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EXECUTIVE SUMMARY

Trends in fishing effort in bottom trawl and non-nearshore fixed gear sectors of the observed U.S. west coast groundfish fisheries for 2002 to 2013 are presented. This report describes changes in the amount, timing, location, and depth of effort, in terms of landed weight of target species or groups, with a focus on the potential impacts of the 2011 implementation of an individual fishing quota (IFQ) program in the federal west coast bottom trawl fishery. Fishing effort described by haul duration and number of pots or hooks and the amount of lost and recovered gear from 2010 to 2013 is also briefly summarized.

Groundfish landings and trawl duration in the IFQ bottom trawl sector decreased after the implementation of IFQ (Tables 1 and 2). Sablefish landings in the non-nearshore and IFQ fixed gear sectors peaked in 2011 and have decreased since that time (Tables 2 and 3). The number of pots in the non-nearshore fixed gear sector decreased from 2010 to 2012, but increased in 2013; the number of pots in the IFQ sector increased from 2011 to 2012 and then sharply decreased from 2012 to 2013. The number of hooks in both the non-nearshore and IFQ fixed gear sectors has decreased from 2011 to 2013.

Timing of effort in the bottom trawl sector became more evenly distributed after implementation of Amendment 19-related spatial closures in mid-2006, with the peak proportion of catch shifting from March/April to July/August (Table 5). Since IFQ implementation, bimonthly trends have more closely resembled those of 2002 to mid-2006 rather than those of 2006 to 2010 due to a peak early in the year; however, the decline after the peak is more gradual (Table 5). After 2011, both non-nearshore and IFQ fixed gear sectors peak in September/October (Table 6). Prior to the implementation of IFQ, the non-nearshore fixed gear pot sector peaked in May/June. IFQ vessels fishing pot and hook and line gears catch more than 50% of their total sablefish landings in September/October.

Bottom trawl effort has moved further northward since spatial closures were implemented in 2006, with these trends continuing since IFQ implementation (Tables 7 and 8; Figures 12, 13, and 16). The average latitude of landings in the hook and line portion of the sablefish fisheries has trended southward since 2009, while the average latitude in the pot sector moved steadily north from 2008 until 2012 (Tables 7 and 9; Figures 14 and 15). The average latitudes of both pot and hook and line gears of the IFQ fishery are considerably further north than the average latitude of non-IFQ fixed gear fisheries.

After IFQ implementation, bottom trawl effort has moved into slightly shallower waters, but remains far deeper than effort in the pre-2006 period (Tables 10 and 11, Figure 16). Bottom trawling north of 40°10' N. occurs in deeper waters than in the south. The hook and line portion of the non-nearshore fixed gear fisheries has increased in depth from 2002 to 2013. Similar to trawl effort, hook and line south of 40°10' N. consistently occurs in deeper waters than in the north (Figure 17). The depth of pot gear effort has been

extremely dynamic from 2002 to 2013, but effort has largely moved into deeper water both north (starting in 2006) and south (starting in 2003) of 40°10' N.

Effort by the IFQ hook and line sector south of 40°10' N. occurred in fairly deep waters in 2011 and 2013, with a considerably shallower average depth in 2012 (Tables 10 and 11). In the north, depths were more constant, with a move to shallower waters in 2013. The depth of effort in IFQ pot fishing has been similarly dynamic. In the north, fishing effort in 2012 was 100 fm deeper than in either 2011 or 2013, while effort in the south moved into shallower waters in 2013.

In the sections that follow, we will elaborate on these observations and provide some context as to what may be driving these changes in effort.

INTRODUCTION

The primary objective of this report is to evaluate changes in fishing effort over time by gear type as a result of implementing the IFQ management program in the U.S. Pacific coast groundfish fishery. This report is required by the National Marine Fisheries Science (NMFS) Biological Opinion on Continuing Operation of the Pacific Coast Groundfish Fishery (NMFS 2012). Specifically, we describe fishing effort in the following sectors of U.S. west coast groundfish fisheries for the years 2002-2013:

- Limited entry (LE) bottom trawl (2002-10)
- IFQ non-hake, bottom trawl (2011-2013)
- Non-nearshore fixed gear (aggregating sablefish LE fixed gear sablefish primary (tier endorsed), open access (OA) fixed gear, and LE fixed gear daily trip or quota limits) (2002-2013)

We did not explore trends in other groundfish sectors, recreational fisheries, research fisheries, tribal fisheries, or any fisheries not observed by the Northwest Fisheries Science Center (NWFSC) Observer Program.

In 2011, new regulations governing the LE bottom trawl fishery led to the induction of IFQs. Primary goals of IFQ management included decreased bycatch and increased catch accountability, profitability, and efficiency. With this change, each vessel is now required to carry a federal observer on all fishing trips, resulting in 100% observer coverage. Observer coverage was provided by the West Coast Groundfish Observer Program (WCGOP) and administered by the NWFSC Fishery Resource Analysis and Monitoring Division (FRAM) Fishery Observation Program (FOS), Seattle, WA.

Permit holders with IFQ and a trawl endorsement can fish multiple gear types (although not within the same trip), including bottom or midwater trawl gear or hook and line or pot gear. These management changes could impact fishing effort in bottom trawl sectors, as well as alter fixed gear fishing effort by providing a new opportunity for fixed gear fishing activity. Throughout this report, we will refer to non-IFQ, non-nearshore sectors, which include the sablefish primary, open access, and daily trip limit sectors.

This report describes trends over time in fishing effort related to the implementation of IFQ management. However, many other factors, including variations in weather, market price, stock size, and catch limits, are at play in the 12-year data set. We focus our attention on implementation of IFQ, but definitively attributing changes in effort to changes in this specific management shift are not always straightforward. We discuss other management shifts and their effects on fishing effort for context when appropriate.

Since the PFMC's first Groundfish Fishery Management Plan, its goals have included achieving maximum sustainable yield (MSY) and promoting year-round fishing opportunities to support domestic consumer

markets and the economies of coastal communities. The numbers of participating commercial vessels were first limited in 1994, with the implementation of a Federal licensing program. Rather than allow trawl seasons to shorten, the effort expended by individual vessels was constrained through a system of periodic (usually 2- or 1-month) cumulative landing limits.

Beginning in the late 1990s, it became apparent that several species were depleted and in need of rebuilding. The severity and scope of management actions required to promote rebuilding led the Department of Commerce to declare the fishery a disaster (and eligible for Federal relief) in 2000. Not only were quotas for rebuilding species reduced by more than 90% from what they had been in the 1990s, the ability to maintain fishing opportunities for healthy stocks throughout even most of the year was reliant upon the development and implementation of new management approaches.

One of the first new developments was the introduction of explicit modeling of fleet catch and bycatch, in order to evaluate the effects of management alternatives. Around the same time, the NWFSC implemented a comprehensive observer program, with at-sea observation of all groundfish fleets. Random coverage of the trawl fleet was 20-30%, and the data from this program provided critical information to support reliable fishery modeling and estimation of fishing mortality, especially for rebuilding species.

Early in the 2000s, it became clear that average bycatch rates for rebuilding species, across all fishing areas, would not support year-round fishing with viable cumulative limits for target species. One response to this situation was the designation of closed areas. By preventing fishing from occurring in many of the areas where bycatch of rebuilding species was highest, average fleet bycatch rates could be lowered. Some closures, such as the Cowcod and Yelloweye Rockfish areas, had fixed boundaries, while the Rockfish Conservation Area (RCA) combined fixed, minimum boundaries—lines approximating the 100- and 150-fathom contours—with the ability to extend the closed area, in shoreward or seaward directions, by 25-fathom increments. Differential cumulative limits for target species were frequently set for areas shoreward and seaward of the RCA, with limitations on fishing in both areas during the same cumulative period. In order to assure that fishing was not occurring in closed areas, all trawl vessels (initially) were required to install an approved Vessel Monitoring System (VMS). This requirement was later extended to cover other sectors of the groundfish fleet.

In addition to area closures, gear restrictions were also implemented. Throughout the 1980s and 1990s, bottom-trawl fishing on the continental shelf was characterized by two very different strategies. The targeting of flatfish was conducted over flat gravel or mud substrate, using nets with footropes whose bobbins were typically less than 12.7 cm in diameter, in order to minimize fish escaping under the footrope. The other strategy targeted rockfish, or a mix of rockfish and flatfish, using much larger footropes, including some that employed large, commercial truck tires, which allowed fishing to occur in very rocky substrate. Concurrently with the implementation of the RCA, trawl gear use shoreward of the RCA was restricted to using footropes

no larger than 20.32 cm in diameter, with added restrictions on chafing gear, used to protect the under-side of the net. Combined with the minimal landing limits provided for all shelf rockfish, these restrictions removed economic incentive for vessels to trawl in rocky, shelf habitats. Subsequently, based on fishery testing of new gear designs, a new, more selective flatfish trawl net was required in waters shoreward of the RCA, north of 40°10' N. lat. This design featured a headrope that was longer than the footrope, which exploited the behavior of many rockfish to swim upwards in response to encountering the footrope.

At the dawn of this fishery transformation in 2000, the Economic Sub-committee of the PFMC's Scientific and Statistical Committee released a report on overcapitalization in the groundfish fleet, which concluded that shore-based trawl capacity was 2-4 times the amount needed to harvest the available resource. With the help of NMFS analysis, the trawl industry developed its own proposal to reduce capacity and saw it enacted by the United States Congress. A buyback of trawl permits, along with the crab and shrimp permits of participating vessels, was initiated in late-2003 and permanently removed 91 vessels and 239 groundfish, crab, and shrimp permits. The buyback was funded through both a grant from the Federal government and a government-guaranteed loan, which is repaid by the fleet through landings fees.

Around the same time, the PFMC adopted a control date of November 6, 2003, which served as a cutoff for landings histories to qualify for initial allocation of fishing privileges under a new form of management: individual quotas. In 2011, the prior management regime of landing limits for trawl vessels was replaced by a catch share program, in which shares of overall trawl sector allocations of numerous species were distributed among trawl permit owners, on a continuing basis. Each year, owner's Share percentages are converted to poundage amounts that limit their catch of those species. Transfers of Share Pounds (and more recently the Shares, themselves) are allowed, but subject to accumulation restrictions. Estimates of total catch are based on a combination of landing receipts and at-sea observation of discard on all trawl trips. The goal of the program is to:

> *Create and implement a capacity rationalization plan that increases net economic benefits, creates individual economic stability, provides for full utilization of the trawl sector allocation, considers environmental impacts, and achieves individual accountability of catch and bycatch.*

The program's objectives include promoting a viable, profitable, and efficient groundfish fishery that provides participants with increased operational flexibility and safety, while promoting practices that reduce bycatch, discard mortality, and minimize ecological impacts.

IFQ management has altered two major aspects of the fishery. First, accountability for discards has been shifted from the fleet-as-a-whole to individual operations, which has resulted in a rapid and substantial reduction in discards of most species. Second, with the elimination of artificially-low landing limits for some healthy species, in order to promote rebuilding of others, individual operations have greater opportunities to find ways to target those healthy stocks that result in less bycatch. Over time, it is also expected that the markets for shares will provide another means of addressing remaining excess capacity in this fishery.

Given this background, we present trends in fishing effort in selected U.S. west coast groundfish fishery sectors from 2002 to 2013. We primarily report fishing effort as Fishery Management Plan (FMP)-managed groundfish (excluding Pacific hake) and sablefish landings, recorded on landing receipts (a.k.a., fish tickets). Fish tickets are issued by state agencies (WA, OR, CA) and record the total amount, by weight, landed per trip, regardless of whether a trip was observed. Thus fish tickets represent the single best proxy for fleet-wide fishing effort. Trips in both LE bottom trawl and non-nearshore fixed gear sectors are observed less than 100%, so utilizing fish tickets allows for easier comparison across sectors. Effort can also be estimated by the amount of time gear is fishing or amount of gear used. LE bottom trawl vessels were required to complete logbooks containing tow duration and depth information, providing additional data for that sector. However, extrapolations from observer data were needed to estimate the fleet-wide number of hooks and pots in the non-nearshore fixed gear sector, because these sectors do not have a logbook requirement. For the same reason, depth observations in the non-nearshore fixed gear sector come only from WCGOP data. These differences result in a greater amount of uncertainty in the reported trends of non-nearshore fixed gear fishing effort, compared to both LE and IFQ bottom trawl.

This report aims to show changes in fishing effort overall, as well as more subtle changes in timing, spatial location, and depth. We provide total groundfish and sablefish landings and tow duration or number of hooks or pots coast-wide as well as north and south of the groundfish management line at 40°10' N. latitude. To further explore changes in fishing effort, we present bimonthly landings as a proportion of yearly totals, average latitude of fishing by year, and statistics describing the depth of fishing by year and north and south of the groundfish management line at 40°10' N. latitude. Together, this information helps to identify changes and trends in fishing effort over the past 12 years.

DATA SOURCES

Data sources for this report include data from: 1) observers aboard commercial fishing vessels (recorded and maintained by the WCGOP, 2) state logbooks, and 3) Pacific Fisheries Information Network (PacFIN) landing receipt data, referred to as fish tickets.

OBSERVER DATA

Fishing effort estimates are derived from independent scientific observation of catch conducted on commercial groundfish vessels at sea by the WCGOP, a part of the NWFSC FRAM FOS program. The WCGOP observes several federally-managed sectors of the groundfish fishery, including the LE groundfish bottom trawl, LE and OA fixed gear, IFQ non-hake bottom and midwater trawl and IFQ shoreside hake. The WCGOP also observes several state-managed fisheries that incidentally catch groundfish, including the nearshore fixed gear fisheries in California and Oregon, California halibut trawl, and Oregon pink shrimp

trawl fisheries. For a list of groundfish sectors not observed by FOS, see the description of observer coverage provided in the most recent groundfish mortality report (Somers et al. 2014).

The WCGOP's goal is to improve total bycatch estimates by collecting information on the discarded catch (fish returned overboard at-sea) of west coast groundfish species. For more details about WCGOP goals, vessel selections, and data collection, see the WCGOP website at http://www.nwfsc.noaa.gov/research/divisions/fram/observer/. The website also provides estimates of observer coverage, observed catch, and a summary of observed fishing depths for each sector. A list of fisheries, in order of coverage priority, and detailed information on data collection methods employed in each observed sector can be found in the WCGOP manual (NWFSC 2014a, NWFSC 2014b).

Observer and fish ticket data QA/QC is described in detail on the FOS website (http://www.nwfsc.noaa.gov/research/divisions/fram/observation/data_processing.cfm). All subsequent data processing steps specific to this report are described in the methods section below.

Logbook Data

Vessel logbook record-keeping is a state-mandated requirement for the LE groundfish bottom trawl sector in Washington, Oregon, and California. A common-format logbook is used by all three states, and vessel reported logbook information is entered into state agency databases. The electronic logbook data are then uploaded by state agencies to the PacFIN regional database, which is maintained by the Pacific States Marine Fisheries Commission (PSMFC).

Bottom trawl logbook data for 2002-2013 were retrieved from the PacFIN database. PacFIN logbook data for 2002-2012 was queried in February 2014 and data for 2013 was queried in December 2014. These data were divided into groundfish fishery sectors (Somers et al. 2015). All subsequent data processing steps are described in the methods section below. Logbook data from the OA groundfish trawl sector were not included in our analyses.

Landings Data

Fleet-wide landing receipts, also referred to as fish tickets, are the cornerstone of landed catch information for all sectors of the commercial groundfish fishery operating off the Pacific coast of the United States. Fish tickets are trip-aggregated sales receipts issued to vessels by fish-buyers in each port for each delivery of fish. Fish tickets are designed and issued by a state agency (Washington, Oregon, or California) and must be returned to the agency for processing. Each state conducts species-composition sampling for market categories (single species or a mix of species) reported on fish tickets. Fish ticket and species-composition data are submitted by state agencies to the PacFIN database. For analytical purposes, the percentage of weight of each species within market categories obtained from species composition sampling was applied to the fish ticket data used in our analyses. In doing so, landed weights from sampled market categories were

distributed to individual species whenever possible. PacFIN data for fish ticket landings with state species composition sampling applied (*vdrfd* table) was queried in March 2014 (for 2011-2013) and November 2012 (for 2002-2010). All additional data processing steps are described in the methods section below.

METHODS

AMOUNT OF EFFORT

Total landings were estimated for each sector by year, both coast-wide and north and south of the groundfish management line at 40°10' N. latitude. We calculated total sablefish landings and total FMP groundfish landings (including sablefish). Groundfish landings provide a unit of effort for trawl sectors, while sablefish landings are a more appropriate unit of effort for fixed gear sectors. We provide both measures for all sectors, to allow for comparison. Due to less than 100% in non-IFQ sectors, landings data summaries in these sectors were derived from PacFIN fish tickets, with spatial location approximated based on the latitude of the port of landing. IFQ landings data summaries were derived from fish ticket-adjusted observer records of retained weights, and spatial classifications were based on observer-recorded haul locations.

We also calculated the number of sets or hauls where lost gear was observed and where derelict gear was recovered in each sector, gear, and year. We did not attempt to expand these observed proportions to create fleetwide estimates of gear lost or derelict gear recovered.

In addition to landings, this report includes effort metrics of tow duration, number of hooks, or number of pots, depending on gear type. This metric provides an estimation of effort that is not impacted by factors like the abundance of fish in the given year. However, the lack of 100% coverage in the non-IFQ portion of the fleet requires expansion and results in increased uncertainty in estimations.

For the LE bottom trawl sector, state-required logbook data were used to calculate tow durations and total number of hauls without expansion, despite less than 100% observer coverage. For the IFQ bottom trawl and fixed gear sectors, 100% observer coverage allowed for simple summations within each sector to calculate the total amount of fishing effort.

For the non-IFQ, non-nearshore fixed gear sector, logbook data is not required across all states and observer coverage is below 100%, so expansions were performed based on the observed number of hooks or pots and landed sablefish. Estimates were generated for each effort index by year and season based on the following equation:

$$\hat{E}_{gx} = \frac{\sum_t b_{gxh}}{\sum_t r_{gxh}} \times F_{gx}$$

where:

g: gear type (hook-and-line or pot)
x: index strata (year, area)
h: hauls in observer data
b: observed number of hooks or pots, depending on gear type *g*
r: observed retained weight (mt) of sablefish
F: weight (mt) of retained sablefish recorded on all fish tickets
E: estimated effort for gear type *g* in stratum *x*

For 2002, no hauls were observed in the non-nearshore pot sector south of 40°10' N. latitude, so the observed ratios north of 40°10' N. latitude were used in combination with landings south of 40°10' N. latitude for expansion of effort metrics.

Annual Timing of Effort

Timing of effort depends strongly on the potential profitability of different sectors and landings throughout the year. We calculated the monthly shore-based revenue for both trawl- and fixed-gear-endorsed vessels by fishery in three years: 2002, 2008, and 2012. The seasonal changes in revenue across these years provide important background to understanding patterns in timing of fishing effort.

To assess trends in the timing of fishing effort itself, we calculated the percentage of annual landings by each fishery and gear occurring in bimonthly periods over each year. We then calculated the average percentage across years in different time periods. The LE bottom trawl sector was grouped into pre- and post-Amendment 19 periods, to account for changes caused by essential fish habitat (EFH) closures, as described in the Introduction. The IFQ fishery was grouped into a single time period of 2011-2013. The non-IFQ fixed gear sector was grouped into pre-IFQ and post-2011. The percentage of catch in a bimonthly period was also calculated across all vessels using the same gear, regardless of sector, as well as the change in these proportions before and since IFQ implementation.

For non-IFQ sectors, the fish ticket landing date was used, while for IFQ sectors, the observed haul date was used. The non-nearshore fixed gear fishery was grouped into pre-IFQ and IFQ time periods. The hook and line portion of the IFQ sector in the January/February period contained less than three unique vessels, so the effort in January/February and March/April periods were calculated as the average over both periods.

Location of Effort

To assess trends in the location of fishing effort, we calculated the average latitude of annual landings by gear and sector in each year. We calculated this in two ways: 1) each haul (in IFQ) or fish ticket (in non-IFQ) weighted equally, in order to assess the average latitude of haul locations, and 2) each haul (in IFQ) or fish ticket (in non-IFQ) weighted by groundfish or sablefish retained per latitude divided by the total groundfish in the sector, in order to assess the average latitude of landings in addition to the average latitude of hauls.

As with the amount of effort north or south of the 40°10' N. latitude line described above, we used the port latitude of fish ticket landings for non-IFQ sector and the latitude of the haul as recorded by the observer for the IFQ sector.

Depth of Effort

Depth of effort was summarized in two different ways. First, we calculated the minimum, mean, and maximum depth of all hauls. Second, we calculated the proportion of hauls in 50-fathom depth bins. Both of these datasets were stratified by year for each sector and gear, north and south of the 40°10' N. latitude line.

In the LE bottom trawl sector, we used PacFIN logbook data to analyze depth. In the IFQ sector, 100% observer coverage allowed us to use the recorded haul depth for all fishing effort. In the non-nearshore fixed gear sector, the only depth data available comes from WCGOP observers. Therefore, the non-nearshore depth data represents a smaller proportion of the fleet and fishing activity than the depth data for the LE bottom trawl and IFQ sectors.

