PACIFIC HALIBUT MANAGEMENT SOUTH OF HUMBUG MOUNTAIN

In response to recent unusually high harvests of Pacific halibut off Southern Oregon and Northern California, the Pacific Fishery Management Council (Council) initiated a process to determine how best to incorporate the area south of the Oregon/California border into the International Pacific Halibut Commission (IPHC) stock assessment, determine the effect of including that area in the Area 2A apportionment, determine if adjustments to the 2A Catch Sharing Plan (CSP) allocations are necessary and appropriate, and establish methods to manage the fishery south of Humbug Mt. to comply with allocation provisions of the CSP and the overall total allowable catch (TAC) apportioned to Area 2A.

The first step in this process was to establish the ad hoc South of Humbug Pacific Halibut Workgroup (SHPHW) to help develop an understanding of the biological, assessment, monitoring, and allocation issues involved in the management of this area, and how they relate to Area 2A and other management areas (Agenda Item F.1.b, SHPHW Report).

The second step in this process was to establish the South of Humbug Policy Committee, which would use the SHPHW report to support development of policies and methods to account for Pacific halibut abundance and distribution in California waters, estimating and monitoring recreational Pacific halibut catch in California waters, ensuring compliance with catch allocation south of Humbug Mt., and possibly considering revision of the overall Area 2A apportionment.

Council Action:

1. **Consider the report and recommendations of the Ad Hoc South of Humbug Pacific Halibut Workgroup.**
2. **Provided guidance to the South of Humbug Policy Committee on potential management issues.**

Reference Materials:

1. Agenda Item F.1.b, Attachment 1: Ad Hoc South Of Humbug Pacific Halibut Workgroup Report on Biological, Monitoring, Assessment, and Apportionment Issues in Area 2A.
2. Agenda Item F.1.b, CFGC Letter: California Fish and Game Commission Letter to IPHC, NMFS, and PFMC.
5. Agenda Item F.1.b, IPHC Letter: International Pacific Halibut Commission Letter responding to CFGC Letter.

Agenda Order:

a. Agenda Item Overview — Chuck Tracy
b. Reports and Comments of Management Entities and Advisory Bodies
c. Public Comment
d. **Council Action**: Consider the South of Humbug Pacific Halibut Workgroup Report and Recommendations

PFMC 08/21/12

Agenda Item F.1.b
Attachment 1
September 2012

AD HOC SOUTH OF HUMBUG PACIFIC HALIBUT WORKGROUP REPORT ON BIOLOGICAL, MONITORING, ASSESSMENT, AND APPORTIONMENT ISSUES IN AREA 2A

Workgroup Members:

Ms. Lynn Mattes	Oregon Department of Fish and Wildlife
Ms. Heather Reed	Washington Department of Fish and Wildlife
Mr. Chuck Tracy	Pacific Fishery Management Council Staff
Mr. Gregg Williams	International Pacific Halibut Commission Staff
Ms. Sarah Williams	National Marine Fisheries Service Northwest Region
Ms. Deb Wilson-Vandenberg	California Department of Fish and Wildlife

August 20 2012

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Introduction

In response to recent unusually high harvests of Pacific halibut off Southern Oregon and Northern California, the Pacific Fishery Management Council (Council) initiated a process to determine how best to incorporate the area south of the Oregon/California border into the International Pacific Halibut Commission (IPHC) stock assessment, determine the effect of including that area on the Area 2A apportionment, determine if adjustments to the 2A Catch Sharing Plan (CSP) allocations are necessary and appropriate, and establish methods to manage the fishery south of Humbug Mt. to comply with allocation provisions of the CSP (Figure 1) and the overall total allowable catch (TAC) apportioned to Area 2A. The first step in this process was to establish the ad hoc South of Humbug Pacific Halibut Workgroup (SHPHW) to help develop an understanding of the biological, assessment, monitoring, and allocation issues involved in the management of this area (Figure 2), and how they relate to Area 2A and other management areas. Information developed by the SHPHW would then be used to guide development of policies to achieve the objectives of this process.

The SHPHW convened by conference call on June 12, July 17, and August 15, 2012 to review progress and interim products and develop a report and recommendations to the Council for consideration at the September 2012 Council meeting.

This report summarizes background information that will be useful in establishing policies and methods to account for Pacific halibut abundance and distribution in California waters, estimating and monitoring recreational Pacific halibut catch in California waters, ensuring compliance with catch allocation south of Humbug Mt., and possibly consideration of revising overall Area 2A apportionment.

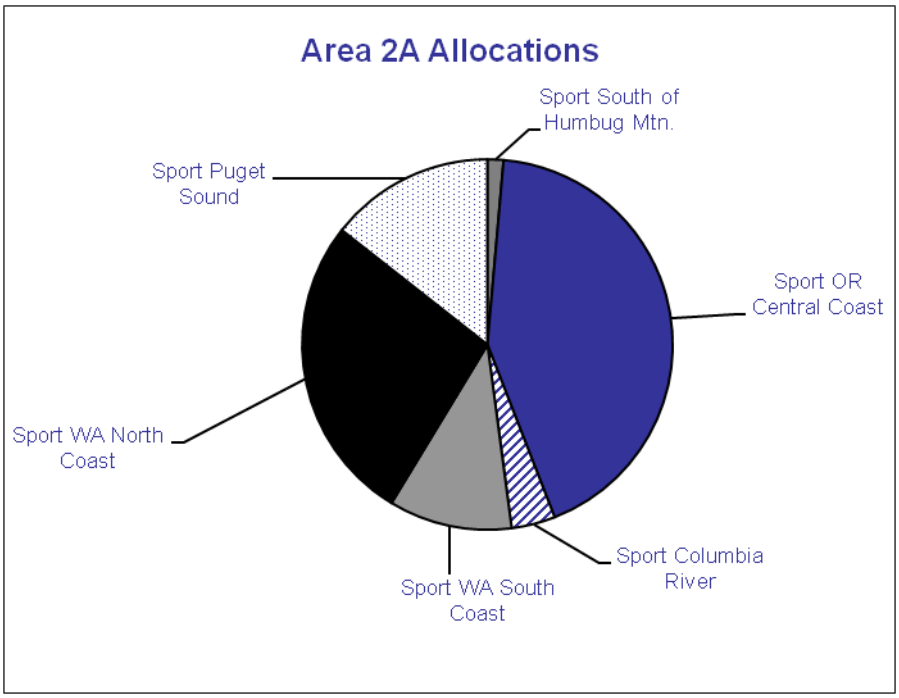

Figure 1. Area 2A Pacific halibut sport allocations based on the 2011 Catch Sharing Plan.

Figure 2. Map of current (2012) Area 2A recreational Pacific halibut management lines, excluding Washington inside waters.

Partial History of the South of Humbug Mt. Subarea Pacific Halibut Recreational Fishery

Recreational Pacific halibut fisheries in Area 2A operated without quotas prior to 1988. A fixed season length (Feb. 1-Sept. 30) was used in 1987 for all Area 2A recreational fisheries in an attempt to keep recreational harvests within 200,000 lbs. (a target, not a quota). Substantial growth in the recreational halibut fisheries occurred during 1987, causing the harvest (461,000 lbs.) to be more than double the target. The majority of the 1987 Area 2A recreational harvest occurred in Washington waters (83%; 382,805 lbs.). In 1987, California's recreational catch was 10.2 mt (22,509 pounds converted net weight) based on Marine Recreational Fisheries Statistical Survey (MRFSS) estimates from RecFIN (Recreational Fisheries Information Network)(downloaded 8/15/2012).

Area 2A recreational fisheries were first subdivided in 1988 (by state; Washington and Oregon-California combined) due to the implementation of quota based management for the 2A recreational fisheries. Washington was allocated 78% (210,000 lbs.) of the 2A recreational quota (270,000 lbs.). The combined Oregon-California recreational fisheries received 60,000 lbs. of quota and were not subdivided until the following year, 1989.

Although 41.7 metric tons (91,931 lbs.) of Pacific halibut were reported to have been landed in California waters in 1988 (RecFIN query), only harvests made in Oregon were reported to the IPHC (Table 1; from 1988 IPHC annual report). The RecFIN query also shows landings (mostly less than 10 mt) in 1986, 1987, 1995, 1996, and 1998 (Table 2).

Table 1. Pacific halibut catch (pounds net weight) reported to the IPHC by subarea during 1988. The 91,931 pounds of Pacific halibut reported to have been landed in California waters was not included in the Oregon-California subarea catch estimate.

State	Sub-Area	Catch Limit	Catch Estimate
WA	Puget Sound	207,000[a/]	45,000
	N. Coast		134,000
	S. Coast	3,000	3,000
OR-CA		60,000	74,300
Total		270,000	256,300

a/ Combined catch limit for Puget Sound and the North Coast sub area.

Table 2. Marine Recreational Fishery Statistical Survey (MRFSS) estimates of California sport Pacific halibut landings from the RecFIN database and converted to net pounds.

Year	Metric Tons Round Weight	Pounds Net Weight
1986	2.2	4,806
1987	10.2	22,509
1988	41.7	91,931
1995	4.1	8,951
1996	2.9	6,415
1998	4.0	8,878

The Oregon-California recreational halibut fishery was split into two subareas at Cape Falcon in 1989. The South of Cape Falcon subarea (including California) received 98% of the Oregon-California quota.

The newly formed South of Cape Falcon subarea was split at the Nestucca River in 1991, and the South of Nestucca River subarea (including California) received 96.4% of the Oregon-California quota. The allocation decreased to 94.9% from 1992-1993 (transferred to the Cape Falcon to Nestucca River subarea).

The Cape Falcon to Nestucca River subarea was eliminated in 1992 and the Oregon-California subarea was once again split at Cape Falcon (South of Cape Falcon subarea included California). The reason for the elimination of the Cape Falcon to Nestucca River is undocumented, but presumably occurred because the seasons were much shorter in the subarea than the other subareas (due to faster growth in the fishery).

The South of Cape Falcon subarea was subdivided again in 1994 at the Florence south jetty (the South of Florence subarea included California) to accommodate requests by halibut anglers from southern ports in Oregon who wanted to be split from northern ports, where majority of landings occurred, with hopes of having longer seasons. Each subarea south of Cape Falcon had separate quotas for their spring all-depth and nearshore fisheries, but shared the quota for their summer all-depth fisheries.

The South of Florence subarea was split at Humbug Mountain, to the California border, in 1997 to allow greater season lengths for Brookings and Gold Beach (annual landings for these ports were typically less than 100 lbs. and often zero lbs.). This area was allocated 3% of the Oregon-California quota. In 1999 the South of Humbug Mountain Subarea was extended to include California, presumably because neither area had much effort or catch reported at the time. The current management lines (excluding Washington inside waters) are shown in Figure2.

Unlike the other sub-areas in Oregon, the South of Humbug Mt. subarea has had fixed season lengths of May 1 through October 31 (prior to 2004 through Sept 30), regardless of harvest (1999-2012 Area 2A CSPs). Harvests in the South of Humbug Mt. subarea were of little concern to halibut fisheries managers prior to 2011 since reported harvests (zero lbs. in most years) were minimal relative to the quota. However, that changed in 2011, when Oregon landings alone exceeded the quota (Figure3), and the IPHC became aware of landings in California waters (Table). While the CSP allows a fixed season from May 1- October 31, it also specifies that the number of days open in that period should be adjusted based on projected catch per day and number of days to achievement of the subquota.[1]

[1] (vi) South of Humbug Mountain subarea.
This sport fishery subarea is allocated 3.0 percent of the Oregon/California subquota, which is approximately 0.62 percent of the Area 2A TAC. This area is defined as the area south of Humbug Mountain, OR (42°40.50' N. lat.), including California waters. The structuring objective for this subarea is to provide anglers the opportunity to fish in a continuous, fixed season that is open from May 1 through October 31. The daily bag limit is one halibut per person, with no size limit. Due to inability to monitor the catch in this area inseason, a fixed season will be established preseason by NMFS based on projected catch per day and number of days to achievement of the subquota; no inseason adjustments will be made, and estimates of actual catch will be made post season.

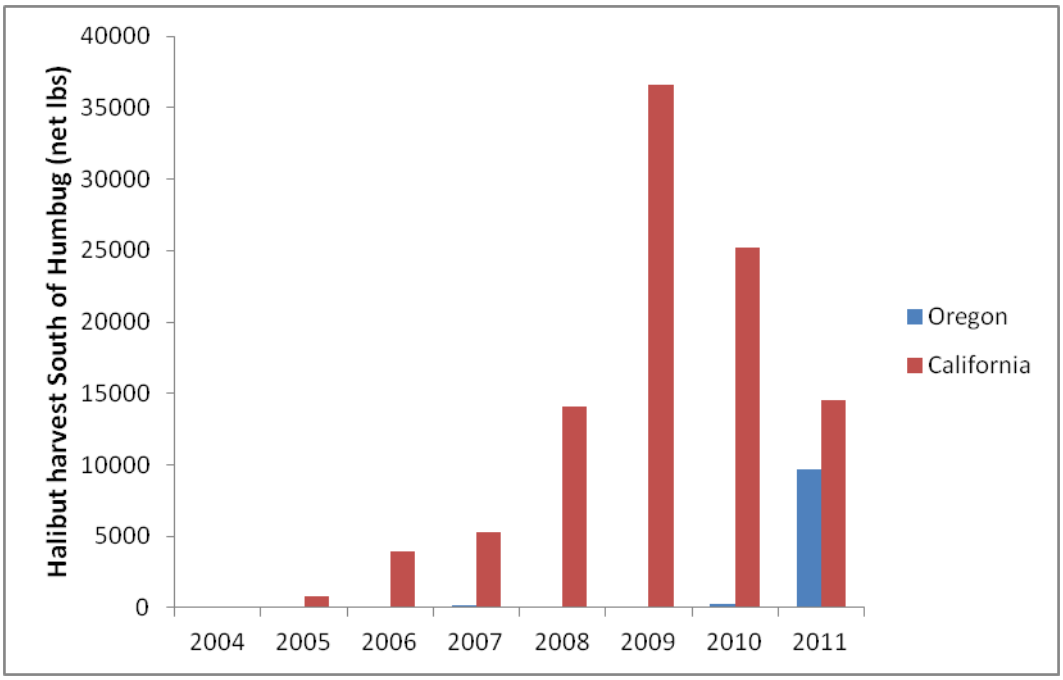

Figure 3. Pounds (net weight) of recreationally caught Pacific halibut landed in the South of Humbug Mt. Subarea, 2004-2011.

Table 3. Net weight (in pounds) of Pacific halibut landed from the Area 2A recreational fisheries, 2004-2011.

State	Area	2004	2005	2006	2007	2008	2009	2010	2011
WA[a/]	Puget Sound	49,600	62,370	63,375	45,415	83,104	114,050	71,801	46,514
	N. Coast	124,229	108,148	105,805	114,489	106,852	102,782	95,014	103,741
	S. Coast	62,823	55,545	58,484	51,166	40,397	39,595	34,553	45,100
	Col R	7,548	7,277	11,005	9,850	9,693	9,497	8,234	7,657
OR[b/]	Col R	7,230	7,755	10,715	11,651	8,205	3,242	2,568	3,621
	Central Coast	224,447	234,981	257,968	266,066	225,168	183,873	155,567	170,010
	S of Humbug	0	0	0	124	0	48	221	9,648
CA[c/]	S of Humbug	45	836	3,977	5,303	14,040	36,656	25,180	14,555
Total		477,926	478,917	513,335	506,071	489,467	491,752	395,148	402,857

a/ Source: WDFW ocean sampling program.
b/ Source: ODFW Oregon recreational boat survey.
c/ Source: CDFG California Recreational fisheries survey.

IPHC Stock Assessment and Apportionment

The following section summarizes the halibut stock assessment and apportionment process. This is a two-step process, beginning with the annual assessment, which outputs an estimate of coastwide exploitable biomass (EBio), and application of the apportionment methodology, which serves to apportion, or divide, the coastwide EBio estimate among the eight IPHC regulatory areas based on results of the annual IPHC assessment survey. Much of this section has been extracted from recent IPHC reports. Additional information can be found on the IPHC's assessment web page: http://www.iphc.int/research/stock-assessment.html. Additionally, Table 4 provides a list of some terms commonly used by IPHC and other agencies in managing Pacific halibut. Table 5 provides a summary of some basic biological characteristics of Pacific halibut.

Description of the Assessment Model (from Hare 2012)

The current halibut assessment model has remained essentially unchanged since 2003. It has been thoroughly described in an IPHC Scientific Report (Clark and Hare 2006) and was subjected to a peer review by two external scientists from the Center for Independent Experts (IPHC 2008). Since the Commission's acceptance of a coastwide stock assessment model, much of the focus of the staff and the industry is now on how the coastwide estimate of exploitable biomass is apportioned among regulatory areas. For both these reasons, the assessment model for 2011 is identical to that used for the last several assessments. In the interest of brevity, little discussion is presented here of the model itself. Interested readers are referred to Clark and Hare (2006, 2007, and 2008) for full details.

The IPHC assessment model is age- and sex-structured. Commercial and survey selectivities are both estimated as piecewise linear functions of observed mean length at age/sex in survey catches. Commercial catchability is typically allowed to vary from year to year with a penalty of 0.03 on log differences. Some variation in survey catchability between years has been allowed in production fits since 2006. The model is fitted to area-specific commercial and survey catch at age/sex and CPUE (catch per unit effort).

The coastwide assessment model, used since 2006, has considerable more flexibility than earlier closed-area models, including sex-specific catchability, selectivity, and natural mortality parameters; it is fitted to CPUE (WPUE: weight and NPUE: number) at age/sex (rather than just total CPUE), uses weaker selectivity smoothing, and neutral data weighting. Finally, and perhaps most importantly, the fits to the coastwide data provide more confidence in the results than was the case for closed-area model results.

Assessment Results: Coastwide Estimates of Recruitment, Exploitable Biomass and Spawning Biomass

Exploitable biomass (EBio) at the beginning of 2012 is estimated to be 260 million pounds and female spawning biomass (SBio) is estimated to be 319 million pounds. Estimated EBio is down by about 18% from the beginning of year 2011, while SBio is about 9% lower than the 2011 beginning of year value estimated in the 2010 assessment. Note that the beginning of year 2011 values and the beginning of year 2012 values derive from different variants of the assessment model, which accounts for some of the inter-year decline. EBio and SBio are both estimated to have declined continuously between 1998 and 2007. EBio continued to decline until 2009, the

model estimates that both are now on the increase, with SBio bottoming out in 2007 and EBio bottoming out in 2009. This differs slightly from the 2010 assessment in terms of when the turnarounds in decline for both EBio and SBio began. Recruitment (measured as age-eight fish in the year of assessment) has varied between 7 and 33 million halibut since the 1988 year class, with a mean of 17.9 million. The 1989 to 1997 year classes, presently 14 to 22 years old and the main target of the commercial fishery for the past several years, are all estimated to have been below average, with several of the year classes substantially below average. The sharply declining biomass over the past decade has resulted from these small year classes, in combination with reduced growth rates, replacing earlier year classes that were much larger, especially the 1987 and 1988 year classes. The projected increase in 2011 biomasses can be attributed, in large part, to the incoming 1998 through 2003 year classes that are estimated to be well above average, particularly the 1999 and 2000 year classes. The extent to which these year classes will contribute to EBio over the next few years depends on the growth rate which, as has been frequently noted, continues to decline.

The annual stock assessment produces an estimate of the total number of male and female halibut, ages 6 and older, in the ocean. The time series of abundance illustrates the strength of the celebrated 1987, and to a lesser extent 1988, year classes. As was true last year, the current assessment suggests that three large year classes – 1998, 1999, and 2000 – have entered the exploitable biomass and should be the largest component over the next few years. Presently, all three year classes look to be larger – in terms of numbers – than the 1987 and 1988 year classes. However, it is important to note that size at age is much smaller now than it was 20 years ago. This has two important ramifications: first it means that the three strong year classes are only just beginning to reach the exploitable size range and, therefore, their true numbers in the population are still quite uncertain; second it means that for a given number of halibut, their collective biomass will be far smaller than the 1987 and 1988 year classes. Currently, a large fraction of males never reach the commercial fishery minimum size limit (32 inches) and thus never enter the exploitable biomass. It remains to be seen just how these year classes will develop into the exploitable component of the stock.

Apportioning the Coastwide Biomass Among Regulatory Areas

Apportionment of Ebio based on survey WPUE is the most objective and consistent method of estimating the biomass distribution among areas and therefore the best distribution of total CEY to achieve the IPHC's goal of proportional harvest among areas (see Webster et al. 2011 for a discussion of alternatives). The validity of the survey WPUE apportioning requires that survey catchability – the relationship between density and WPUE – be roughly equal among areas. Over the past few years, several checks for area differences in catchability were made (Clark 2008abc, Webster 2009) but results were inconclusive in determining differences. However, the staff has conducted analyses of factors that might influence area-specific catchability and provides adjustment factors for these influences. Since 2010, the two same factors for adjusting survey WPUE were employed. A brief summary of the rationale behind the two factors is presented below but details are not repeated here (see Webster and Hare 2011). Following adjustment of the annual survey WPUE values, the IPHC averages the last three years' of values to smooth out annual variation in the survey. Starting in 2011, a weighting scheme based on a Kalman filter approach was adopted by staff as a superior and statistically-sound methodology (see below;

Webster 2011). This approach derives directly from discussions at the Commission's 2010 Annual Meeting and a request of staff by the Commission.

The apportionment of biomass results in a level of EBio for each regulatory area. Staff Catch Limit Recommendations are based on the Fishery Constant Exploitation Yield (FCEY) determined for each area. The FCEY is calculated by subtracting "other removals" from the Total CEY, which itself is calculated by multiplying the area-specific target harvest rate and the area-specific EBio. "Other removals" is composed of bycatch and fishery wastage of fish greater than 26 inches in length (i.e., O26 fish), sport catch (except in Areas 2A and 2B where it is part of the FCEY), and personal use/subsistence (except in Area 2A, where it is part of the FCEY). This process is further discussed in a subsequent section.

Survey WPUE Adjustment Factors

Hook Competition

Catchability of halibut is affected by the presence of other bait takers, a process known as hook competition. If the average number of baits available to halibut varies substantially among regions, this might be a reason to adjust survey WPUE. To compute this adjustment, survey information on the number of returned baits by regulatory area is summed and an adjustment factor relative to the coastwide average is calculated.

Timing of Setline Survey

The survey is designed to measure EBio at approximately the midpoint of the year in each regulatory area. Necessarily, the timing of the survey varies due to survey logistics. The timing of fishery removals (commercial, sport and subsistence fishing, bycatch, wastage) also varies, even more substantially, among areas. It can be reasoned that an area where more of the annual removals are taken prior to our survey would "see" a smaller EBio than an otherwise identical situation where the other removals had not yet occurred. To compute this adjustment, we estimate the WPUE value for the midpoint of the survey as well as fraction of removals prior to that time.

Time-Averaging Method for Weighting Survey WPUE for Apportionment

A detailed statistical analysis was conducted in 2011 that determined the most recent year's survey should be disproportionally weighted compared to earlier years (Webster 2011). This result derives from consideration of the relative variances within an area in a given year compared to interannual variance. Areas with low variance and a large number of stations, such as Area 3A and 2C should, in a statistical sense, give almost no weight to any but the most recent year's WPUE value. However, several areas with greater coefficients of variation should still give some weight to the previous couple of years. Rather than utilize a different set of weights for each area, when the weights can vary somewhat depending on the period of years considered, a weighting scheme was adopted which was most inclusive of previous years' data. That scheme results in weights of 75:20:5 (recent year first).

Definition of Bottom Area

Pacific halibut are found on all bottom substrate types, so halibut habitat includes all bottom area. However, the depth range of halibut habitat is important to the process of apportioning coastwide biomass. The depth range also plays a role in weighting various regulatory area

datasets to construct the coastwide dataset used in fitting the stock assessment (Clark and Hare 2007). Until 2009, halibut habitat was defined as all bottom area between 0 and 300 fathoms. While the setline survey restricts stations to a range of 20-275 fm, the mean density estimates are applied to the larger habitat definition. A recent review of commercial landings revealed that commercial fishing for halibut is increasingly operating in waters deeper than 300 fm (Hare et al. 2010). Correspondingly, beginning in 2010, the definition of halibut habitat was expanded to 400 fm. It is conceivable that applying density estimates from the narrower, surveyed range of 20-275 fm to the broader, defined habitat range of 0-400 fm results in a bias that differs by area. IPHC staff designed and operated an expanded survey in Area 2A in 2011 to better understand the operational constraints involved with conducting the standard survey in both shallower (10-20 fm) and deeper (>275 fm) waters (Webster et al. 2012). The bottom area computations and totals are described in Hare et al. (2010). The estimates of absolute and relative amount of bottom area for the two definitions are listed in Table 6.

Bottom Area Weighting

The IPHC setline survey operates on a 10 nautical mile grid in all IPHC regulatory areas, except for the broad shelf in Area 4CDE. Halibut are distributed, however, in both shallower and deeper waters than 20-275 fms. The choice of which bottom area definition to use with survey WPUE is relatively subjective; both are biased. The broader definition (0-400 fm) assumes halibut density in 0-20 and 275-400 fm, i.e., outside the survey depth range, is the same as in the surveyed depths of 20-275 fm, an assumption that is almost certainly incorrect, at least for some areas. The narrower definition (20-275 fm) gives no credit for biomass distribution for areas that have proportionally more shallower and deeper regions, areas in which commercial fishing is documented to occur. For 2012, the staff used the broader area definition, applied equally to all areas, largely because fishing is known to occur in these depths in at least most of these areas. Thus, survey WPUE is applied to non-surveyed areas within the 20-275 fm depth zone. In the case of Area 2A, this includes the Strait of Juan de Fuca and the inside waters of Puget Sound. The same approach is undertaken in similar non-surveyed areas in other IPHC regulatory areas. Initial work on potentially expanding the survey, at least periodically, to shallower and deeper regions is discussed in Webster et al. (2012).

Pacific Halibut Fishery Catch Limit Determination

A fishery catch limit is the result of a multi-step process, which has the objective of determining how much can be harvested by the directed fishery given the IPHC's goals for stock conservation. The process starts with the IPHC staff determining the size of the coastwide EBio and then apportioning it into regulatory area Ebio using objective scientific procedures. EBio is defined as the fraction of the total biomass (TBio), which is catchable by hook and line gear. Generally, this is composed of fish over 32 inches (O32).

Next, the amount of yield available for harvest is calculated by applying the IPHC's target harvest rate to the EBio estimate. This resulting yield is referred to as the Total Constant Exploitation Yield, or TCEY (EBio times target harvest rate). The target harvest rate differs between Areas 2A-3A and Areas 3B-4, with the latter being lower. In addition, any given harvest rate responds to two stock reference points, the threshold and limit reference points. Harvest rates are constant above the threshold reference point (30% of estimated unfished spawning

biomass) and decrease linearly to zero if the spawning biomass decreases to the limit reference point (20% of estimated unfished spawning biomass).

The third step is to subtract Other Removals from TCEY in order to determine the Fishery CEY or FCEY. The FCEY forms the basis of the directed fishery catch limits. Other Removals include catches which either have no explicit limits on the amount of harvest, or catches which IPHC has no authority to manage. The former category includes sport and subsistence/personal use harvest, and wastage from the commercial halibut fishery; the latter includes bycatch mortality. Exceptions occur for Areas 2A and 2B because of the allocation plans among fishery sectors in those areas. Additionally, for bycatch and wastage, only that portion of the catch over 26 inches (O26) is included in this step, because of the impact those sizes have on the removals from the stock, which essentially equal removals O32.

The next step is for the IPHC staff to determine its recommendation for an area's catch limit, i.e., Catch Limit Recommendation (CLR), based on the current year's FCEY and the trajectory of the stock since the preceding year. Within its Harvest Policy, the IPHC' has a harvest control rule termed Slow Up/Full Down (SUFullD). It works in the following manner: if the current FCEY is greater than the previous year's catch limit, the staff's CLR would be the previous year's Catch Limit PLUS one third of the difference between the two; if the Fishery CEY is less than the previous year's Catch Limit, then the CLR is equal to the Fishery CEY.

The IPHC staff distributes its CLRs in advance of the IPHC Annual Meeting, allowing the halibut industry to discuss and provide comment back to the IPHC. Once the Annual Meeting commences, the Conference Board and Processor Advisory Group further discuss the CLRs, which results in formal recommendations to the IPHC. The IPHC considers all of the input – public comments, recommendations from its advisory bodies, and staff CLRs – and then adopts fishery catch limits and other measures which seek to balance the advice it has received, with stock conservation being the primary consideration. The overall catch limit determination process is depicted in Figure 4.

Assessment and Fishery Results

Assessment and fishery results for Area 2A are provided in Table 7. It should be noted that the assessment changed to a coastwide methodology in 2006 for management of the 2007 fishery. Data shown in the table are in millions of pounds, net weight (head off, eviscerated). All 2011 removals are preliminary.

IPHC Stock Assessment Survey

Survey Description

The purpose of the IPHC standardized assessment survey is to collect information required by the IPHC's annual stock assessment. This information is used to study aspects of the halibut stocks such as growth, distribution, area-wide biomass, age composition, sexual maturity, and relative abundance of bycatch species. The current survey encompasses all offshore waters of the U.S. and Canadian west coast (excluding Califronia), Southeast Alaska, Gulf of Alaska, Aleutian Islands, and the Bering Sea edge. The survey is divided into 27 separate regions, ranging from the southern Oregon border to the northern Bering Sea, including the Aleutian Islands (Figure 5). Generally, each survey region may require between 15 and 23 fishing days to complete, as a survey region may contain between 40-68 predetermined stations. Vessels are allowed to fish a maximum of 3 stations per day, depending on the number of skates fished per station in a given year.

The survey provides standardized stock assessment data. Catch per unit effort (WPUE and NPUE), size, age, and sex composition of the halibut catch are used to monitor changes in abundance, growth, and mortality in the adult population. Survey data are used to determine halibut range, local depletion, and fleet distribution effects on the resource. In addition to halibut data, occurrence of bycatch species is recorded.

Each survey region consists of a regular distribution of stations on a 10 nm by 10 nm grid. The center of each station is within the survey depth range of 20 to 275 fathoms. The ends of some sets may extend shallower or deeper than the standard range. A single coordinate indicating the center of the set is given for each station location. The setline gear is set through the center position in either an N-S or E-W orientation. All stations within a survey region do not have to be set in the same direction. If protected areas (e.g., sea lion rookeries), weather or tide do not permit setting directly N-S or E-W, the captain may set in the direction necessary. Under no circumstances is the setting altered to purposefully increase or decrease the catch.

The execution of the survey is dictated by a prescribed fishing plan. The choice of where to begin and the number of stations to fish each day (≤4 stations/day) is generally left to the discretion of the captain and lead sea sampler on board, taking into account setting and hauling logistics, weather and tide conditions, and distance between sets. Setting generally begins at approximately 5:00 a.m. local time (not earlier) or at first light each morning - whichever is later. When all stations are set, the vessel will return to the first station and begin hauling after the set has soaked at least 5 hours. During hauling, all halibut are brought aboard. Lengths, otoliths, sex determination, and other information are collected for all O32 halibut and a random sample of the under 32 inch (U32) halibut. U32 halibut that are not sacrificed are measured and returned to the water unharmed. All O32 halibut and some bycatch (Pacific cod and rockfish) are retained and sold to reduce costs of the survey. Revenue from sale of bycatch species is shared between the vessel and the state where the fish were caught. IPHC's goal for the survey operation is to be cost-neutral.

The fishing operation and data collection program necessitates specific vessel requirements. Although there are no set minimums, survey vessels previously employed for the Area 2A

survey have generally been greater than 50 ft overall length. In addition, the vessel must be suitably equipped to fish conventional setline gear. A well-insulated hold is required, as re recirculating seawater or slush is not permitted for holding the catch. The vessel must have adequate deck space to allow the Commission staff to carry out their duties, which requires space to mount a recording shack (approximately 36" by 38" by 74" high) with an attached measuring cradle. The vessel shall have adequate accommodations for the vessel crew and IPHC staff, which may include women. With the lower catch rates in Area 2A, the Commission may consider chartering vessels with limited bunk and/or deck space as the work may be able to be completed with one staff member. Preference may be given to vessels capable of taking a second staff member for two trips in Washington. (In other areas, two or three IPHC staff are necessary, depending on area and data needs.) The IPHC Charter Specifications also describe additional requirements for the vessel, gear, crew, electronics, baiting, and conduct. Additional survey information can be found on the IPHC's survey web page: http://www.iphc.int/research/surveys.html.

Survey Objectives

1. Provide standardized data for stock assessment modeling including catch-per-unit-effort, sex specific length-at-age, and age composition.
2. Examine halibut distribution and abundance including how the sex, length, maturity, and age composition change over the fishing grounds.
3. Provide stock dynamics data that might not be available through commercial fishery statistics. Examples include the incidence of bycatch species, overall rate of bait attacks, halibut sex and maturity data, presence of prior hooking injuries, and data from sublegal (juvenile) halibut.
4. Log marine mammal and seabird occurrence and interactions with fishing gear.
5. Upon request, collect relevant data for IPHC and other scientific and management agencies.

IPHC Survey History

IPHC began conducting systematic surveys in 1963 for the purpose of collecting sex-specific data on both legal-sized and sublegal-sized fish in the setline catch. These data cannot be obtained by sampling commercial landings because the legal-sized fish are eviscerated at sea and the sublegals are discarded. However, this survey effort was discontinued after 1966. Annual setline surveys were reinstituted from 1977 through 1986. At that time the assessment staff did a comparison between the survey CPUE time series and the corresponding estimates of stock abundance in those years from the 1986 stock assessment. They found that survey CPUE was a highly variable index of stock abundance, far inferior to commercial CPUE. As a result the surveys were canceled after the 1986 season.

The grid survey program was reinitiated in 1993, with a focused approach that annually rotated among core areas. In 1996, the surveys were expanded to cover all of Area 3, and all of Area 2 north of Vancouver Island. In 1998, the survey layout in all areas was redesigned to create a more even distribution of stations. For historical information about standardized setline grid surveys see IPHC Annual Reports 1963-1965, 1976-1986, 1993-current, Report of Assessment and Research Activities (RARA) documents for 1993-current, and Hoag et al. (1980).

At present survey CPUE is an essential component of the assessment, but the ongoing series of sex-specific specimen data, including sublegal-size halibut, remains equally important. In particular, the survey sex ratio at length is used to estimate the sex ratio of the commercial catch. Because of its broad reach, the survey has also been called on in recent years to carry out a number of special projects, chief among them the mass passive integrated transponder (PIT) tag releases in 2003 and 2004, but also including the water column profiling, special tissue collections, and other unique sampling projects.

Area 2A Survey Results

The assessment survey conducted within Area 2A is divided into a Washington and Oregon survey regions for operational purposes (Figure 6; Figure 7 displays stations relative to the Area 2A CSP sport management areas). The regions are not intended to precisely mirror state boundaries but to divide the survey effort somewhat equally for planning and survey operational efficiencies. Table 8 presents annual results from the standard grid stations; other stations fished on an experimental basis or for rockfish assessment purposes are not included. Data shown are the O32 WPUE, or weight per unit effort (net pounds per standard skate of 100 hooks) of fish over 32 inches in total length, for each survey region within Area 2A, and then the coastwide results. Table 9 groups the survey results by the CSP sport management areas, and Figure 8 displays results for each station graphically.

References

Clark, W.G. 2008a. Effect of station depth distribution on survey CPUE. Int. Pac. Halibut Comm. Report of Research and Assessment Activities 2007: 205-210

Clark, W.G. 2008b. Effect of hook competition on survey CPUE. Int. Pac. Halibut Comm. Report of Research and Assessment Activities 2007: 211-215.

Clark, W.G. 2008c. Comparison of setline and trawl survey catch rates in different areas. Int. Pac. Halibut Comm. Report of Research and Assessment Activities 2007: 221-228.

Clark, W.G., and Hare, S.R. 2006. Assessment and management of Pacific halibut: data, methods, and policy. Int. Pac. Halibut Comm. Sci. Rep. 83.

Clark, W.G., and Hare, S.R. 2007. Motivation and plan for a coastwide stock assessment. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2006: 83-96.

Clark, W.G., and Hare, S.R. 2008. Assessment of the Pacific halibut stock at the end of 2007. Int. Pac. Halibut Comm. Report of Research and Assessment Activities 2007: 177-203.

Forsberg, J. 2012a. Age distribution of the commercial halibut catch for 2011. Int. Pac. Halibut Comm. Report of Research and Assessment Activities 2011: 83-89.

Forsberg, J. 2012b. Age distribution of Pacific halibut in the 2011 IPHC stock assessment setline survey. Int. Pac. Halibut Comm. Report of Research and Assessment Activities 2011: 553-560.

Hare, S.R. 2011. Potential modifications to the IPHC harvest policy. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2010: 177-199.

Hare, S.R. 2012. Assessment of the Pacific halibut stock at the end of 2011. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2011: 91-194.

Hare, S.R., Webster, R.A., and Kong, T.M. 2010. Updated and expanded estimates of bottom area in IPHC regulatory areas . Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2009: 347-361.

Hare, S.R., Webster, R.A., and Kong, T.M. 2010. Updated and expanded estimates of bottom area in IPHC regulatory areas . Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2009: 347-361.

Hoag, S. H., Williams, G. H., Myhre, R. J., and I. R. McGregor. 1980. Halibut assessment data: Setline surveys in the north Pacific Ocean, 1963-1966 and 1976-1979. Int. Pac. Halibut Comm. Tech. Rep. No. 18. 42 p.

Trumble, R. J., J. D. Neilson, W. R. Bowering, and D. A. McCaughran. 1993. Atlantic halibut (*Hippoglossus hippoglossus*) and Pacific halibut (*H. stenolepis*) and their North American fisheries. Can. Bull. Fish. Aquat. Sci. No. 227: 84 pp.

Webster, R. 2009. Further examination of fisheries-survey interactions. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2008: 203-211.

Webster, R. 2011. Weighted averaging of recent survey indices. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2010: 241-250.

Webster, R.A. and Hare, S.R. 2011. Adjusting IPHC setline survey WPUE for survey timing and hook competition. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2010: 251-260.

Webster, R.A., Dykstra, C.L., and Hare, S.R. 2012. Area 2A survey expansion. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2011: 331-340.

Webster, R.A., Hare, S.R., Valero, J.L., and Leaman, B.M. 2011. Notes on the IPHC setline survey design, alternatives for estimating biomass distribution, and the hook competition adjustment. Int. Pac. Halibut Comm. Report of Assessment and Research Activities 2010: 229-240.

Table 4. Selected terminology and definitions often used in Pacific halibut management.

Term	Definition
BAWM	Bycatch and wastage mortality.
Biomass	Weight in net (head off, eviscerated) pounds.
Bycatch	Halibut caught by fisheries targeting other species. 'Bycatch' is often used interchangeably with 'bycatch mortality'. Technically, bycatch represents fish caught, whereas bycatch mortality represents the amount of halibut bycatch that is killed.
Catchability	Fraction of total available fish caught per unit of effort.
CEY	Constant Exploitation Yield. IPHC measures CEY in terms of Total CEY, which is the total amount of yield available for harvest in an area, and Fishery CEY, which is the amount of yield available for the halibut fisheries.
CPUE	Catch per unit effort. A general term denoting catch, either in number of fish or in weight, per unit of effort. Effort is usually measured in terms of a standard skate of fishing gear, which is defined by IPHC as 100 hooks at 18-foot spacing.
CSP	Catch Sharing Plan. A management program, subject to approval by the IPHC but generally administered by the domestic management body, which allocates available yield among specific user groups, sectors, or within a management area.
Ebio	Exploitable biomass. Ebio is the fraction of the Total biomass which is catchable by hook and line gear.
NPUE	Number (of fish) per unit effort. Effort is usually measured in terms of a standard skate of fishing gear, which is defined by IPHC as 100 hooks at 18-foot spacing.
Sbio	An abbreviation for female spawning biomass, measured in weight, which is comprised only of sexually mature female halibut. Sexual maturity begins as early at age 8. IPHC estimates that 50% of the females are mature by age 13, and 100% at age 20.
Selectivity	The relative probability of a fish being retained by the fishing gear as a function of its size (or age).
SSA survey	Standardized Stock Assessment survey. The survey consists of an expansive grid of stations that have been fished annually by IPHC since 1996.
SUFastD	Slow Up/Fast Down. A harvest control rule used by the Commission which has been generally applied since 2001 and formally adopted as policy in 2007. Modified to SUFullD (see below) in 2011. SUFastD works in the following manner: if the current FCEY is greater than the previous year's catch limit, the staff's CLR would be the previous year's Catch Limit PLUS one third of the difference between the two; if the Fishery CEY is less than the previous year's Catch Limit, then the CLR is equal to one-half of the decrease from the previous year's catch limit to the current Fishery CEY.
SUFullD	Slow Up/Full Down. See the above description of SUFastD. Operates the in the same manner as SUFastD, except that the CLR is equal to the Fishery CEY if the current year's Fishery CEY is less than the previous year's Catch Limit.
Tbio	Total biomass. Tbio, measured in weight, is the biomass of all halibut, generally for ages 8 and older.
Wastage	The amount of pounds killed and discarded by the commercial halibut fishery, either from the release of undersize halibut, or from lost and abandoned fishing gear.
WPUE	Pounds of fish per unit effort. Effort is usually measured in terms of a standard skate of fishing gear, which is defined by IPHC as 100 hooks at 18-foot spacing.

