Regional Operational Plan CF.1J.2015.06

Northern Southeast Inside (Chatham Strait) Sablefish Marking Survey

by
Kristen Green
Aaron Baldwin
and
Jennifer Stahl
Symbols and Abbreviations

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REGIONAL OPERATIONAL PLAN CF.IJ.2015.06

NORTHERN SOUTHEAST INSIDE (CHATHAM) SABLEFISH MARKING SURVEY

by
Kristen Green

and
Aaron Baldwin

and
Jennifer Stahl

Alaska Department of Fish and Game
Division of Commercial Fisheries
January 2016
The Regional Operational Plan Series was established in 2012 to archive and provide public access to operational plans for fisheries projects of the Divisions of Commercial Fisheries and Sport Fish, as per joint-divisional Operational Planning Policy. Documents in this series are planning documents that may contain raw data, preliminary data analyses and results, and describe operational aspects of fisheries projects that may not actually be implemented. All documents in this series are subject to a technical review process and receive varying degrees of regional, divisional, and biometric approval, but do not generally receive editorial review. Results from the implementation of the operational plan described in this series may be subsequently finalized and published in a different department reporting series or in the formal literature. Please contact the author if you have any questions regarding the information provided in this plan. Regional Operational Plans are available on the Internet at: http://www.adfg.alaska.gov/sf/publications/

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**SIGNATURE PAGE**

Project Title: Northern Southeast Inside (Chatham Strait) Marking Survey

Project leader(s): Kristen Green

Division, Region, and Area Commercial Fisheries, Region 1, Chatham Strait

**Project Nomenclature:**

Period Covered 2015–2020

Field Dates: Mid-May to mid-June

Plan Type: Category II

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**Approval**

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PURPOSE

The current Northern Southeast Inside (NSEI) sablefish fishery stock assessment is based on mark-recapture methodology to estimate sablefish abundance using Chapman’s modification of the Petersen estimator. The Alaska Department of Fish and Game (ADF&G) conducts sablefish marking surveys with pot gear in May and June to mark and release fish in the NSEI Subdistrict. As of 2015, the survey will occur biennially due to funding. The recapture event occurs during the ADF&G longline survey and the commercial fishery season (August 15–November 15). The mark recapture data are used to calculate the acceptable biological catch (ABC) for sablefish in NSEI along with age, sex, length, weight and maturity data collected in the fishery and survey. This Regional Operational Plan documents the current marking survey methodology and protocol in detail and is designed to be a detailed guide to use in preparation for and onboard the survey.

Key words: Sablefish, Anoplopoma frimbia, mark-recapture, Chatham Strait, Northern Southeast Inside, black cod

OBJECTIVES

1. Capture, measure, mark and release 6,000–8,000 sablefish greater than 32 cm.
2. Mark sablefish among statistical areas in proportion to the previous three-year average of the NSEI commercial harvest by statistical area.
3. Mark sablefish throughout each statistical area to assist with mixing of marked and unmarked fish.
4. Mark sablefish by depth in proportion to the previous three-year average of the NSEI commercial harvest by depth in each statistical area.
5. Record the temperature that sablefish are exposed during capture and handling.
6. Collect recovery information from fish that were marked during previous surveys to obtain net movement.

BACKGROUND

Since 1997, mark-recapture surveys have been performed in NSEI to assess the sablefish stock; prior to this time, sablefish stock assessment activities were based on catch per unit effort (CPUE) from a department longline survey, and age, size, and maturity composition from the survey and port sampling of the commercial landings. The initial mark-recapture survey was designed as a biomass-based harvest rate approach to stock assessment (Carlile et al. 2002). The results of the mark-recapture experiment were not used for stock assessment immediately, as the methodology needed some refinement. For example, during the first three years of the survey (1997 to 1999), sablefish were tagged during the annual longline survey. In 1999, it was determined that low numbers of recaptures were due to the fish becoming hook-shy (i.e. avoiding recapture by longline). In 2000, the survey was transitioned to using pot gear to capture fish to avoid the hook-shyness response to longline gear. Additional improvements to the survey design and overall stock assessment were made after external review (Leaman et al, 2002, Mueter 2010). Sablefish have been marked with external T-bar tags with the exception of 2004 when Passive Integrated Transponder (PIT) tags were used as part of an experiment to
use an ‘invisible’ mark. However, PIT tag recovery was not successful in the noisy acoustic environment of the processing plants. In addition to tagging, sablefish are ‘double marked’ with an upper or lower caudal fin clip (upper and lower clips are alternated. This allows for recovery of marked fish even if the tag is removed by fishermen or falls out. Upper and lower caudal fin clips are alternated so that clipped fish from two years ago are more easily differentiable from the current years’ clip. See Dressel (2009) for a detailed description of the current statistical design and explanation of how the assumptions of the mark recapture experiment are met.