Geospatial Analysis

Given the long north-south dimension of the FMP area, latitude and depth of fishing hauls or sets provides the means to analyze general spatial and temporal trends in fishing effort. To assess changes in more discrete spatial patterns of fishing requires plotting of individual fishing locations. The challenge in analyzing the spatial patterns of fishing effort is how to best represent trawl tows or fixed gear sets. To analyze the effort spatially, a straight line connecting the start and end points of trawl hauls or fixed gear sets was used to represent each fishing event. Lines intersecting land, outside the U.S. EEZ, deeper than 2,000 m, or with a calculated straight-line speed greater than five knots (bottom trawl only) were removed from the spatial analysis. From these line features, we created an effort density layer that depicts the relative intensity of fishing effort within relevant gear types and time periods. The following description of methods closely matches those used for development of fishing intensity layers created for the Council's recent review of groundfish EFH (GEFHRC 2012).

Fishing intensity was calculated as the total length of all lines intersecting a standardized area. To calculate this metric, a line density algorithm in ArcGIS™ geographical information system software (Environmental System Research Institute, Incorporated, Redlands, California) was used. The line density algorithm calculates density within a circular search area centered at a grid cell of specified size. The value (units: km/km^2) for each grid cell is the quotient of total line portions intersecting the circular area per grid cell area (Figure 1). Because density outputs are highly sensitive to the specified radius and cell size, relative values are more informative than absolute values. Relative density identifies areas where fishing effort is concentrated while still ensuring confidentiality of individual fishing locations and is thus superior to depicting confidential tow lines. The initial density output was more spatially extensive than those shown in the map figures, because it

included confidential cells where density values were calculated from tows or sets made by less than three vessels. Confidential cells were removed from the maps presented in this report. Density parameters were chosen to minimize data exclusion but maintain confidentiality while still providing a high spatial resolution (500 m cell size). A larger search radius (10,000 m vs. 3,000) was used for non-nearshore fixed gear effort density because fixed gear effort data was incomplete and patchier compared to the LE and IFQ bottom trawl and IFQ fixed gear sectors.

For the LE bottom trawl sector, logbook data were summarized for three relevant time periods: 2002 to mid-2006, mid-2006 to 2011, and 2011 to 2013, coinciding with two major regulatory actions (i.e., Amendment 19 and 20). For the fixed gears, observer records were analyzed separately by gear type (longline, pots), sector (non-nearshore and IFQ) and time period (2002-10 and 2011-13).

RESULTS

AMOUNT OF EFFORT

In 2011 and 2012, the amount of groundfish retained coast-wide by bottom trawl vessels was lower than any previously observed year (Tables 1 and 2, Figure 2). In 2013, the amount increased but remains lower than most pre-IFQ years. These patterns hold true when comparing landings north and south of the management line at 40°10' N. latitude (Figure 3). Both before and since IFQ implementation, 74-90% of landings occurred north of the management line. South of the management line, landings between the few years before and since IFQ implementation decreased by a much lower amount. Trawl duration decreased sharply between 2003 and 2004, reflecting the trawl permit buyback, and then increased yearly through 2009 (Figure 4). In 2010, the tow duration again dropped sharply. Since IFQ implementation, tow durations have remained fairly constant from 2011 to 2013.

Cumulative landed sablefish across both non-IFQ and IFQ fixed gear sectors peaked in 2011 and has decreased sharply over 2012 and 2013 (Tables 2 and 3, Figure 5). The annual catch limits (ACL) for multiple species also fluctuated over this time period, so we explored trends in the proportion of attainment of ACL. The proportion of sablefish ACL attained has decreased to a lesser degree than the landed weight. After a sharp decrease with the implementation of IFQs, the proportion of ACL attainment for major and minor trawl target species, Dover sole, thornyheads, and lingcod has primarily increased from 2011 to 2013 (Figure 6). Yellowtail rockfish attainment has remained more constant, between 31 and 36%.

Trends in landed weight by the non-nearshore fixed gear sector are largely attributable to the hook and line portion across all years, although smaller decreases have also occurred in the pot portion. Additionally, 2011 showed the highest amount of sablefish landings in the IFQ fixed gear fishery. In 2011, IFQ hook and line catch made up 11% of the total sablefish landings by all hook and line vessels (IFQ and non-IFQ); in 2013

the IFQ hook and line sector only made up 5% of all hook and line sablefish landings. Fishing effort by IFQ pot vessels has comprised between 55 and 63% of landings by pot gear from 2011 to 2013. In the non-nearshore fixed gear fishery, hook and line effort shows a southward trend from 2009 to 2013. In the IFQ fishery, pot gear effort has shifted north.

The estimated number of hooks in the non-nearshore fixed gear sector is extremely variable, with a gradual increase from 2002 to 2006 other than a dip in 2005, a sharp decrease in 2007, a steep increase until 2009, and a sharp decline through 2013 (Figure 8). The number of hooks in the IFQ fishery is considerably lower than in non-IFQ and has decreased from 2011 to 2013.

In the non-nearshore fixed gear sector, the number of pots increased gradually from 2002 to 2010, with a decrease through 2012 followed by a slight increase in 2013 (Figure 9). In the IFQ sector, the number of pots fleetwide has been considerably more variable, with a sharp increase from 2011 to 2012 followed by a sharp decrease from 2012 to 2013. Across all three years, the number of pots in the IFQ sector has been at least triple, and in 2011 more than six times, the number estimated in the non-nearshore sector. This low catch per unit effort may be due to fixed gear fishing effort experimentally occurring in new areas in the south and landing little sablefish. Due to confidentiality, this data cannot be shown spatially, as described in the "Geospatial Analysis" section below.

The proportion of annual observed hauls with lost gear in the non-nearshore fixed gear fishery ranged from 1 to 6% for the years 2010 to 2013 (Table 4). In the IFQ fishery, 1% of observed hook-and-line hauls lost some gear across 2011 to 2013, while 3 to 5% of observed pot hauls lost some gear. Less than 1% of annual observed hauls across trawl sectors lost gear. The bottom trawl fishery recovered derelict gear in 3 to 4% of annual observed hauls from 2010 to 2013. All fixed gear sectors recovered derelict gear in less than 1% of annual observed hauls across all years except the open access fixed gear fishery in 2010, when 1% of observed hauls recovered lost gear.

Annual Timing of Effort

With IFQ management in the bottom trawl sector, fishers have gained freedom from 2-month limits that must be fished or foregone, allowing many trawl vessels greater flexibility in scheduling groundfish activities around participation in other fisheries important to overall profitability (Figure 10). The primary sources of revenue for trawlers from other west coast fisheries are pink shrimp, in late spring and summer, and Dungeness crab, during winter months.

Before the spatial closures that occurred in June 2006, groundfish landings in LE bottom trawl, on average, peaked in March/April and then decreased throughout the rest of the year (Table 5, Figure 11). After the 2006 closures until 2011, landings were more stable throughout the year, peaking in July/August. Since implementing IFQ, the timing of trawl effort appears more similar to pre-closure patterns, with a larger

increase from January/February to March/April and a more gradual decrease from March/April to November/December.

Many operations with LE fixed-gear permits participate in other, non-groundfish fisheries on the west coast. Historically, the most important of these is the fishery for Dungeness crab. This fishery begins in November or December and typically peaks in December or January (Figure 12). Participation drops off considerably by March, although some may continue to deliver crab into earlier summer, if catch rates remain acceptably high. The other three principal fisheries that support these operations are salmon, Pacific halibut, and tuna, which are most active between May and October. These fisheries vary in importance from year to year and are frequently subject to short seasons and/or vessel landing limits.

The timing of hook and line effort in sablefish fisheries has not changed greatly with the implementation of IFQ (Table 6, Figure 13). In both time periods, effort increases until September/ October and then sharply decreases. The IFQ hook and line sector also peaks in September/October, but the levels of fishing before that bimonthly period are considerably lower.

The timing of pot effort in sablefish fisheries has changed slightly after the implementation of IFQ (Table 6, Figure 13). Before IFQ, the proportion of catch peaked in May/June, and since IFQ, effort peaks in September/October, as do all other fixed gear sectors in this time pperiod. IFQ pot effort follows a very similar pattern to that of hook and line, with a slightly less sharp increase to its peak in September/October.

Across both pot and hook and line, more than 50% of catch by IFQ vessels occur in September/October. No other bimonthly period comprised more than 21% of the annual catch.

Location of Effort

After an initial southern shift during the 2006 spatial closures, much of the bottom trawl effort moved northward from 2007 to 2011 (Table 7, Figure 14). In 2012, however, average latitude of hauls was further south than in 2011, before returning to again trending northward in 2013. When these locations are weighted by the amount of groundfish landed, landings moved slightly southward in 2010, followed by a minor northward movement in 2011 (Table 8, Figure 15). In 2012 and 2013, the weighted average latitude was similar and slightly south of the average latitudes in 2010 and 2011.

The average latitude of sets in the hook and line portion of the sablefish fisheries has trended southward since 2009, while the average latitude in the pot sector moved steadily north from 2008 until 2012 (Table 7, Figure 16). When weighted by sablefish landings, the patterns for hook and line are similar, although the southern shift begins in 2006 and is more apparent (Table 9, Figure 17). For the pot sector, average latitudes weighted by sablefish landings show a northward trend since 2008, with an even greater increase in latitude between 2012 and 2013. Although the number of hauls may have moved slightly southward in 2013, the greatest amount of sablefish landings continues to occur in more northern waters.

The average latitudes of both fixed gear portions of the IFQ fishery are considerably higher than those of the sablefish fisheries. The average latitude in hook and line peaked in 2012, with considerably lower averages in both 2011 and 2013. Pot effort has moved steadily northward from 2011 to 2013. When weighted by sablefish landings, the spatial differences between IFQ and sablefish fisheries become much less apparent. However, in 2012 the hook and line portion of the IFQ sector was considerably further north than that of the non-nearshore fixed gear sector.

Depth of Effort

Average fishing depth of bottom trawl vessels decreased both north and south of the 40°10' N. latitude line from 2002 to about 2006, after which it increased until 2010 (Table 10, Figure 18). Since IFQ implementation, bottom trawl effort has been moving into slightly shallower waters, yet remains far deeper than depths in the pre-2006 period. Bottom trawling south of 40°10' N. continues to occur in deeper waters than in the north. The greatest proportion of bottom trawl tows occurs in the 50-100 fm depth bin in the pre-IFQ period and is split between the 50-100 and 250-300 fm depth bins in the IFQ period (Table 11).

The hook and line portion of the non-nearshore fixed gear fisheries has primarily increased in depth from 2002 to 2013 both north and south of 40°10' N (Table 10, Figure 19). Similar to trawling effort, hook and line in the south consistently occurred in deeper waters than in the north. The depth bin containing the highest proportion of hook and line sets were deeper since IFQ implementation in both the north and the south (Table 11).

The pot portion has been extremely dynamic from 2002 to 2013 (Table 10, Figure 19). From 2006 to 2012, the depth of pot fishing in the northern sablefish fisheries increased. However, in 2013, the average depth was the second shallowest ever observed. In the south, effort in the pot fishery also increased in depth from 2003 to 2012. However, the increase in average depth in 2012 was a considerable jump, and in 2013 the average depth was only slightly shallower than in 2011. The greatest proportions of sablefish pot hauls in the north and south have moved deeper since the implementation of IFQ, with a notable increase in fishing 500-600 fm in the south (Table 10).

Effort by the IFQ hook and line sector south of 40°10' N. occurred in fairly deep waters in 2011 and 2013, with a considerably shallower average depth in 2012. (Table 10, Figure 19) In the north, depths were more constant, with a move to shallower waters in 2013. In 2012 and 2013, IFQ hook and line fishing has occurred in deeper waters south of 40°10' N. The depth of effort in IFQ pot fishing has been similarly dynamic. In the south, fishing effort was focused in deeper waters until 2013. In the north, fishing effort in 2012 was 100 fm deeper than in either 2011 or 2013.

Geospatial Analysis

Spatio-temporal trends in bottom trawl fishing intensity are generally consistent with trends in latitude and water depth, but more nuanced (Figure 20). Following implementation of Amendment 19 regulatory measures, most notably the closure of 51 areas to bottom trawling, bottom trawl effort shifted to deeper waters off Washington (WA) and Oregon (OR) and off San Francisco, California (CA) (Figure 21). In areas south of 40°10' N., trawl effort has decreased in general. Since the inception of IFQs, there has been an almost ubiquitous decline in bottom trawl effort, with the exception of discrete areas of increase off central WA, the Columbia River on the north side of Astoria Canyon, and a few small areas off central CA and Santa Barbara, CA. It should be noted, however, that the most recent time period only includes three years of data, compared to roughly 4.5 years for the prior two time periods. Due to confidentiality mandates, 3.0, 2.2 and 8.1 % of all effort (i.e., length of towlines) was excluded from time periods 1, 2 and 3, respectively (Table 12), although the proportion varies considerably in certain areas along the coast (Figure 22). For example, due to a small number of trawl vessels operating off Morro Bay, CA (35°23' N) after implementation of Amendment 19, much of the effort in the latter two time periods for that area was excluded from map figures.

For fixed gears, we remind readers that the source data only represent a portion of the total effort prior to implementation of IFQ. Fishing effort has been spatially variable from 2002-10 and is much patchier than the bottom trawl sector over all time periods we examined. Consequently, and despite the fact that all trips are observed in the IFQ period, the maps presented here cannot be used to characterize the fishery completely. Furthermore, we combined nine years of data for the pre-IFQ period (i.e., 2002-10), while we only had access to three years since implementation of IFQ. Therefore, examination of changes in the intensity of effort for a given area is not practical.

The map figures provide a good overview of where most hot spots of longline effort occurred, and a fair representation of hot spots of pot effort. For longline, hot spots of effort in the non-nearshore sector pre-IFQ occurred only off northern WA, but effort was widely distributed on the WA and OR continental slope (Figure 23, left panel). Both non-nearshore and IFQ sectors for the later period showed hot spots on the OR and WA slope, with additional hot spots off San Diego, CA in the non-nearshore sector and central CA in the IFQ sector (Figure 23, middle and right panels). Due to confidentiality mandates, 5.7, 34.1 and 54.5 % of all longline effort (i.e., length of set lines) was excluded from pre-IFQ non-nearshore 2002-2010, non-nearshore 2011-13, and IFQ sectors 2011-2013, respectively (Table 13), although the proportion varies considerably in certain areas along the coast (Figure 24).

For pots, the amount of non-confidential data is relatively small. Regardless, hot spots of pot effort are evident south of Cape Mendocino (40°10' N) near Fort Bragg, CA in both time periods of non-nearshore sector (Figure 25, left and middle panels), along with slightly weaker and dispersed areas of effort in the pre-IFQ period on the central OR slope (Figure 25, left panel). Hot spots of pot effort during IFQ appear to have shifted northward off northern OR and WA, but a large and intense hot spot emerged off Pt. Conception in central CA (Figure 25, right panel). Due to confidentiality mandates, 28.1, 82.0 and 38.6 % of

all pot effort (i.e., length of set lines) was excluded from pre-IFQ non-nearshore 2002-2010, non-nearshore 2011-13, and IFQ sectors 2011-2013, respectively (Table 14), although the proportion varies considerably in certain areas along the coast (Figure 26).

Although the maximum magnitude of fishing intensity for longline appears much higher in the pre-IFQ period (Figure 23), the pre-IFQ time period encompasses three times the number of years in the IFQ period. Despite this striking difference in time range, the pot sector shows a comparable level of maximum fishing intensity for pre-IFQ and IFQ periods (Figure 25). This might suggest that the level of pot effort has increased with IFQ, at least in some areas, or simply that pot effort has become more localized in discrete areas.

ACKNOWLEDGEMENTS

The authors are grateful to Marlene Bellman, whose previous work which laid the groundwork for this report, and to the many WCGOP observers who worked hard under sometimes extreme conditions to collect these valuable data.

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FIGURES

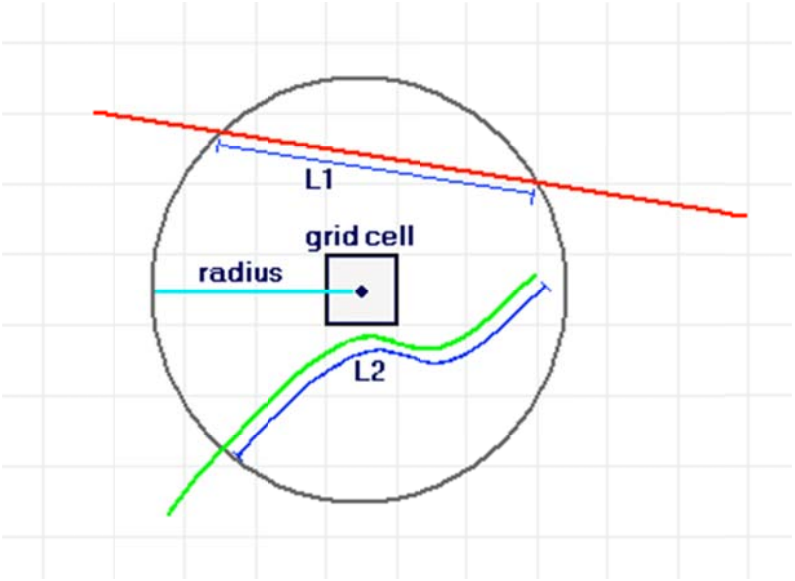

FIGURE 1. Conceptual drawing of how the ArcGIS™ line density algorithm works, showing application of the user specified parameter values: search radius and grid cell size. "L1" and "L2" represent hypothetical line inputs to the density algorithm. Image source: Environmental Systems Research Institute, Inc.

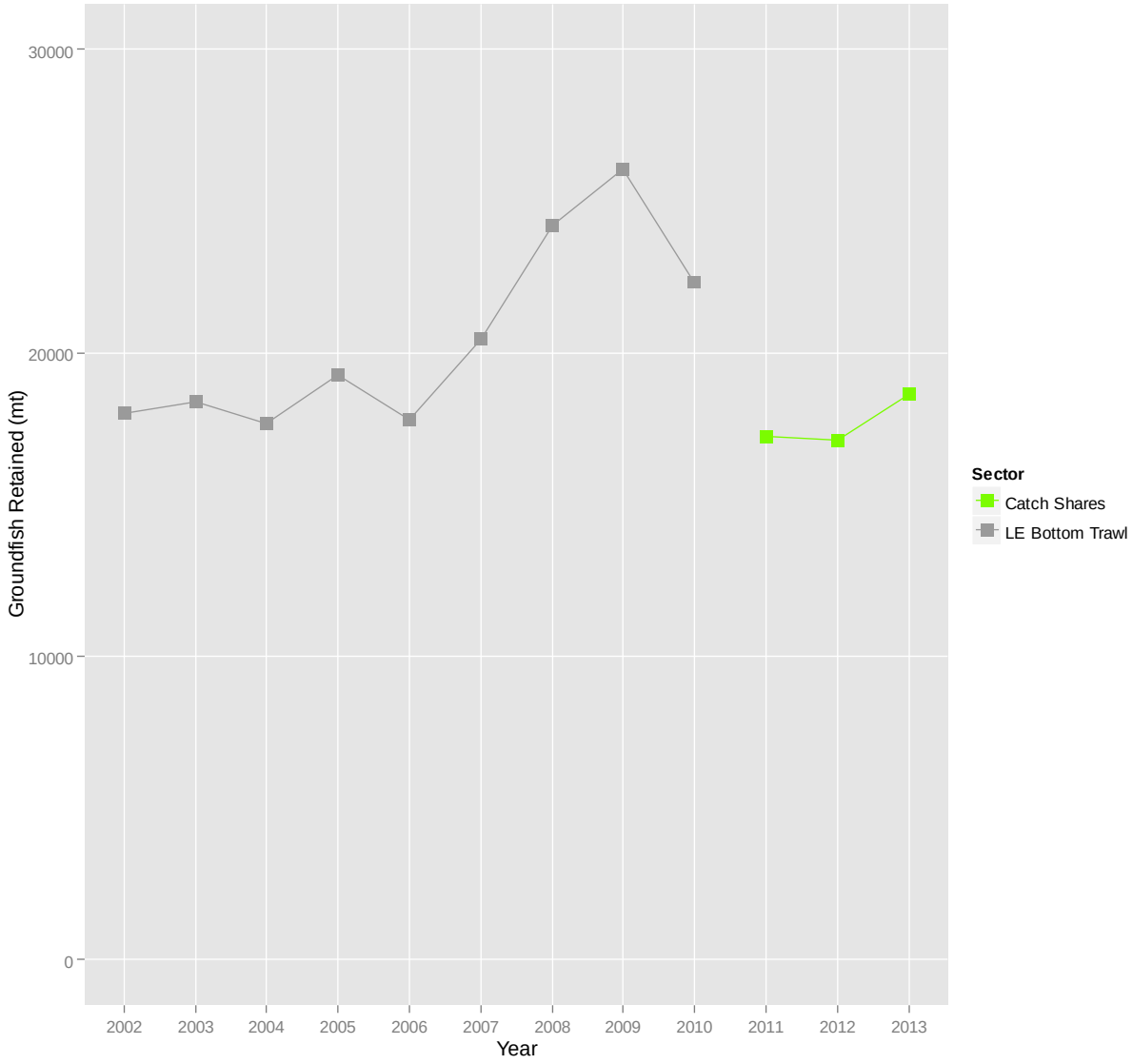

FIGURE 2. Annual fishing effort (mt of FMP-groundfish retained) in bottom trawl sectors.