Table 5. Summary of some biological characteristics of Pacific halibut. Adapted and updated from Trumble et al. (1993) and other sources as indicated.

Characteristic	Descriptor	Remarks, if any
Taxonomy	*Hippoglossus stenolepis*	
Spawning season	November-March	
Spawning area	Continental shelf	Generally considered to occur deeper than 150 fathoms. Spawning occurs coastwide though major locations have been identified.
Spawning temperature (C^{o})	3-8	
Eggs Diameter (mm) Density	 2.9-3.8 Neutral	From Schmitt and Skud (1978)
Age at 50% maturity (yrs) Female Male	 13 8	
Maximum age (yrs) Female Male	 55 55	
Size at 50% maturity (cm) Female Male	 119 uncertain	
Area 2A comm. fishery 2011 mean age (yrs) 2011 mean weight (lbs) 2011 mean length (cm)	 11.7 17.7 93.2	See Forsberg (2012a)
Area 2A survey - 2011 Females Max age (yrs) Min age (yrs) Mean age (yrs) Max length (cm) Min length (cm) Mean length (cm) Males Max age (yrs) Min age (yrs) Mean age (yrs) Max length (cm) Min length (cm) Mean length (cm)	 25 6 11.4 150 64 95.6 25 6 12.0 118 58 81.5	See Forsberg (2012b)
Natural mortality	0.15	
Range	Northern California to Bering Sea	
Migration	To 1000's of miles	Based on extensive IPHC tagging studies

Table 6. Estimated bottom area within each IPHC regulatory area.

	IPHC Regulatory Area							
	2A[a/]	2B	2C	3A	3B	4A	4B	4CDE
0-400 fm								
Sq. nm	14,132	29,601	14,580	49,178	29,584	19,889	19,711	219,599
Prct	3.6%	7.5%	3.7%	12.4%	7.5%	5.0%	5.0%	55.5%
20-275 fm								
Sq. nm	10,725	23,770	11,915	41,998	25,581	16,989	11,865	150,191
Prct	3.7%	8.1%	4.1%	14.3%	8.7%	5.8%	4.0%	51.3%

a/ Representing area off Washington and Oregon.

Table 7. Annual halibut assessment metrics and estimates of removals in Area 2A. Values shown are in millions of pounds, net weight (head off, eviscerated). All 2011 removals are preliminary. Sport removals do not include California.

						Removals					
Year	Ebio	Harvest Rate	Total CEY	Fishery CEY	Fishery Catch Limit	Treaty Tribes	Sport	Comm.	Comm. Wastage	Bycatch Mortality	Research Catch
2000	6.11	0.200	1.22	0.83	0.83	0.33	0.34	0.17	0.01	0.82	0.00
2001	7.44	0.200	1.49	1.14	1.14	0.43	0.45	0.25	0.01	0.84	0.02
2002	9.25	0.200	1.85	1.31	1.31	0.49	0.40	0.37	0.01	0.56	0.01
2003	9.10	0.200	1.82	1.29	1.31	0.49	0.40	0.34	0.01	0.56	0.01
2004	8.50	0.250	2.11	1.81	1.48	0.54	0.49	0.35	0.01	0.50	0.01
2005	6.96	0.225	1.56	1.17	1.33	0.48	0.48	0.34	0.02	0.28	0.02
2006	7.60	0.225	1.71	1.49	1.38	0.51	0.52	0.34	0.02	0.37	0.01
2007	7.00	0.225	1.58	1.31	1.34	0.50	0.50	0.25	0.02	0.37	0.02
2008	4.70	0.200	0.94	0.65	0.95	0.45	0.48	0.22	0.02	0.30	0.01
2009	3.21	0.200	0.64	0.50	0.95	0.33	0.46	0.18	0.02	0.51	0.01
2010	4.09	0.200	0.82	0.57	0.81	0.28	0.35	0.13	0.01	0.51	0.01
2011	6.63	0.215	1.43	1.11	0.91	0.38	0.39	0.19	0.01	0.14	0.02
2012	6.15	0.215	1.32	1.15	0.99	-	-	-	-	-	-

Table 8. Annual IPHC assessment survey results by survey region. "O32 WPUE" represents weight per unit effort (net pounds per standard skate of 100 hooks) of fish over 32 inches in total length.

	OR survey region			WA survey region			OR and WA combined		
Year	No. of Stations	O32 WPUE	(SE)	No. of Stations	O32 WPUE	(SE)	No. of Stations	O32 WPUE	(SE)
2001	42	17.8	(4.4)	42	65.1	(25.8)	84	41.4	(13.3)
2002	42	16.7	(5.4)	42	49.8	(25.1)	84	33.2	(12.9)
2003	42	9.2	(2.8)	42	34.8	(11.4)	84	22.0	(6.0)
2004	42	15.0	(5.9)	42	38.9	(14.4)	84	26.9	(7.8)
2005	42	10.8	(2.8)	42	45.2	(18.6)	84	28.0	(9.5)
2006	42	9.2	(4.0)	42	23.2	(9.3)	84	16.2	(5.1)
2007	42	5.6	(2.2)	42	31.9	(14.6)	84	18.7	(7.5)
2008	42	12.5	(4.8)	42	24.4	(10.7)	84	18.5	(5.9)
2009	42	5.8	(2.1)	42	10.2	(4.0)	84	8.0	(2.3)
2010	42	16.5	(6.6)	42	16.9	(4.6)	84	16.7	(4.0)
2011	47	30.5	(7.7)	49	25.7	(4.2)	96	27.0	(4.0)

Table 9. Annual IPHC assessment survey results for 2007-2011 by PFMC Area 2A Catch Sharing Plan sport management area. The WPUE values represent weight per unit effort (net pounds per standard skate of 100 hooks) of fish. The table does not include the Puget Sound area.

	North Coast WA			South Coast WA			Columbia River			Central OR			South of Humbug (OR only)		
Year	O32 WPUE	U32 WPUE	No. of Stations	O32 WPUE	U32 WPUE	No. of Stations	O32 WPUE	U32 WPUE	No. of Stations	O32 WPUE	U32 WPUE	No. of Stations	O32 WPUE	U32 WPUE	No. of Stations
2007	93.0	18.0	12	15.1	9.7	13	1.9	0.9	9	5.3	1.3	45	1.1	0.0	5
2008	71.5	17.1	12	11.6	7.8	13	2.0	1.9	9	11.3	4.1	45	3.7	0.6	5
2009	30.0	15.7	12	4.5	2.1	13	0.6	0.4	9	5.0	1.2	45	4.7	2.0	5
2010	37.9	11.1	12	18.3	4.1	13	2.6	0.8	9	14.8	2.8	45	5.5	0.4	5
2011	45.9	8.6	15	26.1	8.0	14	10.2	2.5	11	27.6	3.3	50	7.2	1.0	5

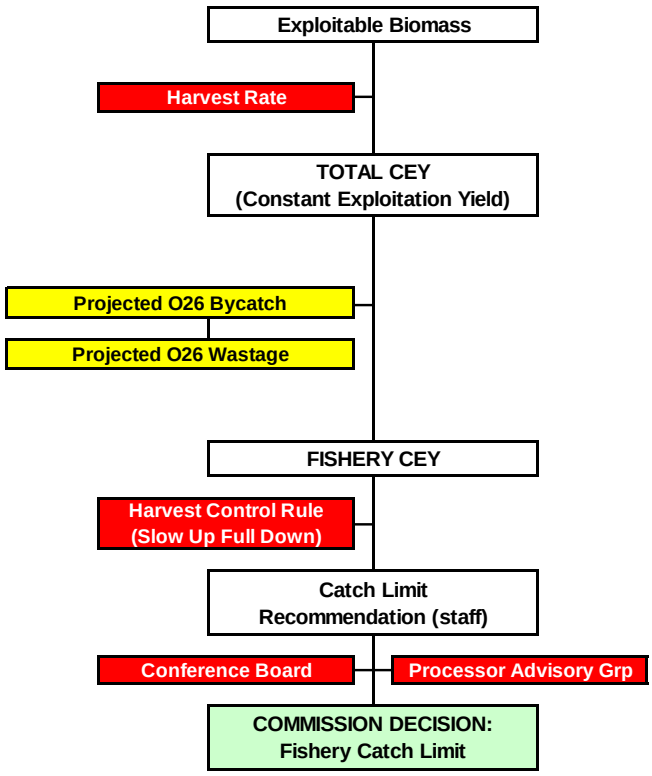

Figure 4. The IPHC process for Pacific halibut fishery catch limit determination in Area 2A.

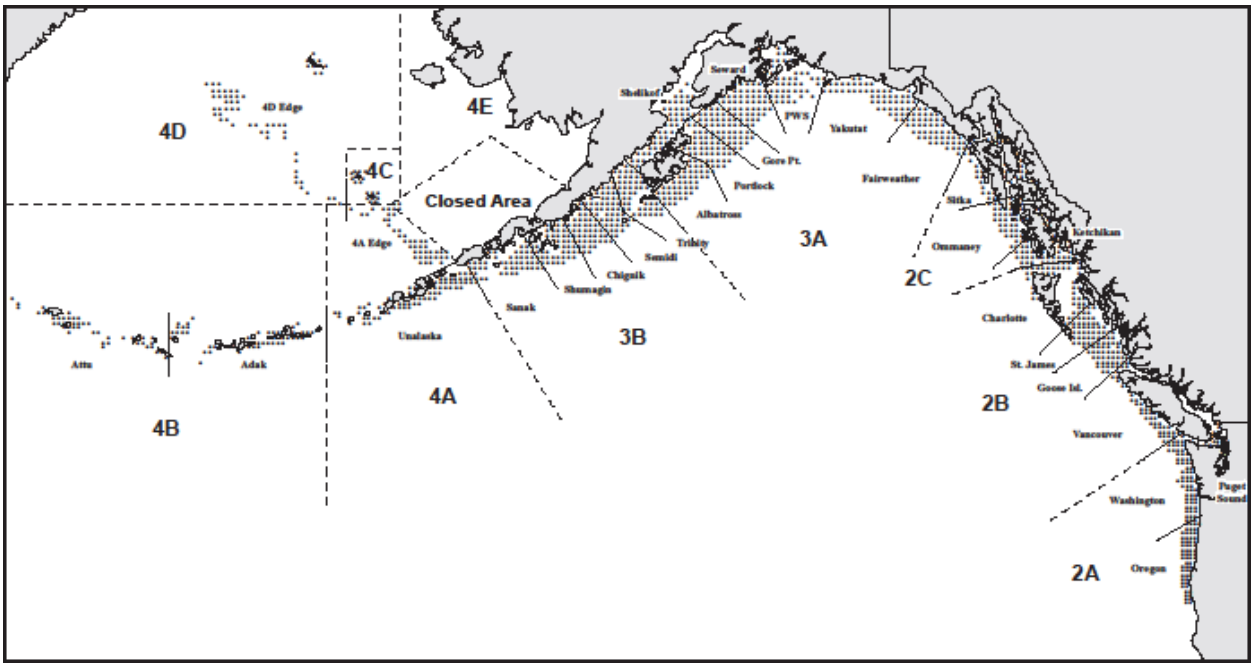

Figure 5. 2011 IPHC standardized assessment survey stations.

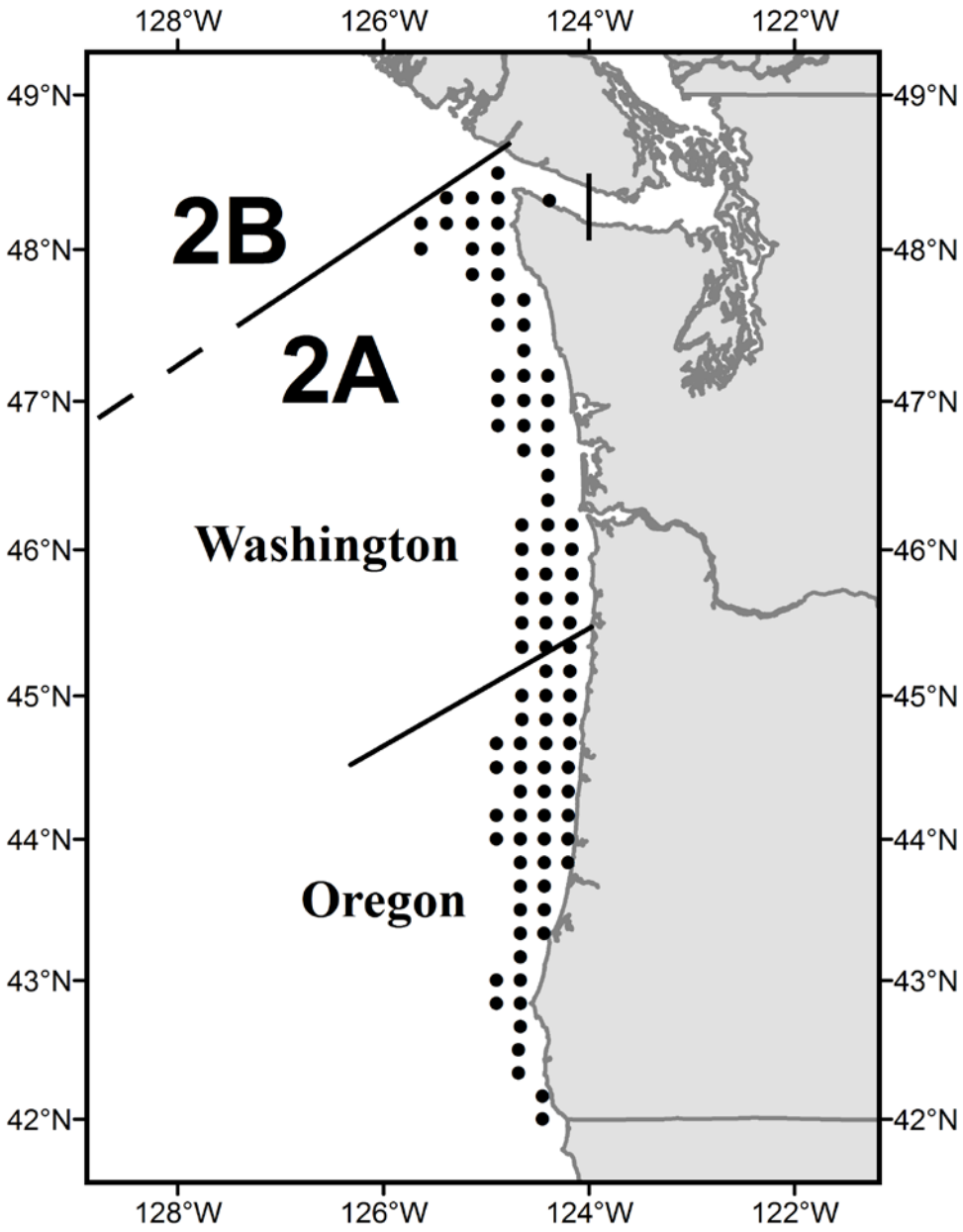

Figure 6. Distribution of assessment survey stations in IPHC Area 2A, including the division between the Washington and Oregon survey regions.

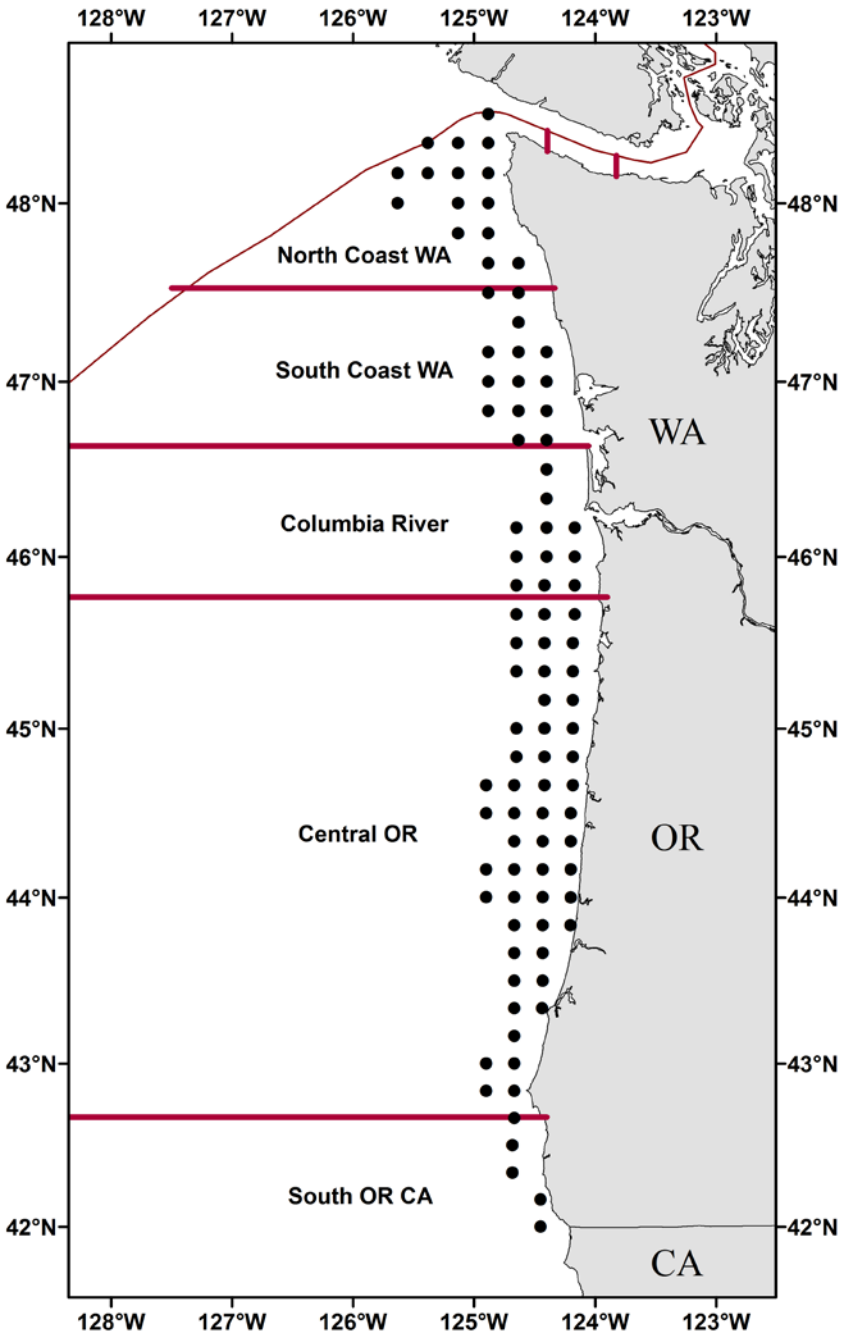

Figure 7. IPHC assessment survey station distribution as defined by the Area 2A Catch Sharing Plan sport management areas.

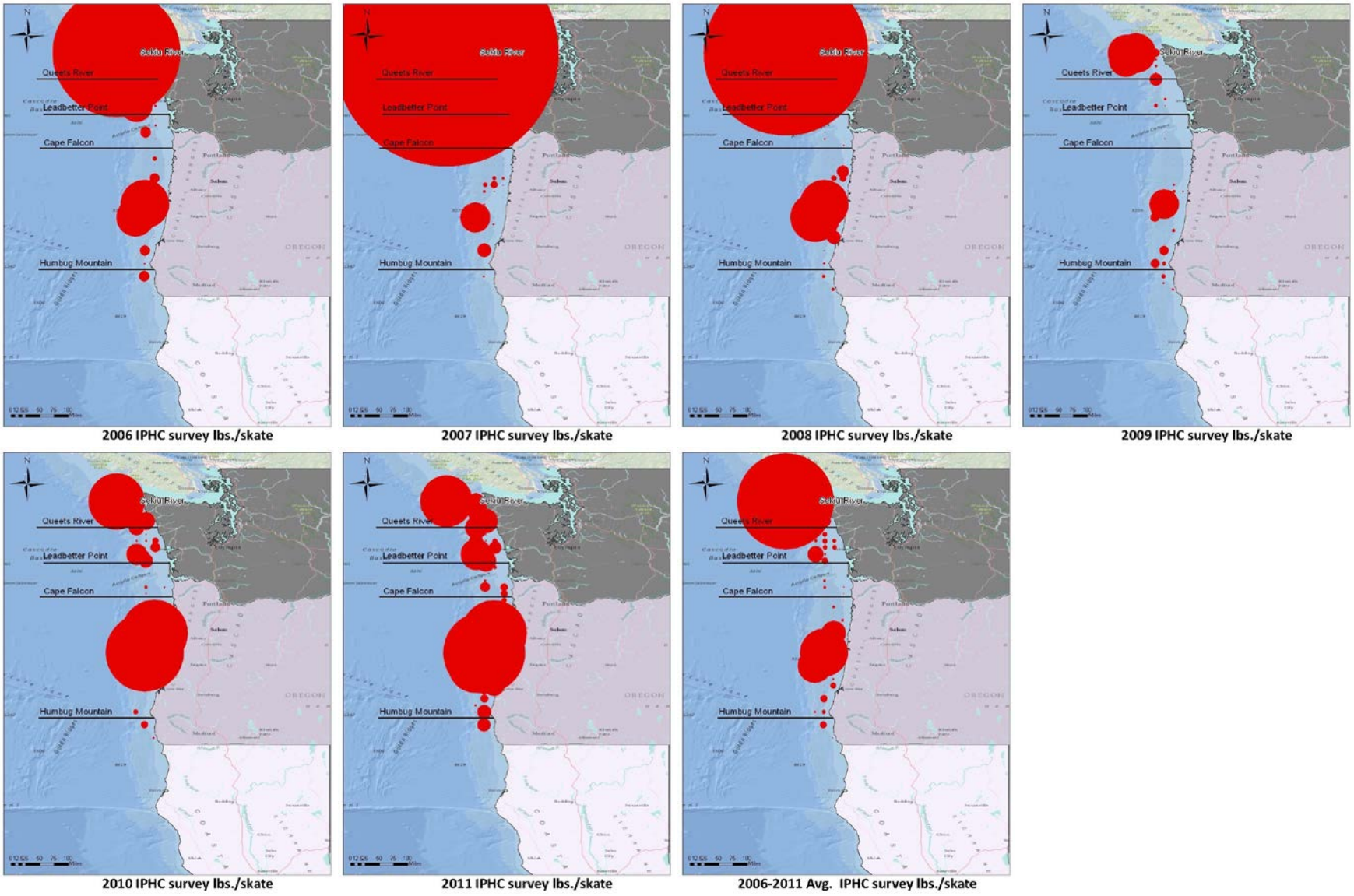

Figure 8. Annual IPHC assessment survey results for 2006-2011 by Area 2A Catch Sharing Plan sport management area. The red circles represent relative weight per unit effort (net pounds per standard skate of 100 hooks) of fish over 32 inches in total length.

Location of Pacific Halibut Bycatch in California's Commercial Fisheries from the West Coast Groundfish Observer Program

The California Department of Fish and Game (CDFG) requested information from the West Coast Groundfish Observer Program (WCGOP) about observations of Pacific halibut bycatch in commercial groundfish trips occurring off the California coast to determine the spatial occurrence of Pacific halibut. Distribution of Pacific halibut from various datasets could be useful for determining how far into California research surveys should be extended.

The WCGOP provided a summary of observations accounting for all observed trips (5,694) in Northern California from 2002 through 2010; Pacific halibut were encountered on 500 (or 9%) of those trips. The data were grouped for analysis to comply with federal data confidentiality requirements. Fixed and trawl gears were combined so that latitude, depth and years could be displayed on smaller scales to demonstrate the amount and temporal nature of Pacific halibut encounters. Results are presented in the attached WCGOP report.

Initial results indicated that a consistent level of trips were observed each year yet in more recent years Pacific halibut were encountered in higher numbers (67 in 2003 to 1,394 fish in 2008; Figure 10) and in deeper water depths (25 to 325 fm; Figures 12). The low incidence of observations between 100 and 150 fm may be due to the presence of Rockfish Conservation Area boundaries at those depths and consequent lower fishing effort (Figure 11). The majority of Pacific halibut were observed north of approximately 39° North latitude (just north of Pt. Arena) with low to moderate encounters south of 39° North latitude (as far south as San Francisco; see Figures 9, 10, and 13).

Additional data analysis would be needed to inform size distribution of encountered fish and potential research survey areas off California. Further data requests could be refined by excluding fixed gear to view only trawl data and associated length information. Trawl gear has a wider size selectivity of Pacific halibut than fixed gear and should provide a better picture of size distribution.

Additionally, a review of similar data for waters off Oregon and Washington would be beneficial for comparing coastwide occurrences.

Figures 9-12 show the number of Pacific halibut observed (years = different symbols, legend below) as a function of either latitude (degrees N. Lat.; Figures 9 and 10) or depth (fm; Figures 11 and 12). Intervals for latitude (from 34.5 to 42.0, by 0.5 degree increments) and depth (0 to 375, by 25 fm increments) are left-open and right-closed, i.e., of the form (a,b] such that for x in the interval, $(a,b] = \{x \mid a < x \leq b\}$, indicating that the lower bound is not included in the interval, whereas the upper bound is included in the interval. Note that in Figures 10 and 12, the y-axis (no. of P. halibut) is on different scales for each year.

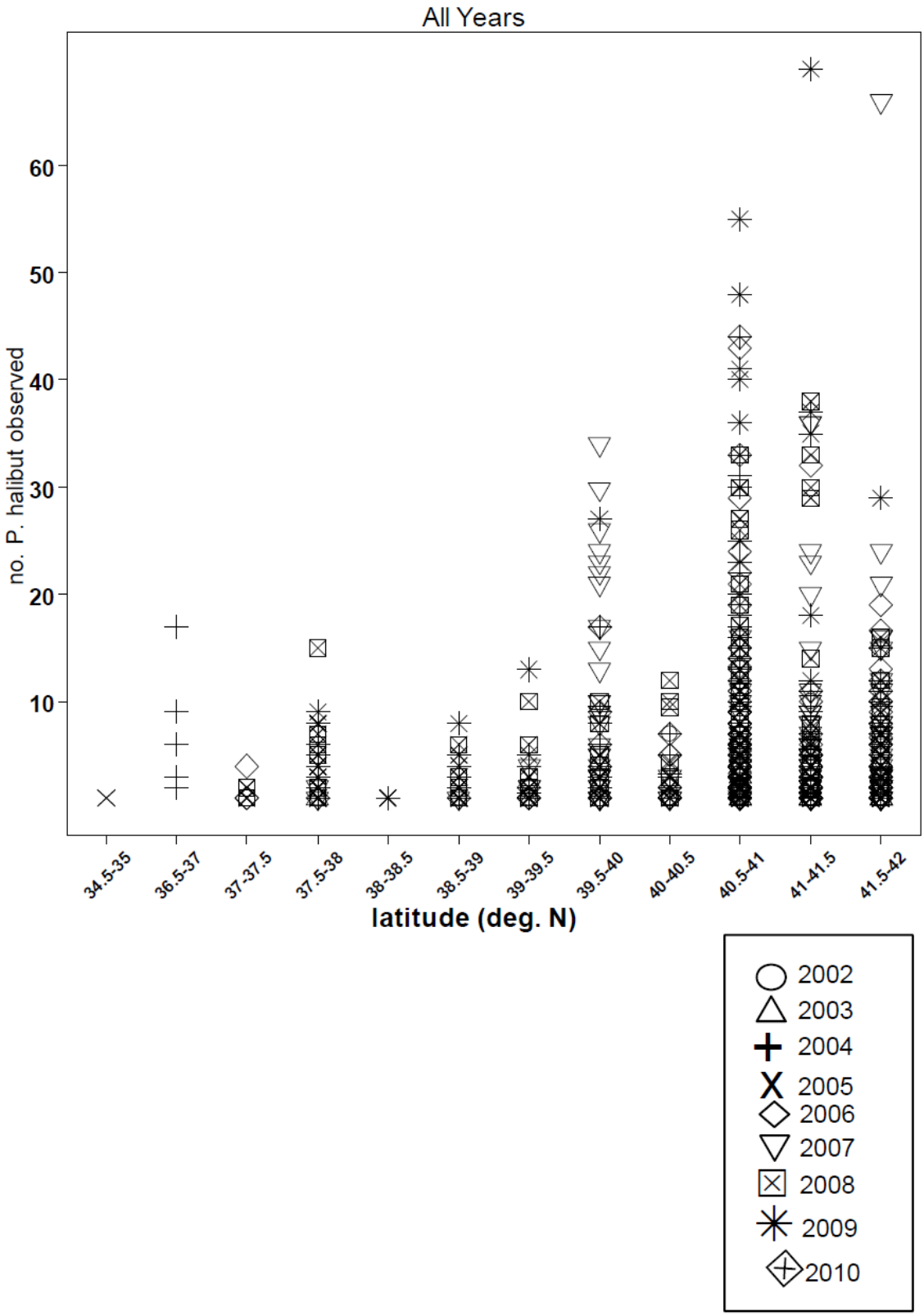

Figure 9. Number of Pacific halibut from the West Coast Groundfish Observer Program database as a function of latitude for all years combined.

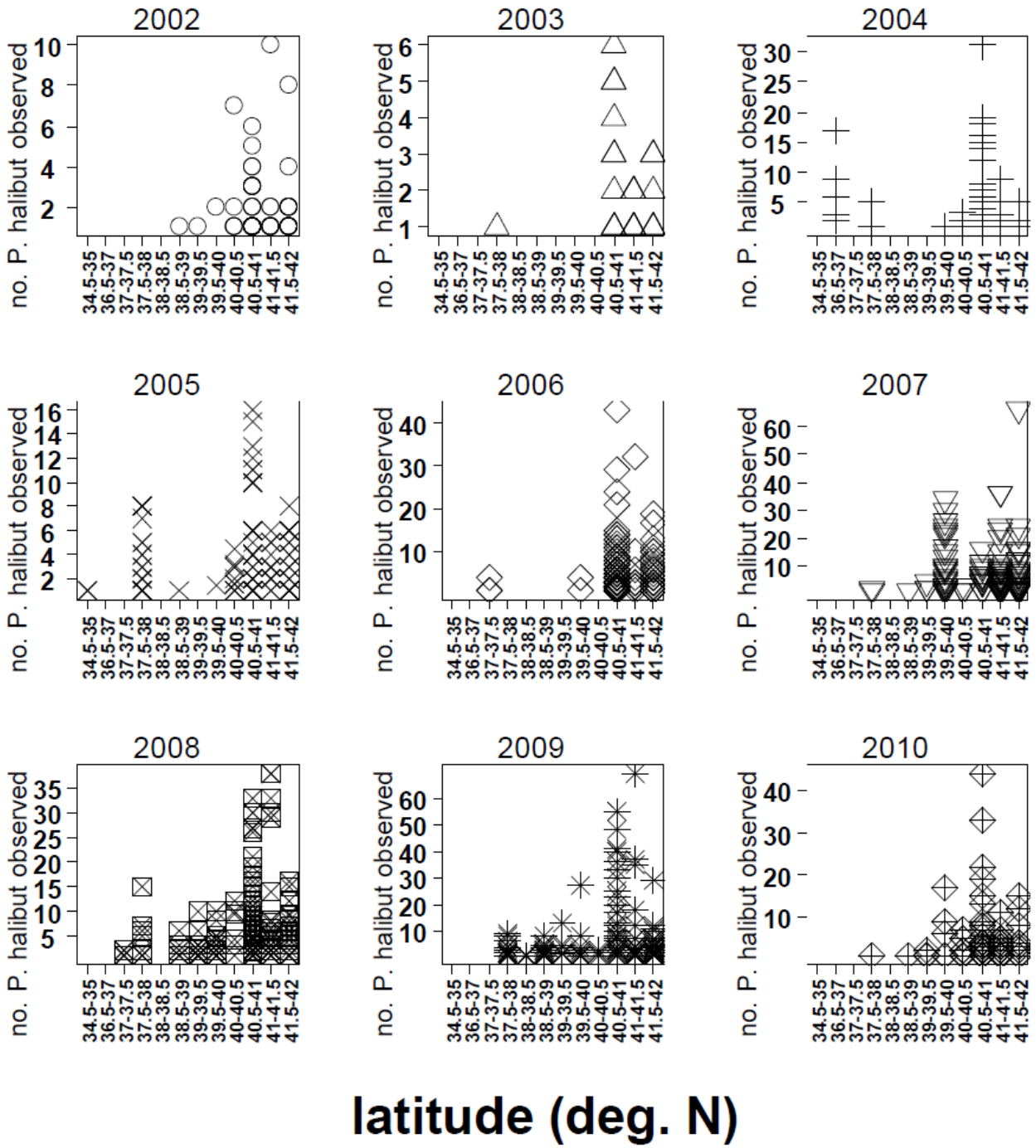

Figure 10. Number of Pacific halibut from the West Coast Groundfish Observer Program database as a function of latitude by year.

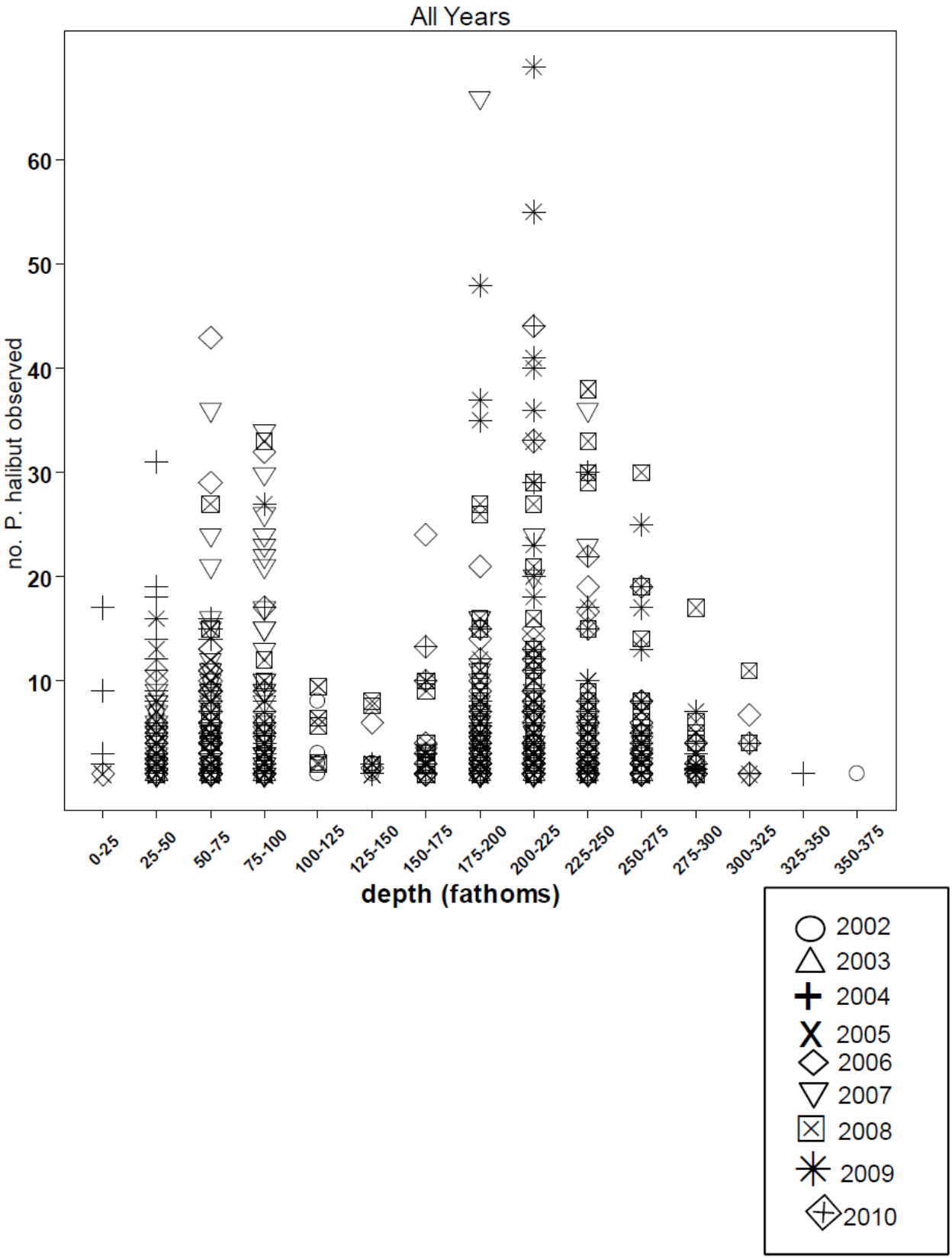

Figure 11. Number of Pacific halibut from the West Coast Groundfish Observer Program database as a function of depth for all years combined.

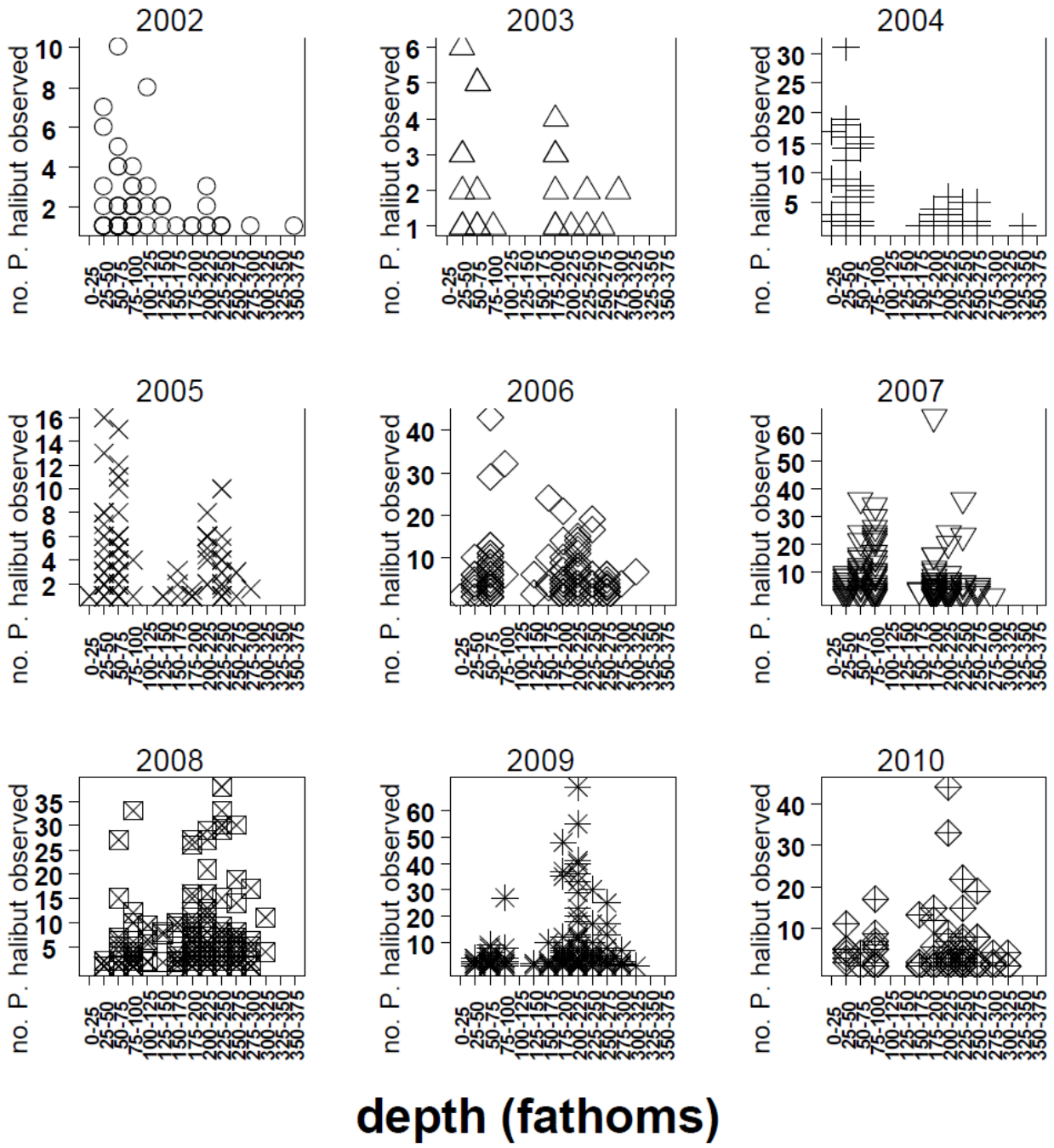

Figure 12. Number of Pacific halibut from the West Coast Groundfish Observer Program database as a function of depth by year.

