Special Publication No. 03-07

SUSTAINABLE SALMON STRATEGY FOR SOUTHEAST ALASKA—2002:

An Interagency Strategy to Determine Priorities for Southeast Sustainable Salmon Funds and Other Initiatives

edited by

Amy Skilbred

December 2003

Alaska Department of Fish and Game Division of Sport Fish

Symbols and Abbreviations

The following symbols and abbreviations, and others approved for the Système International d'Unités (SI), are used in Division of Sport Fish Fishery Manuscripts, Fishery Data Series Reports, Fishery Management Reports, and Special Publications without definition.

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
ounce	oz
pound	lb
quart	qt
yard	yd

Time and temperature

day	d
degrees Celsius	°C
degrees Fahrenheit	°F
Degrees kelvin	K
hour (spell out for 24-hour clock)	h
minute	min
second	s

Physics and chemistry

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

General

ADF&G	Alaska Department of Fish and Game
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)

Measures (fisheries)

fork length	FL
mideye-to-fork	MEF
mideye-to-tail-fork	METF
total length	TL

Mathematics, statistics

all standard mathematical signs, symbols and abbreviations	
alternate hypothesis	H_A
base of natural logarithm	*e*
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
catch per unit effort	CPUE
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

SPECIAL PUBLICATION NO. 03-07

SUSTAINABLE SALMON STRATEGY FOR SOUTHEAST ALASKA—2002: AN INTERAGENCY STRATEGY TO DETERMINE PRIORITIES FOR SOUTHEAST SUSTAINABLE SALMON FUNDS AND OTHER INITIATIVES

Amy Skilbred,
Editor

Alaska Department of Fish and Game
Division of Sport Fish, Research and Technical Services
333 Raspberry Road, Anchorage, Alaska, 99518-1599
and
Southeast Sustainable Salmon Fund
Science Coordination Panel

December 2003

The Special Publications series was established in 1991 for the publication of techniques and procedures manuals, informational pamphlets, special subject reports to decision making bodies, symposia and workshop proceedings, application software documentation, in house lectures, and other documents that do not fit in another publication series of the Division of Sport Fish. Special Publications are intended for fishery and other technical professionals. Special Publications are available through the Alaska State Library and on the Internet: http://www.sf.adfg.state.ak.us/statewide/divreports/html/intersearch.cfm. This publication has undergone editorial and peer review.

Amy Skilbred, editor
Alaska Department of Fish and Game and the Southeast Sustainable Salmon Fund Science Coordination Panel,
c/o 333 Raspberry Road, Anchorage, AK 99518-1599, USA

This document should be cited as:
Skilbred, Amy, editor. 2003. Sustainable Salmon Strategy for Southeast Alaska—2002: An Interagency Strategy to Determine Priorities for Sustainable Salmon Funds and Other Initiatives. Alaska Department of Fish and Game, Special Publication No. 03-07, Anchorage.

The Alaska Department of Fish and Game administers all programs and activities free from discrimination based on race, color, national origin, age, sex, religion, marital status, pregnancy, parenthood, or disability. The department administers all programs and activities in compliance with Title VI of the Civil Rights Act of 1964, Section 504 of the Rehabilitation Act of 1973, Title II of the Americans with Disabilities Act of 1990, the Age Discrimination Act of 1975, and Title IX of the Education Amendments of 1972.

If you believe you have been discriminated against in any program, activity, or facility, or if you desire further information please write to ADF&G, P.O. Box 25526, Juneau, AK 99802-5526; U.S. Fish and Wildlife Service, 4040 N. Fairfax Drive, Suite 300 Webb, Arlington, VA 22203 or O.E.O., U.S. Department of the Interior, Washington DC 20240.

For information on alternative formats for this and other department publications, please contact the department ADA Coordinator at (voice) 907-465-4120, (TDD) 907-465-3646, or (FAX) 907-465-2440.

ACRONYMS USED IN THIS REPORT

NOTE: Not all of the references to agency functions and/or projects contained in this document are current. During 2003, Executive Order 107 moved responsibility for habitat permitting from the Alaska Department of Fish and Game (ADF&G) to the Alaska Department of Natural Resources (ADNR). Habitat functions remaining with ADF&G are now housed within its Divisions of Sport Fish and Wildlife Conservation. Others reside at ADNR. Passage of HB 191 during the 1st Session of the 23rd Legislature changed the Alaska Coastal Zone Management Program (ACMP). Implementation of the legislation is ongoing. Readers should be aware of these changes when using this document.

ACWA	Alaska Clean Waters Action
ADEC	Alaska Department of Environmental Conservation
ADF&G	Alaska Department of Fish and Game
ADNR	Alaska Department of Natural Resources
ADOT&PF	Alaska Department of Transportation and Public Facilities
ASL	Age, sex, length
ATV	All-terrain vehicle
BEG	Biological Escapement Goal
BOF	Board of Fish
CDFO	Canadian Department of Fisheries and Oceans
CPUE	Catch per unit effort
CRSA	Coastal Resource Service Area
CTC	Chinook Technical Committee
CWT	Coded-wire tag
DIPAC	Douglas Island Pink and Chum
DNA	Deoxyribonucleic acid
EPA	Environmental Protection Agency
EVOS	Exxon Valdez Oil Spill
FERC	Federal Energy Regulatory Commission
FSB	Federal Subsistence Board
GIS	Geographic Information System
GSI	Genetic Stock Identification
HUC	Hydrologic Unit Code
IFDB/ALEX	Integrated Fisheries Database/Alexander Archipelago
IMEG	Interagency Monitoring and Evaluation Group
LUD	Land Use Designation
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRIS	Natural Resource Information System
NWS	National Weather Service
PSC	Pacific Salmon Commission
PSFMC	Pacific States Marine Fisheries Commission
PST	Pacific Salmon Treaty
RPT	Regional Planning Team
SSSF	Southeast Sustainable Salmon Fund
UAF	University of Alaska Fairbanks
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey

TABLE OF CONTENTS

Page

TABLE OF CONTENTS i

LIST OF FIGURES AND TABLES i

LIST OF APPENDICES i

INTRODUCTION 1

BACKGROUND 1

The Southeast Sustainable Salmon Fund 1

Alaska's Sustainable Salmon Policy 2

Salmon in Southeast Alaska 3

DEVELOPING THE SUSTAINABLE SALMON STRATEGY 5

Initial ADF&G Strategy—2001 5

Interagency Science Coordination Panel Strategy—2002 5

SUSTAINABLE SALMON STRATEGY – 2002 FRAMEWORK 7

'GAP ANALYSIS': Review of How Existing Programs Implement the Sustainable Salmon Strategy—2002 12

CONCLUSION 13

Annual Review and Monitoring 13

Implementing the Strategy 13

ACKNOWLEDGMENTS 13

LITERATURE CITED 14

LIST OF FIGURES AND TABLES

Page

Figure 1. Map of Southeast Alaska 4

Table 1. Sustainable Salmon Strategy—2002 Framework 8

LIST OF APPENDICES

Page

Appendix A. Projects Funded with Southeast Sustainable Salmon Funds—2001 15

Appendix B. Projects Funded with Southeast Sustainable Salmon Funds—2002 20

Appendix C. Roles of Agencies in Southeast Alaska Salmon Research, Management and Stewardship 23

Appendix D. Gap Analysis—2002, prepared by SSSF Science Coordination Panel 27

INTRODUCTION

The *Sustainable Salmon Strategy for Southeast Alaska—2002* establishes a framework for maintaining and enhancing sustainable salmon populations and fisheries in Southeast Alaska.[1] The strategy will guide the use of Southeast Sustainable Salmon Funds (SSSF) received from Congress and managed by the Alaska Department of Fish and Game (ADF&G) to assist with Pacific salmon recovery efforts. It will also advise other state and federal agencies as they make decisions about which projects to undertake, sponsor or fund to work toward the goal of sustainable salmon populations in Southeast Alaska, outside of the SSSF program.

The 2002 strategy was developed cooperatively by the SSSF Science Coordination Panel, a group of state and federal agencies with responsibilities in salmon research, monitoring, and habitat stewardship and restoration in Southeast Alaska. ADF&G coordinated the work of the panel and invited the participation of interested non-government organizations and members of the public.

The mission of the Sustainable Salmon Strategy is to sustain a healthy and biologically diverse wild salmon ecosystem in Southeast Alaska and the human use of wild salmon in that ecosystem. The strategy establishes goals and objectives for sustainability that can be achieved through salmon research and monitoring, habitat stewardship and restoration in Southeast Alaska. It also lists the information needs/issues that need to be addressed to accomplish each objective.

A 'Gap Analysis' conducted by the Science Coordination Panel evaluated existing salmon programs against the highest priority information needs/issues for 2002, and identified projects that should be accomplished under the SSSF program to begin to address these high priority needs. The ADF&G is directing near-term SSSF funding to accomplish these projects.

[1] The years 2001 and 2002 are the first and second years, respectively, that Pacific Coastal Salmon Recovery funds were received by the State of Alaska and managed by the ADF&G under the SSSF.

The ADF&G and the Science Coordination Panel will work toward developing a memorandum of agreement among agencies with primary responsibility for salmon and salmon habitat in Southeast Alaska to ensure that the strategy is implemented. It is intended that the strategy will help agencies collaborate when setting goals and objectives, regularly share information and research results, pool resources to accomplish shared goals, and avoid duplication of effort.

The strategy and gap analysis will be reviewed and updated annually by the Science Coordination Panel. The annual review will give the agencies the opportunity to consider which goals, objectives and information needs/issues are being met; incorporate new issues that have arisen; and recommend projects for funding. Through this collaboration, agencies will work together to maintain sustainable salmon populations and human use of wild salmon in Southeast Alaska.

BACKGROUND

THE SOUTHEAST SUSTAINABLE SALMON FUND

The U.S. Congress, recognizing the need to assist states with Pacific coastal salmon recovery, has appropriated funds to states and tribes in the Pacific Northwest, including Alaska, each year since the year 2000. The ADF&G established the SSSF program to manage these funds. Alaska's SSSF received approximately $14 million to fund projects in 2001 and $19 million to fund projects in 2002.[2]

Alaska's SSSF has a broad mission. The SSSF is working toward maintaining both sustainable wild salmon populations and a sustainable salmon fishing industry and fishing communities in Southeast Alaska. This mission responds to Alaska's unique situation with regard to Pacific salmon recovery. No salmon originating in Alaska are listed under the Endangered Species Act and there is still a viable commercial salmon fishing fleet in Southeast Alaska, although the industry is having to adapt to the challenges of markets influenced by farmed salmon. To ensure sustainable populations of wild salmon in

[2] For 2003 projects, Alaska's SSSF will receive $16.75 million through Congressional appropriation.

Southeast Alaska, healthy and productive habitat must be maintained and salmon harvests must be monitored and regulated.

Alaska's SSSF program currently funds projects in four categories to maintain sustainable salmon populations and vital salmon fisheries in Southeast Alaska:

1. ***Research and Monitoring***—to continually improve information and methods for managing salmon and salmon fisheries in Southeast Alaska.
2. ***Habitat Stewardship and Restoration***—to maintain and restore salmon habitat to increase fishable salmon populations.
3. ***Economic Opportunities***—to increase economic opportunities for Southeast Alaska salmon fishermen and fishing communities.
4. ***Cooperative Projects***—to participate with other Pacific Northwest tribes, Pacific Northwest states, and Canada on salmon-related projects of mutual benefit.

The State of Alaska uses a 'two-part' system to manage the SSSF program. ADF&G, with the assistance of the interagency Science Coordination Panel, has taken the lead in determining the strategy and funding for projects related to salmon research and monitoring (category 1), habitat stewardship and restoration (category 2), and cooperative projects with other states and Canada (category 4). The *Sustainable Salmon Strategy for Southeast Alaska—2002* is an essential tool for ADF&G and the Science Coordination Panel to use in making decisions about projects to fund in these categories.

A Stakeholder Advisory Panel made up of fishery, community and non-government organizations recommends projects related to economic opportunities for salmon fishermen and fishing communities (category 3). In the SSSF program's first two years, the Stakeholder Advisory Panel has recommended funding primarily for enhancement/hatchery projects, with some funds allocated to marketing, public education, and infrastructure projects. The *Sustainable Salmon Strategy for Southeast Alaska—2002* does not address economic opportunity projects.

Appendixes A and B list the projects that have been funded by the SSSF in its first two years: 2001 and 2002. ADF&G will allocate future SSSF funding for projects based on the 2003 strategy, with recommendations from the Science Coordination Panel and the Stakeholder Advisory Panel.

At the time this 2002 strategy was prepared, the SSSF program could only fund non-federal entities. However, the ADF&G has since been given the flexibility to use SSSF funds to support federal agency work, so that the agency best equipped or suited for specific research projects are able to undertake them with SSSF support. This will encourage all agencies working with salmon to be committed to using and improving the SSSF program and the Sustainable Salmon Strategy. Beginning in 2003, the Sustainable Salmon Strategy will address funding of federal agency projects to implement SSSF goals.

ALASKA'S SUSTAINABLE SALMON POLICY

The success of the Sustainable Salmon Strategy may be measured against the *Sustainable Salmon Fisheries Policy for the State of Alaska*, adopted by the Alaska Board of Fisheries in March 2000. This landmark policy promotes the sustainability of wild, abundant, and healthy salmon stocks in Alaska. The policy is designed to guide Alaska's fishery management plans and programs to attain optimum salmon production and consider factors that threaten salmon conservation.

Alaska's Sustainable Salmon Policy's goal is to "ensure conservation of salmon and salmon's required marine and aquatic habitats, protection of customary and traditional subsistence uses and other uses, and the sustained economic health of Alaska's fishing communities." The policy articulates five strategic points:

1. Wild salmon populations and their habitats must be protected to maintain resource productivity.
2. Fisheries must be managed to allow escapements within ranges necessary to conserve and sustain potential salmon production and maintain normal ecosystem functioning.
3. Effective salmon management systems must be established and applied to regulate human activities that affect salmon.

4. Public support and involvement for sustained use and protection of salmon recourses must be maintained.
5. In the face of uncertainty, salmon stocks, fisheries, artificial propagation and essential habitats must be managed conservatively.

The Sustainable Salmon Strategy coordinates the work of state and federal agencies with responsibility for salmon research, stewardship and management in implementing Alaska's Sustainable Salmon Policy.

SALMON IN SOUTHEAST ALASKA

Southeast Alaska extends from Dixon Entrance to Cape Suckling, covering 500 miles from north to south and 100 miles east to west, with nearly 1,000 islands and over 10,000 miles of shoreline (Figure 1). It is a temperate rainforest averaging 80 to 200 inches of rain per year. The terrain of icefields and snow capped mountains, muskegs, and forested valleys are laced with lakes, pools, streams, and rivers that pour into cold marine waterways rich with flora and fauna. These combined environmental features create ideal habitat for salmon production.

The production of salmon is widely distributed throughout the region. There are currently 5,432 cataloged water bodies in the region producing anadromous fishes. Coho and pink salmon are found in virtually all of these, chum salmon in most, and sockeye salmon in those with accessible lakes and often in streams without lakes. Chinook salmon are primarily found in mainland, glacially fed rivers. Some mainland rivers originate in Canada and flow to the sea through the U.S. These transboundary rivers include the Alsek, Taku, and Stikine rivers. Many Southeast Alaska streams are small producers, but collectively, they contribute a substantial portion of the region's annual salmon production.

Salmon are woven into the lifeblood of Southeast Alaska's culture and economy. During the last five years, an annual average of 3,405 commercial fishermen held permits to fish commercially for salmon. Commercial salmon harvest from 1997 to 2001 averaged $73.2 million per year (in harvest year dollars) from Southeast Alaska waters. Southeast Alaska has been the top-earning salmon region in Alaska during the last five years. Economic benefits from commercial salmon fishing have also extended to fishing vessel crew members, fish processors and their employees, businesses providing goods and services to fishermen and processors, and communities.

Sport fishing effort, by resident and nonresident anglers, target mainly chinook and coho salmon and make significant contributions to local community economies. In 1988, anglers spent $83.1 million for sport fishing for all species of fish in Southeast Alaska (Jones and Stokes 1991), the most recent year of data available. Estimated spending included purchases of licenses and stamps, fishing equipment and gear, hotels and motel stays, guiding costs and other retail items associated with angling. Of the total, about $23 million (28 percent) was spent to catch king salmon. Resident anglers spent about $40.7 million and nonresident anglers spent about $42.4 million; $24.5 million of the nonresident total was spent in Alaska.

From harvesting and storing salmon for food; to salmon clans, rituals, celebrations, songs, dances, and totems; salmon have been an essential part of Southeast's Tlingit, Haida, and Tsimshian native communities and culture for thousands of years. And, salmon play an important role for all people living in Southeast Alaska today, regardless of ethnic or cultural affiliation. Household interviews conducted in 1987 in more than thirty rural Southeast Alaska communities reported that 172,293 salmon were harvested for home use. In recent household surveys, 80 percent of rural households in Southeast Alaska reported harvesting fish and 94 percent of the rural households reported using fish.

Salmon also have an important role in the Southeast Alaska ecosystem, regardless of human use. Adult wild salmon return nutrients to Southeast ecosystems and help maintain productive, diverse stream channels through their spawning activities. Both juvenile and adult salmon are essential food sources for a wide array of wildlife and fish species in freshwater and marine environments.

ADF&G has a constitutional mandate to manage salmon for sustained yield. Alaska's salmon management program is built on the principles

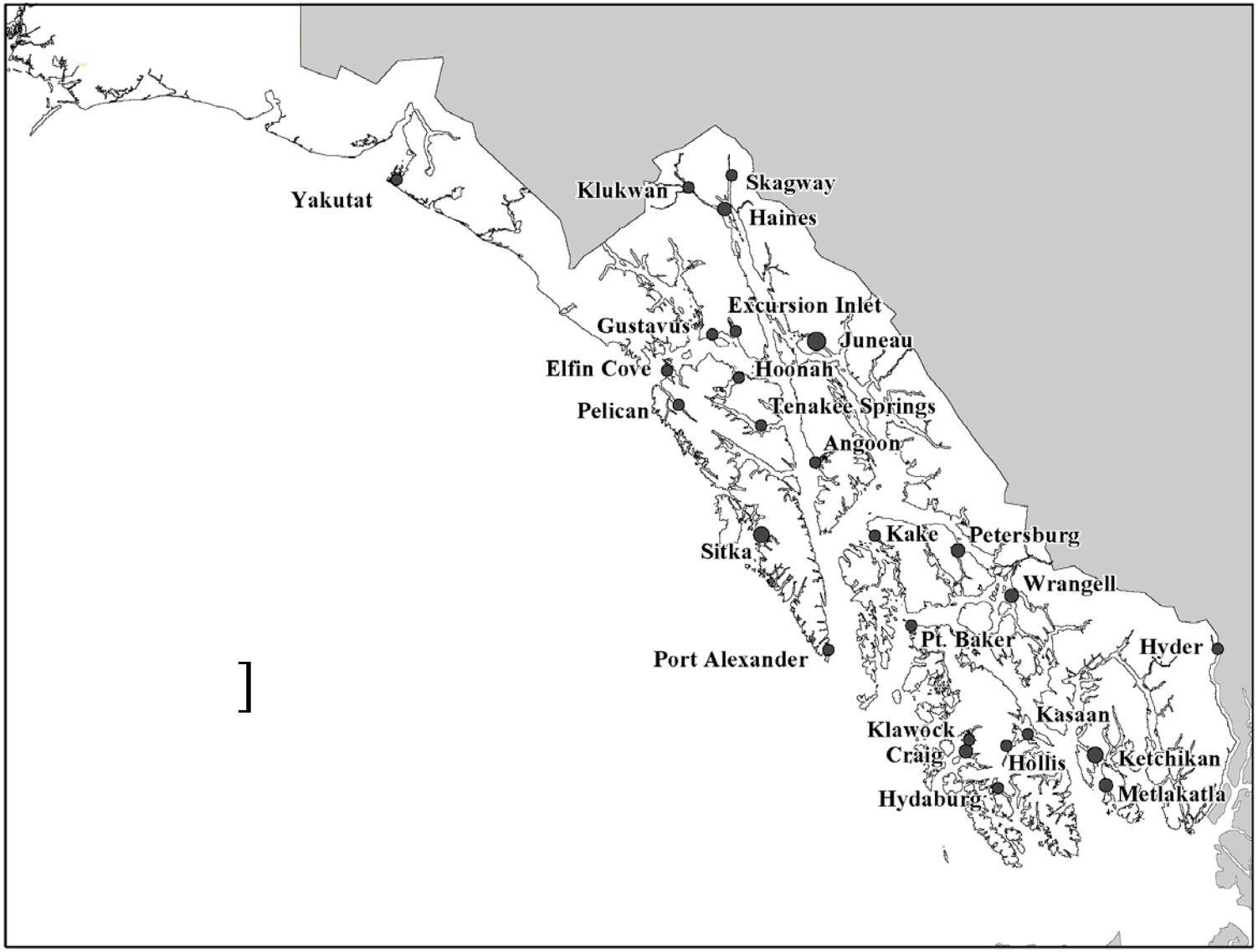

Figure 1.–Southeast Alaska area east of Cape Suckling.

of conservative management, sound science, and habitat protection. Alaska's habitat conservation laws and regulations provide clean, free-flowing waterways vital to abundant, sustainable salmon production. Harvests and escapement of most salmon stocks in Southeast Alaska are at or near record levels and salmon habitat is in generally good condition. No salmon stocks of Alaska origin are listed as threatened or endangered. This is in sharp contrast to the declining salmon runs in the Pacific Northwest.

The marine environment during the last 20 years has been very favorable for Pacific salmon survival in Alaska, and this has resulted in ever-increasing salmon harvests. In recent years, the harvests have been the largest in the state's history. However, the real test of management's effectiveness is how it responds during periods of poor marine survival. During the early 1970s when survivals plummeted, Alaskan salmon managers closed fisheries, and conserved spawning stocks. The high catches of the recent years with favorable survival are in part due to the conservative management during periods of unfavorable survival.

However, some salmon stocks are at less than desired abundance and human activities have reduced the ability of some habitat to support salmon. Alaska needs to examine and mitigate the impacts to wild salmon and their habitat that have and are occurring, including stream and estuarine alterations. These impacts include the residual effects from historic logging, watershed degradation, effects on the nearshore habitat from log transfer facilities in estuarine areas, and alteration of habitat by urban development.

DEVELOPING THE SUSTAINABLE SALMON STRATEGY

The ADF&G coordinated development of the *Sustainable Salmon Strategy for Southeast Alaska—2002* through a two-step process. In 2001, ADF&G prepared an initial strategy, focusing on areas within its own salmon programs that should receive additional funding to fulfill Alaska's Sustainable Salmon Policy. To prepare the strategy for 2002, ADF&G broadened the effort to involve other state and federal agencies with responsibilities for salmon research, stewardship and management.

INITIAL ADF&G STRATEGY—2001

ADF&G worked internally to develop an initial Sustainable Salmon Strategy in 2001 to help determine the best use of SSSF funds received by the agency for salmon research, monitoring, habitat assessment and restoration. Although ADF&G recognized the limits of this single-agency approach, this initial strategy was needed to make expeditious funding decisions for the first year of SSSF projects in 2001.

Supervisory staff from ADF&G's divisions of Commercial Fisheries Management and Development, Sport Fisheries, and Habitat and Restoration met in January 2001 to articulate goals and objectives for the SSSF, to review ADF&G's salmon management and research programs, and to identify the highest priority "information needs/issues" that could be addressed with new SSSF funding.[3] Appendix A lists the projects funded by the SSSF in 2001 to implement the initial ADF&G strategy.