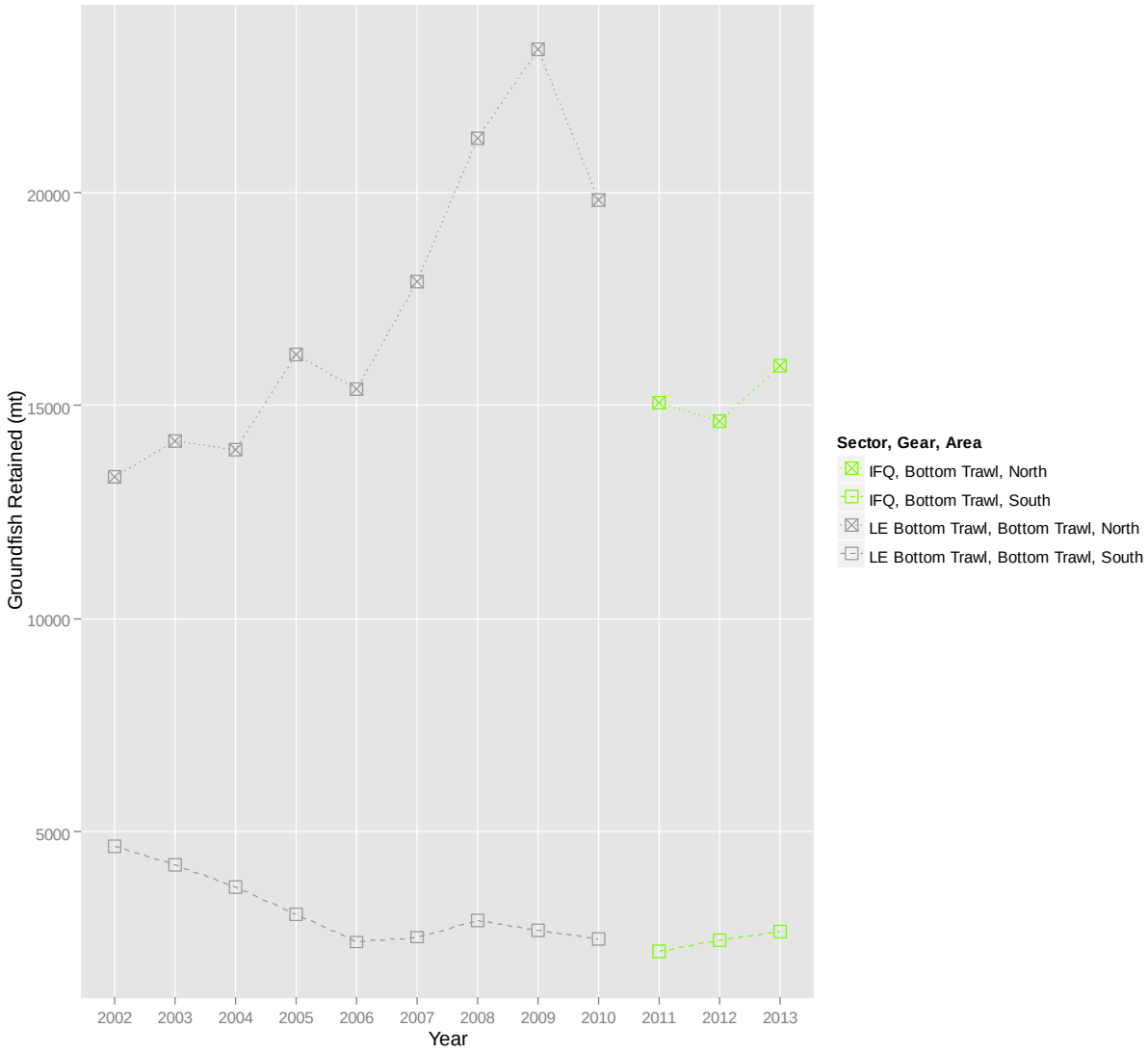

FIGURE 3. Annual fishing effort north and south of 40°10' N. (mt of FMP-groundfish retained) in bottom trawl sectors.

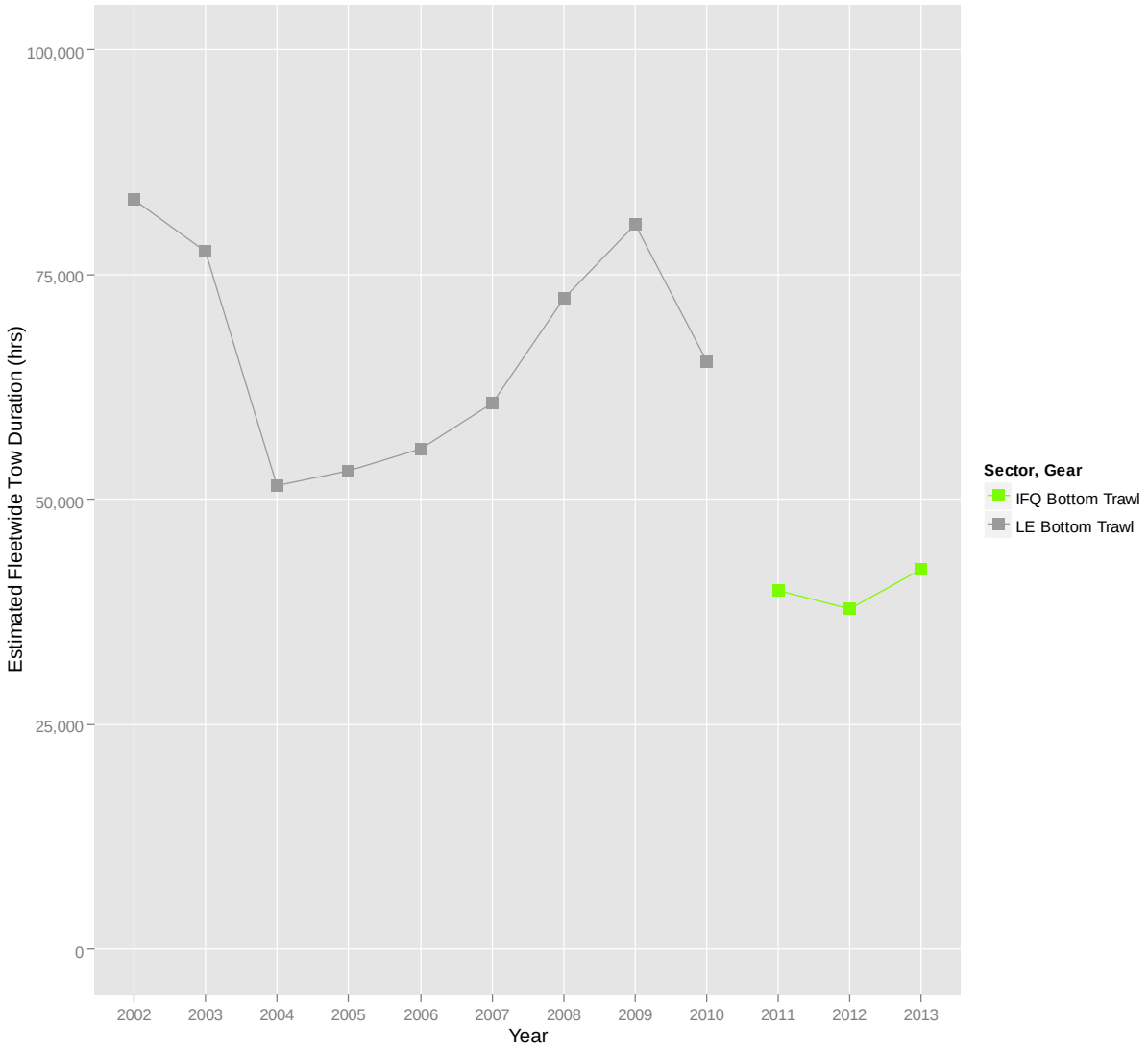

FIGURE 4. Annual fishing effort (hrs of tow duration) in bottom trawl sectors.

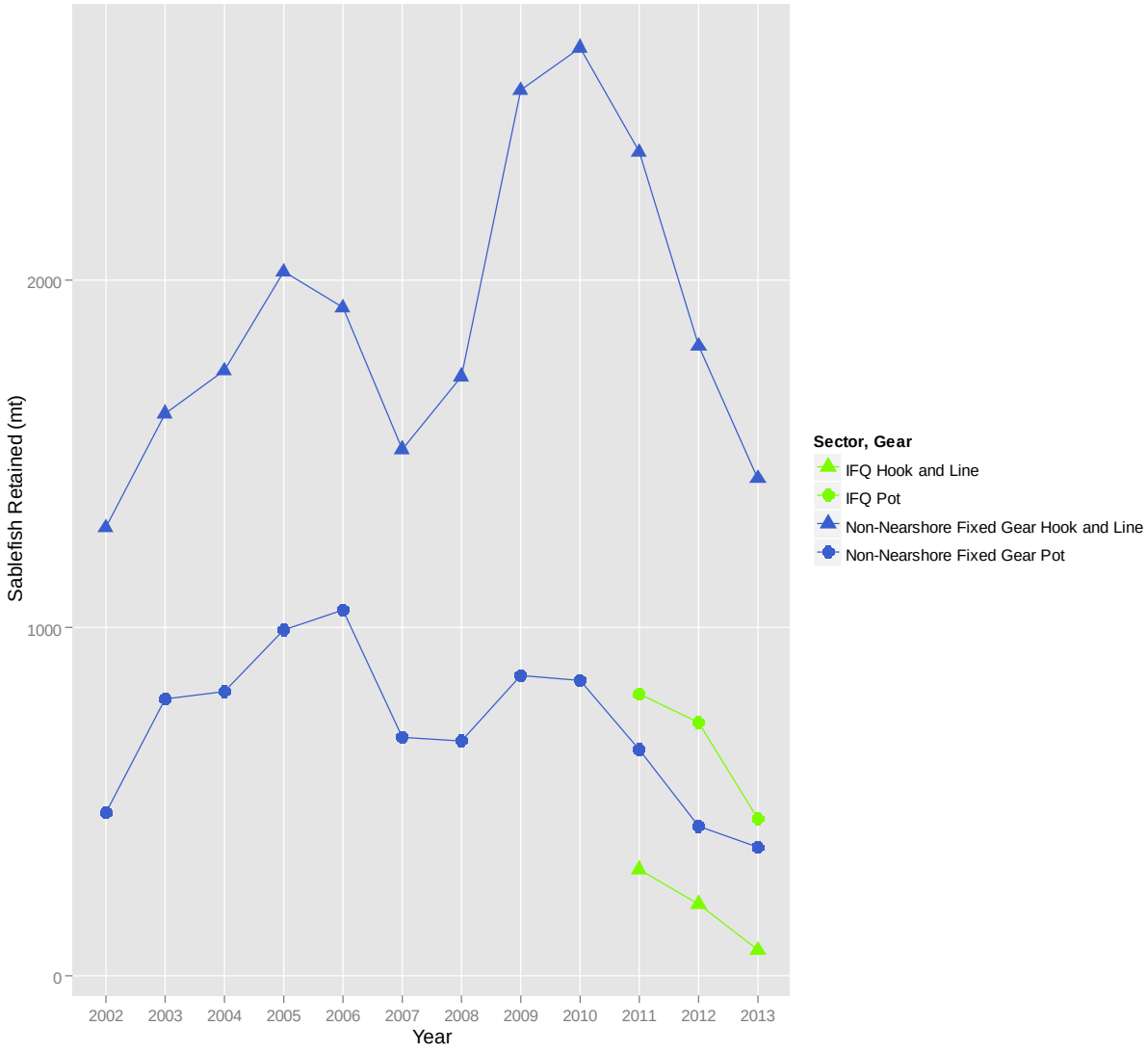

FIGURE 5. Annual fishing effort (mt of sablefish retained) in fixed gear sectors.

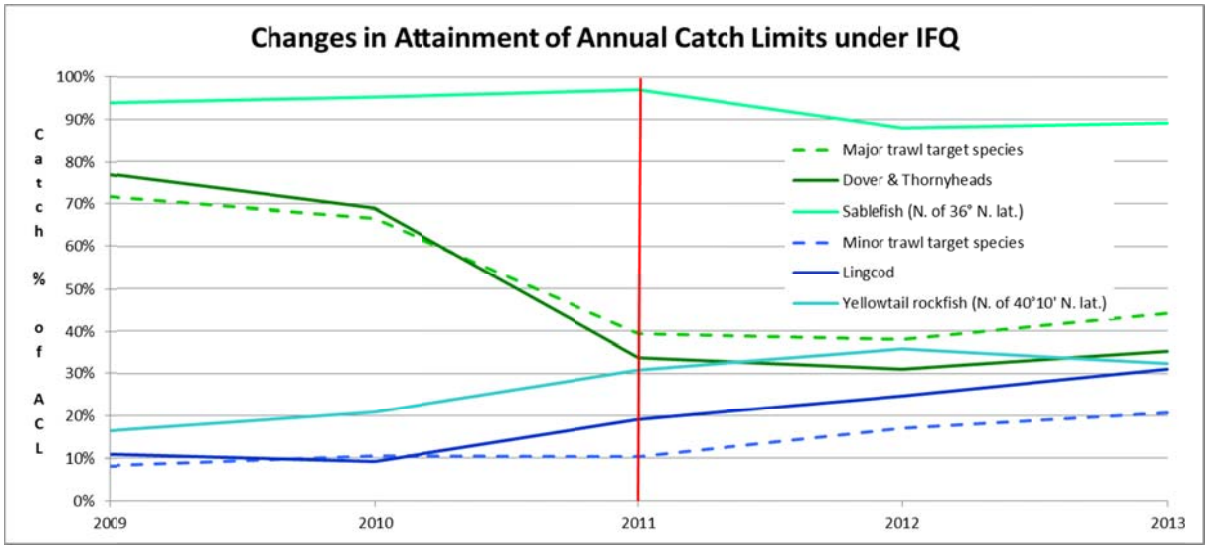

FIGURE 6. Changes in attainment of annual catch limits from 2009 to 2013, including IFQ transition in 2011, shown by red line. Major trawl targets include: arrowtooth flounder, Dover sole, longnose skate, petrale sole, sablefish, minor slope rockfish, shortspine and longspine thornyheads (North of 34°27' N. lat.). Minor trawl targets include: chilipepper rockfish (S. of 40°10' N. lat.), English sole, lingcod, Pacific cod, yellowtail rockfish (N. of 40°10' N. lat.).

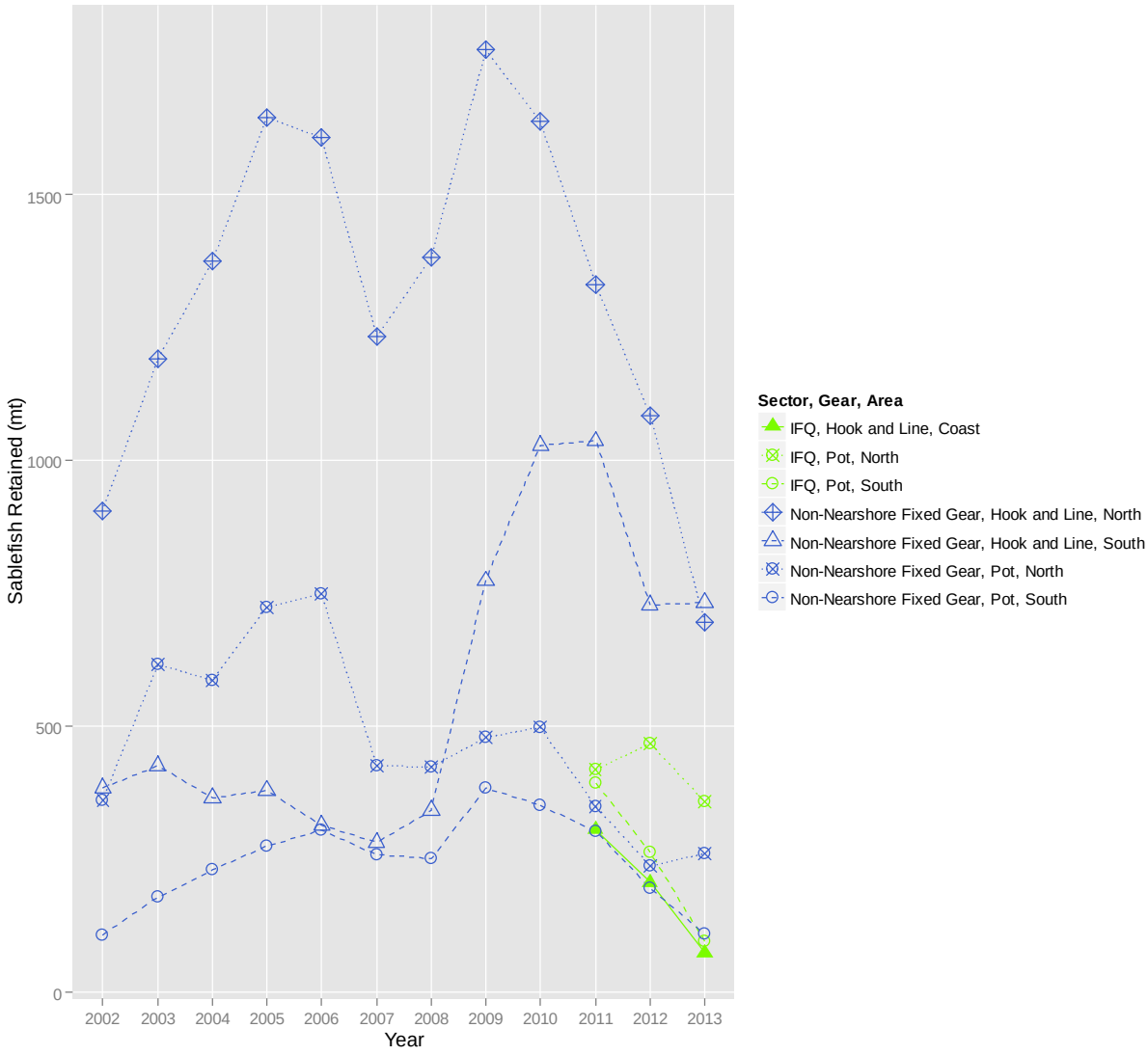

FIGURE 7. Annual fishing effort north and south of 40°10' N. (mt of sablefish retained) in fixed gear sectors.

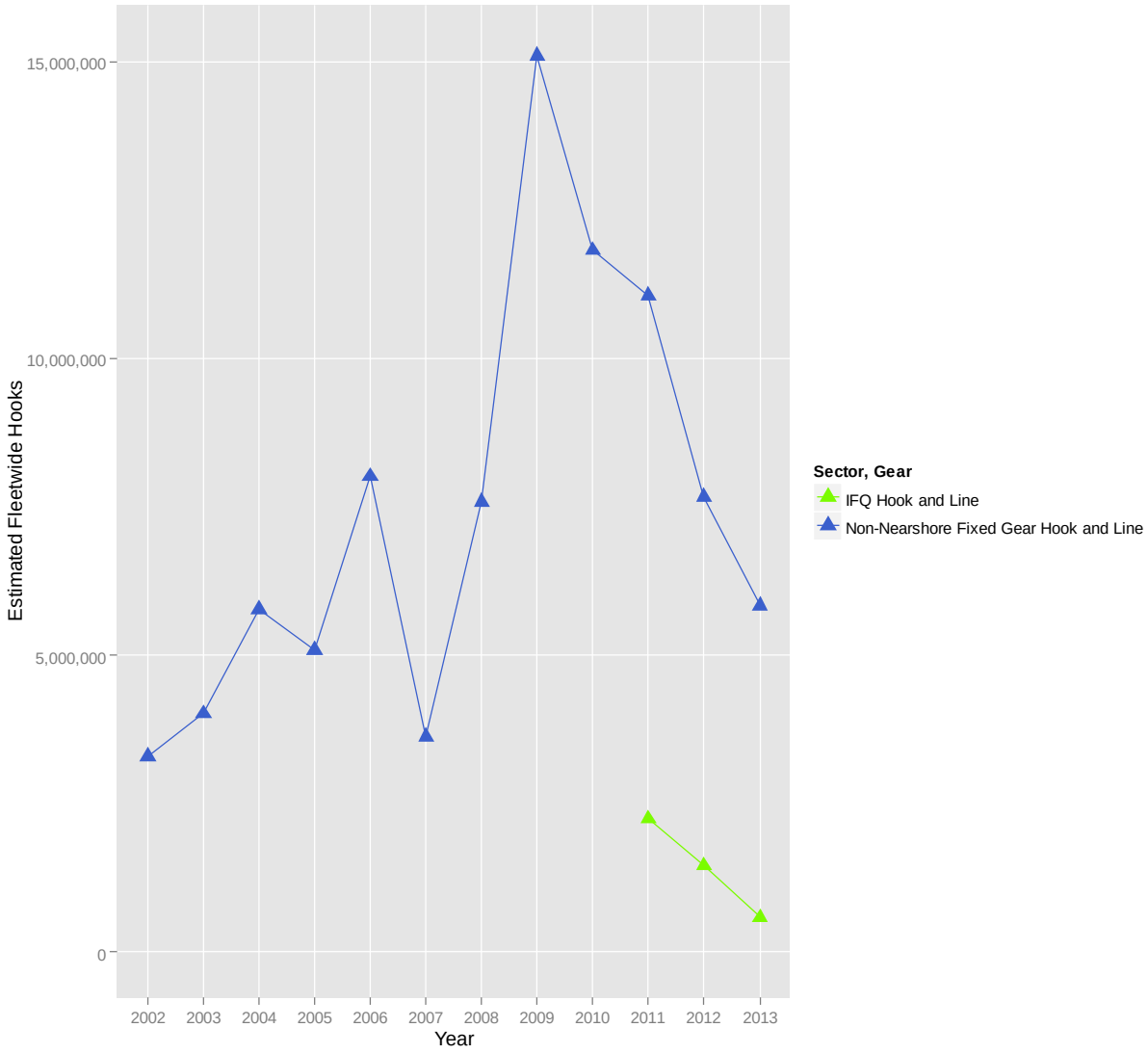

FIGURE 8. Annual fishing effort (number of hooks) in fixed gear sectors. IFQ sectors are 100% observed, but the fleetwide estimates for non-nearshore fixed gear were calculated based on observed rates.