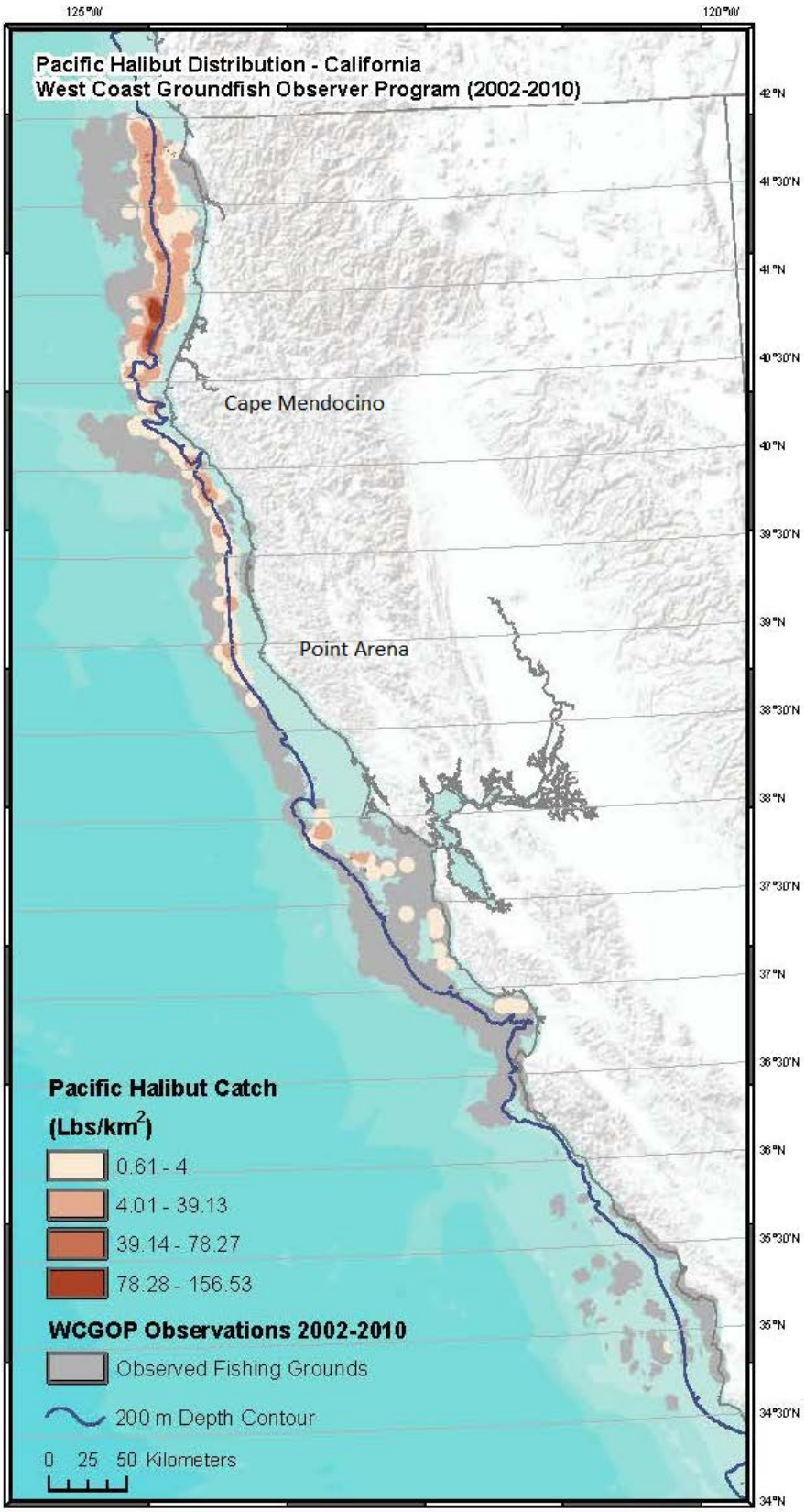

Figure 13. Spatial distribution of Pacific halibut catch (lbs/km2) and fishing grounds observed by the West Coast Groundfish Observer Program (WCGOP), off the coast of California.

Figure 13 shows the spatial distribution of Pacific halibut catch. The four catch classifications (0.61-4, 4.01-39.13, 39.14-78.27, 78.28-156.53) were defined by dividing the maximum value (156.53) in half to obtain the 78.28-156.53 catch bin. The next lower bin was obtained by dividing the lower bound of the upper bin (78.28) in half again to obtain the 39.14-78.27 catch bin. The remaining observations were allocated into equal proportions into the two lowest classifications. Any cells calculated from overall sampled observations of less than 3 vessels were omitted from the map due to confidentiality. Observed fishing grounds are GIS-modeled areas observed with any fishing activity, including Pacific halibut catch = 0.

Distribution of Pacific Halibut in California Based on Recreational Catch Locations

Background

There is limited information available on Pacific halibut distribution and abundance in waters off the California coast. California is located at the southern extent of the range where Pacific halibut are often found, and historically, very little recreational catch has been reported. Recent increased recreational Pacific halibut catches in California and the need to learn more about the stock off the state's coast spurred an analysis of available recreational catch data to better understand the Pacific halibut resource in California.

Methodology

The CDFG's recreational sampling program, the California Recreational Fisheries Survey (CRFS), began collecting recreational catch information in 2004. The CRFS provides a comprehensive approach to recreational fishery data collection throughout the state, and the information is used to estimate total marine recreational catch and effort in California. It is a coordinated sampling survey designed to gather information for all finfish species, including Pacific halibut, from anglers in all modes of recreational fishing. Anglers are intercepted by CRFS samplers on the water or on shore to collect fishing information. Samplers record the number, length and weight (if possible) of fish observed in the catch, along with the angler's demographic and fishing activity information (including fishing location). In addition, the number and condition of discarded fish (alive or dead) is reported by anglers and recorded[2].

The CRFS intercept data were used to analyze Pacific halibut catch from 2004 through 2011 for anglers fishing from boats (private/rental or party/charter). Location information from CRFS sample data were used to review encounters of Pacific halibut by depth and location. Pacific halibut encounter data were plotted by catch location using ArcGIS software. These data were used to evaluate recent fishing activity and to evaluate the southern extent that Pacific halibut are generally encountered in California.

Results

A total of 1,243 Pacific halibut were encountered (kept/retained or released) from waters off of Del Norte, Humboldt and Mendocino counties from 2004 through 2011 (Table 10 and Figure 14). An additional 14 Pacific halibut were encountered south of Mendocino County, in Santa Cruz, Monterey, and San Diego counties but were not included in the analysis because there were so few of them they were not considered common enough to show in the plots, or due to concerns that angler-reported catch may have been misidentified as Pacific halibut rather than California halibut.

Sixty-three fish are not included due to null values, or other data mismatches, in the location table. Figure 14 includes catch location data from 1,180 fish from waters off of Del Norte, Humboldt and Mendocino counties. Most of the Pacific halibut recreational catch (at least 51 percent) appears to be coming from depths between 30 and 60 fathoms.

Waters off of Trinidad and Eureka in Humboldt County experienced the highest amount of Pacific halibut encounters (83 percent); almost one third of the Pacific halibut were landed at the Trinidad Pier CRFS sample location. The southernmost CRFS sample location with significant numbers of encountered Pacific halibut was Shelter Cove, located in southern Humboldt County; however, based on catch location

[2] For more information on the CRFS program methodology, see the report titled *Summary of Recreational Catch Estimation for Pacific Halibut using Information from the California Recreational Fisheries Survey*.

information, at least some Pacific halibut are being encountered in waters off Mendocino County when anglers travel south from Shelter Cove to fish.

Survey and Management Implications

These results indicate that Pacific halibut are often encountered off California's coast at least as far south as Mendocino County, and possibly further south. This information should be useful for determining the southern extent of the West Coast Pacific halibut population for the purposes of extending research surveys and future management.

Table 10. Number of Pacific halibut encountered (kept/retained or released) by year and CRFS sample site in Del Norte and Humboldt counties from 2004-2011. Data from CRFS.

	Del Norte County		Humboldt County							
Year	**Crescent City Boat Basin**	**Crescent City Harbor**	**Trinidad Harbor**	**Trinidad Pier**	**Eureka Marina**	**Woodley Island Marina**	**Samoa Boat Ramp**	**Fields Landing**	**Shelter Cove[1]**	**Total**
2004	1								2	**3**
2005				2	6			5	5	**18**
2006			13	19	43			17	16	**108**
2007		1	4	7	12	5	2	12	33	**76**
2008	1		24	65	47	6		48	43	**234**
2009		4	91	145	47	16		84	67	**454**
2010		1	48	71	30	12		38	13	**213**
2011	1	2	30	16	34	1		30	23	**137**
Total	**3**	**8**	**210**	**325**	**219**	**40**	**2**	**234**	**202**	**1243**

Note:
1. Some of Shelter Cove's catch came from waters off Mendocino County.

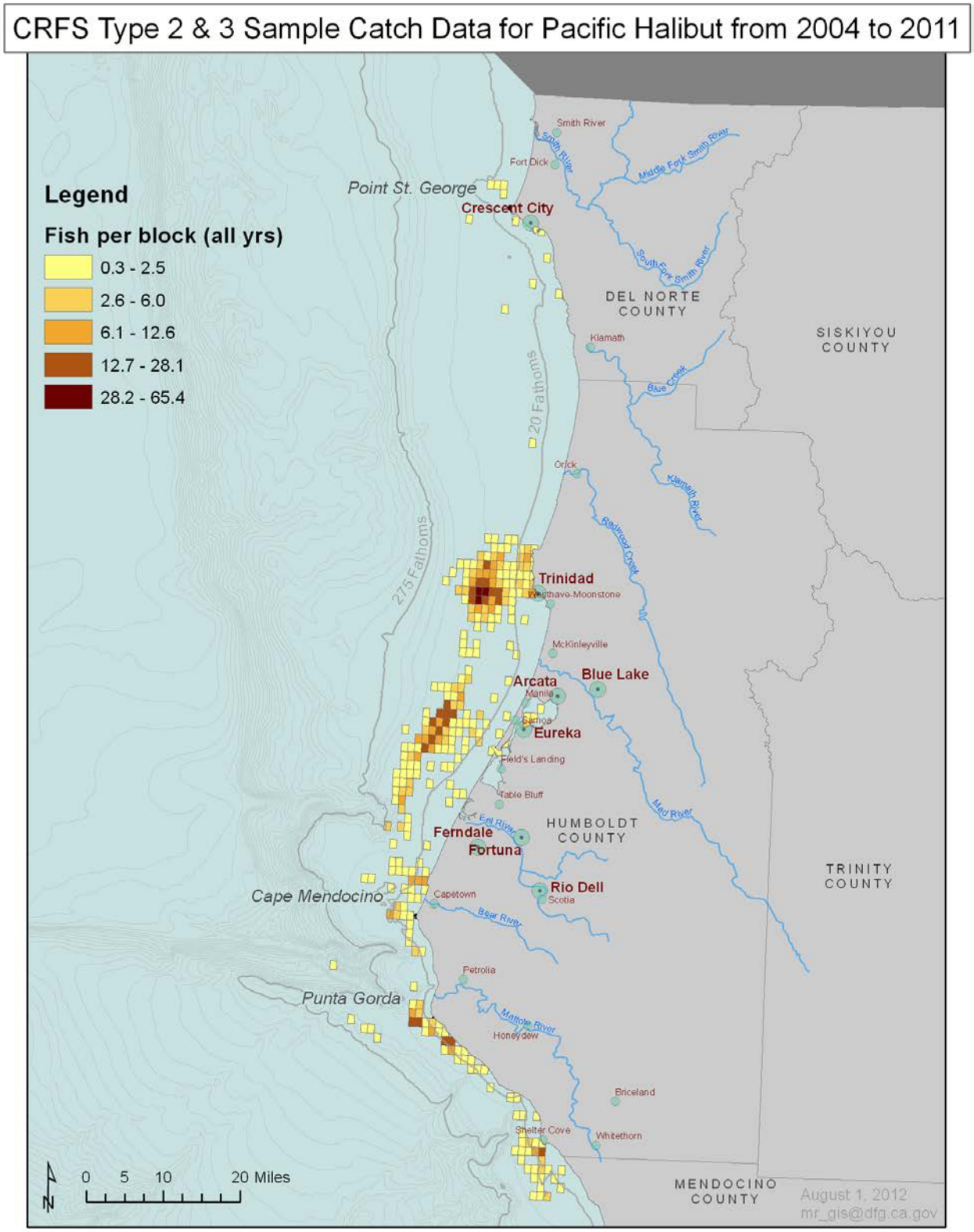

Figure 14. Number of Pacific halibut encountered (kept/retained or released) by CRFS location block. Data are summed from 2004-2011. Data includes Type 2 (kept/retained or released but not observed by the sampler) and Type 3 (kept/retained and observed by the sampler) CRFS sample data.

WDFW Pacific Halibut Catch Monitoring and Accounting

Halibut Management Overview

Pacific halibut are managed through coordination with the IIPHC, the Council and the Washington Department of Fish and Wildlife (WDFW). IPHC is responsible for stock assessments, setting annual catch quotas, research and biology, conservation, and general management oversight. The Council and the National Marine Fisheries Service (NMFS) coordinate West Coast allocation and commercial and sport rule making. WDFW acts in an advisory role, facilitates a public process for Washington stakeholders, adopts conforming regulations and contributes to enforcement.

Washington's halibut fisheries are managed under the Council's Area 2A CSP. The CSP specifies how the Area 2A TAC, as defined by the IPHC, is allocated or "shared" among various tribal, state, commercial and recreational sectors. For Washington, WDFW manages its recreational fisheries by subarea. These subareas are:

- Puget Sound (inside waters east of the Sekiu River, including Puget Sound)
  - Eastern Region (inner Sound waters east of Low Point)
  - Western Region (Strait waters west of Low Point)
- North Coast (waters in the Strait of Juan de Fuca west of the Sekiu River and Pacific Ocean waters south to the Queets River)
- South Coast (Pacific Ocean waters south of the Queets River to Leadbetter Point)
- Columbia River (Pacific Ocean waters south of Leadbetter Point to Cape Falcon, Oregon)

Monitoring and Estimating Catch for Recreational Fisheries in Puget Sound

WDFW produces catch estimates for all marine fish in Puget Sound including halibut using a two-phase method. Estimates of catch per angler trip (CPUE) are produced from data gathered by samplers conducting creel surveys at recreational boat launch or access sites and estimates of fishing effort are produced from a phone survey of licensed anglers.

Intercept surveys are conducted at numerous access sites throughout the Puget Sound region (Figure 15). Intercept surveys provide data on CPUE by species, total (including unlicensed juveniles)-to-licensed anglers, and biological information from catch in the sport fishery. The sampling rate for halibut trips ranges between 20 to 40 percent. CPUE is calculated for each combination of species (halibut, lingcod, dogfish, etc.), target (salmon, bottomfish, halibut), fishing area, launch area, and month.

Phone surveys to estimate effort are conducted by CIC Research, San Diego, CA. Calls are made after each two-month period. Phone numbers are selected at random from the database of licensed anglers and only anglers with saltwater licenses valid during the two months are included. Phone survey questions include the number of trips, dates, fishing locations, and target species. There are no questions about fish caught.

The CPUE data from the creel survey is multiplied by the effort estimate from the phone survey to produce catch estimates. Catch estimates are generated for two-month periods known as "waves". There are six waves a year starting with Wave 1 which is January and February.

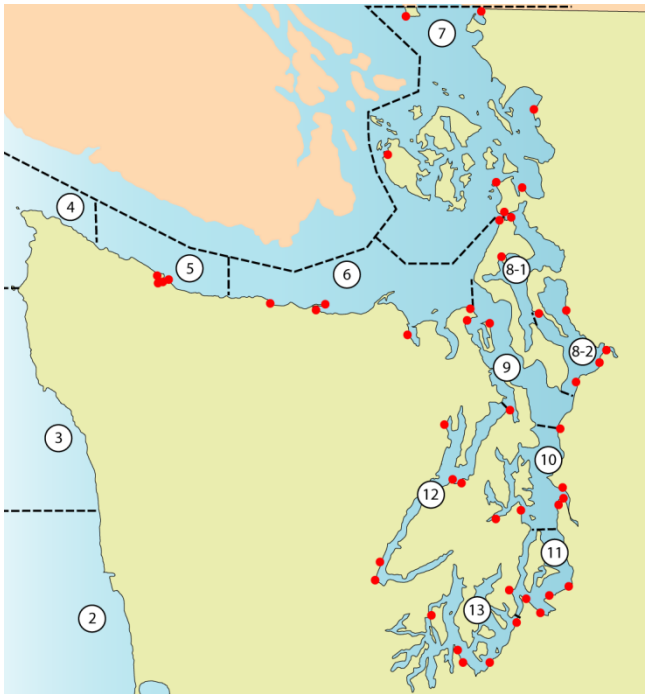

Figure 15. Puget Sound Management Areas (5-13) and recreational sampling access sites.

Tracking Puget Sound Recreational Halibut Catch Against the Annual Quota

In-season catch estimates are not available in time to allow for in-season tracking of the halibut catch against the quota. Management of the Puget Sound fishery to keep catch within the subarea quota relies on the use of historical catch rates to pre-determine the season open and closing dates. The season dates are adjusted annually to reflect the catch from the most recent season, the current year's sub area quota, and stakeholder input. The season setting methodology and application for 2012 are described in Figure 16. Additional information on the stakeholder process used to set the Puget Sound seasons is described later in the report. Historical catch compared to the quota for the Puget Sound sub-area is described in Figure 17.

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE
PUGET SOUND SEASON SETTING METHODOLOGY AND APPLICATION IN 2012

Season Setting Method

1. Divide subarea quota by average weight for past three years to estimate approximate number of fish available
2. Review catch data for past five years to calculate the average number of fish caught per day each year (combination of weekdays and weekend days)
3. Divide the number of fish by the highest catch per day for the past five years
4. Result is the approximate number of days available for the next season

Calculation for 2012

Step 1: Subarea quota is 57,393 lbs
Average weight for 2009-11 is 21.3 lbs; 57,393 divided by 21.3 = 2,695 fish

Step 2: Highest catch per day for past five years occurred in 2009 at 170 fish per day

Step 3: 2,695 fish divided by 170 fish/day = 15.9 days available for the next season*
*The 2011 season was under the quota by 12%; therefore, WDFW's recommendation is to add 1 day to each area (17) for a total of 26 days in 2012.

2012
Eastern Region (MCAs 6, 7, 8, 9 and 10)

Dates	# Wk days	# Wkend days	Total
May 3-5	2	1	3
May 10-12	2	1	3
May 17-19	2	1	3
May 24-28	3	2	5
May 31- June 2	2	1	3
Total:	11	6	17

Open first Thursday in May, Thu-Sat except Memorial Day weekend open Thu-Mon

Western Region (MCA 5)

Dates	# Wk days	# Wkend days	Total
May 24-28	3	2	5
May 31- June 2	2	1	3
June 7-9	2	1	3
June 14-16	2	1	3
June 21-23	2	1	3
Total:	11	6	17

Open Thursday before Memorial Day, Thu-Sat except Memorial Day weekend open Thu-Mon

Total Days (MCA 5-10): 26

2011
Eastern Region (MCAs 6, 7, 8, 9 and 10)

Dates	# Wk days	# Wkend days	Total
May 5-7	2	1	3
May 12-14	2	1	3
May 19-21	2	1	3
May 26-29	2	2	4
Total:	8	5	13

Open first weekend in May, Thu-Sat except Memorial Day weekend open Thu-Sun

Western Region (MCA 5)

Dates	# Wk days	# Wkend days	Total
May 26-29	2	2	4
June 2-4	2	1	3
June 9-11	2	1	3
June 16-18	2	1	3
Total:	8	5	13

Open Thursday before Memorial Day Thu-Sat except Memorial Day weekend open Thu-Sun

Total Days (MCA 5-10): 22

Figure 16. Process detail for 2012 Puget Sound sport Pacific halibut season.

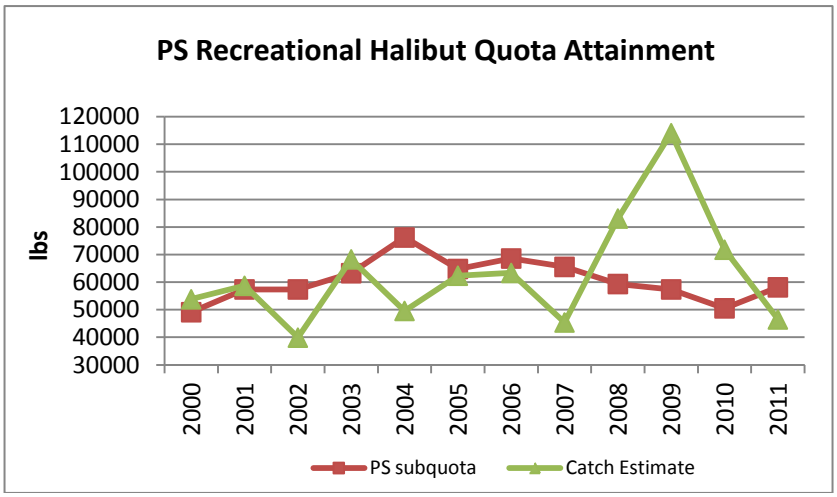

Figure 17. Puget Sound recreational halibut catch compared to quota 2000-2011.

Monitoring and Estimating Catch for Recreational Fisheries on the Washington Coast

The WDFW Ocean Sampling Program (OSP) produces estimates for coastal salmon, groundfish, Pacific halibut, tuna and sturgeon to meet state and federal needs. This includes weekly estimates of catch (number of fish) and effort (angler trips) by species and management area for in-season management of quota managed species. OSP sampling goals for producing catch estimates and collecting biological data, data components, and sampling rates and schedules are summarized below.

Recreational Catch Estimates

- Weekly in-season catch estimates by management area for quota fisheries.
- Monthly in-season groundfish catch estimates for incorporation into RecFIN database.
- Post-season catch estimates for all species by February 1, with a goal of coefficient of variation < 10% in all ports on "important" management species.

Biological Data

- Minimum 20% sample of landed coho and Chinook for coded wire tags (CWTs).
- Scale samples for age analysis from a minimum 4% of Chinook landed.
- DNA samples from Chinook.
- Halibut lengths for conversion to biomass.
- Sturgeon lengths and tags.
- Lengths from groundfish for conversion to biomass.

Data Components

- **Exit/entrance count.** Boats are counted (by boat type) either leaving the port (4:30AM-end of the day) or entering the port (approximately 8:00AM through dusk) to give total counts of charter and private boats for the day.
- **Interview.** Boats are encountered systematically as they return to port. Angler interviews include:
  - Primary target species ("trip type")
  - Number of anglers

  - Management area fished
  - Number of released fish by species
  - Depth at which the majority of rockfish were caught
  - Non-fishing trips are recorded as such and expanded
- **Examination of catch** – retained catch is counted and speciated by the sampler. Salmon are electronically checked for CWTs, other biological data is collected.

Sampling Rates and Schedules

- **Sampling rates** - vary by port and boat type. Generally, at boat counts less than 30, the goal is 100% coverage. The sampling rate goal decreases as boat count increases.
  - e.g., At an exit count of 100, the sample rate goal is 33%; over 300, the sample rate goal is 20%
  - Boats are selected systematically for sampling; a consistent sample rate is maintained throughout the day
  - Overall sampling rates average approximately 50% coastwide through the season
- **Sampling schedules** - weekdays/weekend days are stratified in all ports except the Columbia River north jetty (land-based fishery). Usually, both weekend days and a random 3 of 5 weekdays are sampled.

Sampling data are stratified by: day type (weekend/week day), boat type (charter, private, land-based), and by port. Data are post-stratified for catch estimation by: management area and trip type (primary target species: salmon, bottomfish, halibut, tuna, sturgeon, dive, salmon-halibut combo). Week days and weekend days are treated independently; weekend days include holidays. Catch estimates and sampling schedules for quota fisheries are stratified by statistical week periods; non-quota fisheries are stratified by statistical month.

Tracking Coastal Recreational Halibut Catch Against Annual Quotas

Weekly halibut estimates are produced for catch, effort, and average weight for each coastal management area. Each week, OSP sampling staff collects raw data from the previous statistical week (Monday-Sunday) and produce catch estimates typically by the following Tuesday or Wednesday. At a minimum, weekly catch estimates are emailed to IPHC, NMFS, and ODFW staff (for the Columbia River management subarea) with conference calls scheduled weekly (or as needed) to provide updates or to discuss potential inseason action when catch is approaching the quota. Catch updates an inseason changes to the season dates are posted weekly to the WDFW recreational halibut web-page to allow tracking by stakeholders.

Timely in-season catch data is extremely important for managing the coastal recreational halibut seasons to avoid exceeding the subarea quotas. In recent years, coastal recreational halibut quotas for most subareas have been reached in fewer than ten fishing days. The Columbia River sub-area is the exception and these seasons have lasted throughout the summer due to much lower fishing pressure.

When in-season action is needed, WDFW staff arranges a conference call with staff from IPHC and NMFS to discuss the catch relative to the quota and recommend appropriate action. Stakeholders from affected management areas are included on the call to provide specific information on anticipated effort that might be helpful when considering options. Following the

call, if in-season action is needed, WDFW staff initiates the rule change process to close or restrict fishing through emergency action and drafts public notices that will be released as soon as the emergency rules are approved by the Director.

In-season changes may also allow re-opening an area if weekly catch updates show that there is enough quota remaining to allow for additional fishing days. Potential fishing dates follow the general season structure outlined in the CSP with re-openings scheduled to provide fishermen with significant notice to plan for another fishing day.

Different subareas have different levels of effort and therefore the amount of quota needed for one fishing day varies by area. For example, the north coast subarea (Neah Bay and La Push), requires a significant amount of quota to open for just one day. Historical catch by day (by management subarea), weather forecasts, and anticipated effort gathered by talking with OSP staff and stakeholder representatives, all contribute to the information needed to evaluate the catch relative to the quota and make recommendations on potential added fishing days or the need to close a subarea on projected attainment of the quota.

Oregon Department of Fish and Wildlife Recreational Pacific Halibut Sampling Methodology and Inseason Management

Estimation Methods

The recreational Pacific halibut fishery off of Oregon is sampled by the Oregon Recreational Boat Survey (ORBS) program, as part of the overall sampling program. There is not a halibut specific sampling program. However during the "all-depth" openings in the Central Oregon Coast subarea, additional staff are scheduled at the busiest ports (Figure), such as Garibaldi and Newport, to reflect the additional effort.

The ocean sport catch of Pacific halibut in Oregon is estimated weekly by multiplying average catch per boat from interviews by the total effort for each port. In each port, separate catch estimates are made by boat type (charter, private) and trip type (target species such as bottomfish, salmon or halibut, to name a few).

For example, for a particular week, we generate an estimate for Newport of the number of Pacific halibut landed by boat type = charter boats and trip type = halibut. The total coastwide weekly catch is determined by adding together the separate estimates from each port.

Private Boat Effort

In most ports, ODFW personnel tally private boats as they cross the bar to enter the ocean. Boat counts are made most days, beginning at dawn and usually ending 5 to 6 hours later. Interviews back at the docks are used to determine the proportion of boats by trip type (bottomfish or halibut, for example).

Charter Boat Effort

Charter offices are the primary source for charter boat counts by trip type. Charter boats are also counted as they cross the bar.

Average Catch per Boat

Dockside interviews are used to determine average catch per ocean boat by boat type and trip type.

Sampling procedures specify that interviews be conducted randomly and representatively throughout the week. Port samplers do not focus on particular trip types or catch. The overall sampling rate goal is 20%, to meet salmon CWT expansion requirements, however in most ports and for most fisheries, the sampling rate ends up being higher.

Example:

> The following example illustrates how an estimate for Pacific halibut is generated for a particular day in a particular port for a particular boat type and trip type.

Effort

- 130 private boats are counted crossing the Newport bar by the ODFW sampler
- Random dockside interviews in Newport indicate that 50% of the private boats fished offshore for Pacific halibut (=50% of 130 total private boats, or 65 private boats fishing halibut)

Average Catch per Boat

- Random dockside sampling in Newport indicates that private boats fishing offshore for Pacific halibut averaged 3 halibut per boat, and the average length of those halibut was 38 inches (or 18.6 pounds net weight)

Estimated Catch

- The estimate of Pacific halibut landed in Newport by private boats fishing offshore for Pacific halibut is:

  65 private boats x 3 halibut per boat x 18.6 pounds per halibut = 3,627 pounds net weight

For halibut trips, effort, and harvest in the Central Oregon Coast subarea, the data is further divided into the nearshore vs. all-depth fisheries, based on the day of the week. All halibut trips and landings occurring on days that the all-depth fishery is open are assigned to the all-depth fishery, regardless of actual depth of fishing or harvest. An example of the data generated on a weekly basis is in Table 11. For the Oregon portions of the halibut estimates in the Columbia River and South of Humbug Mt. subareas, this is not an issue, since there is only one season/fishery at a time. Landings estimates from all ports in each subarea and fishery are then combined for the weekly total. Based on the minimal effort and harvest (prior to 2011) in Oregon ports in the South of Humbug Mt. subarea, weekly estimates have not been tallied inseason.

For a detailed description of the ORBS sampling design see:
http://www.dfw.state.or.us/MRP/salmon/docs/ORBS_Design.pdf

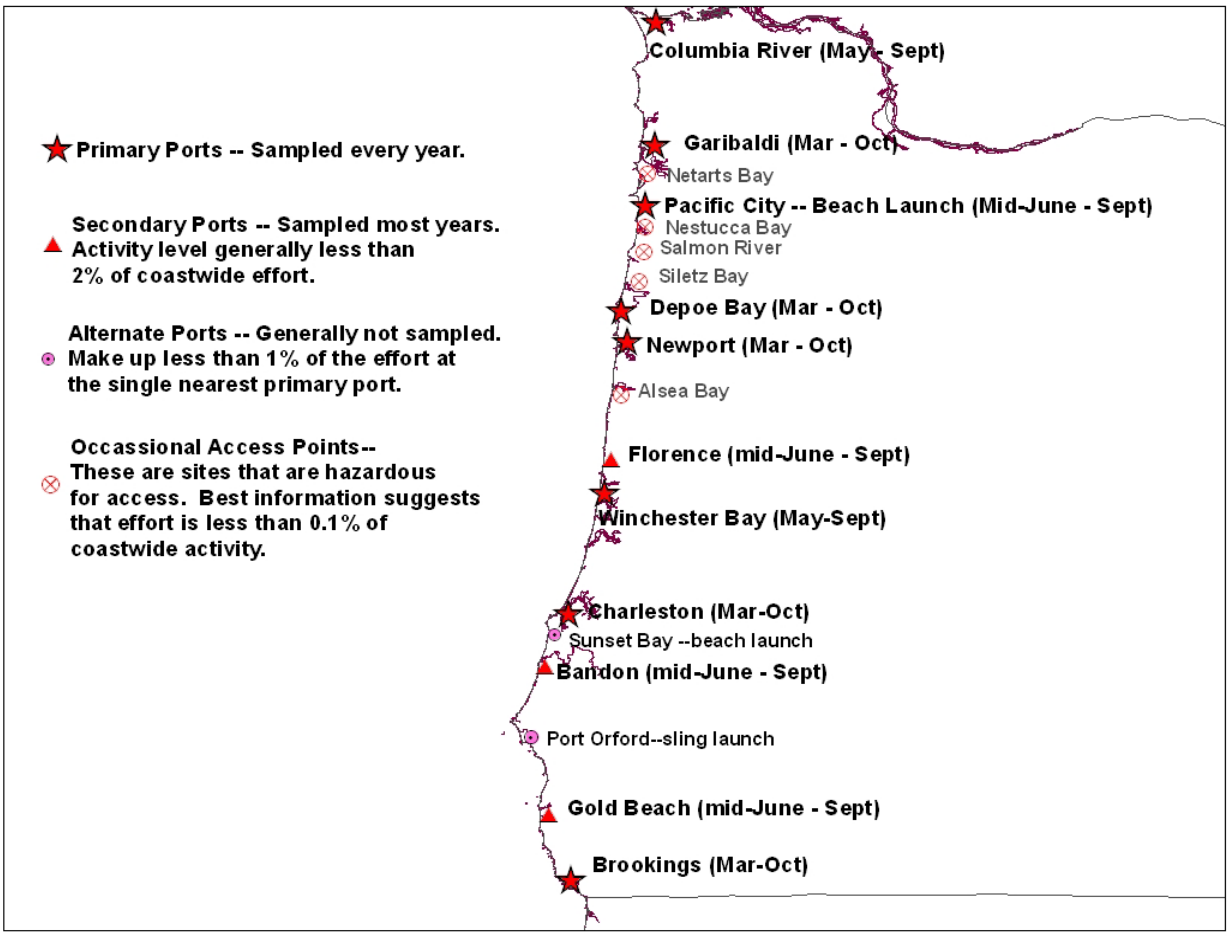

Figure 18. Ocean Recreational Boat Survey (ORBS) sampling locations and times.

Inseason Management Process

The fishery week, or statistical week, is Monday through Sunday. Samplers turn their data into their crew chiefs either Sunday night or Monday morning. Crew chiefs physically deliver data to the Newport office, late Monday afternoon or Tuesday if Monday was a holiday. Data is uploaded, error checked, and estimates generated Tuesday, Wednesday, and Thursday. As soon as estimated catch data is available, sometime between Wednesday afternoon and Friday morning, depending on the other fisheries occurring that week, it is passed along to the fisheries manager. The fisheries manager then reviews the catch data and makes the weekly estimate for each fishery or subarea. Estimates are sent to NMFS and IPHC (and WDFW for the Columbia River subarea) usually sometime on Thursday. If a conference call is necessary to discuss the need for management action, it usually occurs on Thursday or by mid-day on Friday.

If possible, ODFW tries to give anglers a week's notice of the next opening (e.g., announced on June 7 that June 14-16 would be open). For closures, it usually takes one to two days to do the necessary state temporary rule paperwork, signing and filing. ODFW tries to give anglers at least 48 hours' notice, when possible. Any inseason changes are announced via the NMFS halibut hotline (1-800-662-9825), ODFW news release, postings on the ODFW website (http://www.dfw.state.or.us/MRP/finfish/halibut/index.asp), signs in key locations in the ports (Figure 19), and e-mails to the halibut list server.

Table 11. Example of the weekly halibut estimate generated by the ORBS program.

Year	Week	Port	Boat Type	Trip Type	Type	Estimated Boats	Estimated Anglers	Sampled Catch	Estimated Catch	Catch /Angler	Avg. Length	Avg. Weight	Total Pounds
2010	23	2	P	H	NearShore	2	4	1	2	0.5	996	20.6	41
2010	23	10	C	H	AllDepth	6	72	60	72	1	889	14.8	1,064
2010	23	10	P	H	AllDepth	34	159	50	142	0.89	889	14.7	2,083
2010	23	22	C	H	AllDepth	4	39	29	39	1.01	884	14.5	565
2010	23	22	P	B	NearShore	12	51	1	2	0.04	909	16.7	33
2010	23	22	P	H	AllDepth	5	15	3	5	0.33	986	21.1	105
2010	23	22	P	H	NearShore	3	8	3	4	0.53	1,065	32.6	130
2010	23	24	C	C	AllDepth	3	36	15	22	0.61	860	13.7	302
2010	23	24	C	H	AllDepth	12	136	102	136	1	891	15.0	2,044
2010	23	24	P	C	AllDepth	4	6	2	4	0.67	879	13.8	55
2010	23	24	P	H	AllDepth	162	528	190	400	0.76	974	20.3	8,124
2010	23	24	P	H	NearShore	21	48	3	9	0.19	965	18.8	169
2010	23	32	P	H	AllDepth	3	18	12	18	1	983	20.3	365
2010	23	34	C	H	AllDepth	6	82	68	82	1	989	21.1	1,729
2010	23	34	P	H	AllDepth	20	75	47	72	0.96	948	18.7	1,346
2010	23	36	P	H	AllDepth	3	12	1	3	0.25	991	20.3	61

June 8, 2012

Sport Fishery Update

Pacific Halibut

Cape Falcon to Humbug Mt.:

The all-depth Pacific halibut sport fishery will be **open June 14-16** (Thurs.-Sat.).

If sufficient quota remains after June 16, the *spring* all-depth fishery may continue on one or more of the following days: June 28, 29, 30; July 12, 13, 14; July 26, 27, 28.

Open dates will be announced on the National Marine Fisheries Service hot line (1-800-662-9825) and posted on the ODFW Web site at www.dfw.state.or.us/mrp/ (click on the picture of the halibut).

The **summer all-depth** Pacific halibut fishery is scheduled to begin on August 3 under a separate quota.

The **nearshore** Pacific halibut fishery is open seven days a week inside of the 40-fathom curve (defined by waypoints).

Regulations from previous all-depth periods are still in effect. Anglers are advised to review the *2012 Oregon Sport Ocean Regulations for Salmon, Halibut and Other Marine Fish Species* booklet for closed areas and restrictions. General fishing regulations are found in the *2012 Oregon Sport Fishing Regulations* booklet.

OREGON Fish & Wildlife

For more information contact ODFW at (541) 867-4741 or go to www.dfw.state.or.us/mrp

Figure 19. Example of an inseason announcement sign posted in strategic locations in Oregon ports.

Overview of the California Recreational Fisheries Survey Program, Inseason Tracking, and Catch Estimation for Pacific Halibut Management

California Recreational Fisheries Survey Program

The CDFG recreational sampling program (CRFS) began collecting recreational catch information in 2004. The CRFS provides a comprehensive approach to recreational fishery data collection throughout the state, and the information is used to estimate total marine recreational catch and effort in California. It is a coordinated sampling survey designed to gather information for all finfish species, including Pacific halibut, from anglers in all modes of recreational fishing. Anglers are intercepted by CRFS samplers on the water or on shore to collect fishing information. Samplers record the number, length, and weight (if possible) of fish observed in the catch, along with the angler's demographic and fishing activity information. In addition, the number and condition of discarded fish (alive or dead) is reported by anglers and recorded. Location of fishing activity is obtained by samplers onboard vessels or when interviewing anglers at the dock.

Private/Rental Mode

The primary mode for recreational fishing in California is the Private/Rental (PR) mode, which includes three components—PR1, PR2, and PR-Private Access or Night (PR-PAN). The PR1 and PR2 components represent primary and secondary public marinas and launch ramps. They are categorized into theses two components based on the amount of effort directed at key species (e.g., groundfish or salmon). The catch information from the PR1 and PR2 components is based on field data collection from PR1 and PR2 sites on sample days. The CRFS does not sample PR-PAN due to the inaccessibility of private locations as well as safety concerns associated with sampling at night. An under-coverage adjustment is used to account for this missed effort. The adjustment uses data derived from a telephone survey of licensed anglers as well as data collected in the field during the PR1 and PR2 surveys.

The PR1 sites (where most Pacific halibut are landed) are public ramps, hoists, and other launch facilities where the majority (at least 90 percent) of fishing effort and catch of important management species by private and rental boats occurs in California. Each PR1 site is generally sampled six to seven days a month for a minimum target rate of 20 percent when salmon or groundfish seasons are open. Randomly selected sample days for each sample site are generally distributed evenly between type of day, (three weekend samples and three weekday samples) and timing (half month period). The sampling design may differ slightly in districts north of Point Conception during the salmon season, when the number of sample days, or the ratio of day type increases to accommodate the greater sampling coverage required for salmon management.

Sample sites designated as PR2 are publicly accessible launch facilities (e.g., launch ramps, hoists, beach tractors, rental shops) and historically had less than 10 percent of the private and rental boat catch of important management species in California. Each site is randomly sampled at three times per month (one weekday and two weekend days) for a target sample rate of 10 percent.

The PR-PAN "private access" sites can be large or small scale marinas that do not have any field sampling due to the difficulty in reliably accessing locations. This PR-PAN component is very important in areas of California where many large capacity marinas exist (e.g., San Francisco Bay or southern California). To account for PR-PAN effort, a ratio of private-night/public-day effort estimates from the CRFS telephone survey is applied to PR effort estimates from the field surveys, to make an under-coverage adjustment to the PR1 and PR2 estimates.

