WEST COAST GROUNDFISH OBSERVER PROGRAM
DATA REPORT AND SUMMARY ANALYSES OF SABLEFISH-ENDORSED FIXED-GEAR PERMITS

Northwest Fisheries Science Center

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Introduction

Objective

The WCGOP collects at-sea data from limited entry trawl, nearshore, and prawn and shrimp fleets. The WCGOP's goal is to collect information on the discard of west coast groundfish to be used in assessing and managing the total fishing mortality of a variety of groundfish species. This report summarizes data collected by the West Coast Groundfish Observer Program (WCGOP) from the sablefish-endorsed fixed-gear fishery from the 2004 sablefish season.

The West Coast Fixed Gear Sablefish Fishery

Sablefish are caught along the entire west coast of the United States by vessels using fixed gear. Many of these vessels are part of the limited-entry groundfish fleet, while others fish under the open-access provisions of the fishery management plan. Sablefish is the principal groundfish target species for most limited-entry fixed-gear vessels, which range in length from 33 feet to 95 feet. Limited-entry vessels fish for sablefish primarily north of Monterey, California. Groundfish permits for these vessels can be endorsed for use of longline and/or pot gears. The fleet typically fishes in depths greater than 80 fathoms, and may be restricted to even greater depths under evolving management of the fishery. Nearly all of the vessels participating in this fishery deliver their iced catch, which is predominantly sablefish, to shoreside processors.

Most of their catch is retained, but a portion of the catch can be discarded at sea. Reasons for at-sea discard include unmarketability and attainment of vessel landing limits. Also,

since the price paid by processors for sablefish is dependent on fish size, small fish may sometimes be discarded, as fishermen seek to maximize the value of their landed catch allowances. Unlike most rockfish, sablefish do not have swim bladders that expand or explode when the fish are retrieved rapidly from great depth. Consequently, if handled properly, discarded sablefish can experience high rates of survival (Olla, et al., 1998).

Permit tiers

There are approximately 225 permits limited-entry fixed-gear permits (NMFS, NWR, Fisheries Permits Office http://161.55.16.25/main/nwp_system_version3/login/logoff_logon_form.cfm) of which 164 are "sablefish-endorsed". Sablefish-endorsed permits provide the permit holder with an annual share of the sablefish allocated to the primary fishery for fixed-gear permits. Sablefish-endorsed permits are assigned to one of three tiers: 1, 2 or 3. Of the 164 sablefish-endorsed permits, 28 are assigned to Tier 1, 42 to Tier 2, and 94 to Tier 3. Each Tier 1 permit receives 1.4% of the fishery allocation, with Tiers 2 and 3 receiving 0.64% and 0.36%, respectively.(check all preceding percentages, the number of permits are correct) Each year, these shares are translated into amounts of poundage, or "tier limits", which may be caught during the primary fishery. For the 2004 season, initially these shares were translated into tier limits of 62,000 for Tier 1, 28,000 for Tier 2 and 16,000 for Tier 3 (NMFS, NWR 2004). (In-season adjustments were made to these initial tier limits throughout the year.)

Permits that are not sablefish-endorsed are not permitted to land amounts of sablefish in excess of daily/weekly trip limit provisions. During 2004, daily landing limits ranged from 300 –350 lbs. depending on the area fished. There was also a weekly option that provided the opportunity to make a single delivery during a week, up to a poundage threshold that ranged between 900 and 1,050 pounds. Landings made under either of these options are also capped by a 2-month limit of 3,600 pounds. Outside of the primary season, or following the attainment of their tier limits, sablefish-endorsed permits may also land sablefish under the provisions of the daily/weekly limit.

Primary Sablefish Season

The primary sablefish fishery currently takes place over a seven-month season from April 1 to October 31. The seven-month season was implemented first in 2002. During 2001, the season was open from August 15, 2001 to October 31, 2001. For several years prior to 2001, tier limits were assigned, but they could only be fished during a roughly 10-day window. Any primary season tonnage left uncaught would then be divided into equal limits that were available to permitted vessels during a two-week "mop-up" fishery. Permit holders can now land their tier limits at anytime during the 7-month season. However, once the primary season opens, all sablefish landed by a sablefish-endorsed permit is counted towards attainment of its tier limit.