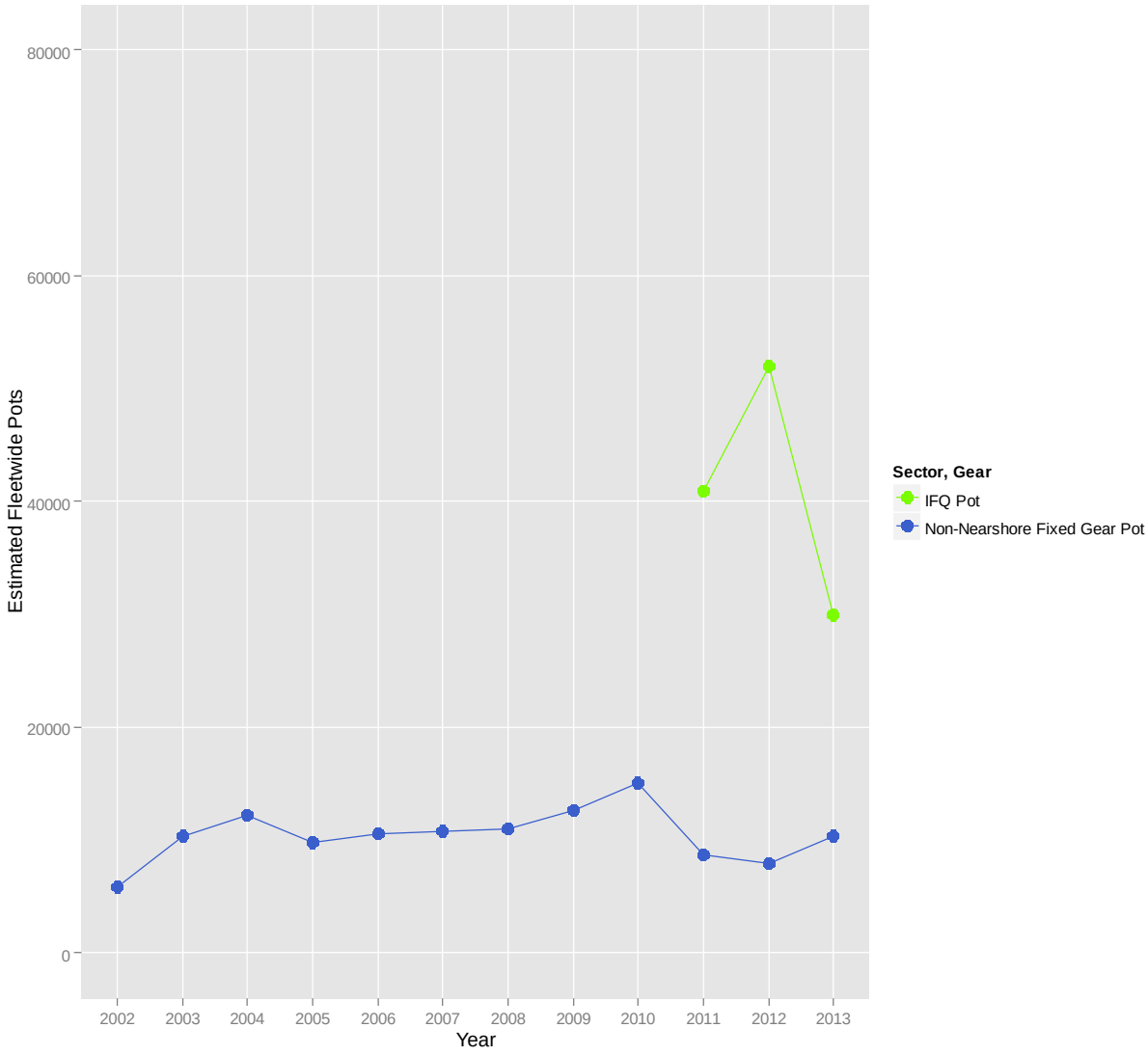

FIGURE 9. Annual fishing effort (number of pots) in fixed gear sectors. IFQ sectors are 100% observed, but the fleetwide estimates for non-nearshore fixed gear were calculated based on observed rates.

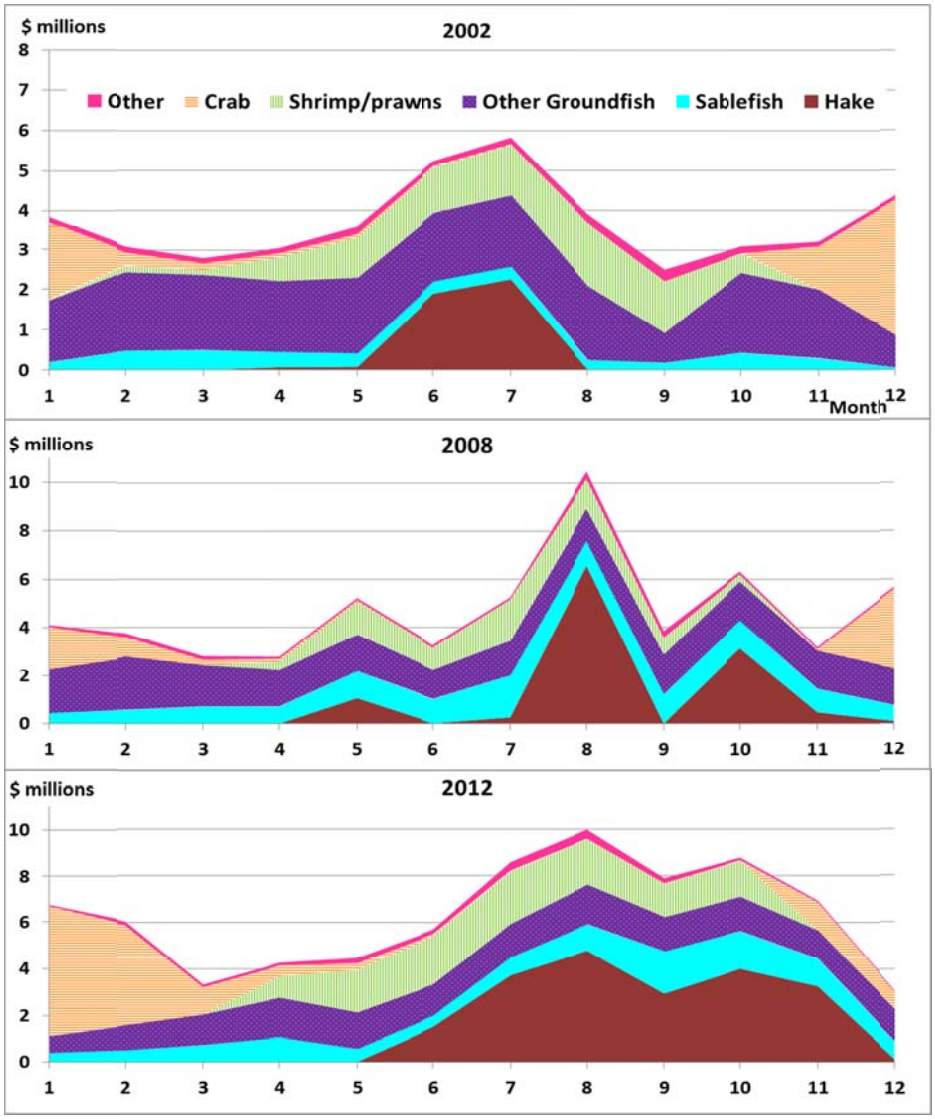

FIGURE 10. Monthly shore-based revenue for trawl-endorsed vessels, by fishery. Note: this figure does not include revenue derived from the at-sea hake fishery or participation in Alaskan fisheries.

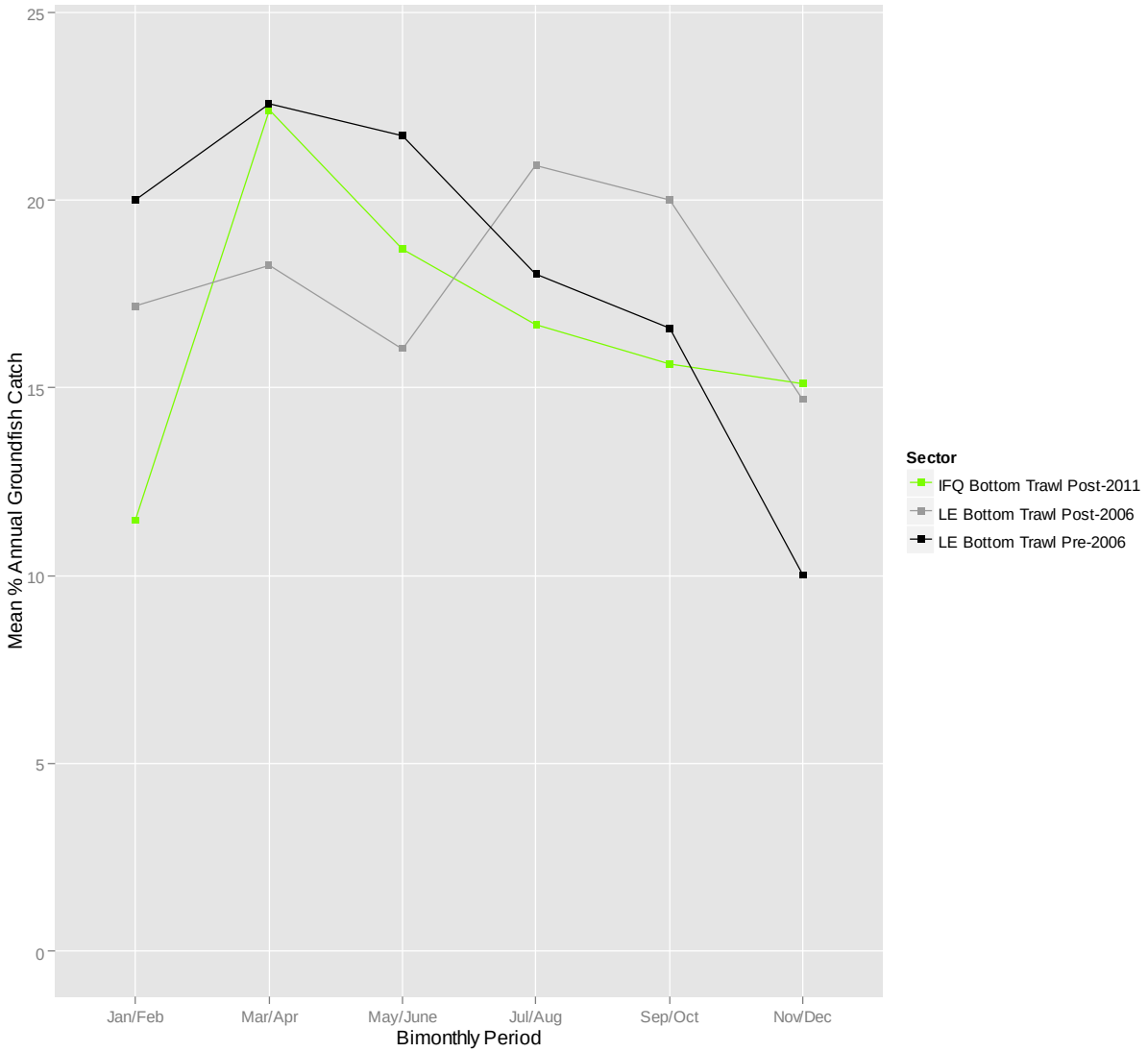

FIGURE 11. Timing of fishing effort as proportion of annual groundfish landings across bimonthly periods.

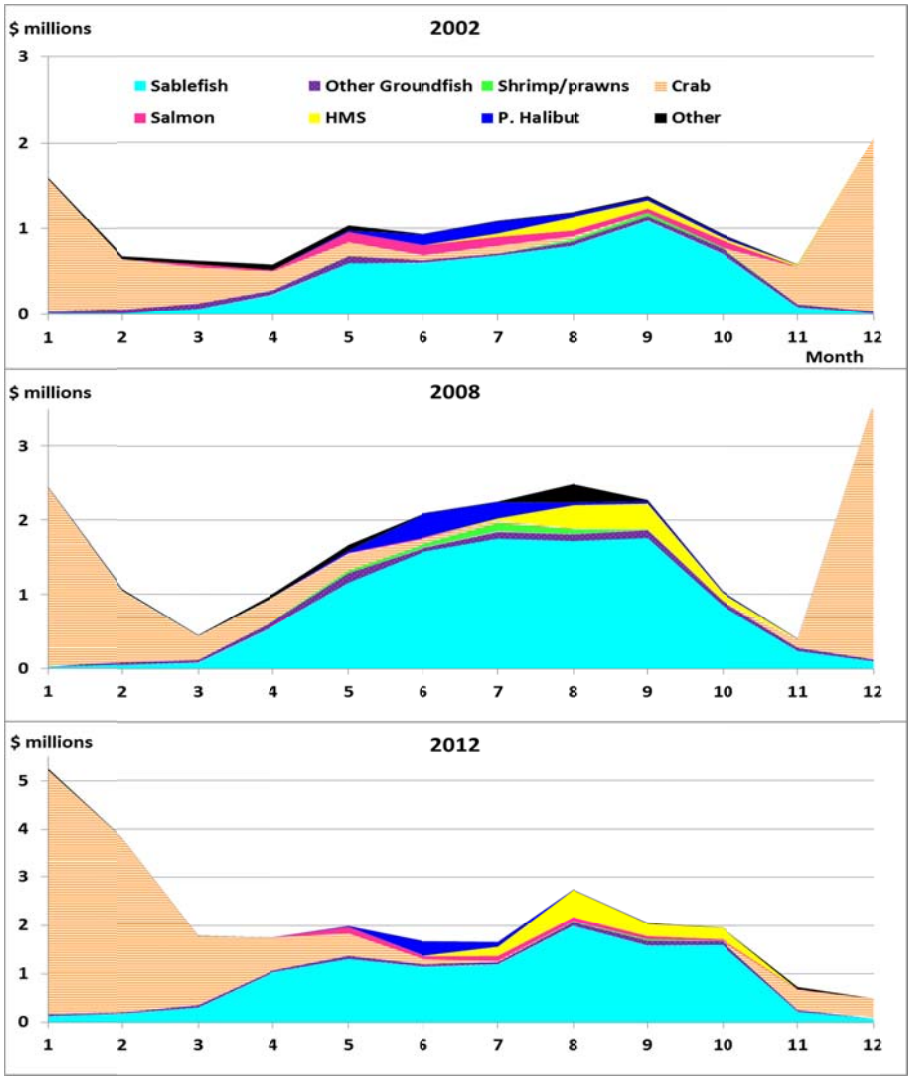

FIGURE 12. Monthly shore-based revenue for sablefish-endorsed, fixed-gear vessels, by fishery. Note: this figure does not include revenue derived from the at-sea hake fishery or participation in Alaskan fisheries.

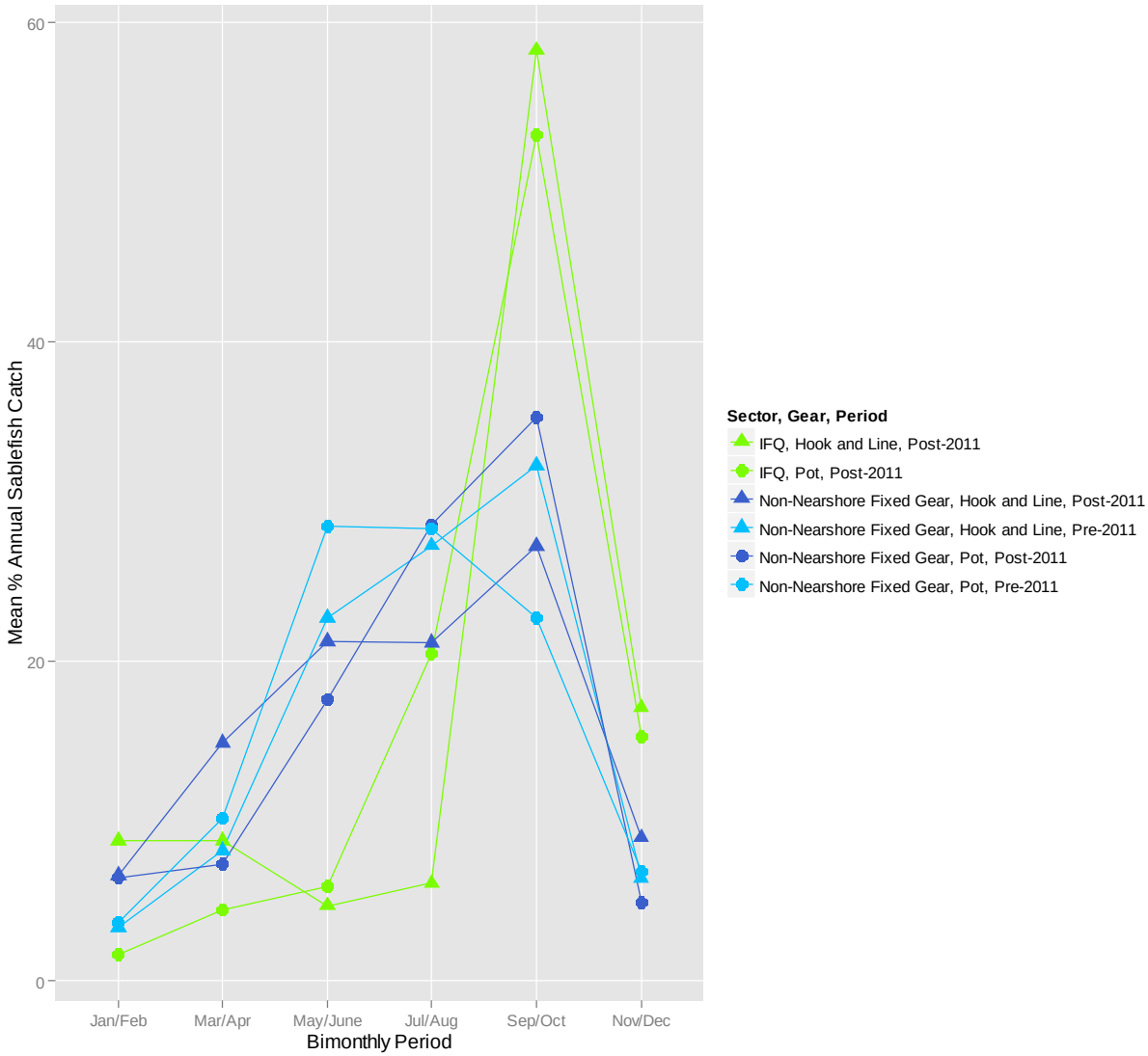

FIGURE 13. Timing of fishing effort as proportion of annual sablefish landings across bimonthly periods.