Party/Charter Mode

The Party Charter (PC) portion of the CRFS program is comprised of Commercial Passenger Fishing Vessels (CPFVs). They are commonly known as party boats, charter boats, or for-hire boats. Catch information is collected by either on-board or dock-side samplers. Up to five percent of CPFV trips are generally sampled per month; the rate increases when salmon is open to intercept at least 20 percent of all salmon landed in each half-month period). On-board samplers are able to collect more information than dock-side samplers, such as the length and weight of discarded fish and more precise information on location of fishing. From 2004 through 2010, the effort component for the PC mode was derived using information collected during a voluntary telephone survey of CPFV landings. Beginning in 2011, effort information for the CPFV fleet was derived from mandatory CPFV logbook data filled out by operators and submitted to CDFG. Logbook submission is checked against a field survey of vessel activity to estimate compliance.

For complete details of the CRFS program, please see the CRFS Methods document available at: http://www.recfin.org/sites/default/files/documents/CRFS_METHODS_6_9_2011.pdf.

Inseason Tracking of Pacific Halibut in California

There is no inseason tracking conducted in California as part of the CRFS program; estimates are produced postseason on an annual basis.

CRFS Catch Estimates and Pacific Halibut

Recreational catch estimates can be retrieved from the online RecFIN database for all three west coast states (Washington, Oregon and California). RecFIN is managed by the Pacific States Marine Fisheries Commission. From 2004 through 2011, California submitted raw CRFS sample data to RecFIN for all species, then RecFIN calculated catch estimates for all species including Pacific halibut.

Modifications to Preliminary Estimates

California estimates from RecFIN for Pacific halibut are not appropriate for management "as is" due to different catch reporting metrics used for Pacific halibut compared to what is used for other west coast groundfish (net weight vs. whole fish, respectively). California's RecFIN Pacific halibut estimates were modified by CDFG to be more accurate and more comparable to those produced by Oregon and Washington and to provide annual catch estimates useful to management by the IPHC or the Council.

- Pacific halibut estimates (A+B1 metric tons) from 2004-2011 for all of California, for the PR1, PR2, and PC fishing modes and all fishing areas were downloaded from the

password-protected section of RecFIN. Estimates were summed by year and converted from metric tons to pounds: Pounds = Metric Tons * 0.0004536

- The PR-PAN component was expected to be a minor contribution to the catch; however, it was not used due to ongoing concerns about data accuracy—these data issues have not been resolved and are still under investigation.
- California's estimates were converted from round weight (whole fish) to net weight (gutted, head-off) using the IPHC conversion factor: WNet = WRound(0.7519) to be comparable to estimates produced by Oregon and Washington,
- Note: Oregon and Washington use an IPHC length-to-weight conversion for fish that were measured but not weighed, while RecFIN uses a RecFIN-derived conversion factor. There was no correction for this difference.

Future Catch Estimates of Pacific Halibut

Beginning in 2012, CDFG is producing all California recreational catch estimates for the PR1 and PC modes for all species and those catch estimates will be available from RecFIN. The CDFG plans to review CRFS estimation methodologies for Pacific halibut in the future, which may reconcile the future need for modifications to estimates reported on RecFIN.

Overview of Regulations and Catch Sharing Plan Annual Implementation

Every year the IPHC promulgates regulations governing the Pacific halibut fishery under the Convention between Canada and the United States for the Preservation of the Halibut Fishery of the North Pacific Ocean and Bering Sea (Convention), signed at Ottawa, Ontario, on March 2, 1953, as amended by a Protocol Amending the Convention (signed at Washington, D.C., on March 29, 1979).

As provided by the Northern Pacific Halibut Act of 1982 (Halibut Act) at 16 U.S.C. 773b, the Secretary of State, with the concurrence of the Secretary of Commerce (Secretary), may accept or reject, on behalf of the United States, recommendations made by the IPHC in accordance with the Convention (Halibut Act, Sections 773- 773k.). On March 5, 2012, the Secretary of State of the United States, with the concurrence of the Secretary, accepted the 2012 IPHC regulations as provided by the Northern Pacific Halibut Act of 1982 (Halibut Act) at 16 U.S.C. 773-773k.

The Halibut Act provides the Secretary with the authority and general responsibility to carry out the requirements of the Convention and the Halibut Act. The Regional Fishery Management Councils may develop and the Secretary may implement regulations governing harvesting privileges among U.S. fishermen in U.S. waters that are in addition to, and not in conflict with approved IPHC regulations.

The Council also exercises authority in the Area 2A CSP, which allocates halibut among groups of fishermen in Area 2A, off the coasts of Washington, Oregon, and California. The CSP allocates the Area 2A catch limit among treaty Indian and non-Indian harvesters, and non-Indian commercial and sport harvesters (Figure 20). The treaty Indian group includes tribal commercial and ceremonial & subsistence fisheries. The Secretary implemented the Area 2A CSP recommended by the Council in 1995. Each year between 1995 and the present, the Council has adopted minor revisions to the plan to account for needs of the fisheries. These revisions are implemented in regulations for Area 2A through annual rule making and annual IPHC review and recommendation of management measures for Secretarial review. The Area 2A regulations are part of the IPHC annual management measures and are superseded each year by new implementing regulations.

The CSP constitutes a framework that is applied to the annual Area 2A TAC approved by the IPHC each January. The framework is implemented in both IPHC regulations and domestic regulations (implemented by NMFS) as published in the *Federal Register*. The IPHC sets the overall TAC and the CSP governs the allocation of that TAC between tribal and non-tribal fisheries, and among non-tribal fisheries. The Council, with input from industry, the states, and the tribes, may recommend changes to the CSP at their September and November meetings for the upcoming year. (Note that the IPHC also sets the commercial fishery opening date(s), duration, and vessel trip limits to ensure that the quota for the non-tribal fisheries is not exceeded.) For non-tribal fisheries, the CSP governs allocations of the TAC between various components of the commercial fisheries and recreational fisheries, and these allocations may vary depending on the level of the TAC. Seasons, gear restrictions, and other management

measures implemented through domestic regulations are then used to meet the allocations and priorities of the CSP.

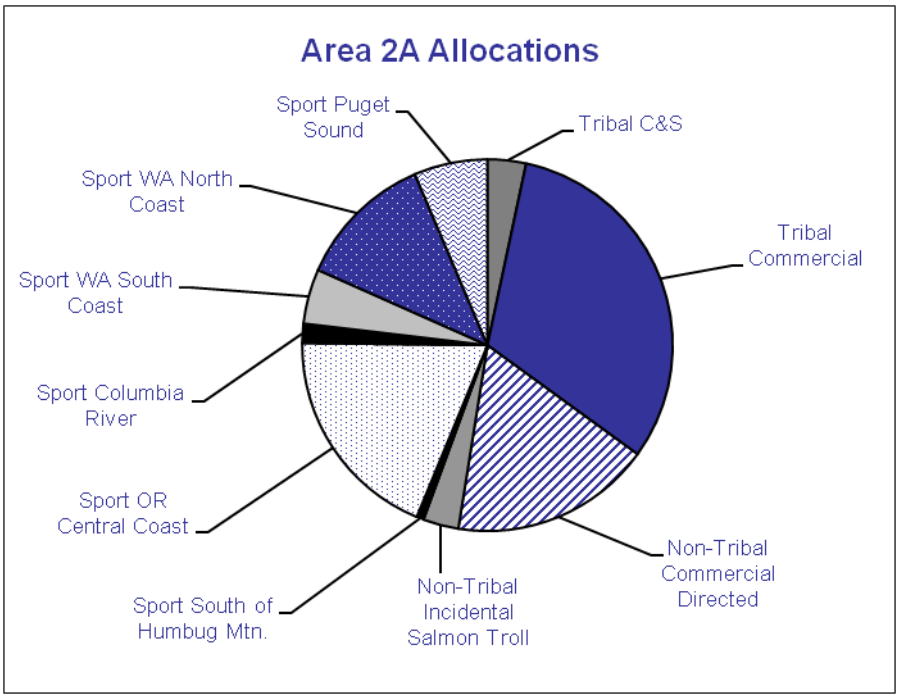

Figure 20. Area 2A Pacific halibut allocations based on the 2011 Catch Sharing Plan.

Processes for Involving Stakeholders in Management Decisions

Puget Sound

The CSP describes a general season structure for the Puget Sound region with the goal to provide a stable fishing opportunity that maximizes the season length within the bounds of the subarea quota. The CSP allows the flexibility to divide the Puget Sound region into two areas with separate seasons and the seasons are more broadly described than for the other subareas to address the unique management structure for the Puget Sound region.

The quota for the Puget Sound region is an essential component of the calculation of the number of fishing days that are available for this area, so WDFW schedules Puget Sound stakeholder meeting in early February following the IPHC Annual Meeting.

Historical catch per day and average weight, together with the annual quota for the subarea is used to calculate the number of days the Puget Sound areas can be open for recreational halibut fishing. See Figure 16 for an explanation of the season setting methods and application for 2012. The opening dates are based on traditional opening dates for the two Puget Sound subareas with the eastern region (Management Areas 6-10) opening on the first Thursday in May and the western region (Area 5) opening on the Thursday before Memorial Day. Both regions are open three days per week (Thursday- Saturday). This is reduced from a five day a week fishery that was in place for a number of years to address increased catch in the Puget Sound area.

Following the public meeting, WDFW submits its proposed season dates to the IPHC and NMFS for approval and adoption into federal regulations and the proposed seasons are distributed to the Puget Sound recreational halibut mailing list.

Washington Coast

Each year, WDFW staff schedules a meeting in mid-August to review the current year's catch and discuss proposed changes to the CSP for the upcoming season. The meeting is structured to include stakeholders from all three coastal management subareas; the north coast (Neah Bay and La Push), south coast (Westport) and Columbia River (Ilwaco and Astoria). Catch review and potential changes are discussed for each sub-area with a final recommendation on a range of proposed changes submitted to the Council for inclusion in the September briefing book.

Following the September Council meeting, WDFW meets again with stakeholders in October to review WDFW analysis of the proposed changes adopted by the Council for public review in September, and to make any revisions. A preferred alternative is selected and submitted to the Council for inclusion in the briefing book for potential adoption at the November Council meeting. Following the November meeting, WDFW sends a letter to the recreational halibut mailing list with the Council's decision on the proposed changes to the CSP for the following year.

The Council's recommended changes to the Area 2A CSP are submitted to the IPHC for approval at their Annual Meeting in late January. NMFS then implements the approved CSP in

federal regulations. Once the final rule is adopted, WDFW sends out a news release with the upcoming year's season dates and incorporates the information into the upcoming year's sport fishing regulation pamphlet.

The Washington Fish and Wildlife Commission has delegated the authority for the WDFW Director to adopt conforming regulations approved by the Council so WDFW can implement the halibut seasons into regulation by emergency rule once they are adopted by NMFS.

Oregon Coast

The annual regulation process for setting Oregon sport halibut seasons begins in August with public meetings to solicit input on proposed changes to the Area 2A CSP, and ends the following April with adoption of state regulations by the Oregon Fish and Wildlife Commission (OFWC) that conform with adopted Federal regulations. Within that time, there are numerous opportunities at different forums to engage stakeholders and for the public to provide input (Figure 21). For 2012 fishing season the following steps were taken:

August 2011

- ODFW hosted three public meetings to hear and discuss proposed changes for the 2012 CSP. This was the opportunity for the public to brainstorm possible changes to the Pacific halibut sport fishery.
    - Public meetings were held in Newport, Tillamook, and North Bend
    - Those who could not attend in person were invited to comment via phone, e-mail or fax: http://www.dfw.state.or.us/MRP/finfish/halibut/docs/management/12_feedback_csp_summary.pdf
    - After reviewing public input, ODFW staff prepared recommendations for the Council's September briefing book: http://www.pcouncil.org/wp-content/uploads/I1b_ODFW_SEPT2011BB.pdf
    - The Council also considered letters, email, and testimony directly from the public or other management entities.

September 2011

- The Council approved alternatives to the CSP for additional public review, as recommended by ODFW. In addition:
    - An alternative for the Columbia River subarea was added during the meeting
    - Three alternatives for the South of Humbug Mt. subarea were added
- ODFW hosted 4 public meetings to solicit input regarding the alternatives forwarded by the Council (in addition ODFW sought public input on some groundfish items at these meetings)
    - Meetings were held in Astoria, Newport, Brookings and Coos Bay. Number and location of meetings was determined by the alternatives adopted by the Council.
    - Those who could not attend were invited to comment via phone, e-mail, or fax
    - Additionally ODFW tired using an online survey to get feedback from a broader range of public.

October 2011

- After considering public input, ODFW prepared a report for the November Council meeting.
    - http://www.pcouncil.org/wp-content/uploads/D1b_ODFW_RPT_NOV2011BB.pdf

November 2011

- The Council adopted final changes to the 2012 CSP
- IPHC accepted public requests for the 2012 regulatory changes or management actions for review at its annual meeting. A form and more information were available on the IPHC annual meeting webpage.
- IPHC held its annual interim meeting in Seattle. Attendance to the interim meeting is by invitation only. ODFW is invited to and does send staff. Most of the interim meeting was available via a webcast for the public.
    - For Area 2A, IPHC staff made a preliminary 2012 catch limit recommendation of 0.989 million pounds.

January 2012

- IPHC held its annual meeting
    - The 2012 catch limits and regulations were finalized
    - Area 2A catch limit set at 0.989 million pounds, a 9% increase from 2011
    - The Area 2A CSP changes were approves as recommended by the Council

February 2012

- ODFW hosted 2 public meeting to hear comments about open dates for the Central Oregon Coast Subarea all-depth fishery
    - Public meetings were held in Newport and Salem
    - Those who could not attend were invited to comment via phone, e-mail, or fax.
- ODFW staff submitted a report to NMFS and the OFWC with recommended dates for the Central Oregon Coast Subarea all-depth fishery.
- ODFW staff provided the public with the "staff recommended" open dates, so that anglers could begin making plans, reservations, etc, with the caveat that dates were not finalized until approved by NFMS and OFWC.

March 2012

- NMFS published the federal regulations

April 2012

- The OFWC approved regulations, including open dates for the recreational halibut fisheries, as recommended by ODFW staff.

May 2012

- Recreational fisheries commenced.

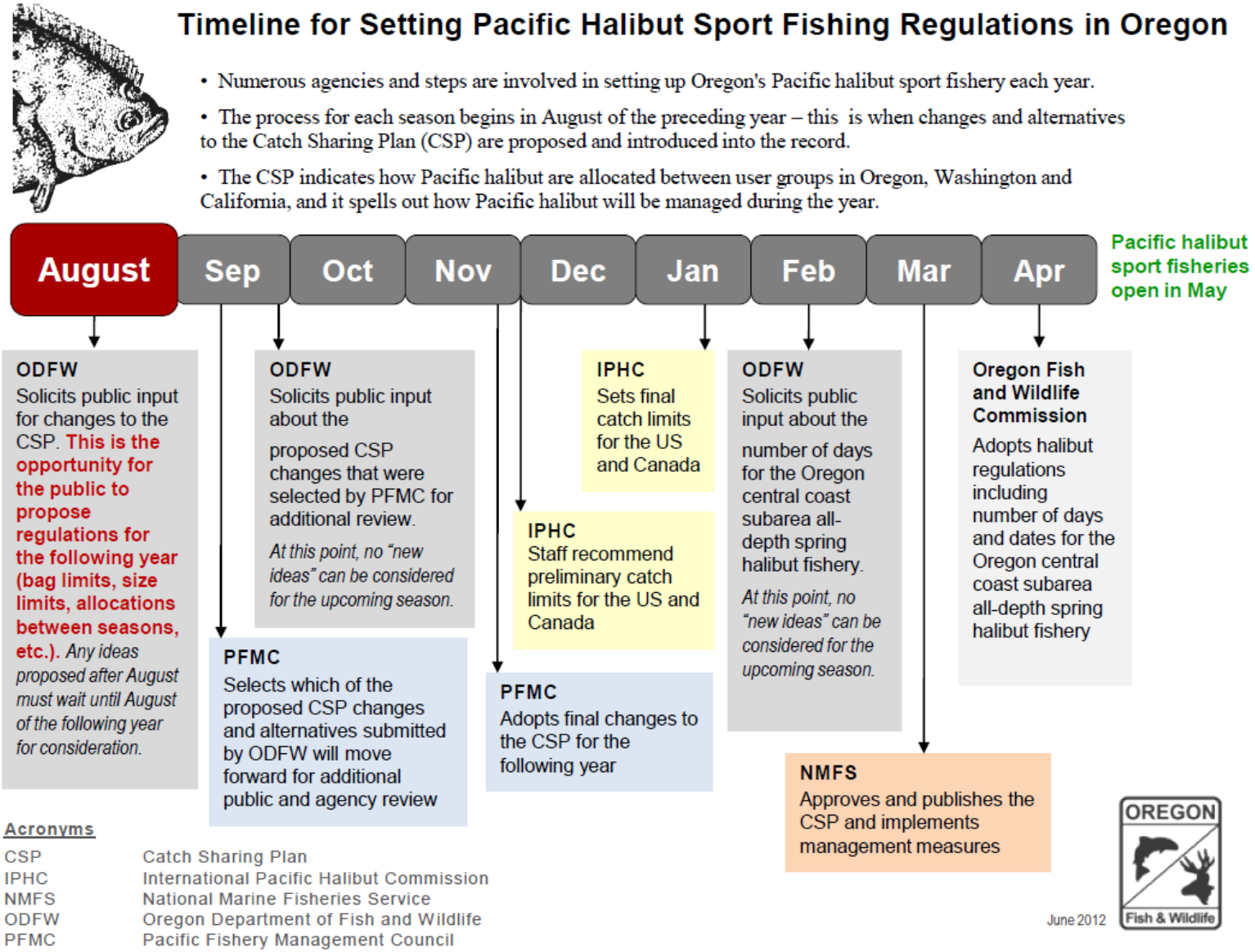

Figure 21. Process detail for 2012 Oregon Coast sport Pacific halibut season.
http://www.dfw.state.or.us/MRP/finfish/halibut/docs/timeline_halibut_regsetting.pdf

California

Until 2012, CDFG had very limited engagement with the public specifically regarding Pacific halibut management. In May 2012, CDFG staff met with members of the public in Eureka, California to discuss Pacific halibut management in light of recent higher than expected landings in the recreational fishery. As part of the agenda, CDFG requested input from the participants on proposed changes that might be needed to bring catches more in line with the South of Humbug Mountain subarea allocation. About 25 individuals attended representing recreational anglers, CPFV operators, a local fishing organization and members of the harbor commission.

The CDFG is still considering its approach to public involvement in Pacific halibut management at the state level and the most effective process for engaging North Coast stakeholders.

Conclusions and Recommendations

1. Sport halibut catches in the South of Humbug subarea have been increasing since the mid 2000's.

8. CSP requirements for management of the South of Humbug subarea include the establishment of a fixed season, based on a projected daily catch rate, to establish the number of days expected to achieve the area's quota.

2. Catch estimates provided by CDFG have been very informative, documenting the growth on harvest in northern California waters.

3. During 2007-2011, sport catches in California waters have ranged from 5,300 to 36,700 lbs. and averaged 19,100 lbs. Anecdotal reports suggest interest in sport halibut fishing in California waters increases when salmon fishing opportunities decline.

9. IPHC assessment and survey currently extends through Washington and Oregon waters, including the Oregon part of the South of Humbug subarea. IPHC management extends throughout the range of the species.

10. To bring northern California into the IPHC assessment, estimates of halibut density in the area are needed. These could be derived from extending the current survey grid into the area, or by use of data from nearby areas already surveyed.

11. Estimates of bottom area for 20-275 fm waters off California are available from recent mapping efforts. However, IPHC has developed a methodology which is used for other areas, and prefers to continue that into the northern CA area. IPHC will work on obtaining those data.

6. Halibut catches on the IPHC assessment survey during 2007-2011 have generally been declining in the northern Washington area, and increasing off central and southern Oregon, although survey effort in southern Oregon is somewhat low.

5. Observer data from WCGOP documents that Pacific halibut bycatch occurs throughout northern California, with highest catches generally being seen north of 40° N. lat.

13. Survey data (trawl only) from WCGOP should be compiled for the West Coast to illustrate relative differences or similarities in halibut density north and south of the Oregon/California border.

14. Survey data from the NMFS West Coast bottom trawl survey should also be use to illustrate relative halibut density.

4. CDFG sport fishery sampling has shown Pacific halibut are being caught as far south as Shelter Cove (40.03° N. lat.).

12. In season tracking of the quota is not available on an inseason basis in the Washington Puget Sound region, an area that is also not currently part of the IPHC survey but is incorporated into the stock assessment and apportionment. These features are similar to the South of Humbug area and could be used as a tool in evaluating future management.

7. WDFW and ODFW have well-developed programs for soliciting input from their halibut sport fishing communities.

STATE OF CALIFORNIA
Edmund G. Brown Jr., Governor

Fish and Game Commission

Sonke Mastrup, Executive Director
1416 Ninth Street, Room 1320
Sacramento, CA 95814
(916) 653-4899
(916) 653-5040 Fax
www.fgc.ca.gov

July 17, 2012

Mr. Bruce Leaman, Executive Director
International Pacific Halibut Commission
2320 W. Commodore Way, Suite 300
Seattle, WA 98199-1287

Mr. William Stelle, Jr., Administrator, Northwest Region
National Marine Fisheries Service
7600 Sand Point Way NE, Building 1
Seattle, WA 98115-0070

Mr. Dan Wolford, Chairman
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Dear Sirs:

On behalf of the California Fish and Game Commission, I am writing to express both our interest in, and our concern with, the regulatory process for Pacific halibut. In particular, we are troubled by the allocation of Pacific halibut available to California recreational anglers through the Area 2A Catch Sharing Plan. We understand the 0.62 percent of the area 2A TAC that is set aside for the recreational fishery South of Humbug Mountain is an incidental allowance based on an expectation of catch, rather than an actual allocation.

We further understand that the Council is committed to revisiting the Catch Sharing Plan in the near future, and we are writing to express support for the Council's work in this endeavor. We believe that a formal allocation for the recreational fishery off California should be equitable, scientifically based, and the result of a deliberative process which includes participation from California representatives and stakeholders. Recent recreational catch estimates indicate that Pacific halibut may be more abundant off California than previously recognized. While the Commission has initiated the regulatory process to keep recreational catches within the 0.62 percent TAC level that

is presently specified in the Area 2A Catch Sharing Plan, we feel there is strong rationale to reconsider the basis for the South of Humbug set-aside, based both on current stock status information as well as historic catches. Although the Commission has taken steps to comply with the Catch Sharing Plan in effect today, it is our expectation that the Council will place revisiting the Area 2A allocation scheme as a high priority item on its upcoming meeting agendas and work plans.

We also strongly request the International Pacific Halibut Commission consider expanding the spatial extent of the annual stock assessment surveys to include an assessment of the biomass in waters south of the California/Oregon border. This would greatly improve the scientific basis of the stock assessment surveys and resulting Area 2A TAC by helping to assess the spatial distribution and biomass of Pacific halibut throughout its range off the U.S. West Coast.

Please do not hesitate to contact me if I can be of any assistance to help facilitate this request.

Sincerely,

Sonke Mastrup
Executive Director

cc: Mr. Phil Anderson, Director
Washington Department of Fish and Wildlife
600 Capitol Way N.
Olympia, WA 98501-1091

Mr. Roy Elicker, Director
Oregon Department of Fish and Wildlife
3406 Cherry Avenue, NE
Salem, OR 97303

Mr. Donald McIsaac, Executive Director
Pacific Fishery Management Council
7500 NE Ambassador Place, Suite 200
Portland, OR 97220

Mr. Chuck Bonham, Director
California Department of Fish and Game
1416 Ninth Street, 12th Floor
Sacramento, CA 95814

INTERNATIONAL PACIFIC HALIBUT COMMISSION

DIRECTOR
BRUCE M. LEAMAN

2320 W. COMMODORE WY, STE 300
SEATTLE, WA 98199-1287

TELEPHONE:
(206) 634-1838

FAX:
(206) 632-2983

August 8, 2012

Mr. Sonke Mastrup
Executive Director
California Fish and Game Commission
1416 Ninth St., Room1320
Sacramento, CA 95814

Dear Mr. Mastrup:

Thank you for your letter of July 17th concerning allocation of Pacific halibut within the Pacific Fishery Management Council's Catch Sharing Plan (CSP) for IPHC Area 2A. While allocation of halibut to harvesting sectors within Area 2A is clearly the purview of the PFMC, the IPHC staff does share the concerns of the Fish and Game Commission and the Council that the halibut resource be accurately assessed and managed in Area 2A.

The apparent increase in landings of recreationally caught Pacific halibut in northern California waters in 2011 and consequent overrun of the CSP allocation for the South of Humbug Mountain (SOH) subarea generated an initiative by the Council to determine appropriate management approach for Pacific halibut in the SOH area, including northern California. The IPHC staff is participating in this initiative and wishes to employ a scientifically-sound methodology to estimate the available yield in this area. Consultation with users and agencies is an important component of this process, in particular to determine the extent of northern California waters that should be reasonably included in the survey/habitat-based apportionment which the IPHC uses to determine yield in Area 2A. Several options are being considered, including expanding the IPHC longline survey into northern California, using survey catch rates from adjacent Oregon waters as proxy for California catch rates, a combination of the foregoing with surveys in CA waters on a less frequent basis, or other alternatives.

However, the IPHC also faces the challenge of expanding our existing survey into shallower and deeper waters throughout the stock range, an expense of approximately $1.5M for which we do not have funding. An expansion into California waters is clearly a more modest expenditure but even using our existing sampling framework would result in expenses for which the IPHC does not currently have funds. We would certainly welcome support from Pacific coast agencies for this additional work.

The Council's SOH Policy Committee (which includes representation from California) will be meeting following the September 2012 Council meeting to review progress on this issue. The Committee will be considering material developed by the SOH Halibut Workgroup, established in April 2012. That workgroup, in which the IPHC is participating, is assembling information on halibut abundance, assessment, catch estimation, and allocation. I believe the intent of the

Council is to have management alternatives developed for consideration at its September 2013 meeting.

I would be pleased to answer any additional questions on the Commission's participation in this initiative. For information, the IPHC staff contact on this initiative is Gregg Williams (Gregg@iphc.int, 206-634-1838 x7687).

Sincerely,

Bruce M. Leaman, Ph.D.
Executive Director

cc: IPHC Commissioners

Mr. Phil Anderson, Director
Washington Department of Fish and Wildlife
600 Capitol Way N.
Olympia, WA 98501-1091

Mr. Roy Elicker, Director
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3406 Cherry Avenue, NE
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Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland, OR 97220-1384

Agenda Item F.1.b
Supplemental GAP Report
September 2012

GROUNDFISH ADVISORY SUBPANEL REPORT ON PACIFIC HALIBUT MANAGEMENT SOUTH OF HUMBUG MOUNTAIN

The Groundfish Advisory Subpanel (GAP) received information from Lynn Mattes (Oregon Department of Fish and Wildlife), Heather Reed (Washington Department of Fish and Wildlife) and Marci Yaremko (California Department of Fish and Game), relating to this agenda item.

It was determined by the GAP that the current issue is a situation where unassessed halibut is being harvested with limited monitoring. The GAP agrees that abundance determinations and adequate monitoring are needed to bring the South of Humbug Mt. recreational fishery into compliance with fishery management standards.

The number one priority with this issue is an abundance determination by the International Pacific Halibut Commission (IPHC) of the halibut population south of the California/Oregon border. If funding resources are not available for formal IPHC surveys, there is data currently available which could be used, such as bycatch, landing information and area projections, etc. If an increase in abundance for area 2A can be shown due to inclusion of the Northern California population, then whatever increase, less the mandatory set asides, could be assigned to the South of Humbug Mt. area. This would also require adjustments to the overall catch sharing plan. This would minimize any loss of allocation by other management areas.

Without any new abundance determinations and the above process, this issue could result in a contentious allocation process where allocation must be taken from one area and given to another solely due to lack of information.

PFMC
09/15/12

Agenda Item F.1.b
Supplemental SHPHW PowerPoint
September 2012

South of Humbug Pacific Halibut Workgroup

Report on Biological, Monitoring, Assessment, and Apportionment Issues

Lynn Mattes, ODFW
Heather Reed, WDFW
Chuck Tracy, PFMC
Gregg Williams, IPHC
Sarah Williams, NMFS NWR
Deb Wilson-Vandenberg, CDFG

Issues

- Pacific halibut harvest in the South of Humbug Mt. subarea has exceeded allocation in recent years
- Accelerated with KMZ salmon closures in 2008 & 2009
- Has become a popular alternative to groundfish

Objectives

- Consider management revisions in the South of Humbug Subarea
- SHPHW develops info to inform policy choices
  - Harvest and allocation history
  - Review abundance and distribution information in CA for IPHC assessment and apportionment
  - Compare regional catch monitoring programs, stakeholder and regulation processes

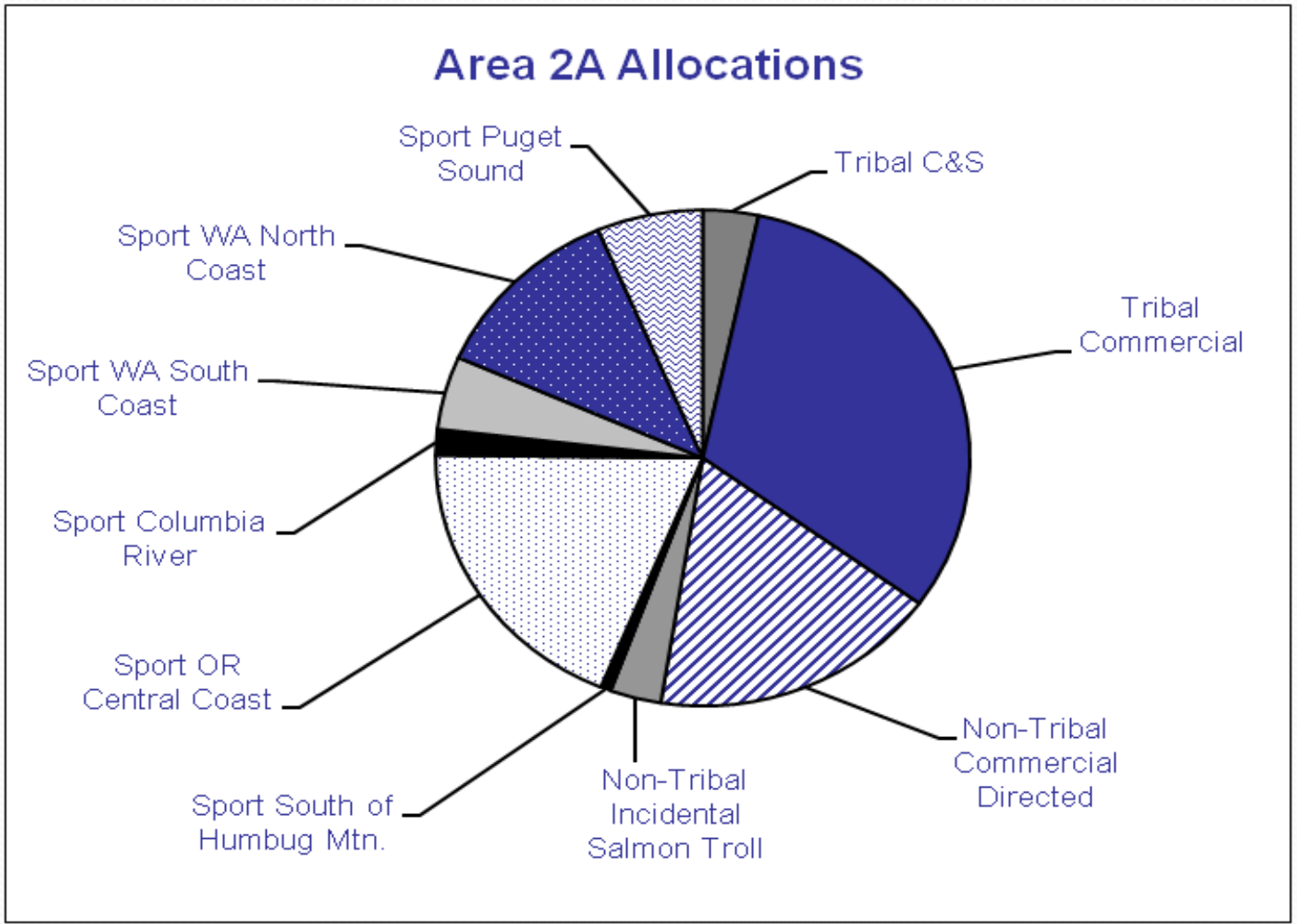
Report Contents

- Partial history of South of Humbug fishery
- IPHC stock assessment and apportionment methodology
- Review of halibut abundance and distribution in South of Humbug subarea
- Summary of sport fishery monitoring programs in Area 2A
- Regulation processes
- Public involvement

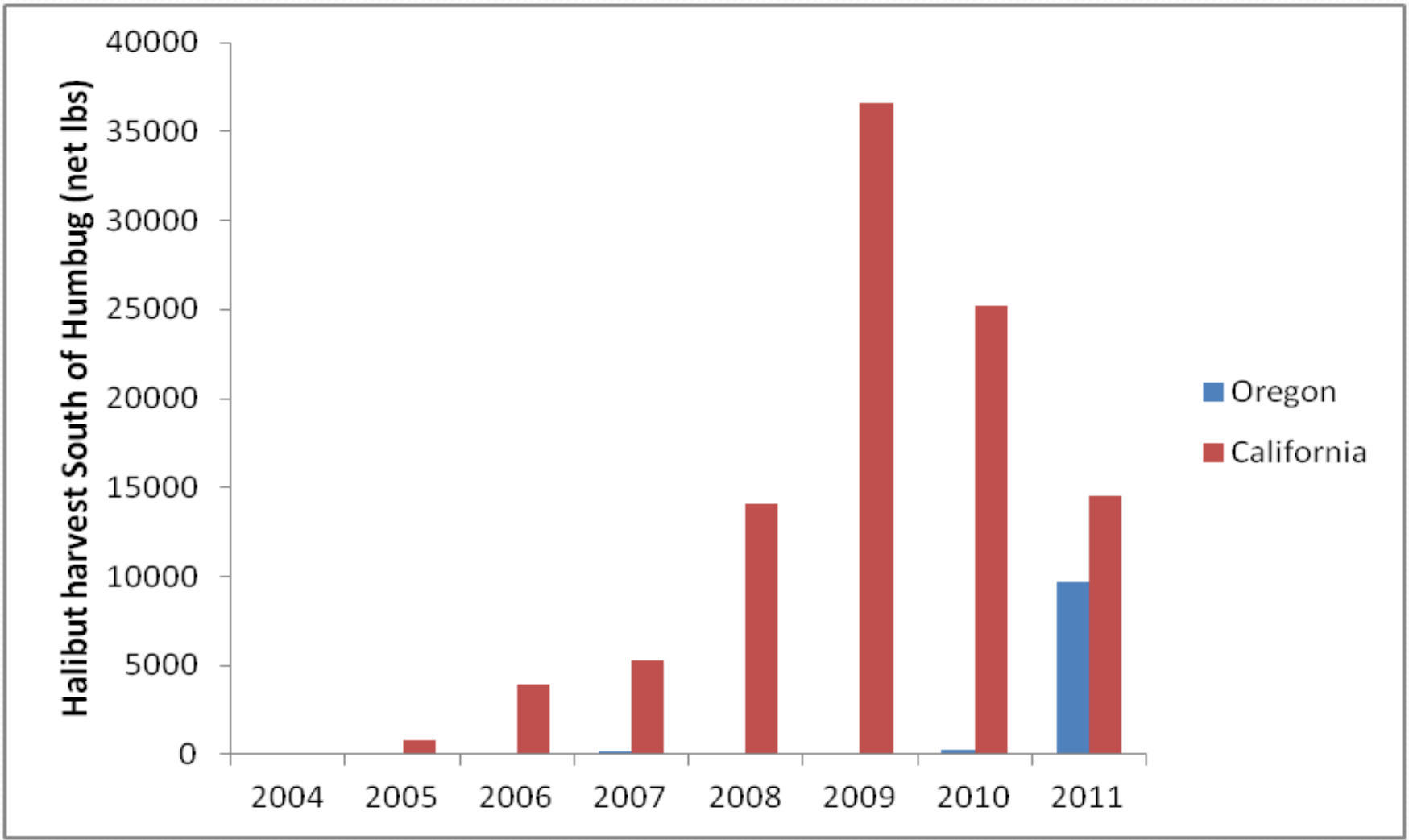
South Of Humbug History

- 1988 – Area 2A catch sharing plan established
- 1997 - South of Humbug first split from Oregon south of Florence, with California area separate
- 1999 – California added to the South of Humbug subarea
- Allocated 0.62% of Area 2A TAC or 3.0% of the OR/CA subquota (6,056 lbs in 2012)
- Fixed season dates from May 1-October 31, should be adjusted by expected catch per day (per CSP)

Area 2A Allocation - 2011



South of Humbug Landings



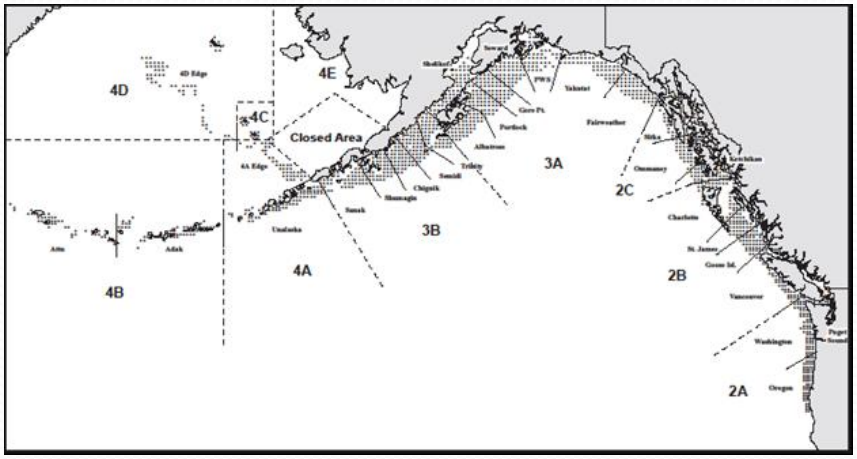
IPHC Stock Assessment

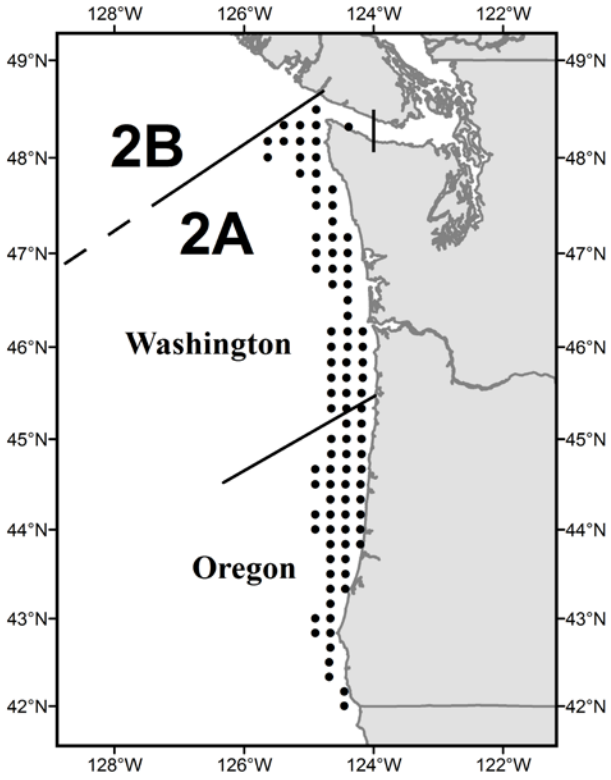
- Coastwide assessment model unchanged since 2006
- Age- and sex- structured fit to CPUE (weight and numbers)
- Exploitable biomass (EBio) apportioned to IPHC regulatory areas based on survey O32 WPUE
  - Adjusted for hook competition
  - Adjusted for timing of survey relative to removals
  - Weighted by bottom area (0-400 fm)
- Catch limits based on EBio, available yield, target harvest rate, and other removals (e.g., bycatch mortality)

