Regional Operational Plan No. ROP.SF.1J.2025.08

Operational Plan: Developing a Species Distribution Model for Yelloweye Rockfish in Southeast Alaska

by

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September 2025

Alaska Department of Fish and Game **Divisions of Sport Fish and Commercial Fisheries**

Symbols and Abbreviations

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

Weights and measures (metric)

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

Weights and measures (English)

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

Time and temperature

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

Physics and chemistry

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

General

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

Mathematics, statistics

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

REGIONAL OPERATIONAL PLAN NO. ROP.SF.1J.2025.08

DEVELOPING A SPECIES DISTRIBUTION MODEL FOR YELLOWEYE ROCKFISH IN SOUTHEAST ALASKA

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TABLE OF CONTENTS

LIST OF TABLES

Table **Page**

LIST OF FIGURES

Figure **Page**

LIST OF APPENDICES

Appendix **Page**

ABSTRACT

The Alaska Department of Fish and Game manages the demersal shelf rockfish (DSR) complex in both state and federal waters of Southeast Alaska, including the Southeast Outside Subdistrict (outer coastal waters east of 140° W longitude), the Northern Southeast Inside Subdistrict and the Southern Southeast Inside Subdistrict. Yelloweye rockfish are the dominant species in the DSR complex in terms of numbers and biomass of catch. Although no current stock assessments are available for Northern Southeast Inside and Southern Southeast Inside, yelloweye rockfish density in Southeast Outside have been estimated using visual survey data collected from 1994 to 2009 with a manned submersible and from 2012 to 2023 with a remotely operated vehicle. Biomass of yelloweye rockfish in Southeast Outside is derived as the product of estimated density, the estimate of delineated yelloweye rockfish habitat, and the average weight of fish.

The delineated yelloweye rockfish habitat is central to both survey design and biomass estimation; it was developed using characteristics of known yelloweye rockfish habitat, sonar data, logbook data from the directed DSR commercial fishery, and habitat data from National Oceanic and Atmospheric Administration charts. The species distribution model integrates species observation data and environmental variables to generate spatially explicit predictions of yelloweye rockfish distribution and these predictions will be used to revise and update the delineated yelloweye rockfish habitat.

Keywords: yelloweye rockfish, *Sebastes ruberriumus*, demersal shelf rockfish, DSR, Southeast Alaska, distribution, habitat, species distribution model, remotely operated vehicle, ROV

PURPOSE

The purpose of this project is to develop a species distribution model (SDM) for yelloweye rockfish (*Sebastes ruberrimus*) in Southeast Alaska, covering the Southeast Outside (SEO), Northern Southeast Inside (NSEI), and Southern Southeast Inside (SSEI) Subdistricts (Figure 1). The SDM will generate spatial predictions of yelloweye rockfish distribution based on species observations, environmental covariates, and benthic terrain variables. Results will be used to re-evaluate the delineated yelloweye rockfish habitat (DYRH) currently used to guide stock assessment survey design and biomass estimation in SEO, and to extend habitat delineations to the NSEI and SSEI, where no stock assessment surveys currently exist.

This project advances the Statewide Rockfish Initiative strategic plan by addressing the research and assessment goal to improve understanding of rockfish habitat, specifically for yelloweye (Howard et al. 2019). The methods follow a standardized, documented workflow and are designed to be transferable across regions and to other species (e.g., black rockfish) or assemblages (e.g., pelagic).

BACKGROUND

The demersal shelf rockfish (DSR) complex in Southeast Alaska includes canary, China, copper, quillback, rosethorn, tiger, and yelloweye rockfish, as defined in 5 AAC 39.975 (34). These species support commercial, sport, and subsistence fisheries across the region. All members of the complex exhibit life history traits typical of K-selected species: slow growth, late maturity, long lifespan, and low reproductive rate (Archibald et al. 1981). These biological characteristics make DSR particularly vulnerable to overexploitation and slow to recover once depleted (Leaman and Beamish 1984).