Permit stacking

Regulations allow for up to three sablefish-endorsed limited-entry permits to be 'stacked' on a single vessel. Stacking additional sablefish-endorsed permits on a vessel allows the vessel to land sablefish up to the sum of the associated tier limits. However, stacking does not convey additive landing limits for any other species, nor for sablefish when caught under the daily/weekly option. For example, using 2004 tier limits, a vessel with a Tier 1 permit which bought or leased an additional Tier 2 and a Tier 3 permit could land a total of 106,000 lbs. of sablefish during the primary fishery (Tier 1 + Tier 2 + Tier 3 = 62,000 lb + 28,000 lb + 16,000 lb). Prior to 2002, there were no provisions for obtaining additional tier limits through permit stacking in this fishery. Permit stacking was implemented to increase the economic efficiency of the fleet and promote fleet capacity reduction.

Fish tickets and logbooks

Fisheries managers and enforcement officers use state-issued sales receipts (fish tickets) to monitor landings. This information is transferred to the Pacific Fisheries Information Network (PacFIN) by state fisheries agencies in Washington, Oregon, and California. Fish tickets are used to ensure that each vessel's landings during the primary fishery do not exceed the sum of the vessel's tier limits. Unlike the groundfish trawl fleet, vessel fishing logbooks are neither required nor routinely collected for the fixed-gear fleet. This

absence prevents an analysis comparing observed and unobserved fishing locations. Further, while trawl observers are able to record a vessel's haul-by-haul logbook estimates of retained catch, fixed-gear observers can only rely on their own set-by-set estimates of discarded and retained catch (see Methods).

West Coast Groundfish Observer Program

On May 24, 2001, NOAA Fisheries (NMFS) established the WCGOP to implement the Pacific Coast Groundfish Fishery Management Plan (50 CFR Part 660). This regulation requires all vessels that participate in the groundfish fishery to carry an observer when notified to do so by NMFS or its designated agent. The observer program's goal is to improve estimates of total catch and discard. The program deploys as many as 40 observers, depending on seasonal variation in fishing activity. These observers are stationed along the coast from Bellingham, WA to San Diego, CA.

Program Goals

During the first year of coverage, the primary goal for the WCGOP was to provide observation of 10% of the coast wide limited entry trawl landings of groundfish species other than whiting (as reported in fish tickets). However, an additional goal was to provide pilot observer coverage in the limited-entry fixed-gear sablefish fishery (The observer coverage plan is available at: http://www.nwfsc.noaa.gov/research/divisions/fram/Observer/). During the second year of coverage, the program's goal was to increase trawl coverage and expand coverage of the limited-entry fixed-gear sablefish fishery, nearshore, prawn and shrimpfisheries.

While a major focus of the WCGOP continues to be the limited entry trawl fleet, the program has accomplished its goal of expanding coverage for both the limited-entry fixed-gear fleet, the nearshore and prawn and shrimp fleets. This report summarizes data from only the limited-entry fixed gear primary sablefish fishery.

Methods

Permit Selection Process for Sablefish-endorsed Limited-entry Permits

Assignment of permits to port groups

The first step in the stratified random selection of permits is to associate each permit with one of the port groups defined by the program. Sablefish-endorsed fixed-gear permits are assigned to a port group based upon the location of the previous year's landings. The use of port groups is designed to produce a distribution of observations along the coast that is proportional to the volume of landings. Within each port group, permits are placed in a randomly selected order and sequentially selected for observation.

Coverage Period

As sablefish-endorsed permits can land tier limit (allotted poundage) at any time during the primary season, permits must be selected for coverage throughout the entire season or until their tier limit are attained. This was the case during the primary fisheries in 2001 and 2003, allowing all fish that were landed against the tier limits of vessels selected in those years to be observed. Because the 7-month duration of the primary season was not introduced until 2002, pilot coverage in fall 2001 fishery did not highlight the need for permits to be selected for up to the full 7-month period. Consequently, the same 2-month selection period used for the trawl fleet was also employed for fixed-gear during 2002. Because permits were selected for only a single two-month period, all landings of tier poundage for selected permits were not necessarily observed.

Complications of Selecting Sablefish-endorsed Permits

Until a primary season sablefish landing has been made on a sablefish-endorsed permit, the permit can be transferred to any other fixed gear vessel. This flexibility, combined with the benefits from stacking, results in greater inter- and intra-year movement of permits between fixed-gear vessels than is observed in the trawl fleet. As mentioned above, a fixed-gear vessel participating in the sablefish-endorsed fishery can have up to three tier permits stacked on it. This environment can lead to several difficulties for

observer data collection, including: tracking of permits and vessels and attributing landings to a specific permit when stacking occurs.

