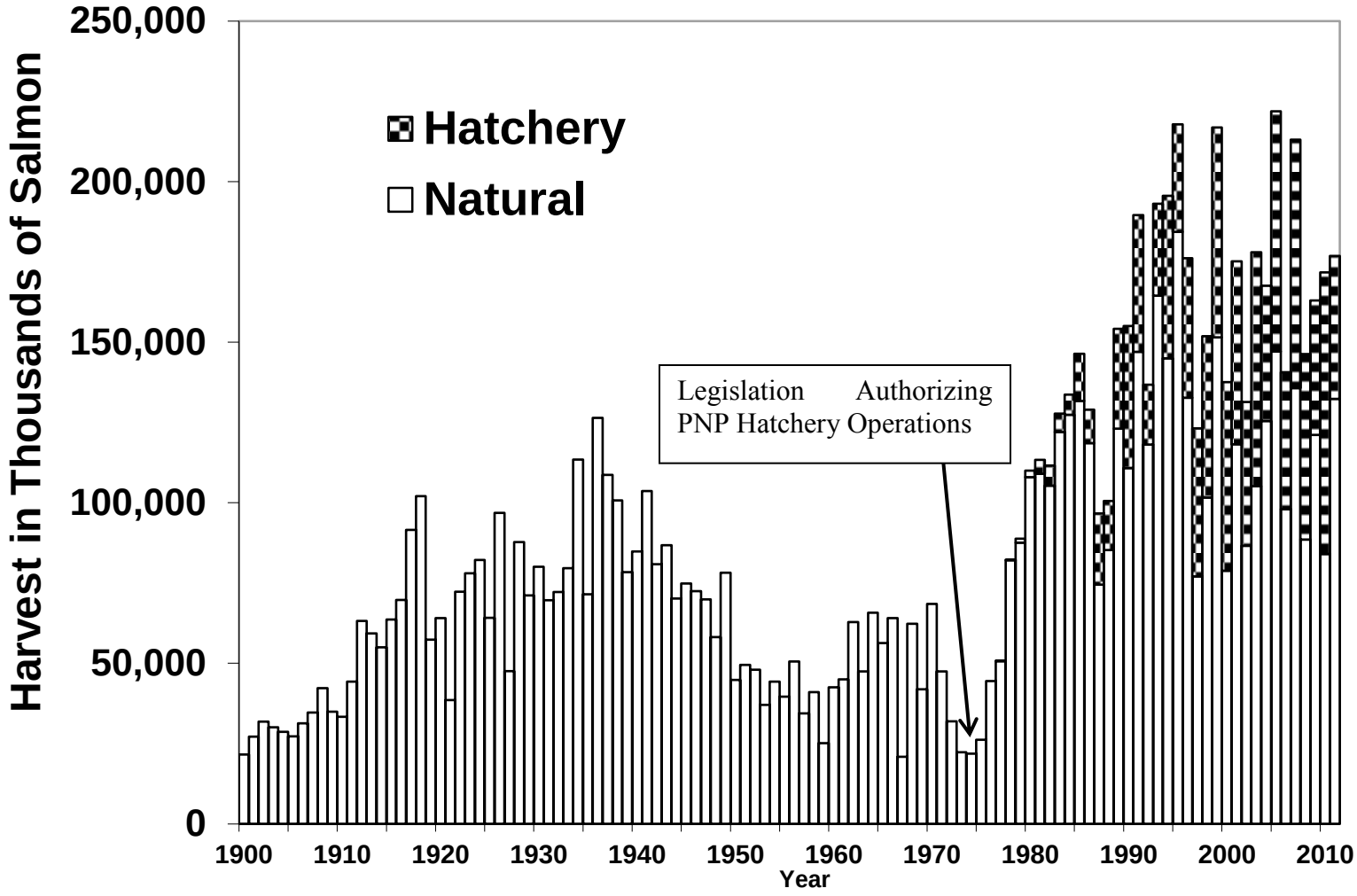

Figure 1.–Commercial salmon harvest in Alaska, 1900–2011.

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

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

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

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

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

---

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

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

Part of the reason for the rise in price of Alaska salmon was a message of sustainable fisheries management to a growing audience of discriminating buyers. The Alaska Seafood Marketing Institute (ASMI) applied to the Marine Stewardship Council (MSC) for certification as a sustainably managed fishery. In 2000, the MSC certified the salmon fisheries managed by ADF&G as sustainably managed, and the state's salmon fisheries remained the only MSC certified salmon fishery in the world for nearly a decade. Salmon fisheries elsewhere (Annette Islands Indian Reserve salmon, British Columbia pink and sockeye salmon, and Iturup Island, Russia, pink and chum salmon) were later certified for much smaller geographic areas, and in some cases, only for specific salmon species (MSC 2012). Alaska's certification was MSC's broadest and most complex, covering all five salmon species harvested by all fishing gear types in all parts of the state. Achievement of statewide certification was a reflection of the state's commitment to abundance-based fisheries management and constitutional mandate to sustain wild salmon populations.

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

ASMI changed to a new sustainable fishery certification under the Food and Agriculture Organization in 2011. The hatchery evaluations started under the MSC certification continued to be 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, and Stopha and Musslewhite (2012) completed the hatchery review for Tutka Bay Lagoon Hatchery in Cook Inlet. This report for the Trail Lakes Hatchery (TLH) is the second for the Cook Inlet region. Following completion of hatchery reviews in Cook Inlet, reviews of hatcheries in Prince William Sound, Southern Southeast Alaska, and Northern Southeast Alaska will follow.

OVERVIEW OF POLICIES

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

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

ADF&G staff to assess hatchery operations for genetic, health, and fishery management issues in the permitting process.

The State of Alaska ADF&G *Genetic Policy* (Davis et al. 1985; Davis and Burkett 1989) sets out restrictions and guidelines for stock transport, protection of wild stocks, and maintenance of genetic variance. Policy guidelines include banning importation of salmonids from outside the state for enhancement (except transboundary rivers); restricting transportation of stocks between the major geographic areas in the state (Southeast, Kodiak Island, Prince William Sound, Cook Inlet, Bristol Bay, Arctic-Yukon-Kuskokwim, and Interior); requiring the use of broodstock with appropriate phenotypic characteristics; maintaining genetic diversity by use of large populations of broodstock collected across the entire run; and limiting the number of hatchery stocks derived from a single donor stock.

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

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

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

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

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

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

OVERVIEW OF HATCHERY PERMITS AND PLANS

The FRED Division built and operated several hatcheries across the state in the 1970s and gradually transferred operations of most facilities to PNP corporations. Regional aquaculture associations (RAAs), comprised primarily of commercial salmon fishing permit holders, operate most of the PNP hatcheries in Kodiak, Cook Inlet, Prince William Sound, and Southeast Alaska. Each RAA's board of directors establish goals for enhanced production, oversee business operations of the hatcheries, and work with ADF&G staff to comply with state permitting and planning regulations. RAAs may vote to impose a salmon enhancement tax on sale of salmon by permit holders in their region to finance hatchery operations. Independent PNP corporations, not affiliated with a RAA, also operate hatcheries in several areas of the state. Both the RAAs and independent PNP hatchery organizations may harvest salmon returning to their hatcheries or release sites to pay for operations. These salmon are referred to as the "cost recovery" harvest. Several organizations have tourist and educational programs that contribute to the financial support of their programs, as well.

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

Alaska PNP hatcheries operate under four documents required in regulation (5 AAC 40.110–990 and 5 AAC 41.005–100) and statute (AS 16.05.092): hatchery permit with basic management plan (BMP), annual management plan (AMP), fish transport permit (FTP), and annual report (Figure 2). The hatchery permit authorizes operation of the hatchery, specifies the maximum number of eggs of each species that a facility can incubate, specifies the authorized release locations, and may identify stocks used for broodstock. The BMP is an addendum to the hatchery permit and outlines the general operations of the hatchery. The BMP may describe the facility design, operational protocols, hatchery practices, broodstock development schedule, donor stocks, harvest management, release sites, and consideration of wild stock management.

The BMP functions as part of the hatchery permit and the two documents should be revised together if the permit is altered. The permit and BMP are not transferrable. Permits remain in effect unless revoked or withdrawn.

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

The AMP outlines operations for the current year and is in effect until superseded by the following year's AMP. 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, AMP's include the upcoming year's egg-take goals, fry or smolt releases, expected adult returns, harvest management plans, FTPs required or in place (described below), and fish culture techniques. The AMP must be consistent with the hatchery permit and BMP.

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

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

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

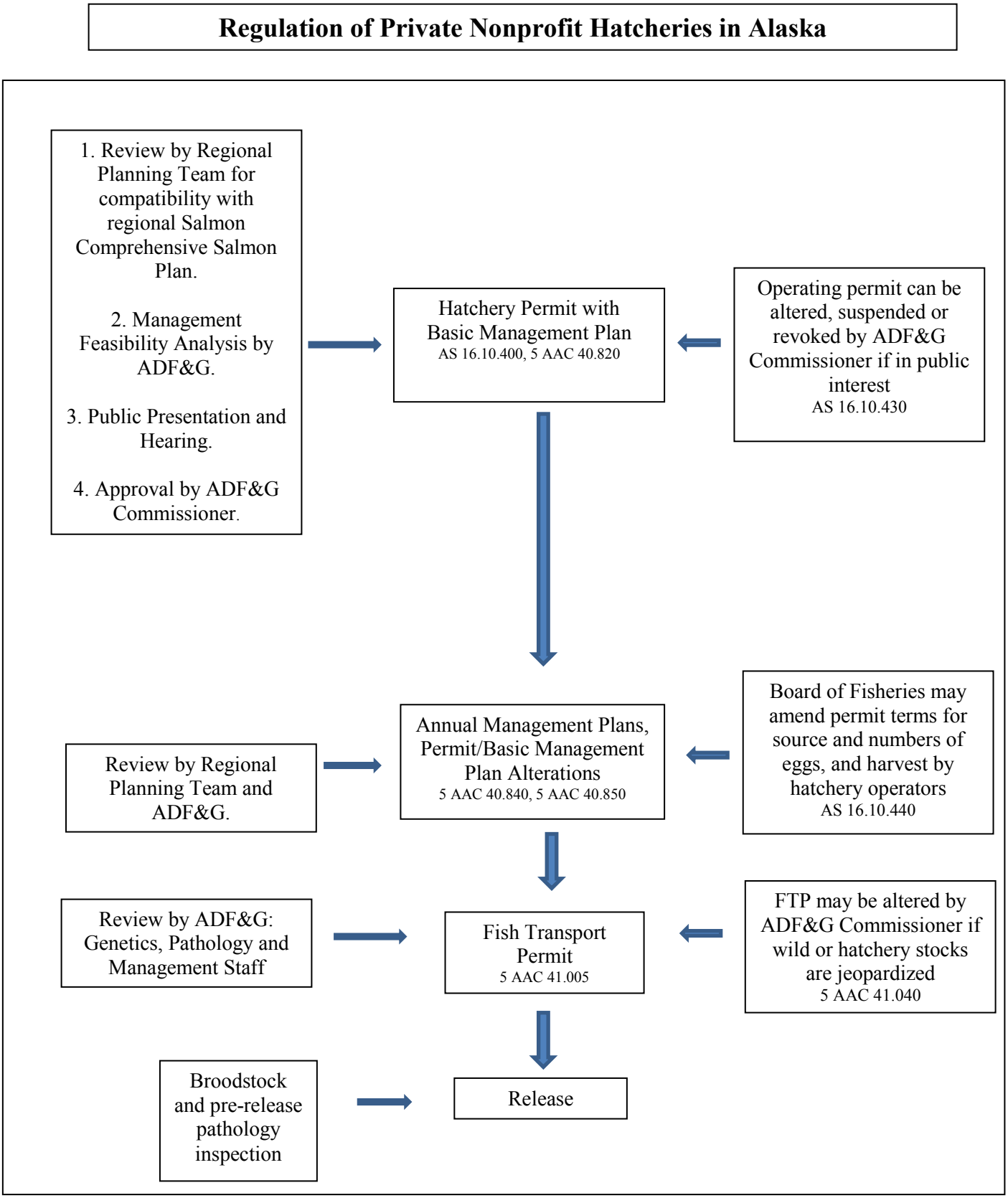

Figure 2.–Diagram of Alaska hatchery permitting process.

TRAIL LAKES HATCHERY OVERVIEW

CIAA is the RAA for Cook Inlet, and operates the TLH. The CIAA Board of Directors has 27 members. Five board members are elected by commercial fishermen. The remaining seats are appointed by commercial fishing groups (12 seats), local municipalities (7 seats) and other organizations (3 seats).

TLH, located near Moose Pass on the Kenai Peninsula, was constructed and operated by the FRED Division as a central incubation facility in 1982 (Figure 3). In 1988, operation of the hatchery was contracted to CIAA. The State of Alaska continues to own the facility. TLH has a permitted capacity of 30 million sockeye salmon eggs, 6 million coho salmon eggs, and 4 million Chinook salmon eggs. The hatchery is an important component of salmon fisheries enhancement in the Cook Inlet region, incubating eggs and rearing juvenile salmon for stocking in numerous lakes and saltwater release sites.

Since 1989, TLH sockeye salmon annual releases of juvenile fish ranged from 1.1 million in 2001 to nearly 19 million in 2002 (Appendix A). Sockeye salmon returns peaked in the early 2000s, when a 2003 court ruling terminated use of Tustumena Lake salmon broodstock as a source of sockeye salmon fry for several projects around Cook Inlet, causing a dramatic reduction in sockeye returns thereafter (Appendix C). Coho salmon releases ranged from 75,000 in 1996 to 1.3 million in 1989 (Appendix B). The principal coho salmon project is at Bear Lake, which primarily supports the sport fishery in Resurrection Bay (Appendix D).

PROGRAM EVALUATIONS

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

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

The hatchery permit and BMP do not expire. The BMP should be updated when any permit amendments are approved through PARs. CIAA is diligent in this process, submitting an updated BMP with each PAR.

The 2011 AMP provides thorough documentation of expected operations for the season, including egg-take and release goals, expected returns, new construction and maintenance, plans for thermal marking, a listing of current FTPs, and potential projects that may occur subject to FTP or PAR approval. The AMP is also consistent with the permit and BMP.

The current TLH program requires over 25 FTPs for projects in Cook Inlet and Resurrection Bay (Appendix E). Each FTP was reviewed and approved by numerous ADF&G personnel. Permit duration was limited in some instances by the state fish pathologist to evaluate progress toward UV treatment of the TLH water supply, and by the geneticist to evaluate the potential of straying when stock sources were changed. Some FTPs stipulate that ADF&G will estimate sport and personal use fishery harvests to assess hatchery returns. However, catch estimates in many of these fisheries have not been updated for nearly 20 years.

The evaluation plans in the 2011 AMP include thermal marking of all releases, limnological studies, weirs for counting smolt and adults, and monitoring for strays. As part of the Hidden Lake sockeye salmon project on the Kenai River drainage, CIAA conducts an ongoing monitoring study for strays in other parts of the Kenai drainage. Formal sampling projects to estimate the hatchery contribution in the harvest or to systematically monitor streams near enhancement activities for strays were not required for most other projects.

Over a dozen projects have been permitted since CIAA took over operations of TLH from ADF&G in 1988 (Appendices F and G). Some projects have been suspended, new projects started, and others continued with little change. For clarity, each project was assessed separately. Permitted egg takes, release numbers, and broodstock sources were compared among the hatchery permit/BMP, AMP, FTPs, and annual report documents for agreement.