IPHC Setline Survey

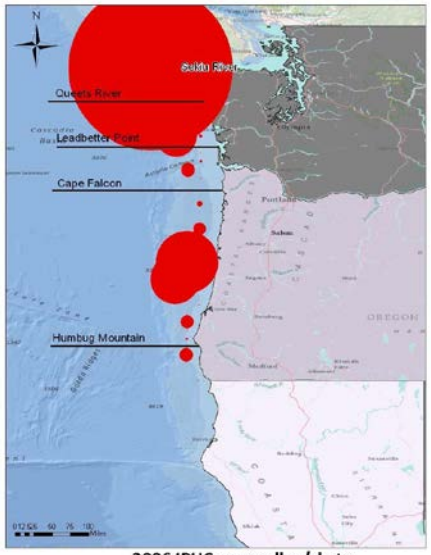
- Standardized survey conducted annually
  - CPUE
  - Age composition
  - Sex specific age at length
  - Maturity
- 27 areas between OR/CA border and Bering Sea
  - 10 x 10 nm grid
  - All stations with 20-275 fm

IPHC Survey Stations

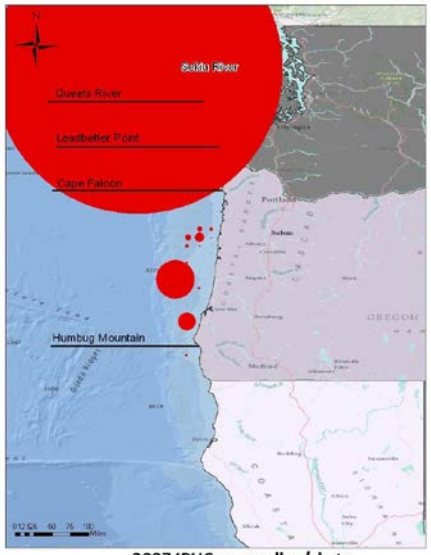




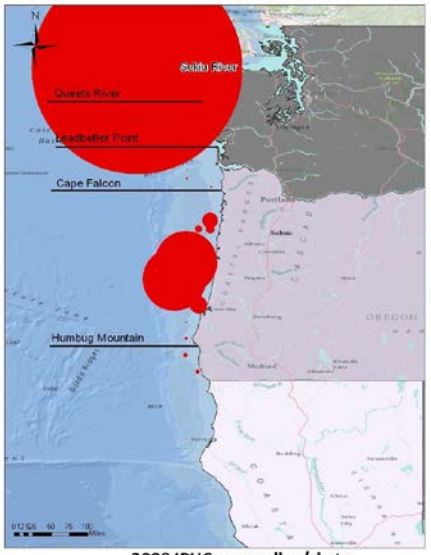
IPHC Survey Area 2A WPUE



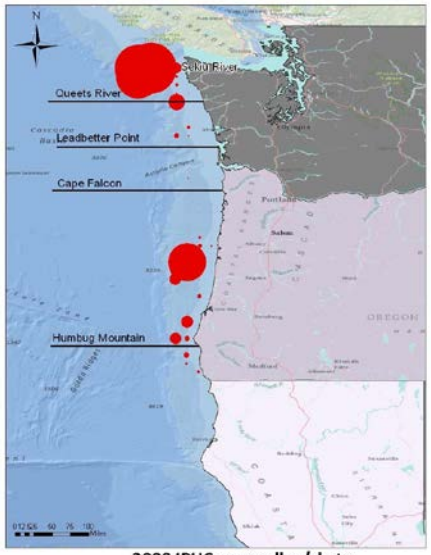
2006 IPHC survey lbs./skate



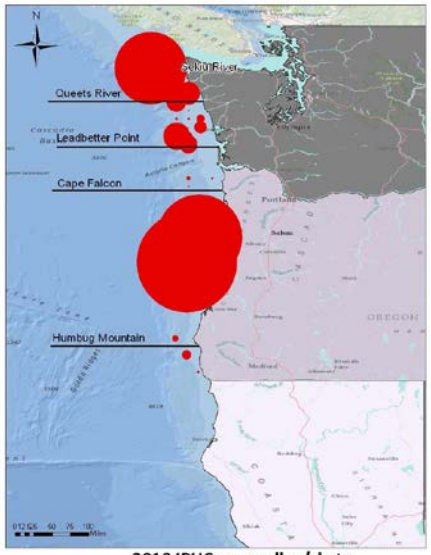
2007 IPHC survey lbs./skate



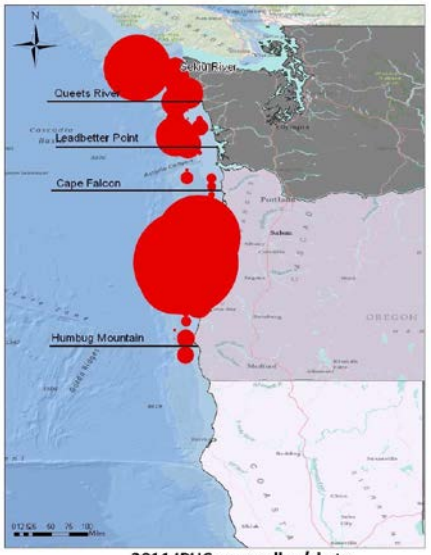
2008 IPHC survey lbs./skate



2009 IPHC survey lbs./skate



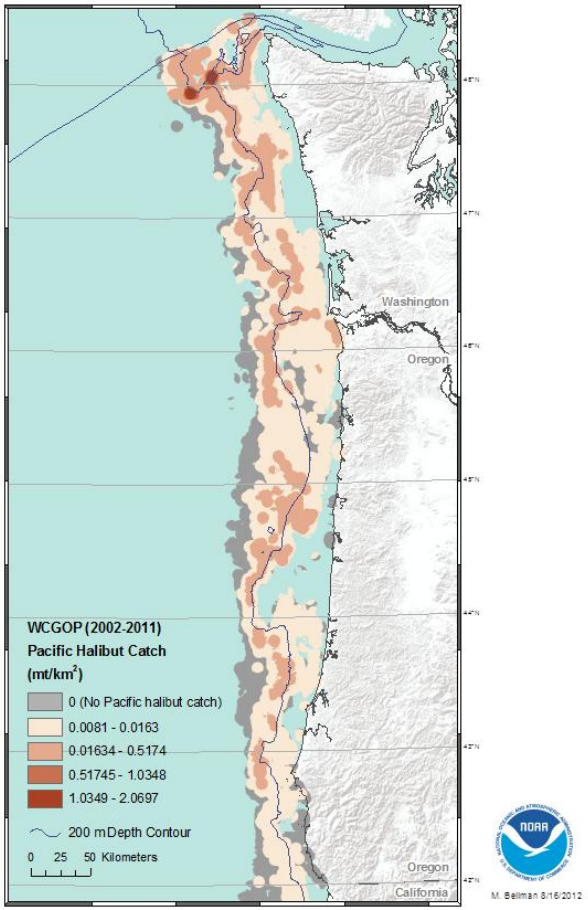
2010 IPHC survey lbs./skate

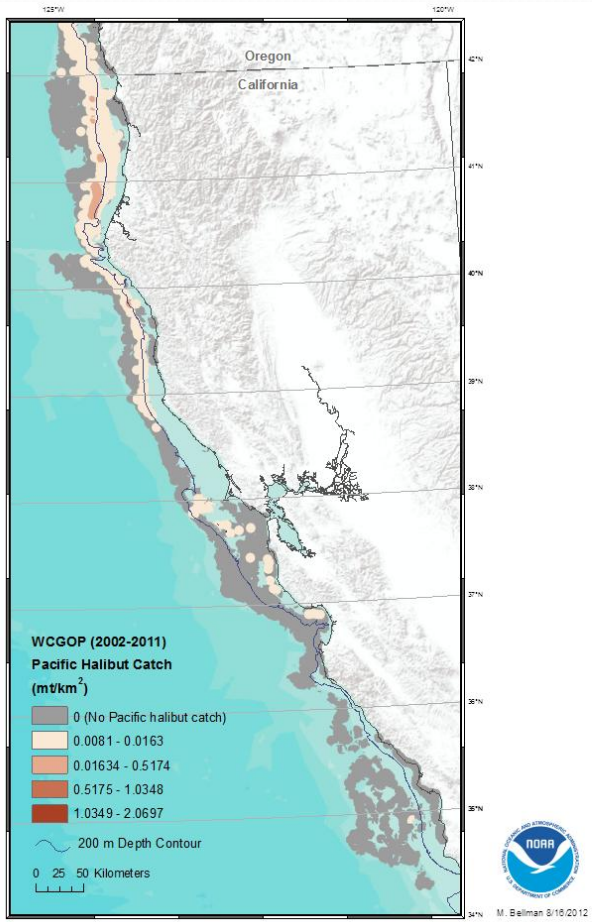


2011 IPHC survey lbs./skate

Halibut Bycatch in Commercial Fisheries

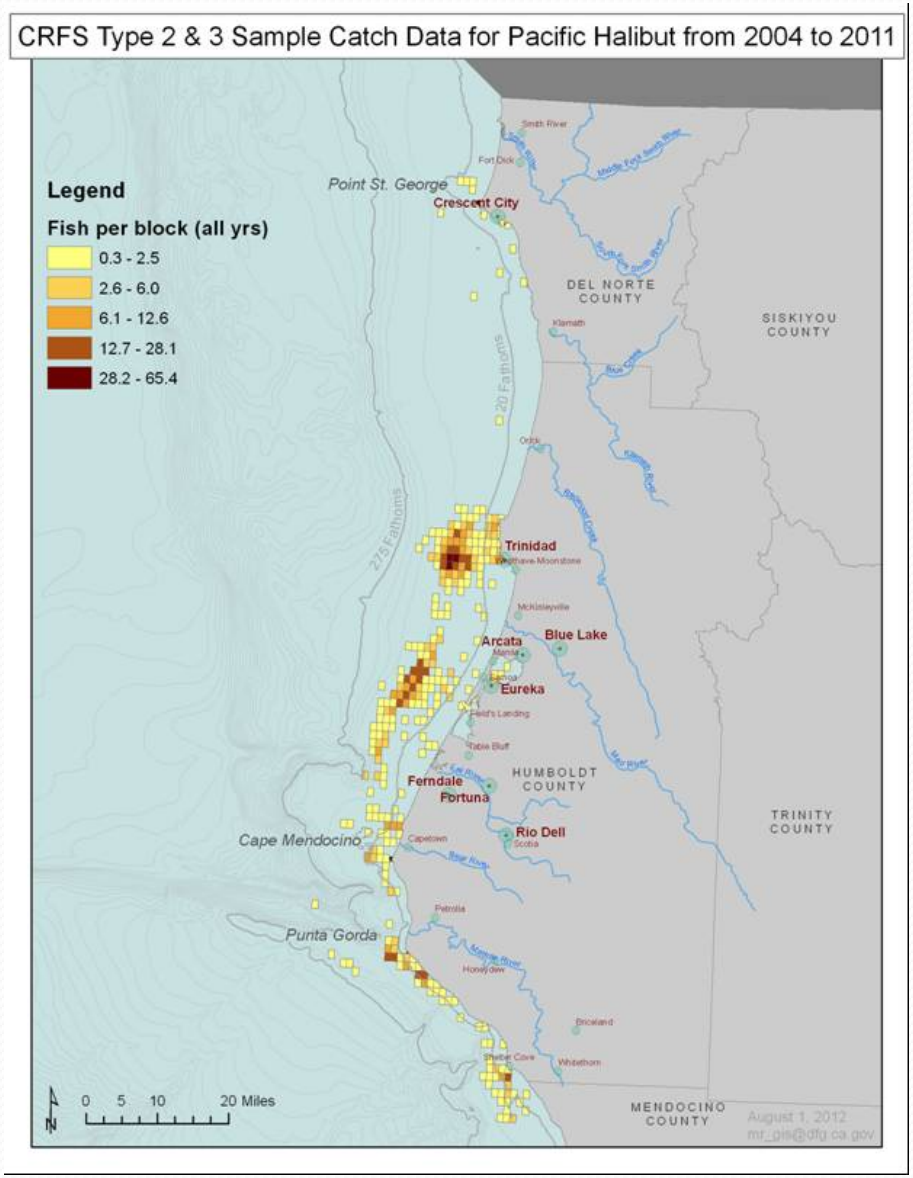
WCGOP observer data, all gears, 2002-2011





California Recreational Catch

(source: California Fish & Game)



Catch Monitoring Programs

- Puget Sound – postseason catch estimates (WDFW)
  - CPUE/biological data from dockside interviews
  - Total effort and target species from phone surveys
- WA/OR Coast – inseason catch estimates (WDFW, ODFW)
  - CPUE/biological/target data from dockside interviews
  - Total effort from exit counts and charter offices
  - Weekly catch estimates made inseason N. of Humbug
  - Inseason estimates possible for S. of Humbug
- California Coast – postseason catch estimates (CDFG)
  - CPUE/biological/target data from dockside interviews
  - Total effort from trailer counts, phone survey (for private marina effort ratio), and charter logbooks

Workgroup Conclusions

- Sport halibut catches in the South of Humbug subarea have been increasing since the mid-2000's.
- Current CSP requires a fixed season based on a projected daily catch rate to establish the number of days expected to achieve the area's quota.
- IPHC assessment survey CPUE generally declining in the northern Washington and increasing off central and southern Oregon
- WCGOP data indicate bycatch throughout northern California, highest catch north of Shelter Cove
- CDFG sport fishery sampling has shown Pacific halibut are being caught mostly north of Shelter Cove

Workgroup Conclusions

- Estimates of halibut density in California are needed for IPHC assessment. Options are:
  - Extend IPHC survey grid into the area
  - Use data from nearby areas already surveyed
    - Weight by bottom area
- Other information can be used to inform the decision regarding the size of the area to be included
  - Use bycatch data from observer program
  - Use CPUE data from NMFS trawl survey

Workgroup Recommendations

- Filter observer data for bottom trawl only
- Request NMFS trawl survey data for similar analysis
- Consider Puget Sound management as model for managing South of Humbug Mt. subarea
  - Inseason quota tracking is not available
  - Not currently part of the IPHC survey but is incorporated into the stock assessment and apportionment.
  - Similar issues South of Humbug.
- Start policy process to develop options for revising management of South of Humbug Subarea

Agenda Item F.1.c
Supplemental Public Comment
September 2012

Jim Martin, Chair
Northern California Chapter
Recreational Fishing Alliance
P.O. Box 2420
Fort Bragg, CA 95437
flatland@mcn.org

Wednesday, September 12, 2012

Chairman Dan Wolford
Pacific Fishery Management Council
7700 NE Ambassador Place, Suite 101
Portland OR 97220

Re: Agenda Item F: Pacific Halibut Catch Sharing Plan - South of Humbug

Dear Chairman Wolford, and members of the PFMC:

I am writing to the Council on behalf of the Northern California Chapter of the Recreational Fishing Alliance. RFA-NorCal members participate in the Pacific Halibut fishery on the northern coast of California and all the way up to Alaska. Thanks for the opportunity to comment on the Pacific Halibut Catch Sharing Plan.

We strongly support the letter from the California Fish and Game Commission dated July 12, 2012. The IPHC needs to conduct stock assessment research in California and the allocation of 0.62% of the TAC to California recreational anglers is too low.

Our members have observed an increase in halibut populations in Northern California ever since the trawl fleet was moved further offshore. Halibut is increasingly important to charter fishing businesses in Eureka, Shelter Cove, Trinidad and other northern California ports.

We generally support the range of options outlined in the CDFG report, although we would ask that the Council remove the option for a 48" size limit, which would result in an 86% cut in this fishery. We ask that the Council add an option for a 28" size limit. CDFG did a good job of capturing stakeholder input in the range of options. At this time we do not support any action for 2013, and will need more information about 2012 landings South of Humbug and more stakeholder discussion of the range of options. Options that close summer months to halibut retention would effectively force recreational anglers off Mendocino County to throw any halibut they catch back, because they are generally caught while rockfishing.

Reviewing the CDFG landings data table, over the last 8 years for which data is available, an average of 12,500 pounds of halibut was landed in California each year. This would be a more realistic catch share or harvest guideline for our state.

The Council should consider the implementation of new marine protected areas in northern California as a result of the Marine Life Protection Act. Shelter Cove, which has

a well-established halibut fishery, took a 20% bite out of their halibut fishing according to EcoTrust data.

The economic value of the recreational halibut charter businesses is relatively more important to the northern California ports than in other regions, because of limited rockfishing seasons, limited Klamath Management Zone salmon fishing opportunity in most years, and the low level of "economic resiliency" characteristic of the ports and harbors in this region.

Average charter trip prices range from $150 to $250 and a full boat charter on a "six-pack" charter would cost roughly $1000 a day. There are currently more than 6 "six-pack" charter fishing vessels in Eureka, all of which target halibut at various times during the year. Pacific halibut opportunity is extremely important to the viability of the charter fleet on the CA north coast. In 2010, halibut was a mainstay of the recreational private boat fleet on the coast from Cape Mendocino to the Oregon border.

Currently, there are only a few private boat or charter trips targeting halibut in Noyo Harbor, Albion, and Pt. Arena. However, the late Capt. Jim Casey (Patty C) historically ran halibut trips off Ten Mile Beach and had regular success during the 1970s and 1980s. Locals believe there is a potential fishery available, but over the last two decades, halibut landings have mainly been from incidental catch while rockfishing, especially in the area between Albion and Point Arena, in shallow water (less than 20 fathoms). Halibut are also incidentally caught and retained by recreational salmon trollers, but this is rare.

One potential issue with the CDFG landings data: the area off Mendocino County is the northern edge of the California halibut's range and also the southern edge of the fishable range of Pacific Halibut. Fairly large specimens of California halibut have been landed here. There may be some misidentification issues in the data.

This year was unusual in that the salmon fishery off Humboldt Bay has been outstanding; we expect a significant decline in 2012 halibut landings.

Ultimately, the Council needs to review whether the current 0.62% of the TAC allocated to California's recreational anglers is fair and equitable. We note that 3.1% of the TAC is allocated to "incidental" catch in the commercial salmon troll fishery. We question whether these landings are truly "incidental" or whether the fishery goal is, as the Council staff report states, "… to harvest the troll quota as an incidental catch during the May/June salmon troll fishery. The secondary management objective is to harvest the remaining troll quota as an incidental catch during the remainder of the salmon troll fishery." This sounds suspiciously like a directed fishery rather than an allowance for true incidental catch. Commercial salmon troll vessels are not required to obtain VMS electronic monitoring, so there is no tracking of whether these vessels are fishing in closed groundfish areas, as required of other commercial sectors.

We support transferring a portion of the incidental catch in the commercial salmon troll fishery to the SOH recreational fishery. This, combined with reasonable size limits, could result in a obtainable allocation for the recreational halibut fishery in California and Southern Oregon. We note in the staff report:

> "A salmon troller may participate in this fishery or in the directed commercial fishery targeting halibut, but not in both."

The Council should have an open discussion as to why any "incidental" halibut should be targeted, retained and managed in the commercial salmon troll fishery. Or is it a directed fishery? Fishermen who participate in a fishery should get a permit for that fishery. An argument can be made for an allowance for truly incidental catch, to reduce regulatory discards, but at what point did this allowance become a "fishery" to be "participated in" by non-permit holders?

The commercial salmon troll "fishery" for pacific halibut exceeded its quota by nearly 5,000 pounds, or 15% over its 2012 quota. Until this issue is addressed we see no need for drastic changes to California's recreational halibut fishery. We look forward to working with the Council on increasing our allocation while adopting sensible restrictions on our fishery.

Respectfully,

Jim Martin

Agenda Item F.2
Situation Summary
September 2012

2013 PACIFIC HALIBUT REGULATIONS

Each September meeting, the Council considers proposed changes to the halibut regulations. The purpose of this consideration is for adjustments in the annual regulations (primarily in the recreational fishery) or the Catch Sharing Plan (CSP) for Area 2A (Agenda Item F.2.a, Attachment 1), and can include changes in catch allocation among areas or gear groups.

Public meetings were held to solicit proposed changes to the CSP and to present staff proposals for public comment. The Washington Department of Fish and Wildlife (WDFW) held a public meeting on August 14 in Montesano. The Oregon Department of Fish and Wildlife (ODFW) held public meetings on July 31 in Portland, August 6 in North Bend, and August 7 in Newport. The California Department of Fish and Game (CDFG) held a public meeting on May 17 in Eureka. Recommendations resulting from the meetings will be presented for review at the September Council meeting (Agenda Items F.2.b, WDFW Report; F.2.b, ODFW Report; and F.2.b, CDFG Report).

The Council will take final action on proposed changes for 2013 Area 2A halibut fisheries at the November 2012 Council meeting.

Council Action:

1. **Adopt, for public review, any proposed changes to season structure and the Catch Sharing Plan for 2013.**
2. **Adopt, for public review, any proposed changes to the codified Federal regulations.**

Reference Materials:

1. Agenda Item F.2.a, Attachment 1: 2012 Pacific Halibut Catch Sharing Plan for Area 2A.
2. Agenda Item F.2.b, WDFW Report: Washington Department of Fish and Wildlife Report on Proposed Changes to Catch Sharing Plan and 2013 Annual Regulations.
3. Agenda Item F.2.b, ODFW Report: Oregon Department of Fish and Wildlife Report on Proposed Changes to the Pacific Halibut Catch Sharing Plan for the 2013 Fishery.
4. Agenda Item F.2.b, CDFG Report: California Department of Fish and Game Report on Final Recreational Catch Estimates and Proposed Changes to the 2013 Pacific Halibut Catch Sharing Plan.
5. Agenda Item F.2.c, Public Comment.

Agenda Order:

a. Agenda Item Overview — Chuck Tracy
b. Reports and Comments of Advisory Bodies and Management Entities
c. Public Comment
d. **Council Action**: Adopt for Public Review Proposed Changes for the 2013 Pacific Halibut Catch Sharing Plan and Annual Fishery Regulations

PFMC
08/24/12

2012 PACIFIC HALIBUT CATCH SHARING PLAN FOR AREA 2A

(a) FRAMEWORK

This Plan constitutes a framework that shall be applied to the annual Area 2A total allowable catch (TAC) approved by the International Pacific Halibut Commission (IPHC) each January. The framework shall be implemented in both IPHC regulations and domestic regulations (implemented by NMFS) as published in the *Federal Register*.

(b) ALLOCATIONS

This Plan allocates 35 percent of the Area 2A TAC to U.S. treaty Indian tribes in the State of Washington in subarea 2A-1, and 65 percent to non-Indian fisheries in Area 2A. The allocation to non-Indian fisheries is divided into three shares, with the Washington sport fishery (north of the Columbia River) receiving 36.6 percent, the Oregon/California sport fishery receiving 31.7 percent, and the commercial fishery receiving 31.7 percent. Allocations within the non-Indian commercial and sport fisheries are described in sections (e) and (f) of this Plan. These allocations may be changed if new information becomes available that indicates a change is necessary and/or the Pacific Fishery Management Council takes action to reconsider its allocation recommendations. Such changes will be made after appropriate rulemaking is completed and published in the *Federal Register*.

(c) SUBQUOTAS

The allocations in this Plan are distributed as subquotas to ensure that any overage or underage by any one group will not affect achievement of an allocation set aside for another group. The specific allocative measures in the treaty Indian, non-Indian commercial, and non-Indian sport fisheries in Area 2A are described in paragraphs (d) through (f) of this Plan.

(d) TREATY INDIAN FISHERIES

Thirty-five percent of the Area 2A TAC is allocated to 13 treaty Indian tribes in subarea 2A-1, which includes that portion of Area 2A north of Point Chehalis, WA (46°53.30' N. lat.) and east of 125°44.00' W. long. The treaty Indian allocation is to provide for a tribal commercial fishery and a ceremonial and subsistence fishery. These two fisheries are managed separately; any overages in the commercial fishery do not affect the ceremonial and subsistence fishery. The commercial fishery is managed to achieve an established subquota, while the ceremonial and subsistence fishery is managed for a year-round season. The tribes will estimate the ceremonial and subsistence harvest expectations in January of each year, and the remainder of the allocation will be for the tribal commercial fishery.

(1) The tribal ceremonial and subsistence fishery begins on January 1 and continues through December 31. No size or bag limits will apply to the ceremonial and

subsistence fishery, except that when the tribal commercial fishery is closed, treaty Indians may take and retain not more than two halibut per day per person for subsistence purposes. Ceremonial fisheries shall be managed by tribal regulations promulgated inseason to meet the needs of specific ceremonial events. Halibut taken for ceremonial and subsistence purposes may not be offered for sale or sold.

(2) The tribal commercial fishery season dates will be set within the season dates determined by the IPHC and implemented in IPHC regulations. The tribal commercial fishery will close when the subquota is taken. Any halibut sold by treaty Indians during the commercial fishing season must comply with IPHC regulations on size limits for the non-Indian fishery.

(e) NON-INDIAN COMMERCIAL FISHERIES

The non-Indian commercial fishery is allocated 31.7 percent of the non-Indian share of the Area 2A TAC for a directed halibut fishery and an incidental catch fishery during the salmon troll fishery. The non-Indian commercial allocation is approximately 20.6 percent of the Area 2A TAC. Incidental catch of halibut in the primary directed sablefish fishery north of Point Chehalis, WA will be authorized if the Washington sport allocation exceeds 224,110 lb (101.7 mt) as described in section (e)(3) of this Plan. The structuring and management of these three fisheries is as follows.

(1) Incidental halibut catch in the salmon troll fishery.

Fifteen percent of the non-Indian commercial fishery allocation is allocated to the salmon troll fishery in Area 2A as an incidental catch during salmon fisheries. The quota for this incidental catch fishery is approximately 3.1 percent of the Area 2A TAC. The primary management objective for this fishery is to harvest the troll quota as an incidental catch during the May/June salmon troll fishery. The secondary management objective is to harvest the remaining troll quota as an incidental catch during the remainder of the salmon troll fishery.

(i) The Council will recommend landing restrictions at its spring public meeting each year to control the amount of halibut caught incidentally in the troll fishery. The landing restrictions will be based on the number of incidental harvest license applications submitted to the IPHC, halibut catch rates, the amount of allocation, and other pertinent factors, and may include catch or landing ratios, landing limits, or other means to control the rate of halibut harvest. NMFS will publish the landing restrictions annually in the *Federal Register*, along with the salmon management measures.

(ii) Inseason adjustments to the incidental halibut catch fishery.

(A) NMFS may make inseason adjustments to the landing restrictions, if requested by the Council Chairman, as necessary to assure that the incidental harvest rate is appropriate for salmon and halibut availability, does not encourage target fishing on halibut, and does not increase the likelihood of exceeding the quota for this fishery. In determining whether to make such inseason adjustments, NMFS will consult with the applicable state representative(s), a representative of the Council's Salmon Advisory Sub-Panel, and Council staff.

(B) Notice and effectiveness of inseason adjustments will be made by NMFS in accordance with paragraph (f)(5) of this Plan.

(iii) If the overall quota for the non-Indian, incidental commercial troll fishery has not been harvested by salmon trollers during the May/June fishery, additional landings of halibut caught incidentally during salmon troll fisheries will be allowed in July and will continue until the amount of halibut that was initially available as quota for the troll fishery is taken or until the end of the season date for commercial halibut fishing determined by the IPHC and implemented in IPHC regulation. Landing restrictions implemented for the May/June salmon troll fishery will apply for as long as this fishery is open. Notice of the July opening of this fishery will be announced on the NMFS hotline (206) 526-6667 or (800) 662-9825. Halibut retention in the salmon troll fishery will be allowed after June only if the opening has been announced on the NMFS hotline.

(iv) A salmon troller may participate in this fishery or in the directed commercial fishery targeting halibut, but not in both.

(v) Under the Pacific Coast groundfish regulations at 50 CFR 660.330, fishing with salmon troll gear is prohibited within the Salmon Troll Yelloweye Rockfish Conservation Area (YRCA). The Salmon Troll YRCA is an area off the northern Washington coast and is defined by straight lines connecting latitude and longitude coordinates. Coordinates for the Salmon Troll YRCA are specified in groundfish regulations at 50 CFR 660.70(c) and in salmon regulations at 50 CFR 660.405(c).

(2) Directed fishery targeting halibut.

Eighty-five percent of the non-Indian commercial fishery allocation is allocated to the directed fishery targeting halibut (e.g., longline fishery) in southern Washington, Oregon, and California. The allocation for this directed catch fishery is approximately 17.5 percent of the Area 2A TAC. This fishery is confined to the area south of Subarea 2A-1 (south of Point Chehalis, WA; 46°53.30' N. lat.). This fishery may also be managed with closed areas designed to protect overfished groundfish species. Any such closed areas will be described annually in federal halibut regulations published in the *Federal Register* and the

coordinates will be specifically defined at 50 CFR 660.71 through 660.74. The commercial fishery opening date(s), duration, and vessel trip limits, as necessary to ensure that the quota for the non-Indian commercial fisheries is not exceeded, will be determined by the IPHC and implemented in IPHC regulations. If the IPHC determines that poundage remaining in the quota for the non-Indian commercial fisheries is insufficient to allow an additional day of directed halibut fishing, the remaining halibut will be made available for incidental catch of halibut in the fall salmon troll fisheries (independent of the incidental harvest allocation).

(3) Incidental catch in the sablefish fishery north of Point Chehalis.

If the Area 2A TAC is greater than 900,000 lb (408.2 mt), the primary directed sablefish fishery north of Point Chehalis will be allocated the Washington sport allocation that is in excess of 214,110 lb (97.1 mt), provided a minimum of 10,000 lb (4.5 mt) is available (i.e., the Washington sport allocation is 224,110 lb (101.7 mt) or greater). If the amount above 214,110 lb (97.1 mt) is less than 10,000 lb (4.5 mt), then the excess will be allocated to the Washington sport subareas according to section (f) of this Plan. The amount of halibut allocated to the sablefish fishery will be shared as follows: up to 70,000 lb of halibut to the primary sablefish fishery north of Pt. Chehalis. Any remaining allocation will be distributed to the Washington sport fishery among the four subareas according to the sharing described in the Plan, Section (f)(1).

The Council will recommend landing restrictions at its spring public meeting each year to control the amount of halibut caught incidentally in this fishery. The landing restrictions will be based on the amount of the allocation and other pertinent factors, and may include catch or landing ratios, landing limits, or other means to control the rate of halibut landings. NMFS will publish the landing restrictions annually in the Federal Register.

Under Pacific Coast groundfish regulations at 50 CFR 660.230, fishing with limited entry fixed gear is prohibited within the North Coast Commercial Yelloweye Rockfish Conservation Area (YRCA) and the Non-Trawl Rockfish Conservation Area (RCA). The North Coast Commercial Yelloweye Rockfish Conservation Area YRCA is an area off the northern Washington coast, overlapping the northern part of North Coast Recreational YRCA. The Non-Trawl RCA is an area off the Washington coast. These closed areas are defined by straight lines connecting latitude and longitude coordinates. Coordinates for the North Coast Commercial YRCA are specified in groundfish regulations at 50 CFR 660.70(b). Coordinates for the Non-Trawl RCA are specified in groundfish regulations at 50 CFR 660.73.

(4) Commercial license restrictions/declarations.

Commercial fishers must choose either (1) to operate in the directed commercial fishery in Area 2A and/or retain halibut caught incidentally in the primary directed sablefish fishery north of Point Chehalis, WA or (2) to retain halibut caught incidentally during the salmon troll fishery. Commercial fishers operating in the directed halibut fishery and/or retaining halibut incidentally caught in the primary directed sablefish fishery must send their license application to the IPHC postmarked no later than April 30, or the first weekday in May, if April 30 falls on a weekend, in order to obtain a license to fish for halibut in Area 2A. Commercial fishers operating in the salmon troll fishery who seek to retain incidentally caught halibut must send their application for a license to the IPHC for the incidental catch of halibut in Area 2A postmarked no later than March 31, or the first weekday in April, if March 31 falls on a weekend. Fishing vessels licensed by IPHC to fish commercially in Area 2A are prohibited from operating in the sport fisheries in Area 2A.

(f) SPORT FISHERIES

The non-Indian sport fisheries are allocated 68.3 percent of the non-Indian share, which is approximately 44.4 percent of the Area 2A TAC. The allocation is further divided as subquotas among six geographic subareas.

(1) Subarea management. The sport fishery is divided into six sport fishery subareas, each having separate allocations and management measures as follows.

(i) Washington inside waters (Puget Sound) subarea.

This sport fishery subarea is allocated 23.5 percent of the first 130,845 lb (59.4 mt) allocated to the Washington sport fishery, and 32 percent of the Washington sport allocation between 130,845 lb (59.4 mt) and 224,110 lb (101.7 mt) (except as provided in section (e)(3) of this Plan). This subarea is defined as all U.S. waters east of the mouth of the Sekiu River, as defined by a line extending from 48°17.30' N. lat., 124°23.70' W. long. north to 48°24.10' N. lat., 124°23.70' W. long., including Puget Sound. The structuring objective for this subarea is to provide a stable sport fishing opportunity and maximize the season length. To that end, the Puget Sound subarea may be divided into two regions with separate seasons to achieve a fair harvest opportunity within the subarea. Due to inability to monitor the catch in this area inseason, fixed seasons, which may vary and apply to different regions within the subarea, will be established preseason based on projected catch per day and number of days to achievement of the quota. Inseason adjustments may be made, and estimates of actual catch will be made postseason. The fishery will open in April or May and continue until a dates established preseason (and published in the sport fishery regulations) when the quota is predicted to be taken, or until September 30, whichever is earlier. The Washington Department of Fish and Wildlife will develop recommendations to NMFS on the opening date and weekly structure of the fishery each year. The daily bag limit is one fish per person, with no size limit.

(ii) Washington north coast subarea.

This sport fishery subarea is allocated 62.2 percent of the first 130,845 lb (59.4 mt) allocated to the Washington sport fishery, and 32 percent of the Washington sport allocation between 130,845 lb (59.4 mt) and 224,110 lb (101.7 mt) (except as provided in section (e)(3) of this Plan). This subarea is defined as all U.S. waters west of the mouth of the Sekiu River, as defined above in paragraph (f)(1)(i), and north of the Queets River (47°31.70' N. lat.). The management objective for this subarea is to provide a quality recreational fishing opportunity during May and June. The fishery will open on the first Thursday between May 9 and 15, and continue 2 days per week (Thursday and Saturday) in May as scheduled pre-season, unless there is a quota management closure. If there is no quota management closure in May, the fishery will reopen on the first Thursday in June as an all depth fishery on Thursdays and Saturdays as long as sufficient quota remains. This schedule allows adequate public notice of any inseason action before each Thursday opening. If there is not sufficient quota for an all-depth day, the fishery would reopen in the nearshore areas described below:

A. WDFW Marine Catch Area 4B, which is all waters west of the Sekiu River mouth, as defined by a line extending from 48°17.30' N. lat., 124°23.70' W. long. north to 48°24.10' N. lat., 124°23.70' W. long., to the Bonilla-Tatoosh line, as defined by a line connecting the light on Tatoosh Island, WA, with the light on Bonilla Point on Vancouver Island, British Columbia (at 48°35.73' N. lat., 124°43.00' W. long.) south of the International Boundary between the U.S. and Canada (at 48°29.62' N. lat., 124°43.55' W. long.), and north of the point where that line intersects with the boundary of the U.S. territorial sea.

B. Shoreward of the recreational halibut 30-fm boundary line, a modified line approximating the 30 fm depth contour from the Bonilla-Tatoosh line south to the Queets River. Coordinates for the closed area will be specifically defined annually in federal halibut regulations published in the *Federal Register.*

No sport fishing for halibut is allowed after September 30. If the fishery is closed prior to September 30, and there is insufficient quota remaining to reopen the nearshore areas for another fishing day, then any remaining quota may be transferred inseason to another Washington coastal subarea by NMFS via an update to the recreational halibut hotline. The daily bag limit in all fisheries is one halibut per person with no size limit.

Recreational fishing for groundfish and halibut is prohibited within the North Coast Recreational Yelloweye Rockfish Conservation Area (YRCA). The North Coast Recreational YRCA is a C-shaped area off the northern Washington coast

and is defined by straight lines connecting latitude and longitude coordinates. Coordinates for the North Coast Recreational YRCA are specified in groundfish regulations at 50 CFR 660.70(a) and will be described annually in federal halibut regulations published in the *Federal Register*.

(iii) Washington south coast subarea.

This sport fishery is allocated 12.3 percent of the first 130,845 lb (59.4 mt) allocated to the Washington sport fishery, and 32 percent of the Washington sport allocation between 130,845 lb (59.4 mt) and 224,110 lb (101.7 mt) (except as provided in section (e)(3) of this Plan. This subarea is defined as waters south of the Queets River (47°31.70' N. lat.) and north of Leadbetter Point (46°38.17' N. lat.). The structuring objective for this subarea is to maximize the season length, while maintaining a quality fishing experience. The south coast subarea quota will be allocated as follows: 10% or 2,000 pounds, whichever is less, will be set aside for the nearshore fishery with the remaining amount allocated to the primary fishery. During days open to the primary fishery and seaward of the 30-fm line lingcod may be taken, retained and possessed, when allowed by groundfish regulations. The fishery will open on the first Sunday in May. The primary fishery will be open two days per week, Sunday and Tuesday, in all areas, except where prohibited, and will remain open for three consecutive Sundays and Tuesdays before a management closure the following week to tally the catch. If the primary quota is projected to be obtained sooner than expected the management closure may occur earlier. If there is sufficeient quota remaining following the management closure the fishery would continue two days per week, Sunday and/or Tuesday, until the quota for the primary fishery season is reached or September 30, whichever is earlier. If there is insufficient quota remaining to reopen the primary fishery for another fishing day, the remaining primary fishery quota will be added to the nearshore quota. The nearshore fishery takes place, in the area from 47°31.70’ N. lat. south to 46°58.00’ N. lat. and east of a boundary line approximating the 30 fathom depth contour as defined by the following coordinates:

47°31.70′ N.lat, 124°37.03′ W. long;
47°25.67′ N. lat, 124°34.79′ W. long;
47°12.82′ N. lat, 124°29.12′ W. long;
46°58.00′ N. lat, 124°24.24′ W. long.

During the primary season the nearshore fishery will be open seven days per week. Subsequent to the closure of the primary fishery, the nearshore fishery will continue seven days per week until the remaining quota is projected to be taken. If the fishery is closed prior to September 30, and there is insufficient quota remaining to reopen the nearshore areas for another fishing day, then any remaining quota may be transferred inseason to another Washington coastal subarea by NMFS via an update to the recreational halibut hotline. The daily bag limit is one halibut per person, with no size limit.

Recreational fishing for groundfish and halibut is prohibited within two YRCA's off Washington's southern coast. The South Coast Recreational YRCA and the Westport Offshore YRCA are defined by straight lines connecting latitude and longitude coordinates. Coordinates for these Recreational YRCAs are specified in groundfish regulations at 50 CFR 660.70 (d) and (e) and will be described annually in federal halibut regulations published in the *Federal Register*.

(iv) Columbia River subarea.

This sport fishery subarea is allocated 2.0 percent of the first 130,845 lb (59.4 mt) allocated to the Washington sport fishery, and 4.0 percent of the Washington sport allocation between 130,845 lb (59.4 mt) and 224,110 lb (101.7 mt) (except as provided in section (e)(3) of this Plan). This subarea is also allocated an amount equal to the contribution from the Washington sport allocation from the Oregon/California sport allocation This subarea is defined as waters south of Leadbetter Point, WA (46°38.17' N. lat.) and north of Cape Falcon, OR (45°46.00' N. lat.). The fishery will open on the first Thursday in May or May 1 if it is a Friday or Saturday, 3 days per week, Thursday through Saturday until 80 percent of the subarea allocation is taken or until the third Sunday in July, whichever is earlier. The fishery will reopen on the first Friday in August and continue 3 days per week, Friday-Sunday until the remainder of the subarea quota has been taken, or until September 30, whichever is earlier. Subsequent to this closure, if there is insufficient quota remaining in the Columbia River subarea for another fishing day, then any remaining quota may be transferred inseason to another Washington and/or Oregon subarea by NMFS via an update to the recreational halibut hotline. Any remaining quota would be transferred to each state in proportion to its contribution. The daily bag limit is one halibut per person, with no size limit. No groundfish may be taken and retained, possessed or landed, except sablefish and Pacific cod when allowed by groundfish regulations, if halibut are on board the vessel.

(v) Oregon central coast subarea.