Since 2012, the survey has been conducted on the 110’ ADF&G vessel, R/V Medeia. The survey was shifted to this vessel after the 2011 marking survey was cancelled due to mechanical problems with the vessel and chronic lack of interest from more than one vessel in years prior to 2011. The minimum crew size has been three science crew, including the crew leader, and five boat officers.

The recapture portion of the study occurs during the NSEI commercial longline fishery season when the number of marked and unmarked sablefish are enumerated during commercial landings. The mark-recapture abundance estimate is used to calculate biomass after accounting for selectivity and applying fishery weight-at-age. The recommended acceptable biological catch (ABC) is set after applying a biological reference point (F50% since 2010 and subject to future review) to the biomass estimate. Sablefish mortality in other fisheries are deducted from the ABC to determine the directed commercial annual harvest objective (AHO), which is typically released in June. In addition, marked fish (external tag and finclip) recaptured in the fishery provide information on sablefish migrations (e.g. Hanselman et al. 2014).

**METHODS**

**SAMPLE DESIGN**

The goal of the survey is to mark and release between 6,000 and 8,000 sablefish, prioritizing the distribution of marked fish among statistical areas and depth zones in proportion to the commercial fishery harvest. A preliminary marking goal will be set prior to the start of a survey. Generally, the survey will be conducted from north to south in Chatham Strait with a brief east to west excursion in Frederick Sound. The marking goal may be adjusted after the northern areas are sampled to ensure that an attainable marking goal is set for the survey as a whole. Marked sablefish will be distributed by statistical area in proportion to the past three-year average of the NSEI commercial sablefish harvests in the three years prior to the survey. The proportion of harvest by statistical area will be determined for each year separately and then averaged for all three years using fish ticket data. Sablefish will only be marked in statistical areas where greater than 2% of the total harvest for the three-year average occurred.

Within each statistical area, marked sablefish will be distributed by depth in proportion to the past three-year average of the NSEI commercial harvest of sablefish; however, meeting the marking goal for a particular statistical area will be considered a priority, especially for depth zones where only a small proportion of the commercial fishery harvest occurred. For each statistical area, the average proportion of harvest by depth will be determined for each year separately and then averaged for all three years using
commercial fishing logbook data. This calculation will include all sablefish harvest (in round pounds) from both halibut and sablefish target sets. All sablefish recorded in numbers of fish on commercial logbooks will be converted to round pounds using the annual average weight determined from port sampling data. To determine the number of fish to mark by depth zone in each statistical area the following calculation will be used:

\[
\text{Target tagging goal for survey} \times \text{Proportion of sablefish harvest by statistical area from fish tickets (3 yr avg)} \times \text{Proportion of sablefish harvest by depth zone and statistical area from logbooks (3 yr avg)}
\]

Marking in proportion to the commercial catch among statistical areas and depth zones is of primary importance, though distribution of marks throughout a statistical area is an important consideration as well. To distribute marked fish throughout a statistical area, no overlapping sets will be performed within a statistical area, and sets will be performed both over the latitudinal (north-south) and longitudinal (east-west) range of a statistical area. In addition, at least one set will be performed as far south as Cape Ommaney (56° 10’ N, 134° 40’ W) in statistical area 345603 (Figure 1) weather and habitat permitting.

