

Regional Information Report No. 1J08-03

**A Program for Improving Management and Research
of Fisheries in the Southeast Region—Groundfish
Fisheries**

by

Kyle Hebert

February 2008

Alaska Department of Fish and Game

Division of Commercial Fisheries



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Weights and measures (metric)		General		Measures (fisheries)	
centimeter	cm	Alaska Administrative Code	AAC	fork length	FL
deciliter	dL			mid-eye-to-fork	MEF
gram	g	all commonly accepted abbreviations	e.g., Mr., Mrs., AM, PM, etc.	mid-eye-to-tail-fork	METF
hectare	ha			standard length	SL
kilogram	kg			total length	TL
kilometer	km	all commonly accepted professional titles	e.g., Dr., Ph.D., R.N., etc.		
liter	L	at	@	Mathematics, statistics <i>all standard mathematical signs, symbols and abbreviations</i>	
meter	m	compass directions:		alternate hypothesis	H _A
milliliter	mL	east	E	base of natural logarithm	e
millimeter	mm	north	N	catch per unit effort	CPUE
		south	S	coefficient of variation	CV
		west	W	common test statistics	(F, t, χ^2 , etc.)
Weights and measures (English)		copyright	©	confidence interval	CI
cubic feet per second	ft ³ /s	corporate suffixes:		correlation coefficient (multiple)	R
foot	ft	Company	Co.	correlation coefficient (simple)	r
gallon	gal	Corporation	Corp.	covariance	cov
inch	in	Incorporated	Inc.	degree (angular)	°
mile	mi	Limited	Ltd.	degrees of freedom	df
nautical mile	nmi	District of Columbia	D.C.	expected value	E
ounce	oz	et alii (and others)	et al.	greater than	>
pound	lb	et cetera (and so forth)	etc.	greater than or equal to	≥
quart	qt	exempli gratia (for example)	e.g.	harvest per unit effort	HPUE
yard	yd	Federal Information Code	FIC	less than	<
		id est (that is)	i.e.	less than or equal to	≤
Time and temperature		latitude or longitude	lat. or long.	logarithm (natural)	ln
day	d	monetary symbols (U.S.)	\$, ¢	logarithm (base 10)	log
degrees Celsius	°C	months (tables and figures): first three letters	Jan, ..., Dec	logarithm (specify base)	log ₂ , etc.
degrees Fahrenheit	°F	registered trademark	®	minute (angular)	'
degrees kelvin	K	trademark	™	not significant	NS
hour	h	United States (adjective)	U.S.	null hypothesis	H ₀
minute	min	United States of America (noun)	USA	percent	%
second	s	U.S.C.	United States Code	probability	P
		U.S. state	use two-letter abbreviations (e.g., AK, WA)	probability of a type I error (rejection of the null hypothesis when true)	α
Physics and chemistry				probability of a type II error (acceptance of the null hypothesis when false)	β
all atomic symbols				second (angular)	"
alternating current	AC			standard deviation	SD
ampere	A			standard error	SE
calorie	cal			variance	
direct current	DC			population	Var
hertz	Hz			sample	var
horsepower	hp				
hydrogen ion activity (negative log of)	pH				
parts per million	ppm				
parts per thousand	ppt, ‰				
volts	V				
watts	W				

REGIONAL INFORMATION REPORT NO. 1J08-03

**A PROGRAM FOR IMPROVING MANAGEMENT AND RESEARCH OF
FISHERIES IN THE SOUTHEAST REGION—GROUND FISH FISHERIES**

By

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ABSTRACT

This report summarizes research and management information gaps and projects to address those gaps for groundfish fisheries in Southeast Alaska. Projects identified in this document are currently unfunded or under funded. If fully funded these projects would contribute to the knowledge base for the species associated with each project and in many cases facilitate abundance-based management of fisheries that exploit those stocks

Key words: Groundfish, funding, sablefish, rockfish, lingcod, dogfish, Pacific cod, movement, assessment, testfish

INTRODUCTION

OVERVIEW OF SOUTHEAST ALASKA COMMERCIAL FISHERIES

The Eastern Gulf of Alaska regulatory area for groundfish management encompasses all waters surrounding the Alexander Archipelago from Dixon Entrance (54°30' N. latitude) northwestward along the outer coast to 144° W. longitude.