This subarea extends from Cape Falcon (45°46.00' N. lat.) to Humbug Mountain, Oregon (42°40.50' N. lat.) and is allocated 92.0 percent of the Oregon/California sport allocation minus any amount of pounds needed to contribute to the Oregon portion of the Columbia River subarea quota. The structuring objectives for this subarea are to provide two periods of fishing opportunity in Spring and in Summer in productive deeper water areas along the coast, principally for charterboat and larger private boat anglers, and provide a period of fishing opportunity in the summer for nearshore waters for small boat anglers. Any poundage remaining unharvested in the Spring all-depth subquota will be added to either the Summer all-depth sub-quota or the nearshore subquota based on need, determined via joint consultation between IPHC, NMFS and ODFW. Any

poundage that is not needed to extend the inside 40-fathom (73 m) fishery through October 31 will be added to the Summer all-depth season if it can be used, and any poundage remaining unharvested from the Summer all-depth fishery will be added to the inside 40-fathom (73 m) fishery subquota, if it can be used. If inseason it is determined via joint consultation between IPHC, NMFS and ODFW, that the combined all-depth and inside 40-fathom (73 m) fisheries will not harvest the entire quota to the subarea, quota may be transferred inseason to another subarea south of Leadbetter Point, WA by NMFS via an update to the recreational halibut hotline. The daily bag limit is one halibut per person, unless otherwise specified, with no size limit. During days open to all-depth halibut fishing, no groundfish may be taken and retained, possessed or landed, except sablefish and Pacific cod when allowed by groundfish regulations, if halibut are on board the vessel.

Recreational fishing for groundfish and halibut is prohibited within the Stonewall Bank YRCA. The Stonewall Bank YRCA is an area off central Oregon, near Stonewall Bank, and is defined by straight lines connecting latitude and longitude coordinates. Coordinates for the Stonewall Bank YRCA are specified in groundfish regulations at 50 CFR 660.70 (f) and will be described annually in federal halibut regulations published in the *Federal Register*.

ODFW will sponsor a public workshop shortly after the IPHC annual meeting to develop recommendations to NMFS on the open dates for each season each year. The three seasons for this subarea are as follows.

A. The first season opens on May 1, only in waters inside the 40-fathom (73 m) curve, and continues daily until the subquota (12 percent of the subarea quota) is taken, or until October 31, whichever is earlier. Any overage in the all-depth fisheries would not affect achievement of allocation set aside for the inside 40-fathom (73 m) curve fishery.

B. The second season is an all-depth fishery with two potential openings and is allocated 63 percent of the subarea quota. Fixed season dates will be established preseason for the first Spring opening and will not be modified inseason except if the combined Oregon all-depth Spring and Summer season total quotas are estimated to be achieved. Recent year catch rates will be used as a guideline for estimating the catch rate for the Spring fishery each year. The number of fixed season days established will be based on the projected catch per day with the intent of not exceeding the subarea subquota for this season. The first opening will be structured for 2 days per week (Friday and Saturday) if the season is for 4 or fewer fishing days. The fishery will be structured for 3 days per week (Thursday through Saturday) if the season is for 5 or more fishing days. The fixed season dates will occur in consecutive weeks starting the second Thursday in May (if the season is 5 or more fishing days) or second Friday in May (if the season is 4 or fewer fishing days), with possible exceptions

to avoid adverse tidal conditions. If, following the "fixed" dates, quota for this season remains unharvested, a second opening will be held. If it is determined appropriate through joint consultation between IPHC, NMFS and ODFW, fishing may be allowed on one or more additional days. Notice of the opening(s) will be announced by NMFS via an update to the recreational halibut hotline. The fishery will be open every other week on Thursday through Saturday except that week(s) may be skipped to avoid adverse tidal conditions. The potential open Thursdays through Saturdays will be identified preseason. The fishery will continue until there is insufficient quota for an additional day of fishing or July 31, whichever is earlier.

C. The last season is an all-depth fishery that begins on the first Friday in August and is allocated 25 percent of the subarea quota. The fishery will be structured to be open every other week on Friday and Saturday except that week(s) may be skipped to avoid adverse tidal conditions. The fishery will continue until there is insufficient quota remaining to reopen for another fishing day or October 31, whichever is earlier. The potential open Fridays and Saturdays will be identified preseason. If after the first scheduled open period, the remaining Cape Falcon to Humbug Mountain entire season quota (combined all-depth and inside 40-fathom (73 m) quotas) is 60,000 lb (27.2 mt) or more, the fishery will re-open on every Friday and Saturday (versus every other Friday and Saturday), if determined to be appropriate through joint consultation between IPHC, NMFS, and ODFW. The inseason action will be announced by NMFS via an update to the recreational halibut hotline. If after the Labor Day weekend, the remaining Cape Falcon to Humbug Mountain entire season quota (combined all-depth and inside 40-fathom (73 m) quotas) is 30,000 lb (13.6 mt) or more and the fishery is not already open every Friday and Saturday, the fishery will re-open on every Friday and Saturday (versus every other Friday and Saturday), if determined to be appropriate through joint consultation between IPHC, NMFS, and ODFW. After the Labor Day weekend, the IPHC, NMFS, and ODFW will consult to determine whether increasing the Oregon Central Coast bag limit to two fish is warranted with the intent that the quota for the subarea is taken by September 30. If the quota is not taken by September 30, the season will remain open, maintaining the bag limit in effect at that time, through October 31 or quota attainment, whichever is earlier. The inseason action will be announced by NMFS via an update to the recreational halibut hotline.

(vi) South of Humbug Mountain subarea.

This sport fishery subarea is allocated 3.0 percent of the Oregon/California subquota, which is approximately 0.62 percent of the Area 2A TAC. This area is defined as the area south of Humbug Mountain, OR (42°40.50' N. lat.), including

California waters. The structuring objective for this subarea is to provide anglers the opportunity to fish in a continuous, fixed season that is open from May 1 through October 31. The daily bag limit is one halibut per person, with no size limit. Due to inability to monitor the catch in this area inseason, a fixed season will be established preseason by NMFS based on projected catch per day and number of days to achievement of the subquota; no inseason adjustments will be made, and estimates of actual catch will be made post season.

(2) Port of landing management. All sport fishing in Area 2A will be managed on a "port of landing" basis, whereby any halibut landed into a port will count toward the quota for the subarea in which that port is located, and the regulations governing the subarea of landing apply, regardless of the specific area of catch.

(3) Possession limits. The sport possession limit on land in Washington is two daily bag limits, regardless of condition, but only one daily bag limit may be possessed on the vessel. The sport possession limit on land in Oregon is three daily bag limits, regardless of condition, but only one daily bag limit may be possessed on the vessel. The sport possession limit on land in California and on the vessel is one daily bag limit, regardless of condition.

(4) Ban on sport vessels in the commercial fishery. Vessels operating in the sport fishery for halibut in Area 2A are prohibited from operating in the commercial halibut fishery in Area 2A. Sport fishers and charterboat operators must determine, prior to May 1 of each year, whether they will operate in the commercial halibut fisheries in Area 2A which requires a commercial fishing license from the IPHC. Sport fishing for halibut in Area 2A is prohibited from a vessel licensed to fish commercially for halibut in Area 2A.

(5) Flexible inseason management provisions.

(i) The Regional Administrator, NMFS Northwest Region, after consultation with the Chairman of the Pacific Fishery Management Council, the IPHC Executive Director, and the Fisheries Director(s) of the affected state(s), or their designees, is authorized to modify regulations during the season after making the following determinations.

(A) The action is necessary to allow allocation objectives to be met.

(B) The action will not result in exceeding the catch limit for the area.

(C) If any of the sport fishery subareas north of Cape Falcon, OR are not projected to utilize their respective quotas by September 30, NMFS may take inseason action to transfer any projected unused quota to another Washington sport subarea.

(D) If any of the sport fishery subareas south of Leadbetter Point, WA are not projected to utilize their respective quotas by their season ending dates, NMFS may take inseason action to transfer any projected unused quota to another Oregon sport subarea.

(ii) Flexible inseason management provisions include, but are not limited to, the following:

(A) Modification of sport fishing periods;

(B) Modification of sport fishing bag limits;

(C) Modification of sport fishing size limits;

(D) Modification of sport fishing days per calendar week; and

(E) Modification of subarea quotas.

(iii) Notice procedures.

(A) Inseason actions taken by NMFS will be published in the *Federal Register*.

(B) Actual notice of inseason management actions will be provided by a telephone hotline administered by the Northwest Region, NMFS, at 206-526-6667 or 800-662-9825 (May through October) and by U.S. Coast Guard broadcasts. These broadcasts are announced on Channel 16 VHF-FM and 2182 kHz at frequent intervals. The announcements designate the channel or frequency over which the notice to mariners will be immediately broadcast. Since provisions of these regulations may be altered by inseason actions, sport fishermen should monitor either the telephone hotline or U.S. Coast Guard broadcasts for current information for the area in which they are fishing.

(iv) Effective dates.

(A) Inseason actions will be effective on the date specified in the Federal Register notice or at the time that the action is filed for public inspection with the Office of the Federal Register, whichever is later.

(B) If time allows, NMFS will invite public comment prior to the effective date of any inseason action filed with the *Federal Register*. If the Regional Administrator determines, for good cause, that an inseason action must be filed without affording a

prior opportunity for public comment, public comments will be received for a period of 15 days after of the action in the *Federal Register*.

(C) Inseason actions will remain in effect until the stated expiration date or until rescinded, modified, or superseded. However, no inseason action has any effect beyond the end of the calendar year in which it is issued.

(v) Availability of data. The Regional Administrator will compile, in aggregate form, all data and other information relevant to the action being taken and will make them available for public review during normal office hours at the Northwest Regional Office, NMFS, Sustainable Fisheries Division, 7600 Sand Point Way NE, Seattle, WA.

(6) Sport fishery closure provisions.

The IPHC shall determine and announce closing dates to the public for any subarea in which a subquota is estimated to have been taken. When the IPHC has determined that a subquota has been taken, and has announced a date on which the season will close, no person shall sport fish for halibut in that area after that date for the rest of the year, unless a reopening of that area for sport halibut fishing is scheduled by NMFS as an inseason action, or announced by the IPHC.

(g) PROCEDURES FOR IMPLEMENTATION

Each year, NMFS will publish a proposed rule with any regulatory modifications necessary to implement the Plan for the following year, with a request for public comments. The comment period will extend until after the IPHC annual meeting, so that the public will have the opportunity to consider the final Area 2A TAC before submitting comments. After the Area 2A TAC is known, and after NMFS reviews public comments, NMFS will implement final rules governing the sport fisheries. The final ratio of halibut to Chinook to be allowed as incidental catch in the salmon troll fishery will be published with the annual salmon management measures.

Sources:

76 FR 14300 (March 16, 2011)
75 FR 13024 (March 18, 2010)
74 FR 11681 (March 19, 2009)
73 FR 12280 (March 7, 2008)
72 FR 11792 (March 14, 2007)
71 FR 10850 (March 3, 2006)
70 FR 20304 (April 19, 2005)
69 FR 24524 (May 4, 2004)
68 FR 10989 (March 7, 2003)
67 FR 12885 (March 20, 2002)
66 FR 15801 (March 21, 2001)
65 FR 14909 (March 20, 2000)
64 FR 13519 (March 19, 1999)
63 FR 13000 (March 17, 1998)
62 FR 12759 (March 18, 1997)
61 FR 11337 (March 20, 1996)
60 FR 14651 (March 20, 1995)
59 FR 22522 (May 2, 1994)
58 FR 17791 (April 6, 1993)

REPORT ON THE 2012 PACIFIC HALIBUT FISHERIES IN AREA 2A

(9/3/2012)

The 2012 Area 2A total allowable catch (TAC) of 989,000 lbs set by the International Pacific Halibut Commission (IPHC) was allocated as sub-TACs as follows:

Treaty Tribes	346,150 lbs (35%)
Non-Tribal Total	642,850 lbs (65%)
Non-Tribal Commercial	203,783 lbs
Washington Sport	214,110 lbs
Oregon/California Sport	203,783 lbs

All weights in this report are net weight (gutted, head-off, and without ice and slime.) The structure of each fishery and the resulting harvests are described below. Refer to the table at the end of this report for the catches by the tribal, commercial and recreational fisheries.

NON-TRIBAL COMMERCIAL FISHERIES

A sub-TAC of 203,783 lbs (31.7% of the non-tribal share + 21,173 lbs for incidental halibut catch in the sablefish primary fishery) was allocated to two fishery components: 1) a directed longline fishery targeting on halibut south of Point Chehalis, WA; and 2) an incidental catch fishery during the salmon troll fisheries off Washington, Oregon, and California. An additional 21,173 lbs were allocated to an incidental catch fishery in the sablefish primary fishery for vessel using longline gear north of Point Chehalis, WA. This allowance for the sablefish primary fishery is only available in years when the overall Area 2A TAC exceeds 900,000 lbs and comes from the portion of the Washington sport allocation that is above 214,110, as long as the amount is atleast 10,000 lbs.

Incidental halibut catch in the salmon troll fishery

A quota of 30,568 lbs of Pacific halibut (15% of the non-tribal commercial fishery allocation) was allocated to the non-tribal commercial salmon troll fishery in Area 2A as incidental catch during salmon troll fisheries. According to the Catch Sharing Plan, the primary management objective for this fishery is to harvest the troll quota as an incidental catch during the May/June salmon troll fishery. If any of the allocation for this fishery remains after June 30, the fishery may continue to retain incidentally caught halibut in the salmon troll fisheries until the quota is taken. The final catch ratio established preseason by the Council at the April 2012 meeting was one halibut (minimum 32 inches) per four Chinook landed by a salmon troller, except that one halibut could be landed without meeting the ratio requirement, and no more than 20 halibut could be landed per open period. Fishing with salmon troll gear is prohibited within the Salmon Troll Yelloweye Rockfish Conservation Area (YRCA) off the northern Washington Coast. Additionally, the "C-shaped" North Coast Recreational YRCA off Washington is designated as an area to be avoided (a voluntary closure) by salmon trollers.

- Halibut retention was permitted in the salmon troll fisheries from May 1-July 3, 2012. As of July 3, 2012, it is estimated that 35,255 lbs were taken.

Directed fishery targeting on halibut

A quota of 173,216 lbs (85% of the non-tribal commercial fishery allocation) was allocated to the directed longline fishery targeting on halibut in southern Washington, Oregon, and California. The fishery was confined to the area south of Subarea 2A-1 (south of Point Chehalis, WA; 46E53.30' N. lat.). In addition, there are closed areas along the coast defined by depth contours. Between the U.S./Canada border and 40E10' N. lat. the western boundary is defined by a line approximating the 100 fm depth contour. The eastern boundary is defined as follows: Between the U.S./Canada border and 46°16' N. lat., the boundary is the shoreline. Between 46°16' N. lat. and 43°00' N. lat., the boundary is the line approximating the 30 fm depth contour. Between 43°00' N. lat. and 42°00' N. lat. the boundary is the line approximating the 20 fm depth contour. And between 42°00' N. lat. and 40E10' N. lat. the boundary is the 20 fm depth contour. One-day fishing periods of 10 hours in duration were scheduled every other week by the IPHC starting June 27, 2012. A 32 inch minimum size limit with the head on was in effect for all openings. Vessel landing limits per fishing period based on vessel length were imposed by IPHC during all openings as shown in the following table. Vessels choosing to operate in this fishery could not land halibut in the incidental catch salmon troll fishery, nor operate in the recreational fishery.

2012 fishing period limits (dressed weight, head-off without ice and slime in pounds) by vessel size.

Vessel Class/Size	June 27 Opening	July 11 Opening
A 0 - 25 ft.	755 lbs	200 lbs
B 26 - 30 ft.	945 lbs	200 lbs
C 31 - 35 ft.	1,510 lbs	250 lbs
D 36 - 40 ft.	4,165 lbs	695 lbs
E 41 - 45 ft.	4,480 lbs	745 lbs
F 46 - 50 ft.	5,365 lbs	895 lbs
G 51 - 55 ft.	5,985 lbs	1,000 lbs
H 56+ ft.	9,000 lbs	1,500 lbs

- The June 27 directed commercial fishery resulted in a catch of about 150,000 lbs, leaving approximately 23,000 lbs.
- The July 11th directed commercial opening resulted in an approximate catch of 29,000 lbs. The fishery closed following the July 11th opening.

Incidental halibut catch in the sablefish primary longline fishery north of Point Chehalis

A quota of 21,173 lbs was allocated to the limited entry sablefish primary fishery in Area 2A as

an incidental catch during longline sablefish operations north of Point Chehalis, WA. The sablefish primary season is open from April 1 to October 31, although incidental halibut retention was not permitted until May 1. Properly licensed vessels were permitted to retain up to 50 lbs (dressed weight) of halibut per 1,000 lbs (dressed weight) of sablefish and up to 2 additional halibut in excess of the landing limit ratio. The fishery is confined to an area seaward of a boundary line approximating the 100-fm depth contour. Fishing is also prohibited in the North Coast Commercial YRCA, an area off the northern Washington coast. In addition, the "C-shaped" North Coast Recreational YRCA off Washington is designated as an area to be avoided (a voluntary closure) by commercial longline sablefish fishermen.

- Through August 1, this fishery is estimated to have taken 3,366 lbs.

SPORT FISHERIES (Non-tribal)
A sub-TAC of 417,894 lbs (68.3% of non-tribal share, minus 21,173 lbs allocated to the sablefish primary fishery from the Washington sport allocation) was allocated between sport fisheries in the Washington area (36.6%) and Oregon/California (31.7%). The allocations were further subdivided as quotas among six geographic subareas as described below. Unless otherwise notes the daily bag limit in all subareas was one halibut of any size, per person, per day.

Washington Inside Waters Subarea (Puget Sound and Straits of Juan de Fuca).
This area was allocated 57,393 lbs (23.5% of the first 130,845 lbs allocated to the Washington sport fishery, and 32% of the Washington sport allocation between 130,845 and 224,110 lbs). Due to inability to monitor the catch in this area inseason, a fixed season was established preseason based on projected catch per day and number of days to achieve the sub-quota. The Puget Sound eastern sub-area, east of Low Point, was open May 3-19, 3 days per week, Thursday-Saturday. May 24-28, 5 days, Thursday-Monday. May 31-June 2, 3 days per week, Thursday through Saturday. The Puget Sound western sub-area, west of Low Point, was open May 24-28, Thursday-Monday, and May 31-June 23, 3 days a week, Thursday-Saturday.

- The estimates for total catch in this area are not yet available.

Northern Washington Coastal Waters Subarea (landings in Neah Bay and La Push).
The coastal area off Cape Flattery to Queets River was allocated 108,030 lbs (62.2% of the first 130,845 lbs allocated to the Washington sport fishery, and 32% of the Washington sport allocation between 130,945 lbs and 224,110 lbs). The fishery was open for seven days (May 10, 12, 17, 19, and 31, June 2 and 14, 2012). The "C-shaped" North Coast Recreational YRCA, southwest of Cape Flattery, was closed to sport halibut fishing.

- The estimated total catch for this area is 105,479 lbs, leaving 2,551 lbs.

Washington South Coast Subarea (landings in Westport)
The area from the Queets River to Leadbetter Point was allocated 42,739 lbs (12.3% of the first 130,845 lbs allocated to the Washington sport fishery and 32% of the Washington sport allocation between 130,845 and 224,110 lbs). This subarea operates with a primary fishery and a nearshore fishery. The primary fishery was open May 6, 8, 13, 15, 20, and closed after the 20th.

The nearshore fishery was open 7 days a week between May 6 and June 8, 2012.

The nearshore fishery occurs in waters between the Queets River and 47°25.00' N. lat. south to 46°58.00' N. lat., and east of 124°30.00' W. long. The south coast subarea quota was allocated as follows: 2,000 lbs to the nearshore fishery and the remaining lbs (40,739 lbs) to the primary fishery. The nearshore quota was reduced by the 33 lbs overage in the primary fishery for an adjusted quota of 1,967 lbs.

- The primary season was open from May 6 through May 20 with an estimated catch of 40,772 lbs.
- The northern nearshore area was open May 6 through June 8 with an estimated total catch of 1,695 lbs

Columbia River Subarea (Leadbetter Point to Cape Falcon)
This sport fishery subarea was allocated 11,895 lbs, consisting of 2.0% of the first 130,845 lbs allocated to the Washington sport fishery, and 4.0% of the Washington sport allocation between 130,845 lbs and 224,110 lbs, minus 21,173, (which is the amount allocated to incidental take in the sablefish primary fishery), and an equal amount from the Oregon/California sport allocation. This is a change from previous years, when the Oregon/California contribution to the Columbia River subarea was 5% of the Oregon/California sport allocation or an amount equal to the Washington contribution, whichever was greater.

The fishery opened May 3 and continued 3 days per week until July 14, 2012. The fishery reopened on August 3 and is currently open, through September 30, 2012.

- The early fishery was open May 3 to July 14 with an estimated catch of 6,499 lbs.
- Catch during the early season resulted in underage of 3,017 lbs, which was added to the late season quota, for a revised late season quota of 5,396 lbs.
- The late season fishery opened August 3 and continues until September 30.
- Through August 26 the estimated late season total catch is 903 lbs.

Oregon Central Coast Subarea (Cape Falcon to Humbug Mountain).
This sport fishery subarea was allocated 191,780 lbs (92% of the Oregon/California sport allocation.

Three seasons were set for this subarea: 1) a restricted depth (inside 40-fm) fishery commenced on May 1 and continued 7 days a week until July 22; 2) a fixed Spring season in all depths that was open on May 10-12, 17-19, 24-26, May 31-June 2, 14-16, and 29-30, and; 3) a Summer season in all depths that was open on August 3, 4, 17, 18.

- The inside 40-fathom fishery closed on July 22 with an estimated total catch of 32,872 lbs. This was an 4,858 lbs overage.
- The fixed Spring all-depth season closed on June 30 with an estimated total catch of 111,269 lbs. This resulted in an underage of 9,552 lbs.
- The spring all depth underage was allocated 5,000 lbs to the inside 40-fathom fishery and 4,552 to the summer all depth fishery. However, because the final inside 40-fathom

fishery landed 4,858 lbs over the revised quota this amount was taken from the summer all depth.

- The initial Summer all-depth season quota was 47,639 lbs, which was was revised by the inside 40-fathom overage. The Summer all-depth fishery was open August 3, 4, 17, 18, and resulted in an estimated catch of 42,853 lbs. The fishery was closed on August 18.
- This resulted in a 4,786 lbs underage for the central coast fishery. This amount is not enough for one day in the nearshore fishery at this time.

South of Humbug Mountain, Oregon and off the California Coast Subarea

This sport fishery was allocated 6,056 lbs (3.0% of the Oregon/California quota). This area had a pre-set season of 7 days per week from May 1 to October 31.

- This season is scheduled to remain open through October 31. No total catch estimates are available for this fishery.

TRIBAL FISHERIES

A sub-TAC of 346,150 lbs (35% of the Area 2A TAC) was allocated to tribal fisheries. The tribes estimated that 24,500 lbs would be used for ceremonial and subsistence (C&S) fisheries and the remaining 321,650 lbs were allocated to the commercial fishery. The 2012 management plan was based on a court-order, to use the 2000 season plan, updated to reflect the current allocation and management measures. It contains provisions for both unrestricted fisheries with no landing limits and restricted fisheries with limits as well as a late season fishery or mop-up fishery that can be set up to have no landing limits or with limits, toward the end of the season.

- The restricted fishery began at noon on March 17 and lasted 55 hours. This fishery was managed with a landing limit, set at 500 lbs/vessel/day. The restricted fishery landed 66,952 lbs in 269 landings.
- The unrestricted fishery began at noon on March 24 and lasted 48 hours. There was a total of 155,517 lbs taken in 225 landings during the unrestricted fishery.
- A late season fishery (mop-up fishery) took place beginning at noon on May 2 and continued for 13 hours. The late season fishery was set up with no landing limits. The fishery landed 132,592 lbs in 121 landings.
- In all, treaty tribal fisheries harvested 355,061 lbs in 615 landings. This was an overage of 33,411 lbs above the commercial allocation. The C&S fishery will continue through December 31 and tribal estimates of catch will be reported by the tribes in January 2013.

Fishery	Dates Held	Pounds Landed	# of Landings
Unrestricted	March 24-28 (48 hr.)	155,517 lbs	225 landings
Restricted, 500 lbs/vessel/day	March 17-19 (55 hr.)	66,952 lbs	269 landings
Mop Up	May 2 (13 hr.)	132,592 lbs	121 landings
Total		355,061 lbs	615 landings

2012 Area 2A TAC and Catch (in pounds)					
	Quota	Inseason Revised Quota	Catch		% of Quota Taken
TRIBAL INDIAN	346,150		355,061		102.6
Commercial	321,650		355,061		110.4
Ceremonial and Subsistence	24,500			%	0.0
NON-TRIBAL	642,850		565,559		88.0
COMMERCIAL	203,783		217,621		106.8
Troll	30,568		35,255		115.3
Sablefish incidental	21,173		3,366	%	15.9
Directed	173,216		179,000		103.3
SPORT	419,412		341,439		81.4
WA Sport	214,110		147,946		69.1
OR/CA Sport	203,783		186,994		91.8
WA Inside Waters	57,393			*	0.0
WA North Coast	108,030		105,479		97.6
WA South Coast	42,739		42,467		99.4
Columbia River	11,895		6,499	%	54.6
Early Season	9,516		6,499		68.3
Late Season	2,379	5,396			0.0
OR Central Coast	203,783		186,994		91.8
Inside 40 fathoms	23,014	32,872	32,872		100.0
Spring (May-June)	120,821		111,269		92.1
Summer (August- October)	47,945	47,639	42,853		90.0
OR S. of Humbug/CA	6,056			%	0.0
TOTAL	989,000		920,620		93.1
$ Assumed					
* Complete data not available					
% This fishery is ongoing					

CALIFORNIA DEPARTMENT OF FISH AND GAME REPORT ON FINAL RECREATIONAL CATCH ESTIMATES AND PROPOSED CHANGES TO THE 2013 PACIFIC HALIBUT CATCH SHARING PLAN

At its November 2011 meeting, the Pacific Fishery Management Council (Council) and International Pacific Halibut Commission identified the need to conduct a review of recreational Pacific halibut taken in the South of Humbug (SOH) subarea and requested final catch estimates for California. Additionally, the Council did not recommend any changes to the Catch Sharing Plan (CSP) for the SOH subarea for 2012 but scheduled a full review and discussion of any information that may be useful for future stock assessments or possible management changes for 2013.

As a result of the Council's November 2011 request, the California Department of Fish and Game (CDFG) agreed to provide recent years' final catch estimates for use in future management discussions by the September 2012 meeting. This report provides the final recreational catch estimates for Pacific halibut in California and summarizes the input received from a public meeting conducted to discuss possible Pacific halibut management measures for 2013.

Based on the final recreational catch estimates provided in this report, in conjunction with the feedback received at the public meeting, a range of potential options specific to California is provided below. These options may be used singly, or in combination, to reduce future catches of Pacific halibut to levels that are projected to keep California's catches within the SOH allocation amount.

Background

The Council and National Marine Fisheries Service (NMFS) manage Pacific halibut according to a CSP that sets allocations and determines recreational and commercial catch limits within sub-areas of area 2A[1]. California's recreational fishery is included in the 2A sub-area known as "South of Humbug Mountain", which encompasses southern Oregon (beginning at 42°40.50'N lat) and all of California. Management throughout the SOH area was structured to allow for a continuous fixed season from May through October. Historically, the season has been based on a preseason catch per day and number-of-days projection analysis. The allocation amount is determined from the CSP, and applies to both the California and southern Oregon sport fisheries.

[1] Area 2A encompasses all of Washington, Oregon and California.

California Recreational Catch Estimates for Pacific Halibut

CDFG examined the California Recreational Fisheries Survey (CRFS) sampling program and recreational catch estimation process, and explored other data-related issues affecting the production of final estimates of Pacific halibut catch. Based on that review, CDFG determined that the level of sampling effort is sufficient to produce robust Pacific halibut estimates for the Party/Charter and the Private/Rental[2] (PR) modes – where Pacific halibut are usually encountered. The final CDFG Pacific halibut estimates were modified from CRFS estimates reported by RecFIN by utilizing the IPHC's whole weight to net weight (=headed and gutted) conversion factor. This method provides annual catch estimates in a form consistent with those produced by Oregon and Washington. Final recreational catch estimates of Pacific halibut in California have been completed for 2004 through 2011 and are provided in Table 1.

Table 1. Final recreational catch estimates of Pacific halibut caught in California from 2004 through 2011 in net weight. (Data source: CRFS as modified by CDFG).

Year	Estimate (net pounds)
2004	45
2005	836
2006	3,977
2007	5,303
2008	14,040
2009	36,656
2010	25,180
2011	14,555

These estimates show that sport catch in California increased significantly from 2004 – 2009.

The SOH allocation amount is defined by the CSP as 0.62 percent of Area 2A Total Allowable Catch; since 2008, California's recreational fishery exceeded the entire allocation which averaged about 6,000 pounds each year[3] (see Figure 1).

Based on the CRFS sample information, Pacific halibut were commonly encountered as far south as Shelter Cove (Humboldt County). Highest catches occurred in the vicinity of Trinidad.

The increased catch is likely a result of a combination of factors. It may be a result of increased abundance, however, information on the abundance of Pacific halibut off California is lacking. It is also possible that interest in the Pacific halibut fishery increased when anglers searched for other targets to replace lost opportunities for

[2] The PR-Private Access or Night (PR-PAN) component of PR information was excluded from final catch estimates due to ongoing concerns with unresolved data issues. PR-PAN is expected to be a minor contribution to the overall catch.

[3] In 2011, catch from the Oregon portion of SOH also exceeded the allocation.

groundfish or salmon, and then interest continued because Pacific halibut is an additional, highly desirable target.

Public Meeting Summary

On May 17, 2012, CDFG conducted a public meeting in Eureka, California to discuss current and future management of Pacific halibut and to gather input on potential regulation changes for 2013. Over 20 constituents attended, representing recreational private skiff anglers, Commercial Passenger Fishing Vessel (CPFV, or Party/Charter) operator/owners, interested members of the public, and local officials. The largest areas of concern identified by the public were the need to potentially reduce fishing opportunities given the lack of California data in the stock assessment, concerns with the apportionment process, and concern with the SOH allocations that are defined in the CSP.

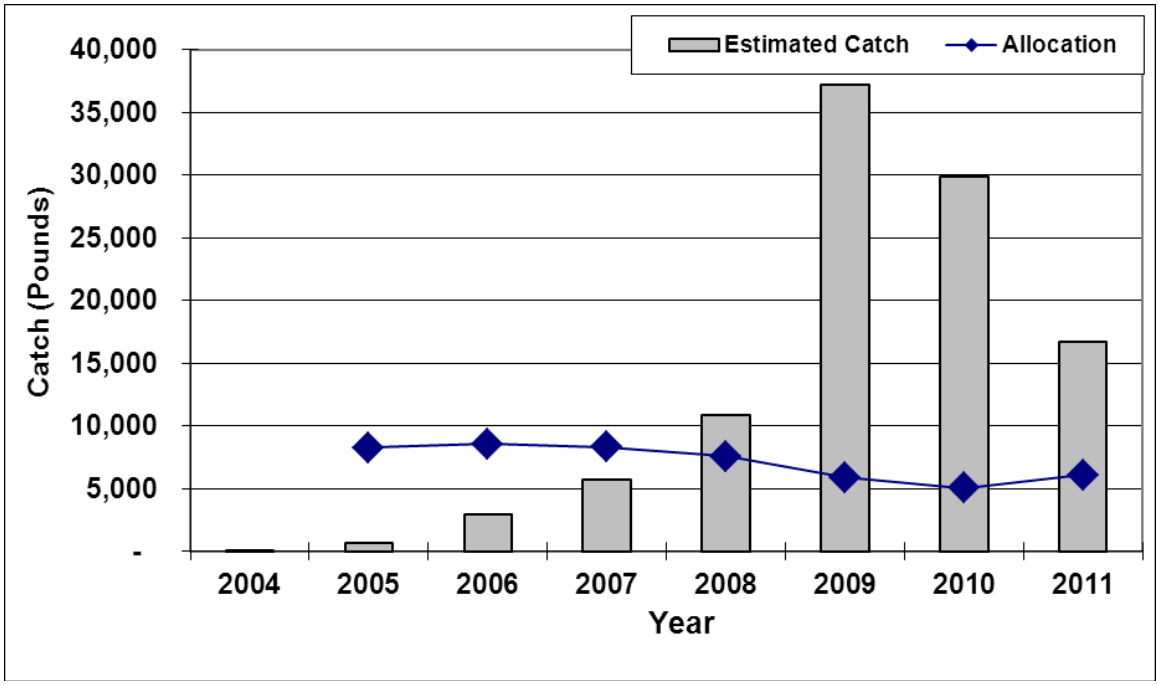


Figure 1. Recreational Pacific halibut estimated catch (in net weight = headed and gutted) in California compared to the SOH allocation from 2004 through 2011. (Data source: CRFS as modified by CDFG).

Potential Recreational Management Measures for the California Portion of SOH

Currently, the recreational fishery throughout the SOH sub-area is open May through October; there is a one-fish bag limit and no size limit. The fishery is managed based on a post-season review, and there is no inseason tracking (in California) or inseason management.

Three regulatory options are proposed for the Council's consideration which would modify regulations specific to California waters only. Each may be used singly, or in combination, to reduce future catches of Pacific halibut to levels that are projected to keep California's catches within the SOH allocation amount. Proposed options were

developed from the available data, a review of the past fishery, current or past management measures used in California, Oregon or Washington, constituent feedback, and an expectation they would be the simplest for the fishing community to use and understand. These alternatives are also under consideration by the California Fish and Game Commission for discussion and potential adoption at its November 2012 meeting.

1. Shorten the May through October Season with a Summer Closure – Close fishing for Pacific halibut during some or all of July and/or August; creating a split season (Figure 2.)

2. Re-instate a Minimum Size Limit – Prior to 2009, a 32-inch minimum size limit was in effect for the recreational fishery off California, as well as Oregon and Washington. CDFG is considering a minimum size limit from 32 to 48 inches. (Figure 3)

3. Limit Days of the Week Open to Fishing –
    a. *Option 3A:* Allow fishing only on Fridays and Saturdays during the open months from May through October
    b. *Option 3B:* Allow fishing only on Thursdays, Fridays and Saturdays during the open months from May through October (Figure 4)

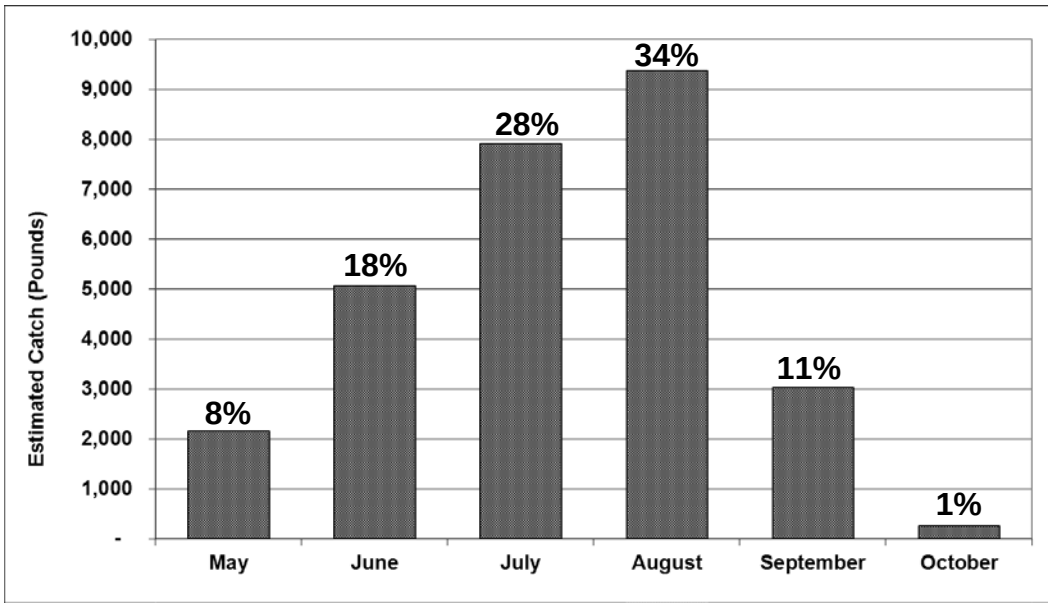


Figure 2. Average monthly recreational Pacific halibut catch (in net weight) from 2004-2011. Catch data from the Department based on CRFS information.

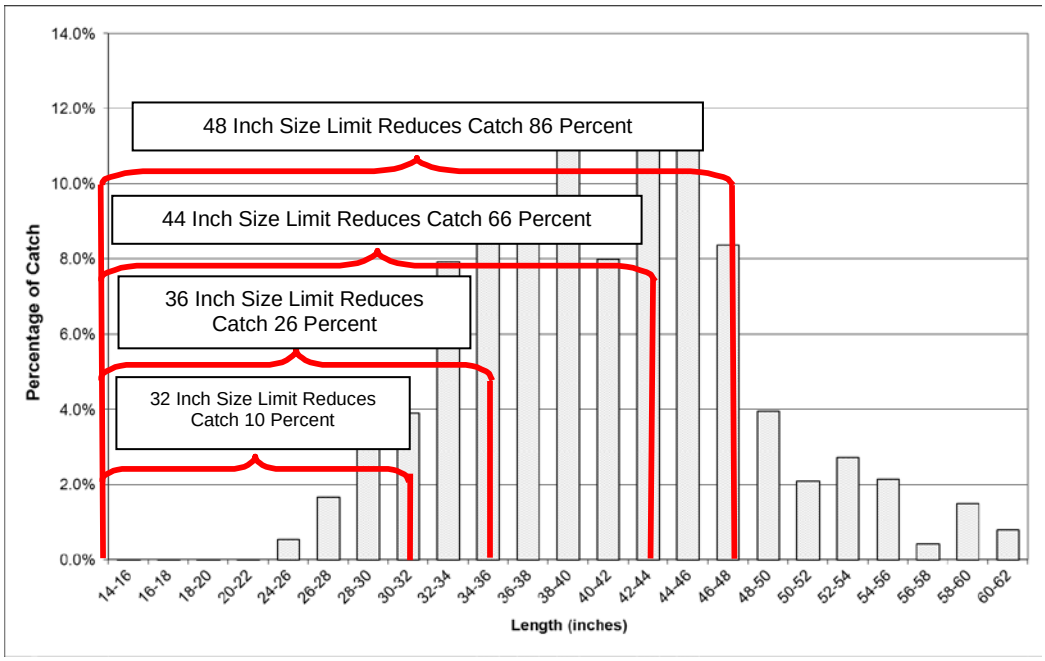


Figure 3. Percentage by weight of sampler examined Pacific halibut binned into two-inch length increments. Data from CRFS sample information.

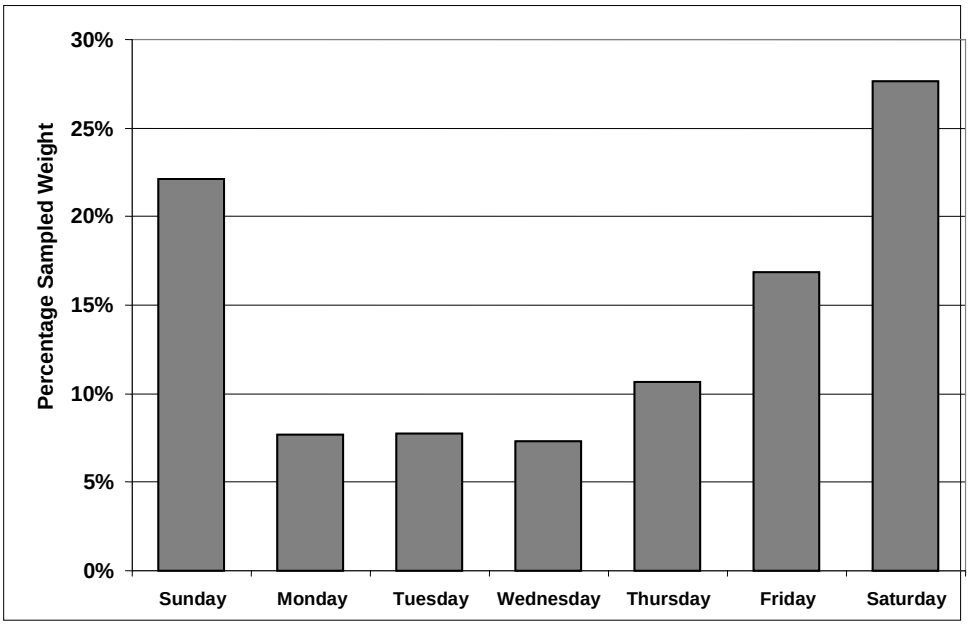


Figure 4. Percentage of sampled recreational Pacific halibut catch by day of week from 2004 through 2011. Data from CRFS sample information.