In Southeast Alaska, yelloweye rockfish are the most abundant and ecologically significant species of the DSR complex in terms of biomass and catch. They range from northern Baja California to the Aleutian Islands and occur in nearshore waters to depths of 300 fathoms (Mecklenburg et al. 2002). Individuals have been recorded up to 96 cm in length (Kellii Wood, former ADF&G

Division of Commercial Fisheries Biologist, Southeast Alaska Groundfish Project, unpublished data, 2020) and can live to at least 122 years of age (Sullivan et al. 2022). Yelloweye rockfish are generally associated with rocky habitat, including rocky reefs, ridges, and pinnacles, and have historically been considered a species with high site fidelity (O'Connell 1991; O'Connell and Carlile 1993; Hannah and Rankin 2011). However, a recent study revealed greater mobility than previously assumed (Rasmuson et al. 2025).

The Alaska Department of Fish and Game (ADF&G) has management authority over DSR fisheries in inside state waters, including the Northern Southeast Inside (NSEI) and Southern Southeast Inside (SSEI) Subdistricts, and jointly manages DSR with the National Marine Fisheries Service (NMFS) in both state and federal waters of the Southeast Outside (SEO) Subdistrict. The SEO is comprised of four management areas: East Yakutat (EYKT), Northern Southeast Outside (NSEO), Central Southeast Outside (CSEO), and Southern Southeast Outside (SSEO) Sections. Since 1997, the directed commercial DSR fishery in inside waters has been managed using an annual Guideline Harvest Level (GHL) of 110,000 round lb in each Subdistrict (NSEI and SSEI). In contrast, DSR fisheries, including directed and incidental across commercial, sport and subsistence, in SEO have been managed using a total allowable catch (TAC) derived by applying an exploitation rate equal to natural mortality (2%) to a biomass estimate (Joy et al. 2022).

For each management area in SEO, yelloweye rockfish biomass is estimated as the product of yelloweye rockfish density, mean fish weight, and the area of rocky habitat (Green and Stahl 2017). ADF&G conducts a multi-year stock assessment survey to estimate yelloweye rockfish density using distance sampling methodology, which estimates fish density based on the number of fish observed and their distance from the transect line (Green and Stahl 2017; Buckland et al. 1993, 2015; Thomas et al. 2010). Mean fish weight is estimated annually using fishery-dependent biological data from the directed commercial DSR fishery and yelloweye rockfish bycatch from the federal halibut longline fishery for each management area. The area of yelloweye rockfish habitat within each management area, termed the delineated yelloweye rockfish habitat (DYRH), is defined as rocky habitat inshore of the 100-fathom depth contour.

Seafloor is designated as "rocky" based on three data sources: (1) ADF&G sonar data (McRea et al. 1999; O'Connell et al. 2007), (2) directed commercial fishery logbook data identifying areas of consistent catch (O'Connell et al. 2007), and (3) substrate information from National Oceanic and Atmospheric Administration (NOAA) nautical charts (O'Connell et al. 2007). Substrate information obtained from sonar surveys is considered the best information available on rocky habitat, thus, the extent of the DYRH has evolved over time as new sonar surveys have been conducted. Substrate information from NOAA charts is only used in the NSEO management area where logbook data is limited because the directed fishery has not been prosecuted since 1994 (Ehresmann et al. 2024).

Observations by ADF&G staff and commercial fishery participants indicate that both current and historical DYRH boundaries may not fully represent the spatial distribution of yelloweye rockfish. Logbook data from the directed commercial fishery have documented catches in areas outside the designated DYRH (O'Connell et al. 2007), and ROV surveys have identified locations within the DYRH that lack rocky habitat or yelloweye rockfish (Mike Byerly, retired Fishery Biologist 2, ADF&G, Division of Commercial Fisheries, personal communication). These discrepancies likely reflect limitations in the original data sources and methodologies used to construct the DYRH.

To address these issues, ADF&G is developing an SDM for yelloweye rockfish to update the DYRH. SDMs use species occurrence data to predict the spatial distribution of the same species. ADF&G has collected species observation data from commercial DSR logbooks, manned submersible dives, and ROV surveys since the 1980s; however, these data are not currently formatted for spatial modeling and require review, standardization, and archiving. This process not only supports SDM development but also facilitates future data sharing and inter-agency use. Our approach will integrate yelloweye rockfish observation data with a suite of physical habitat and environmental variables (collectively 'environmental' variables/predictors hereafter) to generate spatially explicit predictions of yelloweye rockfish distribution.