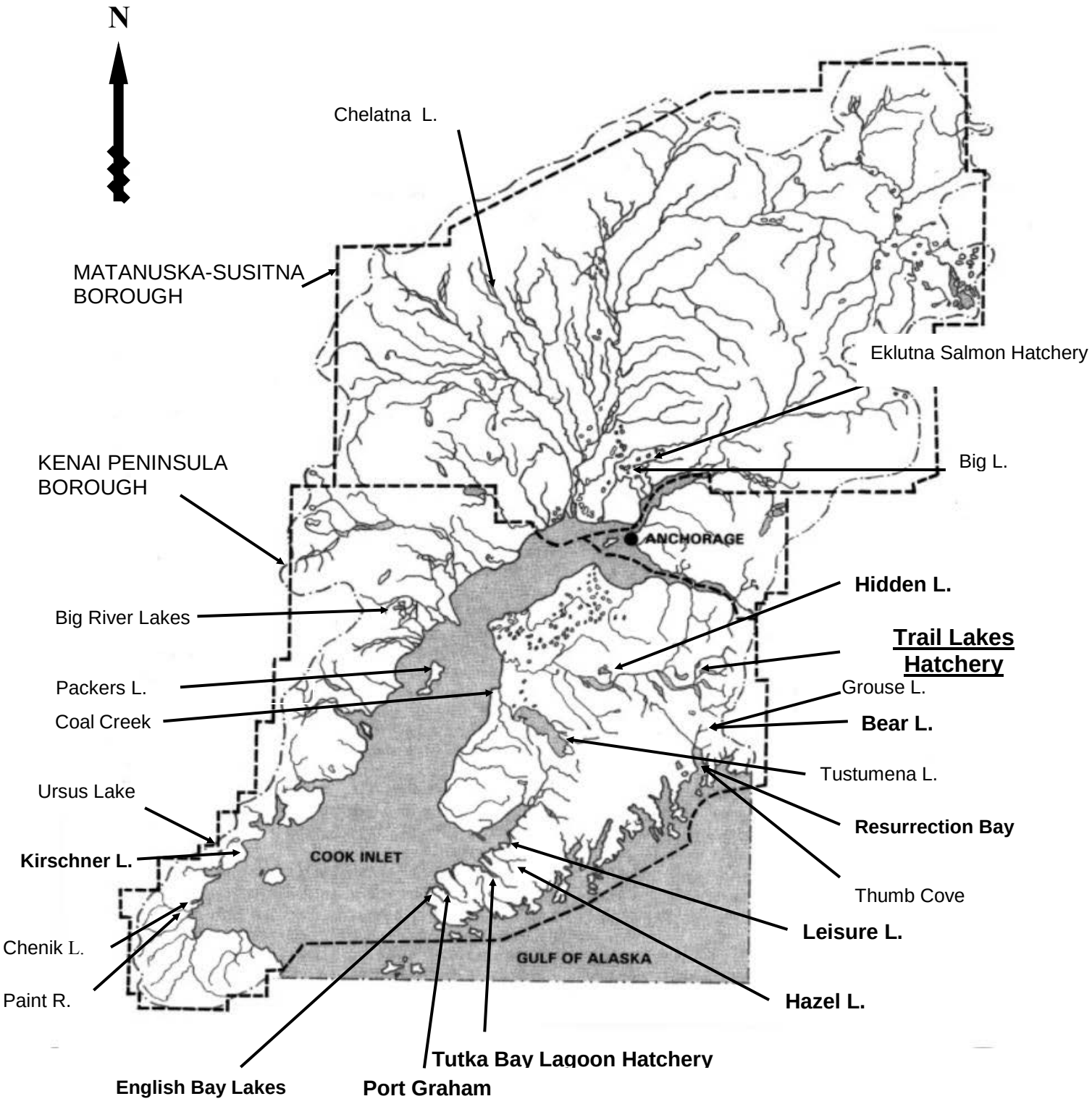

Figure 3.–Trail Lakes Hatchery and Cook Inlet Aquaculture Association project locations. Current projects in bold.

SUSPENDED HATCHERY PROGRAMS

CHELATNA LAKE SOCKEYE SALMON PROJECT

Chelatna Lake is located in the Susitna Valley, and is drained by Lake Creek, a tributary of the Yentna River (Figure 3). The enhancement project was intended to increase sockeye production through stocking fry into a productive, but underutilized habitat (ADF&G 2011b). Gametes were collected from adult Chelatna Lake sockeye salmon, incubated at TLH, and resulting fry released back to the lake the following year. CIAA stocked Chelatna Lake from 1990 to 1996, at which time the returning adult population appeared self-sustaining with a harvestable surplus. A comparison of management plans and permits indicate that reported egg-take numbers slightly exceeded permitted levels in most years, but recommended release levels from the AMP did not (Table 1). Permits and plans were in agreement and FTPs were kept current.

Table 1.–Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits, and annual reports for the Chelatna Lake sockeye salmon project at Trail Lakes Hatchery, in millions, 1990–1996.

	Basic Management Plan in Effect	Annual Management Plan		Fish Transport Permit [a]			Annual Report	
Year	Eggs	Eggs	Release	FTP No.	Expiration	Eggs	Eggs	Release
1990	2.0	2.0		89A-0028	1993	2.0	1.6	.504
1991	2.0	2.0				2.0	2.1	.635
1992	2.0	2.0	1.6			2.0	2.5	1.1
1993	2.0	2.0	1.6	93A-0034	1997	2.0	2.5	1.0
1994	2.0	2.0	2.0			2.0	2.3	1.3
1995	2.0	2.0	2.0			2.0	2.0	1.8
1996	2.0	2.0				2.0		1.0

[a] As part of the project, FTP 89A-0014 (not listed above) allowed Judd Lake broodstock to be taken as a backup to Chelatna Lake sockeye salmon, but no Judd Lake gametes were ever used for the project.

PACKERS LAKE SOCKEYE SALMON PROJECT

Packers Lake is located on Kalgin Island in north central Cook Inlet (Figure 3) and had numerous enhancement activities over the years. In 1973, ADF&G applied rotenone to the lake to remove competitor species of sockeye salmon. Later activities included construction of a flow control structure at the outlet stream, lake fertilization, and stocking (ADF&G 2011). CIAA and ADF&G jointly started the Packers Lake sockeye salmon stocking project in 1987. CIAA operated a field camp at Packers Lake from April through September to conduct the egg takes and to monitor outmigrating smolt and returning adults.

Gametes were collected from Packers Lake sockeye salmon, incubated at TLH, and fry planted in the lake the following year. The permitted egg take at the beginning of the project (Appendix F, FTP 87A-1005) was limited to 700 ripe females, but supporting documentation attached to the FTP indicated an egg-take goal of 5.0 million eggs, with an expected release of 3.5 to 4.0 million fingerlings. The first BMP and AMP issued to CIAA for TLH in 1989 specified an egg-take limit of 4.0 million eggs and the reported egg takes on annual reports from 1990 to 1992 were about 4.1 million eggs each year (Table 2). An FTP issued in 1993 specified an egg take of 4.0 million eggs and a release level of 3.2 million fry.

Packers Lake was stocked with fry from 1989 to 1997. The program produced annual adult returns of over 100,000 fish from 1990 to 1996 (Appendix C). Reported egg takes were slightly above the permitted levels in most years. Releases were generally less than permitted levels. Release level reductions in 1996 and 1997 were recommended by ADF&G staff as a precaution against potentially overstocking the lake based on smolt size and age (G. Fandrei, Executive Director, CIAA, personal communication; Table 2).

The Alaska Board of Fisheries moved the closing date of the commercial drift gillnet fishery that harvested Packers Lake sockeye to an earlier date (the first week in August) in about 1996. A substantial number of sockeye salmon return to Packers Lake after this date and therefore were no longer available to the commercial fleet paying for the enhancement project (G. Fandrei, Executive Director, CIAA, personal communication). The combination of high operational costs and regulatory changes prompted the CIAA board to suspend the project in 1997.

Table 2.–Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits and annual reports, in millions, for the Packers Lake sockeye salmon project at Trail Lakes Hatchery, 1987–1997.

	Basic Management Plan	Annual Management Plan		Fish Transport Permit				Annual Report	
Year	Eggs	Eggs	Release	FTP No. in Effect	Expires	Eggs	Release	Eggs	Release
1987	[a]	[a]	[a]	87A-1005	1992	[b]		[a]	[a]
1988	[a]	[a]	[a]			[b]		[a]	[a]
1989	4.0	4.0				[b]		[a]	[a]
1990	4.0	4.0				[b]		4.1	2.8
1991	4.0	4.0	2.0			[b]		4.1	2.5
1992	4.0	4.0	3.2			[b]		4.2	3.2
1993	4.0	3.3	2.8	93A-0037	2003	4.0	3.2	4.0	3.3
1994	4.0	5.7	2.8			4.0	3.2	4.5	2.8
1995	4.0	3.2	1.5			4.0	3.2	3.1	1.6
1996	4.0	3.7				4.0	3.2	2.4	0.688
1997	4.0	3.7	0.750			4.0	3.2	2.0	0.627

[a] CIAA took over operation of TLH in 1988. Basic and annual management plans were then developed in 1989 and Annual Reports in 1990.

[b] FTP 87A-0005 allowed for use of 500 ripe female broodstock, but did not specify a specific egg-take level.

BIG LAKE SOCKEYE SALMON PROJECT

Big Lake is located in the Matanuska-Susitna Valley, about 15 miles west of Wasilla (Figure 3). Meadow Creek is the main tributary of Big Lake and drains over 30 lakes and ponds. The lake outlet is Fish Creek, which flows into Knik Arm (Chlupach and Kyle 1990). FRED Division began sockeye salmon enhancement activities at Big Lake in 1975 with a hatchery on Meadow Creek. CIAA took over operations in 1993 from ADF&G, when the project was transferred by PAR approval to CIAA's Eklutna Salmon Hatchery. A PAR approved in 2000 transferred the project from Eklutna to TLH (Appendix G).

From 1998 to 2005, fry were released at two sites: 3.0 million fry at the Big Lake Hatchery site and 2.0 million fry further upstream on Meadow Creek watershed (Blodgett Lake). After 2006, the release site stated in the BMP was simply "above the Big Lake Hatchery site." The initial

FTP (98A-0057) issued in 1998 was reissued in 2002 as FTP 02A-0049 without substantive change.

In 2006, two FTPs (06A-0058 and 06A-0060) were issued to change the release strategy in an experiment to see if fry survival could be improved. The project had originally released fry only in the spring. The 2006 FTPs provided for releases of one-third of the fry in the spring, one-third of the fry in the fall, and one-third as smolt the following spring. The project was suspended in 2008 due to continued poor survival of juveniles in the Big Lake system (G. Fandrei, Executive Director, CIAA, personal communication). Egg takes slightly exceeded permitted levels in several years, but fry releases were within permitted limits (Table 3).

Table 3.–Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits and annual reports for the Big Lake sockeye salmon project at Trail Lakes Hatchery, in millions, 1998–2008.

	Basic Management Plan		Annual Management Plan		Fishery Transport Permit				Annual Report	
Year	Eggs	Fry	Eggs	Fry	FTP No.	Expire	Eggs	Fry	Eggs	Fry
1998			7.75 [a]		98A-0057	2002	6.25	5.0	5.1	
1999			8.25 [a]	3.2 [b]					1.5	0.197
2000			6.25	0.846					3.6	0.846
2001	6.25	5.0	6.25	0[c]					6.3	0[c]
2002	6.25	5.0	6.25	4.7	02A-0049	2007	6.25	5.0	6.3	4.3
2003	6.25	5.0	6.25	4.0					7.0	3.6
2004	6.25	5.0	6.25	5.0					2.6	5.0
2005	6.25	5.0	6.25	1.9					2.2	1.7
2006	6.25	5.0	6.25	1.2 [d]	06A-0060 and 06A-0058	2008	2.5	2.0 [e]	6.5	0.87
2007	6.25	5.0	5.0	3.7 [f]					4.9	4.8
2008	6.25	5.0	3.75	3.4 [g]	08A-0024	2010	1.25	1.0 [h]		4.0

[a] Includes 6.25 million eggs for Big Lake project and balance for Grouse Lake project.
[b] Stocked 1.6 million fry in Meadow Cr (Big Lake) and 1.6 million fry in Grouse Lake.
[c] All fry destroyed due to Infectious Hematopoietic Necrosis Virus (IHNV).
[d] Released 400,000 as spring fry, 400,000 as fall fry, and 400,000 as smolt in 2007.
[e] 1.0 million fry and 1.0 million smolt release limit.
[f] Released 3.25 million as spring fry and 400,000 as fall fry.
[g] Released 3 million as spring fry, 200,000 as fall fry, and 200,000 as smolt.
[h] Smolt.

GROUSE LAKE SOCKEYE SALMON PROJECT

Grouse Lake is located on the Kenai Peninsula eight miles north of Seward (Figure 3). The lake outlet stream, Grouse Creek, empties into Bear Creek, which empties into Resurrection Bay. The Territory of Alaska built a hatchery at Grouse Lake in 1924, and raised sockeye, Chinook and pink salmon. When a fire destroyed the hatchery in 1927, it was not rebuilt (Cook and Norris, 1998). Grouse Lake was stocked with coho salmon smolt by ADF&G from 1974 to 1983, using broodstock from Bear Lake in some years and Seward Lagoon in others (McHenry 1982, ADF&G Coded Wire Tag Lab database). Some stocking was also done from CIAA's Eklutna Salmon Hatchery in 1995, 1997 and 1998.

The Grouse Lake sockeye salmon project was authorized by an amendment to the TLH hatchery permit in 1994 (Appendix G). The project was initiated to increase cost-recovery revenue for CIAA. Packers Lake was approved as the initial broodstock for the project by FTP in 1994, and Tustumena Lake added as a second broodstock source in 1995. All eggs were incubated at TLH.

The BMP initially permitted an egg-take limit of 3.34 million eggs and a smolt release limit of 1.67 million. In 1997, the permit was amended to allow all progeny of the egg take to be stocked into Grouse Lake. No releases occurred in 1996 because no fry were available from broodstock sources. In 1999, there were no releases because fry were destroyed due to Infectious Hematopoietic Necrosis Virus (IHNV). The program was suspended in 2000 due to difficulty conducting cost-recovery harvests of the Grouse Lake fish. Stocking limits for Grouse Lake were within permitted limits for all years. Plans and permits were in agreement (Table 4).

Table 4.–Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits and annual reports, in millions, for the Grouse Lake sockeye salmon project at Trail Lakes Hatchery, 1994–2000.

	Basic Management Plan		Annual Management Plan		Fish Transport Permit				Annual Report	
Year	Eggs	Smolt	Eggs	Smolt	FTP No.	Expires	Eggs	Smolt	Eggs	Fry
1994	3.34	1.67	1.7 [a]	0.600	94A-0059	1999	3.34 [a]	1.67		0.57
1995			1.7 [a]	1.1	95A-0009	1999	3.34 [b]	1.67		0.79
1996			1.7 [a]							
1997	3.34	3.34	1.7 [a]	1.8	95A-0009	1999	3.34 [b]	3.34 [c]		1.9
1998			1.7 [b] [e]	1.3 [f]	98A-0058	2002	3.34 [d]	3.34		1.3
1999										
2000				[g]	95A-0009	1999	3.34 [b]	3.34		

[a] Packers Lake broodstock.
[b] Tustumena Lake broodstock.
[c] FTP 95A-0009 amended to allow all resulting progeny of the 3.34 million eggs taken to be stocked into Grouse Lake.
[d] Big Lake broodstock.
[e] 1.5 million egg-take goal from Tustumena Lake for Grouse Lake releases. In addition, egg take for Grouse Lake and other release sites were to be from permitted 8.25 million Big Lake broodstock egg take, but no specific egg-take goal listed for Grouse Lake alone in the AMP.
[f] No Tustumena Lake progeny held for Grouse Lake in 1999. Packers Lake progeny assigned to Grouse Lake were diagnosed with IHNV and destroyed.
[g] Big Lake stock smolt held for release in 2000 were destroyed due to IHNV.

TUSTUMENA LAKE SOCKEYE SALMON

ADF&G initiated the Tustumena Lake sockeye salmon project in 1974 at the Crooked Creek Hatchery. CIAA assumed operation of Crooked Creek Hatchery in 1993, and in 1996, transferred the project by approved PAR from Crooked Creek Hatchery to TLH (Appendix G). The project included rearing of eggs collected from sockeye salmon returning to Tustumena Lake, and stocking the progeny back into Tustumena Lake, as well as to numerous fishery enhancement projects around Cook Inlet collectively known as the Lower Cook Inlet (LCI) lakes project. In December 2003, the 9th Circuit Court ruled the Tustumena Lake enhancement project violated the 1962 Wilderness Act and ordered the project be terminated. No egg collections have occurred since 2003 and the last fry were stocked into Tustumena Lake in 2004.

The BMP permitted an annual egg-take limit of up to 25 million eggs and a fry release limit of 6 million fry to Tustumena Lake. Plans and permits were in agreement (Table 5).

Table 5.–Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits and annual reports, in millions, for the Tustumena Lake sockeye salmon project at Trail Lakes Hatchery, 1996–2004.

	Basic Management Plan		Annual Management Plan		Fish Transport Permit				Annual Report	
Year	Eggs	Fry	Eggs	Fry	FTP No.	Expires	Eggs	Fry	Eggs	Fry
1996	225	6	1.7		96A-0086	2007	6.0	6.0	1.245	
1997			8.9	6.0					6.849	6.013
1998			7.5	5.9					13.382[b]	4.558
1999			7.5	6.0					14.984[b]	5.948
2000			7.5	6.0					11.810[b]	5.432
2001			7.5	0[a]					12.037[b]	0[a]
2002			7.5	6.0					11.721[b]	6.065
2003			7.5	6.0					10.936[b]	6.024
2004			7.5	6.0						6.006

[a] Fry destroyed due to IHNV outbreak.
[b] Eggs in excess of 7.5 million were for LCI lakes project.

CURRENT HATCHERY PROGRAMS

Current CIAA projects at TLH include sockeye salmon projects at Hidden Lake, Bear Lake, and English Bay Lakes and the coho salmon project at Bear Lake. These programs take gametes from adults returning to the respective lake, incubate the eggs at TLH, and return fry back to the donor lake. Sockeye salmon fry are also stocked in saltwater release sites (Tutka Bay Lagoon, Port Graham, and Resurrection Bay) and lakes with waterfall barriers (Leisure, Hazel and Kirschner Lakes).