Permits being allowed to move from vessel to vessel throughout the year complicate permit selection. Thus, keeping track of the vessel to which a permit is assigned requires continuous monitoring. Although permit transfers are tracked through NMFS' Fisheries Permits Office in Northwest Regional Office, WCGOP has limited resources to monitor these changes throughout the season. So, while permit owners are initially contacted before the season about their selection for coverage, their permits can be transferred to different vessels anytime before they are used to land tier-limit sablefish. In response to this situation, the observer program has adopted a policy of observing whatever vessel a selected permit is eventually fished on, even though that vessel may land fish into a different port group.

A second complication of permit selection occurs when permits are stacked. When fish are landed by a vessel that has multiple permits attached to it, there is no requirement to associate all or part of the poundage with a specific permit. Consequently, if a vessel has a mix of selected and unselected permits attached to it, all tier-limit trips must be observed, in order to ensure that the landings of selected permits have been covered. This leads to the following two complications: unselected permits receiving coverage and permits being selected a second time before other permits are covered a first time.

For example, a vessel with a Tier 1 and a Tier 2 permit attached could land a total of 90,000 pounds of sablefish in 2004. If only the Tier 1 permit were selected for observer coverage, it would still be necessary to observe all primary season landings, up to 90,000 pounds, to assure that all of the Tier 1 permit's landings had been observed. This interferes with the assumption that the permit selection is a simple random sample of available permits due to the concurrent coverage of a permit that was not selected.

For an example of the second case, suppose that the unselected Tier 2 permit in the example above was in fact observed, along with the Tier 1 permit, during 2004. Following the season, the Tier 2 permit might remain on the same vessel or might be transferred to another vessel for the 2004 fishery. In either case, it might be selected for coverage in 2004, which would result in its landings having been observed in two

consecutive years. In such circumstances, where a permit has been previously covered, though not selected, the WCGOP has adopted the following policy:

1. Observe the permit if it is attached to a vessel not previously observed for the primary fishery during the current cycle;
2. Do not observe the permit if it is attached to a vessel that has been observed for the primary fishery during the current cycle.

Fixed Gear Data Collection

The fisheries observers are trained professionals who monitor and record catch data on commercial fishing vessels, following the protocols in the WCGOP Manual (NMFS, NWFSC, 2004, unpublished report). The data collected by the observers include:

- Start time, end time and location of the set
- Gear type and fishing strategy
- Estimated total catch weight (including sets for which there is 100% discard)
- Weight of discard by catch category
- Reason for discard by catch category or species
- Species composition of discard by catch category
- Weight of fish retained by catch category
- Species composition of retained by catch category
- Document catch of prohibited species and incidental take of protected species
- Size composition, tags, and viability assessments for Pacific halibut
- Size composition of discarded fish (from randomly selected categories)
- Size composition of retained fish (from randomly selected categories)
- Basic taxonomic composition of non-fish bycatch
- Special biological collections (otoliths, maturity, food habits, genetic samples, etc.)

Fishing Trip Data

Fish ticket identification numbers are obtained from captains, processing plants, or PSMFC-WCGOP state liaisons and recorded. Observers interview skippers in order to assign a target strategy and gear code to each set.

Observed Total Catch

The methods used to estimate the observed total catch (OTC) of a set are: 1) summation of observed retained and discarded fish, and 2) extrapolation of partial observations. Use of method 1 is preferred. However, observers follow these general rules when deciding which method to employ:

1. If all individual fish in a set are counted, the estimated total catch weight is derived by multiplying the number of retained and discarded fish by the appropriate catch category weights from the Catch Form.
2. If all of individual fish in a set are not counted, extrapolation is used. The weights of retained and discarded species in the sample are derived as above, then divided by the number of hooks sampled, and multiplied by the total number of hooks in the set.

OTC's are calculated using the number of hooks or pots set. This accounts for potential fishing mortality from lost gear..

Composition Sampling

Observers sample both retained and discarded catch on fixed gear vessels by tally sampling. Tally sampling means that the observer counts every individual fish that is caught, by species, including fish released from longlines before they are brought onboard, for all hooks or pots in a set, or a randomly selected sample thereof. Total hooks or pots in a set are determined by:

1. Counting all hooks or pots in the set,
2. Multiplying the average number of hooks per skate by the number of skates in a set. When this method is used, observers count hooks on at least 1/5 of the gear fished during each trip.