OBJECTIVES

1. Develop a SDM for yelloweye rockfish in Southeast Alaska and update the DYRH for each management area.
2. Re-enter directed commercial DSR logbooks into the Groundfish Logbooks – Pot & Longline Zander application to include dual target trips (e.g, halibut and DSR), species disposition, depredation, and mixed gear.
3. Standardize and archive historic manned submersible and ROV survey data in OceanAK.

Primary data collection is described in project-specific reports or Regional Operational Plans. Data includes:

- information gathered by the manned submersible occurred between 1994 and 2009 (i.e., O'Connell and Carlile 1993; O'Connell et al. 2000, 2001, 2002, 2003),
- data gathered by the ROV occurred between 2012 and 2023 (Green and Stahl 2017; Coleman et al. *in prep*), and
- logbook data from the directed commercial fishery gathered by commercial anglers occurred between 1986 and 2025 (Appendix A1).

METHODS

SPECIES DISTRIBUTION MODEL OVERVIEW AND THEORICAL FRAMEWORK

An SDM (Objective 1) will be developed following the conceptual framework described by Guisan et al. (2017), with the goal of predicting yelloweye rockfish distribution in Southeast Alaska. Yelloweye rockfish are well-suited for SDM development due to their strong association with rocky, high-relief habitat (O'Connell and Carlile 1993). However, several theoretical and methodological assumptions outlined by Guisan et al. (2017) must be considered. These include the following three theoretical assumptions:

1. the species-environment relation needs to be at equilibrium or pseudo-equilibrium,
2. all important environmental predictors required to capture the desired niche of the modeled species are assumed to be available at the appropriate spatial resolution,
3. species observations (relative abundance/density, presence-absence, presence-only) need to be appropriate to the aim of the study,

and four methodological assumptions:

4. the model needs to be appropriate for the data,

5. predictors need to be measured without error,
6. species data are unbiased, and
7. species observations used to fit the model need to be independent.

Initial evaluation of our study area suggests some theoretical assumptions may be violated. For example, yelloweye rockfish in Southeast Alaska are unlikely to be at equilibrium with their environment (assumption 1). While violating this assumption does not preclude the use of SDMs, it may lead to an underestimation of the species' potential range size.

Species observation data may include both source and sink populations (assumption 3). Source populations occur in areas where local reproduction exceeds mortality and can support dispersal to other locations, whereas sink populations persist in lower-quality habitat only through continued immigration. For yelloweye rockfish, traits such as pelagic larval dispersal, long life spans, and either high site fidelity or potential mobility may result in occurrences in marginal habitats, making it difficult to distinguish suitable from unsuitable areas based on presence data alone. While this violation does not invalidate the SDM approach, it limits the interpretability and generalizability of model predictions (Guisan et al. 2017).

Spatial predictors are almost certainly measured with error (assumption 5), due to limitations in the spatial resolution of both the species occurrence and environmental datasets. For fishery-dependent data, there is often uncertainty about the precise location where a fish was encountered. Similarly, environmental variables derived from ArcGIS raster layers represent averaged values within each cell, potentially masking fine-scale heterogeneity. As with previous cases, this violation does not preclude SDM application, but it does necessitate caution in both model development and interpretation.

A complete assessment of each assumption and the implications of any violations will be conducted after data compilation and during model development.

DATA

Species Occurrence Data

The SDM will leverage a combination of fishery-dependent and fishery-independent data sources to train, validate, and test model performance. Presence-only data from commercial logbook records, collected since 1986 (Appendix A1), will be used to train and validate the model. These data provide spatially explicit records of yelloweye rockfish in areas fished and reported by the ADF&G managed directed commercial fleet. While logbook data have known limitations, including spatial and reporting biases (O'Connell et al. 2007), they represent the most comprehensive dataset available. Additional presence-only and potentially presence-absence data may also be available from yelloweye bycatch recorded by observers in the halibut-directed commercial fleet, which is managed by NMFS.