INTERAGENCY SCIENCE COORDINATION PANEL STRATEGY—2002

To further develop the Sustainable Salmon Strategy and prepare for the second year of SSSF funding in 2002, ADF&G invited other state and federal agencies with responsibility for salmon research, management and habitat to participate on an interagency Science Coordination Panel for the SSSF program. The panel was asked to review the initial Sustainable Salmon Strategy prepared by ADF&G in 2001—and to add goals, objectives, information needs/issues, and options for addressing needs that are important to maintaining the sustainability of salmon in Southeast Alaska, including those that may be beyond the purview of ADF&G.

The top priority goals, objectives and information needs/issues identified by the Science Coordination Panel for 2002 are presented in the Sustainable Salmon Strategy—2002 Framework,

[3] ADF&G used the analytic hierarchy process to facilitate group discussion and decisions (Merritt and Skilbred, 2002).

in the following section and Table 1. Appendix B lists the projects funded by the SSSF in 2002 to implement the strategy developed by the interagency Science Coordination Panel.

The Science Coordination Panel includes experts with hands-on experience in Southeast Alaska, who not only represent their agency mandates but also contribute their extensive knowledge and experience of salmon natural history, habitats and management. Participating agencies include:

- Alaska Department of Fish and Game (ADF&G)
- Alaska Department of Environmental Conservation (DEC)
- National Marine Fisheries Service (NMFS)
- U. S. Fish and Wildlife Service (USFWS)
- U. S. Forest Service (USFS)
- U.S. Environmental Protection Agency (EPA)
- University of Alaska
- Exxon Valdez Oil Spill Trustees Office, Gulf Ecosystem Monitoring Project

The role of each agency in salmon research, management and stewardship in Southeast Alaska is described in Appendix C. Nongovernmental organizations that have participated in Science Coordination Panel discussions include Trout Unlimited, The Nature Conservancy, Southern Southeast Aquaculture Association, and Sealaska Corporation. Individual participants are listed in the acknowledgments.

The Science Coordination Panel met in March, May and September 2001 to refine the goals and objectives of the SSSF, review state and federal agency salmon management and research programs, and identify the highest priority 'information needs/issues' that could be addressed with new SSSF funding.

The panel used the following six criteria to prioritize the information needs/issues in 2002. The criteria were not weighted or listed in any order of priority. The panel recommends that these criteria be used when the strategy is reviewed and updated each year—and will revisit the question of whether the criteria should be ranked or weighted. High priority information needs/issues are those which:

1. <u>Prevent degradation</u>.

   Addressing this information need/issue would provide information relevant to preventing future degradation of salmon populations or habitat (e.g., influence of nearshore marine conditions on juvenile salmon production, effectiveness of permit requirements at maintaining productivity of salmon habitat, or watershed scale effects of human activities). Includes:

   a. Broad-scale inventories to define geographic scope and coverage.
   b. Consideration given to functionally related physiographic and biologic systems.
   c. Trends analyses sensitive to change within a 'noisy' environment.

2. <u>Provide direct benefits to salmon populations or habitats</u>.

   Addressing this information need/issue would provide information relevant to sustaining wild salmon populations, or to identifying or maintaining important wild salmon habitat. For example:

   a. Number of species, stocks, bio-units (demes, ecologically significant units, trophic assemblages, life history strategies, spawning aggregates, etc.), life history phases.
   b. Geographic extent (e.g., regionwide or watershed-specific).
   c. Temporal extent (e.g., one harvest season, life of project, or long-term).
   d. Number of fisheries (e.g., gear type, harvest area, target species).

3. <u>Contribute essential knowledge or have practical application.</u>

   Addressing this information need/issue would provide information considered to be essential to fulfilling the goal of the strategy to maintain sustainable salmon populations in Southeast Alaska. For example:

   a. Baseline information, including natural forces (e.g., water quality and quantity, oceanic conditions, climate change, effect of natural landslides on habitat, habitat requirements by life history phases in various types of systems, timing and pattern of movements of salmon through a system).

b. Prerequisite knowledge required for other actions (e.g., swimming ability of juvenile salmonids through various designs of culverts, scale patterns of stocks to improve accuracy of harvest management).

c. Addresses critical or identified management need in strategy.

4. Address stock characteristics.

Addressing this information need/issue would provide information relevant to salmon stocks which are of particular concern under the SSSF. For example:

a. Stocks performing poorly (low fish numbers), stocks subject to habitat degradation, unique or isolated stocks, valuable stock, 'stock of concern,' 'stocks of importance.'

b. Stocks for which there is limited current knowledge, or limited or no historical knowledge.

In applying this criterion, evaluate stock status on the basis of geographically proximal stock groups, and consider genetic importance in context of metapopulations.

5. Address a number of human actions.

Addressing this information need/issue would illuminate potential effects of human actions on wild salmon habitat and population sustainability. For example:

a. Urbanization, mining, logging, roads.

b. Hydroelectric power development, water withdrawal.

c. Pollution.

d. Recreation development, harbors, and other sources of habitat alteration.

In applying this criterion, consider future demographics and the balancing of local scale action with landscape scale changes and trends.

6. Serve a number of scientific purposes (multi-disciplinary).

Addressing this information need/issue would provide information relevant to multiple scientific purposes in different disciplines. In applying this criterion, consider evaluation of functional processes related across physical and biologic systems (e.g., climate change, hydrology, habitat, productivity).

Science Coordination Panel participants each applied the above criteria and voted for the objectives and information needs/issues they considered to be the highest priorities for 2002.

SUSTAINABLE SALMON STRATEGY—2002 FRAMEWORK

Table 1 illustrates the framework for the *Sustainable Salmon Strategy for Southeast Alaska —2002*, including the strategy's goals and objectives, and the information needs/issues that must be addressed to accomplish them. The four goals of the strategy articulated by the Science Coordination Panel in 2002 are:

Goal 1—Habitat: Protect and restore freshwater, estuarine and marine salmon habitats to maintain resource productivity. It is critical to maintain healthy and productive habitat to support sustainable populations of wild salmon, in the face of increasing human population and competing resource uses.

Goal 2—Wild Stock: Maintain and restore wild salmon stocks to sustain high potential productivity. Abundance of wild salmon stocks may fluctuate over time because of a variety of natural and human-induced factors. However, the SSSF seeks to maintain salmon habitat and genetic variability so that wild salmon populations retain the potential to be productive when conditions are favorable.

Goal 3—Salmon Management: Maintain effective, biologically sound salmon harvest management systems to regulate human activities that affect salmon.

Goal 4—Public Involvement: Promote public involvement and support for sustained use and protection of salmon. Education of the public regarding the importance of wild salmon to the economy and culture of Southeast Alaska —and the importance of maintaining habitat— will be essential to maintaining sustainable salmon populations in the future.

In the Sustainable Salmon Strategy framework (Table 1), the information needs/issues considered by the Science Coordination Panel to be the highest priorities for each goal in 2002 are shaded. There was no ranking of importance among these top priorities.

Table 1.–Sustainable Salmon Strategy—2002 Framework

Goal 1: Habitat

Shading indicates high priority information needs/issues identified by SSSF Science Coordination Panel.

Protect and restore freshwater, estuarine and marine salmon habitats to maintain resource productivity	
Objective	**Information need/issues**
1-A. Identify, protect and manage spawning, rearing and migration habitats to prevent perturbations beyond the bounds of natural variation.	(1A-1) Monitor development projects, construction and operation for compliance with permit requirements or conditions to ensure protection and effectiveness of permits.
	(1A-2) Quantify flow requirements for life stages of salmon and reserve sufficient amounts of water.
	(1A-3) Develop information syntheses (summaries of analyzed information) and management sharing systems to provide managers and public readily available information on salmon habitat and existing and future land and water uses.
	(1A-4) Catalog anadromous water bodies.
	(1A-5) Identify location of critical/essential spawning, incubation, rearing and migration habitat, including site-specific habitat characteristics (e.g., vegetation, substrate, hydrology).
	(1A-6) Establish baselines for water quality and quantity for selected systems.
	(1A-7) Analyze cumulative effects of human activity across spatial and temporal scales for watershed management on important salmon producing systems.
	(1A-8) Identify and assess marine areas for protection.
1-B. Detect and predict annual and long-term changes and trends in salmon habitat.	(1B-1) Understand ocean conditions that affect early marine survival.
	(1B-2) Understand the effect of human activities on salmon habitat.
	(1B-3) Research short-term (5-25 year) oceanic cycles and salmon.
	(1B-4) Understand long-term effectiveness of mitigation/restoration techniques.
	(1B-5) Detect and understand effects of global climate change.
	(1B-6) Evaluate salmon for contaminant burdens.
	(1B-7) Understand the role of salmon escapement in food webs of aquatic and terrestrial ecosystems.
	(1B-8) Determine feasibility of monitoring long-term trends of smolt production from selected streams.
1-C. Restore degraded habitat and access to habitat.	(1C-1) Address fish passage that is restricted due to culverts, roads, and other structures and improve culvert design and identify fish movement to adequately design protection measures that minimize the impacts of culverts.
	(1C-2) Restore riparian, spawning, rearing habitats that have been degraded by land management practices (e.g., urbanization, timber harvest).
	(1C-3) Conduct research on oil spill prevention and clean up.
1-D. Evaluate effectiveness of programs for protecting salmon habitat and improve where appropriate.	(1D-1) Evaluate existing statutes, regulations and policies to ensure adequate protection of salmon habitat.
	(1D-2) Improve enforcement.
	(1D-3) Evaluate and improve protocols to monitor riparian standards and stream habitat.

-continued-

Table 1.–Page 2 of 4.

Goal 2: Wild stocks

Shading indicates high priority information needs/issues identified by SSSF Science Coordination Panel.

Maintain and restore wild salmon stocks to sustain high potential productivity	
Objective	**Information need/issues**
2A. Estimate and periodically evaluate escapement goal approach and the biological goal ranges to achieve sustained yield.	(2A-1) Obtain reliable estimate of escapement by age/sex/length.
	(2A-2) Identify the limiting factors for depressed stocks.
	(2A-3) Collect data regarding harvest by stock by brood year for hatchery and wild stocks.
	(2A-4) Develop data analyses, databases, or models for biological escapement goals.
	(2A-5) Develop, evaluate, and implement methods to estimate escapement, including: developing cost effective technologies, evaluating existing escapement estimates, and developing technologies to estimate a larger proportion of total escapements without increasing cost.
2B. Develop and implement methods to assess stock status and management systems to achieve escapement goals.	(2B-1) Determine genetic baselines of all species to prioritize conservation and restoration efforts and predict and monitor effects of enhancement actions.
	(2B-2) Respond effectively to changes in annual run strength.
	(2B-3) Develop a list of stocks by stock status category and habitat condition, including identifying data gaps and where no information is available (ideally list by anadromous stream catalog number, aggregated to stock status [management unit] and include information that is known, such as harvest, escapement data).
2C. Identify and catalog conservation units (stock aggregations, meta-populations).	(2C-1) Identify and assess conservation or management units for each species.
	(2C-2) Collect phenotypic information: abundance, age and size structure, run and spawn timing.
	(2C-3) Collect genotypic baseline data (as per 2B-1) to describe relationships among demes, stock, conservation units, meta-populations.
2D. Establish information sharing system.	(2D-1) Standardize historical data to be usable in a data series for integrated analysis, including stock status and habitat quality.
	(2D-2) Develop public access to salmon and salmon habitat data via web.
	(2D-3) Improve data management infrastructure.
2E. Restore depressed stocks where applicable.[4]	(2E-1) Restore sockeye salmon stocks where needed.
	(2E-2) Restore chum salmon stocks where needed.
	(2E-3) Restore chinook salmon stocks where needed.
	(2E-4) Restore coho salmon stocks where needed.
	(2E-5) Restore pink salmon stocks where needed.

-continued-

[4] After 2A-2 and 2C-1 are completed, depressed stocks will be better defined.

Goal 3: Salmon management systems

Shading indicates high priority information needs/issues identified by SSSF Science Coordination Panel.

Maintain effective, biologically sound, salmon management systems to regulate human activities that affect salmon.	
Objective	**Information need/issues**
3A. Develop management system to achieve cultural, social and economic objectives within acceptable biological limits.	(3A-1) Incorporate estimates of harvest of wild salmon from a particular drainage or set of drainages to meet allocation objectives.
	(3A-2) Develop more comprehensive information to meet Alaska's PST obligations under the June 1999 Agreement.
	(3A-3) Collect sufficient information on the biology of wild salmon from a particular drainage or set of drainages to meet management objectives.
	(3A-4) Collect sufficient information to forecast and manage in-season to achieve management objectives.
	(3A-5) Evaluate the effects of management actions on socioeconomic needs, preferences, or goals.
	(3A-6) Identify user preferences.
	(3A-7) Collect sufficient information on by-catch.
	(3A-8) Collect ethno-historic and ethnographic research describing customary and traditional use patterns of wild salmon from a particular drainage or set of drainages.
	(3A-9) Evaluate fishery management plans, including regulatory plans, hatchery management plans, and other plans and regulations affecting wild salmon stocks.
3B. Develop and implement methods for managing enhanced production while evaluating and minimizing adverse impacts to wild stocks.	(3B-1) Assess effects of interactions between wild and hatchery (enhanced) stocks.
	(3B-2) Assess to what extent enhanced fish compete with and prey on wild salmon.
	(3B-3) Estimate stray rates, understand impacts, and determine acceptable rates for straying.
	(3B-4) Ensure enhanced production is adequately marked.
	(3B-5) Provide an adequate recovery and analysis program.
	(3B-6) Determine acceptable release practices.
	(3B-7) Improve accounting of returns to terminal harvest areas to estimate total run size.
	(3B-8) Develop management tools to effectively harvest enhanced fish.
	(3B-9) Develop and implement sound fish culture practices.
3C. Determine necessary level of enhancement to meet stakeholder needs.	(3C-1) Provide for commercial and recreational fishing opportunities.
	(3C-2) Provide for customary and traditional uses of salmon fisheries.
	(3C-3) Meet mitigation obligation under Pacific Salmon Treaty.
3D. Identify, assess, and minimize interaction and impact of invasive species (exotics).	(3D-1) Determine distribution and extent of non-indigenous species in Southeast Alaska.
	(3D-2) Gather pre-invasion baseline data.
	(3D-3) Determine effects and potential effects of non-indigenous species on wild salmon.

-continued-

Table 1.–Page 4 of 4.

Goal 4: Public involvement

Shading indicates high priority information needs/issues identified by SSSF Science Coordination Panel.

Promote public involvement and support for sustained use and protection of salmon.	
Objective	**Information need/issues**
4A. Establish effective lines of communication with stakeholders.	(4A-1) Seek stakeholder input on plans.
	(4A-2) Publish and distribute reports.
	(4A-3) Offer technical assistance.
	(4A-4) Achieve increased public acceptance and compliance with regulations and programs (such as tag returns).
	(4A-5) Sponsor and participate in technical and user group forums.
	(4A-6) Collect additional research on nutritional and other benefits of wild salmon.
4B. Establish partnerships to address issues and achieve program goals.	(4B-1) Encourage formal adoption of Sustainable Salmon Policy by federal and state agencies and non-government organizations.
	(4B-2) Encourage cooperative projects with others to avoid duplication and leverage joint funding.
	(4B-3) Encourage local government conservation ordinances.
	(4B-4) Encourage local government conservation incentives.
4C. Assure an effective information and education program on salmon stewardship for the general public.	(4C-1) Develop and integrate salmon information and education program into organization and agency information and education programs.
	(4C-2) Sponsor and participate in events, clinics, workshops (e.g., Kids Fishing Day, Boat Show, etc).

'GAP ANALYSIS':
HOW EXISTING SALMON PROGRAMS IMPLEMENT THE SUSTAINABLE SALMON STRATEGY—2002

To contribute to the *Sustainable Salmon Strategy for Southeast Alaska—2002* and to help guide funding decisions for 2002, the Science Coordination Panel conducted a 'Gap Analysis.' The analysis determined the extent to which existing salmon programs address the high priority information needs/issues of the strategy (Table 1, shaded areas), and where they fall short. The Science Coordination Panel formed working groups to conduct the gap analysis for Goals 1–3 of the strategy, related to habitat, wild stock and salmon management.[5]

The working groups reviewed the projects that agencies have completed or have underway to address the high priority information needs/issues. The analysis showed the extent to which existing projects or programs address these priorities—and identified areas where additional emphasis and funding should be placed. These 'gaps' helped determine which projects should be funded by the SSSF program in 2002.

The gap analysis is presented in Appendix D. It provides the following information for each of the high priority information needs/issues:

- Summary of the current situation (2002).
- Projects underway to address this information need/issue.
- Summary of what needs to be done over the long-term.
- Recommendations for specific projects to be funded by in 2002.

Based on the gap analysis, the Science Coordination Panel recommended high priority projects for Goals 1–3 that should be funded by SSSF in the short term. After consultation with the Stakeholder Advisory Panel, ADF&G funded high priority projects with SSSF funding in 2002 (Appendix B).

Gap Analysis—2002 Working Groups[5]

Goal 1: Habitat

Bill Hanson (ADF&G, Habitat)
Kevin Brownlee (ADF&G, Sport Fish)
K Koski (NMFS, Auke Bay Lab)
Linda Shaw (NMFS)
Susan Walker (U.S. Fish & Wildlife Service)
Mason Bryant (U.S. Forest Service, Forestry Sciences Lab)
Bill Lorenz (U.S. Forest Service)
Jim Ferguson (The Nature Conservancy)

Goal 2: Wild stock

Scott McPherson (ADF&G, Sport Fish)
Andy McGregor (ADF&G, Commercial Fisheries)
Alex Wertheimer (NMFS, Auke Bay Lab)
Doug McBride (USFWS, Office of Subsistence Management)

Goal 3: Salmon management

Scott McPherson (ADF&G, Sport Fish)
Tom Brookover (ADF&G, Sport Fish)
Andy McGregor (ADF&G, Commercial Fisheries)
Alex Wertheimer (NMFS, Auke Bay Lab)

[5] The panel does not include the necessary expertise to conduct a gap analysis for Goal 4, related to public involvement. ADF&G is working with a committee of stakeholders, agency staff and the public to coordinate a gap analysis for Goal 4 in the third year of SSSF funding.

CONCLUSION

ANNUAL REVIEW AND MONITORING

The Sustainable Salmon Strategy for Southeast Alaska must be reviewed and updated each year to be a valuable tool for adaptive management of salmon research, monitoring, habitat assessment and restoration programs. As objectives are met, projects completed, and/or new issues arise, the strategy will need to be reconsidered and new priorities assigned. An annual review will also help ensure that the strategy is not forgotten as agency managers and staff change over time.

The process used by the Science Coordination Panel to develop the *Sustainable Salmon Strategy for Southeast Alaska—2002* will be used each year to update priorities and guide funding decisions for new projects. The criteria should be applied consistently each year to identify the top priority issues and information needs for the near-term.

ADF&G believes that the strategy would also be strengthened by requesting more input from the Stakeholder Advisory Panel, the public and additional agencies. In refining the strategy for 2003, ADF&G will invite these parties to participate.

IMPLEMENTING THE STRATEGY

To be fully effective, the Sustainable Salmon Strategy must be used by all agencies with responsibility for salmon research, management and habitat stewardship. The Science Coordination Panel recommends the following steps be taken to implement the strategy. The ADF&G and the panel will work toward developing a memorandum of agreement among agencies with responsibility for salmon and salmon habitat in Southeast Alaska to accomplish the following:

1. Agencies with responsibility for conservation of salmon and their habitats should endorse this interagency planning approach as an important basis for prioritizing the salmon-related work that agencies undertake or fund.
2. Beginning in 2003 (the third year of SSSF funding), ADF&G will work with the Science Coordination Panel to develop final recommendations for projects to be funded by the SSSF to implement the highest priorities of the strategy in salmon research and monitoring (Category 1) and habitat stewardship and restoration (Category 2).
3. Each agency should annually assess its progress in implementing the strategy and evaluate how its programs and actions are contributing to meeting the strategy's goals and objectives.
4. An annual meeting of agency decision-makers should be held to discuss how agencies can collaborate to improve the sustainability of salmon resources and their habitats.

ACKNOWLEDGMENTS

Amy Skilbred supervised the ADF&G and Science Coordination Panel planning processes and professional services contract that resulted in the final *Sustainable Salmon Strategy for Southeast Alaska—2002.*

Scott Marshall, Ben Van Alen, Scott Kelley, Leon Shaul, Rocky Holmes, Scott McPherson, Tom Brookover, Lana Shea Flanders, Bill Hanson, Jim Cariello and Ben Kirkpatrick contributed their technical expertise in salmon stocks and habitat management and research in Southeast Alaska to prepare ADF&G's initial strategy. Peggy Merritt facilitated the January 2001 ADF&G workshop and led the preparation of the initial ADF&G strategy, using her expertise in the analytical hierarchical decision process. Tom Brookover provided technical support at the ADF&G workshop with Expert Choice software. Ben Van Alen, Scott McPherson and Scott Kelley supplied text for the Fisheries Management section and Linda Shea Flanders supplied text for the Habitat Management section of the ADF&G initial strategy.

The following people participated in Science Coordination Panel meetings to prepare the *Sustainable Salmon Strategy for Southeast Alaska—2002* and the Gap Analysis—2002:

<u>*Alaska Department of Fish and Game*</u>

Tom Brookover, Sport Fish Division
Kevin Brownlee, Sport Fish Division
Christopher Estes, Sport Fish Division
Lana Shea Flanders, Habitat/Restoration Division
Hal Geiger, Commercial Fish Division

Bill Hanson, Habitat/Restoration Division
Scott Kelley, Commercial Fish Division
Andy McGregor, Commercial Fish Division
Scott McPherson, Sport Fish Division
Leon Shaul, Commercial Fish Division
Mike Turek, Subsistence Division

Alaska Department of Environmental Conservation

Chris Foley

Environmental Protection Agency

Chris Meade

National Marine Fisheries Service

K Koski, Auke Bay Lab
Linda Shaw, Alaska Region, Protected Resources
Alex Wertheimer, Auke Bay Lab

U.S. Fish and Wildlife Service

Doug McBride, Office of Subsistence Management
Susan Walker, Southeast Field Office

U.S. Forest Service

Mason Bryant, Forestry Sciences Lab
Ron Dunlap, Alaska Region

University of Alaska

Bill Smoker

Exxon Valdez Oil Spill Trust Office

Phil Mundy, Gulf Ecosystem Monitoring Project

Nongovernment organizations

Ron Wolfe, Sealaska Corporation
Jim Ferguson, The Nature Conservancy
John Burke, Southern Southeast Aquaculture Association
Ben Greene, Trout Unlimited

LITERATURE CITED

Jones and Stokes Associates, Inc. 1991. Southeast Alaska sport fishing economic study. Final Research Report. December 1991. (JSA 88-028). Sacramento, CA. Prepared for Alaska Department of Fish and Game, Sport Fish Division, Research and Technical Services Section, Anchorage, AK.

Merritt, M. and A. Skilbred. 2002. Planning for Sustainable Salmon in Southeast Alaska, and Prioritization of Projects for the Southeast Sustainable Salmon Fund, 2001. Alaska Department of Fish and Game, Division of Sport Fish, Special Publication No. 02-01.