OREGON DEPARTMENT OF FISH AND WILDLIFE REPORT ON PROPOSED CHANGES TO THE PACIFIC HALIBUT CATCH SHARING PLAN FOR THE 2013 FISHERY

The Oregon Department of Fish and Wildlife (ODFW) solicited public input via e-mail, phone, and public meetings to discuss proposed changes to the Pacific Halibut Catch Sharing Plan (CSP) for fisheries off Oregon in 2013. The public meetings occurred on July 31 in Portland, August 6 in North Bend, and August 7 in Newport. Based on public input, ODFW recommends the Pacific Fishery Management Council (Council) approve the following alternatives for additional public review:

Columbia River Subarea

ODFW is not recommending any changes to the subarea for 2013 for public review .

South of Humbug Mountain Subarea

ODFW is not recommending any changes to the subarea for 2013 for public review, and will continue to work with the Ad Hoc South of Humbug Workgroup and Policy Committee to determine recommendations, if necessary for 2014.

Central Coast Subarea

Allocation

A portion of anglers that attended public meetings were in favor of transferring the entire summer all-depth fishery quota to the other fisheries (i.e., spring all-depth and nearshore), or in other words, eliminating the summer all-depth fishery. This is in contrast to previous years, in which anglers commonly requested transferring quota from the spring all-depth fishery to the summer all-depth fishery. For instance, in 2010, transfer of 2% of the Central Coast Subarea quota from the spring all-depth fishery to the summer all-depth fishery was approved (by the Council) to accommodate these requests.

Allocation Alternatives

1. Status quo (no action)—
    a. Spring all-depth = 63%
    b. Summer all-depth = 25%
    c. Nearshore = 12%
2. Eliminate the summer all-depth fishery
    a. Spring all-depth = 75%
    b. Nearshore = 25%

Rationale 1

Anglers want to transfer quota from the summer all-depth fishery to the spring all-depth and nearshore fisheries because "there is nothing else to fish for in the spring (May-June when the spring all-depth fishery occurs) besides bottomfish, but in summer (August; when the summer all-depth fishery occurs) there are also salmon and tuna fisheries".

Response to 1

Transferring summer all-depth quota to the spring all-depth would not increase halibut opportunities during May. Starting the second weekend in May, the spring all-depth fishery has been open every weekend in May (unless closed due to adverse tides) and a change to the number of open days per week or start date (i.e., first weekend in May) would be necessary to increase halibut opportunities during May. Halibut opportunities would be expected to increase during June. The fishery has generally been open every other weekend in June because there has only been enough quota to have "fixed days" (guaranteed open, occur every week) in May and "back-up days" (open until quota taken, used to ensure quota not exceeded, occur every other week) in June. More quota would increase the number of fixed days, which would likely result in the fishery occurring every weekend in June instead of every other, and would also push the back-up days from June until July. The extra weekend or two in June for halibut fishing would increase harvest opportunities during months when there are relatively few salmon and tuna trips (Figure 1), compared to July and August.

Rationale 2

"Transfer of quota from the summer all-depth fishery to the spring all-depth and nearshore fisheries will reduce yelloweye rockfish impacts because catch rates of yelloweye rockfish are greatest in the summer fishery."

Response to 2

Although yelloweye rockfish catch rates (fish per angler trip) from the nearshore fishery are approximately half of those of the summer all-depth fishery (Figure 2), the halibut catch rate is also half;

therefore, it may take twice the effort to harvest the same quota and the resulting yelloweye rockfish savings would accordingly be negligible. In other words, it takes the same amount of yelloweye rockfish to harvest a halibut from the nearshore and all-depth fisheries.

However, transfer of quota from the summer all-depth fishery to the spring all-depth fishery would be expected to reduce yelloweye rockfish impacts because both fisheries have similar catch rates of halibut, but the yelloweye rockfish catch rate from the spring fishery is approximately half that of the summer fishery.

Recommendation

ODFW is recommending, for public review, eliminating the summer all-depth fishery by transferring the entire quota to the spring all-depth and nearshore fisheries. ODFW expects to receive much greater public input regarding potential changes to the Catch Share Plan this year than in previous years because ODFW has obtained contact information of ~800 halibut anglers since June (via a halibut fishery listserv), and they will be invited to participate in an online survey.

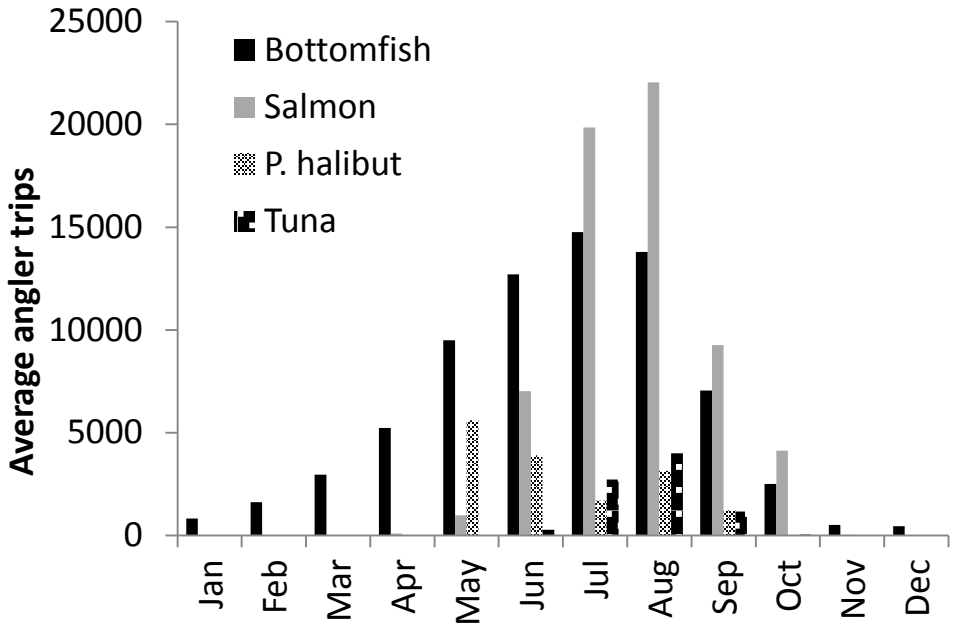


Figure 1. Average number of angler trips by month for bottomfish, salmon, halibut, and tuna (2005-2011).

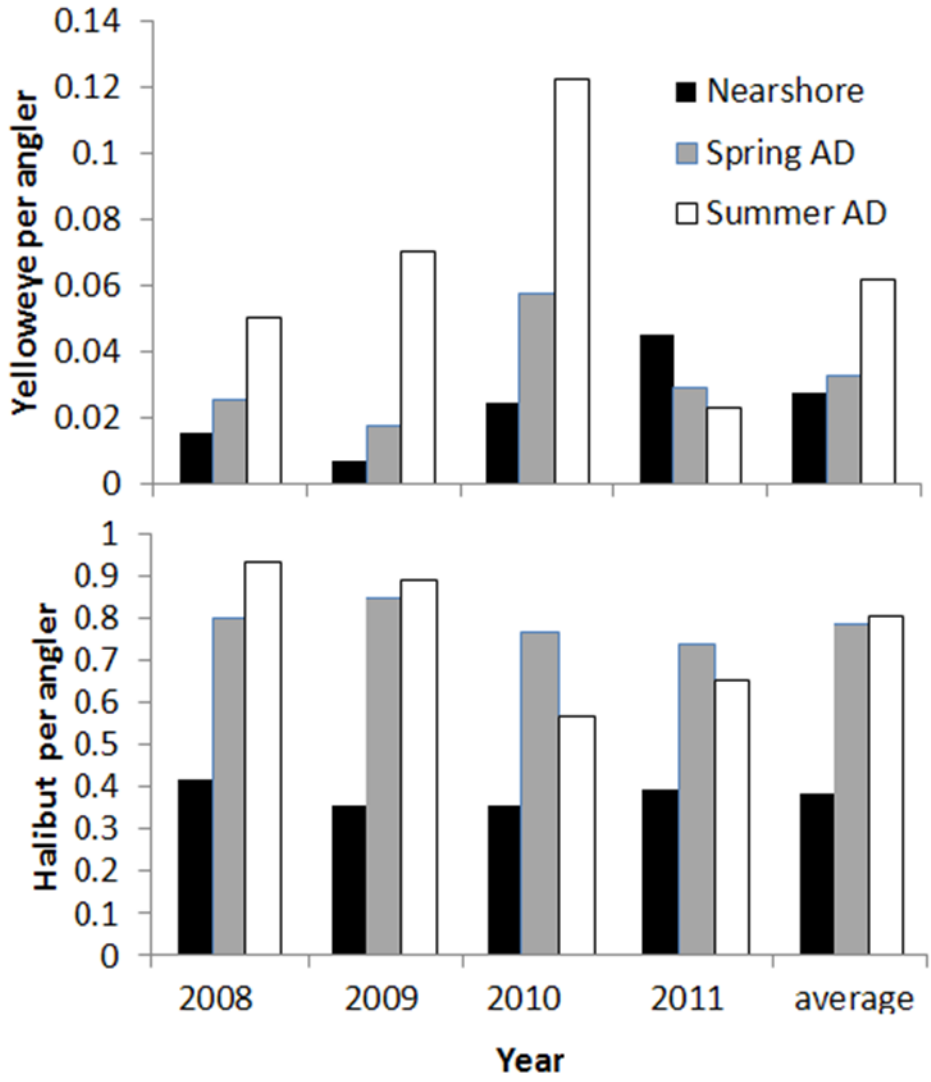


Figure 2. Yelloweye rockfish and halibut catch rates (fish per angler trip) for the Central Coast subarea fisheries, 2008-2011 (and the average of these years).

Management Measures: Nearshore Fishery

Nearshore fishery background

The nearshore fishery has closed in July each year since 2009 due to attainment of quota, but in prior years was generally open until the regulatory closure date (October 31; early closures were due to overages from other fisheries). The vast majority of comments received in recent years (since 2009) have regarded taking actions to ensure that the nearshore fishery lasts at least through the summer (i.e., end of August or Labor Day).

There has been substantial growth each year in the nearshore fishery since 2009, which is best described by fitting cumulative harvest curves by week for each year and comparing the slopes (Figure 3). If the same level of growth continues and the quota and season structure remains the same as in 2012, the fishery is projected to last only five-and-a-half weeks in 2013 and four weeks in 2014.

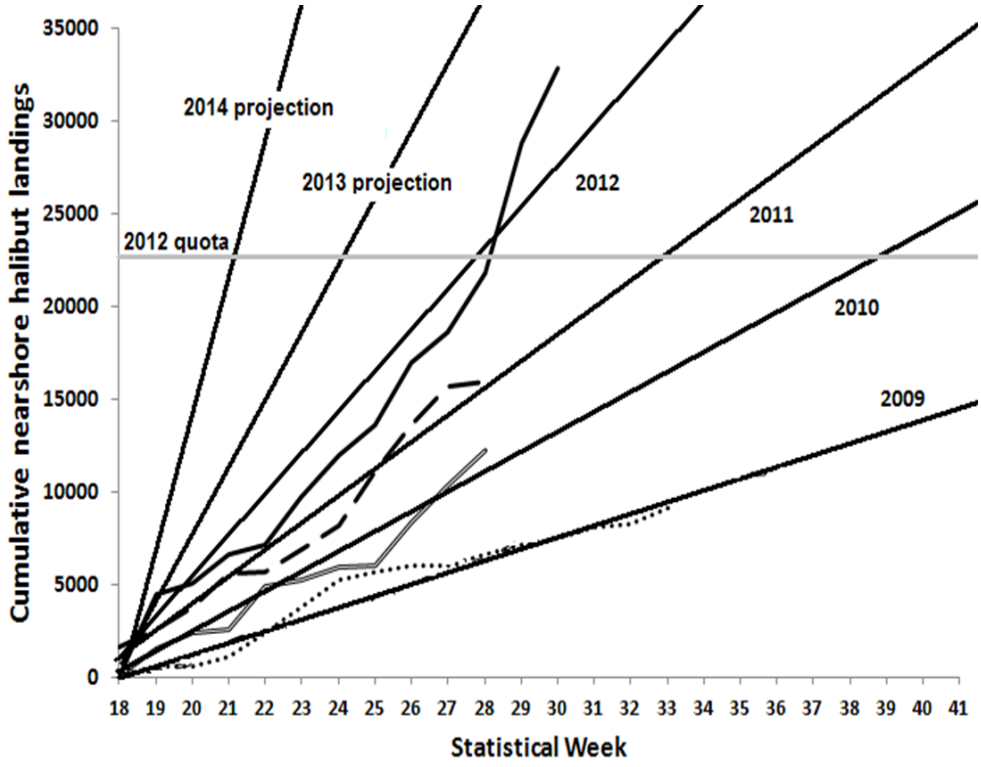


Figure 3: Cumulative nearshore halibut landings (net lbs) from 2009-2012 and projected cumulative landings for 2013-2014 if the season structure remains the same (7 days per week). Projected season lengths can be made by finding the corresponding week below the intersection of the fitted catch curve for a year and the quota line.

Number of Days Open Alternatives

Some anglers suggested reducing the number of open days per week (currently seven) in the nearshore fishery as a way to extend the fishery later into the season. Two alternatives are suggested below:

1. Status quo (no action): open seven days per week until the earlier of quota attained or October 31
2. Open three days per week
    a. If three days per week, which three days?

Rationale

Early attainment of the nearshore halibut quota the past three years has been due to increased effort in the fishery. Reducing the number of open days per week would be expected to spread effort and allow for a longer season.

Response

Growth in the nearshore fishery has been attributed to increases in effort. Except for a lull from 2010-2011, weekly effort has increased substantially each year since 2008 (Figure 4); however, catch rates (lbs per angler trip) have remained fairly stable (Figure 5). Therefore, a reduction in the open number of days per week (from seven) would be expected to reduce weekly effort and harvests during the early months of the season (May-July), and potentially extend the season for additional weeks or months.

Recommendation

ODFW is recommending, for public review, reducing the number of open days per week for the nearshore fishery from seven to three. ODFW believes this would be the best method for extending the nearshore fishery later through the summer. ODFW is not recommending delaying the season start date a month (June 1 instead of May 1) or allocating more quota to the fishery because neither method is expected to extend the fishery through the end of summer (see Appendix). ODFW is recommending the nearshore fishery be open Thursdays through Saturdays in order to minimize regulatory complexity, as these are the open days for the spring all-depth fishery. Additionally, having the same days open days per week in both fisheries

would eliminate the nearshore fishery during spring all-depth weeks (typically 5-7 per year) and further increase the possibility of the fishery extending later through the summer.

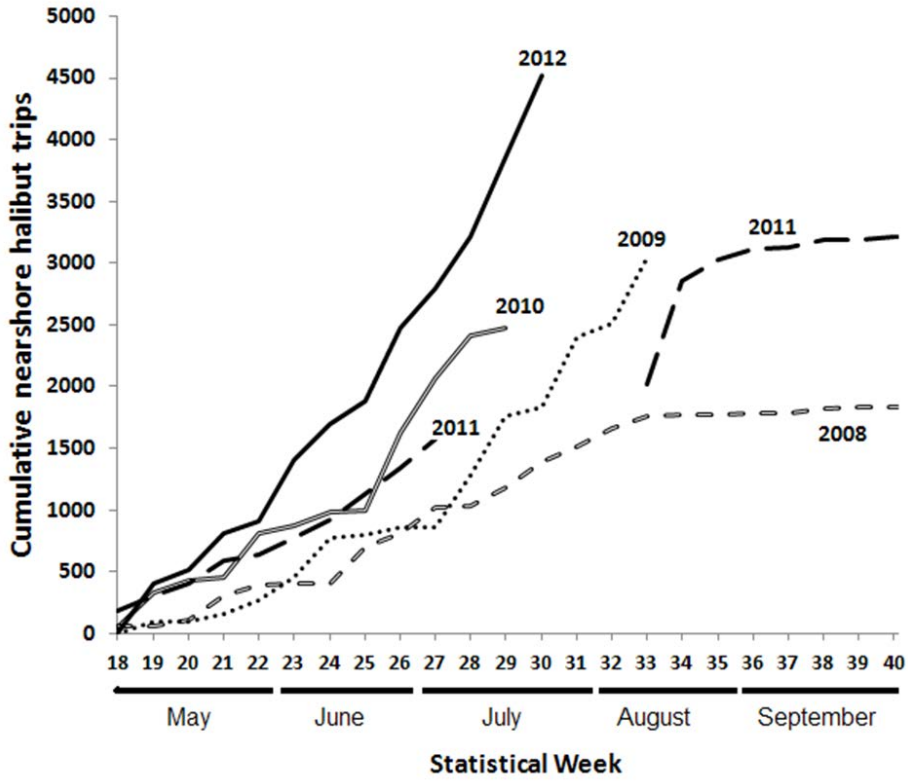


Figure 4. Cumulative nearshore halibut trips by statistical week and year, 2008-2012. Data is only shown for open weeks (note mid-season closure in 2011; season reopened due to inseason reallocation of quota).

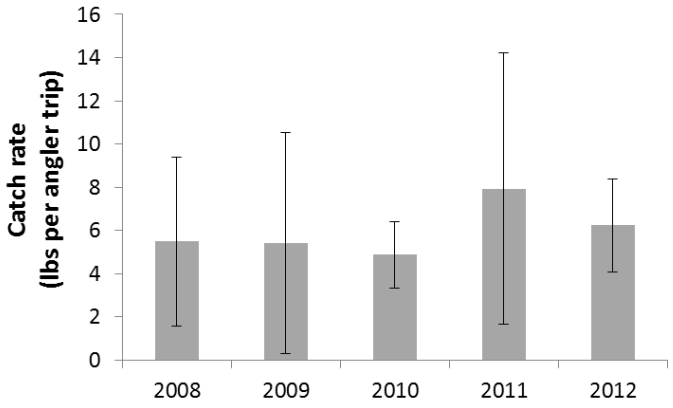


Figure 5. Average weekly catch rates (lbs of halibut per angler trip) and standard deviation by year for the nearshore fishery, 2008-2012.

Catch Sharing Plan Language

Due to the range of alternatives presented above, ODFW does not currently have proposed changes to the language in the Catch Sharing Plan for 2013. As the range of alternative is finalized, ODFW will provide draft language revisions to the Catch Sharing Plan, in consultation with staff at NMFS Northwest Region.

Additional proposals received from the public, but not forwarded for consideration are in Attachment 1.

Appendix: Additional Proposals Received

Delay the nearshore fishery start date a month

Moving the nearshore fishery start date back a month from May 1 to June 1 was suggested as a means to extend the season through summer.

Moving the nearshore halibut start date back a month from May 1 to June 1 would be expected to extend the nearshore fishery later into the season; however, since the 2013 season is projected to last four-and-a-half weeks less than in 2012 (Figure 3) due to increased effort, then the 2013 season would still end in mid-July despite pushing the start date back a month. If the same growth rate continues through 2014, then the 2014 season would be open four weeks and would close before July despite a June 1 start date.

It is unlikely that future halibut seasons will extend through August or September if the fishery remains open seven days per week, regardless of start date, unless the quota is dramatically increased. Projections of quota required to keep the nearshore fishery open through the end of August were made using the formulas of the fitted landings curves from Figure 3. To have kept the nearshore season open through the end of August in 2012, an estimated 49,000 lbs of quota (or 30.7% of the subarea quota) would have been needed. For 2013, the same situation would require 76,800 lbs (48.1%) with a May 1 start date and 61,400 lbs (38.5%) with a June 1 start date. For 2014, these values would increase to 126,000 (78.9%) for a May 1 start date and 100,800 lbs (63.2%) for a June 1 start date.

Table 1. Projected lbs of quota and percentage of subarea quota (based on 2012) that would be required to keep the nearshore fishery open through the end of August for May 1 and June 1 start dates for 2012-2014 if the fishery remains open seven days per week.

	Lbs needed			% quota needed		
	2012	2013	2014	2012	2013	2014
May	48,958	76,800	126,000	30.7	48.1	78.9
June	39,166	61,440	100,800	24.5	38.5	63.2

Restrict the nearshore fishery to 30 fm

To extend the nearshore season length, anglers have proposed limiting the nearshore fishery to 30 fm instead of 40 fm (current) in order to slow catch rates (halibut per angler trip). Further, this would reduce regulatory complexity as the bottomfish fishery is limited to 30 fm during nearshore halibut months.

Shifting the nearshore fishery depth restriction from 40 fm to 30 fm would likely only temporarily increase the length of the season. Catch rates (fish per angler) in the 30-40 fm depth range are similar to those in shallower depth ranges (i.e, 10-20 fm and 20-30 fm) for ports where anglers fish deeper than 30 fm (Figure 6). Therefore, it would only be a matter of time before anglers that customarily fish 30-40 fm depths would find the equally productive shallower water (< 30 fm) areas. Additionally, some ports (i.e., Pacific City, Garibaldi, and Charleston) may not be affected at all by a 30 fm depth restriction because nearly all their nearshore angler trips already occur shallower than 30 fm.

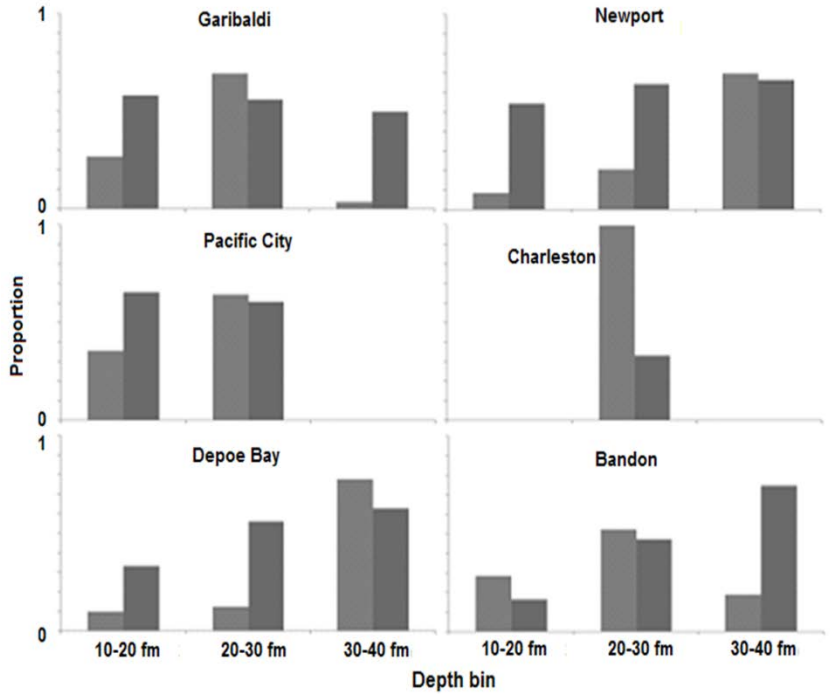


Figure 6. Proportion of nearshore angler trips (light grey) and catch rates (halibut per angler; dark grey) by depth bin for Central Coast subarea ports.

Two day spring all-depth weeks instead of three

The spring all-depth fishery is open three days per week (Thusrdays through Saturdays) starting the second week of May, and typically closes around the last week in June (Table 2).

Some anglers have suggested reducing the open days per week from three to two in order to extend the season into July. They state that the weather in May is often too rough for smaller vessels to go out onto the ocean to fish for halibut and that conditions are better in July. Additionally, families

with children in school are less likely to be able to participate in the fishery until school adjourns, which is in mid-June.

However, the majority of anglers prefer having more halibut opportunities during May and June (than July) because they can participate in other fisheries during July (i.e., salmon and tuna; see allocation section). Additionally, the majority of boats that fished each of the spring all-depth openers were generally 20'-22'. (Figure 7). Since "small boats" has not been defined, it is difficult to say whether or not the weather was too rough for "small boats" to fish, but 20'-22' is generally considered a "small boat" for ocean fishing.

Table 2. Open dates for the Central Oregon Coast Subarea spring all-depth fishery, 2008-2012.

Statistical Week	2012	2011	2010	2009	2008
19					May 8-10
20	May 10-12	May 12-14	May 13-15	May 14-16	May 15-17
21	May 17-19		May 20-22	May 21-23	May 22-24
22	May 24-26	May 26-28		May 28-30	May 29-31
23	May 31-June 2	June 2-4	June 3-5	June 4-6	
24		June 9-11			June 12-14
25	June 14-16		June 17-19	June 18-20	
26		June 23-25			June 26-28
27	June 29-30		July 1-2	July 2-4	
28					July 10-12
29					
30					July 24-26

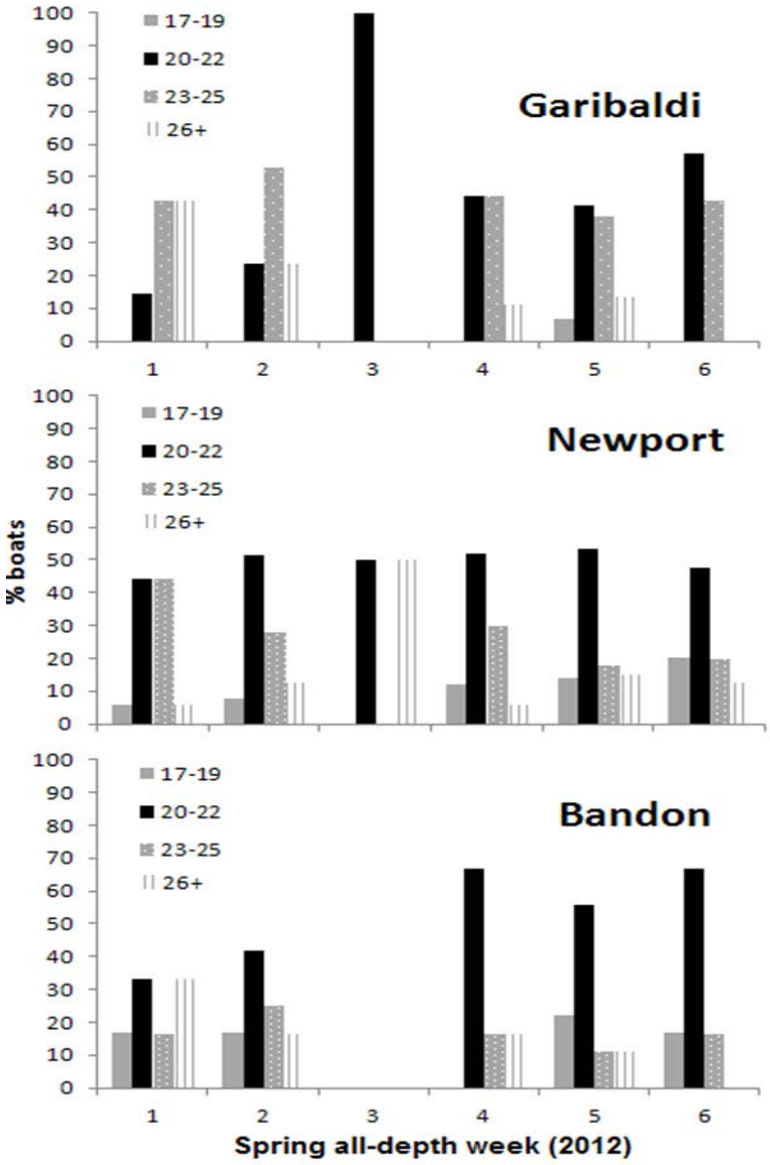


Figure 7. Percent of boats by hull lengths (feet) that fished each of the six spring all-depth openers (weeks) during the 2012 season for select ports (those with adequate sample sizes for analysis).

Do not skip spring all-depth weeks with adverse tides

Public meetings are held each spring to determine which weeks the spring all-depth fishery will occur and the option exists to skip weeks with adverse tides to safety concerns. Some anglers claim that tides are irrelevant to their decision to fish and would prefer not to skip weeks. However, other anglers have informed ODFW that tides of -1.7 feet or lower that occur around the time vessels are leaving the

docks (0500-0700) can cause safety and bar crossing issues, in some ports more than others; therefore, ODFW would like to keep the option of skipping weeks with adverse tides.

Split the Central Oregon coast subarea into smaller management units

Comments were received requesting subdivision of the central Oregon coast subarea allocation (all-depth and/or nearshore) into two or more smaller areas. The objective of this proposed split is to separate Newport, where the majority of landings occurs (e.g., 68% in 2011), from the rest of the subarea in order to increase season lengths for other ports (specifically ports south of Newport).

ODFW is not supporting a split of the Central Coast subarea because there is "equality" in harvests among ports. Although 68% of harvest occurred in Newport in 2011, harvests were not disproportionate to effort (69% of angler trips were from Newport). Additionally, halibut harvests among individual anglers were also similar among ports (percentages of anglers catching 1-6 halibut; Figure 8). Simply comparing harvests among ports, without factoring in effort, is not a suitable means for determining "fairness". If the Central Coast subarea were split in order to provide longer seasons to the south of Newport than to the north, then disproportionate harvest-to-effort ratios would be expected to occur among ports, leading to an "unfair" situation.

A split of the Central Coast subarea has already been done, but was overturned due because it failed to increase season lengths in the subarea without Newport. The subarea was split at the Florence in 1995 with the objective of increasing season lengths for the southern subarea. During the first year of the split, the southern subarea had longer spring all-depth and nearshore seasons (summer all-depth fishery was not split) than to the north. However, seasons thereafter were generally either the same length or shorter to the south due to faster growth in the halibut fisheries in southern ports. As a result, anglers from the southern area requested to eliminate the split and recombine the Central Coast subarea (approved for 2004).

The split also led to frequent allocation battles between the subareas, typically with the goal of creating equal season lengths (which was the opposite of the intended purpose of the split).

Table 3. Comparison of open days per week and year for spring all-depth and nearshore fisheries for the subareas (North of Florence and South of Florence) when the Central Coast subarea was split.

	Spring all-depth days open								
Subarea	1995	1996	1997	1998	1999	2000	2001	2002	2003
North of Florence	12	6	8	6	6	5	4	8	9
South of Florence	15	9	6	6	6	5	5	8	8
	Nearshore days open								
North of Florence	37	104	67	91	153				
South of Florence	61	97	60	91	107				

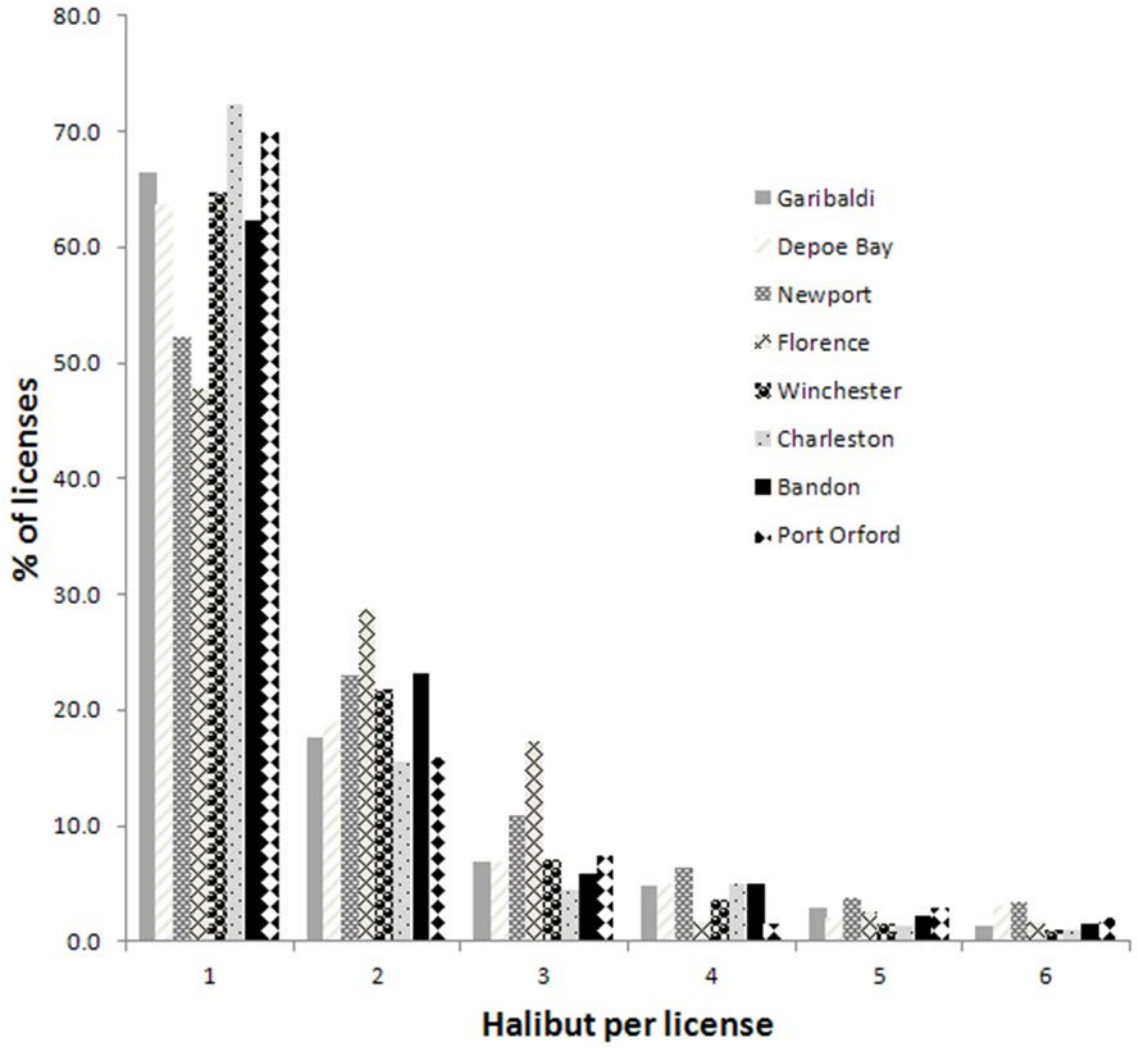


Figure 8. Percentages of halibut licenses (anglers) that caught 1-6 halibut for ports of the Central Coast subarea, 2005-2009 combined. Pacific City was excluded due to small sample size (few anglers returned their harvest cards).

Size limit: Minimum or maximum

Maximum (50") and minimum (32") size limits were suggested as means to decrease catch rates and extend season lengths (currently no size limit). Recent size-at-age data on Pacific halibut shows that "a large fraction of males never reach the minimum size limit and thus never enter the exploitable biomass" (http://www.iphc.int/papers/sa09.pdf). To avoid a primarily female selective fishery, ODFW is not proposing instituting a 32" minimum size restriction at this time. Nor is ODFW proposing a request to implement a 50" maximum size because less than 1% of halibut harvested in Oregon are greater than 50". Implementing a 50" maximum size would

consequently have little effect on season lengths and anglers would be upset if they were no longer able to harvest “trophy” fish.

Annual bag limit and tag structure

Additional overarching comments were received regarding the annual bag limit and tag structure. Since 78% of anglers harvest less than three fish per year (Figure 9), the annual bag limit would have to be reduced dramatically from six to obtain significant reductions in harvest (Table 3). For example, reducing the annual bag limit to one would only be projected to reduce harvests by 46.6%. Additionally, changes to those regulations would need to be addressed through state and legislative processes; therefore those alternatives are not included in the report.

Table 3. Projected decrease in harvest by reducing the annual bag limit from six.

Bag limit	Harvest reduction
6	0.0%
5	1.6%
4	5.1%
3	11.8%
2	23.5%
1	46.6%

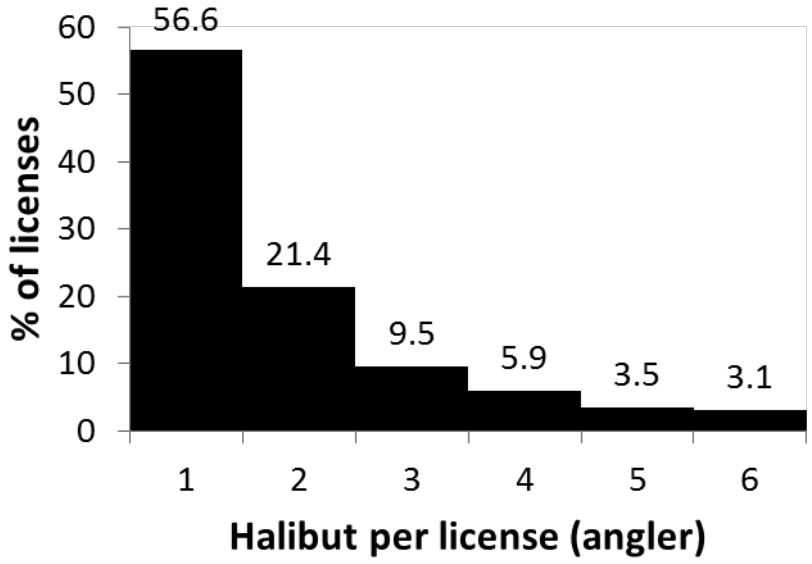


Figure 9. Percentage of halibut harvested by license holders (anglers) from harvest card data.

Agenda Item F.2.b
Supplemental GAP Report
September 2012

GROUNDFISH ADVISORY SUBPANEL REPORT ON
2013 PACIFIC HALIBUT REGULATIONS

The Groundfish Advisory Subpanel (GAP) considered proposed alternatives submitted by Oregon Department of Fish and Wildlife (ODFW) and Washington Department of Fish and Wildlife (WDFW) and California Department of Fish and Game (CDFG) to the Pacific halibut catch sharing plan and the current regulations for the halibut fishery in IPHC area 2A. A presentation was given to GAP members by representatives from ODFW, WDFW and CDFG.

GAP Recommendations:
The GAP supports the recommended alternatives in the ODFW, WDFW and CDFG reports contained within Agenda Item F.2.b to go forward for public review.

There is some concern expressed regarding the proposed management measures contained in the CDFG Report. The history needed to project harvest is lacking, as well as limited resources for monitoring and inseason flexibility. This could result in unintended outcomes.

PFMC
09/15/12

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE REPORT ON PROPOSED CHANGES TO CATCH SHARING PLAN AND 2013 ANNUAL REGULATIONS

The Washington Department of Fish and Wildlife held a public meeting on August 14, 2012, in Montesano, Washington, to solicit and discuss proposals for changes to the Pacific Fishery Management Council's Catch Sharing Plan for Pacific Halibut. Representatives from the North Coast and South Coast attended the meeting; there were no representatives from the Columbia River subarea at the meeting, but we received proposals from them via e-mail, which we discussed by phone.

For the North Coast, a private angler raised a concern about the days of the week the fishery is open—Thursday and Saturday. He suggested providing more weekend fishing opportunity by having a season structure comprised of just Saturdays or Fridays and Sundays; however, both of these season structures would be contrary to the primary objective for the fishery, which is to maximize season length while providing for a meaningful fishing opportunity. Both of these structures would likely result in attaining the quota faster, as effort is higher on a weekend day compared to a weekday, which would minimize the benefits. For example, in 2012, the North Coast halibut season lasted seven days—four Thursdays and three Saturdays. If there were a Saturday-only season, then the fishery probably would have lasted five days, so there would be a gain of two weekend days, but an overall loss of two fishing days. Also, while catch is lower on a Thursday, it is still substantial with harvest averaging about 12,000 pounds of halibut per day, and some anglers prefer fishing on weekdays because the local towns and fishing grounds are less crowded.

For the South Coast, we discussed whether to set aside additional poundage for the northern nearshore area, as the nearshore quota (2,000 pounds) was achieved by June 8 this year. For comparison, in 2011, the nearshore quota lasted until July 31, but there had been additional poundage from the offshore fishery and North Coast residual that had contributed to it. In 2012, the offshore fishery achieved its quota (exceeding it by 33 pounds), and the North Coast residual had been less and was not transferred to provide additional nearshore opportunity in the South Coast. For 2013, WDFW is committing to consider transferring residual from the North Coast to provide additional opportunity for the South Coast nearshore area inseason after the North Coast fishery has closed. We will revisit this issue next year for potential revisions for 2014.

For the Columbia River, we received a few proposed changes to the season structure and thought that a couple of them had merit, which we are proposing be approved for public review:

1. Proposal: Revise the early season structure to keep the early season open until 80 percent of the subarea allocation is reached removing the provision that would close the early season on the third Sunday in July.

   Rationale: In recent years, the early season quota has not been reached prior to the closure in July resulting in a transfer of the remaining early season quota to the late season and therefore, by default increasing late season quota above what is intended in

the CSP. This change would keep the season open longer providing more opportunity to access the early season quota and would preserve the 80 percent allocation to the early season by maintaining the provision to close the early season once that set aside has been reached.

2. Proposal: Revise the days of the week that the early season is open from Thursday through Saturday to Friday through Sunday.

   Rationale: This change would allow for more fishing opportunity on weekend days and during the early season where the early season catch has been coming in below the set aside. In addition, this would make the days of the week that the fishery is open consistent between the early and the late seasons. If the first proposal is adopted and the early season set aside (80 percent of the subarea allocation) is not caught prior to the opening of the late season, the fishery would be able to continue on the same days of the week with the remaining quota available for the late season fishery.