Fishery independent data sources include historical observations from manned submersible and ROV surveys conducted by ADF&G since the early 1990s, as well as data from the International Pacific Halibut Commission's (IPHC) fishery-independent setline survey, available since 1999. These datasets provide a complementary mix of presence-absence and relative abundance information that will be used in model testing. Although these ADF&G and IPHC survey data are among the most methodologically robust, their limited spatial and temporal coverage prevents their use in model training and validation. Thus, the primary role of these data will be in model testing.

ADF&G Logbook Review and Survey Data Archival

Yelloweye rockfish data collected by ADF&G will be reviewed during SDM development to ensure data quality and support long-term archival for future research. These activities address Objective 2 (review commercial logbook yelloweye rockfish records for inaccuracies) and Objective 3 (standardize and archive historic manned submersible and ROV survey data in OceanAK).

As part of Objective 2, all DSR logbook records submitted to ADF&G (Appendix A1) will be re-entered into the Groundfish Logbooks – Pot & Longline Zander application. In 2020 and 2023, this application was revised which allowed staff to enter the following attributes: disposition (e.g. retained or released) of catch; dual target trips; mixed gear logbooks with specific gear data by set and by species; and whether depredation occurred. Logbook data will also be reviewed for geolocation errors and other reporting inconsistencies. This includes checking reported coordinates, gear types, and fishing effort to improve the spatial accuracy and consistency of records used in model calibration.

Objective 3 will standardize and archive historical data collected from ADF&G manned submersible and ROV surveys in OceanAK. In some cases, this may require reviewing original video footage using EventMeasure software to confirm or extract yelloweye rockfish observations and associated information. Data to be recorded include species counts, maturity condition, and morphological descriptors based on established visual criteria (Appendix A2). All standardized data will be archived in a georeferenced format suitable for incorporation into ArcGIS and SDM development.

Environmental Covariates

Numerous environmental variables are known or hypothesized to influence yelloweye rockfish distribution. Depth and substrate type are well-known drivers of habitat preference, with yelloweye rockfish typically associated with rocky, high-relief seafloor features at mid-shelf depths (O'Connell and Carlile 1993; Hannah and Rankin 2011; Mumm 2015). In addition, temperature, currents, and salinity may influence or be associated with distribution (Love et al. 1991; Johnson et al. 2003).

Data will be compiled from publicly available sources (Table 1). These include static seafloor structure variables such as depth, slope, aspect, rugosity, and bathymetric position index, derived from NOAA's ETOPO1 bathymetric dataset and processed using the Benthic Terrain Modeler and Google Earth Engine terrain functions. Dynamic oceanographic variables include chlorophyll-a concentration, salinity, and eastward/northward current velocities at 50- and 100-meters depth, obtained from the National Aeronautics and Space Administration (NASA) Ocean Biology Distributed Active Archive Center and the Hybrid Coordinate Ocean Model (HYCOM). If dynamic oceanographic variables are not available at the same resolution as the species occurrence data, both datasets will be subset to a common spatio-temporal scale.

MODEL CALIBRATION AND EVALUATION

A range of statistical and machine learning models will be explored, including generalized linear models (GLM), generalized additive models (GAM), Random Forests, and Maximum Entropy

(MaxEnt). Each candidate model will be assessed based on data structure, predictive performance, and assumption validity. If multiple techniques are found to be suitable, ensemble modeling may be considered. Following model training and validation, the resulting SDM will be tested on unseen data from fishery-independent surveys to assess predictive accuracy; this ground-truthing will involve quantifying the agreement between predicted yelloweye rockfish presence and observed occurrence across a representative range of environmental variables.

MODEL OUTPUT

The primary output generated by the SDM will be a spatially explicit map of the predicted probability of yelloweye rockfish occurrence (scaled 0–100%) for each management area within Southeast Alaska. In conjunction with model validation and testing results, this map can inform future study designs aimed at estimating rockfish abundance using distance sampling methods. Specifically, the SDM output can be used to stratify the broader study area into zones of varying predicted occurrence, within which random sampling could be implemented.