APPENDIX A: PROJECTS FUNDED BY SOUTHEAST SUSTAINABLE SALMON FUNDS, 2001

SALMON RESEARCH AND MONITORING AND SALMON HABITAT PROJECTS				
Project number	**Project title**	**Project description**	**Agency / organization**	**SSSF funding**
45002	Transboundary River Tulsequah	Identify and protect salmon spawning and rearing habitat	ADF&G Habitat and Restoration Division	$96,000
45003	Tulsequah Chief Review	Participate in proposed British Columbia mine project review	Alaska Department of Environmental Conservation	$34,219
45004	Transboundary Watershed	Develop a detailed base-map of Southeast Alaska/Canadian transboundary rivers	ADF&G Habitat and Restoration Division	$372,036
45006	Invasive Species	Develop and implement an Aquatic Nuisance Species Plan	ADF&G Commissioner's Office	$70,347
45007	Instream Flow & Other Salmon Habitat Needs	Facilitate interdepartmental coordination to meet habitat needs of salmon stocks	Alaska Governor's Office	$216,300
45012	Chinook Model	Improve the accuracy of the PSC Coastwide Chinook Model annual estimates	ADF&G Commissioner's Office	$792,455
45013	Prelim. Habitat Assessment	Assess SE AK salmon habitat from upland areas to estuaries	ADF&G Habitat and Restoration Division	$202,700
45014	Alsek River Chinook Escapement	Estimate escapement of chinook salmon on the Alsek river using a mark-recapture experiment	ADF&G Sport Fish Division	$164,800
45015	Annual Habitat Condition	Develop a database to be used to analyze the condition of salmon habitat and future risks to that habitat	ADF&G Sport Fish Division	$938,021
45016	Nearshore Habitat Survey	Collect data on the location, habitat type and condition of nearshore marine salmon habitat in SE AK	ADF&G Habitat and Restoration Division	$130,089
45017	Road Condition - Fish Passage	Assess the condition of roads and fish passage structures and identify where restoration of habitat and fish passage is needed	ADF&G Habitat and Restoration Division	$76,400
45018	Salmon Habitat Surveys in Streams & Lakes	Conduct salmon habitat and distribution surveys to document salmon streams in SE AK	ADF&G Habitat and Restoration Division	$301,996
45019	Enhanced Habitat Management	Review salmon habitat protection authorities to avoid, minimize or mitigate adverse impacts to salmon habitat	ADF&G Habitat and Restoration Division	$129,780

-continued-

Project number	Project title	Project description	Agency / organization	SSSF funding
45021	Nakwasina Coho	Develop estimates of coho salmon escapement and assess habitat recovery from logging	ADF&G Sport Fish Division	$103,000
45022	Chickamin Coho	Estimate magnitude of coho salmon production and integrate with habitat data	ADF&G Sport Fish Division	$154,500
45023	Taku Coho	Improve accuracy of escapement and abundance estimates of Taku River coho	ADF&G Sport Fish Division	$139,050
45024	Unuk Coho	Develop precise estimates of coho salmon production and integrate with habitat data	ADF&G Sport Fish Division	$227,630
45025	Warm Chuck Coho	Sample coho salmon to estimate age, sex, and length and integrate with habitat data	ADF&G Sport Fish Division	$154,500
45027	Identification & Protection of Marine Habitat Zones	Develop a process for identifying and implementing protection zones and goals and uses for these zones	ADF&G Division of Commercial Fisheries	$49,955
45028	Northern Boundary Area Sockeye, Pre- and In-season Forecasting	Forecast sockeye salmon returns in the Northern Boundary area to help achieve the goals of the PST	ADF&G Division of Commercial Fisheries	$82,400
45034	Chilkat River Boat Effect Study	Determine the effect of boat usage on the salmon habitat in the Chilkat River	ADF&G Habitat and Restoration Division	$20,600
45036	Taku River Watershed Planning	Conduct habitat assessment of the Taku River watershed	ADF&G Habitat and Restoration Division	$74,881
45040	Instream Flow & Other Salmon Habitat Needs	Contribute to protection of instream flows for water bodies in SEAK to ensure fish productivity, habitat protection and instream flow needs	ADF&G Sport Fish Division	$164,800
45041	Chilkoot Lake Sockeye	Determine productivity and carrying capacity for Chilkoot Lake sockeye salmon	ADF&G Division of Commercial Fisheries	$175,100
45042	Stikine Sockeye	Estimate the abundance of sockeye salmon in the lower Stikine River	ADF&G Division of Commercial Fisheries	$103,000
45043	Alsek Sockeye	Improve estimates of sockeye salmon escapement in the Alsek River	ADF&G Division of Commercial Fisheries	$61,800
45044	SEAK Chinook Genetics	Generate baseline information for implementing a genetic stock identification program for SEAK chinook salmon	ADF&G Division of Commercial Fisheries	$267,800
45045	Coho Salmon Aging Validation	Develop aging criteria that can be used to accurately determine freshwater age	ADF&G Division of Commercial Fisheries	$51,500

-continued-

Project number	Project title	Project description	Agency / organization	SSSF funding
45046	Tatsamenie Sockeye	Determine and study factors influencing the survival of wild and enhanced sockeye fry in Tatsamenie Lake	ADF&G Division of Commercial Fisheries	$144,200
45048	DEC Fish Tissue Sampling	Collect and test fish samples for the presence of pollutants	Alaska Department of Environmental Conservation	$200,747
45052	Northern Boundary Sockeye ID	Improve the understanding of migratory timing, routes, and mixing rates of Northern Boundary Area sockeye salmon	ADF&G Division of Commercial Fisheries	$370,800
45053	Tuya Lake Sockeye Access	Examine the feasibility of removing the natural migration barriers located on the Tuya River	ADF&G Division of Commercial Fisheries	$31,300
45070	Chinook Model Evaluation	Provide Sport Fish Division support to the evaluation and improvement of the chinook model	ADF&G Sport Fish Division	$207,545
TOTAL SALMON RESEARCH & MONITORING AND SALMON HABITAT PROJECTS:				**$6,310,251**

ECONOMIC OPPORTUNITIES AND COOPERATIVE AND OUTREACH PROJECTS

Project number	Project title	Project description	Agency / organization	SSSF funding
45005	CRITFC: Stock Assessment & Research Plan	Catalog essential biological and environmental data pertinent to Mid-Columbia Chinook	Columbia River Inter-Tribal Fish Commission (CRITFC) and ADF&G	$51,500
45008	Increased Remote Release of Chum Salmon, Neets and Anita Bays	Increase chum salmon production for Southeast AK Fisheries	ADF&G Division of Commercial Fisheries	$2,796,450
45009	Salmon Fresh Express	Examine the feasibility of utilizing the AK Marine Highway system to transport salmon products	ADF&G Commissioner's Office	$12,360
45010	Crystal Lake	Increase chinook salmon production for SE AK fisheries	ADF&G Sport Fish Division	$396,692
45011	Stakeholder	Provide public participation in selecting projects to benefit salmon stocks and fisheries	ADF&G Commissioner's Office	$400,000
45026	Troll Salmon Marketing	Develop and implement a marketing plan to enhance the value of SE AK troll salmon products	ADF&G Commissioner's Office	$998,585

-continued-

Project number	Project title	Project description	Agency / organization	SSSF funding
45029	Salmon Publication & Teacher's Guide	Update the Alaska Salmon publication with information on the interaction of salmon and their habitats and how Alaska has worked to maintain healthy salmon stocks	ADF&G Commissioner's Office	$185,400
45030	CRITFC: Stock Assessment & Research, Upper Columbia R. Chinook	Research and evaluate the contribution of the Priest Rapids Hatchery to supplement naturally spawning fall Chinook in the upper Columbia River	ADF&G and CRITFC	$51,500
45031	Oceans & Watersheds Symposium EVOS	Bring together scientists and interested Alaskans to further our understanding of the oceans and watersheds that support salmon	Exxon Valdez Oil Spill Trustees Council (EVOS)	$51,500
45032	Sheldon Jackson Wetlab	Educate both students and visitors about Pacific salmon, their habitats, and their sustainability	Sheldon Jackson College	$20,898
45033	Fisheries Education Signage Sitka Harbor	Install informative signs in visitor traffic areas of the Sitka harbors	City of Sitka	$8,240
45035	Information Development and Exchanges	Develop information exchanges among CRITFC, the State of Alaska, and Alaska Native organizations to help build ties	City of Angoon	$145,488
45037	Marine Stewardship Council Certification of Sustainable Salmon	Seek certification of AK salmon management systems as sustainable under MSC criteria	ADF&G Commissioner's Office	$16,387
45038	Technical Assistance to SSSF Project	Provide technical assistance and scientific expertise to the agency's sustainable salmon initiative, with focus on Southeast Sustainable Salmon Fund	ADF&G Commissioner's Office	$102,003
45039	Deer Mountain Tribal Hatchery Educational Raceway	Design and installation of an educational raceway at the tribal hatchery, which will serve to educate the public about salmon and their habitat needs.	Ketchikan Indian Corporation	$46,350
45047	Angoon Fish Buying Station	Infrastructure improvements designed to improve handling of the harvest, and attract fishermen to the Angoon area	City of Angoon	$76,951
45049	POWHA Sockeye Enhancement	Increase sockeye production within permitted levels at the Klawock Hatchery as part of a multi-phase approach to restoring fish returns	Prince of Wales Hatchery Assoc. (POWHA)	$206,000

-continued-

APPENDIX A. Page 5 of 5.

Project number	Project title	Project description	Agency / organization	SSSF funding
45051	POWHA Coho Enhancement	Infrastructure improvements to increase coho salmon production to permitted level	Prince of Wales Hatchery Assoc. (POWHA)	$482,676
45054	Assoc. Applied Science in Fisheries Technology UAS	Establish an education program to develop well-rounded fisheries technicians with a broad background in the practical and academic skills of fish and invertebrate culture	University of Alaska, Ketchikan	$140,490
45057	CRITFC Deschutes Salmon Count Strategy	Research to measure the retention of coded-wire tags (CWT), part of a feasibility study of establishing a CWT program for Deschutes River fall chinook	ADF&G and CRITFC	$52,479
45058	Deschutes River Fall Chinook Feasibility	Research to develop methods for capturing juvenile fall chinook salmon in the Deschutes River, part of the feasibility study for a CWT program	ADF&G and CRITFC	$51,500
45059	CRITFC FERC Hanford Reach	Map bathymetry of the Hanford reach, and design program to determine the number of outmigrating fall chinook smolts stranded due to low water levels	ADF&G and CRITFC	$247,200
TOTAL ECONOMIC OPPORTUNITIES AND COOPERATIVE & OUTREACH PROJECTS:				**$6,540,649**

APPENDIX B: PROJECTS FUNDED BY SOUTHEAST SUSTAINABLE SALMON FUNDS, 2002

SALMON RESEARCH AND MONITORING AND SALMON HABITAT PROJECTS				
Project number	**Project title**	**Project description**	**Agency / organization**	**SSSF funding**
45106	Road Condition-Fish Passage	Assess the condition of roads and fish passage structures and identify where restoration of habitat and fish passage is needed	ADF&G Habitat and Restoration Division	$148,320
45107	Instream Flow Reservations	Identify instream flow needs for salmon and make reservations	ADF&G Sport Fish Division	$599,975
45110	Salmon Habitat Surveys	Survey and document salmon habitat on state, municipal, and private lands	ADF&G Habitat and Restoration Division	$988,129
45304	Subsistence Salmon Harvest Assessment & Descriptive Analysis	An understanding of traditional and contemporary harvest patterns which will contribute to better salmon management practices	ADF&G Division of Subsistence	$93,987
45305	Klawock Subsistence Sockeye Salmon Project	Identify mechanisms that may positively or adversely affect the production of sockeye and coho salmon in Klawock Lake	ADF&G Division of Commercial Fisheries	$100,000
45306	Tuya Lake Access Study	Assess the ability of sockeye salmon to ascend the Tuya River above the natural migration barriers	ADF&G Division of Commercial Fisheries	$149,865
45307	Tuya Fish Passage and Harvest Structure	Construction of a fish ladder and flow diversion structure at Tuya River that provides a means to harvest enhanced adult sockeye salmon	ADF&G Division of Commercial Fisheries	$92,064
45308	Phase III Southeast Regional Comprehensive Salmon Plan	This project will provide continued protection of wild salmon while setting goals and objectives for enhanced production in the Southeast region	ADF&G Division of Commercial Fisheries	$257,500
45309	Chilkat River Chum Salmon Escapement	This project will allow the Department to estimate escapement of chum salmon to the Chilkat River	ADF&G Division of Commercial Fisheries	$115,523
45314	Chilkat River Coho Salmon Escape. M-R	Provide annual estimates of coho salmon escapement by age and sex to refine escapement goals and forecast runs	ADF&G Sport Fish Division	$93,652
45315	Chilkat River Coho Salmon Coded-Wire Tagging	Coded-wire tagging of coho salmon smolt will provide the baseline information to produce sustainable long-term fishing opportunities	ADF&G Sport Fish Division	$123,600
45316	DEC Fish Safety Monitoring Project	Monitoring of fish tissue for the 2003 fishing season for heavy metals and methyl mercury	Alaska Department of Environmental Conservation	$50,000

-continued-

Project number	Project title	Project description	Agency / organization	SSSF funding
45317	Alsek River Chinook Salmon Escapement	Provide annual estimates of chinook salmon escapement by age and sex to refine escapement goals and forecast runs	ADF&G Sport Fish Division	$112,270
45318	Warm Chuck Coho	Precise estimates of total coho salmon production, exploitation, and survival will be obtained	ADF&G Sport Fish Division	$133,900
45319	Chickamin River Chinook and Coho Salmon CWT	Develop precise estimates of salmon production, exploitation, and survival	ADF&G Sport Fish Division	$172,010
45322	Habitat Database Field Verification and Reporting	Complete work on the SE AK salmon habitat database	ADF&G Habitat and Restoration Division	$164,800
45323	Salmon Escapement Database Integration	Improve salmon escapement data storage and retrieval system and link to broader SE AK salmon database system	ADF&G Habitat and Restoration Division	$305,395
45326	Data Links - SE AK Limnology Database	Construct a limnology database system for 175 lakes in SE AK, and link to broader SE AK salmon database system	ADF&G Habitat and Restoration Division	$249,775
45328	Data Links-Nearshore Ground-Truth	Design a systematic method for storing and retrieving ground-truth data and link to broader SE AK salmon database system	ADF&G Habitat and Restoration Division	$35,020
TOTAL SALMON RESEARCH & MONITORING AND SALMON HABITAT PROJECTS:				**$3,985,785**

ECONOMIC OPPORTUNITIES AND COOPERATIVE AND OUTREACH PROJECTS

Project number	Project title	Project description	Agency / organization	SSSF funding
45103	SE Community Watershed Stewardship Project	Promote, initiate, and implement community watershed stewardship councils in SE AK	Southeast Conference	$721,000
45105	SE Community Watershed Stewardship Project-ADF&G	ADF&G technical assistance to the Community Watershed Stewardship Project	ADF&G Habitat and Restoration Division	$492,340
45108	Ketchikan and SE AK Salmon Wastes and Utilization Studies	Provide information for value-added salmon waste products and the reduction of environmental impacts by finding alternative uses	Alaska Department of Environmental Conservation	$500,000
45111	Infrastructure Assessment RFP	Conduct interviews/surveys to determine infrastructure needs and recommend criteria for selecting project areas and projects	ADF&G Commissioner's Office	$103,000

-continued-

Project number	Project title	Project description	Agency / organization	SSSF funding
45301	Technical Assistance to SSSF	Assist the Science Coordination Panel in developing and implementing the annual sustainable salmon plans and ensuring coordination among salmon projects; coordinate with other salmon funds (e.g. EVOS, NPRB, Northern Fund); assist with reports and information requests for the program.	ADF&G Commissioner's Office	$151,275
45310	Hidden Falls Chum Expansion	Infrastructure improvements to increase chum salmon production and provide for otolith marking capability	Northern Southeast Regional Aquaculture Association	$590,113
45311	Hidden Falls Coho Expansion	Increase economic opportunity for Southeast Alaska fisheries	Northern Southeast Regional Aquaculture Association	$1,024,850
45312	Medvejie Chum Salmon Expansion	Infrastructure improvements to increase chum salmon production and provide for otolith marking capability	Northern Southeast Regional Aquaculture Association	$1,077,380
45313	Petersburg Area Chum Salmon Fry Rearing Investigations	Project will conduct site investigations, identify brood stocks, and ascertain water quality	Northern Southeast Regional Aquaculture Association	$25,016
45320	Crescent Lake Sockeye Escapement Estimation	Escapement estimates will assist ADF&G with managing this wild/enhanced mixed fishery to ensure sustainable production of wild sockeye salmon from Crescent and Speel lakes	Douglas Island Pink and Chum Hatchery (DIPAC)	$136,372
45321	Gastineau Channel/Sheep Creek New Pen Complex	The construction of additional net pens will reduce the densities of fry to acceptable levels, increasing fitness and marine survival of enhanced salmon fry	Douglas Island Pink and Chum Hatchery (DIPAC)	$280,160
45324	Coho Pre-Smolt Enhancement Research	Research lakes in central and southern SE for potential coho pre-smolt release sites	Southern Southeast Regional Aquaculture Association	$154,500
45325	Port Armstrong Coho Expansion	Increase coho production for SE AK fisheries	Armstrong Keta, Inc.	$653,535
45327	DEC Watershed Stewardship and Wetlands	ADEC technical assistance to the Community Watersheds Stewardship Program, including development of stormwater BMPs and a wetlands assessment tool	Alaska Department of Environmental Conservation	$330,000
TOTAL ECONOMIC OPPORTUNITIES AND COOPERATIVE & OUTREACH PROJECTS:				**$6,239,541**

APPENDIX C: ROLES OF AGENCIES IN SOUTHEAST ALASKA SALMON RESEARCH, MANAGEMENT AND STEWARDSHIP

Many state and federal agencies have responsibilities for researching and managing salmon and their habitat in Southeast Alaska. Preparation of the *Sustainable Salmon Strategy for Southeast Alaska – 2002* brought together these agencies to set the priorities that the agencies will use to guide their salmon research, monitoring, restoration and stewardship activities. Agencies that were involved include: Alaska Department of Fish and Game, Alaska Department of Environmental Conservation, National Marine Fisheries Service, U.S. Forest Service, U.S. Fish and Wildlife Service, University of Alaska, and Exxon Valdez Oil Spill Trustees Office. A brief description of roles and responsibilities of each agency related to Southeast Alaska salmon, and their interest in the Sustainable Salmon Strategy is provided below.

Alaska Department of Fish and Game

Habitat and Restoration Division

The Habitat and Restoration Division of the Alaska Department of Fish and Game (ADF&G) is responsible for protecting, maintaining, and improving the fish, wildlife and aquatic plant resources and habitats of Alaska. The division protects anadromous fish habitat by issuing Fish Habitat and Special Area permits under Alaska Title 16 for activities affecting fish-bearing waters. For authorizations issued by other state and federal agencies affecting both freshwater and marine habitats, the division also recommends permit conditions and protection measures under a wide variety of other federal and state statutes, including: Alaska Coastal Management Program, Alaska Forest Resources and Practices Act, National Forest Management Act, Tongass Timber Reform Act, Federal Power Act, Federal Clean Water Act, Alaska Water Quality Standards, Alaska Water Use Act, and Alaska Land Act (Title 38). The division collaborates with landowners, managers and state and federal agencies to develop land use plans that conserve salmon habitat. When funding allows, the division monitors development projects to insure compliance with permit conditions and the effectiveness of the permit in protecting or restoring salmon habitat.

The current ADF&G habitat management program focuses on proposed developments involving in-stream activities, timber harvest, mining, community and urban expansion, transportation infrastructure, hydroelectric, water withdrawal and export, and commercial recreation and tourism. To review proposed development projects and land use plans, the Habitat and Restoration Division analyzes biological, engineering, hydrological and other technical information about fish abundance, habitat condition, the location and value of fisheries, and potential environmental effects of land and water developments. The division recommends methods to mitigate adverse effects of proposed development activities and to restore past fish habitat damage or fish passage problems.

Commercial Fisheries and Sport Fish Divisions

The ADF&G manages salmon to ensure sustainability. Management includes setting escapement goals, meeting gear group allocations as set out by the Board of Fisheries, considering hatchery needs while giving a priority to wild stock, providing recommendations to the Board of Fisheries, developing fisheries regulations and closures as needed to ensure sustainability of salmon, and assisting the Department of Public Safety in enforcement of the fisheries regulations, and the use and development of these resources that is in the best interest of the economy and well-being of the people of the state.

In Southeast Alaska, commercial, subsistence, and personal use fisheries are managed by ADF&G's Division of Commercial Fisheries Management and Development. Recreational fisheries are managed by the Division of Sport Fish. Area management biologists and their support staff, stationed in the principal ports of landing—Ketchikan, Petersburg, Sitka, Juneau, Wrangell, Haines, Craig, and Yakutat—closely monitor returns and escapements and open the fisheries for specific areas and times by 'emergency order.'

ADF&G's management of fisheries is intended to take advantage of the surplus production potential inherent in salmon stocks by managing for escapements that fall within optimal ranges well above the minimum number needed to sustain the stock. Management's primary goals are to achieve the distribution and abundance of spawners needed to (1) sustain, if not maximize, production, and (2) provide for traditional subsistence harvests. Secondary objectives are to facilitate an orderly harvest of salmon of the highest quality and value in commercial fisheries and of the greatest benefit to recreational and personal use fishers, consistent with user group allocations established by the Board of Fisheries. Transboundary and boundary area fisheries are managed to comply with terms of the Pacific Salmon Treaty, as is the regionwide harvest of chinook salmon.

ADF&G manages salmon in over 15,000 salmon spawning streams and rivers throughout the state. Salmon management is conducted on a real-time basis with regulations imposed in-season by local biologists who have a clear conservation mandate and authority to open or close fisheries as needed to ensure adequate escapement for long-term sustainable yields.

Alaska's emphasis on in-season, abundance-based management is a key to successful sustainable salmon production. An in-season abundance-based management approach was recently adopted by the Pacific Salmon Commission to manage and conserve salmon resources shared by Alaska, Oregon, Washington, and Canada

Subsistence Division

State and federal law define subsistence as the 'customary and traditional uses' of wild resources for food, clothing, fuel, transportation, construction, art, crafts, sharing, and customary trade. The Division of Subsistence is a research branch of ADF&G, responsible for providing comprehensive information on the customary and traditional uses of wild resources in Alaska.

In 1978, the Alaska Legislature passed the Alaska subsistence law requiring that subsistence uses of fish and game be authorized and protected, and established the legal basis for the Division of Subsistence within the Alaska Department of Fish and Game. The division's main duty lies in the area of human dimensions research which focuses on understanding human systems, that is, people and their ways of living. The division uses systematic methods of gathering and analyzing information developed for the social sciences, including interviews, mapping, surveys, direct observation, and participant observation. The division maintains the public's trust by adhering to high ethical standards in carrying out its research, obtaining community approval before beginning research, including local residents directly in the research process, providing proper confidentiality, and presenting study results to community representatives before publication. The division's professional staff includes social scientists, biologists, and local subsistence experts.

Subsistence fishing is important for the economies and cultures of many families and communities in Southeast Alaska. Subsistence fishing exists alongside other important uses of fish in Alaska, including commercial fishing, sport fishing, and personal use fishing. About 60 percent (by weight) of the wild food harvested by rural families in Alaska is fish. Fish varieties include salmon, halibut, herring, and rockfish. In recent household surveys conducted in Southeast Alaska, 80 percent of the rural households reported harvesting fish, and 94 percent of the rural households reported using fish.