Survey set locations will be selected in order to meet the requirements of the sample design and with consideration of set history in an area and availability of sablefish habitat. No sets will be made in locations where significant gear problems have occurred in the past, such as parted or abraded groundline or torn pot webbing. In addition, sets where large numbers of rockfish have been caught or where sand fleas are abundant may be avoided. The number of sablefish captured and marked during previous marking surveys will be taken into account as well for placement of current year’s sets. For new set locations, charts with information on bathymetry and substrate should be examined to determine that sets will be in the appropriate depth zone and do not have steep or variable terrain that would challenge gear retrieval; the skipper may verify bathymetry with the vessel sounder by running the proposed set line prior to gear deployment. The crew leader will recommend set locations to the skipper, along with any changes in number of pots to set or length of time of the set; no sets will be performed if the skipper has any concerns. For each statistical area, the crew leader will complete the “Sablefish Marked Form” (Appendix A) after each set is hauled in order to keep track of the number of sablefish that have been marked and remain to be marked for each depth zone. Completion of this form will assist the crew leader in determining the best potential set locations to meet marking goals by depth zone and statistical area.

Once the approximate marking goal is reached for a statistical area, the next statistical area will be sampled; fish in the remaining pots will be released before being brought onboard. To avoid excess discard of fish, no additional sets will be performed for statistical areas with only a small number (25–50) of fish remaining to reach the marking goal.

**SABLEFISH CAPTURE**

Longline pot gear is used to catch sablefish during the survey. Conical sablefish pots with a 5’ diameter and two opposing tunnels will be used to capture live fish. At each station a
string of gear will be set consisting of a floating line with a large buoy bag followed by a hard trawl float, 300’ of line, a sash weight, buoy line equal to approximately 2,100’ depending on set depth, a surge weight, and an additional 300’ of line and an anchor. The attached groundline will be configured with 40 becket spaced at approximately 300’ intervals. Pots will be attached to the becket with approximately 240 ft of line between each pot. Each pot will be baited with approximately 4 lbs of chopped pollock and 4 lbs of chopped squid that will be placed in a bait bag inside the pot. In general, two pot strings will be set and hauled per day with a maximum of 40 pots per string. Pots are typically soaked for 10 to 24 hours. The minimum soak time will be used in areas with a large quantity of “sand fleas” (amphipods) to help prevent sablefish mortalities. In other areas the soak time will be increased to ensure the bait “smell” has dispersed and sablefish have enough time to find the bait and enter the pots.

During hauling operations, pots attached to the groundline that contain sablefish must be kept underwater to prevent battering or injuring of fish in that pot. The gear will be checked throughout hauling so that the next pot on the string is completely submerged even as the vessel navigates to stay on the gear. Torn lips and other injuries on the fish are an indication that the pot is too near the ocean surface and needs to be kept lower in the water until brought on board.

During hauling, sablefish will be released from each pot on to a sorting table that connects to a live well that is set up as a temporary holding tank for sablefish and bycatch. The aluminum well (26”x 86” x 15”) will be continuously plumbed with saltwater. Sablefish will be removed individually from the holding tank for marking or discard. Incidental catch will be recorded and released with minimum holding time.

DATA COLLECTION

Set Information

For each pot string, the set and haul information will be recorded on the “Set Form” (Appendix B). During setting, science crew will record the latitude and longitude (decimal minutes) for the start and end of the pot string using the coordinates at the first and last anchors and record depth (fathoms) at the location each pot is released overboard. The first and last pots will be recorded as the start and stop depths for the set, and the average depth of the set will be calculated as the mean depth for all pots set excluding the anchor depths. In addition, it will be noted whether the gear is hauled in the same direction as it was set, the number of pots set, the number of pots hauled, and the substrate of the ocean floor. In addition, the date and time (military) will be recorded when the second anchor goes overboard during setting and the first and second anchors come onboard while hauling a pot string. Any additional information unique to a set will be recorded in the comments section including: the number of pots lost, returned with open purse strings, and/or returned with holes in the webbing; time and where in a pot string any breaks in the groundline occur; and tangled gear. In the event pots are lost during hauling, the actual number of pots retrieved will be entered into the database.

While on deck, the recorder will note time of first buoy, first anchor and last anchor on board for each set as well as any substrate (e.g. mud, clay, rocks) observed on each anchor during hauling. If the groundline of a pot string breaks during hauling, the vessel will run to the other end of the string and haul from the second anchor. The recorder
should note the time each end of the broken line is encountered, the time the second buoy is brought on board, and the time the second anchor is brought aboard and record this information in the comments section of the “Set Form” (Appendix B). The time that the second break in the line is encountered will be recorded in place of the second anchor onboard on this form.