The Alaska Department of Fish and Game has management jurisdiction over all groundfish resources within state waters in the Eastern Gulf of Alaska area. State waters include all internal waters of Southeast Alaska and Yakutat Bay, and waters within three miles of shore along the outer coast. Additionally, a provision in the Gulf of Alaska Groundfish Fisheries Management Plan (FMP) authorizes the state to execute inseason management of DSR in both state and federal waters in the Southeast Outside (SEO) Subdistrict (outer coastal waters east of 140° W. longitude). Lingcod is under state jurisdiction in both state and federal waters east of 147° W. longitude because lingcod is not defined as a groundfish under the FMP. In 1999, the North Pacific Fisheries Management Council (PPFMC) removed black and blue rockfish from the FMP. The State of Alaska now has sole management and assessment responsibilities for these species.

Seven groundfish management areas have been established in Southeast Alaska. Four of the areas, Eastern Yakutat (EYKT) section, Northern Southeast Outside (NSEO) section, Central Southeast Outside (CSEO) section, and Southern Southeast Outside section (SSEO), are along the outer coast and make up the Southeast Outside (SEO) subdistrict. The Icy Bay Subdistrict (IBS) section encompasses Yakutat Bay and waters between 140° and 144° W longitude. The remaining two areas, Northern Southeast Inside (NSEI) subdistrict and Southern Southeast Inside (SSEI) subdistrict, are in internal waters.

The primary state-managed fisheries that have occurred in the region include sablefish, rockfish, lingcod, Pacific cod, and starry flounder. By regulation, sablefish can be fished only with longline and pot gear, and state-managed rockfish and lingcod fisheries are restricted to hook and line gear in the Southeast District. Fisheries targeting on sablefish and demersal shelf rockfish (DSR) almost exclusively use longline gear and directed lingcod fisheries use primarily dinglebar troll gear. Flatfish are harvested with beam-trawl gear. Landed harvest of state-managed groundfish in Southeast totaled over 3.5 million pounds during 2007 with an estimated exvessel value of \$6.9 million. The sablefish fishery is by far the most valuable of groundfish fisheries, with landings totaling nearly 2.2 million pounds with an exvessel value of \$5.8 million.

Sablefish have been harvested in the internal waters of Southeast Alaska since the early 1900s. The fishery is split into two areas: The NSEI area, where fishing occurs mostly in Chatham Strait, and the SSEI area, including Clarence Strait and adjacent waters of Dixon Entrance. Prior to the 1940s, sablefish were primarily landed as incidental catch in the halibut fishery. Halibut

longline gear was modified in the late 1940s to specifically target sablefish. Pot gear was first introduced in 1970 in the SSEI and Dixon Entrance, accounting for 33% of the harvest in the early 1970s. By 1979, pot gear was responsible for less than 5% of the catch. Harvest levels fluctuated widely until the 1970s due to price and more opportunities in other fisheries.

The second most valuable groundfish fishery in Southeast is the Demersal Shelf Rockfish fishery with 2007 landings totaling more than 498,000 pounds worth an exvessel value of about \$488,000. DSR is a management assemblage with six species of rockfishes, with yelloweye rockfish accounting for 96% of the catch. DSR have been the target of a directed shore-based longline fishery in Southeast Alaska since the late 1970s.

Lingcod is another important target fishery, with over 229,000 pounds of fish landed in 2007, with an exvessel value of \$305,000. Lingcod have traditionally been an important bycatch species in the rockfish longline fishery and in the salmon troll fishery, as well as bycatch in the halibut fishery and taken in subsistence and recreational fisheries. The directed commercial fishery for lingcod developed in 1987 off the outer coast of Kruzof Island in CSEO and has increased in importance and presence since that time. The peak directed fishery harvest occurred in 1995, with 653,228 pounds taken. The total harvest of lingcod was highest in 1991, with 960,378 pounds landed by all gears.