Another output from the SDM is an updated DYRH by management area, but producing this from SDM output requires a non-trivial transformation. The DYRH is one of the three components used to estimate biomass under current estimation methods: density, DYRH area, and average round weight. In this formulation, the DYRH serves as a proxy for areas of consistently high yelloweye rockfish occurrence. To create an updated DYRH that remains consistent within this formulation, the following procedure is proposed, applied separately to each management area:

1. generate predicted probability of yelloweye rockfish occurrence from the SDM,
2. calculate the mean predicted probability within the existing DYRH, or
3. calculate the mean predicted probability for areas identified as having high yelloweye rockfish occurrence, and
4. define a new DYRH by clipping the SDM prediction surface to areas with predicted probabilities equal to or exceeding this threshold.

This procedure is applied at the management area level because not all areas have an existing DYRH. Specifically, the NSEI and SSEI areas lack historical DYRH definitions. In these cases, areas of high yelloweye rockfish occurrence will likely be identified using a combination of expert judgment and available data.

These updated DYRH should be considered an interim tool that facilitates continuity with current estimation methods. Its reliance on the existing DYRH to define a probability threshold assumes all areas within the existing DYRH represent high-probability habitat, which may or may not be true. Future surveys designed using the full SDM output, rather than constrained to a DYRH, may include rare but valid habitat types that are currently underrepresented or excluded from the current DYRH (i.e., the survey frame).

Depending on data availability and future objectives, a model-based estimation approach (e.g., see Thompson 2002) could also be used to derive biomass estimates directly from SDM predictions, bypassing the need for discrete habitat delineation altogether.

SCHEDULE AND DELIVERABLES

Dates	Activity
August – September 2025	QAQC ADF&G directed commercial logbook data for obvious depth and location errors
August 2025	Compile federal observer data
September 2025 – December 2025	Compile, organize, and clean ADF&G ROV transect data for OceanAK archival
September 2025	Complete preliminary species distribution model to present at fall SRI meeting
July 2026	Complete DSR logbook re-entry
July 2026	Complete final species distribution model
December 2026	Report of results (draft FDS submitted to Regional Coordinators)

RESPONSIBILITIES

- Randy Peterson, Biometrician III, assists with data review; provides modeling support; develops and reviews operational plan and final report.
- Laura Coleman, Fisheries Biologist II, assists with data review, standardization and archival; provides modeling support; develops and reviews operational plan and final report.
- Maya Chari, Biometrician I, assists with data review; provides modeling support; develops and reviews operational plan and final report.
- Ana Vinson, Fisheries Biologist I, assists with data review, standardization and archival.
- Ivy Mumm, GIS Analyst III, assists with data review and archival; provides modeling support; reviews operational plan and final report.
- Rhea Ehresmann, Fisheries Biologist III, reviews operational plan and final report.

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TABLES

Table 1.–Description of environmental layers that will be used.

Layer	Unit	Source	Spatial Resolution	Temporal Resolution
Depth	Meters below mean sea level	GEBCO Compilation Group (2021) GEBCO 2021 Grid	15 arc-seconds	n/a
Slope	Degrees	Derived from bathymetry grid using ArcGIS Pro Slope function	15 arc-seconds	n/a
Aspect	Positive degrees from north	Derived from bathymetry grid using ArcGIS Pro Aspect function	15 arc-seconds	n/a
Broad scale bathymetric position index	Mean difference of location relative to surrounding cells	Derived from bathymetry grid using Benthic Terrain Modeler version 3.0	15 arc-seconds	n/a
Fine scale bathymetric position index	Mean difference of location relative to surrounding cells	Derived from bathymetry grid using Benthic Terrain Modeler version 3.0	15 arc-seconds	n/a
Rugosity (vector ruggedness measure)	Measure of seafloor terrain complexity	Derived from bathymetry grid using Benthic Terrain Modeler version 3.0	15 arc-seconds	n/a
Salinity	Sea water salinity at depths ranging from 0 to 5000 m	Hybrid coordinate ocean model	≈290 arc-seconds	1992–2024
Velocity	Eastward and northward sea water velocity at depths ranging from 0 to 5000 m	Hybrid coordinate ocean model	≈290 arc-seconds	1992–2024
Temperature	Sea water temperature at depths ranging from 0 to 5000 m	Hybrid coordinate ocean model	≈290 arc-seconds	1992–2024
Chlorophyll-a concentration	Concentration of the green pigment in phytoplankton in sea surface layer	Global change observation mission	≈150 arc-seconds	2018–2024