**Marking**

All healthy sablefish brought on board and greater than 32 cm will be marked (finclipped and tagged) and released. Sablefish selected for marking will have one of the lobes of their caudal fin clipped and a tag inserted below the dorsal fin (Figure 2). For each set hauled, staff will rotate between the positions of clipper, tagger, or recorder. The clipper will collect the fish, measure the fork length of each fish to the nearest cm, read out the measurement to the recorder, and clip the upper 1/3 lobe of the caudal fin using a straight cut angled at a 45° orientation from the dorsal-ventral axis (Figure 2). The tagger will tag each fish, note the condition of the fish and read out the tag number to the recorder. Fish are most effectively handled by gently holding the fish in a “U-shaped position” with one hand on the fish head and one on the fish body. Sablefish will be tagged with an external T-bar tag applied at a shallow angle posterior to the base of the first dorsal spine between the interneural spines on the left-side of the fish body (Figure 2). Fish will be gently released down a plastic release chute (11” diameter). For every marked sablefish, the recorder will write the length in mm, tag number and fish condition on the “Marking Release Form” (Appendix C) and note the pot number from which each marked sablefish is caught in the margins of the form. After each set, the number of fish marked in each pot will be calculated and entered on the “Pot Tally and Temperature Sampling Form” (Appendix D).

In addition to recording data, the recorder is responsible for managing tags. This includes providing the tagger with a tagging gun pre-loaded with the next group of tags and confirming recorded tag numbers are in the correct order. It is important that the tags be consecutive, both within and between batches. Regular verification of the entire six digit number (e.g. at the beginning of a new batch of tags) can insure correct sequential order. If tags are out of order or a tag number is voided, make a note in the margins of the release form and return to the correct order at the end of the batch.

**Previously Tagged Fish**

All sablefish that were previously tagged by ADF&G and are in good health will be rereleased after recording tag number and measuring the fish. If a fish is in poor health, dead, or the tag is no longer readable or well attached, the fish is measured, the tag number is recorded, and the tag is collected. Occasionally tags from other agencies are recovered during this survey. In all cases the tag number is recorded and the fish is measured. Dependent on the agency and/or specific project, fish will be rereleased or retained in order to collect additional biological data; in some cases tagged fish require special processing, i.e. growth study fish or those with archival tags. Please follow detailed instructions for processing other agency tagged fish in Appendix E. All other agency tags, associated data, and otoliths should be mailed to NMFS Auke Bay laboratory in Juneau. For previously tagged ADF&G fish that are harvested and other
agency tagged fish that are harvested or re-released, data should be recorded on the “Tag Recovery Form” (Appendix F).

**Discards**

Any fish determined to have a reduced survival probability will be measured and released without marking, such cases may include: fish with a high degree of flea bites or exposed tissue due to flea bites; fish damaged from pot gear, such as gilled or abrasions causing exposed tissue; fish with old injuries; or fish that lack of vigor. Fish with substantial pot abrasions or sand flea damage may have a higher risk of infection leading to delayed mortality. Wounding in sablefish has been weakly related (but not significantly) to delayed mortality (Davis and Ottmar 2006), and delayed mortality has been observed in 100% of fish that developed skin infections in an experiment where sablefish were towed in nets for 4 hours and then exposed to air for 15 to 30 minutes (Davis 2005). In addition, sablefish <32 cm will measured and released without marking. All information for discarded sablefish will be recorded on the “Marking Discard Form” (Appendix G) using the appropriate discard (Appendix H) and release condition (Appendix I) codes.

In addition, fish may be discarded before pots are brought on board if the marking goals are met for a statistical area or if a sleeper shark is captured in the pot. In such cases, the number of sablefish will be estimated and recorded on the “Pot Tally and Temperature Sampling Form” (Appendix D) and the incidental catch will be estimated and tallied on the “Marking Discard Form” (Appendix G). If a sleeper shark is in a pot and as a result the pot cannot be brought aboard due to the size of the shark, the number of sablefish in the pot will be estimated and recorded on the “Marking Discard Form” (Appendix G) regardless of whether an accurate count of sablefish in the pot can be made.