Catch Category Sampling

Catch categories are assigned, based on species disposition (retained or discarded) and the method employed for determining fish weight. Three methods of determining fish weight are used on fixed gear vessels:

1. Tally Sample – This method is used if all species are counted and an actual or extrapolated weight is obtained.
2. Visual Estimate – This method is used if a species is counted, but an actual or extrapolated weight is not obtained. It is commonly employed for large species that cannot be weighed, such as big skates. This method is also used when obtaining individual weights could increase release mortality.
3. Pacific halibut length-weight estimate – This method is used for Pacific halibut only. An estimated or actual length is taken and the Length/Weight conversion table generated by the International Pacific Halibut Commission is used to determine weight.

If visual estimates or Pacific halibut length/weights are used, the actual number of fish in the tally sample must be documented for the catch category.

Species Composition Sampling

Species Composition samples are taken for all retained and discarded catch categories using the tally sample weight method. Actual counts, from the tally sample, are used. Weights can be actual (all individuals of species are weighed) or extrapolated from average weight.

Reasons for Discard

Observers document the reason for discard based on reason provided by the captain or crew for each catch category and/or species. The reasons for discard are categorized as 'prohibited', 'size', 'market', 'regulation', 'other', 'drop-off', and 'predation'.

When discerning a reason for discard for a species, the primary reason for discard is used. Therefore, the categorizations of 'drop-off' and 'predation' are only used for fish that would have been retained.

Data Management

The WCGOP uses the following procedure to ensure that the quality of the data collected is maintained. Data are collected at-sea by the observer following the protocols in the WCGOP Manual (NMFS, NWFSC, 2004, unpublished report).

During 2004, WCGOP used a web-based graphical user interface (GUI) that allows observers to directly enter data into a centralized Oracle database located at the Northwest Fisheries Science Center (NWFSC). Data within the Oracle database are accessible via the web-based GUI or by direct SQL queries to the database. For a list of data tables, see appendix A. For quality control of calculations and sampling methods, a debriefer or lead observer checks all computations made by the observer and reviews form to ensure that it is complete and that appropriate sampling methods were used. The observers are also debrief after every two-month cumulative trip limit period. Observer debriefing includes a vessel survey, a review of observer logbooks, data correction, and observer evaluation. The database is then corrected after debriefing. For quality control, the electronic data is compared to the raw data forms, and queries are run to detect data that fall outside specified ranges and other inconsistencies between data elements. The data issues detected by the QC queries are then reviewed and the electronic data is updated. Finally, the data are considered complete and ready for analysis.

Results and Discussion

Amounts of observed and unobserved sablefish (in metric tons) landed against tier limits during the primary fixed-gear sablefish seasons of 2001, 2002, 2003, and 2004 are listed in Table 1. Because port groups were not used in selecting the 5 permits that were covered during the pilot program in 2001, most port groups received no coverage that year. Beginning in 2002, permits were randomly selected within each port group and more observers were assigned to fixed-gear vessels, resulting in much more comprehensive sampling of the fleet's sablefish fishing.

Table 2 summarizes the coverage of all groundfish species (other than sharks and skates) that were landed as part of this tier-limit sablefish trips. Sablefish is the primary target of vessels participating in this fishery. Comparison of the tonnages between comparable strata in Tables 1 and 2 reveals the small percentage that is comprised by species other than sablefish.

The number of sablefish tier-limit trips and sets observed during the 2004 season are summarized in Tables 3 and 4, respectively. Table 3 reports the distribution of coast wide observed trips among port groups. Please note that the port-group assignment in Table 3 represents the port in which the fish were off-loaded from the vessel, not necessarily the port at which the fish were processed. Port-group assignments in Tables 1 and 2 reflect ports as recorded on fish tickets. In cases where fish are trucked to a different port following off-loading, this can result in apparent discrepancies between Table 3 and Tables 1 and 2. Table 4 summarizes the number of sets that were observed by general depth strata. During 2004, the vast majority of observed sets are assigned to the 'deep' strata in the table. The dividing depth between deep and shallow used in this table was 100 fathoms for sets made north of $40^{o}10'$ N. lat., 150 fathoms for the observed sets made south of $40^{o}10'$ N. lat.

It is important to note that WCGOP controls only the selection of permits for coverage. The activity of the selected vessels can vary in unpredictable ways. Therefore, the program cannot control the percentage of tonnage or trips that are observed. Also, the current sampling protocol does not separate longline from pot permits. As a result, coverage levels within each gear type, particularly within a port group, may vary from one year to the next, depending on which permits are selected. In the future, as patterns in vessel activity emerge, the coverage levels can be more easily controlled.