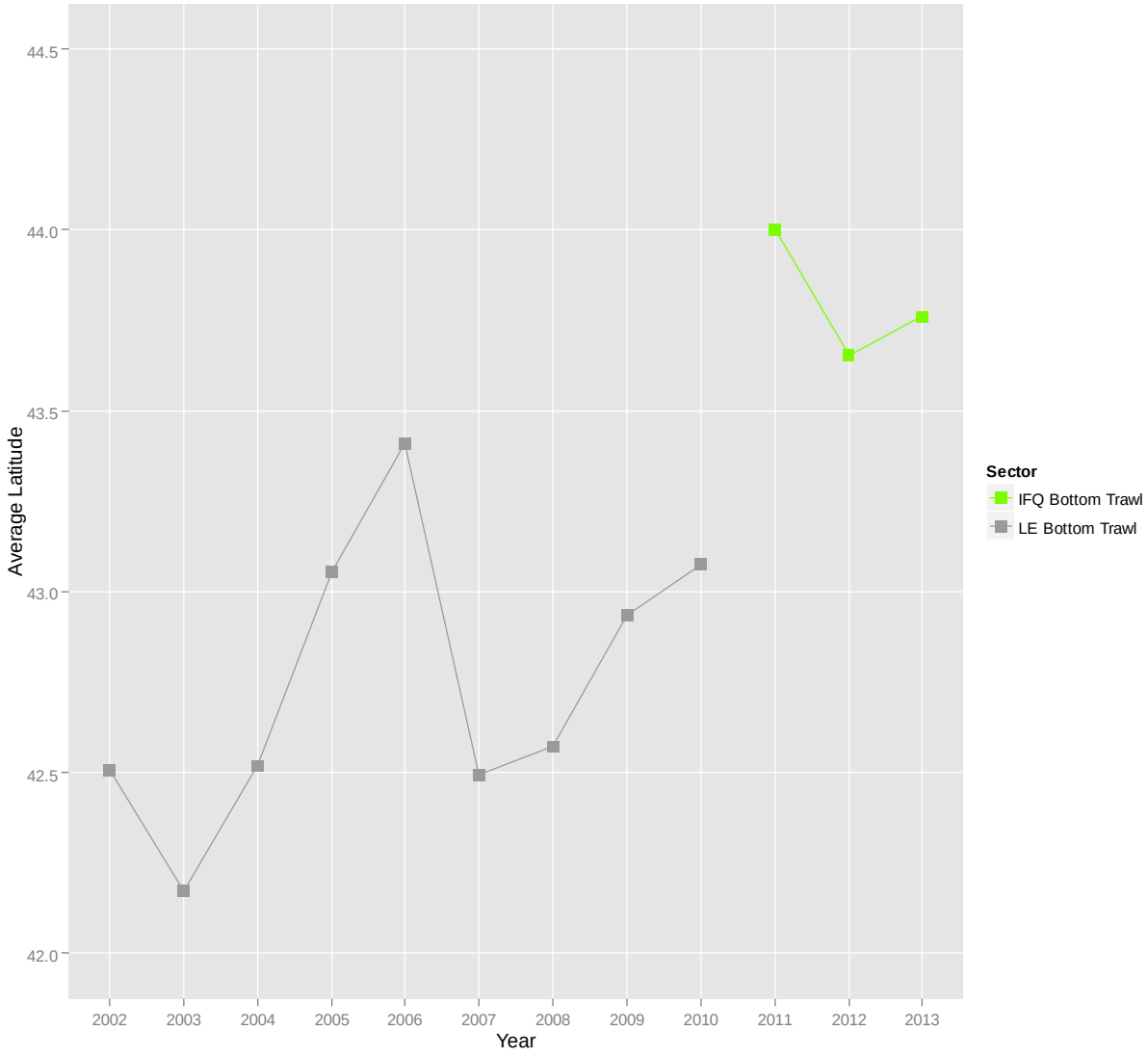

FIGURE 14. Spatial distribution of fishing effort as average latitude of bottom trawl hauls. Non-IFQ sectors show landing location, while IFQ sectors show fishing locations.

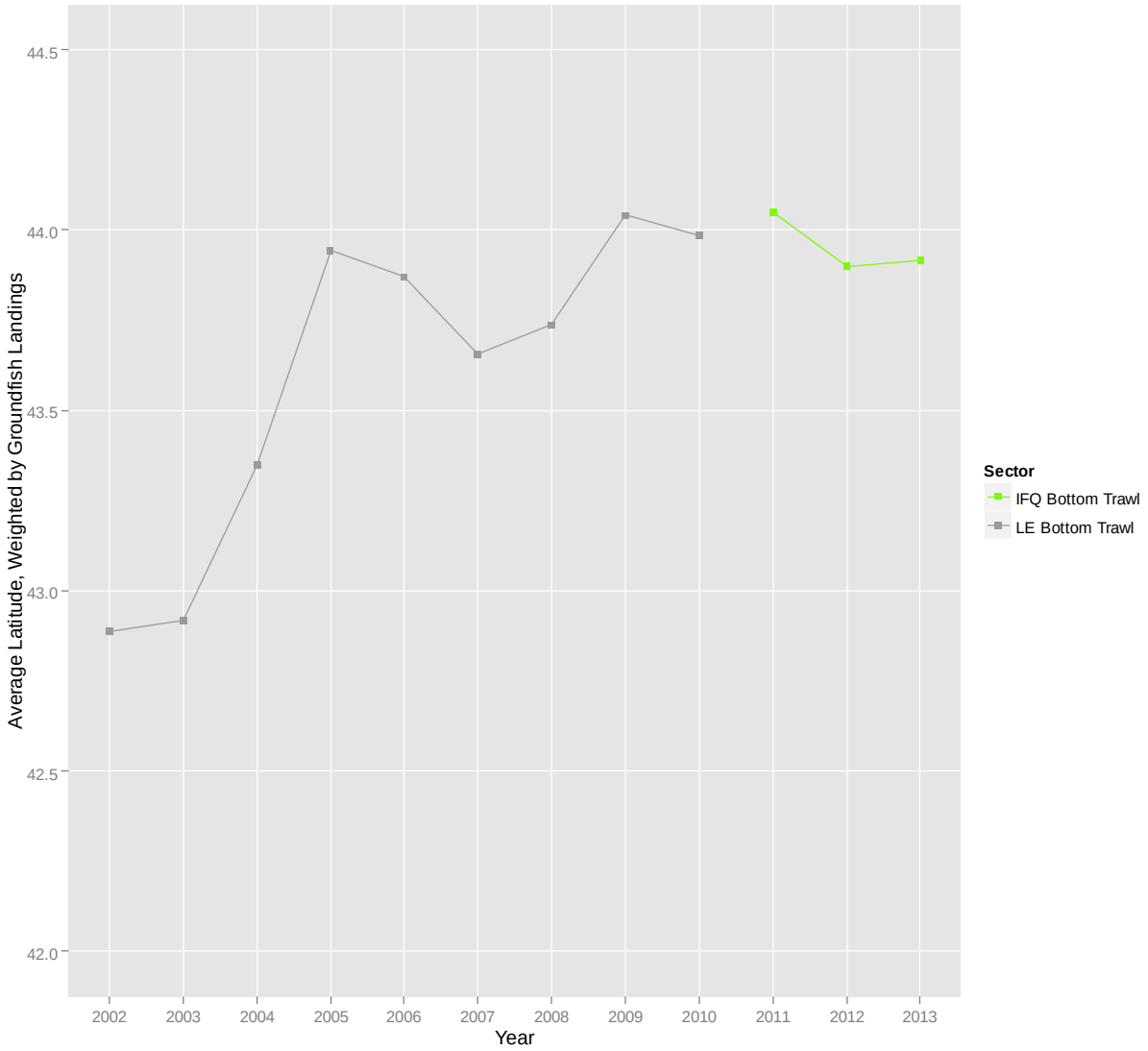

FIGURE 15. Spatial distribution of fishing effort as average latitude of groundfish landings. Non-IFQ sectors show landing location, while IFQ sectors show fishing locations.

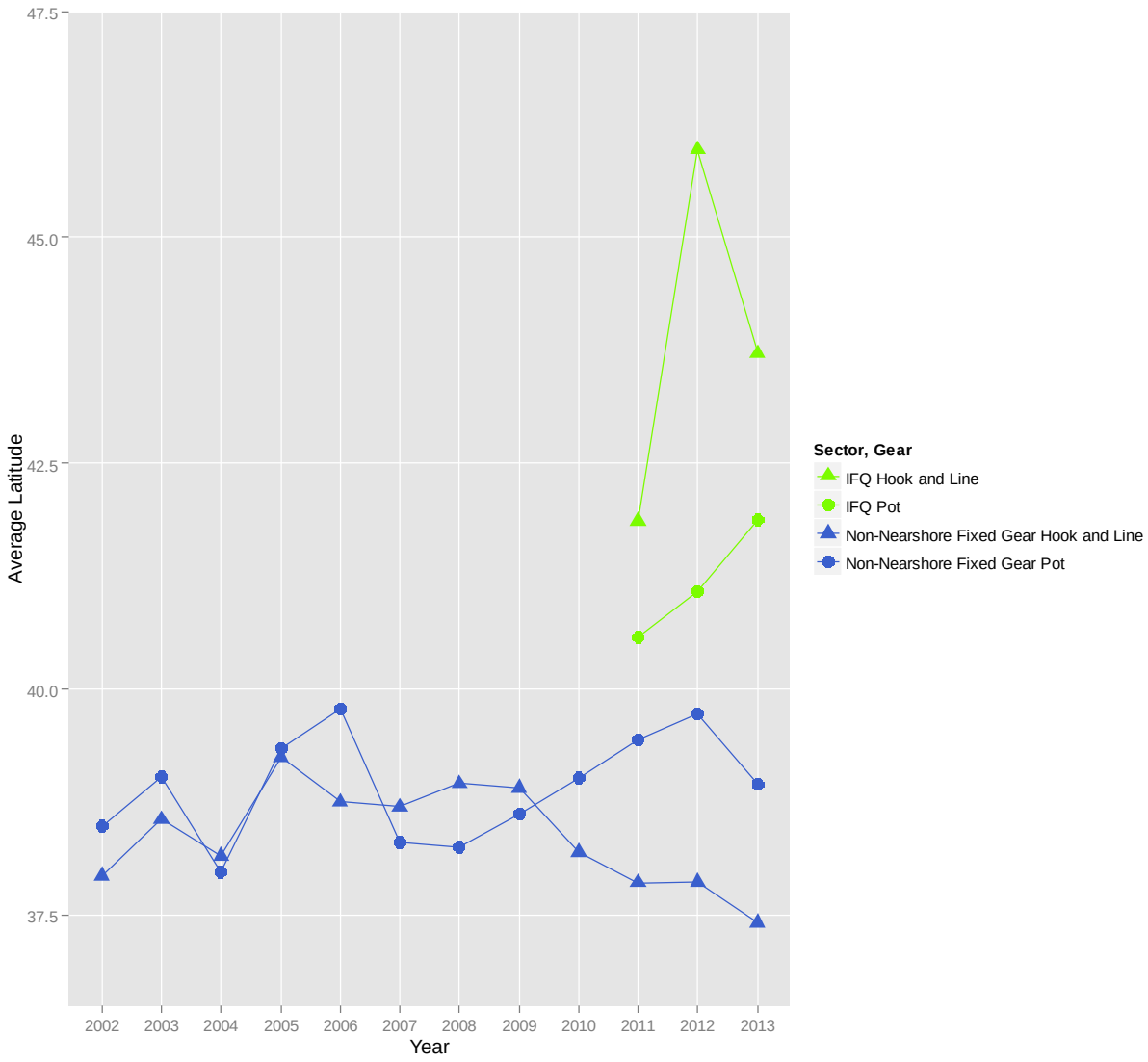

FIGURE 16. Spatial distribution of fishing effort as average latitude of fixed gear hauls. Non-IFQ sectors show landing location, while IFQ sectors show fishing locations.

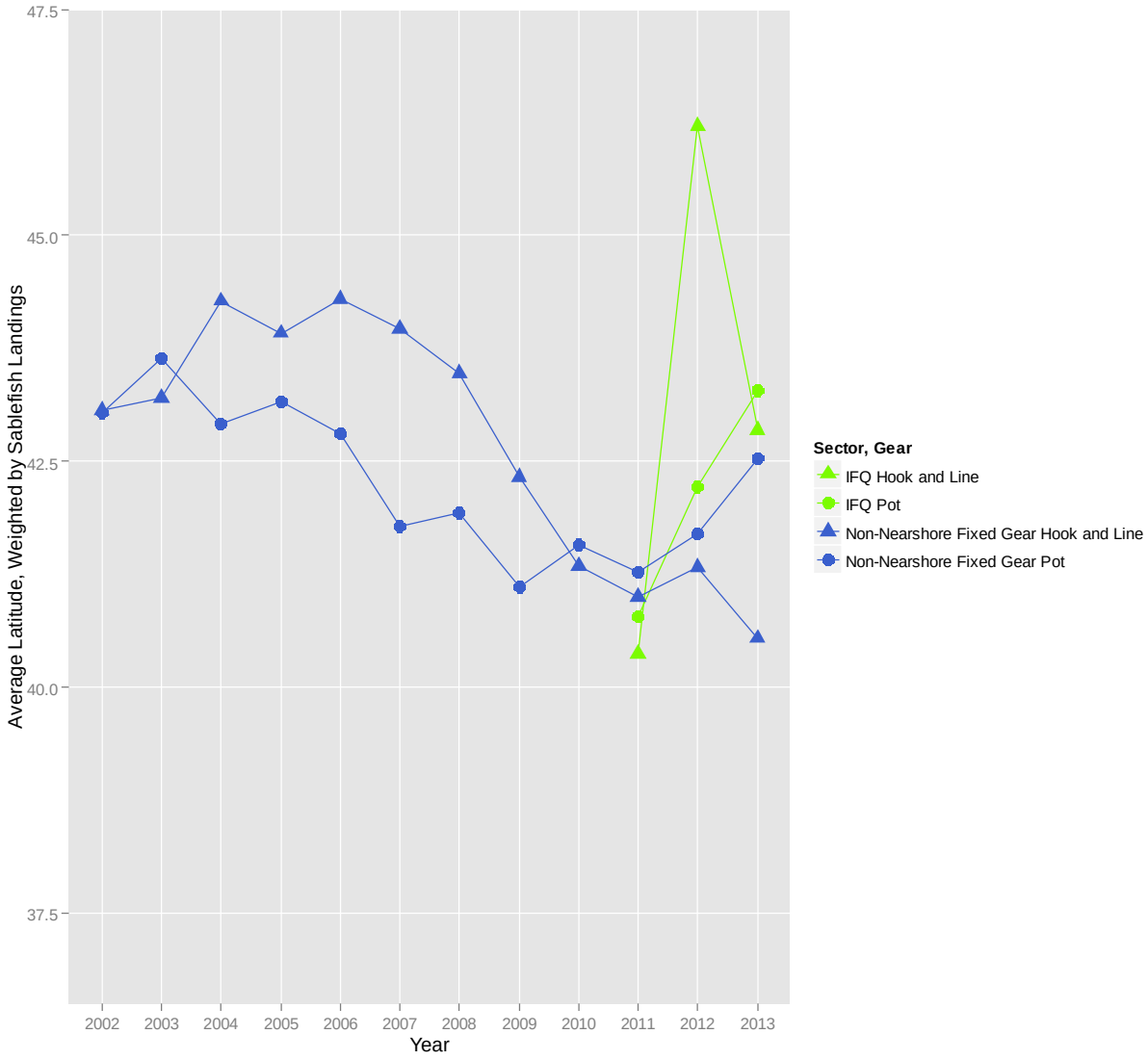

FIGURE 17. Spatial distribution of fishing effort as average latitude of sablefish landings. Non-IFQ sectors show landing location, while IFQ sectors show fishing locations.

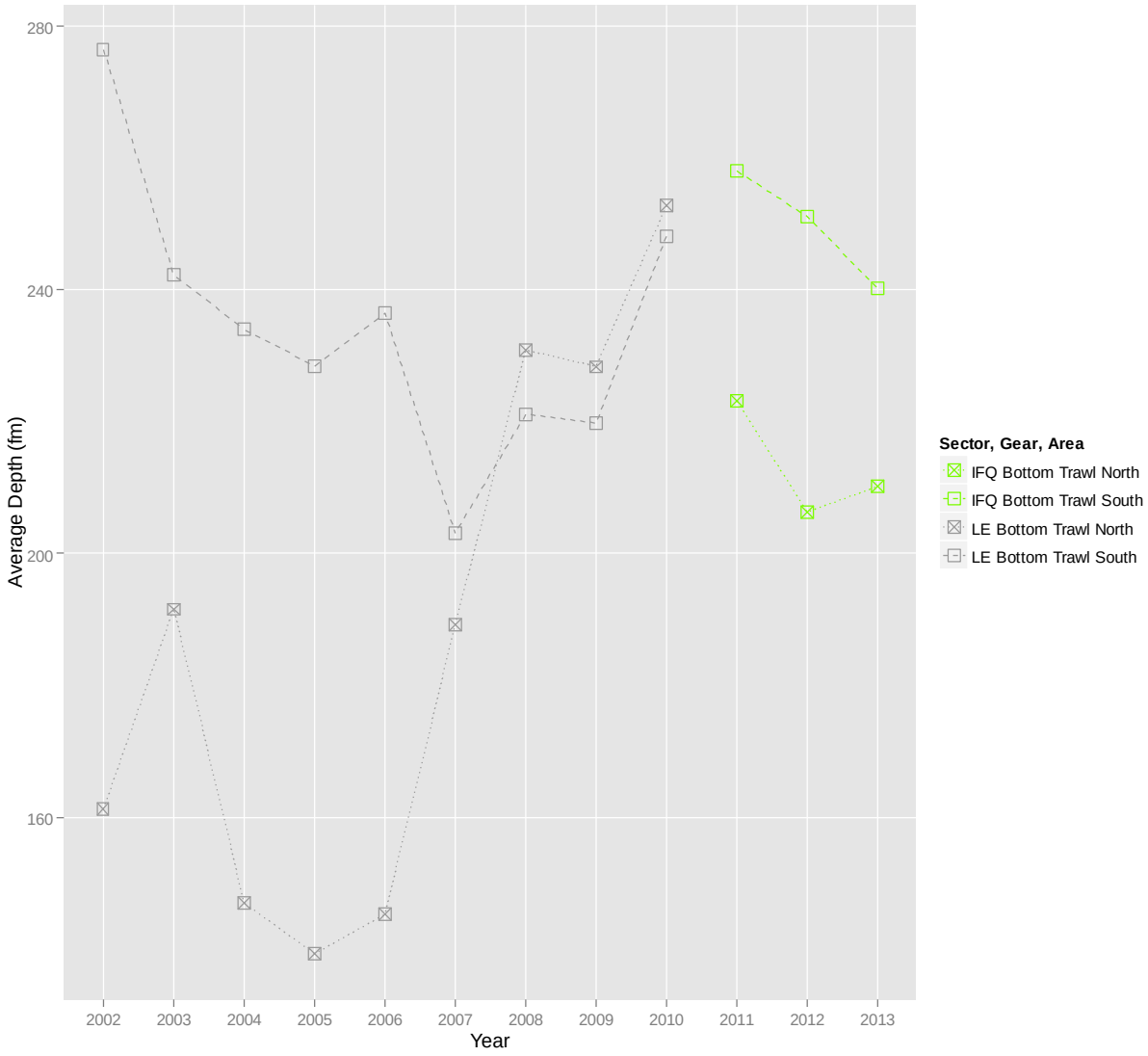

FIGURE 18. Depth distribution of bottom trawl hauls. IFQ depths were derived from WCGOP data; limited entry trawl depths were derived from PacFIN logbook data.