**Incidental catch**

All incidental catch, including rockfish and thornyheads, will be. Bycatch species will be tallied on the “Marking Discard Form” (Appendix G). No biological data will normally be collected for bycatch, including length measurements. However, in special cases, i.e. other agency projects or an extremely large fish for a species is captured, biological data may be collected and the sample would be recorded as “select” (05) in the biological table. All halibut are immediately released. Released halibut are coded as alive (20) or dead (21).

**Temperature**

The temperatures to which sablefish are exposed during capture and handling, including surface, bottom, and holding tank temperatures, will be monitored, and the processing time of fish will be minimized to reduce exposure to air and warmer holding and surface temperatures that may increase risk of delayed mortality, behavioral impairment, and/or immunological suppression. Temperature data loggers will be used to record bottom temperature, date, and time at 30 minute intervals. A temperature logger will be attached to the first or last pot on a string and deployed each time the gear is set. During hauling, the recorder will note the temperature logger number and which pot it was attached on the “Pot Tally and Temperature Sampling Form” (Appendix D). In addition, temperature loggers will be deployed at the water’s surface and in the holding tank for the duration of the haul; the time of deployment and retrieval and the temperature logger number will be
recorded on the “Pot Tally and Temperature Sampling Form” (Appendix D). The data recorder will also note the weather during the haul.

**ELECTRONIC DATA**

Data will be entered electronically into tables in an ADF&G Region I database; currently the database Alexander (ALEX) is used; however, a replacement database is under development. Before disembarking on the survey, the network laptop designated as the ALEX server on board the R/V Medeia and a stand-alone laptop computer will be outfitted with a complete version of portable Alexander (ALEX) to enable the entry of all survey data while at-sea. This version of ALEX cannot be configured remotely. A new tag batch, including the range of tag numbers to be used in the present year’s survey should be created in ALEX by IT staff prior to departure. Upon return to port the IT staff will download the data entered at-sea into the database, and the tag batch should be edited to reflect actual tag numbers used on the survey. Electronic files should be brought on the survey for crew leading, including the tables used for determining the number of fish to mark by statistical area and depth based on overall marking goals, as well as the spreadsheet for tracking fish tagged at depth for each set.

**Trip Table**

The trip information will be entered into Alex in the “Trip Table” under pot survey data. This includes the year, trip number, and any trip comments.

**Set Table**

The set information will be entered into Alex in the “Set Table” under pot survey data. See the section on “Set Information” under “Data Collection” for details.

**Catch Table**

All sablefish and incidentally caught fish and commercially important invertebrates captured on the survey will be entered into the “Catch Table” in Alex under pot survey data. The total number of sablefish captured for each discard condition will be recorded in this table, including the total number of sablefish estimated due to reaching a tagging goal or due to a shark in the pot. Discard codes used for sablefish are summarized in Appendix H. The total number of each species of bycatch captured will be recorded along with discard status of “unknown” (00) or “retained” (01) with the exception of halibut which will be recorded as “released alive” (20) or “mortality discard” (21).

**Biological Table**

Biological data for sablefish will be entered into Alex in the “Age/Sex/Size Sampled at Sea Table”; all sablefish will be accounted for with the exception of sablefish that are in pots that are not brought on board, i.e. sablefish numbers estimated in a pot due to reaching a tagging goal in a statistical area or from a sleeper shark. All sablefish recorded on this form will have a sample type of “random sample” (01) and length type of fork length (01) or no length taken (00); length will be entered in mm. In addition all fish will be given a discard (H) and release (I) condition code. For each tagged and finclipped sablefish, the tag batch and tag number will also be recorded. For fish previously tagged by ADF&G and fish tagged by other agencies, tag numbers are recorded in the comment section beginning with “T-“.
Tag Recovery Table

Information on previously tagged sablefish that were initially tagged and released by ADF&G will be entered into the “Tag Recovery Table” in Alex. If fish are re-released on the survey, then the “2nd Release” tag event should be selected in the table. If a sablefish has already been previously recaptured, then the table will automatically populate once tag and batch number are entered. In this case, the table will need to be cleared, and the tag event “3rd release” should be selected. This process should be continued until the table does not autofill, which indicates the correct tag event has been selected for the re-release of the fish for the current survey. If a previously tagged fish is retained, then the tag event of “harvested” should be selected. The information of catch year, project, trip, and set number should be entered, and other trip and set information will automatically populate the table (if the trip and set tables have been entered). The specimen number and length (in mm) will need to be entered as well. In addition, the following items will need to be selected: vessel type of “Survey vessel”, measurer type of “scientific staff”, information source of “scientific survey”, tag returned by “scientific survey”, tag recovery person “ADF&G NSEI, pot survey”, and reward and drawing status of “Not qualified”.