With the exception of test-fish receipts there is no state funding allocated for groundfish management or research in the Southeast region.

MANAGEMENT AND ASSESSMENT OF SOUTHEAST ALASKA GROUND FISH FISHERIES

Management of the region's commercial groundfish fisheries is highly complicated because of the large number of species involved, area-specific directed fishery quotas, allocations between gear groups, and bycatch of species in fisheries targeting other species. Regulations approved by the Alaska Board of Fisheries provide specific guidance on fishing areas, seasons, gear, and allocative issues.

The department's goal for management of groundfish is to estimate biomass for each species harvested commercially and apply an appropriate harvest rate to this biomass to set catch levels. Although we have had assessment surveys for sablefish, lingcod, black rockfish, and DSR, the only populations for which we have biomass estimates of the stock are DSR and NSEI sablefish. Significant quota reductions have occurred in the NSEI sablefish fishery and the lingcod fishery, the latter based largely on declining catch per unit effort in the commercial fishery.

Many groundfish species exhibit life history characteristics such as longevity, slow growth, and low natural mortality that make them susceptible to over-harvest. Stock assessment is difficult given that many of these species (i.e. sablefish, lingcod, and pacific cod) move between management areas or live in habitats difficult to assess using traditional techniques (i.e. rockfishes). Much of our research effort for sablefish, lingcod, and black rockfish has been focused on mark-recapture studies to determine exploitation rates and abundance.

PROPOSED PROJECTS

This document contains a list of projects proposed for increased funding. The projects described are either not conducted due to a lack of funding or are currently operated at levels insufficient to meet management objectives. All ongoing research and management of groundfish are funded through federal grants or revenue generated through test fisheries. It is difficult to accomplish many project research goals under the short time period (1–3 years) associated with most grants. Currently most of the groundfish staff is funded either under the federal AKFIN, Interjurisdictional (IJ) or Demersal Shelf Rockfish (DSR) Stock Assessment grants. The DSR and IJ grants have been reduced in recent years. The AKFIN grant is assumed to be a stable, long-term funding source. However if either the AKFIN or DSR budgets were not funded the department would require about \$340.0 in addition to what is requested here.

Projects are grouped into three categories (A–C) and are listed in Table 1. With the exception of A.1 and A.2, which are the top priorities, the categories are not prioritized, but the projects within each category are listed in order of priority. Category A outlines our needs for increased line 100 funding, category B outlines our funding needs for sablefish assessment, and category C outlines our funding needs for other groundfish resources.

In general, the addition of moderate to large scale stock assessment projects requires additional groundfish staff, as current staff is completely committed to existing projects. Staffing needs are explicitly stated below only for project C1 (lingcod stock assessment), due to the large scale and high priority of that proposed project. However, the addition of other long-term projects should only be considered if funding for additional staff is provided. The number and level of staff should be determined on a case-by-case basis, but generally, a Fishery Biologist II can handle no more than two projects and biometric assistance is required for new projects.

Table 1.—Summary of proposed projects and estimated costs (thousands of dollars).

Project	Estimated First-Year Cost	Estimated Annual Continuing Cost	Duration
A. Personnel Needs			
A.1. Biometrics Support	\$80.0	\$80.0	Long Term
A.2. Groundfish Project Management	\$173.0	\$173.0	Long Term
A.3. Age Laboratory Support	\$48.0	\$48.0	Long Term
A.4. Fishery Technician Support	\$56.0	\$56.0	Long Term

-Continued-

Table 1.–continued (page 2 of 2)