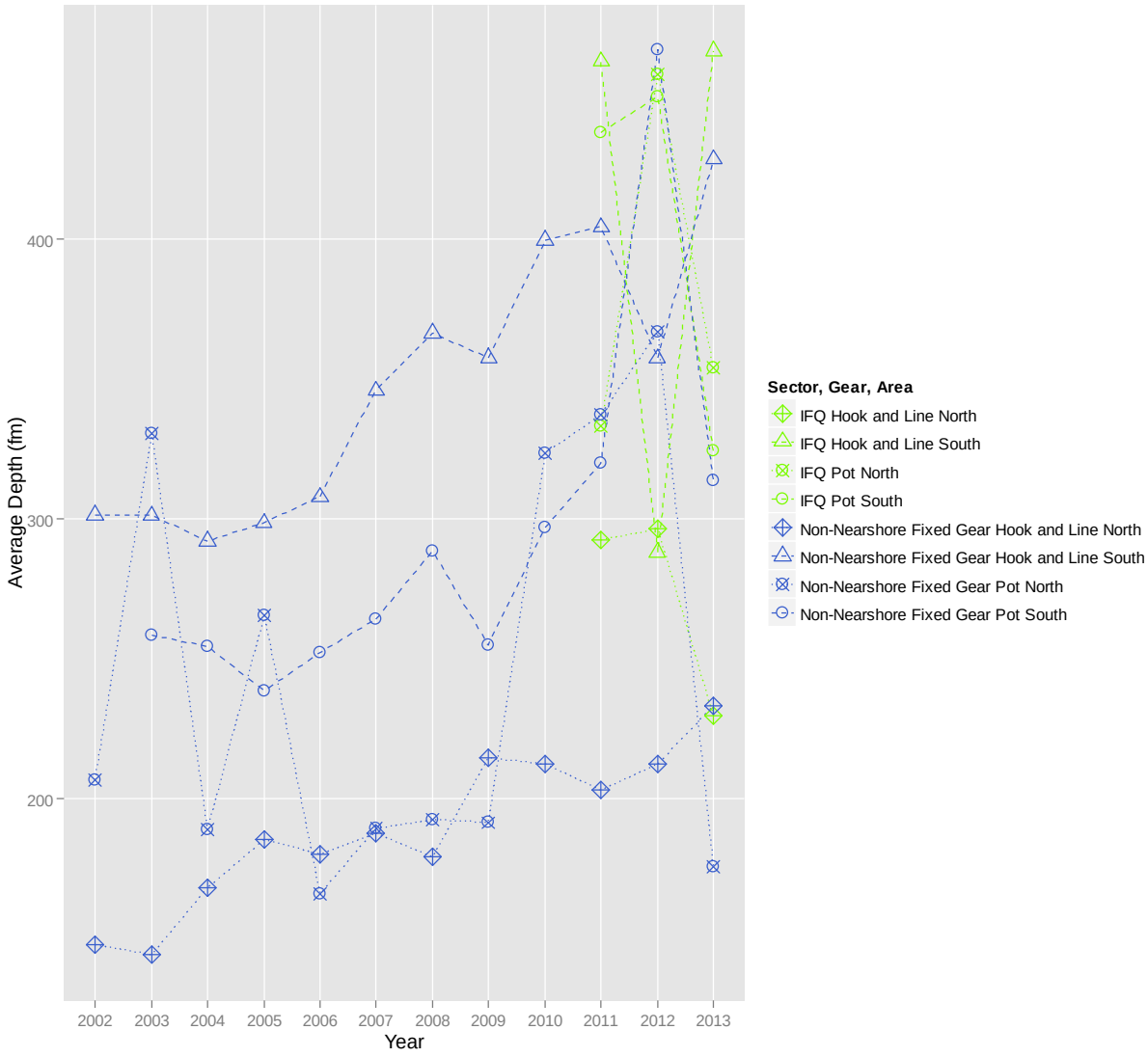

FIGURE 19. Depth distribution of fixed gear hauls. Both non-nearshore fixed gear and IFQ depths were derived from WCGOP data, but only the IFQ sector is 100% observed.

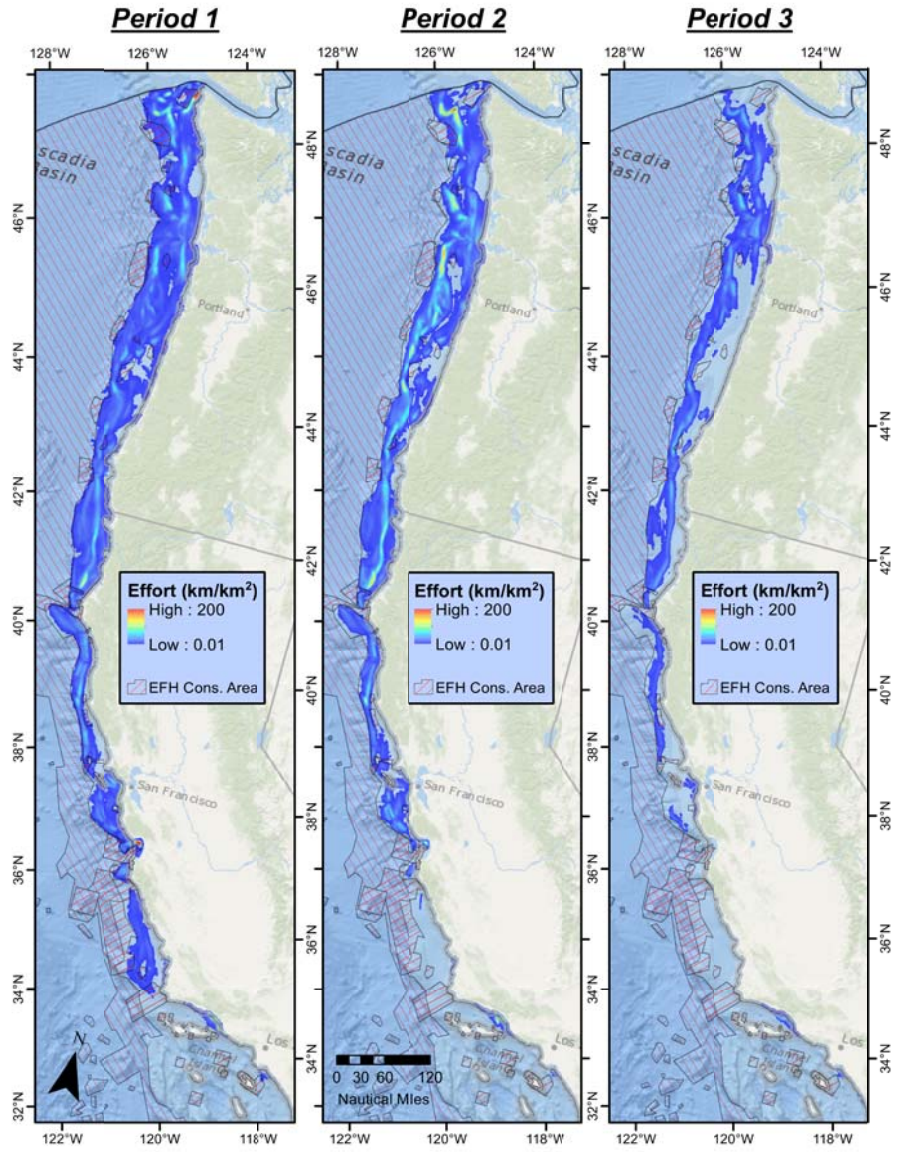

FIGURE 20. Spatial distribution and intensity of bottom trawl fishing effort within 3 relevant time periods. Time periods are defined as "Period 1" = 1 Jan 2002 - 11 Jun 2006; "Period 2" = 12 Jun 2006 – 31 Dec 2010; "Period 3" = 1 Jan 2011 – 31 Dec 2013, representing major eras in regulatory regimes. To depict intensity, we used a line density algorithm (ArcGIS™ v.10.2 Geographical Information System Software [Environmental System Research Institute, Inc., Redlands, California]). The density values for the color ramps for each map panel are equal, so pixel-by-pixel comparisons can be made. The highest (red) and lowest (blue) values are set arbitrarily so that areas of relatively high and low fishing intensity can be compared across time periods.

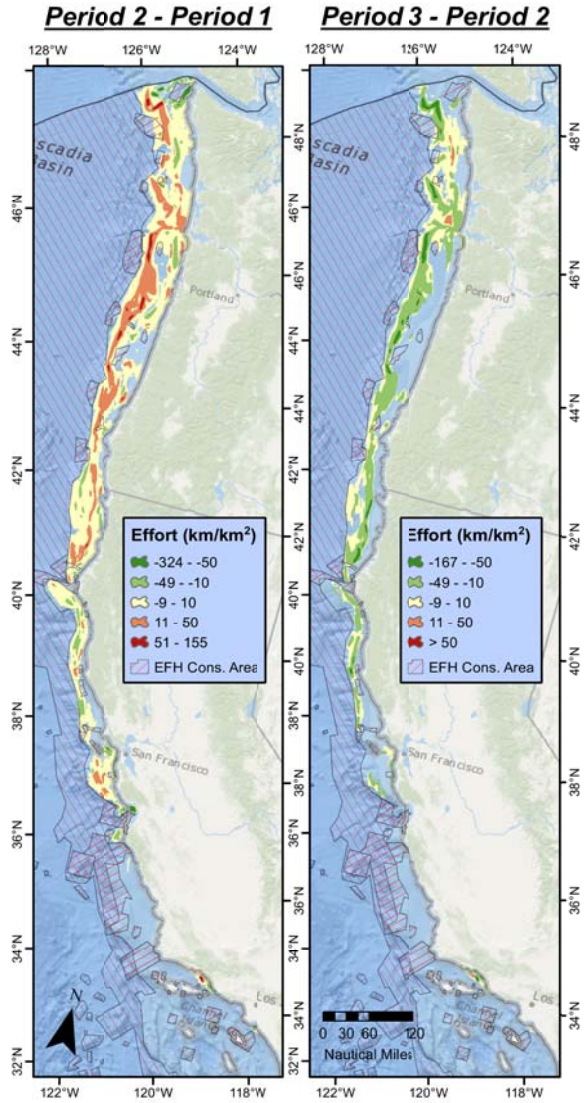

FIGURE 21. Differences in spatial distribution and intensity of bottom trawl fishing effort across two relevant time points. Time periods are defined as "Period 1" = 1 Jan 2002 - 11 Jun 2006; "Period 2" = 12 Jun 2006 – 31 Dec 2010; "Period 3" = 1 Jan 2011 – 31 Dec 2013, representing major eras in regulatory regimes (Amendment 19 and 20). To depict intensity, we used a line density algorithm (ArcGIS™ v.10.2 Geographical Information System Software [Environmental System Research Institute, Inc., Redlands, California]). From those outputs, the intensity layer from Period 1 was subtracted from Period 2, and similarly Period 2 was subtracted from period 3. This difference represents the change in fishing intensity after a particular date in time. The values for each color class for each map panel are equal, so pixel-by-pixel comparisons can be made.

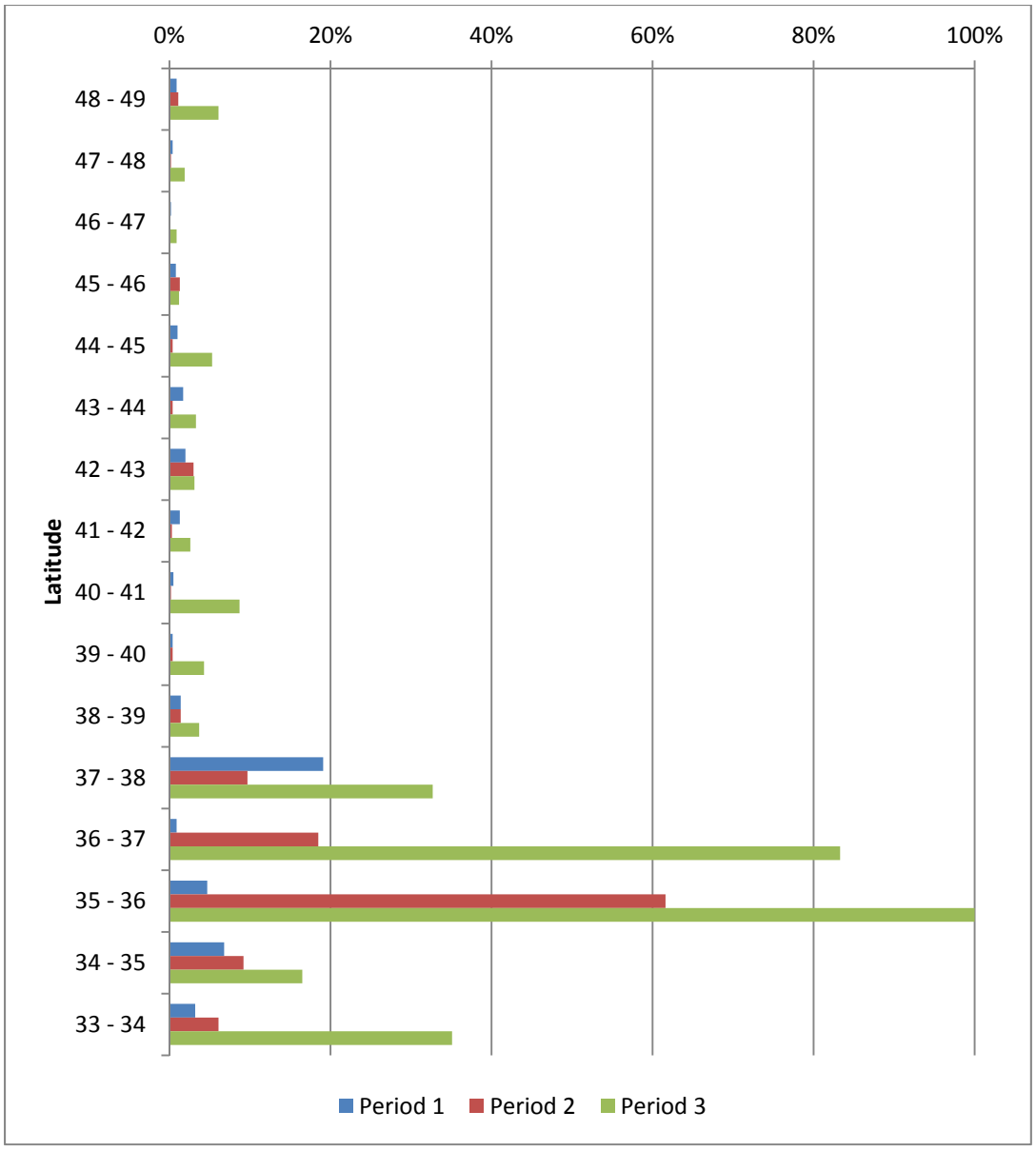

FIGURE 22. Relative proportion of bottom trawl fishing effort (km) by degree of latitude excluded from map figures due to confidentiality requirements. Time periods are defined as "Period 1" = 1 Jan 2002 - 11 Jun 2006; "Period 2" = 12 Jun 2006 – 31 Dec 2010; "Period 3" = 1 Jan 2011 – 31 Dec 2013, representing major eras in regulatory regimes.

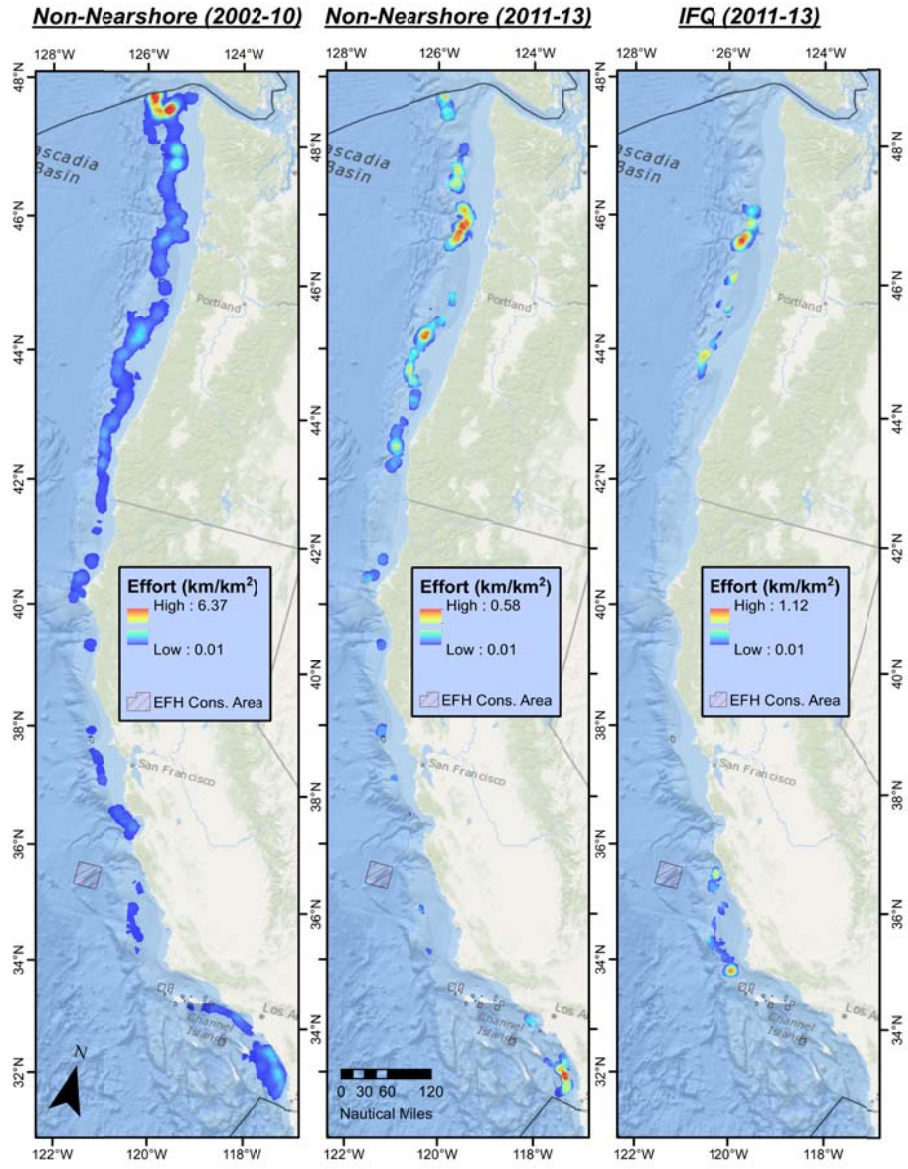

FIGURE 23. Spatial distribution and intensity of longline fishing effort for three relevant sectors/time periods. The "non-nearshore" moniker represents the non-IFQ sectors including sablefish primary, open access, and daily trip limit. To depict intensity, we used a line density algorithm (ArcGIS™ v.10.2 Geographical Information System Software [Environmental System Research Institute, Inc., Redlands, California]). The density values for the color ramps for each map panel are not equal, so pixel-by-pixel comparisons cannot be made. The highest 0.5% of the data values for each sector/time period is depicted in red.

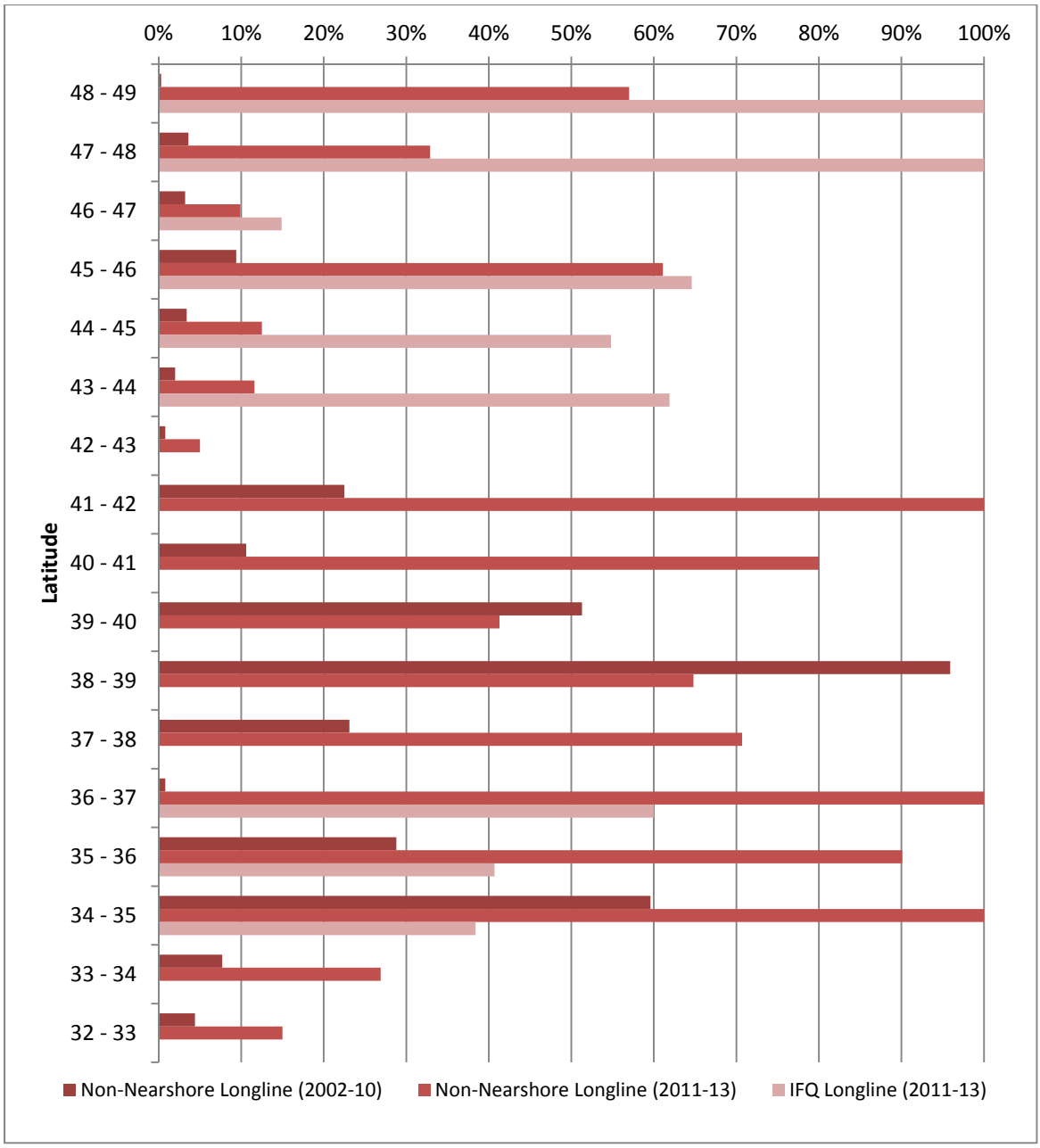

FIGURE 24. . Relative proportion of longline fishing effort (km) by degree of latitude excluded from map figures due to confidentiality requirements. The "non-nearshore" moniker represents the non-IFQ fixed gear sectors, including sablefish primary, open access, and daily trip limit.