Alaska Department of Environmental Conservation

The Division of Air and Water Quality of the Alaska Department of Environmental Conservation (ADEC) provides technical assistance and regulatory guidance to protect water quality in Alaskan water bodies, including waters important for salmon habitat. The division maintains water quality standards that protect Alaskan waters from pollutants. The division issues permits for wastewater discharges (including cruise ship discharges) to ensure water quality is protected; certifies federal general permits for stormwater discharges; works to prevent or reduce nonpoint source water pollution through public education, assessment of water bodies with threatened or impaired water quality, and planning for recovery of impaired water bodies. The division provides pass through funding and technical assistance to municipalities, local groups, and other state agencies involved in water quality projects

designed to protect, enhance or restore polluted waters and protect local watersheds. The division also reviews timber harvest plans, highway projects, and development projects greater than five acres in size to ensure that water quality will be protected. When funding allows, the division monitors development projects to insure compliance with permit conditions and the effectiveness of the permit in protecting water quality.

National Oceanic and Atmospheric Administration

National Marine Fisheries Service

The National Marine Fisheries Service (NMFS) is the federal agency with responsibility for stewardship of living marine resources of the nation through science-based conservation and management. These resources include commercial and recreational fisheries, marine mammals, sea turtles, and endangered species within those categories. Anadromous fishes, including the five species of Pacific salmon, are included under NMFS jurisdictional responsibility.

In Alaska, the state manages all salmon fisheries within three miles of the coast. In federal waters from three to 200 nautical miles (the exclusive economic zone or EEZ), management of salmon fisheries is shared by NMFS with the State of Alaska, the North Pacific Fisheries Management Council, the International North Pacific Fisheries Commission and the U.S.-Canada Pacific Salmon Commission. Salmon fishing in the EEZ of Southeast Alaska is managed by the State of Alaska and Pacific Salmon Commission for commercial trolling.

NMFS is mandated under federal laws to help maintain socially and economically viable fisheries, to protect and conserve the habitat of Pacific salmon species and to promote educational information on and restoration of such habitat. NMFS conducts scientific research to better understand various aspects of salmon life history in both the freshwater and marine environments, to develop enhancement strategies and technologies for supplementing natural production through ocean ranching, and to evaluate the impacts of various human activities to the salmon resource, such as urbanization, logging, large-scale ocean ranching and oil spill effects. NMFS is the federal agency responsible for listing any Pacific salmon species or subunits under the Endangered Species Act. Consequently, NMFS has a keen interest in avoiding such listings by maintaining a healthy and sustainable salmon resource in the State of Alaska.

U.S Forest Service

The U.S. Forest Service (USFS) administers the Tongass National Forest in Southeast Alaska, which encompasses over 17 million acres. The USFS has responsibility to maintain or improve fish habitat capability, maintain viable populations of native and desired non-native fish species, monitor population trends, prevent detrimental changes in water quality, and prevent blockages of water courses. USFS fishery biologists and hydrologists maintain a comprehensive Geographic Information System (GIS) database, including inventory and classification of aquatic habitat capability.

The Forest Service also shares management responsibility for implementing the provisions of Title VIII of the Alaska National Interest Lands Conservation Act (ANILCA) relevant to the taking of fish and shellfish. For Southeast Alaska, that includes the lands and waters within and adjacent to the exterior boundaries of the Tongass National Forest, excluding marine waters. USFS subsistence fisheries staff gathers information on fish stock status and trends, subsistence harvest patterns, and traditional ecological knowledge—both to conserve fishery resources and to ensure a subsistence priority to rural residents. Subsistence studies gather, analyze, and report information needed to manage and conserve subsistence fishery resources, address fisheries issues and priorities identified by Regional Advisory Councils, minimize fishery conflicts, and address regulatory actions.

The USFS Pacific Northwest Research Station, which has a research facility in Juneau, Alaska, provides scientific information to land managers, policymakers, scientists, and citizens. The mission of the Station is to generate and communicate scientific knowledge that helps people understand and make informed choices about people, natural resources, and the environment. The research goals of the Station are: (1) to develop a fundamental understanding of ecological, social, and economic systems and their interactions, (2) to assess the

status and trends of ecosystems and natural resources and their uses, (3) to develop science-based options for informed management, and (4) to communicate science findings and enhance their application. The Station headquarters is in Portland, Oregon. The Juneau Forestry Sciences Laboratory is one of ten USFS research laboratories located in Alaska, Oregon, and Washington.

U.S. Fish and Wildlife Service

Fisheries Program

With respect to salmon in Southeast Alaska, the U.S. Fish and Wildlife Service (USFWS) Fisheries Program is focused on assisting federal land managers in fish management on federal lands and restoring fish passage in streams that have been obstructed by dams or other structures. This program also provides technical assistance and coordination services to regional, interstate, and international fishery commissions and other organizations for USFWS trust species. Another primary responsibility of the Fisheries Program is to inform the American public about fish and wildlife management and the activities of the USFWS.

The USFWS Fisheries Program operates under numerous legal authorities, including: Fish and Wildlife Coordination Act; Fish and Wildlife Act of 1956, as amended; Anadromous Fish Conservation Act; Alaska National Interest Lands Conservation Act of 1980; Salmon and Steelhead Conservation and Enhancement Act of 1980; and Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990, as amended.

Fish and Wildlife Management Assistance Program

The Fish and Wildlife Management Assistance program in Alaska coordinates Federal subsistence fisheries management. Biologists at four Fishery Resource Offices, a Fish Genetics Laboratory, and the Regional Office in Anchorage, work to conserve fish populations for today and the future. USFWS biologists monitor long-term trends of fish populations, monitor aquatic nuisance species, restore degraded habitats, remove fish barriers, and conduct environmental education in rural and urban schools. USFWS staff work cooperatively with government agencies, tribal organizations, schools and universities, and other interested groups. This coordinated effort helps provide fish for subsistence users, as well as commercial and recreational fishermen, and the economies that depend on them.

University of Alaska – Fairbanks

The University of Alaska Fairbanks (Alaska's Land-Grant and Sea-Grant University) is responsible for teaching, research, and public service throughout the state. The University's School of Fisheries and Ocean Sciences' faculty includes scientists whose research focuses on Pacific salmon, their biology, population and evolutionary genetics, stream and ocean ecology, conservation biology, artificial culture, harvest forecasting and management, etc. Several faculty members are located in Southeast Alaska at the School of Fisheries and Ocean Science's Juneau Center.

Exxon Valdez Oil Spill Trustees Office

The *Exxon Valdez* Oil Spill (EVOS) Trustee Council was formed in October 1991 to oversee restoration of the injured Prince William Sound ecosystem through the use of the $900 million civil settlement with Exxon (see www.oilspill.state.ak.us). The Trustee Council has pursued research related to the effects of the spill, habitat protection and restoration in the northern Gulf of Alaska. The Trustee Council has endowed the Gulf Ecosystem Monitoring (GEM) program to conduct long-term research and monitoring efforts in the northern Gulf of Alaska. The GEM program will be implemented in four highly interdependent natural systems in the Gulf of Alaska: nearshore, watersheds, Alaska Coastal Current, and offshore habitats. GEM's long-term core monitoring program will, when combined with the efforts of other resource agencies and research entities, help detect long-term change in valued natural resources such as birds, fish and mammals, and provide greater understanding of the sources of these changes in Gulf of Alaska ecosystems. Research would include projects related to the productivity and sustainability of Pacific salmon in the Gulf of Alaska. The Southeast Sustainable Salmon Fund and EVOS have been discussing how projects funded through each program can complement and benefit one another.

APPENDIX D: GAP ANALYSIS—2002
SUSTAINABLE SALMON STRATEGY FOR SOUTHEAST ALASKA

CONTENTS

Page

INTRODUCTION 33

GOAL 1: HABITAT GAP ANALYSIS 37

***OBJECTIVE 1A**: Identify, protect and manage spawning rearing and migration habitats to prevent perturbations beyond the bounds of natural variation*

1A-1 Monitor development projects 37
1A-2 Quantify flow requirements 38
1A-3 Develop information syntheses and management sharing system 39
1A-4 Catalog anadromous water bodies 41
1A-5 Identify critical/essential salmon habitat 42
1A-6 Establish water quality and quantity baselines 44

***OBJECTIVE 1B**: Detect and predict annual and long-term changes and trends in salmon habitat*

1B-1 Understand ocean conditions 45
1B-2 Understand affect of human activities on salmon habitat 46

***OBJECTIVE 1C**: Restore degraded habitat and access to habitat*

1C-1 Address fish passage that is restricted due to culverts 48
1C-2 Restore riparian, spawning and rearing habitats 49

***OBJECTIVE 1D**: Evaluate the effectiveness of the programs and improve where appropriate*

1D-1 Evaluate existing statutes, regulations and policies 51

GOAL 2: WILD STOCKS GAP ANALYSIS 52

CHINOOK

***OBJECTIVE 2A**: Estimate and periodically evaluate escapement goal approach and biological ranges to achieve sustained yield*

2A-1 Reliable escapement estimate by age/sex/length 52
2A-2 Limiting factors for depressed stocks 53
2A-3 Harvest by stock by brood year 54
2A-4 Develop data analyses, databases or models for escapement goals 55

***OBJECTIVE 2B**: Develop and implement methods to assess stock status and management systems to achieve escapement goals*

2B-1 Genetic baselines 56
2B-2 Respond to changes in annual run strength 56

***OBJECTIVE 2C**: Identify and catalog conservation units (stock aggregations, meta-populations).*

2C-1 Identify and assess conservation / management units 57

GOAL 2: WILD STOCKS GAP ANALYSIS *(continued)*

SOCKEYE

***OBJECTIVE 2A**: Estimate and periodically evaluate escapement goal approach and biological ranges to achieve sustained yield*

2A-1 Reliable escapement estimate by age/sex/length 58
2A-2 Limiting factors for depressed stocks 59
2A-3 Harvest by stock by brood year 59
2A-4 Develop data analyses, databases or models for escapement goals 60

***OBJECTIVE 2B**: Develop and implement methods to assess stock status and management systems to achieve escapement goals*

2B-1 Genetic baselines 60
2B-2 Respond to changes in annual run strength 61

***OBJECTIVE 2C**: Identify and catalog conservation units (stock aggregations, meta-populations)*

2C-1 Identify and assess conservation / management units 61

COHO

***OBJECTIVE 2A**: Estimate and periodically evaluate escapement goal approach and biological ranges to achieve sustained yield*

2A-1 Reliable escapement estimate by age/sex/length 62
2A-2 Limiting factors for depressed stocks 63
2A-3 Harvest by stock by brood year 64
2A-4 Develop data analyses, databases or models for escapement goals 65

***OBJECTIVE 2B**: Develop and implement methods to assess stock status and management systems to achieve escapement goals*

2B-1 Genetic baselines 65
2B-2 Respond to changes in annual run strength 66

***OBJECTIVE 2C**: Identify and catalog conservation units (stock aggregations, meta-populations)*

2C-1 Identify and assess conservation / management units 66

CHUM

***OBJECTIVE 2A**: Estimate and periodically evaluate escapement goal approach and biological ranges to achieve sustained yield*

2A-1 Reliable escapement estimate by age/sex/length 67
2A-2 Limiting factors for depressed stocks 67
2A-3 Harvest by stock by brood year 68
2A-4 Develop data analyses, databases or models for escapement goals 69

***OBJECTIVE 2B**: Develop and implement methods to assess stock status and management systems to achieve escapement goals*

2B-1 Genetic baselines 69
2B-2 Respond to changes in annual run strength 70

***OBJECTIVE 2C**: Identify and catalog conservation units (stock aggregations, meta-populations)*

2C-1 Identify and assess conservation / management units 70

GOAL 2: WILD STOCKS GAP ANALYSIS *(continued)*

PINK

***OBJECTIVE 2A**: Estimate and periodically evaluate escapement goal approach and biological ranges to achieve sustained yield*

2A-1 Reliable escapement estimate by age/sex/length 71
2A-2 Limiting factors for depressed stocks 72
2A-3 Harvest by stock by brood year 72
2A-4 Develop data analyses, databases or models for escapement goals 72

***OBJECTIVE 2B**: Develop and implement methods to assess stock status and management systems to achieve escapement goals*

2B-1 Genetic baselines 73
2B-2 Respond to changes in annual run strength 73

***OBJECTIVE 2C**: Identify and catalog conservation units (stock aggregations, meta-populations)*

2C-1 Identify and assess conservation / management units 74

ALL SPECIES

***OBJECTIVE 2D**: Establish information sharing system*

2D-1 Standardize historical data for integrated analysis 75

GOAL 3: SALMON MANAGEMENT SYSTEMS GAP ANALYSIS 76

***OBJECTIVE 3A**: Develop management system to achieve cultural, social and economic objectives within acceptable biological limits*

3A-1 Incorporate estimates of harvest of wild salmon 76
3A-2 Develop more comprehensive information to meet PST obligations 76
3A-3 Collect information on biology of wild salmon to meet management objectives 79
3A-4 Collect information to forecast and manage in season 79
3A-5 Evaluate effects of management actions on socioeconomics 79

***OBJECTIVE 3B**: Develop and implement methods for managing enhanced production while evaluating and minimizing adverse impacts to wild stocks*

3B-1 Assess effects of interactions between wild and hatchery stocks 80
3B-2 Assess to what extent enhanced fish compete with and prey on wild salmon 80
3B-3 Estimate stray rates 81
3B-4 Ensure enhanced production is marked 82

INTRODUCTION

The Alaska Department of Fish and Game, in cooperation with an interagency Science Coordination Panel, prepared the *Sustainable Salmon Strategy for Southeast Alaska—2002* to provide a framework for maintaining and enhancing sustainable salmon populations and fisheries in Southeast Alaska.[6] The strategy highlights the goals, objectives and information needs/issues that should be addressed through research, monitoring, management and restoration to work toward sustainability (Table 1).

The strategy will guide the use of Alaska's Southeast Sustainable Salmon Funds (SSSF), received from Congress and managed by ADF&G to assist with Pacific salmon recovery efforts. It will also guide other state and federal agencies in decisions about which projects to undertake, fund or support to work toward the goal of sustainable salmon populations in Southeast Alaska.

To contribute to the strategy, the Science Coordination Panel conducted a "Gap Analysis" to determine the extent to which existing salmon programs address the high priority information needs/issues of the strategy, and where they fall short. The results of the analysis helped determine which projects ADF&G would fund through the SSSF program in 2002 (see Appendix B).

The Gap Analysis presented in this document examines Goals 1–3 of the SSSF related to salmon habitat stewardship and restoration, and research and monitoring:[7]

Goal 1: Habitat—Protect and restore freshwater, estuarine and marine salmon habitats to maintain resource productivity.

Goal 2: Wild Stock—Maintain and restore wild salmon stocks to sustain high potential productivity.

Goal 3: Salmon Management—Maintain effective, biologically sound salmon harvest management systems to regulate human activities that affect salmon.

For each information need/issue identified as a high priority (shaded area, Table 1) for Goals 1–3, the Gap Analysis provides the following information:

- Summary of Current Situation
- Projects Underway to Address the Information Need/Issue
- What Needs to Be Done
- Recommendations for 2002

[6] The panel includes State and federal agencies involved in salmon research, monitoring, and habitat stewardship and restoration. The panel assists ADF&G in planning for sustainable salmon and implementation of the SSSF.

[7] A fourth goal of the SSSF, to promote public involvement and support for sustained use and protection of salmon, is not evaluated in this Gap Analysis. ADF&G is working with the stakeholders, agencies and the public to determine gaps in public education and involvement.

GOAL 1: HABITAT GAP ANALYSIS

PROTECT AND RESTORE FRESHWATER, ESTUARINE AND MARINE SALMON HABITATS TO MAINTAIN RESOURCE PRODUCTIVITY

OBJECTIVE 1A: Identify, protect and manage spawning, rearing and migration habitats to prevent perturbations beyond the bounds of natural variation.

INFORMATION NEED/ISSUE 1A–1: Monitor development projects, construction, and operation for compliance with permit requirements or conditions to ensure protection and effectiveness of permits.

SUMMARY OF CURRENT SITUATION

Agencies generally have not had the funds and staff required to fully monitor the implementation and effectiveness of project requirements, post-project effects, and mitigation projects affecting salmon habitat. Independent monitoring efforts by citizens groups are under-funded.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Enhanced Habitat Management Project: Helping land owners, local governments, other agencies and the public with salmon habitat identification and protection, and recommending measures to protect, enhance, and restore salmon habitat.
- Monitoring fish habitat creation, fish passage and wetland replacement related to Alaska Department of Transportation and Public Facilities (ADOT&PF) reconstruction of the Haines Highway. Includes monitoring permits and mitigation projects.
- Area Habitat Biologists in Douglas, Sitka, Petersburg, Ketchikan, and Craig are reviewing, assessing and monitoring potential and actual effects of a wide variety of development projects in their areas; providing information to the public; and coordinating with developers, landowners, other agencies, and the public to protect and enhance fish habitat and fish populations.
- Statewide Hydro Coordinator reviewing and monitoring hydroelectric facility development and water export.

ADF&G—Water Program/Sport Fish Division

- Reviewing water development projects statewide to ensure permit conditions are followed. Assessing aquatic habitat impacts and using state and federal laws to avoid and minimize impacts.

ADEC—Water Programs/Division of Air and Water Quality

- Providing funding to ADF&G and Alaska Department of Natural Resources (ADNR) for forest practices implementation, including monitoring.

Note: The U.S. Forest Service (USFS), Environmental Protection Agency (EPA) and U.S. Army Corps of Engineers have also undertaken projects that relate to information need/issue 1A-1. However, information regarding these projects was not available to include in the Gap Analysis—2002. Additional information about these and other agency efforts will be included in gap analyses conducted in subsequent years.

WHAT NEEDS TO BE DONE

- Audit current permit enforcement for both state and federal agencies to determine the extent of permit enforcement problems. Suggest ways to address audit findings, such as formalizing and summarizing specific protocols.
- Increase monitoring of state and federal permit compliance during construction activities to ensure that permits lead to protection and restoration of anadromous fish habitat. Monitor the long-term effectiveness of selected permits to determine if changes in permit requirements are needed to meet statutory objectives.
- Require independent monitoring in permit conditions.
- Provide technical assistance and direct funding to non-agency groups interested in watershed protection. Encourage formation of watershed councils to provide a comprehensive view of problems; provide funding for these groups.

RECOMMENDATION FOR 2002

1. Maintain an inventory of existing mitigation projects.
2. Develop an interagency permit database for permits that affect salmon and their habitat in Southeast Alaska.
3. Audit current permit enforcement, including how mitigation projects are functioning, as it relates to salmon and their habitat for state and federal agencies.
4. Seek funding and resources for state and federal agencies to ensure that salmon habitat is protected and mitigation projects are successful as development proceeds, including assistance for watershed groups.

INFORMATION NEED/ISSUE 1A-2: Quantify flow requirements for the life stages of salmon and reserve sufficient amounts of water.

SUMMARY OF CURRENT SITUATION

Approximately 5,000–10,000 water bodies in Southeast Alaska support anadromous fish. The ADF&G has a long-term project to determine flow requirements for life stages of salmon and reserve instream flow in areas most at risk from alteration. However, funding has been limited and much work remains to be done to reserve flows needed to sustain anadromous fish. To date, reservations have been acquired for twenty-four streams in Southeast Alaska, and some streams have an instream flow reservation filed with the ADNR, but not yet processed.

Note: Additional information will be presented in the gap analyses for subsequent years regarding the work of DNR, ADOT&PF and the U.S. Geological Survey (USGS) in research, gaging and allocation decisions related to instream flow.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Water Program/Sport Fish Division

- Water Reservation Needs Assessment Project: Prioritizing water bodies (instream flow needs) for reservation.
- Submitting flow reservation applications to ADNR for selected streams.
- As part of an instream flow needs assessment, conducting stream gaging, hydrologic analysis, and salmon species distribution studies on Peterson Creek, Douglas Island and Situk River.
- Determining the needs for all freshwater and estuarine species important to sport fishermen statewide, and reserving water to meet those needs through state and federal laws.

USFS—Forestry Science Laboratory

- Assessing juvenile steelhead and coho salmon feeding interactions and response to varying water velocities and flow levels in an experimental stream tank in Juneau and field studies on Prince of Wales Island and Yakutat.
- Conducting small basin (less than 2 square miles) gaging and design flows for fish passage.

WHAT NEEDS TO BE DONE

- Identify flow needs/water quantity for specific species and their life stages in individual water bodies that are at risk from alteration and complete instream flow reservations for these areas within ten years.
- Identify and develop long-term index gauging sites for quantifying instream flows, current flow regimes and enforcement for salmon streams.
- Better identify effects of variations of water quantity on different life stages of fish.
- Continue existing gage operations.
- Develop a Southeast Alaska Habitat Suitability Index for salmon that is tied to water flows and is watershed-specific.
- Provide training and support to others to reserve and protect instream flows for salmon.

RECOMMENDATIONS FOR 2002

1. Identify streams at high risk for loss of instream flow and complete instream flow reservations for these areas.
2. Identify five index sites in Southeast Alaska and begin gaging at these sites.
3. Begin to develop a Southeast Alaska Habitat Suitability Index for salmon that is tied to water flows and is watershed-specific.

INFORMATION NEED/ISSUE 1A-3: Develop information syntheses (summaries of analyzed information) and management sharing system to provide managers and public readily available information on salmon habitat and existing and future land and water uses.

SUMMARY OF CURRENT SITUATION

State and federal agencies have extensive databases regarding salmon, with varying degrees of linkage between them. Some of these databases are very large and comprehensive, while others are more limited in scope and content. These databases need to be assessed for quality of data and then linked and made available to resource managers and the public.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Annual Habitat Assessment Project: Developing an integrated information system to assess the condition of salmon habitat across Southeast Alaska on an annual basis to assist in prioritizing funding, research, and management efforts. This database will include the location and quality of salmon habitat, and annual review for freshwater and marine systems, including harvest and escapement databases. This information is to be made available to the public.
- Preliminary Habitat Assessment Project: Conducting an overview of salmon habitat conditions based on existing information and indicators of conditions to assist in prioritizing funding, research and management efforts related to salmon habitat protection. This project is focused on information that is already available and links existing ADF&G databases through a Geographic Information System (GIS) including Anadromous Fish Catalog, USFS information and Landsat analysis by The Nature Conservancy.

ADF&G—Water Program/Sport Fish Division

- Conducting small-scale database work on instream flow that is integrated with Habitat Division's Annual Habitat Assessment Project. These databases are focused on the ADF&G instream flow priority list. These databases are linked to other data sources.

ADEC—Water Programs/Division of Air and Water Quality

- Continually updating ADEC permit database, which covers permits issued by ADEC for water quality purposes.
- Combining all information on waters of concern into the Alaska Clean Waters Action (ACWA) database.

EPA

- Maintaining STORET, a repository for water quality, biological, and physical data.

Federal Energy Regulatory Commission (FERC)

- Maintaining FERRIS (Federal Energy Regulatory Records Information System) a records information system that contains more than 20 years of documents submitted to and issued by FERC, including data relevant to hydroelectric projects in Southeast Alaska.

NOAA—Auke Bay Laboratory

- Monitoring size, age at maturity, abundance, and distribution of chum salmon at Fish Creek and Marx Creek near Hyder, Alaska, to develop a long-term database for these stocks.