B. Sablefish Research			
B.1. Intra-annual Movements of Sablefish in the vicinity of Chatham St.	\$151.0	\$151.0	3 Years
B.2. Capture and Tagging of Juvenile Sablefish in Internal Waters.	\$35.0	\$35.0	4 Years
B.3. Inter and Intra-annual Movements of Sablefish in the Vicinity of Clarence St.	\$60.0	\$60.0	3 Years
B.4. Sablefish Test Fishery Funded Stock Assessment	\$260.0	\$260.0	Long Term
C. Other Groundfish			
C.1. Lingcod Stock Assessment	\$250.0	\$250.0	Long Term
C.2. Black Rockfish Stock Assessment	\$33.7	\$33.7	3 Years
C.3. Assessment of Pacific Cod, Dogfish, and Other Groundfish Species in the Internal Waters of Southeast	\$143.8	\$113.8	Biennial, Long Term
C.4. Assessment of Pacific Cod, Dogfish, and Other Groundfish Species in the Waters of Yakutat Bay	\$68.5	\$68.5	4 Years
C.5. Fecundity Study (GSI) of Key Groundfish Species	\$42.5	\$32.0	3 Years
C.6. Juvenile Lingcod Recruitment and Movement Study	\$10.0	\$10.0	Long Term
Total	\$1,411.5	\$1,371.0	

A. PERSONNEL NEEDS

Project A.1. Biometrics Support

Location: Southeast Alaska.

Primary Objective: To improve stock assessment for groundfish fisheries.

Description: Region I Commercial Fisheries Division is responsible for research and management of groundfish in state waters, and in some cases federal waters (i.e. lingcod and black rockfish). Actively managed fisheries include sablefish in NSEI, sablefish in SSEI, Demersal Shelf Rockfish, lingcod, black rockfish, flatfish trawl fishery, Pacific cod longline fishery, and miscellaneous rockfish fisheries. Port sampling data is collected for all of these fisheries and research and stock assessment is on going for only sablefish and DSR fisheries. Currently there is inadequate biometric support for these projects and there is not time for both conducting stock assessments and other critical functions, such as writing reports. The

groundfish project shares a biometrician with the herring project. The herring assessment and the sablefish assessment take up the majority of this position's time. In order to improve management of groundfish fisheries where biometric analysis is conducted, it is necessary to increase the biometric support for these fisheries. We are requesting funds to hire a Biometrician I (12 mm) to aid in our long-term research and management programs.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: \$80.0.

Project A.2. Groundfish Project Management

Location: Sitka.

Primary Objective: To provide funding for the Groundfish Project Leader (FBIII) and the project assistant (FBII).

Description: Currently the FBIII and FBII positions responsible for research and management of the Southeast groundfish fisheries are funded through an annual federal grant (Interjurisdictional Fisheries Fund). In the past, this grant has covered the salaries, office support, travel, and supplies necessary to oversee this project. This funding has been significantly reduced over time and since FY02 has not fully covered the FBIII position or office expenses. As these dollars erode other grant money must be used for operating expenses and salary. Stable funding is critical if groundfish fisheries are to be managed successfully in Southeast.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: 173.0.

Project A.3. Age Laboratory Support

Location: Southeast Alaska.

Primary Objective: To improve stock assessment for groundfish fisheries.

Description: Region I Commercial Fisheries Division is responsible for research and management of groundfish in state waters, and in some cases federal waters (i.e. lingcod and black rockfish). Actively managed fisheries include sablefish in NSEI, sablefish in SSEI, Demersal Shelf Rockfish, lingcod, black rockfish, flatfish trawl fishery, Pacific cod longline fishery, and miscellaneous rockfish fisheries. All of these fisheries require information on the biological makeup of the stocks, in particular the age distribution of the stock and catch. Aging of groundfish otoliths is a skill that takes significant training and an aptitude for detailed microscope work. Our needs for production aging have increased as fisheries have developed and expanded. Currently there is inadequate technical support for these projects at the age lab, in some cases there are two year delays in getting the otoliths processed. In addition to production age reading the lead biologists at this lab are responsible for research into age validation and developing error matrices in order for age data to be useful. In order to improve management of groundfish fisheries it is necessary to increase the productivity of the age lab without compromising quality of data. We are requesting funds to hire a Fishery Biologist I (8 mm) to work within the ADF&G Age Determination Unit (aging laboratory) and aid in our research and management programs. There would be start-up costs associated with training and equipment purchases.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: \$48.0.

Project A.4. Fishery Technician Support

Location: Sitka, Petersburg, and Ketchikan.

Primary Objective: Provide port samplers and data editors for monitoring of the sablefish fisheries.