HIDDEN LAKE SOCKEYE SALMON PROJECT

Hidden Lake is located in the Kenai River drainage (Figure 3). The lake outlet stream, Hidden Creek, empties into Skilak Lake. FRED Division initiated the Hidden Lake project in 1976, and operated it until CIAA took over operations in 1989. CIAA operates a weir at Hidden Lake to estimate smolt emigration, adult migration, and ratio of wild and hatchery fish for outmigrating smolt and returning adults.

Hidden Lake has limited sockeye salmon spawning habitat in comparison to the available habitat for rearing fry (Litchfield and Flagg 1988). Egg takes at Hidden Lake are limited to the number of eggs which are projected to yield adult return escapements to the lake of 30,000 fish. The average adult escapement of 30,000 fish was considered an appropriate escapement goal to avoid altering the level of primary productivity, which might shift the zooplankton community to species not utilized by rearing sockeye fry (Weber 2011). The escapement goal includes broodstock for egg takes, which historically range from about 1,000 to 4,000 fish (Weber 2011).

The egg-take objective in any given year is based on the most recent four-year average smolt emigration, egg-to-fry survival, fry-to-smolt survival, and harvest rate. From 2007 to 2010, an

average of about 60% of smolts emigrating from, and adults returning to, Hidden Lake were from the enhancement project (Weber 2011).

The permitted limit for the Hidden Lake project was 10 million eggs when CIAA took over the project in 1988. This level of egg take would have allowed for adequate escapement for natural and enhancement spawning needs, as well as a cost recovery harvest. Due to mixed stocks migrating up the Kenai River with the Hidden Lake sockeye salmon, cost recovery was only feasible at the Hidden Lake weir, after the Hidden Lake stock separated from other stocks in the watershed. Hidden Lake and the outlet stream are located within the Kenai National Wildlife Refuge, and subject to permitting by the U.S. Fish and Wildlife Service (USFWS). The USFWS would not allow a cost recovery harvest (D. Doshier, 1989 USFWS comments to the draft Basic Management Plan for Trail Lakes Hatchery. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau, Alaska). As a result, although the annual egg-take limit for the Hidden Lake project remained at 10 million in the TLH BMP, FTPs limit egg takes to about 2.2 million eggs, which is the number of eggs necessary to sustain the return for escapement and enhancement broodstock.

In 2003, a court ruling terminated use of Tustumena Lake salmon for enhancement projects. Tustumena Lake broodstock was used for LCI lakes projects. An interim plan was developed by CIAA, ADF&G, and the USFWS. The USFWS permitted CIAA to increase egg takes at Hidden Lake to replace Tustumena Lake production through 2009. In addition, Hidden Lake broodstock were used to supply a broodstock development program at Tutka Bay Lagoon. Adult returns to Tutka Bay Lagoon from the Hidden Lake smolt releases were to be utilized as the LCI lakes project brood source.

In 2006, the ADF&G commissioner approved a PAR and the BMP was amended, changing the Hidden Lake egg-take limit from 10.0 million to 7.336 million, which reflected the combined egg-take requirements for the Hidden Lake project, the LCI lakes project, and releases from Tutka Bay (Appendix G). Adult returns to Tutka Bay Lagoon were to serve as broodstock for the LCI projects after 2009. Although the release site at Tutka Bay provided adequate returns for broodstock for the LCI lakes project by 2010, the Hidden Lake stock did not work well as a brood source for the Cook Inlet projects because of delayed maturation of broodstock and consequential late timing of emergent fry. The brood source for the Tutka Bay release site was changed from Hidden Lake to English Bay Lakes in 2011.

From 1988 to 1993, a cooperative agreement between the ADF&G and CIAA provided that ADF&G would secure all necessary permits for conducting sockeye salmon activities at Hidden Lake. CIAA took over full responsibility for the project in 1993 (G. Fandrei, Executive Director, CIAA, personal communication). The first FTP issued to CIAA for the Hidden Lake project was issued in 1993 for a 2.2 million egg take. Later FTP's increased egg takes to provide fry for stocking area projects as described above (Appendix E). Comments in FTP 08A-0091 noted concern that adults resulting from hatchery production returning to Hidden Lake might be used as broodstock, contrary to *Genetic Policy*, which does not allow "more than one generation of separation from the donor system to stocking of the progeny" in stock rehabilitation and enhancement situations. The geneticist recommended that broodstock collection and fry releases occur at different locations in the lake so that adults from parents that spawned naturally in the lake were used for gamete collection. CIAA and ADF&G entered into a cooperative study to identify a release strategy that would meet the *Genetic Policy*. Stocking and egg take sites were changed in 2012 as a result of the study, which is in press (G. Fandrei, Executive Director,

CIAA,, personal communication). Egg takes and releases have been generally at or below permitted levels (Table 6).

Table 6.– Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits, and annual reports for the Hidden Lake sockeye salmon project at Trail Lakes Hatchery, in millions, 1989–2011.

	Basic Management Plan	Annual Management Plan		Fish Transport Permit			Annual Report	
Year	Eggs	Eggs	Fry Release	FTP No. in Effect	Expires	Eggs/ Juvenile Release Limit	Eggs	Juvenile Release
1989	10	7.0						
1990	10	2.3	1.8-2.0				2.5	1.7
1991	10	2.3	2.0				2.8	1.6
1992	10	2.3	2.0				2.4	1.7
1993	10	2.3	2.0	93A-0036	1997	2.2	2.2	1.9
1994	10	2.3	2.0			2.2	2.2	1.8
1995	10	2.3	2.0			2.2	2.3	1.7
1996	10	2.2	1.6			2.2	2.1	1.6
1997	10	2.2	1.7			2.2	2.6	1.5
1998	10	2.2	1.7	93A-0036	2008	2.2	2.3	1.0
1999	10	2.2	1.7			2.2	2.3	1.5
2000	10	1.5	1.8			2.2	1.5	1.2
2001	10	1.3	0.906			2.2	1.3	0.906
2002	10	1.0	0.900			2.2	1.1	0.980
2003	10	0.900	0.600			2.2	0.890	0.629
2004	10	0.790	0.600			2.2	5.4	0.646
2005	10	0.800	0.600			2.2	2.0	0.573
2006	7.332	5.73 \0.73	0.600			2.2	5.6	0.582
2007	7.332	1.1	0.530			2.2	5.7	0.658
2008	7.332	1.3	0.864	08A-0089 and 08A-0091	2011	2.2	4.0	0.917
2009	7.332	6.2	1.0			2.2	5.1	0.911
2010	7.332	1.1	1.0			2.2	1.2	0.880
2011	7.332	1.2	1.1	08A-0089 and 08A-0091	2014	2.2	1.1	1.0

LOWER COOK INLET LAKES AND ENGLISH BAY LAKES SOCKEYE SALMON

The LCI lakes sockeye salmon program involves stocking barriered lakes (e.g., lakes with a waterfall outlet) with sockeye salmon fry, which then complete their freshwater rearing naturally and emigrate over the barrier to salt water. Eggs are collected from permitted donor sources, incubated at TLH, and fry stocked in the barriered lakes. Adults returning to the LCI projects are primarily harvested in terminal fisheries near the lake outlets and saltwater release sites. Adults cannot ascend the barriers into the lakes to spawn.

Nine lakes were stocked with fry plants over the years (Leisure, Hazel, Kirschner, Upper Paint, Lower Paint, Chenik, Ursus, Bruin, and Elusivak lakes; Hammerstrom and Ford, 2011). Port Dick Lake was also stocked prior to CIAA operating the project (G. Fandrei, Executive Director, CIAA, personal communication). Since 1997, only Leisure, Hazel, and Kirschner lakes have been stocked, except for an experimental release of sockeye salmon fry into Upper Paint Lake in 2002 (Trail Lakes Basic Management Plan, April 2011. Unpublished document obtained from Sam Rabung, ADF&G PNP Hatchery Coordinator, Juneau, Alaska).

Numerous operational changes occurred over the history of the LCI lakes program. The program began at Crooked Creek Hatchery (now closed), was transferred to Eklutna Salmon Hatchery in 1996, then to TLH in 2000 (Appendix G). In review of the records, an FTP switched the egg incubation location from Eklutna Salmon Hatchery to TLH in 1998, but the PAR to amend the TLH permit was not approved until 2000. It is unclear if this was an oversight or there was other documentation the author could not locate that otherwise authorized the incubation relocation.

Tustumena Lake was used as a broodstock source for the project from 1998 until the court decision prohibited further egg takes there in 2003. In 2004, CIAA switched to Hidden Lake stock for the LCI lakes project and began developing a broodstock return to the Tutka Bay Lagoon release site.

The Hidden Lake stock proved unsatisfactory for the LCI lakes as described earlier. In 2011, a permit alteration allowed transition to sockeye salmon from English Bay Lakes (EBL), located in Lower Cook Inlet (Figure 3). EBL sockeye salmon return earlier in the summer and should provide a higher value fish.

The EBL fisheries enhancement project began about 20 years ago. Gametes are collected from adult sockeye salmon returning to EBL, incubated offsite, and juveniles are released back into the EBL. Eggs were incubated at the Big Lake Hatchery in the early years of the project. Later, eggs were incubated at the Port Graham Hatchery. The program was contracted by Port Graham Hatchery to TLH in 2007, and then transferred to the TLH permit by approved PAR in 2010. EBL eggs are incubated at TLH and stocked back into EBL as fry. Some fry may also be reared to smolt and released from saltwater net pens in Port Graham Bay.

A PAR approved in 2011 permitted additional gamete collection from EBL for smolt releases at Tutka Bay and fry releases to the LCI lakes. EBL returns to Tutka Bay will be used as the future LCI lakes project broodstock. Returns to the Port Graham release site and EBL will be used to supplement returns to Tutka Bay until the Tutka Bay return alone can supply the necessary gametes.

During the transition to EBL stock, Hidden Lake stock fish returning to Tutka Bay will continue to be used for broodstock to meet overall stocking goals for the LCI lakes project. Both Hidden Lake and EBL origin fish will be returning to Tutka Bay during the transition period. Based on known run timing, gametes will be taken from EBL broodstock returning prior to June 30 and from Hidden Lake broodstock returning after July 21 to keep the two stocks separated. Fish returning between June 30 and July 21 will be harvested. Fry releases to Leisure, Hazel, and Kirschner lakes may be from only one of the stocks in any given year, but may be from different stocks in alternate years.

Permitting from 1998 to 2011 indicated that, for the most part, the BMP was properly amended when PARs were approved and FTPs were current each year (Table 7). Approved PARs were

received as needed when the broodstock sources changed from Tustumena to Hidden Lake to English Bay, as were the FTPs.

CIAA requested an extension of FTP 05A-0095 for Tutka Bay releases in 2005. The request was initially denied because hatchery water-depuration equipment had not been installed at TLH as requested by the ADF&G pathologist. CIAA and ADF&G developed a plan to depurate the water at TLH, but the FTP was not officially issued with the necessary signatures after the plan was approved. The 2005 oversight was discovered in 2010, and ADF&G implemented additional administrative checks to reduce similar errors in the future.

Table 7.–Lower Cook Inlet (LCI) lakes sockeye salmon program permit comparison at Trail Lakes Hatchery, in millions, 1998–2011. The Trail Lakes Hatchery basic management plan, annual management plan, and annual report listed an egg-take limit for the all LCI lakes combined, rather than for each lake.

	Basic Management Plan		Annual Management Plan		Fish Transport Permit				Annual Report	
Release Site	Eggs	Juvenile	Eggs	Release	FTP No. in effect	Expires	Eggs	Juvenile	Eggs	Juvenile
					1998					
LCI Total	4.4 [a,b]		4.37 [a]						4.0 [a,b]	
Hazel Lake		1.25 [a,b]		1.25	98A-0059	2002	1.56 [a]	1.25 [a]		1.2 [c]
Leisure Lake		2.0 [a,b]		2.0	98A-0061	2002	2.5 [a]	2.0 [a]		1.9 [c]
Kirschner Lake		0.250 [a,b]		0.250	98A-0060	2002	0.31 [a]	0.25 [a]		0.234 [c]
					1999					
LCI Total	4.4 [a,b]		4.37 [a]						15.0 [a,d]	
Hazel Lake		1.25 [a,b]		1.25	98A-0059	2002	1.56 [a]	1.25 [a]		0.453
Leisure Lake		2.0 [a,b]		2.0	98A-0061	2002	2.5 [a]	2.0 [a]		0.265
Kirschner Lake		0.25 [a,b]		0.250	98A-0060	2002	0.31 [a]	0.25 [a]		0.173
					2000					
LCI Total	4.4 [a,b]		4.37 [a]						11.8 [a,d]	
Hazel Lake		1.25 [a,b]		1.25	98A-0059	2002	1.56 [a]	1.25 [a]		1.2 [a]
Leisure Lale		2.0 [a,b]		2.0	98A-0061	2002	2.5 [a]	2.0 [a]		1.7 [a]
Kirschner Lake		0.25 [a,b]		0.250	98A-0060	2002	0.31 [a]	0.25 [a]		0.249 [a]
					2001					
LCI Total	10.0 [a]		4.37 [a]						12.0 [a,d]	
Hazel Lake		1.25 [a]		0.089	98A-0059	2002	1.56 [a]	1.25 [a]		0.089 [a]
Leisure Lake		2.0 [a]			98A-0061	2002	2.5 [a]	2.0 [a]		[e]
Kirschner Lake		0.25 [a]			98A-0060	2002	0.31 [a]	0.25 [a]		[e]
					2002					
LCI Total	10.0 [a]		4.37 [a]						11.7 [a,c]	
Hazel Lake		1.25 [a]		1.25 [a]	98A-0059	2002	1.56 [a]	1.25 [a]		1.3 [a]
Leisure Lake		2.0 [a]		2.0 [a]	98A-0061	2002	2.5 [a]	2.0 [a]		2.2 [a]
Kirschner Lake		0.25 [a]		0.25 [a]	98A-0060	2002	0.31 [a]	0.25 [a]		0.302 [a]
Upper Paint River		1.0 [a]			02A-0054	2002		0.50 [a]		0.508 [a]
					2003					
LCI Total	10.0 [a]		4.37 [a]						10.9 [a,c]	
Hazel Lake		1.25 [a]		1.25 [a]	02A-0050	2007	1.56 [a]	1.25 [a]		1.5 [a]
Leisure Lake		2.0 [a]		2.0 [a]	02A-0052	2007	2.5 [a]	2.0 [a]		2.2 [a]
Kirschner Lake		0.25 [a]		0.25 [a]	02A-0051	2007	0.310 [a]	0.25[a]		0.298 [a]

-continued-

Table 7. Page 2 of 3.

	Basic Management Plan		Annual Management Plan		Fish Transport Permit				Annual Report	
Release Site	Eggs	Juvenile	Eggs	Release	FTP No. in effect	Expires	Eggs	Juvenile	Eggs	Juvenile
					2004					
LCI Total	10.0 [a]		0 [f]						5.4 [g,j]	
Hazel Lake		1.25 [a]		1.25 [a]	04A-0064	2009	1.56 [g]	1.25 [g,h]		0.351 [a]
Leisure Lake		2.0 [a]		2.0 [a]	04A-0066	2009	2.5 [g]	2.0 [g,h]		2.0 [a]
Kirschner Lake		0.25 [a]		0.25 [a]	04A-0065	2009	0.310 [g]	0.25 [g,h]		0.251 [a]
					2005					
LCI Total	10.0 [a]		5.0 [h]						2.0 [g,j]	
Hazel Lake		1.25 [a]		1.25 [g,h]	04A-0064	2009	1.56 [g]	1.25 [g,h]		1.6 [g,h]
Leisure Lake		2.0 [a]		2.0 [g,h]	04A-0066	2009	2.5 [g]	2.0 [g,h]		2.3 [g,h]
Kirschner Lake		0.25 [a]		0.25 [g,h]	04A-0065	2009	0.310 [g]	0.25 [g,h]		0.316 [g,h]
Tutka B.					05A-0095[m]	2010		0.50 [g,i]		0.096 [g,i]
					2006					
LCI Total	5.0 [g]		5.0 [g]						5.6 [g,j]	
Hazel Lake		1.25 [g,h]			04A-0064	2009	1.56 [g]	1.25 [g,h]		
Leisure Lake		2.0 [g,h]		0.70 [g,h]	04A-0066	2009	2.5 [g]	2.0 [g,h]		0.680 [g,h]
Kirschner Lake		0.25 [g,h]			04A-0065	2009	0.31 [g]	0.250 [g,h]		
Tutka B.		0.50 [g,i]		0.25 [g,i]	05A-0095[l]	2010		0.50 [g,i]		0.260 [g,i]
					2007					
LCI Total	5.0 [g]		5.8 [g]						5.7 [g,j]	
Hazel Lake		1.25 [g,h]		1.25 [g,h]	04A-0064	2009	1.56 [g]	1.25 [g]		1.4 [g,h]
Leisure Lake		2.0 [g,h]		2.0 [g,h]	04A-0066	2009	2.5 [g]	2.0 [g]		2.3 [g,h]
Kirschner Lake		0.25 [g,h]		0.25 [g,h]	04A-0065	2009	0.31 [g]	0.25 [g]		0.254 [g,h]
Tutka B.		0.50 [g,i]		0.125 [g,i]	05A-0095[l]	2010		0.50 [g,i]		0.144 [g,i]
					2008					
LCI Total	5.0 [g]		5.8 [g]						4.0 [g,j]	
Hazel Lake		1.25 [g,h]		1.25 [g,h]	04A-0064	2009	1.56 [g]	1.25 [g]		1.2 [g,h]
Leisure Lake		2.0 [g,h]		2.0 [g,h]	04A-0066	2009	2.5 [g]	2.0 [g]		2.1 [g,h]
Kirschner Lake		0.25 [g,h]		0.25 [g,h]	04A-0065	2009	0.31 [g]	0.25 [g]		0.300 [g,h]
Tutka B.		0.50 [g,i]		0.50 [g,i]	08A-0095	2010		0.50 [g,i]	0.103 [k]	0.483 [g,i]

-continued-

Table 7. Page 3 of 3.