NOAA—National Weather Service

- Maintaining Alaska Pacific River Forecast Center, which provides information on hydrologic conditions, precipitation, flooding, ice conditions and other factors.

USFS—Tongass National Forest

- Developing a database for location and habitat of juvenile salmonid populations based on data from several locations throughout Southeast Alaska. This project will develop a framework for other analyses that will form the aquatic module of the Natural Resource Information System (NRIS). It is a prototype for entering aquatic legacy population data into the NRIS database; expected to be operational in 2002.
- Developing NRIS Water Module, a comprehensive database of non-lake water bodies that links aquatic inventory to GIS using USGS watershed monitoring system; expected to be operational in 2003.
- Developing a Lake Database to supplement the NRIS Water Module. This database will be built in Access software and include information from Aquaculture Associations, ADF&G Sport Fish Division surveys, and other federal and state agencies. This database is to cover the limnology, basin depths, lithology, zooplankton, and other attributes of lakes in Southeast Alaska, and may serve as an interagency regional template for lakes.
- Maintaining USFS GIS system (corporate layer from 1985); includes Class I/II streams.

USFWS

- Developing a data download "filling station" for portable hard drives. This database will include all available information on state, federal and private lands.
- Developing GIS-based cataloging system for all USFWS actions (projects and permits).

USGS

- Maintaining database of research related to water resources, quality and quantity.

Note: Additional databases are being developed and/or maintained by ADNR, the University of Alaska and other agencies or organizations that include information related to salmon in Southeast Alaska. However, information about these databases was not available for the Gap Analysis—2002. The Science Coordination Panel intends to compile additional information about these databases in future years.

WHAT NEEDS TO BE DONE

- Determine how to effectively link databases containing information most relevant for salmon habitat.
- Identify metadata needs and variable fields.
- Link the most relevant databases.

RECOMMENDATIONS FOR 2002

1. Identify most relevant databases and data; determine metadata needs for building linkages.
2. Bring together stream survey information from ADF&G Habitat Division, USFS Tongass National Forest, and USFS Forestry Sciences Laboratory to develop linkages.
3. Complete the databases that are identified as most relevant with existing data, including legacy data.
4. Continue to develop tools for data sharing through NRIS.
5. Develop an index of projects with GIS coverages that are available from various agencies.

INFORMATION NEED/ISSUE 1A-4: Catalog anadromous water bodies.

SUMMARY OF CURRENT SITUATION

State of Alaska statutes provide for protection of salmon habitat as long as the presence of anadromous fish has been confirmed in the water body and is specified in the *Catalog of Waters Important for Spawning, Rearing or Migration of Anadromous Fishes* (5 AAC 95.010). Advance field identification of salmon habitat is essential to ensure that these legal protections are put into place, and to allow developers to plan and design their projects appropriately. As of 2000, approximately 50 percent of freshwater anadromous habitat in Southeast Alaska has been catalogued; the other half remains to be documented and catalogued to receive full statutory protection. In order to accurately permit development activities in anadromous habitat and in watersheds affecting anadromous fish populations, site-specific information is required about the habitat and watershed characteristics as well as the seasonality of use by each life history phase. This site-specific habitat information is largely unavailable.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Mapping fish habitat and assessing productivity of specific habitats in transboundary sentinel watersheds, including Unuk and Lower Taku rivers. This project will also identify extent of anadromous use of these water bodies to add to the *Catalog*.
- Undertaking the project, "Salmon Habitat Surveys in Streams and Lakes" to identify and catalog anadromous water bodies.
- Determining anadromous fish use during surveys of nearshore marine habitats throughout Southeast Alaska.
- Identifying anadromous water bodies while assessing potential risks to anadromous fish and their habitat from roads.
- Conducting advance fish habitat identification to assist University of Alaska and Alaska Mental Health Land Trust in planning forest harvest operation at Icy Cape/Icy Bay biologists.
- Collecting new information and updating existing information related to the location of anadromous habitat and salmon species as part of the enhanced habitat management project.

WHAT NEEDS TO BE DONE

- Complete the *Catalog* within five years for all watersheds that may experience habitat alteration under existing laws and zoning classifications.
- Complete priority identification of anadromous water bodies for areas at risk.
- Catalog protected watersheds where no habitat alteration is anticipated, such as those in wilderness or national parks, within ten years in order to have a complete inventory of anadromous habitat in Southeast Alaska.

RECOMMENDATIONS FOR 2002

1. Identify and catalog salmon habitat in areas at risk. Water development/water allocation projects should be included as areas at risk.
2. Develop "default criteria"; that is, literature-based criteria for recognition of salmon streams not yet cataloged.

INFORMATION NEED/ISSUE 1A-5: Identify location of critical/essential spawning, incubation, rearing and migration habitat, including site-specific habitat characteristics (e.g., vegetation, substrate, hydrology).

SUMMARY OF CURRENT SITUATION

Anadromous fish need access to good quality habitat for spawning, incubation, rearing, and migration. It is understood that nearshore marine habitat is important to salmon and studies have begun on nearshore habitat, including eel grass studies. Agencies know some specific and some general information on what habitat attributes fish need, but need to know more about how these attributes interact to create productive watersheds for anadromous fish.

Assessments and cataloguing of anadromous streams are underway by both the ADF&G and USFS, but 50 percent or more of lakes and streams or portions of streams are still unassessed. Furthermore, much coho habitat is unidentified at this point. Anadromous fish habitat has been and continues to be lost in Southeast Alaska through human activities. Some models have been developed but are untested.

PROJECTS UNDERWAY TO ADDRESS THIS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Tulsequah River Project: Mapping and characterizing fish habitat, trapping of juveniles, and adult surveys to determine fishery values in Tulsequah River.
- Transboundary Watersheds Project: Mapping fish habitat in transboundary sentinel watersheds, assessing productivity of specific habitats of Unuk and Lower Taku rivers.
- Salmon Habitat Surveys in Streams and Lakes Project: Providing advanced cataloging of habitat.
- Nearshore Marine Project: Surveying nearshore marine habitats throughout Southeast Alaska to verify and improve existing databases and mapping.
- Fish Passage Project: Assessing potential risks to fish and fish habitat from roads, and fish passage through culverts and other road structures working with private and municipal land owners. Determining restoration options and priorities for roads maintained by ADOT&PF. Identifying fish habitat risks and fish passage concerns on temporary roads in the Tongass National Forest.
- Identifying fish habitat to assist University of Alaska and Alaska Mental Health Land Trust in planning forest harvest operation at Icy Cape/Icy Bay.
- Assessing habitat conditions at and adjacent to log transfer facilities and coordinating with ADF&G Sport Fish Division to begin assessing productivity of specific habitats.

- Collecting new information and updating existing information related to the location of anadromous habitat and species present.
- Working cooperatively with local governments, landowners, other agencies and the public to provide information on salmon habitats and use. Recommending measures to protect, enhance, and restore salmon habitat throughout Southeast Alaska.
- Recently completed a project to identify, assess and map all-terrain vehicle (ATV) related effects on fish habitat in the Yakutat Forelands.

ADF&G—Water Program/Sport Fish Division

- Instream Flow Project: Assessing instream flow impacts on salmonids from water uses that divert, impound or withdraw water from rivers and lakes in Southeast Alaska.

ADEC—Water Programs/Division of Air and Water Quality

- Peterson Creek Monitoring and Assessment Project: Collecting data on seasonal salmon habitat usage and water quality.

NOAA—Auke Bay Laboratory

- Sampling eelgrass beds throughout Southeast Alaska to determine fish species utilization and function of habitat.
- Monthly sampling in spring and summer of estuarine wetlands to determine species of fish utilizing wetlands habitats in Mendenhall Wetlands.
- Enumerating coho and cutthroat escapement and smolt yield as a measure of ecological value of stream and wetland habitat in the Mendenhall Valley.
- Analyzing coho salmon carcasses to determine importance of returning spawners on nutrient dynamics of salmon streams in Southeast Alaska.
- Researching ocean and climate conditions affecting Gulf of Alaska salmon populations by determining the distribution, growth, stock origin, and associated biophysical parameters of juvenile and immature salmon along the continental shelf in the Gulf of Alaska and eastern Bering Sea.
- Researching marine conditions affecting growth and year class strength of Southeast Alaska salmon by examining the relationship of growth and survival of juvenile salmon in the inside and coastal waters of Southeast Alaska to inter-annual variation in associated biophysical parameters.

USFS—Forestry Sciences Laboratory

- Studying distribution, habitat use and response to upslope riparian management of salmonid habitats in high gradient headwater streams on Prince of Wales Island.
- Researching the role of beaver ponds in coho salmon production in Kadashan watershed.
- Researching seasonal movement and habitat use by juvenile steelhead in Staney Creek, Prince of Wales Island.

USFS—Tongass National Forest

- Conducting small basin (less than 2 square miles) water gaging and design flows for fish passage on various streams on the Tongass National Forest.
- Surveying road conditions, upstream habitats and fish passage on Tongass National Forest road system (3,600 miles of road). Survey includes information on fish presence; upstream assessment above barriers; water quality/quantity; fish distribution; areas where there are questions related to fish passage; and flow analysis.
- Monitoring riparian buffers within logging areas using digital analysis to determine changes in canopy over time, and mapping stream and riparian areas to determine changes in wood in stream and on shore, associated with habitat changes.
- Mapping using aerial photos, and channel typing and stream classification for project planning of timber sales.

USFWS

- Conducting instream flow analysis for FERC project reviews.
- Conducting stream surveys (Gunnuk, Gartina, False creeks) including instream flow analysis.
- Mapping and inventorying nearshore habitat at existing and proposed development sites such as log transfer facilities.
- Participating in funding of instream flow gaging sites on Jordan Creek, Duck Creek, and Mendenhall River with ADEC.
- Updating mapping of nearshore habitats.

WHAT NEEDS TO BE DONE

- Complete anadromous fish distribution and habitat identification and conditions within ten years.
- Complete an inventory of the kinds and condition of habitat by life phase and season of use, including the mapping of small streams.
- Complete watershed assessments on the fifth level Hydrologic Unit Code (HUC) within ten years for priority watersheds and complete nearshore assessments.
- Understand more fully how habitats interact to create productive habitat through time and across scale.
- Establish riparian habitat management objectives.

RECOMMENDATIONS FOR 2002

1. Conduct mapping, inventories and condition assessments in populated areas undergoing development to identify critical salmon habitat. Identify salmon habitat in areas known to be experiencing or likely to experience development. Focus cataloguing on areas at risk. Water development/water allocation projects should be included as areas at risk.
2. Implement projects that help build links between landform and processes in inventorying habitats (links of scale).
3. Undertake projects that link inventory of habitats with functional objectives (specific objectives such as large wood production area), assessment of quality (productivity), and value of the habitat resource.

INFORMATION NEED/ISSUE 1A-6: Establish baselines for water quality and quantity for selected systems.

SUMMARY OF CURRENT SITUATION

System-specific information has been gathered about water quality and quantity in Southeast Alaska for very few water bodies—generally as agencies have gathered information relative to potential impacts from specific development projects. Baseline information is needed to protect water quality and quantity for salmon use. A multi-agency gaging network assessment was completed in the 1990s. Agencies have no information regarding water quantity on non-FERC hydro projects in Southeast Alaska.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Water Program/Sport Fish Division

- Conducting Instream Flow Project, including risk assessment and data collection, analyses of specific instream flow needs, and completing applications for water rights for selected streams. Suitable candidates for reservations will be identified and considered for instream flow analyses. If there is sufficient information from the flow analyses, water rights applications will be submitted to ADNR. Project will focus on watersheds that are at high risk and of high salmon value.

USFS—Tongass National Forest

- Developing water quality parameters in Ketchikan.

- Conducting gaging in small basins (less than 2 square miles) and designing flows for maintaining adequate fish passage.

WHAT NEEDS TO BE DONE

- Identify flow needs for specific salmon species for individual water bodies and identify the effects of variations of water quantity on different life stages of fish.
- Update multi-agency gaging assessment as part of prioritization process that includes risk. Develop long-term index gage sites for quantifying instream flows and current flow regimes.
- Develop an interagency proactive program to collect system specific information on water quality and quantity; ensure interagency coordination and cooperation in obtaining water quality and quantity information from other field studies.
- Inventory existing hydro projects and identify information gaps. Conduct a risk/needs assessment for these projects.
- Develop SE Alaska Habitat Suitability Index that is tied to water flows and is watershed-specific.

RECOMMENDATIONS FOR 2002

1. Integrate water quality and quantity data gathering with other projects; specifically, incorporate collection of hydrologic routing information into the road condition survey.
2. Identify at-risk and sentinel (index) sites and determine what water quality and water quantity baseline information will be gathered.
3. Update multi-agency gaging assessment and prioritize risks.
4. Conduct gaging at high priority sites.

OBJECTIVE 1B: Detect and predict annual and long-term changes and trends in salmon habitat.

INFORMATION NEED/ISSUE 1B-1: Understand ocean conditions that affect early marine survival.

SUMMARY OF CURRENT SITUATION

The sense of the Science Coordination Panel is that a significant amount of nearshore habitat important for salmon may already have been lost. Nearshore habitat for salmon needs to be better mapped. No studies have taken place to determine the effects of habitat alteration in the estuaries and nearshore marine habitats in Southeast Alaska, and the implications of shoreline/nearshore development for salmon are incompletely known.

Functional values of specific habitats for salmon are not well understood (both the physiochemical and scientific understanding of habitats), including the relationship between fresh and saltwater and what drives salmon survival and growth in the nearshore environment.

Early run survival is generally acknowledged to determine run strength. Ocean competition determines the size and age at maturity of salmon. The interaction of wild and hatchery fish in the nearshore ecosystem is not understood; nor is the dependence of salmon on the ocean systems as a whole. Climate change, as it affects ocean density, may play a role in salmon life cycle.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Conducting surveys of nearshore marine habitats to verify and improve existing databases and mapping of nearshore marine habitat. This project is field-verifying work by other agencies and will inventory the condition of the intertidal zone in Southeast Alaska.

EVOS—Gulf Ecosystem Monitoring Program

- Funding studies in the northern Gulf of Alaska that will help understand ocean conditions that affect early marine survival in Southeast Alaska.

NOAA—Auke Bay Laboratory

- Studying the use of the Mendenhall estuary by juvenile salmonids.
- Conducting eelgrass studies in relation to use by juvenile salmonids near Craig, Alaska.
- Completing a map that classifies the intertidal zone of Southeast Alaska in relation to its sensitivity to oil spills.

USFWS

- Assisting Sitka Tribe with a study of subsistence use, including a nearshore habitat study to support salmon.

WHAT NEEDS TO BE DONE

- Develop an understanding of marine life history, carrying capacity, survival and growth of salmon in their first year of ocean life.
- Determine the importance of the chemistry of freshwater and saltwater mixing areas to salmon.
- Complete mapping, inventory and characterization of nearshore habitats in Southeast Alaska. Identify localized bottlenecks/transition areas for salmon development and growth.

RECOMMENDATIONS FOR 2002

1. Map nearshore habitat to determine how much salmon habitat has been lost and to clearly identify what remains. Focus on areas subject to recent development or at risk from alteration in the near future.
2. Study the functional value of nearshore ecosystems/ocean conditions for salmon.
3. Study effects of habitat alteration in the estuaries and nearshore marine habitats in Southeast Alaska on salmon.
4. Provide list of areas scheduled for work by year.

INFORMATION NEED/ISSUE 1B-2: Understand the effect of human activities on salmon habitat.

SUMMARY OF CURRENT SITUATION

There is currently an incomplete understanding of the cumulative, phased impacts of development on salmon habitat in Southeast Alaska on a broad landscape scale. Changes in value of salmon habitat in areas of 'second growth' riparian forest succession are poorly understood—and there is a significant amount of this type of second growth habitat in the forest ecosystem.

The Road Condition Survey conducted on the Tongass National Forest has added much to our understanding of impacts of roads on salmon habitats. However, the effects of urbanization, including non-point source pollution and development effects on marine habitat, are not well understood. To date, there are only a handful of site-specific studies.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Assessing habitat conditions at and adjacent to log transfer facilities and assessing the effects of these facilities on salmon and their habitat.
- Coordinating with extensive trapping by ADF&G Sport Fish Division to begin assessing the productivity of specific habitats.

- Assessing ATV impacts on Yakutat Forelands and in Juneau.
- "Annual Habitat Assessment Project": Developing an integrated information system to assess the condition of salmon habitat across Southeast Alaska on an annual basis to assist in prioritizing funding, research and management efforts.

ADF&G—Water Program/Sport Fish Division

- Assessing site-specific hydroelectric project licensing and assessment of potential effects.
- Developing instream flow methodology related to hydroelectric projects.

NOAA—Auke Bay Laboratory

- Studying impacts of hydrocarbons on the early life stages of salmon.

USFS—Forestry Sciences Laboratory

- Assessing long-term sources of large woody debris.
- Researching the effects of forest succession on juvenile salmonids.

USFS—Tongass National Forest

- Developing plan to control number of people (outfitter guided tours) in specific riparian areas in Southeast Alaska.
- Conducting Road Condition Survey for roads in the Tongass National Forest to assess existing impacts on fish and fish passage.
- Using Interagency Monitoring and Evaluation Group (IMEG) to develop reference conditions for watersheds.

USFWS

- Thinning buffer on the Natzuhini River to produce large woody debris.

WHAT NEEDS TO BE DONE

- Conduct additional research to determine the effects of various types of habitat alteration on salmon habitat. This information would allow managers to improve the effectiveness of their permit requirements and could be used to educate the public and policy makers about the intricacies of salmon habitat. Primary topics needing research are:
  - effect of freshwater and estuarine wetland and riparian loss on anadromous fish habitat that results from development activity other than commercial forestry;
  - seasonal patterns of movement by juvenile anadromous fish in systems in which additional road construction is likely;
  - effects of second growth riparian succession on fish habitat to assist in determining what type of forest management should be applied to those areas;
  - cumulative impacts of urbanization/population areas on salmon habitats across life stages; including mapping/inventory and analysis of cumulative effects of urbanization on hydrology and rearing habitat;
  - studying effects of marine rip-rap, processors, log storage, docks and outfalls on salmon; and
  - mapping/inventory and analysis of cumulative effects of habitat alteration in nearshore habitat (placement of fill, structures, non-point source pollution, point source pollution such as sewage and fish waste).

RECOMMENDATION FOR 2002

Update and republish the ADF&G Area Habitat Management Guide, including information from the USFS Anadromous Fish Habitat Assessment (1995) literature review, and make it available on web.

OBJECTIVE 1C: Restore degraded habitat and access to habitat.

INFORMATION NEED/ISSUE 1C-1: Address fish passage that is restricted by culverts, roads and other structures and improve culvert design and identify fish movement to adequately design protection measures that minimize the impacts of culverts.

SUMMARY OF CURRENT SITUATION

Recent road condition surveys on the Tongass National Forest documented that 66 percent of the culverts on permanent ('system') roads across anadromous fish streams are assumed to be inadequate to provide efficient fish passage. No comprehensive review of fish passage has been conducted on private, university, municipal or state lands. A recent inventory of dams by the USFWS has identified approximately fifty abandoned dams that are barriers to fish passage.

Although some culvert design research has taken place, more needs to be done to address several areas of concern regarding culvert design for Southeast Alaska watersheds. For example, additional research on culverts is needed to address moderate gradient streams and natural bottom culverts.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Area Habitat Biologists work cooperatively with landowners to assess potential risks to fish and fish habitat from roads. This work assesses fish passage through culverts and other road structures
- Assisting USFS with Non-system Road Condition Survey to assess fish passage issues on temporary roads.
- Surveying of fish passage condition on all state roads is scheduled to begin in FY 2003, in cooperation with ADOT&PF.
- Conducting Haines Highway Mitigation Monitoring, monitoring culverts installed on the Haines Highway to ensure fish passage in cooperation with ADOT&PF.
- Conducting Connell Lake fish passage study, related to potential fish passage issues associated with the Connell Lake hydroelectric project in Ketchikan.

USFS

- Modifying "Fish Xing" software to incorporate FISH PASS.
- Conducting Road Condition Survey on the Tongass National Forest road system and on non-system roads (with ADF&G).

USFWS

- Replacing culverts in Miller Creek, Yakutat, and Duck Creek, Juneau, to improve fish passage.
- Providing funding for the Non-system Road Condition Survey.

WHAT NEEDS TO BE DONE

- Complete initial road condition surveys and periodically review road conditions on state, federal, private, university, municipal, and Alaska Mental Health Trust lands. Surveys need to be continually conducted as long as roads and stream crossing structures are in place, in order to ensure that fish passage is not impeded.
- Complete an inventory and database of the condition of culverts that identifies all culverts and impediments to efficient passage of anadromous fish on state, private, university, Alaska Mental Health Land Trust and municipal/borough lands within five years, and determine priorities for remediation.

- Develop cost-effective stream crossing designs to reduce the use of culverts and improvements in the culvert design to ensure fish passage.
- Evaluate sustained and burst swimming speeds by species though culverts; create designs for crossing structures on moderate-gradient steams and natural bottom culverts.
- Formalize the process for maintenance, removal, repair or remediation of structures that do not provide efficient fish passage.

RECOMMENDATIONS FOR 2002

1. Finalize and publish USFWS study of dams in Southeast Alaska. Use this study to help prioritize remediation efforts.
2. Continue road condition surveys on federal lands and revise the road condition survey protocol.
3. Prioritize and fund road condition surveys on non-federal lands to identify and resolve impediments to fish passage.

INFORMATION NEED/ISSUE 1C-2: Restore riparian, spawning and rearing habitats that have been degraded by land management practices.

SUMMARY OF CURRENT SITUATION

The Science Coordination Panel believes that it is more cost effective and productive to preserve salmon habitat than to restore salmon habitat. At the same time, the panel recognizes that restoration is needed in some areas. Very little salmon habitat restoration has been accomplished in Southeast Alaska. Thousands of acres of logged federal forest lands are now in non-timber designations and will not qualify for habitat restoration funding.

ADF&G has put most of its effort to date into identifying and prioritizing where restoration should take place. The USFS has applied a watershed restoration strategy in a few community watersheds, but has not yet done large area assessments that identify restoration needs. The USFS has also conducted riparian thinning studies. Private entities are assisting with habitat restoration work. Community watershed councils have formed in a few Southeast Alaska communities and are conducting local watershed assessments (e.g., Klawock watershed and Mendenhall watershed in Juneau). The Alaska Clean Water Action (ACWA) project, a cooperative state agency effort coordinated by ADEC and including ADF&G and ADNR, was created to assist state agencies in prioritizing restoration efforts for all water bodies in Alaska.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat and Restoration Division

- Recently completed the development of restoration and bank stabilization plans for the Mendenhall River in Juneau.

ADEC—Water Programs/Division of Air and Water

- Developing Granite Creek Watershed Recovery Strategy in Sitka.
- Developing Gunnuk Creek Watershed Recovery Strategy in Ketchikan.

NOAA—Auke Bay Laboratory

- Duck Creek riparian habitat restoration in Juneau.

USFS—Tongass National Forest

- Conducting watershed restoration projects in Southeast Alaska.
- Replacing and restoring selected culverts on the Tongass National Forest.

USFWS

- Through the "Partners for Fish & Wildlife" program, conducting several projects to restore riparian and other habitat on private lands in Southeast Alaska.
- Implementing several projects to improve fish passage.