Fish Tagged By Depth

Information by pot for each set, including the number of fish marked by pot (from the “Pot Tally and Temperature Sampling Form”) and the pot depth at setting (from the “Set Form”) are recorded into an excel spreadsheet in order to calculate the number of fish tagged in each depth zone, which will be recorded on the “Sablefish Marked Form” (Appendix A). Information recorded on the “Set Form” (Appendix B) on whether gear is hauled in the same or opposite direction as set will also be used to correctly identify pot depths. In the event that a pot string line is parted and a change in direction of hauling occurs, hauled pots will need to be reordered and matched to the pot set to obtain the correct depth for each pot. In the event that the count of the number of pots hauled is less than the number of pots set (either a pot was lost at sea or a pot was missed when counting the number hauled) and it is not possible to figure out where the discrepancy occurred, the count will be left as recorded and a count of zero for the last pot (or the number of pots missed) will be listed and a note will be made.

SCHEDULE AND DELIVERABLES

The survey is scheduled to begin in mid-May and end in mid-June. The timing of the survey is scheduled to allow marked sablefish to disperse prior to the NSEI commercial sablefish opening on August 15. The survey departs from and returns to Juneau, Alaska, with a mid-survey stop in Petersburg for crew change and supplies. During the longline commercial fishery season, August 15–November 15, all landed sablefish in Petersburg, Juneau, and Sitka will be individually examined for marks from the current year’s marking survey. Biological samples of the commercial sablefish landings are also taken at this time. These data will be used for stock assessment and the determination of the AHO in June of the following year. A post-survey report will be completed detailing the survey results (i.e. Baldwin and Stahl 2014).
RESPONSIBILITIES

- Kristen Green, Fishery Biologist III (Groundfish Project Leader)
- Jennifer Stahl, Fishery Biologist II (Crew Leader)
- Aaron Baldwin, Fishery Biologist I (Crew Leader)
- Kray Van Kirk, Biometrician III (Biometric review)
REFERENCES CITED


Mueter, F. 2010. Evaluation of stock assessment and modeling options to assess sablefish population levels and status in the Northern Southeast Inside (NSEI) management area. Alaska Department of Fish and Game, Special Publication No. 10–01, Anchorage.
TABLES AND FIGURES
Table 1.—Mean proportion of sablefish harvested by statistical area for previous three years of commercial fishery (2012–2014). Only statistical areas where 2% or greater of the average annual commercial harvest occurred were selected for marking.

<table>
<thead>
<tr>
<th>Statistical Area</th>
<th>Proportion of Harvest</th>
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<tbody>
<tr>
<td>335701</td>
<td>4%</td>
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<tr>
<td>345603</td>
<td>10%</td>
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<td>39%</td>
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</tr>
<tr>
<td>345731</td>
<td>9%</td>
</tr>
<tr>
<td>345803</td>
<td>8%</td>
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Table 2.—Mean proportion of sablefish harvested by depth class (fathoms) in each statistical area for statistical areas selected for marking based on the previous three years of commercial fishery harvest (2012–2014).

<table>
<thead>
<tr>
<th>Statistical Area</th>
<th>Mean percent of sablefish caught by depth (fathoms)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>50–100 150 200 250 300 350 400 450 500</td>
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<tr>
<td>335701</td>
<td>4% 5% 13% 60% 18% 0% 0% 0% 0%</td>
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<td>0% 0% 0% 0% 1% 31% 68% 0% 0%</td>
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</tr>
<tr>
<td>345731</td>
<td>1% 0% 0% 2% 33% 57% 8% 0% 0%</td>
</tr>
<tr>
<td>345803</td>
<td>0% 0% 0% 7% 22% 50% 21% 0% 0%</td>
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</table>
Figure 1.–Statistical areas in the Northern Southeast Inside (NSEI) Subdistrict.
Figure 2.—Sablefish marking guidelines showing tag placement and lower caudal fin clip. During alternate years the upper lobe would be clipped instead.
APPENDICES
Appendix A. – “Sablefish Marked Form” used to record the number of sablefish marked by statistical area and depth zone.