	Basic Management Plan		Annual Management Plan		Fish Transport Permit				Annual Report	
Release Site	Eggs	Juvenile	Eggs	Release	FTP No. in effect	Expires	Eggs	Juvenile	Eggs	Juvenile
					2009					
LCI Total	5.0 [g]		5.8 [g]						5.1 [g j]	
Hazel Lake		1.25 [g,h]		1.0 [g,h]	04A-0064	2009	1.56 [g]	1.25 [g]		1.2 [g,h]
Leisure Lake		2.0 [g,h]		1.2 [g,h]	04A-0066	2009	2.5 [g]	2.0 [g]		1.2 [g,h]
Kirschner Lake		0.250 [g,h]			04A-0065	2009	0.31 [g]	0.25 [g]		
Tutka B.		0.500 [g,i]		.30 [g,i]	08A-0095 & 08A-0098	2010	5.1 [k]	0.50 [g,i]	0.140 [k]	0.300 [g,i]
					2010					
LCI Total	5.0 [n]		5.1 [n]							
Hazel Lake		1.25 [n,h]		1.25 [g,h]	08A-0100	2014		1.25 [g]		1.2 [g,h]
Leisure Lake		2.0 [n,h]		1.8 [g,h]	08A-0096	2014		2.0 [g]		1.9 [g,h]
Kirschner Lake		.25 [n,h]		0.25 [g,h]	08A-0102	2014		0.25 [g]		0.255 [g,h]
Tutka B.		0.50 [n,i]		0.28 [g,i]	08A-0095 & 08A-0098	2013 & 2012	5.1 [k]	0.50 [g,i]	3.3 [k]	0.278 [g,i]
English Bay Lakes					10A-0153	2012	1.35			
					10A-0154	2014		1.15 [q]		
					10A-0155	2013		0.2 [r]	1.113	0.202 [s]
					2011					
LCI Total	4.37 [o]		4.37 [o]							
Hazel Lake		1.25 [o]		1.25 [k]	08A-0100	2014		1.25 [g]		1.2 [k]
Leisure Lake		2.0 [o]		0.65 [k]	08A-0096	2014		2.0 [g]		1.4 [k]
Kirschner Lake		0.25 [o]		0.25 [k]	11A-0053	2015		0.25 [g]		0.16 [p]
Tutka B.		0.50 [o]		0.030 [k]	08A-0095 & 08A-0098	2013 & 2012	4.37 [k]	0.50 [g,i]	3.0 [k]	0.282 [g,k]
English Bay Lakes					10A-0153	2012	5.72			
					10A-0154	2014		1.15 [q]		
					10A-0155	2013		0.2 [r]	2.9	0.203 [t]

[a] Eggs or fry from Tustumena Lake broodstock.
[b] Release and egg-take levels listed were under the Eklutna hatchery permit/BMP in 1996. Egg incubation for the program moved from Eklutna Hatchery to TLH in 1998. The TLH BMP was updated to reflect the incubation site change in 2001.
[c] Fry from eggs incubated at Eklutna Hatchery.
[d] Total includes egg take for both LCI lakes and Tustumena Lake releases.
[e] Remaining fry diagnosed with IHNV and destroyed.
[f] Tustumena egg takes terminated due to court ruling in 2003.
[g] Hidden Lake broodstock.
[h] Fry.
[i] Smolt
[j] Egg take for Lower Cook Inlet project and Hidden lake project.
[k] Egg take from Hidden Lake stock returns to Tutka Bay.
[l] This FTP was never approved, but the project proceeded as if it had been approved.
[n] Kenai Lake stock.
[o] Up to 1 M eggs from English Bay lakes and remainder from Hidden Lake stock returns to Tutka Bay.
[p] English Bay Lakes stock.
[q] Smolt stocked to Port Graham.
[r] Smolt stocked to English Bay Second Lake.
[s] Pre-smolt release to English Bay Lakes. These fish were released under the Port Graham Hatchery permit and FTPs, under contract to TLH.
[t] Pre-smolt release to English Bay Lakes. These fish released under the TLH permit after program was transferred from Port Graham Hatchery to TLH in 2010.

BEAR LAKE/RESURRECTION BAY SOCKEYE AND COHO SALMON PROJECTS

Bear Lake is located near Seward. The lake outlet stream, Bear Creek, empties into Resurrection Bay. CIAA conducts enhancement projects for both coho and sockeye salmon at Bear Lake. The lake was treated with rotenone in 1963, 1969, and 1971 by ADF&G to eradicate undesired predator and competitor fish species (Kyle and Koenings 1983; McHenry 1982). Several stocks were used to reintroduce coho and sockeye salmon to the lake over the years, and current stocks are a genetic mix of these activities.

Early run sockeye salmon from both the Upper Russian River (a Kenai River tributary) and Big River (located on the west side of Cook Inlet) were used as initial broodstock for the project. Sockeye salmon are produced primarily for cost recovery and commercial harvest in Resurrection Bay. Gametes are taken from broodstock returning to the lake and incubated at TLH. Some adults are also allowed to spawn naturally in the lake. Some fry are released to the lake in the spring (May–June) and some fry are reared to smolts and released the following year in the outlet creek or from saltwater net pens in Resurrection Bay. The Bear Lake project also provided juveniles for the Grouse Lake project described earlier.

The BMP was amended to increase the sockeye salmon egg take from 4.1 million to 6.0 million in 2001 and from 6.0 million to 7.1 million in 2006. The increased egg takes were for producing additional fish for cost-recovery revenue to support TLH.

From 1963 to 1974, coho salmon fry from Kodiak Island, Southeast Alaska, Oregon, and Kenai Peninsula sources were planted in Bear Lake by ADF&G (Kyle and Koenings 1983). When CIAA took over the program in 1989, the coho salmon return was well established and CIAA has since used only broodstock from adults returning to Bear Lake.

Coho salmon are produced primarily for one of Alaska's largest coho salmon sport fisheries near Seward in Resurrection Bay. Gametes are collected from the weir at the outlet creek and incubated at TLH. Some fry are released back to the lake and outlet creek. Others are released to salt water in Resurrection Bay. Coho salmon fry have also been released at saltwater sites near Homer and Seldovia. The BMP permitted a maximum egg take of 6.0 million coho salmon eggs. Currently, the AMP has an egg collection goal of 560,000 eggs to produce about 450,000 fry for stocking annually into Bear Lake. Coho juveniles may also be stocked at sites near Homer, Seldovia and Seward.

Both coho and sockeye salmon projects were within permitted egg-take and release levels and had proper FTPs for their operations (Tables 8 and 9). Coho salmon releases are substantially lower than permitted levels because sport fish stocking programs in Seward, Seldovia, and Homer were suspended when local municipal funding for the projects ended (G. Fandrei, Executive Director, CIAA, personal communication).

Table 8.– Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits, and annual reports for the Bear Lake sockeye salmon project at Trail Lakes Hatchery, in millions, 1990–2011.

	Basic Management Plan	Annual Management Plan		Fish Transport Permit			Annual Report	
Year	Eggs	Eggs	Fry Release	FTP No. in Effect	Expires	Eggs	Eggs	Juvenile Release
1990	4.1	3.03 [a]	2.45	89A-0018 89A-0019	1994 1994	3.0 3.0	2.73	2.6
1991	4.1	3.03 [a]	2.45				3.98	1.6
1992	4.1	2.2	2.2				3.48	1.5
1993	4.1	4.1	4.1	93A-0032	2003	4.1	0.277	1.8
1994	4.1	4.1	2.2				0.53	0.17
1995	4.1	4.1	4.0				2.04	0.33
1996	4.1	4.1	1.6				0.95	0.781
1997	4.1	4.1	0.95				0.502	0.788
1998	4.1	2.5	0.35				2.6	0.772
1999	4.1	3.0	2.1				2.4	1.4
2000	4.1	6.0 [c]	1.6				5.1	1.8
2001	6.0 [b]	6.0	0.145				6.0	0.145
2002	6.0	6.0	3.2	01A-0011 01A-0012	2006 2006	1.25 [d] 1.75 [e]	6.0	3.2
2003	6.0	6.0	3.52	93A-0032	2008	4.1	5.0	1.8
2004	6.0	6.0	3.2				5.7	3.0
2005	6.0	6.0	2.8				4.0	3.4
2006	7.1	6.0	3.9				6.1	3.4
2007	7.1	6.0	3.1				6.1	3.1
2008	7.1	6.0	3.936	07A-0061	2011	1.536 [e]	6.0	4.0
2009	7.1	7.1	3.936	08A-0090 08A-0069	2011 2011	2.825 eggs Avg. 2.4 fry[f]	5.0	4.22
2010	7.1	6.0	3.9				5.4	3.8
2011	7.1	6.0	2.4				6.0	2.5

[a] Big Lake broodstock; offspring to be stocked in Bear Lake.
[b] If all eggs cannot be collected from Bear Lake stock, Big River and Upper Russian Creek will serve as back up broodstock sources if approved by ADF&G and/or USFWS.
[c] CIAA proposed the increase to 6.0 million eggs in 2000, but did not receive the PAR approval to do so until 2001.
[d] Resulting presmolt stocked to Bear Lake.
[e] Smolt release to Resurrection Bay.
[f] Fry to Bear Lake hatched from eggs under 08A-0090.

Table 9.– Comparison of permitted and reported egg takes and releases in hatchery permit, basic management plan, annual management plan, fishery transport permits, and annual reports for the Bear Lake coho salmon project at Trail Lakes Hatchery, in millions, 1989–2011.

	Basic Management Plan	Annual Management Plan		Fish Transport Permit			Annual Report	
Year	Release[a]	Eggs	Fry Release	FTP No. in Effect	Expires	Release Limit	Eggs	Juvenile Release
1989	0.80 [a]	0.699	0.545				0.932 [J]	0.981
1990	0.80 [a]	0.60	0.38	90A-0053	1990	0.40 fry	0.798	0.917
1991	0.80 [a]	0.60					1.47	0.391
1992	0.80 [a]	1.3 [b]	0.525				1.638	0.256
1993	0.80 [a]	1.3 [b]	0.45	93A-0030	2003	0.45 fry	1.402	0.621
				93A-0032		0.25 Smolt		
1994	0.80 [a]	1.3 [b]	0.45				0.8	0.320
1995	0.80 [a]	1.3 [b]	0.45				1.99	0.516
1996	0.80 [a]	1.8 [b]	0.60				1.49	0.075
1997	0.80 [a]	1.8 [b]	0.60				1.33	0.602
1998	0.80 [a]	0.80	0.60				0.805	0.409
1999	0.80 [a]	0.80	0.535				0.867	0.357
2000	0.80 [a]	0.85	0.525				0.785	0.418
2001	0.80 [a]	0.85	0.43				1.1	0.432
2002	0.80 [a]	0.95	0.57				0	0.529
2003	0.80 [a]	0.95	0.65				1.2	0.658 [c]
								0.103 [d]
2004	0.80 [a]	1.42	0.65	93A-0030	2008	0.45 fry[c]	1.7	0.691 [c]
				93A-0032	2008	0.25 Smolt[c]		0.113 [d]
			0.10	04A-0053	2008	0.15 smolt[d]		0.192 [d]
			0.20	04A-0016[e]	2005	0.20 smolt[e]		
2005	0.80 [a]	1.42	0.65 [c]				1.4	0.893 [c]
			0.10 [d]					0.095 [d]
			0.20 [e]					
2006[f]	0.80 [a]	1.115	0.655 [c]	06A-0059	2008	.235 smolt[g]	1.1	0.562 [c]
			0.20 [d]					0.324 [d]
			0.10 [e]					0.146 [e]
			0.10 [g]					0.114 [g]
2007[h]	0.80 [a]	0.80	0.70 [c]	06A-0080[e]	2007	.004 smolt[k]	0.748	0.758 [c]
			0.10 [d]					0.101 [d]
			0.10 [g]					0.097 [g]
			0.10 [g]					
2008	0.8 [a]	0.8	0.55 [c]				0.574	0.502 [c]
			0.10 [d]					0.095 [d]
			0.10 [g]					0.088 [g]
2009	0.8 [a]	0.638	0.365 [c]	08A-0112	2010	1.125 eggs	0.545	0.338 [c]
			0.09 [d]	08A-0113	2011	0.45 [c]		0.044 [d]
				08A-0114	2012	0.15 [i]		
				04A-0053	2011	0.15 [d]		
				06A-0059	2011	0.15 [g]		
2010	0.8 [a]	0.56	0.45 [c]				0.647	0.435
2011	0.8 [a]	0.56	0.45 [c]				0.578	0.437

[a] Release number is approximately 450,000 for Bear Lake and up to 350,000 for other ADF&G projects.
[b] Includes egg take for Elmendorf Hatchery. AMP lists total, and does not break-out egg take for Bear Lake and egg take for Elmendorf Hatchery.
[c] Bear Lake system releases.
[d] Release at Homer Spit.
[e] Release at Lowell Falls near Seward.

[f] Two FTPs not listed in the table (05A-0069 which expired in 2005 and 06A-0033 which expired in 2006) allowed transport and temporary rearing of eggs and fry under 93A-0030 and 93A-0032 to be incubated at Eklutna Hatchery when Trail Lakes water supply is not sufficient.
[g] Released at Seldovia Bay.
[h] FTP 07A-0016, not listed in table, was issued for same reason as f.
[i] Smolt release to Bear Creek.
[j] Includes egg take for both Bear Lake and Elmendorf Hatchery.
[k] Coho not released from Seward Sealife Center.

COMPREHENSIVE SALMON ENHANCEMENT PLAN

With regard to TLH, the Phase I Cook Inlet Comprehensive Salmon Enhancement Plan (CICSEP) states: "The facility located on the eastern portion of the Kenai Peninsula near Kenai Lake is expected to be at full capacity by 1992. This would mean the annual production of 243,000 adult sockeye salmon, 92,000 adult coho salmon, and 18,000 adult king salmon. It is anticipated that the facility will function as a central incubation facility, receiving eggs from as yet undesignated sites and returning fry to as yet undesignated locations." (CIRPT 1981).

For Bear Lake, the Phase I CICSEP states: "This 445 acre lake just north of Resurrection Bay is a candidate for fertilization as a F.R.E.D. Division project, and, in fact, has already had two years of pre-fertilization studies conducted on it. It is expected that the employment of this tactic could annually produce an additional 10,000 adult coho salmon." (CIRPT 1981).

The Phase II CICSEP (CIRPT 2007) established criteria for significant stocks by species and run size as follows: Chinook salmon, 400 fish; sockeye salmon, 2,000 fish; coho and chum salmon, 800 fish; and pink salmon, 5,000 fish. The CIRPT also established wild stock sanctuaries in the Phase II plan based on the concepts set out in the *Genetic Policy*. A total of seven Chinook, six sockeye, five coho, four chum, and five pink salmon stocks were designated.

English Bay Lakes sockeye salmon are the only significant sockeye salmon stock in the Kachemak Bay Unit. In the Kenai River watershed, several salmon stocks, including sockeye salmon from Hidden Creek (the outlet of Hidden Lake), the Kenai River main stem and the Russian River are significant stocks in the Upper Peninsula/Kenai River Unit. The Russian River sockeye salmon stock, located upstream from Hidden Lake, is also listed as a wild stock sanctuary/reserve in the Upper Peninsula/Kenai River Unit.

The Phase II plan identified coho and sockeye salmon from Bear Creek (the outlet of Bear Lake) as significant stocks in the Greater Resurrection Bay Unit. Tonsina Creek and Salmon Creek sockeye salmon are also significant stocks in the Greater Resurrection Bay Unit. No other coho salmon stocks in the unit were identified as significant, nor were any systems in the Greater Resurrection Bay Unit designated as wild stock sanctuary/reserves for any salmon species.

CONSISTENCY WITH POLICY

The policies governing Alaska hatcheries were divided into three categories for this review: genetics, fish health, and fisheries management. The key elements of the policies in each of those categories are summarized in Tables 10–12. These templates identifying the key elements of state policies were used to assess compliance of the TLH salmon program with each policy element in Tables 13–15.

Table 10.–Key elements of the ADF&G *Genetic Policy*.