Note: While detailed information was not available for the Gap Analysis—2002, the Science Coordination Panel was also aware that the ADOT&PF has undertaken riparian restoration in association with specific transportation construction projects. This information will be incorporated into subsequent gap analyses.

WHAT NEEDS TO BE DONE

- Identify and prioritize salmon habitat areas in need of restoration and undertake restoration projects.
- Involve communities in determining salmon habitat restoration needs.
- Purchase or obtain easements for salmon habitat needing restoration.
- Improve stewardship of land that has already been degraded.
- Develop a more complete understanding of how to restore areas, while continuing to protect salmon habitats that are unimpaired.
- Repair or modify fish stream crossing structures that do not currently provide efficient fish passage.

RECOMMENDATIONS FOR 2002

1. Encourage use of USFS Timber Stand Improvement funds to restore riparian areas in non-timber land use designations (LUDS) and riparian areas harvested under old forest management standards.
2. Encourage or fund restoration efforts identified as high priorities by communities.
3. Support the prioritization of restoration efforts by ACWA and federal efforts.
4. Support coordinators and provide technical assistance for community watershed efforts.
5. Purchase land or obtain conservation easements for areas needing restoration.

OBJECTIVE 1D: Evaluate the effectiveness of programs for protecting salmon habitat and improve where appropriate.

INFORMATION NEED/ISSUE 1D-1: Evaluate existing statutes, regulations and policies to ensure adequate protection of salmon habitat.

SUMMARY OF CURRENT SITUATION

Many existing federal and state statutes and regulations address protection of salmon habitat. However, there has never been a systematic and comprehensive review of all federal, state and local legal requirements to determine whether they are sufficient or are properly implemented to maintain and restore salmon habitat.

More limited regulatory reviews have been effective in changing management in order to better maintain salmon habitat. For example, the USFS completed a review of its riparian management requirements and practices (Anadromous Fish Habitat Assessment, 1995) that resulted in management changes to better ensure protection of salmon habitat. These changes in riparian management were then incorporated into the 1995 Tongass Land Management Plan revision.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G—Habitat Division, ADEC and ADNR

- Monitoring implementation of the State of Alaska, Forest Resources and Practices Act anadromous fish stream guidelines to determine if statutory or regulatory changes are needed.
- Conducting a review of small streams to determine if regulations are needed to protect salmon habitat.

USFS—Tongass National Forest

- Monitoring Best Management Practices (BPM) for forest operations to determine effectiveness.

WHAT NEEDS TO BE DONE

- The ACWA project has recommended that the effectiveness of existing state statutes and regulations for protection of fish habitat be analyzed.
- Based on the historical level of protection of the riparian and nearshore marine habitats in Southeast Alaska, the Science Cooperation Panel believes that greater regulatory protection is likely needed to adequately sustain riparian, estuarine and nearshore salmon habitat, including instream flow needs. A review of state and federal statutes and regulations, and local ordinances should be conducted to determine whether increased protection is needed and recommend necessary improvements to address inadequacies. This review should be conducted periodically and be similar to the USFS' Anadromous Fish Habitat Assessment (AFHA) conducted in 1995.

RECOMMENDATIONS FOR 2002

1. Conduct a systematic and comprehensive study of the effectiveness of existing state and federal statutes, regulations and local zoning ordinances in maintaining and restoring salmon habitat, and recommended changes to improve the sustainability of salmon, within three years.
2. Conduct a broad independent review, patterned after the USFS AFHA, on non-federal lands to determine how existing statutes and regulations are working. This review should recommend necessary improvements and identify funding needs and sources.
3. Update the 1995 AFHA review on USFS lands.
4. Encourage the Alaska Coastal Management Program to develop coastal management plans for Coastal Resource Service Areas (CRSA) in Southeast Alaska.

GOAL 2: WILD STOCKS GAP ANALYSIS

MAINTAIN AND RESTORE WILD SALMON STOCKS TO SUSTAIN HIGH POTENTIAL PRODUCTIVITY

OBJECTIVE 2A: Estimate and periodically evaluate escapement goal approach and the biological goal ranges to achieve sustained yield.

CHINOOK

INFORMATION NEED/ISSUE 2A-1, CHINOOK: Obtain reliable estimates of escapement by age/sex/length.

SUMMARY OF CURRENT SITUATION

Reliable escapement estimates are essential for local management for each stock and coastwide management of chinook salmon through the Pacific Salmon Commission (PSC). There are 11 escapement indicator stocks with direct annual escapement estimates or survey counts, and associated

estimates of precision. These 11 stocks cover 75 percent or more of the production from the approximately 33 wild stocks in Southeast Alaska. This is considered to be good stock coverage for escapement estimates. The 22 non-indicator stocks are considered small production units, based on periodic historical surveys.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G and Cooperating Agencies

- Conducting the following ADF&G or cooperative escapement enumeration and age/sex/length projects for the 11 escapement indicator stocks:
  - Stocks with direct estimates of total escapement
    - Situk River weir (1976 to present).
    - Alsek River mark-recapture project (Transboundary PSC); cooperative project with Canadian Department of Fisheries and Oceans (CDFO), (1998 to present). Funded through 2002 with SSSF.
    - Chilkat River mark-recapture project: Sport Fish Federal Aid funding ongoing (1991 to present).
    - Taku River mark-recapture project (Transboundary PSC): Sport Fish Federal Aid cooperative project with CDFO (1995 to present; plus 1989 and 1990). In-season estimates 2000 and 2001.
    - Stikine River mark-recapture project (Transboundary PSC): Sport Fish Federal Aid cooperative project with CDFO (1997 to present). In-season estimates being developed 2000-2001.
    - Unuk River mark-recapture project: Sport Fish Federal Aid funding ongoing (1997 to present and 1994).
    - Chickamin River mark-recapture project: Sport Fish Federal Aid and Letter of Agreement funding through 2001. Sport Fish Federal Aid funded in 1995 and 1996.
  - Southeast Alaska chinook index survey program.
    - Surveying King Salmon, Keta and Blossom rivers and Andrew Creek, for which expansion factors have been developed in the past
    - Surveying Alsek, Taku, Stikine, Unuk and Chickamin rivers to refine and improve expansion factors.

WHAT NEEDS TO BE DONE

- Maintain the current escapement estimation and biological (e.g., age, sex, size) sampling program. This program should be dynamic and improved where needed.
- Obtain "snapshot" of the escapement magnitude in some of the non-indicator stocks with periodic surveys. Along with periodic surveys, conduct more detailed evaluations of escapement magnitude and biological characteristics of these stocks.

RECOMMENDATIONS FOR 2002

1. Extend Chickamin River chinook mark-recapture program to increase resolution of escapements because of consistent inability to meet escapement goal.
2. Initiate periodic surveys for non-indicator stocks.
3. Extend Alsek River chinook mark-recapture project beyond 2002.
4. Conduct mark-recapture project on Andrew Creek to revise expansion factor and calibrate various survey methods.

INFORMATION NEED/ISSUE 2A-2, CHINOOK: Identify the limiting factors for depressed stocks.

SUMMARY OF CURRENT SITUATION

ADF&G has identified chinook stocks that may be depressed, and is working on identifying limiting factors for these stocks (e.g., poor freshwater production, poor marine survival, excessive exploitation or lack of an appropriate escapement goal.)

Chilkat River chinook escapements have been low, relative to historical escapements, intermittently in recent years. Escapement goal analysis is underway to provide a benchmark for judging the status of this stock. Some stocks, including the Chickamin and Blossom rivers, are frequently below the biological escapement goal (BEG) range, which has implications under the Pacific Salmon Treaty.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting mark-recapture projects to estimate escapement on Chickamin and Chilkat rivers.
- Conducting an age/sex/size (ASL) project and aerial surveys on Blossom River, to estimate escapement and brood year production.
- Conducting a coded-wire tag (CWT) project on the Chickamin River to estimate over winter freshwater survival, marine harvest and marine survival.

WHAT NEEDS TO BE DONE

- Continue efforts to identify limiting factors for Chilkat, Chickamin and Blossom River chinook salmon.
- Gain a better understanding of freshwater and marine survival rates through coded wire tagging (CWT) studies, whereby young chinook salmon are tagged in freshwater in the immediate fall and spring before smolt emigration begins. These projects provide quantitative estimates of over winter and smolt-to-adult survival rates, as well as indications of habitat utilization and carrying capacity in fresh water.

RECOMMENDATIONS FOR 2002

1. Extend the adult Chickamin River chinook escapement assessment.
2. Ensure that the Chilkat and Chickamin CWT projects extend beyond 2002.

INFORMATION NEED/ISSUE 2A-3, CHINOOK: Collect data regarding harvest by stock, by brood year, for hatchery and wild stocks.

SUMMARY OF CURRENT SITUATION

Estimates of harvest by stock or stock groups are used for three levels of management of chinook salmon stocks in Southeast Alaska:

- Determining annual harvest quotas for Southeast Alaska from the Chinook Technical Committee (CTC) Chinook Model;
- Regional chinook salmon management by ADF&G; and
- Single-stock management by ADF&G and joint management by ADF&G and the CDFO (for transboundary stocks).

Chinook harvests in Southeast Alaska fisheries include hatchery and wild stocks originating within and outside of Alaska. Harvest contribution estimates for single stocks or stock groups are inadequately known for Southeast Alaska chinook fisheries. This is because of inadequate stock identification, limited

sampling of fisheries and poor data quality coast wide. Also, stock composition varies substantially across gear and temporal strata.

Harvests of Alaska hatchery fish are estimated accurately from CWT recoveries because all production releases are tagged and there is a good CWT recovery program for Southeast Alaska commercial and sport fisheries. The ADF&G Tag Lab processing and database is a model for the eastern Pacific coast.

Harvests of some Southeast Alaska wild stocks are estimated accurately from CWT and terminal harvest programs, and others are not. The wild stock tagging program in Southeast Alaska is just starting for three of the five CWTd stocks.

Harvests of some chinook stocks originating outside of Southeast Alaska are estimated accurately from CWT recoveries, although most are not because a multitude of contributing hatchery and wild stocks are not tagged.

Chinook harvest for many stock or stock groups can only be estimated by alternate methods like genetic analysis.

Additional information on stock composition in Southeast Alaska fisheries is needed to improve annual abundance indices from the CTC Chinook Model and for regional and local management.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Coded wire tagging of a minimum of ten percent of all hatchery releases of chinook salmon in Southeast Alaska.
- Coded wire tagging five wild or natural stocks in Southeast Alaska. ADF&G has tagged wild stocks on the Taku and Unuk rivers for the past eight years. These stocks were also tagged for an additional five brood years historically. Recent CWT programs have begun for wild stocks on the Stikine (2000–2001), Chickamin (2001) and Chilkat rivers (2000–2001).
- Conducting sampling programs to recover CWTs from adult chinook salmon in Southeast Alaska commercial (1977 to present) and sport (1986 to present) fisheries.
- Conducting a genetic stock identification project for the Southeast Alaska troll fishery from 1999 to 2001.
- Improving the PSC Chinook Model that the CTC operates to provide annual harvest levels. ADF&G is actively working with the CTC to implement this project.
- Operating CWT lab for processing, decoding and database archiving.

NMFS—Auke Bay Laboratory

- Coded wire tagging 100 percent of all chinook salmon releases from the research facility at Little Port Walter.

WHAT NEEDS TO BE DONE

- Maintain or improve the current levels of hatchery and wild stock tagging programs in Southeast Alaska, to increase the precision of harvest estimates by stock or stock group.
- Establish a data standard for a minimum level of coded wire tagging for all coast wide releases of hatchery chinook salmon.
- Maintain or improve the current levels of catch sampling in commercial and sport fisheries in Southeast Alaska.
- Develop a common data standard for adequate levels of fishery stock identification coast wide.
- Develop alternate methods of estimating stock composition of more stocks or stock groups in Southeast Alaska fisheries.

RECOMMENDATIONS FOR 2002

1. Continue wild stock CWT programs for Chilkat, Stikine and Chickamin River chinook salmon.
2. Continue and expand the genetic stock identification program for Southeast Alaska chinook salmon fisheries to include the sport fishery and possibly the net fisheries.
3. Continue operation of the ADF&G CWT lab.

INFORMATION NEED/ISSUE 2A-4, CHINOOK: Develop data analyses, databases, or models for biological escapement goals.

SUMMARY OF CURRENT SITUATION

Escapement goals are established for 10 of 11 chinook escapement indicator stocks. Most were developed using traditional methods such as stock-recruit analysis. These goals were developed using the best available information. Databases of escapement, harvest and age/sex structure for all 11 stocks are being improved from the escapement and CWT programs.

Escapement goals and, perhaps alternative models, will be evaluated in the future where appropriate. Notes on six stocks and escapement goals are included below. The Taku River goal included an alternate analysis of smolt production versus female spawners, which supplemented the stock-recruit analysis. Escapement goals for the four Behm Canal stocks (Unuk, Chickamin, Blossom and Keta rivers) are currently survey goals and need to be expanded to estimates of total spawning requirements. This will utilize expansion factors currently being estimated from mark-recapture studies on these four stocks.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting chinook escapement enumeration projects and associated ASL studies on the 11 escapement indicator systems.
- Conducting CWT projects on five wild Southeast Alaska stocks.
- Conducting commercial and sport sampling projects to sample harvests for CWT recoveries and the genetic stock identification project, to estimate harvest by individual stock or stock group.
- Estimating total harvests by fish tickets in commercial fisheries, a mail survey and creel projects for sport fisheries and permits for personal use and subsistence fisheries.

WHAT NEEDS TO BE DONE

- Update escapement goals as the databases improve, using traditional or new methods for setting escapement goals.
- Develop and evaluate alternative models for estimating spawning requirements, if needed for a specific stock.
- Complete the escapement goal analysis for the Chilkat River stock in 2002.

RECOMMENDATION FOR 2002

Develop alternative methods and/or models for setting escapement goals.

OBJECTIVE 2B: Develop and implement methods to assess stock status and management systems to achieve escapement goals.

CHINOOK

INFORMATION NEED/ISSUE 2B-1, CHINOOK: Determine genetic baselines of all species to prioritize conservation and restoration efforts and predict and monitor effects of enhancement actions.

SUMMARY OF CURRENT SITUATION

A genetic baseline for Southeast Alaska stocks has been developed by multiple agencies that is consistent with the coast wide allozyme-based genetic stock identification (GSI) database for chinook stocks.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G and NMFS

- Maintain and improve on-going analysis of current allozyme database.

WHAT NEEDS TO BE DONE

- Develop a more powerful method to separate individual or smaller stock groups, such as a DNA baseline.

RECOMMENDATION FOR 2002

Examine feasibility for use of DNA for chinook stock separation.

INFORMATION NEED/ISSUE 2B-2, CHINOOK: Respond effectively to changes in annual run strength.

SUMMARY OF CURRENT SITUATION

Abundance-based management of mixed-stock fisheries, including Southeast Alaska, is determined through the CTC Chinook Model, with annual all-gear quotas. The Pacific Salmon Treaty (PST) directs that there will be no new directed chinook salmon fisheries on the Alsek, Taku and Stikine River stocks without in-season management capabilities and international harvest sharing agreements. ADF&G and Canada are implementing programs to develop in-season management capabilities on all three rivers. Negotiations have begun for harvest sharing. Situk River chinook salmon have been managed in-season since 1991 according to an Alaska Board of Fisheries management plan.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

- Improving CTC Chinook Model.
- Assessing Situk, Alsek, Taku and Stikine rivers to estimate annual run strength.

WHAT NEEDS TO BE DONE

- Maintain or improve the current assessment programs on Situk, Taku, Stikine and Alsek rivers.
- Continue to improve the existing CTC Chinook Model.
- Develop independent estimates of abundance for comparison with the CTC chinook model.

RECOMMENDATIONS FOR 2002: None at this time.

OBJECTIVE 2C: Identify and catalog conservation units (stock aggregations, meta-populations).

CHINOOK

INFORMATION NEED/ISSUE 2C-1, CHINOOK: Identify and assess conservation or management units for each species.

SUMMARY OF CURRENT SITUATION

Management and conservation units have been identified for Southeast Alaska wild chinook stocks, based on results from CWT and genetic studies. Wild stocks are categorized into five management/ conservation units based on geographic location, ocean distribution, and other attributes such as geographic location, spawning timing and life history traits. The five wild stock units are:

- Southern Inside Rearing: mainland stocks near Ketchikan, including Unuk, Chickamin, Blossom and Keta rivers
- Central Inside Rearing: Andrew Creek and other stocks such as Harding and Farragut rivers
- Northern Inside Rearing: Chilkat and King Salmon rivers
- Transboundary: Taku and Stikine rivers
- Yakutat Foreland: Situk and Alsek rivers and other Yakutat Foreland stocks

Southeast Alaska hatchery stocks will probably be divided into two groups: southern and central facilities and northern facilities. These seven stock groups will be represented in the future when the Chinook Model is improved to include a broader range of stocks and fisheries.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting chinook escapement estimation program for the 11 escapement indicator stocks.
- Ongoing hatchery and wild chinook CWT program provides ocean distribution and maturation characteristics.
- Undertaking genetic baseline and harvest GSI projects.

WHAT NEEDS TO BE DONE

- More powerful stock identification techniques (e.g., DNA analysis) may be used to refine these stock groups in the future.

RECOMMENDATIONS FOR 2002: None at this time.

OBJECTIVE 2A: Estimate and periodically evaluate escapement goal approach and the biological goal ranges to achieve sustained yield.

SOCKEYE

INFORMATION NEED/ISSUE 2A-1, SOCKEYE: Obtain reliable estimates of escapement by age/sex/length.

SUMMARY OF CURRENT SITUATION

Currently, there is good coverage of most large sockeye salmon producers in the region. The recently undertaken federal subsistence projects cover additional small and medium-sized sockeye producing systems. Long-term escapement estimation programs are in place on six of the largest and four of the smaller of approximately 200 sockeye systems in Southeast Alaska and Yakutat, using weirs or mark-recapture methods. Canada operates weirs on five index tributaries of the transboundary Taku, Stikine

and Alsek rivers. Historically, weirs have been intermittently operated on numerous other systems in the region when funding was available and conditions dictated. Although weirs generally provide accurate escapement information, concurrent mark-recapture studies have documented that some weirs are not fish-tight, such as the Chilkat Lake sockeye weir.

Numerous systems are surveyed from the air but, except for several systems in the Yakutat area, aerial counts for sockeye are generally not considered reliable for determining escapement.

Abundance-based PST agreements for transboundary river stocks require intensive in-season escapement assessments for the Taku, Stikine and Alsek rivers.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Operating long-term escapement monitoring programs on the Situk, Chilkat, Chilkoot, Taku and Stikine rivers and Auke, Hugh Smith, Speel, Ford Arm and McDonald lakes.
- Conducting projects on the Stikine and Alsek rivers to estimate escapement on an in-season basis, which is necessary for developing abundance-based management regimes required by the PST. These projects were funded for two years by the first increment of SSSF funds.
- New federal subsistence monies are supporting weir and mark-recapture programs on 15 island systems in the region (Klawock, Falls, Gut, Kook, Hoktaheen, Thoms, Salmon Bay, Luck, Kanalku, Hasselborg, Sitkoh, Klag Bay, Hetta, Salmon and Virginia lakes).

WHAT NEEDS TO BE DONE

- Further develop the current escapement estimation and biological (e.g., ASL) sampling programs. This program should be dynamic and improved where needed, including monitoring of more systems and improving upon existing escapement estimation methodologies.

RECOMMENDATIONS FOR 2002

1. Major improvements to the Crescent Lake sockeye escapement enumeration program are needed, because developing enhanced returns of sockeye salmon to Snettisham Hatchery have complicated management of this stock.
2. Continue Stikine and Alsek sockeye mark-recapture programs to meet PST obligations beyond 2002, until the Northern Fund can support them.
3. Build a new fish-tight weir at Chilkat Lake.

INFORMATION NEED/ISSUE 2A-2, SOCKEYE: Identify the limiting factors for depressed stocks.

SUMMARY OF CURRENT SITUATION

The Chilkoot Lake system, historically one of the largest sockeye producers in the region, has been severely depressed since the early 1990s but now shows signs of rebuilding (zooplankton populations and adult returns). Klawock Lake has also been identified as producing significantly below historic levels. A number of other sockeye salmon systems are believed to be producing below historical production levels.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting a five-year lake assessment program (limnology, hydroacoustics, fry sampling) for Chilkoot Lake, funded through SSSF funds.
- Conducting studies of Klawock Lake through 2002, with federal subsistence funds.

WHAT NEEDS TO BE DONE

- Conduct Research to better understand factors limiting restoration of historical production of Southeast Alaska island systems and Chilkoot Lake, through escapement, limnological and biological sampling programs.

RECOMMENDATION FOR 2002

Continue and expand the research program on the Klawock system to understand factors limiting sockeye salmon production.

INFORMATION NEED/ISSUE 2A-3, SOCKEYE: Collect data regarding harvest by stock, by brood year, for hatchery and wild stocks.

SUMMARY OF CURRENT SITUATION

ADF&G operates ongoing stock identification programs for most fisheries harvesting sockeye salmon in Southeast Alaska, using scale patterns and other biological markers such as brain parasites and otoliths. This program is not fully funded. Harvest estimates by stock groups are available for many fisheries for the past 20 years, but specific estimates for individual small stocks are generally not available for all fisheries.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting thermal otolith marking at Central Incubation Facilities to provide the capability for developing precise estimates of harvest contributions for transboundary and several domestic and transboundary river enhancement programs.
- Conducting fishery sampling and analysis to provide contribution estimates for fisheries in Districts 1-11 and 15, using scales, otoliths and parasite information.

WHAT NEEDS TO BE DONE

- Improve harvest estimation programs to meet regional and PST management obligations.
- Develop alternate methods of estimating stock composition to allow finer resolution of stocks or stock groups in Southeast Alaska fisheries, including the use of new biological markers.

RECOMMENDATIONS FOR 2002

1. Continue Northern Boundary stock identification program to meet PST obligations until the Northern Fund can support it.
2. Continue the stock identification program for the District 11 gillnet fishery to estimate hatchery and wild contributions and satisfy PST harvest sharing obligations.

INFORMATION NEED/ISSUE 2A-4, SOCKEYE: Develop data analyses, databases, or models for biological escapement goals.

SUMMARY OF CURRENT SITUATION

Stock-recruitment-based escapement goals are available for a limited number of stocks (Chilkat, Chilkoot, Tahltan, Situk, Klukshu, East, Italio and Lost rivers).

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting sockeye escapement enumeration projects and associated ASL studies on a subset of Southeast Alaska systems.

- Sampling commercial fisheries for biological indicators to estimate harvest by individual stock or stock group. Annual harvest contributions for large producers are estimated from the ADF&G stock identification programs. ADF&G estimates harvest contributions for some of the smaller systems as well.

WHAT NEEDS TO BE DONE

- Update escapement goals as the databases improve, using traditional or new methods for setting escapement goals.
- Develop and evaluate alternative models for estimating spawning requirements, if needed for a specific stock, including models based on habitat and lake limnology characteristics.

RECOMMENDATION FOR 2002

Use existing methods, or, where needed, develop alternative methods and/or models for setting escapement goals.

OBJECTIVE 2B: Develop and implement methods to assess stock status and management systems to achieve escapement goals.

SOCKEYE

INFORMATION NEED/ISSUE 2B-1, SOCKEYE: Determine genetic baselines of all species to prioritize conservation and restoration efforts and predict and monitor effects of enhancement actions.