FIGURES

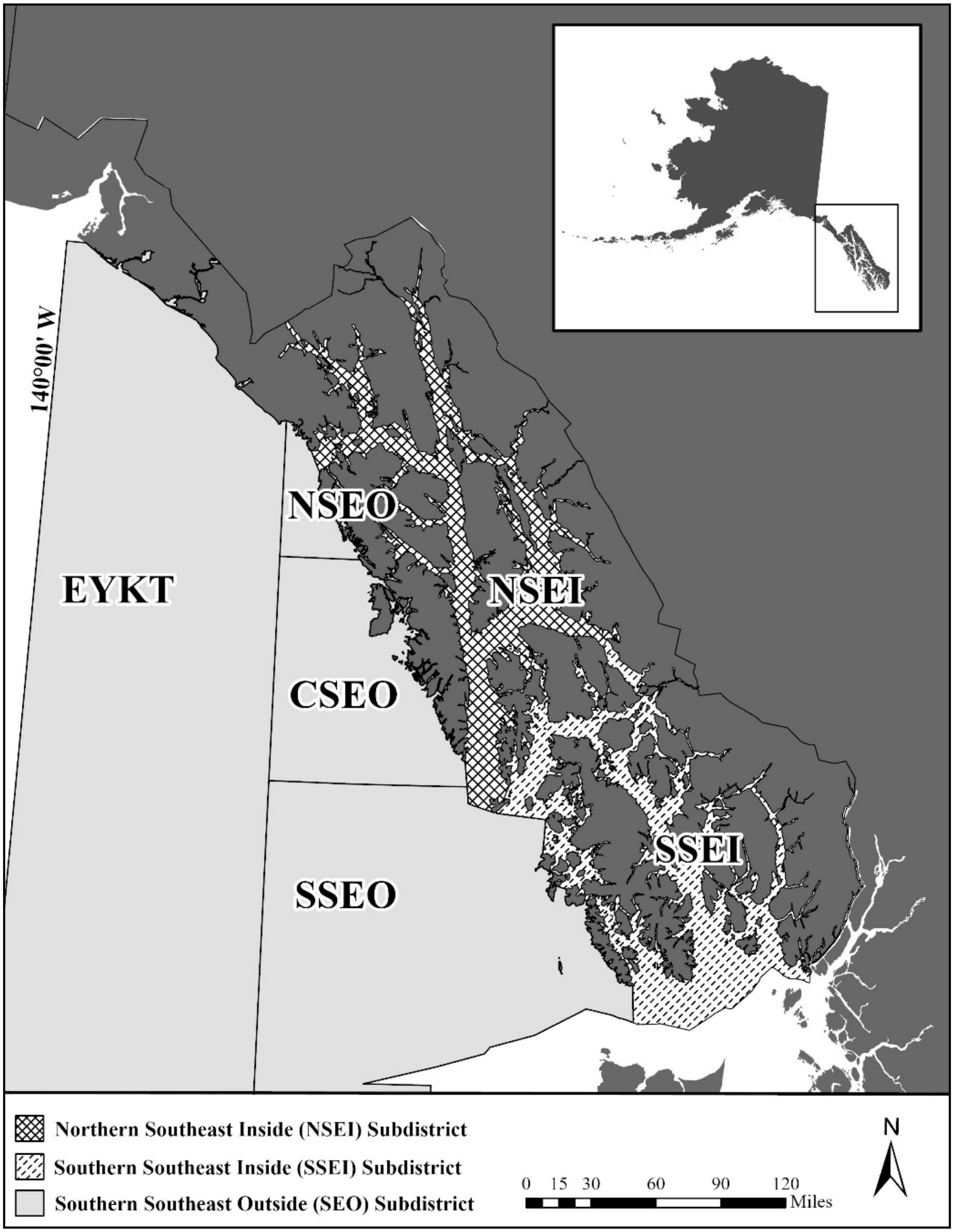

Figure 1.–The Southeast Outside (SEO), Northern Southeast Inside (NSEI), and Southern Southeast Inside (SSEI) Subdistricts. SEO is comprised of the East Yakutat (EYKT), Northern Southeast Outside (NSEO), Central Southeast Outside (CSEO), and Southern Southeast Outside (SSEO) Sections in Southeast Alaska.