I. Stock Transport	
Use of appropriate local stocks	This element addresses Section I of the *Genetic Policy*, covering stock transports. The policy prohibits interstate or inter-regional stock transports and uses transport distance and appropriate phenotypic characteristics as criteria for judging the acceptability of donor stocks.
II. Protection of wild stocks	
Identification of significant or unique wild stocks	Significant or unique wild stocks must be identified for each region and species as stocks most important to that region. The Regional Planning Teams should establish criteria for determining significant stocks and recommend such stock designations.
Interaction with or impact on significant wild stocks	Priority is given to protection of significant wild stocks from harmful interactions with introduced stocks. Stocks cannot be introduced to sites where they may impact significant or unique wild stocks.
Use of indigenous stocks in watersheds with significant wild stocks	A watershed with a significant wild stock can only be stocked with progeny from the indigenous stocks. The policy also specifies that no more than one generation of separation from the donor system to stocking of the progeny will be allowed.
Establishment of wild stock sanctuaries	Wild stock sanctuaries should be established on a regional and species basis. No enhancement activities would be allowed, but gamete removal would be permitted. The guidelines and justifications describe the proposed sanctuaries as gene banks of wild type variability.
III. Maintenance of genetic variance	
Maximum of three hatchery stocks from a single donor stock	A maximum of three hatchery stocks can be derived from a single donor stock. Offsite releases, such as for terminal harvest, should not be restricted by this policy if the release sites are selected so that they do not impact significant wild stocks, wild stock sanctuaries, or other hatchery stocks.
Minimum effective population size	The policy recommends a minimum effective population size of 400. It also recognizes that small population sizes may be unavoidable with Chinook and steelhead.
Use of all segments of donor stock run timing	To ensure all segments of the run have the opportunity to spawn, sliding egg take scales for donor stock transplants will not allocate more than 90% of any segment of the run for broodstock.
Genetics review of Fishery Transport Permits (5 AAC 41.05 – 41.060)	
Review by geneticist	Each application is reviewed by the geneticist, who then makes a recommendation to either approve or deny the application. The geneticist may also recommend to the commissioner terms or conditions to protect wild or hatchery stocks. The commissioner may prescribe such conditions on a FTP.

Table 11.–Key elements of Alaska policies and regulations pertaining to fish health and disease.

Fish Health and Disease Policy (5 AAC 41.080;	
Egg disinfection	Within 48 hours of taking and fertilizing live fish eggs or transporting live fish eggs between watersheds, all eggs must be treated with an iodine solution. This requirement may be waived for large scale pink and chum salmon facilities where such disinfection is not effective or practical.
Hatchery inspections	According to AS 16.10.460, inspection of the hatchery facility by department inspectors shall be permitted by the permit holder at any time the hatchery is operating.
Disease reporting	The occurrence of fish diseases or pathogens listed in 5 AAC 41.080(d) must be immediately reported to the ADF&G Fish Pathology Section.
Pathology requirements for Fish Transport Permits (FTPs) (5 AAC 41.005–41.060)	
Disease history	Applications for FTPs require either a complete disease history of the stock or a broodstock inspection and certification if the disease history is not available.
Isolation measures	Applications must list the isolation measures to be used during transport, including a description of containers, water source, depuration measures, and plans for disinfection.
Pathology review of FTPs	Each application is reviewed by the pathologist, who then makes a recommendation to either approve or deny it. The pathologist may also recommend to the commissioner terms or conditions to the permit to protect fish health. Transports of fish between regions are discouraged.
Sockeye Salmon Culture Policy	
Alaska Sockeye Salmon Culture Manual	The Sockeye Salmon Culture Policy is designed to control the occurrence of infectious hematopoietic necrosis virus (IHNV) in Alaska. The policy specifies the use of a virus-free water supply; rigorous disinfection procedures; compartmentalization of eggs and fry; and immediate destruction of infected fish, followed by disinfection. The *Alaska Sockeye Salmon Culture Manual* prescribes procedures and fish culture practices developed to control IHNV.

Table 12.–Key elements of Alaska fisheries management policies and regulations relevant to salmon hatcheries and enhancement.

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

Significant and wild stock sanctuary designation

Significant and wild stock sanctuary designations indicate special importance (Table 13). Priority is given to protection of significant wild stocks from harmful interactions with introduced stocks. A watershed with a significant wild stock can only be stocked with progeny from the indigenous stocks, with no more than one generation of separation from the donor system to stocking of progeny. Wild stock sanctuaries serve as gene banks of wild type variability; no enhancement activities are allowed, but gamete removal is permitted.

The significant and wild sanctuary designations in the Phase II CICSEP came after many Cook Inlet enhancement projects were long established. Although significant stocks such as Bear Lake sockeye and coho salmon have ancestry from several different parental stocks, ADF&G has worked with CIAA through the permitting process to comply with the *Genetic Policy* for significant stocks, stocking only progeny from the now indigenous stocks, and attempting to use broodstock that are progeny of wild stock parents. As a wild stock sanctuary for sockeye salmon, the Upper Russian River was monitored for strays of stocked Hidden Lake sockeye salmon from 1999 to 2002 and no strays were recorded. CIAA has continued to monitor for strays in the Kenai River above Skilak Lake and in Skilak Lake tributaries and no strays have been found (G. Fandrei, Executive Director, CIAA, personal communication).

Genetics

The Big Lake, Packers Lake, and Chelatna Lake projects were simple fisheries enhancement programs that used native broodstock for fry stocking back into each lake (Table 13). These projects raised few genetic concerns.

Grouse Lake, which is part of the Bear Creek watershed that empties into Resurrection Bay, was stocked with sockeye salmon from Cook Inlet systems: first with Packers Lake sockeye salmon fry, and then with Big Lake sockeye salmon fry (Figure 4). Grouse Lake is also part of the Bear Lake/Bear Creek system, which underwent numerous rehabilitation events in 1963, 1969 and 1971 to eradicate stickleback from Bear Lake in order to promote coho salmon production (McHenry 1982; see Bear Lake section below).

The state geneticist recommended approval of the 1994 FTP that authorized the stocking of Grouse Lake with Packers Lake stock sockeye salmon, despite the transfer of stocks from Cook Inlet to Resurrection Bay:

> It is my understanding that ADFG Division of Sport Fish has historically attempted to extirpate the sockeye inhabiting northern Resurrection Bay in order to accommodate enhancement of coho salmon there. Very few native sockeye remain. The Commissioner should be aware that this proposed stocking of Packers Lake sockeye salmon into Grouse Lake will finally drive the native stock to extinction.
>
> The Department is increasingly becoming aware of controversies regarding harvest and hatchery practices, stock declines, and the federal Endangered Species Act (ESA). I do not believe that this wanton extinction of this native sockeye stock will become an ESA issue. It would seem, from reviewing ESA status reviews of other Pacific Northwest stocks, that the northern Resurrection Bay sockeye salmon do not possess the evolutionary significance required to receive protection under the ESA
>
> The Commissioner may consider not approving any ADFG-permitted activity that will lead to the extinction of a native stock. Yet, the stocking proposed in this FTP is less undesirable from a genetics viewpoint than other alternatives proposed by Cook Inlet Aquaculture Association (CIAA) for its cost recovery program. CIAA has developed (and inherited from FRED Division) a complicated stocking program which poses substantial risk to Cook Inlet stocks in some cases. Region II CFMD staff worked with CIAA staff to find a solution to the cost recovery dilemma identified this year. The Resurrection Bay stocking surfaced as the best solution, in the form of a biological/fiscal/hatchery compromise, after substantial negotiation. It appears that extirpating the Resurrection Bay native stock will afford genetics protection to other, more significant, Cook Inlet wild stocks in the presence of the existing private-non-profit hatchery program. (J. Seeb, ADF&G, comments on FTP 94A-0059 application, ADF&G).

Bear Lake sockeye and coho salmon are both a genetic mix of stocks. Bear Lake coho salmon fingerlings were introduced into the lake in 1963 by ADF&G from several stocks (Kyle and Koenings 1983). Bear Lake sockeye salmon origins include the remnant Bear Lake population, and Upper Russian and Big Rivers stocks. The BMP indicated the Upper Russian River stock was used based on its early run timing, at the direction of the Alaska Board of Fisheries. The Board of Fisheries created a management plan for Bear Lake in the late 1980s to provide

guidelines for a new sockeye salmon fishery enhancement program. One of the stipulations was that "any enhancement of sockeye salmon in Bear Lake must maintain the early run timing of the indigenous stocks."

No discussion was found that addressed the genetic issues with transplanting sockeye salmon from Cook Inlet systems into a Resurrection Bay system. According to the hatchery manager at the time, the Russian River and Big River stocks were chosen to avoid conflict with the coho salmon sport fishery in Resurrection Bay, one of the largest in the state. The early run timing of these stocks allowed harvest by purse seine in Resurrection Bay prior to the return of coho salmon targeted by the sport salmon fishery (Jeff Hetrick, former TLH hatchery manager, personal communication).

For the LCI lakes project, when the Hidden Lake stock did not appear to be an appropriate stock for the program, CIAA submitted a PAR in 2011 to use the Bear Lake stock as an additional source of gametes to meet stocking goals for the project during the transition to English Bay stock. Bear Lake was desirable due to the stock's earlier timing, larger size, higher sale value, and readily available broodstock.

According to the *Genetic Policy*, "Fish releases at sites where no interaction with, or impact on significant or unique wild stocks will occur, and which are not for the purposes of developing, rehabilitation of, or enhancement of a stock (e.g., releases for terminal harvest or in landlocked lakes) will not produce a detrimental effect. Such releases need not be restricted by genetic concerns." This statement lends support to allowing Bear Lake fry to be stocked in these lakes until the English Bay stock returns were adequate for broodstock for all three lakes and Tutka Bay. An RPT member noted that ADF&G stocks distant sites in Prince William Sound with Crooked Creek (Kenai Peninsula) Chinook salmon broodstock and therefore Bear Lake sockeye salmon should be permitted on an interim basis. ADF&G approval for coho salmon stockings of Kachemak Bay release sites in recent years with Bear Lake coho salmon broodstock provided further support for consideration.

Some ADF&G staff were concerned, however, with use of the Bear Lake sockeye stock. The ADF&G geneticist believed that transport of the Bear Lake stock into Cook Inlet posed unacceptable genetic risks, and violated the *Protection of Wild Stocks* tenet of the *Genetic Policy* because they considered it an introduced stock. Ironically, Bear Lake sockeye salmon are a genetic mix of stocks originally from Cook Inlet (Big River and Upper Russian River) approved by ADF&G for stocking into Bear Lake. ADF&G staff contended that the harmful effects of hybridization between Bear Lake fish and wild Cook Inlet fish are high, even if straying was low or moderate. Pathology staff also raised concerns regarding bacterial kidney disease in the Bear Lake stock.

Although there was disagreement on use of Bear Lake stock, there was agreement that English Bay stock was the preferred stock for lower Cook Inlet releases because it was close to the release sites. Choosing it as the sole stock, though, may mean waiting several years for large enough returns to provide broodstock for all release sites. In the end, the ADF&G commissioner believed the potential risks of using the Bear Lake stock outweighed the potential benefits, and allowed only the English Bay stock to replace the Hidden Lake stock in the LCI lakes program.

Transition to the EBL stock for the LCI lakes project will more closely comply with the *Genetic Policy*. This stock is located nearer to the release sites and is felt to pose reduced genetic risk from straying.

Since EBL sockeye salmon are a significant stock, fry can only be stocked in that system from eggs collected from broodstock that were not themselves progeny of hatchery-reared parents. This is acknowledged in the 2011 TLH AMP: "In accordance with ADF&G Genetic Policy, eggs that are to be used to produce fry specifically for back-stocking into EBL should only be collected from non-hatchery produced adults. CIAA will try to ensure that adult sockeye salmon collected for broodstock from EBL will be appropriately screened for this purpose and collected eggs and subsequent fry will be suitably segregated throughout their hatchery life history." Fry from eggs taken from EBL stock returning to Port Graham and Tutka Bay Lagoon releases may not be used to stock EBL, but can be used to stock the LCI lakes.

For the Hidden Lake project, straying is a concern since it is part of the much larger Kenai River system, one of the highest use watersheds in Alaska. The Hidden Lake stock is genetically different from other Cook Inlet stocks, and even other stocks in the Kenai River drainage (Simpson and Edmunson, 1999). The release site is located in the same watershed as the TLH, and is downstream from the Russian River, the only sockeye salmon wild stock sanctuary/reserve in the Kenai watershed (CIRPT 2007).

Straying has been regularly assessed by CIAA since 1999. Otolith samples from the Russian River (upriver from Hidden Lake), Skilak Lake and the Kenai River between Kenai and Skilak Lakes (downstream from Hidden Lake), showed no Hidden Lake stock hatchery fish to date. Monitoring for strays will continue as part of a special use permit issued by the Fish and Wildlife Service.

Table 13.–The current Trail Lakes Hatchery salmon enhancement program and its consistency with elements of the ADF&G *Genetic Policy* for the Lower Cook Inlet Lakes sockeye salmon, Hidden Lake sockeye salmon, Bear Lake sockeye salmon, and Bear Lake coho salmon projects (see Table 10).

I. Stock Transport	
Use of appropriate local stocks	English Bay Lakes is the only local sockeye salmon stock in the area on the southern Kenai Peninsula. Of the three current barriered-lake release sites which will receive English Bay Lakes fry (and formerly received Hidden Lake fry), Kirchner Lake is on the west side of Cook Inlet, in the vicinity of other sockeye systems. Full harvest of returns is important to minimize straying. Hidden Lake sockeye salmon fry are stocked back into the lake. Hidden Lake fry are also planted in barrier lakes in the lower Kenai Peninsula within the same region.
	Bear Lake coho and sockeye salmon fry are stocked in Bear Lake and nearby Resurrection Bay.
II. Protection of wild stocks	
Identification of significant or unique wild stocks	EBL sockeye salmon is a significant stock, and an appropriate brood source for lower Cook Inlet sockeye salmon fisheries enhancement projects.
	Hidden Lake (Hidden Creek) sockeye salmon is a significant stock.
	Bear Lake sockeye and coho salmon are significant stocks.
Interaction with or impact on significant wild stocks	Straying is addressed with intensive harvest of returning fish in special harvest areas (SHAs) adjacent to release sites. ADF&G can restrict fishing to meet escapement goals to EBL.
	CIAA conducts annual evaluations for straying of Hidden Lake sockeye salmon at various locations in the Kenai River drainage. To date, no stray Hidden Lake stock hatchery fish have been found.
	Bear Lake sockeye and coho salmon stocks are not the indigenous stocks. Both species are a mix of several stock transplants. The stocks were designated as "significant" stocks well after the current stocks were cultured and reached their current genetic status.
Use of indigenous stocks in watersheds with significant wild stocks	EBL is the indigenous stock in the watershed and will be used as the donor stock for releases. Only fry hatched from gametes taken directly from EBL are stocked back to EBL per the *Genetic Policy*.
	Hidden Lake is the indigenous stock in the watershed and used as the donor stock for releases.
	Bear Lake sockeye and coho salmon stocks are stocked back into Bear Lake and into Resurrection Bay.
Establishment of wild stock sanctuaries	No wild stock sockeye salmon sanctuaries are listed for lower Cook Inlet.
	Late-run Russian River sockeye salmon, which spawn upriver from the Hidden Lake project, are designated as a wild stock sanctuary. Sampling for Hidden Lake stock hatchery sockeye salmon at Russian River from 1999 to 2002 found no strays.
	No wild stock sockeye or coho salmon sanctuaries are listed for Resurrection Bay, the terminus for Bear Lake/Bear Creek.

-continued-

Table 13. Page 2 of 2.

III. Maintenance of genetic variance	
Maximum of three hatchery stocks from a single donor stock	The English Bay Lakes donor stock will eventually be the only broodstock for the sockeye salmon projects in LCI when sufficient adult returns to Tutka Bay are realized. All projects except Tutka Bay Lagoon are releases for terminal harvest and not broodstock development, in accordance with the *Genetic Policy.* Hidden Lake stock is used for multiple release sites, but broodstock is only taken from adult returns to Hidden Lake and the Tutka Bay release site. The Bear Lake sockeye and coho salmon hatchery stocks are released at several sites, but broodstock is only taken from Bear Lake.
Minimum effective population size of 400	The AMP for EBL-source projects requires using up to 4,744 fish to meet egg-take goals for the Lower Cook Inlet lakes, Port Graham, and EBL projects. The AMP for Hidden Lake requires using up to 900 fish to meet egg-take goals. The AMP for Bear Lake requires using up to 4,720 sockeye and 300 coho salmon to meet egg-take goals.
Use of no more than 90% of any run segment of donor stock so all segments of donor stock run can spawn	Broodstock collections at EBL, Hidden Lake, and Bear Lake are from a cross-section of the run, and unlikely to take more than 90% of any part of the run.
Genetics review of FTPs (5 AAC 41.010 – 41.050)	
Review by geneticist	For lower Cook Inlet releases of Hidden Lake stock hatchery fish, the principal geneticist stressed the need to harvest returning adult Hidden Lake stock sockeye salmon at release sites. "Returning adults from these types of releases can be problematic. If the adult salmon that escape the fisheries do not have fresh water to enter, they may stray to adjacent freshwater systems. To minimize this and subsequent genetic impacts, CIAA must be prepared to harvest the adult return if the commercial fishery does not mop up the excess." These concerns were allayed when the stock source was changed from Hidden Lake to EBL. For Hidden Lake, the geneticist was concerned that the project did not follow the Genetic Policy because hatchery-produced fish were likely being utilized as broodstock. A study was implemented to determine if adults return to the area of the lake where they are released as fry. As a result of the study, a policy was implemented to take broodstock from a different area of the lake than where hatchery fry were released. The geneticist indicated that CIAA should look for strays near the Seldovia release site of Bear Lake coho salmon. There were no concerns for Bear Lake sockeye salmon releases.