Description: The sablefish fisheries are the most economically important groundfish fisheries in the Southeast region. Biological samples from commercial landings are needed to assess any differences between the fishery and the survey populations. Also, collection of sablefish tags with valid landing data is critical to the success of our assessment project. Funding these positions would create a more efficient port sampling program, ultimately help facilitate a cleaner data analysis, and produce results that are easier to interpret. The expected outcome is that management decisions will have more defensible data and analyses behind them. Seasonal samplers are needed to facilitate these projects. Seasonal samplers are currently funded ad-hoc through AKFIN federal funds, through groundfish test fishery revenues, and when “extra” money is available. Consequently a good portion of time and money is spent training new temporary technicians every year. Stable funding would help to alleviate turnover and improve data quality.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: \$56.0.

B. SABLEFISH RESEARCH

At the 2000 Western Groundfish Conference held in Sitka, there was a special session on sablefish management and assessment. A panel of experts (scientists, fishermen, and managers) was convened to identify areas needing further research. Their recommendations were to look at three areas:

- 1) What is sablefish abundance by region?
- 2) What data is needed to estimate abundance?
- 3) How does movement between regions affect abundance estimates?
- 4) What is a sustainable harvest rate?

The following projects address those questions.

Project B.1. Intra-annual Movements of Sablefish in the Vicinity of Chatham Strait

Location: Chatham Strait.

Primary Objective: To improve stock assessment for sablefish by investigating short-term movements of sablefish within Chatham and between Chatham and the Gulf of Alaska.

Description: Use sonic tagging and PIT tagging to identify if there are significant, short term (1 week to 2 months) movements of sablefish within Chatham and between Chatham and the Gulf of Alaska. Determine if movements are seasonal or dependent on tides. Results may influence when and how stock assessment surveys and fisheries are conducted.

Duration: Three years.

Estimated Annual Cost: \$151.0.

Project B.2. Capture and Tagging of Juvenile Sablefish in Internal Waters

Location: Southeast Alaska.

Primary Objective: To determine if sablefish that reside as juveniles in Chatham Strait return to Chatham as adults.

Description: Sablefish are considered to be two stocks coastwide—a northern stock occurring from British Columbia to the Bering Sea, and a southern stock, occurring from southern British Columbia to California. There is evidence of ontogenic movement in the northern stock of sablefish with young fish moving west and older fish moving east. It is not known however if sablefish generally return to their nursery area as adults. We plan to locate, capture, tag, and release juvenile sablefish in Chatham Strait during early summer. If this project is successful we may modify it to allow indexing of year-class strength to aid in assessment of the fishery.

Duration: Four years.

Estimated Annual Cost: \$35.0.

Project B.3. Inter and Intra-annual Movements of Sablefish in the Vicinity of Clarence Strait

Location: Clarence Strait and Dixon Entrance.

Primary Objective: To investigate the movements of sablefish tagged in Clarence Strait and Dixon Entrance.

Description: There is an important limited entry fishery for sablefish in Clarence Strait and Dixon Entrance. Recently there has been more effort in the Northern British Columbia (BC) sablefish fishery adjacent to the Clarence Strait fishery. BC data indicates there is considerable movement of BC sablefish north into Clarence and the Gulf of Alaska. Sablefish in the Clarence Strait fishery are generally younger than those in the Chatham Strait fishery and it is assumed they are transient, as young fish tend to move westward. However there has not been a tagging project in Clarence Strait or Dixon Entrance, so movement and migration patterns of these fish are unknown. Sablefish will be captured prior to the start of the commercial fishery in Clarence using pot gear and tagged using an external tag. Fish will be released where caught. Tag recoveries will be primarily through the commercial fisheries in Alaska and Canada.

Duration: Three years.

Estimated Annual Cost: \$60.0.

Project B.4. Sablefish Test Fishery Funded Stock Assessment

Location: NSEI and SSEI.

Primary Objective: To conduct annual surveys for stock assessment of the Chatham and Clarence sablefish fisheries and to support research and management of these fisheries.