SUMMARY OF CURRENT SITUATION

There is a reasonably well developed baseline of allozyme data for Southeast Alaska sockeye salmon stocks. Southeast Alaska sockeye stocks, lumped together, can be identified in high-seas fisheries. Detailed genetic discrimination of individual Southeast Alaska stocks is limited in high seas and in Southeast Alaska fisheries. DNA-based stock discrimination is not yet available because the database is undeveloped.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G and Cooperating Agencies

- The existing allozyme database is being updated by ADF&G and NMFS on an opportunistic basis.
- ADF&G, NMFS, and CDFO are exploring the use of DNA markers for sockeye stock identification, including selected Southeast Alaska stocks.

WHAT NEEDS TO BE DONE

- Incorporate the existing genetic databases into current stock separation techniques.
- Develop a more powerful method to separate individual or smaller stock groups, such as a DNA baseline.

RECOMMENDATIONS FOR 2002

1. Determine the feasibility of incorporating existing genetic databases into current stock separation techniques.
2. Determine the feasibility of developing a DNA-based genetic database for sockeye salmon in Southeast Alaska.

INFORMATION NEED/ISSUE 2B-2, SOCKEYE: Respond effectively to changes in annual run strength.

SUMMARY OF CURRENT SITUATION

Formal preseason forecasts are available only for Stikine River sockeye stocks. In-season run strength and run reconstruction is conducted for the Situk, Chilkoot, Chilkat, Taku and Stikine rivers. In-season monitoring is used to make local management adjustments for several other stocks/areas, such as island systems with recent federal subsistence funded projects. PST compliance requires in-season assessment to ensure harvest sharing agreements are satisfied and escapements achieved in PST boundary area and transboundary river fisheries (Alsek, Stikine and Taku rivers).

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Operating Situk River weir and harvest monitoring projects.
- Operating Chilkoot River weir, Chilkat River mark-recapture project, Chilkat Lake weir, and the Lynn Canal harvest stock identification program.
- Conducting Taku River mark-recapture (with CDFO) and District 11 harvest stock identification projects.
- Conducting Stikine River abundance management model and mark-recapture program (with CDFO) and Districts 108 and 106 harvest stock identification programs.
- Conducting Alsek River mark-recapture program (with CDFO).
- Conducting numerous other index escapement monitoring projects throughout the region.
- Developing more accurate and timely run strength information in the boundary area fisheries.

WHAT NEEDS TO BE DONE

- Refine and continue in-season escapement estimation programs for the Stikine and Alsek rivers to satisfy PST harvest sharing and abundance-based management requirements.

RECOMMENDATION FOR 2002

Extend the Alsek and Stikine rivers sockeye mark-recapture programs beyond 2002.

OBJECTIVE 2C: Identify and catalog conservation units (stock aggregations, meta-populations).

SOCKEYE

INFORMATION NEED/ISSUE 2C-1, SOCKEYE: Identify and assess conservation or management units for each species.

SUMMARY OF CURRENT SITUATION

Wild stocks can be categorized by genetic analysis and geographic location, spawning timing and life history characteristics. Almost all Southeast Alaska enhanced sockeye stocks are currently identifiable by 100 percent thermal otolith marking.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting sockeye escapement estimation program for the region.
- Implementing sockeye stock identification program that provides ocean distribution and timing characteristics.
- Conducting genetic baseline project.

WHAT NEEDS TO BE DONE

- More powerful stock identification techniques (e.g., DNA analysis) may be used to refine stock groups in the future.

RECOMMENDATIONS FOR 2002: None at this time.

OBJECTIVE 2A: Estimate and periodically evaluate escapement goal approach and the biological goal ranges to achieve sustained yield.

COHO

INFORMATION NEED/ISSUE 2A-1, COHO: Obtain reliable estimates of escapement by age/sex/length.

SUMMARY OF CURRENT SITUATION

ADF&G has developed a limited, but accurate coho escapement program for a selected number of stocks in Southeast Alaska. Total escapement is estimated annually for nine systems at present—Ford Arm, Auke, Hugh Smith, Salmon and Warm Chuck lakes; Taku, Nakwasina, Unuk and Berners rivers; and Slippery Creek. The Ford Arm, Auke Lake, Hugh Smith and Taku River programs have been implemented for 15 or more years each. Salmon Lake was operated historically (1980s) and reinitiated in 2001 with federal subsistence funding. Slippery Creek was started in 1997, the Unuk River project in 1998, and Warm Chuck in 2001.

An additional 60–70 streams are surveyed by helicopter annually for index survey counts. Surveyed streams were selected to represent all geographic areas in the region. These counts are generally accurate in describing trends in escapement across time, but accuracy for individual streams is somewhat limited due to variability in counting conditions and observers.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Annually conducting nine escapement projects—Ford Arm, Auke, Hugh Smith, Salmon and Warm Chuck Lake; Taku, Nakwasina, Unuk and Berners rivers; and Slippery Creek.
- Conducting index survey program in 60-70 streams region wide.

WHAT NEEDS TO BE DONE

- Maintain the existing coho escapement program in Southeast Alaska.
- Conduct additional surveys or escapement work in the Yakutat area, as many of these rivers are major producers and are not surveyed. These river systems are easier to consistently survey than most in the region.
- Initiate a program to estimate total escapement for the Chilkat River, one of the top three coho producers in Southeast Alaska. ADF&G has an existing CWT project for this stock and an escapement estimation program for the river is needed to estimate total run size for the first time. Also, adult harvest, production and marine survival can be estimated.
- Develop additional escapement estimation programs to provide coverage throughout Southeast Alaska.
- Develop expansion factors (calibration) for expanding aerial surveys into estimates of total escapement.

RECOMMENDATIONS FOR 2002

1. Fund the Chilkat coho escapement mark-recapture project for a minimum of two years.
2. Fund additional coho escapement work in the Yakutat area.
3. Fund additional coho escapement projects on more systems in Southeast Alaska (e.g., Warm Chuck Lake.)
4. Fund additional work to calibrate index survey counts of coho salmon in Southeast Alaska.

INFORMATION NEED/ISSUE 2A-2, COHO: Identify the limiting factors for depressed stocks.

SUMMARY OF CURRENT SITUATION

There is some indication of some decreases in stock abundance for a few small production units of coho salmon in Southeast Alaska. These include some drainages that have been logged in Southeast Alaska under certain management practices and drainages impacted from urbanization near communities.

Returns of early run coho salmon to the Taku River have declined over the last five years, although the overall Taku River coho salmon run is healthy and has exceeded the minimum spawning requirements every year since 1987. Escapements above the international border have averaged over 70,000 adults since 1987, well in excess of the minimum escapement target of the 35,000 specified in the June 1999 PST Agreement.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Implementing the Nakwasina (1998) and Warm Chuck (2001) coho projects (escapement and CWT). Both drainages in the Tongass National Forest were logged extensively under pre-Tongass Land Management Plan practices. Both systems still produce runs in the thousands and are not depressed, but the projects offer an opportunity to estimate fish production over time in a lake system (Warm Chuck) and a medium-sized river system (Nakwasina), affected by large-scale logging.

Cooperative Projects

- Implementing the Duck and Jordan Creek restoration projects near Juneau over the past decade to restore coho habitat in these two Juneau roadside systems. The Federal Aviation Administration is funding weir and CWT projects on Jordan Creek and Duck Creek in 2001 in cooperation with ADF&G, NMFS, USFWS, and the Mendenhall Watershed Partnership. (Also see information/issues under the Goal 1—Habitat).

WHAT NEEDS TO BE DONE

- Analyze the results of the above projects to determine the effect of anthropogenic impacts and judge the effectiveness of restoration efforts.
- Examine the potential causes of reduced returns of early run Taku River coho salmon, including inspection of habitat, natural stream blocks to spawning habitat (beaver dams, etc.), and adult and juvenile surveys in key areas of early run stocks.

RECOMMENDATION FOR 2002

Conduct adult and juvenile surveys of coho salmon in early run upriver areas of Taku River drainage.

INFORMATION NEED/ISSUE 2A-3, COHO: Collect data regarding harvest by stock, by brood year, for hatchery and wild stocks.

SUMMARY OF CURRENT SITUATION

Information on harvest contributions for individual stocks or stock groups is limited in Southeast Alaska. From catch sampling and Southeast Alaska wild/hatchery stock CWT programs, ADF&G is able to accurately estimate harvests from all individual Alaska hatcheries (because all release groups are coded wire tagged) and for those Southeast Alaska wild stocks that are also tagged. ADF&G is able to estimate harvests of outside hatchery (British Columbia and the U.S.) stocks that are tagged.

ADF&G is unable to estimate harvests of individual stocks for the majority of Southeast Alaska wild stocks and wild stocks from outside Southeast Alaska. Unlike the chinook fishery, most of the harvest of coho salmon in Southeast Alaska originates from Southeast Alaska. The remainder is primarily from wild stocks in northern British Columbia.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- In Southeast Alaska, an extensive CWT program is in place for some wild and all hatchery stocks. Wild stocks which are tagged at present are: Ford Arm, Hugh Smith, and Auke lakes; and Chilkat, Taku, Stikine, Berners, Unuk, and Nakwasina rivers; and Slippery Creek. Three additional stocks will be tagged beginning in 2002: Chickamin River, Warm Chuck Lake and Salmon Lake.
- Long-term and extensive catch sampling for harvest and CWTs in sport and commercial fisheries in Southeast Alaska.
- Implementing Adult escapement projects to estimate marked fraction of CWTs in returns.
- Operating ADF&G CWT lab for tag processing, decoding and database archiving.

WHAT NEEDS TO BE DONE

- Conduct adult escapement and CWT programs for several additional stocks and continue existing projects. Conduct CWT recovery processing and data analysis.

RECOMMENDATIONS FOR 2002

1. Continue the Chilkat River CWT program beyond 2002.
2. Continue the Warm Chuck Lake CWT program beyond 2002.
3. Conduct a CWT project for an additional wild coho stock.
4. Continue operation of the ADF&G CWT/Otolith lab.

INFORMATION NEED/ISSUE 2A-4, COHO: Develop data analyses, databases, or models for biological escapement goals.

SUMMARY OF CURRENT SITUATION

ADF&G has established escapement goals for approximately 15 Southeast Alaska coho stocks. Agencies recently implemented projects which will allow additional escapement goals to be estimated in the future.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

- Developing or extending databases for current stock assessment program for coho salmon from:
  - projects for adult escapements,
  - harvests estimated from the wild-stock CWT projects,
  - ADF&G CWT/Otolith lab output, and
  - catch sampling in sport and commercial fisheries.

WHAT NEEDS TO BE DONE

- Use traditional models, or develop and evaluate alternative models (such as habitat-based models) for estimating spawning requirements.
- Develop escapement goals for all coho indicator stocks to provide for sustained yield.
- To implement true abundance-based management region wide, develop escapement goals in several geographic areas not presently covered.

RECOMMENDATIONS FOR 2002

1. Evaluate databases for stocks to determine the appropriate method for developing escapement goals, including traditional methods and alternative models.
2. Develop escapement goals for all coho indicator stocks, using sustainable goals (SEGs) where necessary and biological escapement goals (BEG) where data warrants.

OBJECTIVE 2B: Develop and implement methods to assess stock status and management systems to achieve escapement goals.

COHO

INFORMATION NEED/ISSUE 2B-1, COHO: Determine genetic baselines of all species to prioritize conservation and restoration efforts and predict and monitor effects of enhancement actions.

SUMMARY OF CURRENT SITUATION

There is no genetic baseline for Southeast Alaska coho at present.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

USFWS & CDFO

- Exploring the use of DNA as a stock-identification tool for coho salmon, including Southeast Alaska stocks.

WHAT NEEDS TO BE DONE

- Determine the appropriate methodology for developing a genetic database for Southeast Alaska coho salmon.

RECOMMENDATION FOR 2002

Determine the feasibility of developing an appropriate genetic database for Southeast Alaska coho salmon.

INFORMATION NEED/ISSUE 2B-2, COHO: Respond effectively to changes in annual run strength.

SUMMARY OF CURRENT SITUATION

Early in the season, fishery performance data from the troll fishery is used to estimate the harvest of the aggregate for all stocks in Southeast Alaska, which is used as a surrogate for total abundance. As the season progresses, in-season run strength and run reconstruction are done for individual stocks or geographic units to fine tune management. These stocks include the Berners, Chilkat, Taku and Unuk rivers, and Ford Arm, Hugh Smith and Auke lakes, and Slippery Creek.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

NOAA—Auke Bay Laboratory

- Conducting research projects examining the relationship of growth and survival of juvenile salmon in the marine environment with associated biophysical conditions (e.g., the Auke Bay Laboratory's Southeast Coastal Monitoring Project.)

Note: Many of the projects listed previously directly or indirectly address this information need.

WHAT NEEDS TO BE DONE

- Implement preseason forecasting that is dependable and accurate.
- Explore conducting additional analysis of existing data, early marine studies, index of abundance and growth tied with survival and primary production to improve forecasts of run strength.

RECOMMENDATION FOR 2002

Examine the feasibility of using abundance index data from the early marine study to forecast abundance of coho on a preseason basis.

OBJECTIVE 2C: Identify and catalog conservation units (stock aggregations, meta-populations).

COHO

INFORMATION NEED/ISSUE 2C-1, COHO: Identify and assess conservation or management units for each species.

SUMMARY OF CURRENT SITUATION

Conservation or management units for Southeast Alaska coho salmon are defined from ocean distribution and timing from results of CWT studies of wild and hatchery fish and the escapement monitoring program. Wild stocks are currently categorized by eight geographic units in Southeast Alaska and separated by life history characteristics to some extent, within those units (e.g., early, middle, late timing). The geographic units are: Yakutat, North-Central, Lynn Canal, Stephens Passage, Taku River, Central Inside, Southern Outside and Southern Inside.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Implementing coho CWT and escapement monitoring programs.

WHAT NEEDS TO BE DONE

- Analyze phenotypic and genotypic characteristics of coho salmon populations and existing datasets to develop and refine conservation and management units.
- Consider further resolution of geographic units as other fishery or management needs arise.

RECOMMENDATIONS FOR 2002:

None at this time.

OBJECTIVE 2A: Estimate and periodically evaluate escapement goal approach and the biological goal ranges to achieve sustained yield.

CHUM

INFORMATION NEED/ISSUE 2A-1, CHUM: Obtain reliable estimates of escapement by age/sex/length.

SUMMARY OF CURRENT SITUATION

The quality of the chum escapement database is fair, and consists primarily of survey data. Over 1,500 streams produce chum salmon in Southeast Alaska, both summer and fall runs. Aerial surveys are annually conducted on over 100 of the systems, but counts are not calibrated, in most cases, and are likely less accurate than surveys for pink salmon.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting aerial and foot surveys region wide.
- Conducting calibration studies annually at Chaik Bay and Traitor's Cove creeks.
- Using fish wheel catches in the Taku and Chilkat rivers, to some extent, as indices of chum escapement for those two rivers.

WHAT NEEDS TO BE DONE

- Conduct additional observer calibration studies to determine expansion factors for survey counts.
- Estimate total escapement of chum salmon in the Chilkat River to properly manage and evaluate the status of this important stock. The Chilkat River has the largest wild chum salmon run in the region.
- Develop a Portland Canal chum salmon escapement index program to provide escapement data useful for monitoring these important stocks covered by the PST agreement.

RECOMMENDATIONS FOR 2002

1. Conduct an adult Chilkat River mark-recapture escapement project for a minimum of two years, along with the proposed Chilkat River coho escapement project.
2. Conduct a chum salmon escapement index program for Portland Canal, including observer calibration work.

INFORMATION NEED/ISSUE 2A-2, CHUM: Identify the limiting factors for depressed stocks.

SUMMARY OF CURRENT SITUATION

Production of Taku and Chilkat River fall chum runs declined in the 1990's. The Chilkat River run has rebounded in the last three years, but the Taku River run has not. Causes of reduced production are poorly understood, but could include hydrological changes in the drainage, inter-specific competition in the river, competition with enhanced fish in marine waters, or other unidentified factors. Escapement indices in most areas of the region generally appear stable to increasing in recent years.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting aerial surveys for chum salmon throughout Southeast Alaska.
- Using fish wheel catches in the Taku and Chilkat rivers as indices of escapement.

NMFS—Auke Bay Laboratory

- Researching potential competitive interactions in nearshore marine environments, in cooperation with Douglas Island Pink and Chum (DIPAC).

WHAT NEEDS TO BE DONE

- ADF&G and other agencies need to continue escapement monitoring programs and competitive interaction studies.
- Further studies may be needed to determine causes of reduced production from identified stocks.

RECOMMENDATION FOR 2002

Conduct a study of Taku River chum salmon to determine spawning distribution through radiotelemetry, habitat utilization in the nearshore early marine environment, and examination of available Taku River hydrological data.

INFORMATION NEED/ISSUE 2A-3, CHUM: Collect data regarding harvest by stock, by brood year, for hatchery and wild stocks.

SUMMARY OF CURRENT SITUATION

Harvests of enhanced chum salmon are estimated for select mixed stock fisheries by analysis of otolith and CWT gathered from the commercial port sampling data. Currently 100 percent of DIPAC hatchery chums and 50 percent of the Northern Southeast Regional Aquaculture Association's Hidden Falls hatchery are otolith-marked. The Southern Southeast Aquaculture Association will have the capability to mark 100 percent of its hatchery releases by 2002.

In most hatchery terminal harvest areas, catches are composed predominantly of hatchery stocks. Estimates of harvests for individual wild stocks are available for some terminal area fisheries, but this is generally not the case. Most wild chum salmon are harvested in mixed stock fisheries and contributions of individual stocks are unknown.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting otolith marking at most major hatcheries now, or in near future.
- Conducting catch sampling for otolith recovery in Districts 11 and 15, and to some extent in Icy and Chatham Strait (funded primarily by DIPAC.)
- Coordinating thermal marks around the Pacific Rim.
- Implementing ongoing CWT program for chum salmon at several hatcheries.
- Processing marked fish for stock identification database at the ADF&G CWT/Otolith Lab.

WHAT NEEDS TO BE DONE

- Improve stock identification capabilities for chum salmon in Southeast Alaska.
- Increase thermal marking of production releases of hatchery chum salmon for high seas stock identification studies, Southeast Alaska harvest contribution estimates, and more localized studies assessing hatchery releases and returns.
- Support the infrastructure and personnel needed to sample, process and analyze chum salmon otoliths from Southeast Alaska fisheries.

RECOMMENDATIONS FOR 2002

1. Increase the capacity for thermal marking of production releases of hatchery chums.
2. Adequately fund the sampling and processing of chum heads in Southeast Alaska fisheries.

3. Determine the feasibility of using genetic stock identification analysis for chum salmon in Southeast Alaska fisheries.

INFORMATION NEED/ISSUE 2A-4, CHUM: Develop data analyses, databases, or models for biological escapement goals.

SUMMARY OF CURRENT SITUATION

There are no formal stock recruitment based escapement goals for Southeast Alaska chum salmon stocks. ADF&G area management biologists use an extensive database of historic index survey counts to determine and manage for sustainable escapements and to monitor long-term trends in escapement.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting the Southeast Alaska chum salmon escapement survey program to provide escapement estimates and ASL data for some stocks.
- Conducting the Southeast Alaska fishery sampling program to provide harvest information and, in some cases, ASL data.

WHAT NEEDS TO BE DONE

- Develop sustainable escapement goals for Southeast Alaska chum salmon stocks, using traditional or new methods for setting escapement goals.
- Thoroughly review and compile historical databases for Southeast Alaska chum salmon stocks.

RECOMMENDATIONS FOR 2002

1. Use traditional methods or develop and evaluate alternative models for estimating sustainable escapement goals for Southeast Alaska chum indicator stocks or stock groups.
2. Compile a chum salmon escapement by stock group database.

OBJECTIVE 2B: Develop and implement methods to assess stock status and management systems to achieve escapement goals.

CHUM

INFORMATION NEED/ISSUE 2B-1, CHUM: Determine genetic baselines of all species to prioritize conservation and restoration efforts and predict and monitor effects of enhancement actions.

SUMMARY OF CURRENT SITUATION

There is a comprehensive Pacific Rim genetic baseline for chum salmon. The baseline is well-developed for Southeast Alaska stocks.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Updating the current allozyme database periodically with samples from additional stocks.

WHAT NEEDS TO BE DONE

- Maintain the current allozyme database and evaluate it for adequacy of Southeast Alaska wild and hatchery chum salmon stocks.

RECOMMENDATIONS FOR 2002: None at this time.

INFORMATION NEED/ISSUE 2B-2, CHUM: Respond effectively to changes in annual run strength.

SUMMARY OF CURRENT SITUATION

Preseason forecasts are made for most enhanced chum production in Southeast Alaska, based on sibling models. Fishery performance data and aerial surveys of bays and streams are primary management tools. Summer chum salmon generally arrive before pink salmon, and summer chum harvests occur in both mixed-stock and terminal fisheries. Fall chum fisheries are almost exclusively terminal fisheries.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Using aerial surveys, stock identification programs to estimate hatchery contributions, and fishery performance data and the test fishing program to estimate run strength of Southeast Alaska chum salmon stocks, either in terminal areas or mixed-stock areas.

NOAA—Auke Bay Laboratory

- Researching the relationship of growth and survival of juvenile salmon in the marine environment with associated biophysical conditions (e.g., Auke Bay Laboratory's Southeast Coastal Monitoring Project).

WHAT NEEDS TO BE DONE

- Consider improvements needed in preseason and in-season forecasting of run strength. This can be derived from further analysis of existing data or methods, sibling models (preseason forecasts), alternative models, and early marine studies.

RECOMMENDATION FOR 2002

Conduct feasibility study to improve preseason forecasting for chum salmon, hatchery and wild.

OBJECTIVE 2C: Identify and catalog conservation units (stock aggregations, meta-populations).

CHUM

INFORMATION NEED/ISSUE 2C-1, CHUM: Identify and assess conservation or management units for each species.

SUMMARY OF CURRENT SITUATION

Wild chum stocks can be categorized into geographic and temporal units (summer and fall runs).

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Using chum salmon escapement survey program to monitor escapements.

WHAT NEEDS TO BE DONE

- Evaluate genetic data to determine or develop conservation or management units of Southeast Alaska chum salmon stocks.

RECOMMENDATION FOR 2002

Evaluate genetic data in context of geographic or management units.

OBJECTIVE 2A: Estimate and periodically evaluate escapement goal approach and the biological goal ranges to achieve sustained yield.

PINK

INFORMATION NEED/ISSUE 2A-1, PINK: Obtain reliable estimates of escapement by age/sex/length.

SUMMARY OF CURRENT SITUATION

Aerial and foot surveys are typically conducted on over 800 of the 2,500+ pink salmon streams in region, and tracked for over 50 stock groups in the 15 commercial fishing districts of Southeast Alaska. Annual survey calibration studies are underway at two locations, Chaik Bay and Traitor's Cove creeks.

The quality of the escapement database is very good and is the most extensive long-term database for pink salmon escapements in the world. However, the database could be improved by increasing aerial survey coverage and conducting additional calibration studies to improve estimates of total escapement and run size.

Pink salmon runs in Southeast Alaska in the last decade have been among the largest in history.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Using the Southeast Alaska pink salmon escapement survey program to estimate escapements.
- Using observer calibration studies at Chaik Bay and Traitor's Cove creeks to estimate expansion factors for survey counts and to calibrate among different observers.

WHAT NEEDS TO BE DONE

- Continue and improve the current escapement monitoring program.