Fish Health and Disease

The FTPs for the TLH programs were approved by the pathologist (Table 14). Pathology records showed no inconsistencies with fish health and disease policies. Appropriate sockeye salmon culture techniques are being used, and disease reporting and broodstock screening have occurred as required. The pathologist and other ADF&G staff have frequently recommended a UV disinfection system for prevention against IHNV in the TLH water supply since the original hatchery permit was approved. Funding was provided by the 2011 Alaska Legislature to install the system and this should reduce incidence of pathogens.

The hatchery was last inspected in May 2011. Fish pathology staff indicated the facility was in very good order. The report indicated CIAA staff were diligent in applying preventive measures to control disease issues at the hatchery. Staff noted that the Bear Lake stock has a history of IHNV and BKD problems. CIAA has implemented preventive measures, such as installing barriers between raceways to reduce horizontal transmission. Some Bear Lake sockeye salmon fry were treated for flavobacteriosis in 2011. English Bay Lakes sockeye salmon and Bear Lake coho salmon had no identified health issues.

Table 14.–The current Trail Lakes Hatchery salmon enhancement program and its consistency with elements of the Alaska policies on fish health and disease for the Lower Cook Inlet Lakes sockeye salmon, Hidden Lake sockeye salmon, Bear Lake sockeye salmon, and Bear Lake coho salmon projects (see Table 11).

Fish Health and Disease Policy (5 AAC 41.080; amended by Meyers 2010)	
Egg disinfection	Single family delayed fertilization and water hardening disinfecting are used for sockeye salmon. Coho salmon eggs are disinfected prior to incubator loading.
Hatchery inspections	Hatchery inspections were conducted regularly through 2011.
Disease reporting	EBL stocks show no health problems in the Pathology reports. Pathology reports indicate regular IHNV presence in Hidden Lake sockeye salmon and an incidence of bacterial cold water disease in 2011. Pathology reports indicate Bear Lake sockeye salmon show a regular history of BKD, IHNV, and cold water disease. CIAA has implemented a strategy aimed at controlling BKD, and outbreaks have been significantly reduced.
Pathology requirements for FTPs (5 AAC 41.010)	
Disease history	The disease history for English Bay Lakes, Hidden Lake, and Bear Lake sockeye salmon, and Bear Lake coho salmon stocks are updated as necessary at the request of the ADF&G Fish Pathology Section.
Isolation measures	The isolation measures and transport methods used for sockeye and coho salmon production are described in detail in the FTP application.
Pathology review of FTPs	The FTPs for the Trail Lake Hatchery programs were reviewed and approved by the pathologist.

Fisheries Management

Fisheries management was reviewed for current projects (Table 15). Sockeye salmon returning to the LCI lakes are primarily harvested in cost recovery and common property fisheries in

terminal areas. These special harvest areas allow targeted harvest of the enhanced stocks while minimizing the harvest of wild stocks.

At English Bay Lakes, escapement is intensively managed from a weir in the river. ADF&G permits egg takes, subsistence fishing, and commercial fishing based on the strength of the return. Semiweekly escapement goals are established in the Port Graham Hatchery AMP.

Hidden Lake stock hatchery fish migrate up the Kenai River en masse with the other sockeye salmon stocks in the river. The Kenai River has a sockeye salmon escapement goal range of 700,000 to 1.2 million fish, which includes Hidden Lake sockeye salmon. In 2010, the Hidden Lake sockeye salmon return was estimated at 74,000 fish and the total inriver Kenai sockeye salmon return (escapement plus sport/personal use/subsistence harvest) was 1.4 million fish (Shields 2010). Since Hidden Lake sockeye salmon comprise less than 10% of the Kenai River run, this stock does not unduly influence inriver management for escapement and fishing regulations in the common property fisheries (Pat Shields, ADF&G Division of Commercial Fisheries, Fishery Biologist III, Soldotna, personal communication).

Bear Lake sockeye and coho salmon stocks have escapement goals measured by weir counts. Minimum escapement goals must be met prior to broodstock collection, according to the AMP.

Table 15.–The current Trail Lakes Hatchery salmon enhancement program and its consistency with elements of Alaska fisheries management policies and regulations for the Lower Cook Inlet Lakes sockeye salmon, Hidden Lake sockeye salmon, Bear Lake sockeye salmon, and Bear Lake coho salmon projects, respectively (see Table 12).

Sustainable Salmon Fishery Policy (5 AAC 39.222)	
I. Management principles and criteria	
Assessment of wild stock interaction and impacts	All sockeye and coho salmon released to barriered-lakes and saltwater net pen release sites are thermal marked. CIAA samples for strays in the Kenai River drainage. A three year straying assessment plan in FTP 04A-0053 to otolith-sample coho salmon released to Seldovia Bay did not occur as indicated, as funding for the program was dropped after two years of the planned three-year program (G. Fandrei, Executive Director, CIAA, personal communication).
Use of precautionary approach	ADF&G may restrict fishing to meet wild stock escapement goals in area streams.
Salmon Escapement Goal Policy (5 AAC 39.223)	
Establishment of escapement goals	Sustainable Escapement Goals (SEGs) are established for English Bay Lakes, Hidden Lake and Bear Lake sockeye salmon. There is not an SEG for Bear Lake coho salmon because they are not a targeted species in the commercial fishery, but there is a minimum in-river return goal.
Mixed Stock Salmon Fishery Policy (5 AAC 39.220)	
Wild stock conservation priority	Management plans are in place for EBL, Hidden Lake and Bear Lake to meet the lower SEG before broodstock is taken. The use of special harvest areas for adult sockeye salmon returning to release sites allows their targeted harvest and minimizes incidental catch of other stocks.
Fisheries management review of FTPs (5 AAC 41.010 – 41.050)	
Review by management staff	All FTPs for TLH programs were reviewed and approved by fisheries management staff.

OTHER REQUIREMENTS

ANNUAL REPORTING AND CARCASS LOGS

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

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

DISCUSSION

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

This evaluation of TLH was part of the action plan to address conditions for MSC recertification. The action plan called for an evaluation of each of Alaska's hatchery programs for consistency with state policies and prescribed management practices. TLH operations are covered under existing permits that have been reviewed by an array of state officials. Safeguards are in place to prioritize escapement goals in wild stock systems where broodstock are taken. Additional internal review procedures by ADF&G were added in recent years to reduce typographic and administrative errors in management plans and fish transport permits.

Some programs operated by CIAA are vestiges of programs started by the state decades ago which were not vetted against current state policy and modern genetic science. The Hidden Lake sockeye salmon program is perhaps the most precarious of the TLH projects. The project was started by ADF&G in 1976, before development of most formalized state policies in place today. The program is located in the heart of the Kenai River drainage, home to the state's most accessible commercial, sport, and personal use/subsistence fisheries.

Numerous significant and wild stock sanctuary stocks comingle with Hidden Lake fish during smolt emigration and spawning migration. Only the natal stock is used for enhancement. Enhanced returns comprise less than 10% of the Kenai River drainage escapement, creating little impact on management for wild stocks. An active assessment program is in place and has detected no straying in the watershed to date. A review of the program found operations in accordance with the *Genetic Policy* (Simpson and Edmunson 1999). In hindsight, the program—perhaps serendipitously—conforms to current state policy, even though it would not likely be approved today because of straying concerns due to its location downstream from a wild stock sanctuary for Russian River sockeye salmon.

Likewise, the Bear Lake programs, also initiated by ADF&G in the 1960s and 1970s, would not be approved today. At the time, a multitude of broodstocks were used to achieve stocking goals (Kyle and Koenings 1983), without regard to current genetic and fish health concerns. Both sockeye and coho salmon stocks are now a genetic mix of those stocks. Four decades later, the current stocks have been subject to natural and anthropogenic genetic selections, are providing satisfactory returns, and have become the natal stock for Bear Lake.

A recent proposal to stock Bear Lake sockeye salmon to lower Cook Inlet lakes highlights the rigor, debate, and group discussion involved in the modern assessment of Alaska hatchery practices. Although Bear Lake stock's run timing, adult fish size, and readily available broodstock made it attractive for the project, many ADF&G staff were concerned about genetic and disease issues with this stock. In addition, adults returning to the proposed release sites would migrate past the English Bay Lakes outlet, potentially straying into this system that is a significant stock. These concerns ultimately outweighed the positive economic aspects of using the Bear Lake stock, and the proposal was not approved.

RECOMMENDATIONS

1) Accurate assessment of hatchery contribution to the catch and escapement is important to evaluate compliance with state policy, including portions of the genetic policy (e.g., interaction with or impact on significant wild stocks), and the Sustainable Salmon Fishery Policy (e.g., assessment of wild stock interaction and wild stock conservation priority).

a. The state and CIAA should update the baseline information for hatchery contribution estimates in lower Cook Inlet for TLH projects, as well as sample the harvest for otolith thermal marks to estimate hatchery contribution to the catch.

   The sport, personal use, and commercial harvests have not been sampled for otolith marks to more accurately estimate hatchery contribution to fisheries. Some sport and personal use hatchery fish contribution estimates are based on harvest data collected 20 years ago (Hammarstram and Ford 2011). Some contribution estimates to lower Cook Inlet commercial fisheries are based on harvest information dating back to 1971 (Glenn Hollowell, ADF&G Lower Cook Inlet Area Management Biologist, personal communication).

b. Creel surveys at Resurrection and Kachemak Bay should be completed to better estimate those harvests.

   CIAA has proposed creel surveys at Resurrection Bay and Kachemak Bay in the past, and continues to seek assistance from ADF&G with developing and completing creel survey program (G. Fandrei, Executive Director, CIAA, personal communication).

2) The process for issuing permit alterations for CIAA projects should be more consistent.

   The manner of issuing approval for changes in the hatchery permit was not consistent over time. Several PARs were approved only by a Notice of Permit Alteration, some by the Notice and an amended BMP, and some with only an amended BMP. The regulations are not specific as to how approval or denial of PARs is transmitted from the ADF&G Commissioner to the hatchery operator. The department should develop standard procedures and/or update ADF&G regulations to specify permit alteration procedures to provide clarity on this issue.

ACKNOWLEDGEMENTS

Appreciation is given to Gary Fandrei and Caroline Cherry of CIAA, and Glenn Hollowell, Ted Otis, Pat Shields of ADF&G for providing extensive background information on CIAA programs. Ron Josephson, Sam Rabung and Lorraine Vercessi of ADF&G reviewed this document.

REFERENCES CITED

ADF&G (Alaska Department of Fish and Game). 2011a. 2011 Commercial operator's annual report booklet. Alaska Department of Fish and Game. Division of Commercial Fisheries. Juneau.

ADF&G (Alaska Department of Fish and Game). 2011b. Basic management plan for the Trail Lakes Hatchery.

ADF&G (Alaska Department of Fish and Game). 2012. Information by fishery. Commercial salmon catch, effort & value. http://www.adfg.alaska.gov/index.cfm?adfg=commercialbyfisherysalmon.salmoncatch (Accessed January 2012).

Alaska Legislature 1974. An Act authorizing the operation of private nonprofit salmon hatcheries. Section 1, Chapter 111, SLA 1974, in the Temporary and Special Acts.

ASMI (Alaska Seafood Marketing Institute). 2011a. May 2011 seafood market bulletin. Alaska Seafood Marketing Institute. Juneau. www.alaskaseafood.org (Accessed October 2012).

ASMI (Alaska Seafood Marketing Institute). 2011b. Summer 2011 seafood market bulletin. Alaska Seafood Marketing Institute. Juneau. http://www.alaskaseafood.org/fishingprocessing/seafoodweb/index.html (Accessed October 2012).

Chaffee, C., G. Ruggerone, R. Beamesderfer, and L. W. Botsford. 2007. The commercial Alaska salmon fisheries managed by the Alaska Department of Fish and Game, a 5-year re-assessment based on the Marine Stewardship Council program. Final draft assessment report, October 30, 2007 (IHP-05-069), Emeryville, CA. Prepared by Scientific Certification Systems, Inc., for the Alaska Department of Fish and Game, Division of Commercial Fisheries, Juneau.

Chlupach, R. S. and G. B. Kyle. 1990. Enhancement of Big Lake sockeye salmon (Oncorhynchus nerka): Summary of Fisheries Production (1976-1989). Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development Report No. 106. Juneau.

Cook L. and F. Norris. 1998. A stern and rock-bound coast. Kenai Fjords National Park historic resource study. National Park Service, Alaska Support Office, Anchorage.

CIRPT (Cook Inlet Regional Planning Team). 1981. Cook Inlet regional salmon enhancement plan 1981-2000. Alaska Department of Fish and Game, Juneau.

CIRPT (Cook Inlet Regional Planning Team). 2007. Cook Inlet regional salmon enhancement plan phase II 2006-2025. Alaska Department of Fish and Game, Juneau.

Davis, B., B. Allee, D. Amend, B. Bachen, B. Davidson, T. Gharrett, S. Marshall, and A. Wertheimer. 1985. Genetic policy. Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development, Juneau.

Davis, B., and B. Burkett. 1989. Background of the genetic policy of the Alaska Department of Fish and Game. FRED Report No. 95. Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development, Juneau.

FRED (Division of Fisheries Rehabilitation, Enhancement and Development). 1975. Report to the 1975 Legislature. Alaska Department of Fish and Game, Juneau.

FRED (Division of Fisheries Rehabilitation, Enhancement and Development). 1976. Report to the 1976 Legislature. Alaska Department of Fish and Game, Juneau.

Farrington, C. 2003. Alaska salmon enhancement program 2002 annual report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J03-05, Juneau.

Farrington, C. 2004. Alaska salmon enhancement program 2003 annual report. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J04-02, Juneau.

Groot, C., and L. Margolis, editors. 1991. Pacific Salmon Life Histories. UBC Press, Vancouver, BC Canada.

Hammarstrom, L. F., and E. G. Ford. 2011. 2010 Lower Cook Inlet annual finfish management report. Alaska Department of Fish and Game, Fishery Management Report No. 11-26, Anchorage.

REFERENCES CITED (Continued)

Industry Working Group, 2010. Open Letter to Alaska Hatcheries, April 16, 2010. Industry Working Group (Trident Seafoods, Pacific Seafood Processors Association, Icicle Seafoods, Ocean Beauty Seafoods LLC, and Alaska General Seafoods, PSPA member companies with salmon processing operations).

Knapman, P. G. Ruggerone, J. Brady, and A. Hough. 2009. Alaska salmon fisheries: first annual surveillance report 2007/08. February 2009 (MML-F-017), Houston, TX. Prepared by Moody Marine Ltd., for the Alaska Department of Fish and Game.

Knapp, G., K. Roheim, and J. Anderson. 2007. The great salmon run: Competition between wild and farmed salmon. TRAFFIC North America, World Wildlife Fund, 1250 24th Street NW, Washington, D.C.

Kyle, G. and J. Koenings. 1983. Bear Lake nutrient enhancement (pre-fertilization) report. ADF&G FRED report no.15. Juneau.

Litchfield, D. S. and L. B. Flagg. 1988. Hidden Lake sockeye salmon investigations, 1983-1984. ADF&G FRED report no. 86. Juneau.

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

McDaniel T. R., K. M. Pratt., T. R. Meyers, T. D. Ellison, J. E. Follett, and J. A. Burke. 1994. Alaska sockeye salmon culture manual. Alaska Department of Fish and Game, Division of Commercial Fisheries Management and Development Division, Special Publication No. 6, Juneau.

McGee, S. G. 2004. Salmon hatcheries in Alaska – plans, permits, and policies designed to provide protection for wild stocks. Pages 317-331 [*In*] M. Nickum, P. Mazik, J. Nickum, and D. MacKinlay, editors. Symposium 44: Propagated fish in resource management. American Fisheries Society, Bethesda, MD.

McHenry, E. T. 1982. Coho salmon studies in the Resurrection Bay area. Alaska Department of Fish and Game. Federal Aid in Fish Restoration Project F-9-14, Vol. 23. Study G-II.

Meyers, T. 2010. Regulation changes, policies, and guidelines for Alaska fish and shellfish health and disease control. Alaska Department of Fish and Game, Regional Information Report 5J10-01, Anchorage.

Musslewhite, J. 2011a. An evaluation of the Kitoi Bay salmon hatchery for consistency with statewide policies and prescribed management practices. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J11-01, Anchorage.