APPENDIX A: DATA COLLECITON FORMS AND REFERENCES

Appendix A1.–Groundfish longline and pot fishery logbook data collection form used to collect the location of yelloweye rockfish caught in Southeast Alaska.

ADF&G GROUNDFISH LONGLINE • POT FISHERY LOGBOOK

PERMIT HOLDER ____________________ TARGET SPECIES ____________________ CREW SIZE (including skipper)

VESSEL NAME ____________________ PORT OF LANDING ____________________

ADF&G NUMBER ____________________ DATE LEFT PORT ____________________

SKIPPER NAME ____________________ DATE OF LANDING ____________________

SYSTEM USED: CONV ☐ SNAP ☐ AUTOBAITER ☐

LONGLINE GEAR (Specify by set if using mixed gear.)			
HOOK SIZE	SKATE LINE LENGTH	HOOK SPACING	NUMBER OF HOOKS/SKATE

POT GEAR		
POT DIMENSIONS (ft)	GROUNDLINE WT. or DIAMETER	POT SPACING (ft)

BAIT(S) USED	%

SET NO.	DATE SET	TIME SET	Lat X Long. Beginning	DATE HAULED	TIME HAULED	Lat X Long. End	AVERAGE DEPTH (fm)	NO. SKATES or POTS SET	LOST SKATES Y/N—Amount?	COMMENTS: Set depredation? Yes / No (circle one) Sperm/Orca/Sea Lion? No. of skates impacted ____

Set Target Species ____________ Catch amount in Numbers or Round LBS (circle)	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT

SET NO.	DATE SET	TIME SET	Lat X Long. Beginning	DATE HAULED	TIME HAULED	Lat X Long. End	AVERAGE DEPTH (fm)	NO. SKATES or POTS SET	LOST SKATES Y/N—Amount?	COMMENTS: Set depredation? Yes / No (circle one) Sperm/Orca/Sea Lion? No. of skates impacted ____

Set Target Species ____________ Catch amount in Numbers or Round LBS (circle)	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT

SET NO.	DATE SET	TIME SET	Lat X Long. Beginning	DATE HAULED	TIME HAULED	Lat X Long. End	AVERAGE DEPTH (fm)	NO. SKATES or POTS SET	LOST SKATES Y/N—Amount?	COMMENTS: Set depredation? Yes / No (circle one) Sperm/Orca/Sea Lion? No. of skates impacted ____

Set Target Species ____________ Catch amount in Numbers or Round LBS (circle)	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT	SPECIES	AMOUNT

ADDITIONAL COMMENTS: ____________________ Phone Number: ____________

YELLOW COPY MUST BE ATTACHED TO THE FISH TICKET AT THE TIME OF DELIVERY

RECORD TAG NUMBERS BY SET ON BACK OF YELLOW COPY

--continued--

Appendix A1.–Page 2 of 2.

Set Number	Tag Number	Set Number	Tag Number	Set Number	Tag Number

Appendix A2.–Maturity code, condition, and morphology descriptions of yelloweye rockfish used during video review.

Maturity Code	Maturity Condition	Morphology Description
JV	Juvenile	Body is typically dark red-orange and has two bright horizontal stripes on each side of the lateral line. Fins may show black or white fringe and have a white vertical band on the caudal peduncle and white patches along base of dorsal fin. 
SU	Subadult	Body is a lighter orange than the juvenile and may have lost the lower juvenile stripe. The lower white stripe may still be visible but is less pronounced. Typically possesses bright, all white caudal fin and partially bright, white anal, spiny and soft dorsal fin. 
AD	Adult	Body has a light to dark orange coloration depending on habitat and typically has one prominent white dorsal stripe on each side of the lateral line. Adults have muted white or all orange fins and spiny dorsal fin.