Amounts and rates of discard for 22 species or species groups encountered on observed sets are summarized in Table 5. For each species, the decision to discard is dependent not only upon levels of cumulative retained catch and corresponding landing limits, but also the size, condition, and marketability of the fish. For many marketable species, such

as lingcod, thornyheads, and slope rockfish, retention rates are generally high. In other cases, such as yelloweye rockfish, retention has not been allowed, in order to prevent targeting. In the case of Pacific halibut, only vessels with halibut licenses fishing within the designated halibut season may retain halibut.

Bycatch ratios for overfished species caught on observed sets in 2004 are summarized in Table 6, by gear, year, and depth strata. Bycatch ratios were not calculated for shallow strata because there were only two sets observed in shallow water (<100FM north of $40^{o}10'$N and < 150 FM south of $40^{o}10'$N). The bycatch ratios are the total poundage caught of each species per 100 lbs of retained sablefish. In the deep, all species except lingcod and canary rockfish have bycatch ratios of less than 0.1 lbs per 100 lbs of retained sablefish.

Table 7 reports three measures of species discard, and their associated standard errors, for 26 species encountered on observed sets. The first measure is the percentage of each species that was discarded. This is the same measure as reported in Table 5, except that results in Table 7 are presented for each depth zone. The second measure reflects discard per unit of effort. For longline gear, effort is calculated as the duration of a set in hours per number of hooks set divided by 1000. For pot gear, effort is calculated as the duration of a set in hours per number of pots set divided by 10. The third measure relates discarded poundage of each species per 100 lbs of retained sablefish.

Tables 8a-8c summarize bycatch ratios for overfished species and sablefish discard, within an assortment of depth categories that may be useful for evaluating management alternatives. Table 8a provides combined results for both gear types. Table 8b and 8c utilize the same format to display results for longline and pot gears, respectively.

Most sets have small or no amount of discarded of shortspine thornyheads, canary rockfish, yelloweye rockfish, darkblotched rockfish, and lingcod as displayed in Figures 1-3. The amount of sablefish discarded is high for the majority of the sets as displayed in Figure 1. Approximately 145 observed sets had over 200 lbs. of sablefish discard in

2004. The percentage of sets with over 200 lbs of discarded sablefish in observed tows increased to 36% in 2004 from 25% in 2003.

References

NMFS, NWR (Northwest Region), NMFS-SEA-04-02, Pacific Coast Groundfish Fishery Commercial and Recreational Management Measures for March through December 2004, February 27, 2004)

Olla, B.L., M.W. Davis, and C.B. Schreck, "Temperature magnified postcapture mortality in adult sablefish after simulated trawling," *Journal of Fish Biology* (1998) **53**, 743-751.

Appendix A. Oracle Database

Database Table Hierarchy

TRIPS

► FISHING_ACTIVITIES

► FISHING_LOCATIONS

► CATCHES

► SPECIES COMPOSITION

► SPECIES_COMPOSITION_ITEMS

►BIO_SPECIMENS

► BIO_SPECIMEN_ITEMS

► DISSECTIONS

Database Table Descriptions

The database tables listed in the table below are a subset of the total tables contained in the Oracle database. They represent the tables that are actually used to contain the observer data collected by the WCGOP.

BIO_SPECIMENS	Sets of species physical measurements resulting from sampling catches occurring in a haul or set
BIO_SPECIMEN_ITEMS	Physical measurements collected for an individual fish, mammal or bird occurring in a biological sample
CATCHES	PacFIN catch category based on estimates of fish caught during a haul or set
CATCH_CATEGORIES	PacFIN catch categories
DISSECTIONS	Physical specimens collected for an individual fish, mammal or bird
FISHING_ACTIVITIES	Fishing hauls or sets occurring during a trip
FISHING_LOCATIONS	Locations of hauls or sets
PORTS	Coastal cities where fishing activity is based out of
SPECIES	Fish, mammal and bird species that might be encountered during fishing
SPECIES_COMPOSITIONS	Sets of species weights and counts resulting from sampling catches occurring in a haul or set
SPECIES_COMPOSITIONS_ITEMS	Weights and counts for individual species occurring in a species composition sample
TRIPS	Sets of fishing activities that occur between the time a vessel leaves port and when it returns
VESSELS	Trawl, longline, pot or other fishing vessels