RECOMMENDATIONS FOR 2002

1. Maintain the existing coverage of surveyed streams and train new observers.
2. Conduct additional calibration studies to determine expansion factors, and, due to a large turnover in staff, to determine observer specific counting rates for new observers.

INFORMATION NEED/ISSUE 2A-2, PINK: Identify the limiting factors for depressed stocks.

SUMMARY OF CURRENT SITUATION

Pink salmon runs in the last decade have been among the largest in history throughout the region. No depressed stocks are identified.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

- None at this time.

WHAT NEEDS TO BE DONE

- None at this time.

RECOMMENDATIONS FOR 2002: None at this time.

INFORMATION NEED/ISSUE 2A-3, PINK: Collect data regarding harvest by stock, by brood year, for hatchery and wild stocks.

SUMMARY OF CURRENT SITUATION

Total harvest is available on a sub-district level. This level of monitoring is generally adequate here for assessing production by stock group, and for sustaining wild stocks in Southeast Alaska. There is minimal production of enhanced pink salmon in Southeast Alaska.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Using the fish ticket database for fine-scale estimation of pink salmon harvests on a subdistrict level.

WHAT NEEDS TO BE DONE

- Maintain the existing harvest reporting system.

RECOMMENDATIONS FOR 2002: None at this time.

INFORMATION NEED/ISSUE 2A-4, PINK: Develop data analyses, databases, or models for biological escapement goals.

SUMMARY OF CURRENT SITUATION

ADF&G has developed escapement goals by regulatory district for Southeast Alaska pink salmon. Goals for northern and southern portions of the region are based on aggregate production from Districts 1-8 for southern Southeast Alaska and Districts 9-15 for northern Southeast Alaska.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Maintaining the Southeast Alaska pink salmon harvest and escapement data in the IFDB/ALEX database.

WHAT NEEDS TO BE DONE

- Conduct further analysis of the existing database for Southeast Alaska pink salmon to refine existing escapement goals.

RECOMMENDATIONS FOR 2002

1. Update stock recruitment databases and models for pink salmon.
2. Expand and improve the observer calibration studies of pink escapement survey counts.

OBJECTIVE 2B: Develop and implement methods to assess stock status and management systems to achieve escapement goals.

PINK

INFORMATION NEED/ISSUE 2B-1, PINK: Determine genetic baselines of all species to prioritize conservation and restoration efforts and predict and monitor effects of enhancement actions.

SUMMARY OF CURRENT SITUATION

There is a comprehensive Pacific Rim genetic baseline for pink salmon. The baseline is well-developed for Southeast Alaska stocks. Large genetic differences exist between odd and even brood years, but only subtle differences among stocks have been documented within brood years in Southeast Alaska. Larger within-brood-year genetic differences exist on a major geographic scale in the North Pacific.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Maintaining the current allozyme database.

University of Alaska

- Conducting numerous state-of-the-art genetic studies on Southeast Alaska pink salmon, including population genetics, out-breeding depression, heritability, interactions of hatchery and wild stocks and numerous other issues.

WHAT NEEDS TO BE DONE

- Maintain the current allozyme database and continuation of genetic studies.

RECOMMENDATIONS FOR 2002: None at this time.

INFORMATION NEED/ISSUE 2B-2, PINK: Respond effectively to changes in annual run strength.

SUMMARY OF CURRENT SITUATION

The University of Alaska and ADF&G develop preseason and in-season forecasts for pink salmon. Fishery performance, escapement surveys, test fishing and sex ratio sampling are primary tools for assessing run strength in-season and managing fisheries.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Conducting in-season catch and catch per unit effort (CPUE) analysis, escapement surveys, test fishing and sex ratio sampling to monitor incoming run strength.

NOAA—Auke Bay Laboratory

- Researching the relationship of growth and survival of juvenile salmon in the marine environment with associated biophysical conditions (e.g., Auke Bay Laboratory's Southeast Coastal Monitoring Project).

WHAT NEEDS TO BE DONE

- Continue and improve the current escapement monitoring program.

RECOMMENDATIONS FOR 2002

1. Maintain existing coverage of surveyed streams and train new observers.
2. Conduct additional calibration studies to determine expansion factors and, due to a large turnover in staff, to determine observer-specific counting rates for new observers.

OBJECTIVE 2C: Identify and catalog conservation units (stock aggregations, meta-populations).

PINK

INFORMATION NEED/ISSUE 2C-1, PINK: Identify and assess conservation or management units for each species.

SUMMARY OF CURRENT SITUATION

The ADF&G harvest and escapement monitoring programs can be used to identify and manage 50 pink salmon stock groups in Southeast Alaska. There is a comprehensive Pacific Rim genetic baseline for pink salmon. The baseline is well-developed for Southeast Alaska stocks. Differentiation among Southeast

Alaska stock groups is apparent in migration timing and migration routes, from the escapement and harvest monitoring programs.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Maintaining and updating Southeast Alaska pink salmon index survey and harvest reporting programs in the IFDB/ALEX database.

WHAT NEEDS TO BE DONE

- Continue harvest and escapement monitoring programs and ongoing genetic studies.

RECOMMENDATIONS FOR 2002: None at this time.

OBJECTIVE 2D: Establish information sharing system.

ALL SPECIES

INFORMATION NEED/ISSUE 2D-1: Standardize historical data to be usable in a data series for integrated analysis, including stock status and habitat quality.

SUMMARY OF CURRENT SITUATION

The ADF&G Southeast Region's IFDB/ALEX database and decision management system provides standardized access for department staff to harvest, escapement and other biological information. CWT data is stored permanently in the ADF&G Tag/Otolith Lab database, which is also transferred annually to the Pacific States Marine Fisheries Commission (PSFMC) coastwide CWT database. Thermal otolith mark and recovery data is stored in the ADF&G Tag/Otolith Lab database. ASL data is stored and maintained by the ADF&G Commercial Fisheries Division and will eventually be included in the IFDB database. The salmon scale pattern analysis database, consisting of electronic measurements of scale patterns, is stored by the ADF&G Commercial Fisheries Division and will eventually be included in the IFDB database. For all ADF&G Sport Fish Division salmon projects, a permanent archive of data from each project is stored by the Division's Research and Technical Services in Anchorage.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Ongoing entry of CWT and otolith data into of the ADF&G Tag/Otolith Lab database.
- Maintaining the IFDB database program. Planning to expand the IFDB database to include ASL and scale data.
- Maintaining the other databases listed above, but some are not readily accessible to other users.

WHAT NEEDS TO BE DONE

- Expand the IFDB/ALEX database, to include ASL, scale patterns, stock composition and tagging data; improve report generating capabilities; and improve agency and public access to data via the web as well as other features.
- Develop comprehensive accessible databases which, among other applications, can be linked with GIS software to integrate catch, escapement, and habitat data.

RECOMMENDATION FOR 2002

Maintain and continue development of an integrated database.

GOAL 3: SALMON MANAGEMENT SYSTEMS GAP ANALYSIS

MAINTAIN EFFECTIVE, BIOLOGICALLY SOUND, SALMON MANAGEMENT SYSTEMS TO SUSTAIN HUMAN USE AND TO ENSURE CONSERVATION OF SALMON RESOURCES.

OBJECTIVE 3A: Develop management system to achieve cultural, social, and economic objectives within acceptable biological limits.

INFORMATION NEED/ISSUE 3A–1: Incorporate estimates of harvest of wild salmon from a particular drainage or set of drainages to meet allocation objectives.

See gap analysis information provided for each species in **Goal 2: Wild Stocks**—specifically information need/issues: **2A-3**, **2B-3** and **2C-3**.

INFORMATION NEED/ISSUE 3A-2: Develop more comprehensive information to meet Alaska's Pacific Salmon Treaty obligations under the June 1999 Agreement.

SUMMARY OF CURRENT SITUATION

Most of the individual species or project-level issues related to PST are covered in **Goal 2: Wild Stocks**. An overview of Pacific Salmon Treaty issues is presented below.

The June 1999 Agreement of the PST obligates the parties (U.S. and Canada) to intensify management and stock assessment programs to implement abundance-based management regimes. These requirements are in agreement with the principles and criteria of Alaska's Sustainable Salmon Policy. To implement the PST agreement, additional work is required in Southeast Alaska for:

- chinook salmon regionwide,
- boundary area sockeye salmon, and
- chinook, sockeye and coho salmon on the transboundary Alsek, Taku and Stikine rivers.

For chinook salmon regionwide, more precise escapement estimates are needed, as are improved estimates of harvest and annual estimates of age composition for each escapement indicator stock. Alaska is developing five wild "Model" stocks and two Alaska Hatchery "Model" stocks, which require additional harvest data. These data will help improve the utility and accuracy of anticipated CTC Model improvements.

The Boundary Area PST agreement requires that Alaska manage its District 1 gillnet and District 4 purse seine fisheries to harvest specific percentages of the harvestable surplus of Canadian Nass and Skeena River returns. This requires more intensive stock identification programs to estimate stock origins of sockeye salmon in boundary area fisheries.

The Transboundary River PST Agreement requires abundance-based (inseason) management capabilities for chinook, sockeye and coho runs on the Alsek, Taku and Stikine rivers by 2004, along with estimation of new biological escapement goals for Taku River chinook and coho and Stikine River chinook salmon. Escapement goals for the two chinook stocks have been revised in the last several years. Inseason management regimes for Taku River sockeye and coho salmon are in place and nearly complete for Taku

River chinook salmon. ADF&G has started to develop in-season programs for Alsek River chinook and sockeye salmon and Stikine River chinook salmon and is improving its sockeye assessment programs.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

CHINOOK:

- Estimating chinook salmon escapements using weirs or mark-recapture methods on the Situk, Alsek, Chilkat, Taku, Stikine, Unuk and Chickamin rivers, with accompanying ASL composition and CWT recovery. Aerial survey counts, ASL sampling and CWT recovery on Andrew Creek, Blossom River, and Keta River; expansion factors have been estimated for all surveyed chinook systems.
- Operating five wild-stock CWT programs, including Taku and Unuk rivers for the past eight years; and Chilkat, Stikine and Chickamin rivers for the past two years.
- Conducting CWT sampling, at rates averaging 40 percent for commercial and about 15 percent for sport fisheries. The harvest of coded wire tagged stocks is estimated from this data.
- For the last three years, using genetic stock identification techniques to estimate the chinook stock composition in Southeast Alaska troll fishery. This program does not presently cover the Southeast Alaska sport and net fisheries.
- Improving the Chinook Model to improve annual abundance indices and associated annual all-gear harvest levels.
- Operating observer and logbook programs over the last four years to estimate incidental encounters of chinook during retention and non-retention periods in the Southeast Alaska troll fishery.

BOUNDARY AREA:

- Conducting escapement surveys annually on hundreds of boundary area streams to estimate escapements.
- Using scale-pattern analysis to estimate stock contributions of boundary area net fishery harvests of sockeye salmon. This is a time-consuming process that currently takes one year to complete.
- Sampling boundary area fisheries for ASL and CWT data, as well as pink salmon sex ratio data.

TRANSBOUNDARY RIVERS:

- Taku River:
  - Generating inseason mark-recapture estimates for sockeye and coho salmon escapements (since mid-1980s) and chinook salmon (since 2000) through cooperative projects with CDFO and Taku River Tlingit First Nation.
  - Conducting coded-wire tagging of chinook (since 1993) and coho (since 1991) to estimate marine harvest, survival and total production.
  - Operating the District 111 sockeye stock identification program (since early1980s); program has evolved to include a variety of biological characteristics including scale patterns, brain parasite incidence and otolith mark incidence. This program is essential but is currently underfunded.
  - Generating in-season forecasts of the Taku River sockeye salmon run (since late 1980s.)
  - Operating a large-scale joint U.S./Canada sockeye salmon egg take and fry backplant program at Tatsamenie Lake/Taku River (since early 1990s); all fish are thermally marked, allowing harvest sharing of returns to be monitored and enhancement programs to be assessed.

- Stikine River:
  - In 2000 and 2001, began efforts at implementing in-season mark-recapture estimates of sockeye and chinook escapements; programs are not yet adequate because methods and reporting systems are still being developed.
  - Coded wire tagging chinook and coho salmon smolts (since 2000).
  - Conducting coho salmon mark-recapture program (since 2001).
  - Operating District 106 and 108 sockeye stock identification programs (since early 1980s), currently including analysis of scale patterns and recovery of thermal otolith marks.
  - Generating preseason and in-season forecasts of Stikine sockeye salmon run (since late 1980s.)
  - Operating joint U.S./Canada sockeye salmon enhancement programs in the Stikine River drainage (since late 1980s), with egg takes at Tahltan Lake and fry plants to Tuya Lake and backplants to Tahltan Lake. All fish are thermally marked, allowing harvest sharing of returns to be monitored and enhancement programs to be assessed.
- Alsek River:
  - Making substantial efforts in the last few years to develop mark-recapture estimates of the chinook and sockeye salmon escapements to the Alsek River. These programs are not currently structured to provide in-season estimates.
  - CDFO has been operating the Klukshu River weir program to count sockeye and chinook salmon since 1976, providing an index of escapement for the Alsek drainage for both species.

WHAT NEEDS TO BE DONE

CHINOOK:

- Maintain the current wild stock escapement assessment program.
- Maintain the current five wild-stock CWT projects.
- Maintain the existing commercial and sport fishery harvest sampling program.
- Continue the Chinook Model Improvement project.

BOUNDARY AREA:

- Maintain the current wild stock escapement assessment program.
- Improve the boundary area sockeye stock identification program.

TRANSBOUNDARY RIVERS:

- Continue, and improve where feasible, the Taku River chinook, sockeye and coho stock assessment projects.
- Further develop the Alsek and Stikine sockeye salmon mark-recapture projects.
- Initiate coho salmon assessment projects on the Stikine and Alsek rivers.

RECOMMENDATIONS FOR 2002

1. Continue the Chickamin adult chinook salmon escapement and CWT projects beyond 2002.
2. Continue the Stikine and Chilkat River chinook salmon CWT projects beyond 2002.
3. Continue the chinook salmon genetic stock identification program for Southeast Alaska troll beyond 2002 and expand to cover the sport and net fisheries.
4. Continue the new northern Boundary Area sockeye stock identification project beyond 2002.
5. Continue the Alsek and Stikine rivers sockeye mark-recapture projects (Alaska's share) beyond 2002.
6. Continue the Alsek and Stikine rivers coho salmon mark-recapture projects (Alaska's share) beyond 2002.
7. Continue the Alsek River chinook salmon mark-recapture project (Alaska's share) beyond 2002.
8. Continue the District 111 sockeye salmon stock identification program.

INFORMATION NEED/ISSUE 3A-3: Collect sufficient information on the biology of wild salmon from a particular drainage or set of drainages to meet management objectives.

See **Goal 2: Wild Stocks** for each species, specifically information need/issues: **2A-1** through **2A-4**, **2B-2**, **2B-3** and **2C-3**.

INFORMATION NEED/ISSUE 3A-4: Collect sufficient information to forecast and manage in-season to achieve management objectives.

SUMMARY OF CURRENT SITUATION

See **Goal 2: Wild Stocks** for each species, information need/issues **2A-1**, **2B-3** and **Goal 3: Salmon Management Systems**, information need/issue **3A-2**.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G Sport Fish and Commercial Fish Divisions

- Conducting research and management activities throughout the region.

Note: A federal research and management structure has developed since the 1999 assumption by the federal government of subsistence fisheries management in freshwaters flowing through or adjacent to federal lands.

WHAT NEEDS TO BE DONE

- Improved coordination between state and federal management systems.

RECOMMENDATIONS FOR 2002

See recommendations in **Goal 2: Wild Stocks**, information need/issues **2A-1, 2B-3** and **Goal 3: Salmon Management Systems**, information need/issue **3A-2**.

INFORMATION NEED/ISSUE 3A-5: Evaluate the effects of management actions on socioeconomic needs, preferences or goals.

SUMMARY OF CURRENT SITUATION

The Alaska Board of Fisheries (BOF) determines allocations of fish among Alaska user groups. Each community in Southeast Alaska has a local advisory committee comprised of a cross section of users to address local salmon management and resource concerns. The advisory committees provide input to the BOF and ADF&G. Each division of ADF&G has various methods and means of obtaining information from specific user groups regarding needs, preferences and goals, including Sport Fish Division and Division of Commercial Fisheries area offices.

In separate processes, the Federal Subsistence Board (FSB) receives input from the FSB Regional Advisory Council for Southeast Alaska on user preferences and needs from local communities affected by federal subsistence management. The Regional Planning Team (RPT) for Southeast Alaska oversees permitting of enhancement activities in the region. In 1988, the Sport Fish Division contracted an economic survey to determine the money spent and species preferences by sport anglers in Southeast Alaska. Numerous other economic surveys have been conducted to assess the impact and benefits of commercial fisheries and enhancement activities on the communities of the region.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G Sport Fish Division

- Developing a strategic plan, including its most ambitious survey to date, to identify issues, concerns and preferences by sport anglers fishing in Alaska. The strategic plan is expected to be completed by the end of calendar year 2002.

ADF&G Subsistence Division

- Periodically conducts harvest assessment surveys in Southeast Alaska communities to provide estimates of subsistence harvests; 24 communities have been completed to date. Integration of the subsistence harvest database onto a GIS map-based platform is being completed.

WHAT NEEDS TO BE DONE

- Continue coordinated management efforts among BOF, ADF&G, FSB, RPT and to identify and accommodate, within legal constraints, the needs and preferences of those who use fishery resources in Southeast Alaska. Management from this coordinated process needs to be consistent with the principles and criteria of the Sustainable Salmon Policy.

RECOMMENDATIONS FOR 2002: None at this time.

OBJECTIVE 3B: Develop and implement methods for managing enhanced production while evaluating and minimizing adverse impacts to wild stocks.

INFORMATION NEED/ISSUE 3B–1: Assess effects of interactions between wild and hatchery (enhanced) stocks.

INFORMATION NEED/ISSUE 3B-2: Assess to what extent enhanced fish compete with and prey on wild salmon.

Note: The following Gap Analysis information addresses both information need/issue 3B-1 and 3B-2.

SUMMARY OF CURRENT SITUATION

The amount of interaction between hatchery and wild stocks in Southeast Alaska is poorly understood and is complicated to study. Marking of hatchery fish greatly aids the study of hatchery and wild stock interactions. There are several studies underway (listed below) to assess possible effects of interactions.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Implementing Nakwasina coho and Salmon Lake coho and sockeye salmon stock assessment projects.
- Conducting sampling programs in conjunction with enhancement marking projects to address harvest management concerns.

DIPAC

- Conducting habitat utilization studies in early marine areas in waters near Juneau.

NOAA—Auke Bay Laboratory

- Conducting chinook hatchery domestication project at Little Port Walter, Baranof Island.
- Conducting Southeast Coastal Monitoring Project, looking at potential for competitive interactions in the marine environment and nearshore areas.

- Conducting Ocean Carrying Capacity studies in the Gulf of Alaska.
- Implementing pink salmon genetic studies at Auke Creek, with University of Alaska Fairbanks.

University of Alaska Fairbanks

- Conducting outbreeding depression study for coho salmon.

WHAT NEEDS TO BE DONE

- Conduct more comprehensive marking, particularly of chum salmon, to improve assessment of competitive interactions and improve harvest management.
- Document net positive and negative effects of interactions between hatchery and wild salmon in Southeast Alaska.

RECOMMENDATIONS FOR 2002

1. Increase research effort in the nearshore marine zones (see Goal 2: Wild Stocks, information need/issue 2A-2 Chum).
2. Increase the capacity for thermal marking of production releases of hatchery chum salmon.

INFORMATION NEED/ISSUE 3B-3: Estimate stray rates, understand impacts, and determine acceptable rates for straying.

SUMMARY OF CURRENT SITUATION

Straying of Pacific salmon produced by salmon enhancement projects could potentially result in genetic change in wild populations because of introgression from the hatchery populations. The degree of risk associated with genetic introgression is affected by the relative numbers of hatchery strays and wild spawners, temporal and spatial overlap of hatchery strays with wild spawners, the origin of the hatchery brood line, the degree of genetic change in the hatchery due to domestication during some portion of the fishes' life history, and other factors.

In Southeast Alaska, impacts of straying might be expected to be most acute with chum salmon because of the magnitude of hatchery production. However, there is not a comprehensive program for estimating straying rates of chum salmon in the region. There is some documentation of straying of chum salmon in the Juneau area from thermal mark recoveries. The rates have not been estimated quantitatively.

The straying of coho salmon is probably localized to a few locations, particularly associated with remote release programs; few coho salmon strays have been found in wild-stock escapement projects.

Hatchery straying is not considered to be a major problem for chinook, sockeye or pink salmon, based on extensive escapement surveys for chinook salmon, and limited hatchery production of sockeye and pink salmon along with spawning grounds sampling for these two species.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Sampling many chinook stocks on spawning grounds for biological data and CWT recovery (since 1970s.) Presently conducting annual sampling in all 11 index systems; between 8,500 and 11,000 chinook spawners are sampled annually. Results show that straying rates from hatcheries are less than 0.5 percent, and are usually highest in Andrew Creek. Straying rates for wild stocks can currently be estimated for Taku and Unuk River stocks, and, if the Stikine, Chilkat and Chickamin River CWT projects continue, these will provide additional data on wild stray rates in the future.

- Sampling coho for CWTs in ADF&G escapement stock assessment programs on the Taku, Unuk, Chilkat, Nakwasina, Ford Arm, Berners, Auke Lake, and Slippery Creek systems. Minimal straying has been documented.
- Sampling sockeye salmon in large numbers in escapements throughout Southeast Alaska (since early 1980s.)

NOAA—Auke Bay Laboratory

- Currently conducting ongoing study to determine the straying rates of natural populations of sockeye, pink and chum salmon.

WHAT NEEDS TO BE DONE

- Develop better definition of straying rates associated with large scale enhanced production of chum salmon.
- Undertake studies that determine the positive and negative benefits of straying.

RECOMMENDATION FOR 2002

Increase the capacity for thermal marking of production releases of hatchery chum salmon.

INFORMATION NEED/ISSUE 3B-4: Ensure enhanced production is adequately marked.

SUMMARY OF CURRENT SITUATION

Marking is performed on most, but not all, release groups of salmon in Southeast Alaska, using several different techniques. Otolith marking results in all members of release groups carrying marks, which improves accuracy and precision of harvest contribution estimates. Coded-wire tagging is commonly used for chinook and coho salmon as part of a coast wide marking program on these species. At least one hatchery facility routinely thermally marks all chinook and coho as well as CWT portions of these releases.

PROJECTS UNDERWAY TO ADDRESS INFORMATION NEED/ISSUE

ADF&G

- Coordinating CWT codes and mass marks for state-managed programs through the ADF&G Tag and Otolith Lab, and for all agencies through the PSMFC.

NOAA—Auke Bay Laboratory

- At Little Port Walter, developing and maintaining chinook brood stocks for use in enhancement operations for mitigation of impacts to Southeast Alaska chinook fisheries. All (100 percent) of each brood stock maintained are marked with unique CWT codes to facilitate this maintenance and other scientific studies.

Hatcheries

- Implementing CWT and otolith mass-marking programs at hatchery or enhancement facilities throughout the region that release salmon.

WHAT NEEDS TO BE DONE

- Improve thermal marking of production releases of hatchery chum salmon.

RECOMMENDATION FOR 2002

Increase the capacity for thermal marking of production releases of hatchery chum salmon.