<table>
<thead>
<tr>
<th>Date</th>
<th>Set</th>
<th>Tagged and Clipped</th>
<th>Total Tagged and Clipped in Stat Area</th>
<th>Remaining Number to Tag/Clip in Stat Area</th>
<th>Goal to Tag and Clip in Stat Area</th>
<th>Goal to Tag and Clip by Depth (fm):</th>
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<tr>
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<td>150</td>
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</table>

Total Tagged and Clipped by Depth:
Appendix B.–“Set Form” used to record information related to gear and environment for a set string.
Appendix C.—“Marking Release Form” used to record status and tag number of tagged fish.

<table>
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<tr>
<th>Project: NSEI Sablefish Mark Tag Release Form</th>
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<td>Year:</td>
<td></td>
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<tr>
<td>Trip:</td>
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<tr>
<td>Date: /</td>
<td>Pg no.____</td>
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<tr>
<td>(number sets consecutively throughout trip)</td>
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<table>
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<th>TAG NUMBER</th>
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<th>COMMENTS</th>
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Tagger _________________________  Recorder________________________________
Appendix D.–“Pot Tally and Temperature Sampling Form” used to record the temperatures sablefish are exposed during handling and to record the total number of sablefish captured in each pot, including those tagged and released without tagging.

**Pot Tally and Temperature Form**

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<tbody>
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<td>Set number:</td>
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<th>Bottom temp</th>
<th>Surface temp</th>
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<td>Tidbit #</td>
<td>Tidbit #</td>
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<tr>
<td>Pot #</td>
<td>Time in</td>
<td>Time in</td>
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<td>Time out</td>
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<table>
<thead>
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</tr>
</tbody>
</table>
Appendix E.—List of tag-types recovered on the marking survey with instructions on processing.

<table>
<thead>
<tr>
<th>Tag type</th>
<th>Instructions</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADF&amp;G Sitka (orange, red, or green)</td>
<td>Healthy fish with tag well attached - measure, record tag number, and release.</td>
</tr>
<tr>
<td></td>
<td>Unhealthy fish and/or tag not well attached - collect length, sex, and maturity data; record tag number; retain tag.</td>
</tr>
<tr>
<td>ADF&amp;G Homer (red)</td>
<td>All fish - Collect fork length, sex, otoliths, and maturity data; record tag number; retain tag.</td>
</tr>
<tr>
<td>ADF&amp;G/NMFS COOP (orange)</td>
<td>Healthy fish with tag well attached - measure, record tag number, and release.</td>
</tr>
<tr>
<td></td>
<td>Unhealthy fish and/or tag not well attached - collect length, sex, and maturity data; record tag number; retain tag.</td>
</tr>
<tr>
<td>NMFS (yellow)</td>
<td>Healthy fish with tag well attached - measure, record tag number, and release.</td>
</tr>
<tr>
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<td>Unhealthy fish and/or tag not well attached - collect length, sex, and maturity data; record tag number; retain tag.</td>
</tr>
<tr>
<td>Japanese (orange)</td>
<td>Healthy fish with tag well attached - measure, record tag number, and release.</td>
</tr>
<tr>
<td></td>
<td>Unhealthy fish and/or tag not well attached - collect length, sex, and maturity data; record tag number; retain tag.</td>
</tr>
<tr>
<td>NMFS Auke Bay growth study (pink)</td>
<td>All fish - Collect length, sex, otoliths, and maturity data; record tag number; retain tag. Special instructions to store otoliths in vial masked to keep out light.</td>
</tr>
<tr>
<td>NMFS archival marker (green/pink)</td>
<td>All fish - Collect length, sex, otoliths, and maturity data; record tag number; retain tag. Special instructions to collect archival tag from body cavity and retain with tag.</td>
</tr>
<tr>
<td>Canadian (Pacific Bio Station) (yellow)</td>
<td>All fish - Collect length, sex, otoliths, and maturity data; record tag number; retain tag.</td>
</tr>
</tbody>
</table>
Appendix F.—“Tag Recovery Form” used to record recovery information for sablefish that are previously tagged.