Description: Annual stock assessment surveys have been conducted since 1988 in southern (Clarence Strait) and northern Southeast (Chatham Strait) to collect abundance and biological information on stock structure and condition. Annual trends in catch per unit effort, size, and age structure of these sablefish populations are used to set the sablefish quota for the following year. The department contracts five commercial fishing vessels to conduct the survey each year. In addition to the longline surveys we implemented a pot-vessel survey in FY01 to mark and release sablefish for recapture in the longline fishery. This project was partially funded under Nearshore III federal monies—with some of the charter cost and equipment costs were covered under test fish funds.

The sablefish fisheries are the most valuable state-managed groundfish fisheries in Southeast, with an estimated exvessel value of \$5.8 million in 2007. The fisheries are limited entry: current participation is approximately 110 permit holders in NSEI and 28 permit holders in SSEI. At present there is no state general fund support for this very valuable fishery.

The Southeast groundfish project relies on the revenues generated by the test fish project to fund the annual stock assessment surveys. The majority of the revenue is used to pay for charter vessels: the cost of chartering five vessels for the two area surveys is approximately \$125,000, and \$31,000 was needed to partially pay the costs of the pot survey. Other major expenses include sampling supplies, travel and personnel costs for the surveys, purchasing and building longline gear to standardize gear between vessels and with NMFS, and expanding the port sampling program. Additional expenses included equipment, supplies, and incidental office expenses necessary to prepare for the surveys and fisheries. This stock assessment program is very vulnerable under test-fish receipts. Price of fish varies drastically with the Japanese yen and the department would prefer not to kill fish, particularly as the quota in the NSEI area has been reduced significantly in recent years.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: \$260.0.

C. OTHER GROUND FISH

Project C.1. Lingcod Stock Assessment

Location: Southeast Alaska.

Primary Objective: Development of production abundance estimation method for lingcod.

Description: There is no biomass estimate for lingcod in Southeast Alaska and seasonal movements of fish are poorly understood. There are guideline harvest limits for lingcod but these were based on a review of the British Columbia fishery (Richards and Yamanaka 1992, PSARC 1992). Limits were set at a level conservative in comparison but we do not know if the levels are appropriate. Information is urgently needed to help develop a sound management plan for this species. Interest in this resource is likely to expand because lingcod is one of the very few

commercially important species that are not restricted under the federal Groundfish License Limitation plan implemented in 2001.

We propose to continue a multi-area tagging program to estimate movement and exploitation rate of lingcod in portions of the eastern Gulf of Alaska. As part of the tagging program we will conduct multiple small-area removal surveys to further evaluate the utility of the removal method for estimating local abundance of lingcod over time. Removal efforts will complement the tagging operation, since tagging and release of lingcod will constitute “removal” of lingcod from the untagged population. In addition to the removal surveys, several charters will be conducted each year in each area for the primary purpose of tagging lingcod. Tagging-specific charters, in addition to the removal surveys, will be necessary to attain the target levels of tagging in each area. Ten percent of the lingcod will be double-tagged to estimate tag loss rate. Tag recovery will be primarily from the commercial and sport fisheries targeting lingcod or taking lingcod as bycatch.

Addition of such a substantial project requires that additional staff be funded since existing projects require all existing staff time. The addition of a full-scale stock assessment project requires study design, regular survey implementation, data analysis and reporting. Successful implementation of this project require the addition of a Biometrician I and a Fishery Biologist II, which comprises about \$160.0k of the total estimated annual costs below.

Duration: Three years.

Estimated Annual Cost: \$250.0.

Project C.2. Black Rockfish Stock Assessment

Location: Southeast Alaska.

Primary Objective: Development of production abundance estimation method for black rockfish.

Description: The department currently manages black rockfish in both state and federal waters however there is not a biomass estimate for this species. Black rockfish have limited movement (mostly localized) and assessment should be conducted on a management area basis. In order to appropriately manage these fisheries, better information on stock condition and density is needed. The department proposes conducting annual surveys to collect CPUE information, biological samples, and to tag and release black rockfish in order to obtain exploitation rates. Methods used will be similar to those detailed in the lingcod stock assessment description. In addition, aerial surveys will be conducted during the summer to identify areas of high abundance of black rockfish. Black rockfish schools can be seen at the surface feeding on sandlance and herring.