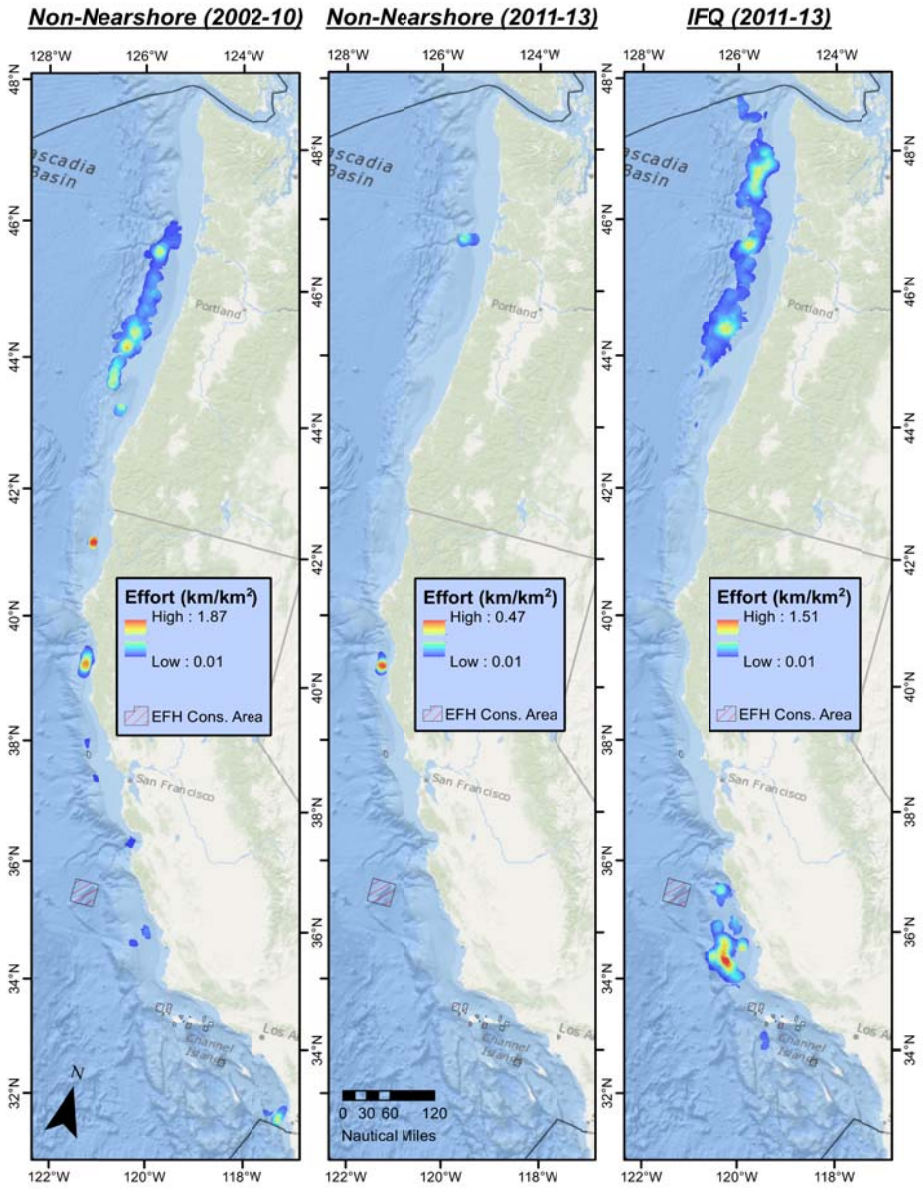

FIGURE 25. Spatial distribution and intensity of pot fishing effort for three relevant sectors/time periods. The "non-nearshore" moniker represents the non-IFQ fixed gear sectors including sablefish primary, open access, and daily trip limit. To depict intensity, we used a line density algorithm (ArcGIS™ v.10.2 Geographical Information System Software [Environmental System Research Institute, Inc., Redlands, California]). The density values for the color ramps for each map panel are not equal, so pixel-by-pixel comparisons cannot be made. The highest 0.5% of the data values for each sector/time period is depicted in red.

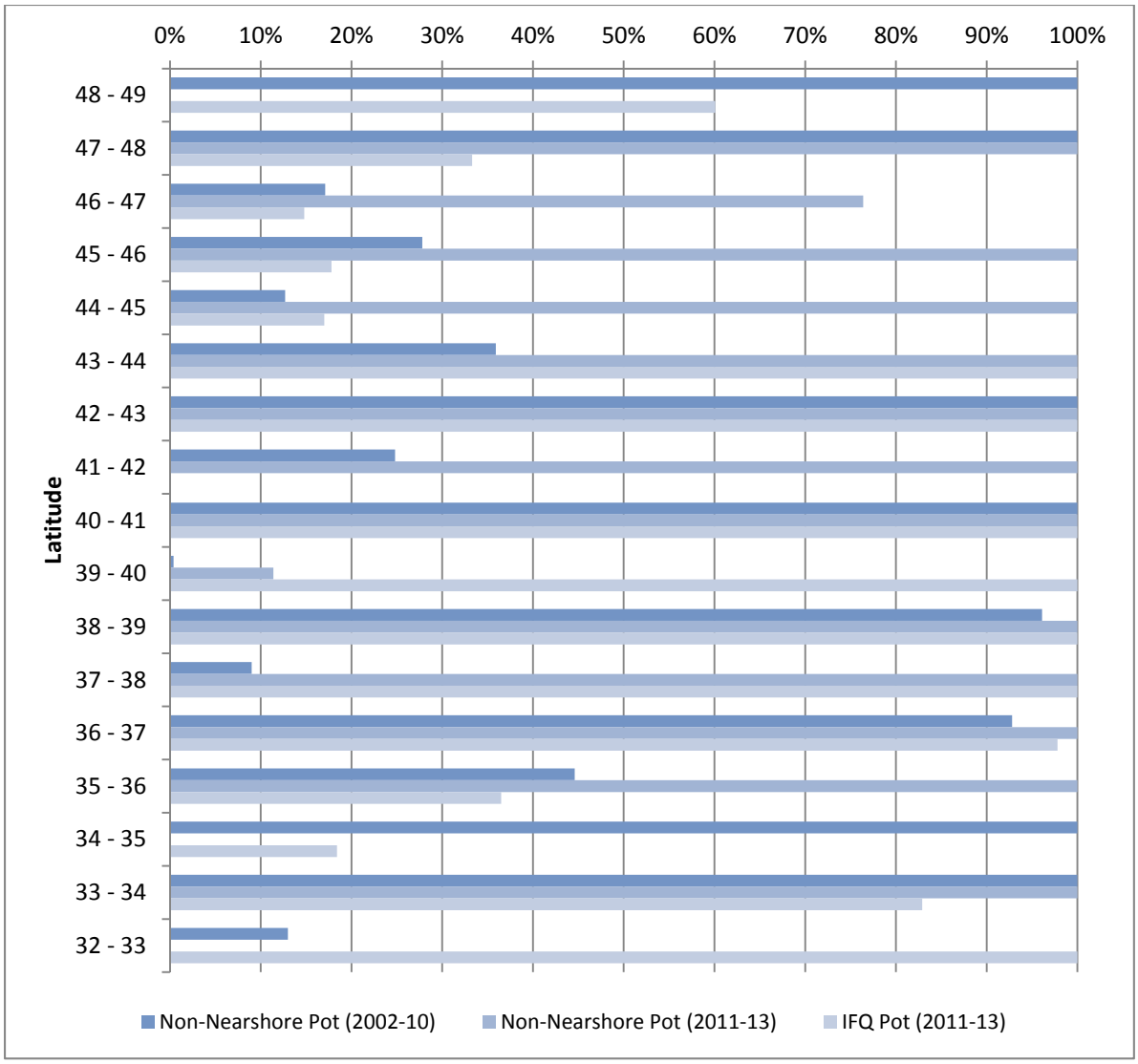

FIGURE 26. Relative proportion of pot effort (km) by degree of latitude excluded from map figures due to confidentiality requirements. The "non-nearshore" moniker represents the non-IFQ fixed gear sectors including sablefish primary, open access, and daily trip limit.

TABLES

TABLE 1. Effort in LE bottom trawl sector. Fleetwide number of hauls and tow duration were derived from PacFIN logbook data.

Limited Entry Bottom Trawl											
		Observed					Fleetwide				
Year	Area	Vessels	Trips	Hauls	Groundfish Landings (mt)	Sablefish Landings (mt)	Vessels	Hauls	Groundfish Landings (mt)	Sablefish Landings (mt)	Tow Duration (hrs)
2002	North	94	441	2591	2008	149	151	15697	13343	1002	62477
	South	45	134	572	672	59	72	3820	4662	380	20785
2003	North	95	316	1792	2070	245	152	13953	14165	1633	60055
	South	40	156	497	521	65	56	3535	4223	453	17471
2004	North	75	446	2703	3311	431	91	11242	13967	1741	38336
	South	34	175	738	999	135	35	2882	3707	443	13223
2005	North	83	396	2881	3572	386	95	12895	16212	1857	42037
	South	25	128	579	669	106	36	2459	3074	455	11175
2006	North	70	366	2511	2985	393	95	13160	15381	2062	46356
	South	20	117	466	458	75	31	2042	2414	397	9272
2007	North	73	283	2054	2890	382	98	12368	17913	2107	50567
	South	18	91	461	552	71	28	2533	2529	311	10125
2008	North	83	356	2727	4426	569	98	13281	21267	2534	60504
	South	21	89	458	479	59	22	2910	2922	330	11892
2009	North	85	485	3819	5433	610	100	15833	23359	2611	70103
	South	18	107	575	620	91	19	2577	2696	387	10491
2010	North	71	286	2255	3659	429	89	11419	19830	2188	55236
	South	13	63	359	361	51	18	2246	2491	318	10157

TABLE 2. Effort in IFQ fishery, including trawl and fixed gear. Note that 2011 bottom trawl includes a small amount of midwater trawl effort, while 2013 bottom trawl includes a small amount of LE California halibut effort.

IFQ Fishery									
Year	Gear	Area	Vessels	Trips	Hauls	Groundfish Landings (mt)	Sablefish Landings (mt)	Tow Duration (hrs)	Hooks or Pots
2011	Bottom Trawl	North	58	864	7648	15069	1424	33754	--
		South	15	247	1439	2187	242	6147	--
	Hook & Line	Coast	11	92	622	336	305	--	2246390
	Pot	North	8	79	777	423	418	--	22166
		South	11	148	738	394	392	--	18750
2012	Bottom Trawl	North	55	812	7181	14642	1239	31538	--
		South	13	260	1714	2465	198	6371	--
	Hook & Line	Coast	8	32	500	241	206	--	1457804
	Pot	North	9	91	887	469	466	--	33558
		South	13	167	812	270	262	--	18381
2013	Bottom Trawl	North	55	891	8112	15951	1160	34958	--
		South	14	320	1958	2670	238	7260	--
	Hook & Line	Coast	4	18	153	85	73	--	580992
	Pot	North	7	52	667	363	358	--	17894
		South	6	41	411	110	94	--	12042

TABLE 3. Effort in non-IFQ, non-nearshore fixed gear fishery. Fleetwide hauls and hooks/pots are estimated as described above. Because pot effort in the south in 2002 was not observed, this stratum was estimated using observed 2002 pot effort in the north and landings in the south.

Non-Nearshore Fixed Gear Fishery													
			Observed						Fleetwide				
Year	Gear	Area	Vessels	Trips	Hauls	Groundfish Landings (mt)	Sablefish Landings (mt)	Hooks / Pots	Vessels	Estimated Hauls	Groundfish Landings (mt)	Sablefish Landings (mt)	Estimated Hooks / Pots
2002	Hook & Line	North	23	65	374	208	184	329095	216	1835	1400	904	1615077
		South	8	15	39	10	8	36401	243	1806	703	384	1685625
	Pot	North	6	23	247	83	82	1041	45	1081	366	361	4556
		South	0	0	0	0	0	0	62	318	107	106	1342
2003	Hook & Line	North	16	49	335	228	213	280770	274	1869	1406	1190	1566840
		South	29	169	282	61	31	178087	229	3884	844	425	2452700
	Pot	North	6	35	362	150	148	735	59	1504	624	616	3053
		South	7	16	50	3	3	120	71	3033	181	178	7279
2004	Hook & Line	North	15	41	303	178	170	315486	229	2443	1627	1374	2543381
		South	30	108	197	41	20	175849	245	3619	707	365	3230268
	Pot	North	1	5	90	46	45	648	39	1178	593	586	8484
		South	19	104	234	56	55	879	60	979	233	229	3678
2005	Hook & Line	North	24	90	632	505	456	735346	301	2276	1991	1644	2648757
		South	24	82	128	46	34	218823	202	1427	666	379	2439567
	Pot	North	7	45	500	285	284	815	88	1275	733	723	2078
		South	14	37	41	8	8	227	51	1390	274	273	7697
2006	Hook & Line	North	19	68	468	313	294	491493	302	2553	1915	1606	2681652
		South	28	130	208	30	11	190375	230	5826	606	314	5332180
	Pot	North	6	35	262	156	152	1788	145	1292	759	748	8815
		South	16	42	65	57	57	329	87	348	307	303	1763
2007	Hook & Line	North	42	112	551	356	291	491389	283	2334	1545	1232	2081258
		South	41	171	335	58	34	186166	226	2787	542	281	1548836
	Pot	North	9	35	164	63	60	852	75	1160	435	425	6028
		South	15	40	62	39	39	703	95	416	263	258	4712
2008	Hook & Line	North	45	125	599	365	341	596375	270	2429	1725	1381	2418337
		South	38	133	228	35	12	174020	199	6767	649	342	5165226
	Pot	North	10	31	353	249	246	1670	57	607	432	423	2871
		South	16	48	50	10	9	303	95	1334	254	251	8087
2009	Hook & Line	North	33	89	349	119	107	388108	273	5767	1977	1772	6413343
		South	42	163	310	43	20	226897	216	11874	1087	773	8690943
	Pot	North	7	25	48	36	35	629	62	649	486	478	8505
		South	15	33	64	40	40	432	107	620	391	384	4185
2010	Hook & Line	North	44	181	798	359	333	918315	230	3920	1638	1832	4510765
		South	48	256	515	81	53	376913	236	9990	1029	1380	7311194
	Pot	North	11	48	328	150	133	1774	54	1228	498	505	6641
		South	23	36	51	17	17	403	92	1065	352	355	8412
2011	Hook & Line	North	51	158	797	283	248	730000	237	4273	1490	1332	3913759
		South	45	210	402	94	63	433961	276	6622	1470	1036	7148021
	Pot	North	8	30	238	140	139	1441	60	595	355	348	3605
		South	23	52	73	17	17	287	97	1286	304	301	5055
2012	Hook & Line	North	37	122	547	240	217	762067	202	2736	1228	1083	3811231
		South	30	132	290	52	36	192191	275	5816	1106	727	3854311
	Pot	North	8	26	347	83	82	1788	43	996	241	236	5134
		South	16	28	74	28	28	399	84	510	198	194	2750
2013	Hook & Line	North	21	46	294	146	126	407867	180	1620	696	867	2247213
		South	35	160	337	81	62	302662	293	3995	992	733	3588167
	Pot	North	7	18	49	17	16	571	30	795	260	345	9268
		South	14	23	44	31	31	317	43	155	110	109	1119

TABLE 4. Number and proportion of hauls with lost gear and hauls that recovered lost gear. Asterisks mark strata that cannot be reported in order to maintain confidentiality. State-managed fisheries are italicized.

Sector	Gear	Year	Observed				Fleetwide					
			Trips	Hauls	Vessels	Retained Target Species (mt)	Targeted Species or Groups Retained (mt)	% Landings Observed	Hauls with Lost Gear	% Observed Hauls with Lost Gear	Hauls with Recovered Gear	% Observed Hauls Recovering Gear
Limited Entry Trawl	Bottom Trawl	2010	347	2614	83	4020	22321	18%	0	0%	87	3%
Catch Shares	Bottom and Midwater Trawl	2011	1110	9087	71	17256	17355	99%	3	0%	399	4%
	Bottom Trawl	2012	1072	8895	66	17107	17214	99%	0	0%	362	4%
		2013	1179	9930	68	18615	18666	100%	2	0%	298	3%
	Hook and Line	2011	92	622	11	336	336	100%	6	1%	2	0%
		2012	30	498	8	241	241	100%	6	1%	0	0%
		2013	18	153	4	85	85	100%	1	1%	0	0%
	Midwater Trawl	2012	8	23	4	194	194	100%	0	0%	0	0%
		2013	13	36	4	209	209	100%	0	0%	0	0%
	Pot	2011	227	1515	17	817	817	100%	52	3%	0	0%
		2012	258	1701	19	740	740	100%	88	5%	1	0%
		2013	93	1078	10	473	473	100%	34	3%	0	0%
Shoreside Hake	Midwater Trawl	2011	913	1701	26	90249	90249	100%	0	0%	17	1%
		2012	715	1565	24	65288	65288	100%	0	0%	1	0%
		2013	946	1725	25	96868	96868	100%	1	0%	8	0%
LE Sablefish	Hook and Line	2010	143	756	21	340	1290	26%	7	1%	1	0%
		2011	98	673	23	241	1147	21%	5	1%	1	0%
		2012	88	532	17	227	1055	22%	7	1%	0	0%
		2013	57	351	18	166	736	23%	6	2%	0	0%
	Pot	2010	43	314	7	142	509	28%	9	3%	0	0%
		2011	22	227	3	137	372	37%	3	1%	0	0%
		2012	19	351	5	101	297	34%	5	1%	0	0%
		2013	14	49	3	41	283	14%	3	6%	0	0%
OA Fixed Gear	Fixed Gear	2010	105	173	60	30	993	3%	2	1%	2	1%
		2011	122	184	64	37	590	6%	6	3%	0	0%
		2012	69	123	42	19	334	6%	3	2%	0	0%
		2013	47	78	30	10	179	6%	1	1%	0	0%
LE Fixed Gear DTL	Fixed Gear	2010	226	470	38	34	361	9%	7	1%	0	0%
		2011	201	426	38	52	534	10%	8	2%	1	0%
		2012	128	252	26	16	348	5%	2	1%	0	0%
		2013	124	248	22	18	346	5%	2	1%	0	0%
Nearshore	*Fixed Gear*	*2010*	*253*	*327*	*82*	*20*	*392*	*5%*	*38*	*12%*	*0*	*0%*
		2011	*349*	*454*	*89*	*24*	*411*	*6%*	*6*	*1%*	*0*	*0%*
		2012	*385*	*526*	*98*	*32*	*398*	*8%*	*2*	*0%*	*0*	*0%*
		2013	*353*	*454*	*104*	*28*	*428*	*6%*	*10*	*2%*	*1*	*0%*
OA CA Halibut	*Bottom Trawl*	*2010*	*34*	*111*	*6*	*2*	*69*	*3%*	*0*	*0%*	*1*	*1%*
		2011	*48*	*204*	*13*	*12*	*80*	*16%*	*0*	*0%*	*8*	*4%*
		2012	*27*	*77*	*7*	*4*	*56*	*6%*	*0*	*0%*	*1*	*1%*
		2013	*29*	*81*	*5*	*4*	*69*	*6%*	*0*	*0%*	*2*	*2%*
LE CA Halibut	*Bottom Trawl*	*2010*	*	*	*	*	*	*	*	*	*	*
Pink Shrimp	*Shrimp Trawl*	*2010*	*126*	*1654*	*51*	*2383*	*20357*	*12%*	*1*	*0%*	*8*	*0%*
		2011	*186*	*2579*	*57*	*4104*	*29460*	*14%*	*3*	*0%*	*18*	*1%*
		2012	*200*	*2733*	*64*	*3988*	*29325*	*14%*	*0*	*0%*	*9*	*0%*
		2013	*153*	*1916*	*67*	*3300*	*31551*	*10%*	*1*	*0%*	*6*	*0%*

TABLE 5. Timing of fishing effort as proportion of annual groundfish landings across bimonthly periods.

Average Percentage of Annual Groundfish Landings														
	Non-Nearshore Fixed Gear				Limited Entry		IFQ			Non-Nearshore and IFQ		Change between post-2011 and pre-2011		
	Hook & Line		Pot		Bottom Trawl		Bottom Trawl	Hook & Line	Pot	Hook & Line	Pot	Bottom Trawl	Hook & Line	Pot
Period	Pre-2011	Post-2011	Pre-2011	Post-2011	2002 - mid-2006	Mid-2006 - 2010	Post-2011			Post-2011		Post-2011		
Jan/Feb	6.22	7.42	3.58	9.90	20.00	17.18	11.48	8.53	1.53	4.26	0.62	-5.70	-1.95	-2.97
Mar/Apr	12.39	15.48	10.10	9.37	22.57	18.26	22.38	8.53	4.32	4.29	2.16	4.13	-8.10	-7.94
May/June	22.33	20.73	28.36	16.58	21.72	16.04	18.68	5.01	5.90	2.07	2.95	2.64	-20.27	-25.41
Jul/Aug	24.11	20.87	28.23	26.80	18.03	20.92	16.69	6.26	20.17	2.56	10.09	-4.23	-21.54	-18.15
Sep/Oct	27.92	25.95	22.90	32.83	16.59	20.00	15.65	57.38	53.32	28.58	26.66	-4.35	0.66	3.76
Nov/Dec	7.04	9.53	6.83	4.52	10.01	14.70	15.12	18.05	15.26	9.01	7.63	0.42	1.97	0.80

TABLE 6. Timing of fishing effort as proportion of annual sablefish landings across bimonthly periods.