<table>
<thead>
<tr>
<th>Tag Recovery Form</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Species</strong>____________________</td>
</tr>
<tr>
<td><strong>Release Agency</strong>____________</td>
</tr>
<tr>
<td><strong>Tag Number</strong>_________________</td>
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<tr>
<td><strong>Subdistrict/Mgtarea</strong>_________</td>
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</tbody>
</table>
Appendix G.–“Marking Discard Form” used to record bycatch and status (i.e. health) of sablefish that are released without tagging.
Appendix H—Discard codes for sablefish and bycatch captured on the marking survey.

<table>
<thead>
<tr>
<th>Discard Status</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 = Unknown</td>
<td>Discard status unknown or not recorded; used for all bycatch except halibut.</td>
</tr>
<tr>
<td>01 = Retained</td>
<td>Fish is not released.</td>
</tr>
<tr>
<td>02 = Discarded, not marketable</td>
<td>Fish has new or old injury and is released without marking to prevent bias in recapture event.</td>
</tr>
<tr>
<td>03 = Discarded, too small</td>
<td>Fish &lt;320 mm fork length, released without marking.</td>
</tr>
<tr>
<td>04 = Lost</td>
<td>Fish lost before clipping or tagging.</td>
</tr>
<tr>
<td>05 = Tagged and released</td>
<td>Fish clipped, tagged, and released unharmed.</td>
</tr>
<tr>
<td>06 = Mortality retained</td>
<td>Fish dead or likely to die so retained.</td>
</tr>
<tr>
<td>07 = Discarded healthy</td>
<td>Fish measured but released without tagging or clipping.</td>
</tr>
<tr>
<td>08 = Retained bio sample</td>
<td>Fish sacrificed to collect biological data.</td>
</tr>
<tr>
<td>09 = Already tagged by AGF&amp;G</td>
<td>Fish previously tagged by Region I ADF&amp;G.</td>
</tr>
<tr>
<td>10 = Discarded due to fleas</td>
<td>Fish measured but not tagged or clipped due to flea bites (dead or alive).</td>
</tr>
<tr>
<td>11 = Discarded due to sharks</td>
<td>Fish measured but not tagged or clipped due to damage from sharks.</td>
</tr>
<tr>
<td>12 = Clipped only and released</td>
<td>Fish measured and clipped but lost before tagging.</td>
</tr>
<tr>
<td>13 = Retained other agency tag</td>
<td>Fish tagged by another agency that has requested biological sampling.</td>
</tr>
<tr>
<td>15 = Released, other agency tag</td>
<td>Fish tagged by another agency that has requested fish be re-released.</td>
</tr>
<tr>
<td>16 = Retained, tagged by ADF&amp;G</td>
<td>Fish previously tagged by ADF&amp;G but retained due to injury or tag damage.</td>
</tr>
<tr>
<td>17 = Discarded, numbers estimated</td>
<td>Fish released directly from pot and number of fish estimated.</td>
</tr>
<tr>
<td>20 = Released alive</td>
<td>Halibut that is released alive.</td>
</tr>
<tr>
<td>21 = Mortality discarded</td>
<td>Halibut that is released dead.</td>
</tr>
</tbody>
</table>
Appendix I.–Release condition codes for sablefish captured on the marking survey.

<table>
<thead>
<tr>
<th>Release Condition</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>00 = Unknown</td>
<td>Fish condition unknown, i.e. for lost fish</td>
</tr>
<tr>
<td>01 = Presumed healthy</td>
<td>Fish appear to have no recent or old injuries and no flea bites.</td>
</tr>
<tr>
<td>03 = Flea bitten</td>
<td>Flea bites visible on skin and/or fins.</td>
</tr>
<tr>
<td>04 = Old injury</td>
<td>Fish have infection or injuries that existed prior to capture with pot gear, i.e. mouth damaged from capture with longline.</td>
</tr>
<tr>
<td>05 = Presumed dead</td>
<td>Fish dead or death is imminent.</td>
</tr>
<tr>
<td>06 = No clip</td>
<td>Fish measured and tagged but lost before clipping.</td>
</tr>
<tr>
<td>08 = Pot damage</td>
<td>Fish have injuries from pot gear, i.e. abrasions, torn mouth, or gilled.</td>
</tr>
</tbody>
</table>