Duration: Three years.

Estimated Annual Cost: \$33.7.

Project C.3. Assessment of Pacific Cod, Dogfish, and Other Groundfish Species in the Internal Waters of Southeast

Location: Southeast Alaska.

Primary Objective: To conduct a tri-annual longline survey for indexing abundance of groundfish species in NSEI and SSEI.

Description: There are commercial fisheries for pacific cod, rockfish, and flatfish in internal waters of Southeast Alaska and there is significant bycatch of other groundfish species such as skates, sharks, and dogfish. There is no information available on stock status, abundance, or biological data for these species. This project would involve a tri-annual survey for groundfish from Icy Strait to Dixon Entrance. The area will be subdivided into three sections with one section being surveyed per year (each area surveyed every four years). The survey stations will be based on a stratified random sample to ensure stations are distributed over all depths. A commercial longline vessel will be contracted to conduct the survey using standardized longline gear provided by the department. When possible, fish will be tagged and released, although a sub-sample will be taken for collecting biological data. A full time biologist is needed to oversee this project and will be responsible for survey planning, fieldwork, data analysis, and authoring an annual written report explaining survey results. Recommendations for changes in management will be made when appropriate.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: \$113.8 (estimated first year cost: \$143.8).

Project C.4. Assessment of Pacific Cod, Dogfish, and Other Groundfish Species in the Waters of Yakutat Bay

Location: Yakutat Bay.

Primary Objective: To conduct a longline and jig survey for indexing abundance of groundfish species in Yakutat Bay.

Description: There are commercial fisheries for pacific cod and rockfish in Yakutat Bay and there is significant bycatch of other groundfish species such as skates, sharks, and dogfish. There is no information available on stock status, abundance, or biological data for these species in this area. This project would charter local fishermen to survey the Yakutat Bay area. The survey stations will be based on a stratified random sample to ensure stations are distributed over all depths. A commercial longline vessel will be contracted to conduct the survey using standardized longline gear provided by the department and a commercial jig vessel will be contracted to sample pelagic species. When possible, fish will be tagged and released, although a sub-sample will be taken for collecting biological data. A seasonal biologist is needed to oversee this project and will be responsible for survey planning, fieldwork, data analysis, and authoring an annual written report explaining survey results.

Duration: Four years.

Estimated Annual Cost: \$68.5.

Project C.5. Fecundity Study (GSI) of Key Groundfish

Location: Southeast Alaska.

Primary Objective: To construct Gonadal-Somatic Indexes (GSI) for key species of groundfish in Southeast Alaska for use in yield per recruit models.

Description: Key biological parameters such as growth, mortality, and fecundity can vary considerably geographically. Growth and mortality rates may be estimated from our current data using port samples and mark-recapture information. However, there is very little information available on the fecundity of groundfish residing in Southeast Alaska. This project would employ a graduate student(s) to determine the GSI for sablefish, pacific cod, lingcod, and yelloweye rockfish from Southeast Alaska. Samples will be taken from commercial fishery landings.

Duration: Three years.

Estimated Annual Cost: \$32.0 (estimated first year cost: \$42.5).

Project C.6. Juvenile Lingcod Recruitment and Movement Study.

Location: Southeast Alaska.

Primary Objective: To develop a method for locating, capturing, and marking juvenile lingcod for an indexing and movement study.

Description: Knowledge of incoming year-class strength is an important factor in commercial fishery management. We do not have a biomass estimate for lingcod but have a fairly complicated management plan that allocates small quotas between user groups and between areas. Lingcod are faster growing and shorter lived than many groundfish species and it would be useful to have an index of recruitment strength in order to make adjustments in management. We will use scuba and snorkeling surveys in shallow water areas in late spring to locate areas with concentrations of young lingcod. We will use beach seines and other sampling devices to collect these juveniles and the fish will be tagged and released. We will rely on the commercial and sport fishery to recapture tagged fish. If we are successful in locating “nursery grounds” and in capture and tag release we will set up survey sites for annual indexing surveys.

Duration: A long-term stable funding source is desired.

Estimated Annual Cost: \$10.0.