Musslewhite, J. 2011b. An evaluation of the Pillar Creek salmon hatchery for consistency with statewide policies and prescribed management practices. Alaska Department of Fish and Game, Division of Commercial Fisheries, Regional Information Report 5J11-02, Anchorage.

Shields, P. 2010. Upper Lower Cook Inlet commercial fisheries annual report, 2010. Alaska Department of Fish and Game, Fishery Management Report No. 10-54, Anchorage.

Simpson, E. and J. Edmunson. 1999. Hidden Lake sockeye enhancement technical review. Alaska Department of Fish and Game, Regional Information Report 2A99-16, Anchorage.

Vercessi, L. 2012. Alaska salmon enhancement program 2011 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 12-04, Anchorage.

Weber, N. 2011. Hidden Lake Sockeye Salmon Enhancement Progress Report 2010. Cook Inlet Regional Aquaculture Association, Soldotna, AK.

White, B. 2005. Alaska salmon enhancement program 2004 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 05-09, Anchorage.

White, B. 2006. Alaska salmon enhancement program 2005 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 06-19, Anchorage.

White, B. 2007. Alaska salmon enhancement program 2006 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 07-04, Anchorage.

White, B. 2008. Alaska salmon enhancement program 2007 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 08-03, Anchorage.

REFERENCES CITED (Continued)

White, B. 2009. Alaska salmon enhancement program 2008 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 09-08, Anchorage.

White, B. 2010. Alaska salmon enhancement program 2009 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 10-05, Anchorage.

White, B. 2011. Alaska salmon enhancement program 2010 annual report. Alaska Department of Fish and Game, Fishery Management Report No. 11-04, Anchorage.

APPENDIX

Appendix A.–Juvenile releases of sockeye salmon incubated at Trail Lakes Hatchery, 1989–2010.

Year	Bear Lake	Big Lake	Chelatna Lake	Coal Creek	English Bay Lakes	Grouse Lakes
1989						
1990	2,577,962[a,b]		503,836[f]			
1991	1,604,922[a,b]		634,830[f]			
1992	1,482,489[a,b]		1,138,205[f]	66,388[g]		
1993	1,810,261[a,c]		1,002,671[f]			
1994	170,000[c]		1,330,000[f]			570,000[i]
1995	330,000[c]		1,806,000[f]	158,485[d]		793,000[i]
1996	780,638[c]		1,042,000[f]			
1997	788,000[c]					1,928,000[i]
1998	772,000[c,d]					1,288,000[i]
1999	1,380,000[c]	197,000[e]				
2000	1,796,000[c]					
2001	145,000[c]					
2002	3,210,300[c]					
2003	1,801,000[c]					
2004	3,012,000[c]					
2005	3,422,000[c]					
2006	3,393,000[c]					
2007	3,056,000[c]					
2008	2,400,000[c]				246,000	
2009	2,543,000[c]					
2010	2,200,000[c]				202,000	
2011	2,488,000[c]				203,300[h]	
Grand Total	41,162,572	197,000	7,457,542	224,873	203,300	4,579,000

Year	Hazel Lake	Hidden Lake	Kirschner Lake	Leisure Lake	Meadow Creek	Packers Creek
1989		2,400,000[j]				3,290,000[i]
1990		1,747,900[j]				2,850,000[i]
1991		1,600,000[j]				2,505,500[i]
1992		1,716,116[j]				3,172,439[i]
1993		1,901,257[j]				3,265,631[i]
1994		1,800,000[j]				2,770,000[i]
1995		1,700,000[j]				1,552,000[i]
1996		1,600,000[j]				688,000[i]
1997		1,501,000[j]				627,470[i]
1998		1,035,000[j]				
1999	453,100[d]	1,507,000[j]	172,700[d]	265,400[d]		
2000	1,248,000[d]	1,242,000[j]	249,000[d]	1,708,000[d]	846,000[k]	
2001		906,000[j]		89,000[d]		
2002	1,280,100[d]	980,100[j]	301,500[d]	2,246,200[d]	4,315,900[e]	
2003	1,547,000[d]	629,000[j]	298,000[d]	2,240,000[d]	3,589,000[e]	
2004	351,000[d]	646,000[j]	251,000[d]	2,002,000[d]	5,004,000[e]	
2005	1,558,000[j]	573,000[j]	316,000[j]	2,252,000[j]	1,742,000[e]	
2006		582,000[j]		680,000[j]	870,000[e]	
2007	1,411,000[j]	658,000[j]	254,000[j]	2,315,000[j]	4,831,000[e]	
2008	1,161,000[j]	917,000[j]	300,000[j]	2,053,000[j]	4,043,000[e]	
2009	1,186,000[j]	911,000[j]		1,225,000[j]		
2010	1,218,000[j]	880,000[j]	255,000[j]	1,933,000[j]		
2011	1,244,000[l]	1,044,000[j]	160,000[h]	1,415,000[l]		
Grand Total	12,657,200	28,476,373	2,557,200	20,423,600	25,240,900	20,721,040

Year	Port Graham	Resurrection Bay	Tustumena Lake	Tutka Bay	Upper Paint Lake	Grand Total
1989						5,690,000
1990						7,679,698
1991						6,345,252
1992						7,575,637
1993						7,979,820
1994						6,640,000
1995						6,339,485
1996						4,110,638
1997			6,013,000[d]			10,857,470
1998			4,558,000[d]			7,653,000
1999			5,948,300[d]			9,923,500
2000			5,432,000[d]			12,521,000
2001						1,140,000
2002			6,065,400[d]		507,700[d]	18,907,200
2003			6,024,000[d]			16,128,000
2004			6,006,000[d]			17,272,000
2005				96,000[j]		9,959,000
2006				260,000[j]		5,785,000
2007				143,800[j]		12,668,800
2008		1,600,000[c]		483,000[j]		13,203,000
2009	112,000[h]	1,675,000[c]		301,000[j]		7,953,000
2010		1,650,000[c]		278,000[j]		8,616,000
2011				281,900[h,j,l]		6,836,200
Grand Total	112,000	4,925,000	40,046,700	1,843,700	507,700	211,783,700

Source: Data from ADF&G Tag Lab

[a] Big River stock.
[b] Upper Russian Lake stock.
[c] Bear Lake stock.
[d] Tustumena Lake stocks.
[e] Big Lake stock.
[f] Chelatna Lake stock.
[g] Glacier Creek Stock.
[h] English Bay Lake stock.
[i] Packers Lake stock.
[j] Hidden Lake stock.
[k] Meadow Creek stock.
[l] Tutka Bay Lagoon stock

Appendix B.–Juvenile releases of coho salmon incubated at Trail Lakes Hatchery, 1989-2011. Stock released is from Bear Lake unless otherwise noted.

Year	Bear Creek	Bear Lake	Crooked Creek[a]	Homer Spit	Lowell Creek	Resurrection Bay	Seldovia	Grand Total
1989		981,340	356,000					1,337,340
1990	93,694	746,891						840,585
1991		390,841						390,841
1992		255,533						255,533
1993		620,588						620,588
1994		320,000						320,000
1995	7,400	509,000						516,400
1996		75,000						75,000
1997	153,000	448,700						601,700
1998		409,000						409,000
1999	51,000	306,000						357,000
2000	102,000	316,000						418,000
2001	121,000	311,000						432,000
2002	123,800	404,700						528,500
2003		658,000		103,000				761,000
2004	285,000	406,000		113,000		192,000		996,000
2005		893,000		95,000				988,000
2006		562,000		324,000	146,000		114,000	1,146,000
2007		758,000		101,000			97,000	956,000
2008		502,000		95,000			88,000	685,000
2009		338,000		44,000				382,000
2010		435,000						435,000
2011		437,000						435,000
Total	936,894	11,083,593	356,000	875,000	146,000	192,000	299,000	13,888,487

Source: Data from ADF&G Tag Lab.

[a] Crooked Creek stock.

Appendix C.–Adult returns of sockeye salmon incubated at Trail Lakes Hatchery, 1990-2010.

Year	Bear Lake	Big Lake	Chelatna Lake	Coal Creek	Salmon Creek[a]	Grouse Lakes
1990						
1991						
1992	1,925					
1993	6,706		55,748			
1994	19,588		71,253			
1995	55,919			-		
1996	53,459				800	
1997	26,977			1,148	12,545	
1998	31,776				21,209	
1999	28,153	54,498				107,476
2000	32,498	24,746				45,350
2001	17,833	78,608				11,276
2002	28,716	143,244				
2003	23,328	148,082				
2004	28,568	41,817				
2005	70,589	22,368				
2006	64,264	24,050				
2007	32,820	36,014				
2008	104,647	18,079				
2009	160,118	43,277				
2010	43,365	129,026				
2011	240,848	129,026				
Total	1,072,097	763,809	127,001	1,148	34,554	164,102

-continued-

Appendix C. Page 2 of 3.

Year	Leisure/Hazel Lakes	Hidden Lake	Kirschner Lake	Packers Creek	Ursus Lake	Chenik Lake
1990				101,000		
1991				149,597		
1992		110,307		131,137		
1993		62,948		145,020		
1994		15,715		134,370		
1995				110,100		
1996				117,462		
1997				56,606		
1998	115,221		27,502	36,700		
1999	226,780	73,242	40,560	63,495	1,500	2,850
2000	102,906	72,166	31,627	43,779	100	4,800
2001	132,515	144,331	38,938			
2002	156,701	244,744	32,492			
2003	432,998	38,515	50,348			
2004	40,610	55,223	16,798			
2005	67,934	47,128	14,969			
2006	104,955	32,190	50,438			
2007	112,439	32,720	37,444			
2008	70,321	24,000	14,762			
2009	5,835	18,703	19,121			
2010	6,602	73,166	8,858			
2011	15,118	28,066	12,942			
Total	1,590,935	1,073,164	396,799	1,089,266	1,600	7,650

-continued-

Year	Tustumena Lake	Tutka Bay	Paint River	Bruin Lake	Grand Total
1990					101,000
1991					149,597
1992					243,369
1993					270,422
1994					240,926
1995					166,019
1996					171,721
1997					97,276
1998					232,408
1999	967,000		900	10	1,566,464
2000	93,970		30	40	452,012
2001	791,565				1,215,066
2002	695,327				1,301,224
2003	996,483				1,689,754
2004	1,677,059	41,817			1,901,892
2005	1,261,216				1,484,204
2006	379,000				654,897
2007	334,200	-			585,637
2008		20,104			251,913
2009		15,154			262,208
2010		43,981			304,998
2011		15,559			
Total	7,195,820	136,615	930	50	13,343,007

Source: Data from annual reports submitted by CIAA.

Note: A portion of some of these numbers likely includes harvests of wild fish caught in terminal hatchery areas. This number of wild fish is presumed to be a small portion of the total hatchery harvest.

[a] Salmon Creek is the outlet stream of Grouse Lake. Numbers represent harvest in the SHA or instream fish counts.

Appendix D.–Adult returns of coho salmon incubated at Trail Lakes Hatchery, 1990–2010.

Year	Bear Lake [a]	Seldovia Bay [a]	Homer Lagoon [b]
1990	10,500		
1991	10,716		
1992	4,242		
1993	10,573		
1994	8,322		
1995	4,795		
1996	13,441		
1997	10,165		
1998	15,700		
1999	6,329		
2000	9,822		
2001	4,013		
2002	5,844		
2003	18,164		
2004	8,780		21,009
2005	7,735		15,075
2006	5,490		4,450
2007	3,699	48	4,617
2008	5,104		3,767
2009	4,409		509
2010	4,670		1,007
2011	886		
Total	175,303	48	50,434

[a] Data from annual reports submitted by CIAA.
[b] Data from ADF&G Sport Fish Statewide Harvest Survey.

Appendix E.–Summary of Fishery Transport Permits for current Trail Lakes Hatchery projects.

FTP Number	Expiration Date	Summary and reviewer comments.
Lower Cook Inlet Projects		
98A-0059	07/31/02	Transfer Leisure Lake project from Eklutna Salmon Hatchery to TLH. Collect 1.56 million sockeye eggs from sockeye salmon returning to Tustumena Lake and stock 1.25 million fry to Hazel Lake.
98A-0060	07/31/02	Transfer Leisure Lake project from Eklutna Salmon Hatchery to TLH. Collect 0.31 million sockeye eggs from sockeye salmon returning to Tustumena Lake and stock 0.25 million fry to Kirschner Lake.
98A-0061	07/31/02	Transfer Leisure Lake project from Eklutna Salmon Hatchery to TLH. Collect 2.5 million sockeye eggs from sockeye salmon returning to Tustumena Lake and stock 2.0 million fry to Leisure Lake.
02A-0050	07/31/07	Continues 98A-0059 for 5 more years (Hazel Lake).
02A-0051	07/31/07	Continues 98A-0060 for 5 more years (Kirschner Lake).
02A-0052	07/31/07	Continues 98A-0061 for 5 more years (Leisure Lake).
02A-0054	11/12/02	One-time stocking of 0.5 million Tustumena Lake origin fry from Trail Lakes Hatchery into Upper Paint Lake for evaluation.
04A-0064	06/30/05	Transfer Hazel Lake project from Tustumena Lake stock to Hidden Lake stock, with egg incubation at TLH. Collect 1.56 million sockeye eggs from sockeye salmon returning to Hidden Lake and stock 1.25 million fry to Hazel Lake.
04A-0064	06/30/10	04A-0064 amended to extend effective period for 5 more years (Hazel Lake)
04A-0065	06/30/05	Transfer Leisure Lake project from Tustumena Lake stock to Hidden Lake stock, with egg incubation at TLH. Collect 0.31 million sockeye eggs from sockeye salmon returning to Hidden Lake and stock 0.25 million fry to Kirschner Lake.
04A-0065	06/30/10	04A-0065 amended to extend effective period for 5 more years (Kirschner Lake)
04A-0066	06/30/05	Transfer Leisure Lake project from Tustumena Lake stock to Hidden Lake stock, with egg incubation at TLH. Collect 2.5 million sockeye eggs from sockeye salmon returning to Hidden Lake and stock 2.0 million fry to Leisure Lake.
04A-0066	06/30/10	04A-0066 amended to extend effective period for 5 more years (Leisure Lake).
05A-0093	06/30/06	Transport and rear up to 500,000 Hidden Lake stock sockeye salmon presmolt from TLH to Tutka Bay and release as smolt to establish a return to Tutka Bay as broodstock for the LCI lakes projects.
05A-0095	See Summary	Collect up to 762,000 Hidden Lake stock sockeye salmon eggs, rear at TLH, transport to Tutka Bay for rearing, and release up to 500,000 smolt at Tutka Bay to establish a return to Tutka Bay as broodstock for the LCI lakes projects. FTP would expire in 2010. State pathologist denied FTP until water depuration at TLH was installed. Water depuration plan agreement later made and permit sent to CIAA, but the permit was not signed.
06A-0084	12/31/09	Collect up to 1.15 million English Bay Lakes sockeye salmon eggs, incubation and rearing at either Port Graham Hatchery or TLH, and release of up to 1.15 million smolt into Port Graham.
08A-0095	12/31/10	Allows the collection of up to 5.072 million sockeye salmon eggs of Hidden Lakes stock from the Tutka Bay Lagoon release site for the LCI lakes projects. Limited duration of 2 years to address need for UV depuration of incoming water.

-continued-

FTP Number	Expiration Date	Summary and reviewer comments.
Lower Cook Inlet Projects		
08A-0095	12/31/13	80A-0095 amended to expire in 2013, and changed egg collection number from 5.072 million to 4.37 million.
08A-0096	06/30/11	Allows the release of an average of 2 million fry into Leisure Lake from eggs collected from Hidden Lake origin broodstock at the Tutka Bay Lagoon release site.
08A-0096	12/31/14	08A-0096 amended to expire in 2014.
08A-0098	06/30/14	Allows the collection of up to 762,000 sockeye salmon eggs for release of an average 500,000 smolt into Tutka Bay Lagoon from eggs collected from Hidden Lakes stock at the Tutka Bay Lagoon release site.
08A-0100	06/30/11	Allows the release of an average of 1.25 million sockeye salmon fry into Hazel Lake. Limited duration of 3 years to address need for UV depuration of incoming water.
08A-0100	06/30/14	08A-0100 amended to expire in 2014.
08A-0102	06/30/11	Allows the release of an average of 250,000 fry into Kirschner Lake from eggs collected from Hidden Lakes origin broodstock at the Tutka Bay Lagoon release site. Limited duration of 3 years to address need for UV depuration of incoming water. Effective period extended to 6/30/14 on 5/23/11.
08A-0102	06/30/14	08A-0102 amended to expire in 2014.
10A-0151	12/31/11	Allows the release of up to 500,000 smolt (Hidden Lake stock) from TLH into Tutka Bay Lagoon.
10A-0153	12/31/16	Allows the collection of up to 6.72 million sockeye salmon eggs from English Bay Lakes for release to English Bay Lakes, Port Graham and Tutka Bay, and Kirschner, Hazel and Leisure lakes.
10A-0154	12/31/16	Allows the collection of up to 1.15 million sockeye salmon eggs from English Bay Lakes, incubation and rearing at TLH, and release into English Bay Lakes (presmolt) and Port Graham Bay (smolt).
10A-0155	12/31/16	Allows the release of up to 200,000 English Bay sockeye fall fry to English Bay Second Lake.
11A-0051	12/31/15	Allows the release of up to 1 million English Bay smolt from TLH into Tutka Bay Lagoon. Staff to re-evaluate program in 4 years.
11A-0052	12/31/15	Allows the release of up to an average 1.25 million English Bay fry from TLH into Hazel Lake. Staff to re-evaluate program in 4 years.
11A-0053	12/31/15	Allows the release of up to 250,000 English Bay fry from TLH into Kirschner Lake. Staff to re-evaluate program in 4 years.
11A-0054	12/31/15	Allows the release of up to 2 million English Bay spring fry from TLH into Leisure Lake. Permit limited to 4 years for staff re-evaluation.
11A-0076	12/31/13	Allows the collection of up to 6.41 million sockeye salmon eggs from the Port Graham Bay release site to support the LCI lakes and Port Graham projects.
11A-0077	12/31/15	Allows the transport of up to 5,000 English Bay origin adults returning to the Port Graham release site to Tutka Bay Lagoon for ripening, with gamete collections then transported to TLH.