Average Percentage of Annual Sablefish Landings														
	Non-Nearshore Fixed Gear				Limited Entry		IFQ			Non-Nearshore and IFQ		Change between post-2011 and pre-2011		
	Hook & Line		Pot		Bottom Trawl		Bottom Trawl	Hook & Line	Pot	Hook & Line	Pot	Bottom Trawl	Hook & Line	Pot
Period	Pre-2011	Post-2011	Pre-2011	Post-2011	2002 - mid-2006	Mid-2006 - 2010	Post-2011			Post-2011		Post-2011		
Jan/Feb	3.33	6.58	3.59	6.42	13.67	12.18	10.65	8.74	1.59	4.36	0.64	-1.53	1.04	-2.95
Mar/Apr	8.12	14.87	10.15	7.29	21.25	15.15	18.80	8.74	4.41	4.39	2.20	3.65	-3.73	-7.95
May/June	22.71	21.25	28.43	17.58	22.80	16.19	18.05	4.68	5.89	1.93	2.95	1.86	-20.78	-25.49
Jul/Aug	27.23	21.16	28.25	28.53	18.23	23.06	16.12	6.09	20.44	2.49	10.22	-6.94	-24.74	-18.03
Sep/Oct	32.23	27.20	22.73	35.29	21.07	22.04	17.19	58.26	52.93	29.03	26.46	-4.85	-3.20	3.73
Nov/Dec	6.38	8.94	6.84	4.89	13.56	16.85	19.18	17.08	15.28	8.53	7.64	2.34	2.15	0.79

TABLE 7. Spatial distribution of fishing effort as average latitude of hauls. Non-IFQ sectors show landing location, while IFQ sectors show fishing locations.

Average Latitude								
	Non-Nearshore Fixed Gear		Limited Entry	IFQ			Non-Nearshore and IFQ	
Year	Hook & Line	Pot	Bottom Trawl	Bottom Trawl	Hook & Line	Pot	Hook & Line	Pot
2002	37.94	38.49	42.51	--	--	--	--	--
2003	38.56	39.03	42.17	--	--	--	--	--
2004	38.16	37.97	42.52	--	--	--	--	--
2005	39.25	39.35	43.06	--	--	--	--	--
2006	38.75	39.79	43.41	--	--	--	--	--
2007	38.70	38.30	42.49	--	--	--	--	--
2008	38.96	38.24	42.57	--	--	--	--	--
2009	38.91	38.62	42.94	--	--	--	--	--
2010	38.20	39.02	43.07	--	--	--	--	--
2011	37.86	39.44	--	44.00	41.86	40.57	40.37	40.78
2012	37.87	39.73	--	43.65	45.97	41.08	46.19	42.22
2013	37.41	38.94	--	43.76	43.72	41.88	42.83	43.29

TABLE 8. Spatial distribution of fishing effort as average latitude of groundfish landings. Non-IFQ sectors show landing location, while IFQ sectors show fishing locations.

Average Latitude, weighted by Groundfish Landings								
	Non-Nearshore Fixed Gear		Limited Entry	IFQ			Non-Nearshore and IFQ	
Year	Hook & Line	Pot	Bottom Trawl	Bottom Trawl	Hook & Line	Pot	Hook & Line	Pot
2002	43.12	43.04	42.89	--	--	--	--	--
2003	42.18	43.64	42.92	--	--	--	--	--
2004	43.35	42.91	43.35	--	--	--	--	--
2005	43.47	43.17	43.94	--	--	--	--	--
2006	43.62	42.80	43.87	--	--	--	--	--
2007	43.37	41.80	43.66	--	--	--	--	--
2008	42.85	41.94	43.74	--	--	--	--	--
2009	41.78	41.09	44.04	--	--	--	--	--
2010	40.81	41.59	43.99	--	--	--	--	--
2011	40.30	41.28	--	44.05	40.22	40.80	40.22	40.80
2012	40.55	41.68	--	43.90	46.21	42.15	46.19	42.15
2013	40.31	43.33	--	43.92	42.60	43.02	42.58	43.02

TABLE 9. Spatial distribution of fishing effort as average latitude of sablefish landings. Non-IFQ sectors show landing location, while IFQ sectors show fishing locations.

Average Latitude, weighted by Sablefish Landings								
	Non-Nearshore Fixed Gear		Limited Entry	IFQ			Non-Nearshore and IFQ	
Year	Hook & Line	Pot	Bottom Trawl	Bottom Trawl	Hook & Line	Pot	Hook & Line	Pot
2002	43.06	43.03	42.42	--	--	--	--	--
2003	43.20	43.64	42.66	--	--	--	--	--
2004	44.27	42.91	43.12	--	--	--	--	--
2005	43.92	43.16	43.27	--	--	--	--	--
2006	44.30	42.80	43.39	--	--	--	--	--
2007	43.96	41.78	43.38	--	--	--	--	--
2008	43.47	41.93	43.67	--	--	--	--	--
2009	42.33	41.11	43.57	--	--	--	--	--
2010	41.34	41.58	43.46	--	--	--	--	--
2011	41.00	41.27	--	43.42	40.37	40.78	40.37	40.78
2012	41.33	41.69	--	43.02	46.21	42.22	46.19	42.22
2013	40.54	42.53	--	43.16	42.85	43.29	42.83	43.29

TABLE 10. Depth (fm) distribution of hauls. Non-nearshore fixed gear and IFQ depths were derived from WCGOP data; LE bottom trawl depths were derived from PacFIN logbook data. 100% of effort in IFQ and LE trawl is shown, but only the observed portion of the non-IFQ fixed gear sector is represented.

	Depth (fm)																																	
	Non-Nearshore Fixed Gear												Limited Entry Trawl						IFQ																
	Hook and Line						Pot						Bottom Trawl						Bottom Trawl						Hook and Line						Pot					
	North			South			North			South			North			South			North			South			North			South			North			South		
Year	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min	Mean	Max
2002	12	148	425	198	301	650	95	207	463	--	--	--	3	161	699	17	276	650	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2003	68	144	485	13	301	700	122	330	725	180	258	387	3	192	680	5	242	630	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2004	90	168	656	40	292	680	110	189	220	115	254	504	3	147	660	16	234	699	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2005	80	185	518	5	298	700	99	265	698	17	238	320	4	139	680	15	228	640	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2006	60	180	585	13	308	600	94	166	231	184	252	360	4	145	699	20	236	660	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2007	36	188	592	40	346	625	98	189	275	169	264	450	4	189	830	10	203	661	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2008	90	179	578	12	366	685	107	193	650	202	288	466	4	231	650	26	221	605	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2009	20	215	627	36	357	600	118	191	300	195	255	365	3	228	675	30	220	620	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2010	106	212	706	175	400	620	122	323	650	190	297	575	3	253	680	11	248	649	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
2011	22	203	635	20	404	600	131	337	870	204	320	600	--	--	--	--	--	--	4	223	900	38	258	606	108	292	688	215	463	615	112	333	641	200	438	728
2012	100	212	635	160	357	630	122	367	700	199	467	650	--	--	--	--	--	--	4	206	695	38	251	714	119	296	666	235	288	372	95	459	820	116	451	763
2013	100	233	666	48	428	662	103	175	283	12	313	614	--	--	--	--	--	--	6	210	655	4	240	610	106	229	564	388	467	558	92	354	670	201	324	718

TABLE 11. Proportion of hauls in 50-fm depth bins. Non-nearshore fixed gear and IFQ depths were derived from WCGOP data; LE bottom trawl depths were derived from PacFIN logbook data. 100% of effort in IFQ and LE trawl is shown, but only the observed portion of the non-IFQ fixed gear sector is represented.

				Proportion in Depth Bin (fm)																		
Fishery	Gear	Area	Period	0	50	100	150	200	250	300	350	400	450	500	550	600	650	700	750	800	850	900
Non-Nearshore Fixed Gear	Hook & Line	North	Pre-2011	0.01	0.03	0.37	0.27	0.17	0.08	0.03	0.02	0.01	0.01	0.01	0.00	0.00	0.00	0.00	--	--	--	--
			Post-2011	0.00	0.00	0.10	0.38	0.24	0.11	0.06	0.04	0.02	0.01	0.01	0.02	0.01	0.00	--	--	--	--	--
		South	Pre-2011	0.02	0.01	0.00	0.03	0.10	0.22	0.30	0.14	0.08	0.04	0.04	0.01	0.01	0.00	0.00	--	--	--	--
			Post-2011	0.00	0.00	0.00	0.02	0.07	0.08	0.14	0.07	0.31	0.13	0.10	0.05	0.01	0.00	--	--	--	--	--
	Pot	North	Pre-2011	--	0.00	0.10	0.36	0.32	0.12	0.03	0.01	0.00	0.00	0.01	0.01	0.02	0.01	0.00	--	--	--	--
			Post-2011	--	--	0.12	0.21	0.31	0.09	0.01	0.00	0.01	0.01	0.03	0.11	0.09	0.02	0.00	--	--	0.00	--
		South	Pre-2011	0.01	--	0.00	0.06	0.42	0.26	0.15	0.05	0.03	0.01	0.01	0.00	--	--	--	--	--	--	--
			Post-2011	0.01	--	--	0.00	0.42	0.07	0.02	0.00	0.03	0.05	0.16	0.20	0.03	0.00	--	--	--	--	--
Limited Entry	Bottom Trawl	North	Pre-2011	0.13	0.29	0.02	0.06	0.14	0.14	0.11	0.04	0.02	0.01	0.02	0.01	0.00	0.00	--	--	0.00	--	--
		South	Pre-2011	0.09	0.23	0.01	0.12	0.11	0.12	0.10	0.06	0.03	0.04	0.05	0.03	0.00	0.00	--	--	--	--	--
IFQ	Bottom Trawl	North	Post-2011	0.09	0.22	0.01	0.04	0.17	0.23	0.14	0.04	0.02	0.01	0.02	0.01	0.00	0.00	--	--	--	--	0.00
		South	Post-2011	0.04	0.27	0.00	0.10	0.08	0.08	0.16	0.09	0.04	0.04	0.07	0.03	0.00	0.00	0.00	--	--	--	--
	Hook & Line	North	Post-2011	--	--	0.08	0.19	0.38	0.10	0.04	0.02	0.05	0.05	0.05	0.03	0.02	0.00	--	--	--	--	--
		South	Post-2011	--	--	--	--	0.14	0.07	0.11	0.08	0.14	0.20	0.22	0.04	0.00	--	--	--	--	--	--
	Pot	North	Post-2011	--	0.00	0.05	0.12	0.19	0.09	0.06	0.03	0.03	0.04	0.09	0.10	0.15	0.03	0.01	0.00	0.00	--	--
		South	Post-2011	--	--	0.00	0.00	0.13	0.26	0.09	0.05	0.05	0.06	0.14	0.12	0.08	0.02	0.01	0.00	--	--	--

TABLE 12. Relative proportions of bottom trawl fishing effort (km of towline), derived from PacFIN logbooks, by degree of latitude excluded from map figures due to confidentiality requirements. Time periods are defined as "Period 1" = 1 Jan 2002 - 11 Jun 2006; "Period 2" = 12 Jun 2006 – 31 Dec 2010; "Period 3" = 1 Jan 2011 – 31 Dec 2013, representing major eras in regulatory regimes. The first set of columns ("INSIDE + OUTSIDE") summarizes the total effort (km) and coast-wide proportion ("Coast") by degree of latitude. The second set of columns ("OUTSIDE") summarizes the excluded effort (km) and latitudinal proportion ("Deg. Lat.") by degree of latitude. The last row in the "OUTSIDE" section is the total coast-wide effort excluded in each time period.

	INSIDE + OUTSIDE						OUTSIDE					
Latitude Range	**Period 1**	**Coast**	**Period 2**	**Coast**	**Period 3**	**Coast**	**Period 1**	**Deg. Lat.**	**Period 2**	**Deg. Lat.**	**Period 3**	**Deg. Lat.**
48 - 49	69,312	7.0%	25,239	2.3%	3,037	0.8%	597	0.9%	280	1.1%	185	6.1%
47 - 48	85,580	8.6%	108,500	10.1%	49,875	13.8%	365	0.4%	254	0.2%	924	1.9%
46 - 47	105,121	10.6%	148,660	13.8%	65,894	18.2%	167	0.2%	197	0.1%	589	0.9%
45 - 46	87,939	8.8%	149,386	13.8%	41,468	11.5%	727	0.8%	1,992	1.3%	494	1.2%
44 - 45	57,176	5.7%	96,044	8.9%	15,357	4.3%	549	1.0%	418	0.4%	815	5.3%
43 - 44	58,642	5.9%	103,427	9.6%	41,433	11.5%	1,023	1.7%	407	0.4%	1,355	3.3%
42 - 43	57,306	5.8%	60,851	5.6%	32,130	8.9%	1,168	2.0%	1,829	3.0%	1,011	3.1%
41 - 42	93,521	9.4%	94,678	8.8%	23,954	6.6%	1,219	1.3%	281	0.3%	612	2.6%
40 - 41	72,347	7.3%	79,219	7.3%	20,612	5.7%	377	0.5%	142	0.2%	1,802	8.7%
39 - 40	51,071	5.1%	41,962	3.9%	9,852	2.7%	187	0.4%	185	0.4%	427	4.3%
38 - 39	38,451	3.9%	30,912	2.9%	8,568	2.4%	557	1.4%	439	1.4%	314	3.7%
37 - 38	91,740	9.2%	71,481	6.6%	14,381	4.0%	17,516	19.1%	6,959	9.7%	4,697	32.7%
36 - 37	46,526	4.7%	20,485	1.9%	3,732	1.0%	402	0.9%	3,798	18.5%	3,110	83.3%
35 - 36	20,137	2.0%	4,881	0.5%	8,484	2.3%	949	4.7%	3,005	61.6%	8,484	100.0%
34 - 35	52,725	5.3%	41,214	3.8%	18,501	5.1%	3,561	6.8%	3,793	9.2%	3,051	16.5%
33 - 34	8,390	0.8%	2,025	0.2%	3,871	1.1%	267	3.2%	123	6.1%	1,358	35.1%
32 - 33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
	995,984	**100.0%**	**1,078,965**	**100.0%**	**361,149**	**100.0%**	**29,632**	**3.0%**	**24,103**	**2.2%**	**29,226**	**8.1%**

TABLE 13. Relative proportion of longline fishing effort (towline km), derived from WCGOP data, by degree of latitude excluded from map figures due to confidentiality requirements. "Non-NS" refers to "non-nearshore" and comprises the non-IFQ, fixed gear sectors, including sablefish primary, open access, and daily trip limit. The first set of columns ("INSIDE + OUTSIDE") summarizes the total effort (km) and coast-wide proportion ("Coast") by degree of latitude. The second set of columns ("OUTSIDE") summarizes the excluded effort (km) and latitudinal proportion ("Deg. Lat.") by degree of latitude. The last row in the "OUTSIDE" section is the total coast-wide effort excluded in each sector.

	INSIDE + OUTSIDE						OUTSIDE					
Latitude Range	Non-NS (02-10)	Coast	Non-NS (11-13)	Coast	IFQ (11-13)	Coast	Non-NS (02-10)	Deg. Lat.	Non-NS (11-13)	Deg. Lat.	IFQ (11 - 13)	Deg. Lat.
48 - 49	4,686	22.1%	191	4.5%	240	4.8%	14	0.3%	109	57.0%	240	100.0%
47 - 48	3,345	15.8%	384	8.9%	832	16.7%	121	3.6%	126	32.9%	832	100.0%
46 - 47	1,853	8.8%	796	18.6%	954	19.2%	60	3.2%	79	9.9%	142	14.9%
45 - 46	815	3.8%	168	3.9%	659	13.3%	77	9.4%	103	61.1%	426	64.6%
44 - 45	2,199	10.4%	552	12.9%	960	19.3%	75	3.4%	69	12.5%	526	54.8%
43 - 44	1,166	5.5%	252	5.9%	82	1.6%	23	2.0%	29	11.6%	51	61.9%
42 - 43	1,053	5.0%	205	4.8%	0	0.0%	9	0.8%	10	5.0%	0	0.0%
41 - 42	143	0.7%	18	0.4%	0	0.0%	32	22.5%	18	100.0%	0	0.0%
40 - 41	615	2.9%	396	9.3%	0	0.0%	65	10.6%	317	80.0%	0	0.0%
39 - 40	94	0.4%	40	0.9%	0	0.0%	48	51.3%	17	41.3%	0	0.0%
38 - 39	146	0.7%	106	2.5%	0	0.0%	140	95.9%	69	64.8%	0	0.0%
37 - 38	290	1.4%	108	2.5%	0	0.0%	67	23.1%	76	70.7%	0	0.0%
36 - 37	614	2.9%	57	1.3%	12	0.2%	5	0.8%	57	100.0%	7	60.0%
35 - 36	182	0.9%	84	2.0%	555	11.2%	52	28.8%	76	90.1%	226	40.7%
34 - 35	246	1.2%	108	2.5%	673	13.6%	146	59.6%	108	100.0%	259	38.4%
33 - 34	3,111	14.7%	631	14.7%	0	0.0%	239	7.7%	170	26.9%	0	0.0%
32 - 33	622	2.9%	189	4.4%	0	0.0%	27	4.4%	28	15.0%	0	0.0%
	21,180	**100.0%**	**4,285**	**100.0%**	**4,968**	**100.0%**	**1,202**	**5.7%**	**1,460**	**34.1%**	**2,708**	**54.5%**

TABLE 14. Relative proportion of pot fishing effort (km) by degree of latitude excluded from map figures due to confidentiality requirements. "Non-NS" refers to "non-nearshore" and comprises the non-IFQ sectors including sablefish primary, open access, and daily trip limit. The first set of columns ("INSIDE + OUTSIDE") summarizes the total effort (km) and coast-wide proportion ("Coast") by degree of latitude. The second set of columns ("OUTSIDE") summarizes the excluded effort (km) and latitudinal proportion ("Deg. Lat.") by degree of latitude. The last row is the total coast-wide effort excluded in each sector.

	INSIDE + OUTSIDE						OUTSIDE					
Latitude Range	Non-NS (02-10)	Coast	Non-NS (11-13)	Coast	IFQ (11-13)	Coast	Non-NS (02-10)	Deg. Lat.	Non-NS (11-13)	Deg. Lat.	IFQ (11-13)	Deg. Lat.
48 - 49	90	1.2%	0	0.0%	172	1.6%	90	100.0%	0	0.0%	103	60.1%
47 - 48	167	2.3%	54	4.0%	1,523	14.0%	167	100.0%	54	100.0%	507	33.3%
46 - 47	484	6.6%	343	25.6%	1,162	10.7%	83	17.1%	262	76.4%	171	14.8%
45 - 46	929	12.6%	185	13.8%	656	6.0%	258	27.8%	185	100.0%	117	17.8%
44 - 45	2,059	27.9%	132	9.9%	1,222	11.2%	262	12.7%	132	100.0%	208	17.0%
43 - 44	778	10.5%	45	3.3%	374	3.4%	279	35.9%	45	100.0%	374	100.0%
42 - 43	1	0.0%	40	3.0%	189	1.7%	1	100.0%	40	100.0%	189	100.0%
41 - 42	809	11.0%	174	13.0%	0	0.0%	201	24.8%	174	100.0%	0	0.0%
40 - 41	99	1.3%	30	2.3%	144	1.3%	99	100.0%	30	100.0%	144	100.0%
39 - 40	707	9.6%	180	13.4%	279	2.6%	3	0.4%	20	11.4%	279	100.0%
38 - 39	420	5.7%	27	2.0%	103	1.0%	403	96.1%	27	100.0%	103	100.0%
37 - 38	12	0.2%	6	0.4%	154	1.4%	1	9.0%	6	100.0%	154	100.0%
36 - 37	60	0.8%	107	8.0%	407	3.7%	56	92.8%	107	100.0%	398	97.8%
35 - 36	167	2.3%	12	0.9%	1,821	16.8%	75	44.6%	12	100.0%	664	36.5%
34 - 35	15	0.2%	0	0.0%	2,222	20.4%	15	100.0%	0	0.0%	410	18.4%
33 - 34	4	0.1%	3	0.2%	392	3.6%	4	100.0%	3	100.0%	325	82.9%
32 - 33	582	7.9%	0	0.0%	50	0.5%	76	13.0%	0	0.0%	50	100.0%
	7,382	**100.0%**	**1,338**	**100.0%**	**10,868**	**100.0%**	**2,073**	**28.1%**	**1,098**	**82.0%**	**4,196**	**38.6%**