-continued-

FTP Number	Expiration Date	Summary and reviewer comments.
Hidden Lake Project		
93A-0036	06/30/08	Allows egg take of 2.2 million sockeye salmon eggs at Hidden Lake, egg transport to TLH for incubation and rearing, and fry released back to Hidden Lake.
08A-0089	06/30/11	Allows the release of sockeye salmon fry into Hidden Lake from eggs collected under 08A-0091. Limited duration of 3 years to address need for UV depuration of incoming water.
08A-0089	06/30/14	08A-0089 amended to expire in 2014.
08A-0091	06/30/11	Allows the collection of up to 2.2 million eggs from Hidden Lake broodstock for release back to Hidden Lake.
08A-0091	06/30/14	08A-0091 amended to expire in 2014.
Bear Lake Projects		
Sockeye Salmon		
89A-0018	1994	Allows collection of up to 3.0 million sockeye salmon eggs from Upper Russian lake, incubation and rearing at TLH, and release into Bear Lake.
89A-0018	1994	Allows collection of up to 3.0 million sockeye salmon eggs from the South Fork of Big River, incubation and rearing at TLH, and release into Bear Lake.
93A-0032	06/30/08	Allows egg take of 4.1 million sockeye salmon eggs at Bear Lake, transport to TLH for incubation and rearing. Fry will be released into the lake, and smolt released at the weir.
93A-0033	12/31/97	Allows egg take of 3.0 million sockeye salmon eggs at Big River Lakes, transport to TLH for incubation and rearing. Fry will be released into the lake, and smolt released at the weir. This stock is used as a back-up stock if enough eggs cannot be taken from Bear Lake returns, according to the 1993 TLH AMP.
98A-0052	12/31/98	Allows transport of up to 500,000 Tustumena Lake origin sockeye smolt reared at TLH to net pens and subsequent release at Bear Lake. CIAA wanted to compare adult survival between Grouse Lake and Bear Creek releases.
00A-0085	06/30/11	Allows collection of 3.0 million sockeye salmon eggs from Upper Russian Lake when eggs cannot be secured from Bear Lake. Eggs will be incubated at TLH and resulting progeny released to Bear Lake.
01A-0011	06/30/11	Allows collection of 1.25 million sockeye salmon eggs, incubate eggs at TLH, and release resulting presmolt to Bear Lake. Broodstock sources from Bear Lake, Upper Russian Lake or Big River.
01A-0012	06/30/06	Allows collection of 1.75 million sockeye salmon eggs from Bear Lake/Upper Russian and Big River Lakes, incubate eggs at TLH, and release resulting presmolt to Bear Lake.
01A-0012	06/30/07	01A-0012 amended to expire in 2007.
07A-0061	06/30/11	Allows collection of 3 million sockeye salmon eggs at Bear Lake, incubation and release of up to 1.536 million smolt to Resurrection Bay.
08A-0069	12/31/11	Allows the release of an average of 2.4 million sockeye salmon fry into Bear Lake from eggs collected under 08A-0090. Limited duration of 3 years to address need for UV depuration of incoming water.

-continued-

FTP Number	Expiration Date	Summary and reviewer comments.
Sockeye Salmon		
08A-0069	12/31/13	08A-0069 amended to extend expiration date through 2013.
08A-0090	12/31/11	Allows the collection at Bear Lake of up to 2.825 million sockeye salmon eggs for release of an average 2.4 million fry to Bear Lake. Limited duration of 2 years to address need for UV depuration of incoming water.
08A-0090	12/31/13	08A-0090 amended to expire in 2013.
11A-0062	12/31/13	Replaced 07A-0061. Short-term rearing and release of up to 1.536 million sockeye smolt to Resurrection Bay.
Coho Salmon		
90A-0053	12/31/90	Allows collection of coho salmon eggs, incubation at TLH, and subsequent release of up to 400,000 fry into Bear Lake.
93A-0025	06/30/02	Allows the release of up to 100,000 Bear Lake fry reared at TLH to Homer Spit.
93A-0026	06/30/02	Allows the release of up to 60,000 Bear Lake fry reared at TLH to Lowell Creek.
93A-0030	12/31/97	Allows the release of up to 450,000 Bear Lake fry reared at TLH to Bear Lake.
93A-0030	12/31/08	93A-0030 amended in 1998 to expire in 2003, and amended again in 2003 to expire in 2008.
93A-0031	06/30/08	Allows the transport of Bear Lake coho salmon eggs to TLH for incubation and rearing. Original permit allowed 75,000 smolt for stocking to Bear Lake Later amendments increased level of stocking to 250,000 smolt.
93A-0031	12/31/08	93A-0031 amended in 2003 to expire in 2008, and amended again in 2004 to increase release number to 250,000.
00A-0024	12/31/02	Allows the stocking of 150,000 Bear Lake coho salmon smolt from Fort Richardsaon Hatchery to the Seward Lagoon.
00A-0024	12/31/11	00A-0024 amended in 2002 to expire in 2007, and amended again in 2007 to expire in 2011.
04A-0016	12/31/08	Allows the transport of 200,000 Bear Lake coho salmon smolt from TLH to the Alaska SeaLife Center for rearing and release in Resurrection Bay.
04A-0053	06/30/08	Allows the transport of 150,000 additional Bear Lake coho salmon smolt from TLH for release at the Homer Spit.
06A-0059	06/30/08	Allows the release of an average of 150,000 coho salmon smolt into Fish Creek Reservoir in Seldovia from eggs collected under FTP 08A-0112.
06A-0059	06/30/11	06A-0059 amended to expire in 2011.
08A-0112	12/31/10	Allows collection of up to 1.1225 million coho salmon eggs from Bear Lake for releases of an average of 450,000 fry to Bear Lake and 150,000 smolt each to Bear Creek, Homer Spit and Seldovia release locations.
08A-0112	06/30/12	08A-0112 amended to expire in 2012.
08A-0113	06/30/13	Allows the release of an average of 450,000 fry into Bear Lake from coho salmon eggs collected under FTP 08A-0112.
08A-0114	06/30/12	Allows the release of an average of 150,000 fry into Bear Creek from coho salmon eggs collected under FTP 08A-0112.
08A-0114	06/30/14	08A-0114 amended to expire in 2014.

Appendix F.–Summary of Fishery Transport Permits for suspended Trail Lakes Hatchery projects.

FTP No.	Expiration Date	Summary and reviewer comments.
Chelatna Lake Project		
93A-0034	12/31/1997	Allows an egg take of 3.2 million eggs at Chelatna Lake, incubation and rearing of fry at TLH, and release of an average of 1.6 million sockeye salmon fry into Chelatna Lake.
Coal Creek Project		
93A-0035	12/31/1997	Allows eggs collected at Tustumena Lake, reared to fry stage at Crooked Creek Hatchery, fry transferred to TLH and raised to smolt, then 200,000 smolt released at Coal Creek.
Tustumena Lake Project		
96A-0085	12/31/96	Allows transport of 7 million eyed sockeye salmon eggs of Tustumena Lake origin from Crooked Creek Hatchery to TLH due to suspension of operations at Crooked Creek Hatchery.
96A-0086	06/31/07	Allows transport of 6 million Tustemena origin sockeye salmon fry from TLH for release at Tustumena Lake.
Crooked Creek Project		
94A-0128	Denied	Transport green eggs from Tustumena Lake to TLH. Transport and rear 200,000 smolts at Crooked Creek Hatchery for imprinting and release. Release remaining fish in Grouse Lake. Denied due to concerns with hatchery conditions and practices for sockeye at Crooked Creek, IHVN disease transfer to Chinook salmon in Crooked Creek, and potential harvest impacts to late run Chinook salmon and early run coho salmon when fishing for the returning enhanced sockeye salmon.
96A-0086	06/31/07	Allows transport of 6 million Tustemena origin sockeye salmon fry from TLH for release at Tustumena Lake.
Big Lake Projects		
98A-0057	07/31/02	Provided for moving the Big Lake sockeye enhancement project, consisting of collection of 6.25 million sockeye eggs from sockeye salmon returning to Meadow Creek, and release of 5.0 million fry to Big Lake, 3.0 million fry to Meadow Creek, and 2.0 million fry to Blodgett Lake, from Eklutna Hatchery to TLH.
Grouse Lake Project		
98A-0058	07/31/2002	Allowed CIAA to replace the Packers Lake broodstock with Big Lake broodstock for the Grouse Lake project. CIAA had suspended the Packers Lake project, so needed to replace this broodstock source with a Big Lake egg take of up to 1.67 million eggs.
95A-0009	07/01/2001	Allowed CIAA to collect up to 3.34 million eggs from Tustumena Lake, transport to TLH for incubation and rearing, and transport and release of up to 1.67 million age 1 smolt in Grouse Lake.
94A-0059	06/30/99	Allowed CIAA to collect up to 3.34 million eggs from Packers Lake, transport to TLH for incubation and rearing, and transport and release of resulting progeny to Grouse Lake.

-continued-

FTP No.	Expiration Date	Summary and reviewer comments.
Packers Lake Project		
87A-1005	09/15/92	Allows the transport of Packers Lake sockeye salmon eggs for incubation and rearing at TLH, and fry stocked back in Packers Lake. The FTP allowed 700 ripe females for broodstock, but the attached project description allowed a 5.0 million egg take.
93A-0037	06/30/03	Allows the transport of Packers Lake sockeye salmon eggs for incubation and rearing at TLH, and fry stocked back in Packers Lake.

Appendix G.–History of Trail Lakes Hatchery permit and permit alterations.

Date	Action
06/28/1988	Original permit number 27 issued to CIAA. Permitted total of 30 million sockeye, 4 million Chinook and 6 million coho salmon eggs. Sockeye donor stocks were Hidden and Packers lakes. Coho donor stocks were Bear and Crooked creeks. Chinook donor stock was Crooked Creek. Initial sockeye project release sites in BMP with donor stocks in parentheses included Packers Lake (Packers Lake), Hidden Lake (Hidden Lake), Bear Lake (Bear Lake and Russian River), Chelatna Lake (Chelatna Lake and Judd Lake), Paint River Lakes (Tustumena Lake). Initial coho project: Bear Lake (Bear Lake).
06/30/1989	PAR approved to expand Paint River SHA to allow CIAA to harvest sockeye returning to Chenik Lake project if no commercial fisheries were otherwise held due to the Exxon Valdez oil spill. Permit alternation expired 08/30/1989.
09/20/1990	BMP approved to include zero-check sockeye salmon smolt program at Bear Lake, and new sockeye programs at Coal Creek (a Kasilof River tributary) and Thumb Cove (Resurrection Bay). Permitted brood sources were as follows: Coal Creek brood source was Tustumena Lake; Thumb Cove brood source was Bear Lake; and Big River or early Russian River. Hewitt Cove added as donor stock to Chelatna Lake in BMP.
02/26/1991	PAR approved to add purse seine and beach seine gears for cost recovery gears at Packers Lake SHA.
05/22/1992	BMP amendment to conduct cost recovery fisheries at several lake stocking sites in lower Cook Inlet.
07/22/1992	PAR approved to increase Coal Creek sockeye salmon releases from 100,000 smolts to 200,000 smolts annually.
01/28/1993	BMP updated to reflect all PAR approvals and BMP alterations since 1991.
07/11/1994	PAR approved for sockeye release into Grouse Lake of the progeny of an egg take of up to 3.34 million eggs. Donor sources listed were Packers Lake and Tustumena Lake. The hatchery's permitted level of sockeye salmon eggs remained at 30 million. Amended BMP indicated 1.67 million smolt could be released into Grouse Lake from the 3.34 million egg take.
05/09/1995	BMP amended to allow CIAA to resume releases of sockeye salmon smolts at Coal Creek at same level of production proposed at Crooked Creek while Crooked Creek project was re-evaluated.
11/01/1996	PAR approved and BMP revised to incubate up to 25 million sockeye salmon eggs for stocking of fry to Tustumena Lake. This changed permitting of this project from Crooked Creek Hatchery to TLH. Straying study returning sockeye salmon into Moose Creek required with PAR approval.
04/25/1997	PAR approved to allow all progeny from 3.34 million egg take for Grouse Lake to be released into Grouse Lake. The BMP indicates 1.67 million smolt – the average number of smolts surviving from the 3.34 million egg take- are allowed for release. This PAR allowed all progeny from the egg take to be released into Grouse Lake when survivals are above average.
06/10/1998	PAR to allow release of sockeye and coho salmon at Spring Creek, near Seward, was denied. A resident population of chum salmon in Spring Creek would have been susceptible to IHNV potentially carried by returning sockeye salmon. Coho salmon were denied pending a tissue samples to determine the prevalence of BKD in chum and coho salmon at Spring Creek.
04/02/2000	PAR approved to move both incubation and rearing of sockeye for the Lower Cook Inlet Lakes project, and the Big Lake project, from the Eklutna Salmon Hatchery to TLH, and to substitute release of Big Lake origin sockeye for Packers Lake stock at the Grouse Lake. Permit conditioned on hatchery well being upgraded to surface water contamination by existing well repair or installation of depuration equipment.

-continued-

Date	Action
04/03/2001	PAR to increase Bear Lake sockeye egg take from 4.1 million to 6.0 million eggs, to manage the harvest in Resurrection Bay for 66,000 fish, a Bear Lake escapement of 12,000 fish, and a cost recovery harvest of the remaining harvest. The egg take was approved in an amended BMP. The BOF approved the escapement goal and rejected the harvest management proposal. No Notice of Alteration found that was issued with the amended BMP (C. Cherry, CIAA personal communication).
02/15/2006	Three PARs submitted: 1: PAR to release 150,000 coho smolt at both Homer Spit Fishing Lagoon and Seldovia Harbor. 2: PAR to release Big Lake sockeye fry in 3 groups at different times of the year to identify the best release strategy. 3: PAR to develop an adult sockeye return to Tutka Bay Lagoon from Hidden Lake stock as a brood source for the Lower Cook Inlet Lakes sockeye program. A Notice of Permit Alteration was issued approving PARs 1 and 2 above. No Notice of Alteration found for PAR 3 above that was issued with the amended BMP (C. Cherry, CIAA, personal communication).
02/14/2007	PARs submitted to: 1. modify Resurrection Bay sockeye salmon project by combining the Bear Lake fall fry (presmolt) and smolt releases in a Resurrection Bay spring smolt release and 2: allow CIAA to rear fish at Eklutna Salmon Hatchery whenever the water supply at TLH is limited. PARs implemented through amended and approved BMP to incorporate PARs. No Notice of Alteration found that was issued with the amended BMP. Amended BMP also removed language describing operation of suspended projects. It was noticed in 2010 that some approved permit alteration provisions were not included in BMP revisions, and these were updated in 2010 (Memo, 12/20/2010 from J. Musslewhite to David Bedford, ADF&G Deputy Commissioner).
01/06/2008	BMP amended and approved to incorporate previously approved changes and removed language describing suspended projects.
02/15/2010	BMP amended to allow collection of up to 1.35 million sockeye salmon eggs from the English Bay Lakes system, their incubation and rearing at TLH, and the release of resulting progeny to the English Bay Lakes system and Port Graham Bay. The PAR did not increase the permitted capacity of TLH. The Notice of Permit Alteration was part of the amended BMP.
06/23/2010	BMP amended to allow Kenai Lake stock sockeye eggs as a source for the LCI lakes and Tutka Bay Lagoon projects. No Notice of Permit Alteration found that was issued with the amended BMP.
05/20/2011	PAR approved to add English Bay as a broodstock source for the LCI lakes and Tutka Bay Lagoon projects. Maximum of 5.72 million sockeye salmon eggs could be taken from EBL for all projects using EBL broodstock.
07/20/2011	PAR denied to allow Bear Lake sockeye salmon as a back-up broodstock for the LCI lakes projects due to genetic concerns.