The proposed language modifications for the CSP are as follows:

(f) SPORT FISHERIES
The non-Indian sport fisheries are allocated 68.3 percent of the non-Indian share, which is approximately 44.4 percent of the Area 2A TAC. The allocation is further divided as subquotas among six geographic subareas.

(iv) Columbia River subarea.

This sport fishery subarea is allocated 2.0 percent of the first 130,845 lb (59.4 mt) allocated to the Washington sport fishery, and 4.0 percent of the Washington sport allocation between 130,845 lb (59.4 mt) and 224,110 lb (101.7 mt) (except as provided in section (e)(3) of this Plan). This subarea is also allocated an amount equal to the contribution from the Washington sport allocation from the Oregon/California sport allocation. This subarea is defined as waters south of Leadbetter Point, WA (46°38.17' N. lat.) and north of Cape Falcon, OR (45°46.00' N. lat.). The fishery will open on the first ~~Thursday~~ Friday in May or May 1 if it is a ~~Friday or~~ Saturday or Sunday, 3 days per week, ~~Thursday through Saturday~~ Friday through Sunday until 80 percent of the subarea allocation is taken. ~~or until the third Sunday in July, whichever is earlier~~. The fishery will reopen on the first Friday in August and continue 3 days per week, Friday-Sunday until the remainder of the subarea quota has been taken, or until September 30, whichever is earlier. Subsequent to this closure, if there is insufficient quota remaining in the Columbia River subarea for another fishing day, then any remaining quota may be transferred inseason to another Washington and/or Oregon subarea by NMFS via an update to the recreational halibut hotline. Any remaining quota would be transferred to each state in proportion to its contribution. The daily bag limit is one halibut per person, with no size limit. No groundfish may be taken and retained, possessed or landed, except sablefish and Pacific cod when allowed by groundfish regulations, if halibut are onboard the vessel.

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OREGON TROLL SALMON
QUALITY IS KING
OREGON SALMON COMMISSION

OREGON SALMON COMMISSION

August 20, 2012

PFMC Members

The Oregon Salmon Commission (OSC) is a state commodity commission under the Oregon Department of Agriculture and represents the 1,000 licensed commercial salmon troll fishermen.

The Oregon Salmon Commission would like to request a change in the future opening dates for the Area 2A incidental Halibut seasons. We would like to see the opening date changed to April 1 of each year to coincide with the Troll Salmon season.

The International Pacific Halibut Commission has been contacted and they see no problems making the change. Their only request is to inform the fleet of this change. The OSC will make the information available and has the addresses of the current Oregon and non-resident permit holders. Out-of-state permit holders include 122 Washington, 121 California and 11 in other states.

The rational for this request is to spread out the incidental Area 2A quota among the other involved states.

Thank you for your consideration.

Darus Peake, Chairman
Oregon Salmon Commission

Chuck Tracy <chuck.tracy@noaa.gov>

Oregon Halibut Input

1 message

Flanders, Stratos <Stratos.Flanders@kniferiver.com> Thu, Aug 23, 2012 at 2:32 PM
To: "Chuck.Tracy@noaa.gov" <Chuck.Tracy@noaa.gov>

Chuck:

I wanted to take a minute and provide some input on the 2013 Oregon Halibut Season. The 2012 season was structured towards a large portion of the open days in May. I feel that this structure is being driven by the Charter Boat Industry and due to the rough ocean conditions typically experienced in May it limits the smaller sport fleet on fishing days. I have a larger boat, but many of my friends and family members have smaller boats and have to hope that the quota lasts long enough for them to get out fishing. It also seems that the fish are typically located further offshore in the spring months (May and June), so the expense to get offshore to fish is higher than if the season was postponed until June and July. By postponing the season later in the year, it also provides the opportunity to pursue tuna or salmon during the same trip and help offset the high fuel costs.

Another change I would like to see to the season is a larger quota for the summer season. If we offered a quota equal to the spring season (balanced 50%/50%), it would provide more angling opportunity for the smaller sport boats. We would also be able to do the multi specie trips as well. Not to mention, the typical size of the summer fish is larger and it seems to be more halibut available to catch in the typical halibut spots closer to port.

One of the other items that would provide more angling opportunity on a healthy fish stock would be to allow the take of lingcod while fishing for halibut. I think that the rule should allow for the retention of lingcod until a person tags a halibut. This would allow us to keep the incidental lingcod, but also prevent boats from staying offshore and targeting lingcod after they have limited on halibut.

Thank you for the opportunity to provide input in the season setting structure.

Stratos Flanders

(541) 936-4554

PACIFIC HALIBUT BYCATCH ESTIMATE FOR USE IN THE 2013 GROUNDFISH FISHERIES

National Marine Fisheries Service (NMFS) will brief the Council on the status of bycatch estimates for Pacific halibut in the Council-area groundfish trawl and fixed gear fisheries.

The halibut bycatch estimates for the 2011 groundfish trawl and fixed gear fisheries in International Pacific Halibut Commission (IPHC) Area 2A waters include information from the groundfish observer program and effects of the groundfish area closures in 2011. NMFS will provide bycatch estimates to the IPHC prior to the interim meeting of the IPHC for use in establishing the 2013 halibut total allowable catch (TAC).

A draft of the summary and conclusions section and the tables from a report documenting the methods used to derive bycatch estimates was provided to the Scientific and Statistical Committee (SSC) for review and comment (Agenda Item F.3.b, NMFS Report 1). Because this is the first year information from individual fishery quota shares in the groundfish trawl fishery were analyzed, the full report was not available for the briefing book, although it was expected prior to the September Council meeting (Agenda Item F.3.a, Attachment 1).

The Council should also discuss the likelihood of carry-over from the Pacific halibut individual bycatch quota between 2012 and 2013, and make a recommendation for IPHC use in establishing the 2013 Area 2A Pacific halibut TAC. Currently, up to 10 percent of the bycatch cap may be carried-over to the 2013 bycatch cap if sufficient poundage is available from the previous year. For 2013, the base level bycatch cap is up to 15 percent of the Area 2A total constant exploitation yield, not to exceed 130,000 pounds (legal-sized net-weight) While the actual carry-over action occurs in 2013, IPHC requires input for their process this fall and winter.

Council Action:

1. **Utilizing input from the SSC, provide any needed Council guidance to the completion of the bycatch assessment and its transmittal by NMFS to the IPHC.**
2. **Recommend an appropriate value for limited entry trawl bycatch assumptions in 2013 based on the carry-over provision for Pacific halibut individual bycatch quota.**

Reference Materials:

1. Agenda Item F.3.a, Attachment 1: Letter from NMFS NWFSC to Dan Wolford.
2. Agenda Item F.3.b, NMFS Report 1: Draft excerpts from Pacific Halibut Bycatch in the U.S. West Coast IFQ Groundfish Fishery (2011) and non-IFQ Groundfish Fisheries (2002–2011).

Agenda Order:

a. Agenda Item Overview — Chuck Tracy
b. National Marine Fisheries Service Recommendation — NW Fisheries Science Center
c. Reports and Comments of Advisory Bodies and Management Entities
d. Public Comment
e. **Council Action:** Review and Provide Guidance on the Pacific Halibut Bycatch Estimate for use by the International Pacific Halibut Commission in 2013 Fisheries

PFMC
08/24/12

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Fisheries Science Center
2725 Montlake Boulevard East
Seattle, WA 98112-2097

August 22th, 2012

Mr. Dan Wolford
Pacific Fisheries Management Council
7700 Ambassador Place, Suite 101
Portland, Oregon 97220-1384

Dear Chairman Wolford,

The attached document includes the DRAFT Summary and Conclusion and Tables for the 2011 "Pacific halibut bycatch in the U.S. West Coast IFQ Groundfish Fishery (2011) and non-IFQ Groundfish Fisheries (2002-2011)" report. Due to the implementation of Catch Shares, we are unable to provide the draft text for the report until the Supplemental Briefing Book deadline.

Please contact Janell Majewski at (206) 860-3293 if you have any questions.

Sincerely,

Janell Majewski

Digitally signed by Janell Majewski
DN: cn=Janell Majewski, o=NWFSC/FRAM, ou=DOC/NOAA/NMFS, email=Janell.Majewski@noaa.gov, c=US
Date: 2012.08.22 11:09:23 -08'00'

Janell Majewski

cc: Dr. Patty Burke, NMFS NWFSC
Dr. Michelle McClure, NMFS NWFSC
Mr. Mike Burner, PFMC
Mr. Frank Lockhart, NMFS NWR
Mr. Chuck Tracy, PFMC

Pacific halibut bycatch in the U.S. West Coast IFQ Groundfish Fishery (2011) and non-IFQ Groundfish Fisheries (2002-2011)

Jason E. Jannot, Alia W. Al-Humaidhi, Marlene A. Bellman, Neil B. Riley, Janell Majewski

NWFSC Observer Program
Fishery Resource Analysis and Monitoring Division
National Marine Fisheries Service

Publication Date:

This document should be cited as follows:

Jannot, J.E., A.W. Al-Humaidhi, M.A. Bellman, N.B. Riley and J. Majewski. 2012. Pacific halibut bycatch in the U.S. west coast IFQ groundfish fishery (2011) and non-IFQ groundfish fisheries (2002-2011). NOAA Fisheries, NWFSC Observer Program, 2725 Montlake Blvd E., Seattle, WA 98112.

SUMMARY & CONCLUSIONS

- In the 2011 IFQ fishery, methods for estimating the relatively small amount of Pacific halibut weight in unsampled and partially sampled hauls were developed for each sector and gear type fished. The weight of P. halibut estimated from these hauls represents ~3% of the total discard mortality of P. halibut in the IFQ fishery.
- Estimated discard mortality from the entire 2011 IFQ fishery represents an 87% decrease relative to the 2010 LE bottom trawl fishery.
- The 2011 estimate of Pacific halibut mortality in the LE sablefish non-primary longline sector was much greater than in any prior year. The 2011 OA fixed gear longline sector exhibited a decline in estimated P. halibut mortality relative to the 2010 estimate.
- Estimated P. halibut mortality in all other non-IFQ sectors are well within the range observed in previous years.
- This report represents the first time we present summarized P. halibut discard from the at-sea Pacific hake fishery for the years 2002-2011.
- The spatial distribution of P. halibut catch observed by the WCGOP (2002-2011) off the U.S. west coast is presented for the first time in this report. Gear types represented include a combination of bottom trawl, midwater trawl, shrimp trawl, fixed gear hook-and-line and pot gear.

Table ES1. Pacific halibut discard mortality estimates (metric tons, 2002-2011) for all sectors observed by the NWFSC Groundfish Observer Program. Discard mortality rates were applied in the bottom trawl fisheries (LE and IFQ), IFQ hook-and-line, IFQ pot, and non-IFQ, non-nearshore fixed gear sectors, for which some information regarding survivorship was available.

Year	LE bottom trawl	IFQ Fishery (first year: 2011)						Non-nearshore fixed gear			Nearshore fixed gear*	Pink shrimp*	CA halibut*‡	At-sea Hake*	Total discard mortality
		Shoreside Hake*	LE CA Halibut*	Bottom Trawl	Midwater Trawl*	Hook and Line	Pot	LE endorsed	LE non-endorsed	OA					
2002	344.8							23.2	0.0	-	-	-	0.0	1.1	392.3
2003	124.4							32.5	0.0	-	0.0	-	0.0	2.6	192.1
2004	133.1							40.2	0.0	-	1.0	0.0	0.8	1.1	216.4
2005	286.5							36.7	0.0	-	2.2	0.1	0.0	2.0	364.2
2006	242.5							107.2	0.0	-	0.5	-	0.0	0.8	458.3
2007	208.8							21.0	0.2	3.6	0.1	0.2	0.1	1.2	256.3
2008	207.8							39.5	0.4	7.1	0.4	0.0	0.3	4.0	298.9
2009	251.1							49.7	0.0	6.4	1.3	0.0	0.0	0.3	358.5
2010	181.0							22.4	0.1	5.3	0.1	0.0	0.0	1.6	232.9
2011		0.03	0.0	31.3	***	1.0	0.9	21.9	3.4	2.8	2.0	0.2	0.0	0.6	64.1
Total	1980.1	0.03	***	31.3	0.00	1.0	0.9	394.3	4.2	25.2	7.6	0.5	1.3	15.3	2833.9

‡ Since 2011, CA Halibut only includes Open Access sector because the Limited Entry sector is covered under the IFQ Fishery.

*Mortality rate of 100% applied

Table ES2. A comparison of 2011 IBQ total discard mortality (mortality rates applied; mt, north of 40°10´ N latitude) between the Vessel Account System (VAS) and the West Coast Observer Program internal analysts. The two systems use different approaches to estimate P. halibut mortality.

Source	Total IBQ mortality of P. halibut (mt)
VAS	32.14
WCGOP	32.99

Figure ES1. Total estimated discard mortality (metric tons) for 2002-2011 from all sectors observed by the NWFSC Groundfish Observer Program. Estimates are not included for sectors and years where there were insufficient observer data.

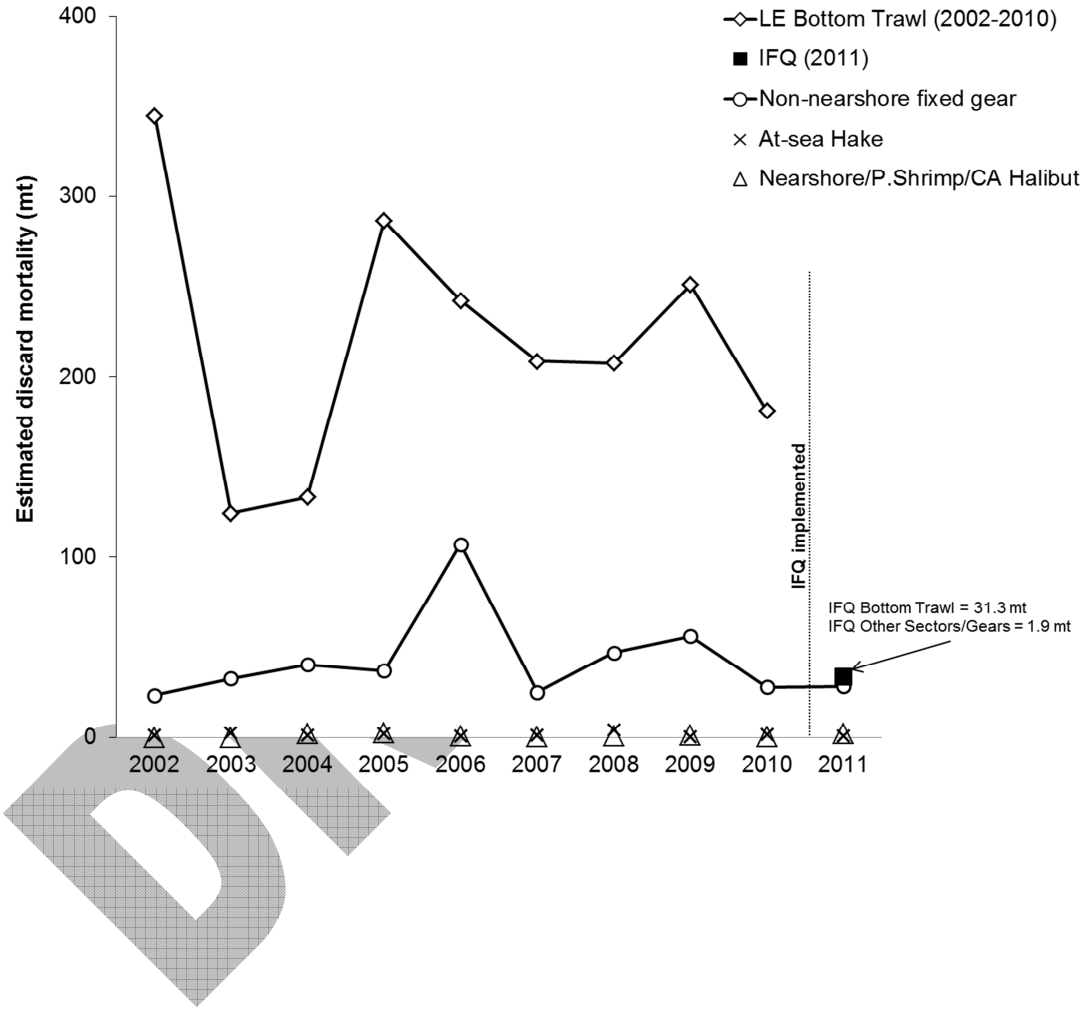

Table 1. The number of observed vessels, trips, and tows (or sets); the number of sampled tows (or sets) and Pacific halibut (mt), and the number of unsampled tows (or sets) within each catch category as a function of gear or sector, area and depth stratification in the 2011 U.S. west coast groundfish IFQ fishery. Unsampled portions of the catch can be categorized into IFQ flatfish species, IFQ mixed species (any IFQ species), non-IFQ species, or all species (IFQ & non-IFQ). See text for full definition of each catch category.

	Observed			Sampled		No. of Unsampled Tows within each Category			
Stratum	**No. vessels**	**No. trips**	**No. tows**	**No. tows**	**P. halibut discard (mt)**	**IFQ flatfish**	**IFQ mixed**	**Non-IFQ**	**All Species (IFQ & Non-IFQ)**
Bottom Trawl									
North of Pt. Chehalis									
0 to 60 fm	13	46	306	292	7.28	2	5	10	3
> 60 fm	22	146	1113	965	18.07	3	8	138	6
Pt. Chehalis to 40°10'									
0 to 60 fm	20	137	1135	1045	9.71	12	2	65	19
> 60 fm	56	755	5127	4915	20.16	5	14	178	29
South of 40°10'									
0 to 60 fm	3	23	66	62	0.17	3	0	1	0
> 60 fm	15	241	1376	1338	0.16	3	0	34	3
Pot									
North of Pt. Chehalis	3	12	63	62	1.03	0	0	0	0
Pt. Chehalis to 40°10'	8	75	716	713	2.30	0	0	1	2
South of 40°10'	11	148	738	736	0.00	0	0	2	0
Hook and Line									
North of 40°10'	6	21	411	402	6.03	0	0	0	1
South of 40°10'	6	71	212	211	0.00	0	0	1	0
LE California Halibut									
All South of 40°10'	3	63	157	155	0.00	0	0	2	0
Shoreside Hake									
All North of 40°10'	26	913	1701	1699	0.03	0	0	2	0
Midwater Trawl									
North of 40°10'	**	**	**	**	**	**	**	**	**

** Confidential

Table 2. Values used to calculate the expanded weight (mt) of Pacific halibut (PHLB) from each unsampled category in the 2011 U.S. west coast groundfish IFQ fishery. Unsampled catch weight could be assigned to one of four categories: IFQ flatfish species, IFQ mixed species, non-IFQ species, or all species (IFQ & non-IFQ). The sampled weight (mt), discard ratio, unsampled weight (mt) and estimated Pacific halibut gross discard (mt) are presented within each category, as a function of gear or sector, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA. The sum of expanded weight (mt) is the sum of the estimated gross P. halibut discard across categories. The sampled PHLB in unsampled hauls (or sets) is the sampled weight of P. halibut in partially sampled hauls (or sets). The sum of the PHLB in unsampled hauls is the sum of the expanded weights plus the sampled PHLB in unsampled hauls. The total discard (gross) is the sum of the PHLB in unsampled hauls plus the sampled PHLB.

					IFQ Flatfish				Mixed IFQ Species				Non-IFQ Species				All Species (IFQ & Non-IFQ)							
Gear or Sector	Depth (fm)	Management Area	Area	Sampled PHLB	Sampled	Discard Ratio	Unsampled	Est. Discard	Sampled	Discard Ratio	Unsampled	Est. Discard	Sampled	Discard Ratio	Unsampled	Est. Discard	Sampled	Discard Ratio	Unsampled	Est. Discard	Sum of Expanded Wght.	Sampled PHLB in Unsamp. hauls	Sum of PHLB in Unsamp. hauls	Total Discard
Bottom Trawl	0 -60	N. 4010	N. Pt Chehalis	7.28	58	0.126	0.16	0.02	78	0.094	5.22	0.49	56	0.000	2.66	0.00	133	0.055	2.29	0.13	0.64	0.16	0.80	8.07
			Pt Chehalis - 4010	9.71	90	0.108	0.97	0.10	110	0.088	2.40	0.21	171	0.000	6.76	0.00	281	0.035	5.71	0.20	0.51	0.95	1.46	11.18
		S.4010	S. 4010	0.17	5	0.000	0.04	0.00	5	0.000	0.00	0.00	12	0.014	0.01	0.00	17	0.010	0.00	0.00	0.00	0.00	0.00	0.17
	> 60	N. 4010	N. Pt Chehalis	18.07	102	0.178	1.03	0.18	128	0.141	1.01	0.14	196	0.000	15.03	0.00	325	0.056	4.79	0.27	0.59	4.39	4.99	23.06
			Pt Chehalis - 4010	20.16	168	0.120	0.78	0.09	325	0.062	4.00	0.25	721	0.000	18.25	0.00	1046	0.019	7.54	0.15	0.49	1.90	2.38	22.55
		S.4010	S. 4010	0.16	155	0.000	0.10	0.00	270	0.000	0.00	0.00	217	0.001	2.87	0.00	487	0.000	1.36	0.00	0.00	0.00	0.00	0.16
Pot		N. 4010	N. Pt Chehalis	1.03	1	0.981	0.00	0.00	2	0.676	0.00	0.00	0	0.000	0.00	0.00	2	0.580	0.00	0.00	0.00	0.00	0.00	1.03
			Pt Chehalis - 4010	2.30	2	0.942	0.00	0.00	8	0.290	0.00	0.00	3	0.000	0.00	0.00	11	0.204	0.01	0.00	0.00	0.00	0.00	2.31
		S.4010	S. 4010	0.00	0	0.000	0.00	0.00	6	0.000	0.00	0.00	7	0.000	0.00	0.00	13	0.000	0.00	0.00	0.00	0.00	0.00	0.00
Hook & Line		N. 4010		6.03	7	0.845	0.00	0.00	22	0.276	0.00	0.00	56	0.000	0.00	0.00	78	0.077	0.00	0.00	0.00	0.02	0.02	6.06
		S. 4010		0.00	0	0.000	0.00	0.00	4	0.000	0.00	0.00	21	0.000	0.00	0.00	25	0.000	0.00	0.00	0.00	0.00	0.00	0.00
Shoreside hake		N.4010		0.03	0	0.991	0.00	0.00	521	0.000	0.00	0.00	3	0.000	1.37	0.00	525	0.000	0.00	0.00	0.00	0.00	0.00	0.03
LE CA Halibut		S. 4010		0.00	1	0.000	0.00	0.00	1	0.000	0.00	0.00	74	0.000	0.01	0.00	75	0.000	0.00	0.00	0.00	0.00	0.00	0.00
Midwater Trawl		N. 4010		**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

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Table 3. Pacific halibut viabilities in the 2011 groundfish IFQ fishery by gear, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA. The condition of sampled Pacific halibut was identified as Excellent (Exc), Poor, or Dead (Appendices N and O, WCGOP manual 2012), consistent with IPHC protocol. The number of fish in each category was weighted based on the length-weight relationship as described in the Methods.

Year	Gear	Depth (fm)	Management Area	Area	Number				Weighted percentages in each category		
2011					Exc	Poor	Dead	Total	Exc	Poor	Dead
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	522	138	309	969	57%	14%	28%
				Pt Chehalis - 4010	1217	182	201	1600	82%	9%	9%
			S. 4010	S. 4010	0	0	10	10	0%	0%	100%
		> 60	N. 4010	N. Pt Chehalis	1168	455	941	2564	48%	18%	34%
				Pt Chehalis - 4010	1005	562	1204	2771	38%	20%	42%
			S. 4010	S. 4010	7	1	6	14	48%	6%	46%
	Pot		N. 4010	N. Pt Chehalis	53	3	19	75	84%	2%	14%
				Pt Chehalis - 4010	149	10	65	224	69%	5%	26%
			S. 4010	S. 4010	0	0	0	0			

Table 4. Estimated gross discard (mt) and discard mortality (mt) of Pacific halibut in the 2011 groundfish IFQ fishery by gear type, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA. Estimates were allocated to the three condition categories based on information presented in Table 3. DMR = Discard Mortality Rate.

Year	Gear	Depth (fm)	Management Area	Area	Number				Weighted percentages in each category		
2011					Exc	Poor	Dead	Total	Exc	Poor	Dead
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	522	138	309	969	57%	14%	28%
				Pt Chehalis - 4010	1217	182	201	1600	82%	9%	9%
			S. 4010	S. 4010	0	0	10	10	0%	0%	100%
		> 60	N. 4010	N. Pt Chehalis	1168	455	941	2564	48%	18%	34%
				Pt Chehalis - 4010	1005	562	1204	2771	38%	20%	42%
			S. 4010	S. 4010	7	1	6	14	48%	6%	46%
	Pot		N. 4010	N. Pt Chehalis	53	3	19	75	84%	2%	14%
				Pt Chehalis - 4010	149	10	65	224	69%	5%	26%
			S. 4010	S. 4010	0	0	0	0			

Table 5. Estimated Pacific halibut bycatch (mt), discard mortality (mt), legal-sized (82 cm) mortality (mt), and percent of legal-sized discard by weight in the 2011 groundfish IFQ fishery by gear or sector, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA.

Year	Gear or Sector	Depth (fm)	Management Area	Area	Total bycatch (mt)	Total discard mortality (mt)	Estimated legal-sized mortality (mt)	Estimated % legal-sized discarded, by weight
2011								
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	8.07	3.62	1.98	55%
				Pt Chehalis - 4010	11.18	3.32	2.06	62%
			S. 4010	S. 4010	0.17	0.15	0.15	100%
		> 60	N. 4010	N. Pt Chehalis	23.06	11.49	8.11	71%
				Pt Chehalis - 4010	22.55	12.68	8.72	69%
			S. 4010	S. 4010	0.16	0.09	0.09	97%
	Pot		N. 4010	N. Pt Chehalis	1.03	0.17	0.13	77%
				Pt Chehalis - 4010	2.31	0.71	0.53	74%
			S. 4010	S. 4010	0.00	0.00	0.00	
	Hook and Line		N. 4010		6.06	0.97	0.43	45%
			S. 4010		0.00	0.00	0.00	
	Shoreside hake		N. 4010		0.03	0.03	0.00	100%
	LE CA Halibut		S. 4010		0.00	0.00	0.00	

Table 6. Pacific halibut length frequencies collected by WCGOP observers during the 2011 groundfish IFQ fishery by gear type. (a) Actual measurement of P. halibut lengths (cm). (b) Visual estimates of P. halibut lengths (cm). Note that there were no actual measurements from vessels fishing with hook-and-line gear. The lower limits on the length intervals are inclusive, while the upper limits are exclusive. Numbers are numbers of individual P. halibut per bin by gear type.

IFQ Fishery 2011

a.

Actual Length bin (cm)	Bottom Trawl	Pot
17-22	1	0
37-42	1	0
42-47	2	1
47-52	12	0
52-57	37	2
57-62	193	9
62-67	586	12
67-72	890	22
72-77	1308	38
77-82	1101	53
82-87	1017	48
87-92	750	41
92-97	584	24
97-102	381	22
102-107	267	4
107-112	174	4
112-117	118	6
117-122	59	3
122-127	39	3
127-132	20	2
132-137	12	2
137-142	5	1
142-147	9	0
147-152	2	0
152-157	0	0
157-162	0	0
162-167	0	0
167-172	0	1
172-177	0	0
177-182	0	0
182-187	0	0
187-192	0	0
192-197	0	0
197-202	0	1

b.

Visual Length bin (cm)	Bottom Trawl	Pot	Hook and Line
30	0	1	3
40	2	2	48
50	3	1	120
60	3	2	237
70	16	4	201
80	12	11	139
90	7	7	68
100	6	7	26
110	1	1	20
120	6	2	11
130	1	1	1
140	3	0	3
150	2	0	1
160	0	0	1

Table 7. Number of observed trips, sets, and vessels by year in the non-nearshore groundfish fixed gear fishery, which includes limited entry (LE) sablefish endorsed season, LE non-sablefish endorsed, and open access (OA) fixed gear sectors.

	LE Sablefish Primary			LE Sablefish Non-Primary	OA Fixed Gear	
	Longline					
Year	North of Pt Chehalis	South of Pt Chehalis	Pot	Longline	Hook-and-line Gears	Pot
	Number of observed trips					
2002	23	47	23	11	0	0
2003	25	25	35	130	41	16
2004	13	35	13	62	43	96
2005	31	73	39	35	34	43
2006	31	34	39	121	11	38
2007	36	40	30	158	50	45
2008	17	60	24	122	58	55
2009	13	34	27	138	68	30
2010	18	126	43	226	69	40
2011	18	84	22	201	68	60
	Number of observed sets					
2002	207	181	247	22	0	0
2003	191	158	362	219	49	50
2004	115	205	139	130	53	182
2005	388	275	491	60	37	50
2006	291	159	288	196	12	39
2007	381	136	154	303	66	72
2008	194	345	329	220	68	74
2009	178	109	67	271	101	45
2010	251	503	314	470	104	69
2011	284	389	227	426	100	84
	Number of observed vessels					
2002	9	18	6	4	0	0
2003	8	8	6	17	13	7
2004	6	13	3	14	15	17
2005	10	18	7	11	10	14
2006	9	10	7	21	8	15
2007	9	14	4	36	25	20
2008	6	13	6	32	33	20
2009	4	6	3	34	33	18
2010	5	20	7	38	37	26
2011	7	20	3	38	40	28

Table 8. Expansion factors and WCGOP observed discard rate by gear type for limited entry (LE) and open access (OA) non-nearshore groundfish fixed gear sectors used to expand discard estimates of Pacific halibut to the fleet-wide level.

Fishery		Expansion Factor	Observed Discard Rate Applied	
LE Sablefish Primary	Longline Pot	Retained Sablefish	LE Sablefish Primary	Longline Pot
LE Sablefish Non-Primary	Longline Pot	Retained Groundfish Retained Sablefish	LE Sablefish Non-Primary OA Fixed Gear *	Longline Pot
OA Fixed Gear	Hook-and-line Pot	Retained Groundfish	OA Fixed Gear *	Hook-and-line Pot

* No discard ratio or discard estimate was computed in the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California during this time.

Table 9. Total sablefish and groundfish landings (mt) and observed Pacific halibut discard ratios for each sector and gear type in the non-nearshore groundfish fixed gear fishery. Sablefish landings were used as the discard ratio denominator and expansion factor in all cases except the limited entry (LE) non-sablefish endorsed and OA fixed gear sectors, where target species include a variety of groundfish species.

	LE Sablefish Primary			LE Sablefish Non-Primary		OA Fixed Gear	
	Longline		Pot	Longline	Pot	Hook-and-Line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis					
Expansion factor **Total fleet landings** *(Based on fish tickets)*	*Sablefish landings (mt)*			*Groundfish landings (mt)*	*Sablefish landings (mt)*	*Groundfish landings (mt)*	
2002	390	407	354	452	6	387	108
2003	499	569	604	485	7	547	186
2004	698	654	626	377	6	474	184
2005	641	676	615	519	7	625	376
2006	684	708	611	441	4	487	439
2007	489	607	426	462	9	270	249
2008	385	663	421	652	18	430	238
2009	418	984	487	695	18	671	364
2010	259	1030	503	1021	34	769	302
2011	223	919	377	1238	25	445	255
Observed Pacific halibut discard ratios							
2002	0.3297	0.0283	0.0114	0.0000	*	*	*
2003	0.3532	0.0467	0.0005	0.0003	*	*	*
2004	0.2369	0.0746	0.0526	0.0000	*	*	*
2005	0.3318	0.0204	0.0043	0.0000	*	*	*
2006	0.7827	0.1636	0.0271	0.0000	*	*	*
2007	0.2184	0.0334	0.0092	0.0032	(0.0035)	0.0785	0.0035
2008	0.3715	0.1453	0.0151	0.0041	(0.0010)	0.0986	0.0010
2009	0.6436	0.0413	0.0017	0.0003	(0.0007)	0.0545	0.0007
2010	0.2642	0.0632	0.0088	0.0004	(0.0016)	0.0424	0.0016
2011	0.4780	0.0281	0.0110	0.0172	(0.0003)	0.0305	0.0003

* No discard ratio is provided for the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California during this time. Since 2007-2008 OA pot discard rates were used to estimate LE non-endorsed discard, discard ratios for this sector were also excluded.

Table 10. Summary of the percent of observed trips that caught Pacific halibut by sector, gear, and area (where applicable) in the non-nearshore groundfish fixed gear fishery. Observed mean, minimum, and maximum annual catch and discard weight (mt) are provided, along with the percent of Pacific halibut catch weight that was discarded per year.

	LE Sablefish Primary			LE Sablefish Non-Primary		OA Fixed Gear	
	Longline		Pot	Longline	Pot	Hook-and-Line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis					
% of observed trips that caught Pacific halibut							
2002	95.7%	46.8%	17.4%	0.0%	--	--	--
2003	100.0%	52.0%	8.6%	0.8%	--	0.0%	0.0%
2004	100.0%	71.4%	38.5%	0.0%	--	0.0%	0.0%
2005	96.8%	58.9%	33.3%	0.0%	--	0.0%	0.0%
2006	100.0%	76.5%	56.4%	0.0%	--	9.1%	0.0%
2007	94.4%	47.5%	33.3%	1.9%	--	26.0%	6.7%
2008	100.0%	78.3%	83.3%	3.3%	--	34.5%	5.5%
2009	84.6%	35.3%	33.3%	7.0%	--	38.2%	10.0%
2010	83.3%	46.8%	51.2%	1.3%	--	21.7%	2.5%
2011	88.9%	42.9%	45.5%	6.0%	--	30.9%	6.7%
Observed annual catch (mt) of Pacific halibut							
Mean	45.4	11.6	2.0	0.3	--	0.9	0.0
Min	12.1	2.3	0.1	0.0	--	0.1	0.0
Max	117.2	36.6	5.4	1.4	--	1.6	0.0
Observed annual discard (mt) of Pacific halibut							
Mean	40.2	11.6	2.0	0.3	--	0.9	0.0
Min	9.5	2.3	0.1	0.0	--	0.1	0.0
Max	109.6	36.6	5.4	1.4	--	1.6	0.0
% of Pacific halibut catch that was discarded							
2002	80.1%	95.5%	100.0%	n.o.c.	--	--	--
2003	82.5%	99.5%	100.0%	100.0%	--	n.o.c.	n.o.c.
2004	79.0%	97.7%	100.0%	n.o.c.	--	n.o.c.	n.o.c.
2005	84.8%	100.0%	100.0%	n.o.c.	--	n.o.c.	n.o.c.
2006	93.5%	97.9%	100.0%	n.o.c.	--	100.0%	n.o.c.
2007	80.6%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2008	87.4%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2009	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2010	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2011	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%

n.o.c. No observed catch of Pacific halibut and thus a % discarded calculation is not possible.
-- No WCGOP observers were depolyed for the sector/year/gear type combination.

Table 11. Estimated Pacific halibut gross discard (mt) and discard mortality (mt) in the limited entry (LE) sablefish endorsed season, LE non-sablefish endorsed, and open access (OA) fixed gear sectors of the non-nearshore groundfish fishery. Estimated discard mortality (mt) was computed by multiplying a 16% (longline) or 18% (pot) discard mortality rate by gross discard estimates. Discard estimates were not initially computed for the 2002-2006 OA fixed gear sector because the WCGOP only observed OA fixed gear vessels off of California during that time. To produce potential values for these years, a combined discard rate was used from 2007-2008 with coastwide observations.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LE Sablefish Primary (mt)										
Longline										
North of Pt Chehalis										
Gross discard estimate	128.7	176.2	165.3	212.6	535.5	106.8	143.2	268.8	70.8	106.7
Estimated discard mortality (16%)	20.6	28.2	26.5	34.0	85.7	17.1	22.9	43.0	11.3	17.1
South of Pt Chehalis										
Gross discard estimate	11.5	26.6	48.7	13.8	115.9	20.3	96.3	40.7	65.0	25.8
Estimated discard mortality (16%)	1.8	4.3	7.8	2.2	18.5	3.2	15.4	6.5	10.4	4.1
Coastwide										
Gross discard estimate	140.2	202.7	214.1	226.4	651.4	127.1	239.5	309.4	135.9	132.5
Estimated discard mortality (16%)	22.4	32.4	34.3	36.2	104.2	20.3	38.3	49.5	21.7	21.2
Pot										
Coastwide										
Gross discard estimate	4.1	0.3	33.0	2.6	16.5	3.9	6.4	0.8	4.5	4.1
Estimated discard mortality (18%)	0.7	0.1	5.9	0.5	3.0	0.7	1.1	0.1	0.8	0.7
LE Sablefish Non-Primary (mt)										
Longline										
Coastwide										
Gross discard estimate	0.0	0.1	0.0	0.0	0.0	1.5	2.6	0.2	0.4	21.3
Estimated discard mortality (16%)	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.1	3.4
Pot										
Coastwide										
Gross discard estimate	*	*	*	*	*	0.03	0.02	0.01	0.05	0.01
*Assuming OA fixed gear 07-08 pot discard rate for 2002 - 2006 **	[0.0]	[0.0	[0.0]	[0.0]	[0.0]					
Estimated discard mortality (18%)	*	*	*	*	*	0.0	0.0	0.0	0.0	0.0
OA Fixed Gear (mt)										
Hook-and-line Gears										
Coastwide										
Gross discard estimate	*	*	*	*	*	21.8	44.1	39.6	32.6	17.2
Assuming 07-08 discard rate for 2002 - 2006	[28.7]	[40.3]	[29.3]	[55.8]	[37.4]					
Estimated discard mortality (16%)	*	*	*	*	*	3.5	7.1	6.3	5.2	2.7
Pot										
Coastwide										
Gross discard estimate	*	*	*	*	*	0.9	0.2	0.3	0.5	0.1
Assuming 07-08 discard rate for 2002 - 2006	[0.2]	[0.4]	[0.4]	[0.8]	[0.9]					
Estimated discard mortality (18%)	*	*	*	*	*	0.2	0.0	0.0	0.1	0.0

* The LE sablefish non-primary pot sector has not been observed by the WCGOP and therefore estimates are based on discard rates from observed OA fixed gear pot vessels. Because the OA fixed gear pot sector was only observed on a coastwide basis in 2007 and 2008, estimates for LE sablefish non-primary pot are only available in these years as well.

Table 12. Estimated Pacific halibut discard mortality (mt) from each sector of the non-nearshore groundfish fixed gear fishery from 2002 through 2011.

	Estimated discard mortality (mt)			
	LE Sablefish Primary	LE Sablefish Non-Primary	OA Fixed Gear	All Sectors
2002	23.1	0.0	0.0	23.1
2003	32.5	0.0	0.0	32.5
2004	39.5	0.0	0.0	39.5
2005	36.6	0.0	0.0	36.6
2006	106.9	0.0	0.0	106.9
2007	21.0	0.2	3.6	24.8
2008	39.3	0.4	7.1	46.9
2009	49.7	0.0	6.4	56.1
2010	22.4	0.1	5.3	27.8
2011	21.9	3.4	2.8	28.1

Table 13. Pacific halibut length frequencies collected by WCGOP observers during the LE sablefish endorsed fishery, including both pot and longline gear, from 2002-2011. (a) Actual measurement of P. halibut lengths (cm). (b) Visual estimates of P. halibut lengths (cm). Note that observers were only required to collect actual measurements from LE sablefish endorsed vessels in 2011. The lower limits on the length intervals are inclusive, while the upper limits are exclusive. Numbers are numbers of individual P. halibut per bin.

LE Sablefish Primary Fishery 2002-2011

a.

Actual Length bin (cm)	Length freq.	Percent length freq.
27 - 32	0	0.00
32 - 37	0	0.00
37 - 42	0	0.00
42 - 47	1	0.00
47 - 52	7	0.00
52 - 57	8	0.01
57 - 62	24	0.02
62 - 67	63	0.04
67 - 72	135	0.09
72 - 77	264	0.17
77 - 82	281	0.18
82 - 87	223	0.14
87 - 92	178	0.11
92 - 97	148	0.10
97 - 102	82	0.05
102 - 107	50	0.03
107 - 112	32	0.02
112 - 117	24	0.02
117 - 122	15	0.01
122 - 127	11	0.01
127 - 132	3	0.00
132 - 137	3	0.00
137 - 142	1	0.00
142 - 147	1	0.00
145 - 149	0	0.00
150 - 154	0	0.00
155 - 159	0	0.00
160 - 164	0	0.00
165 - 169	0	0.00
170 - 174	0	0.00
175 - 179	0	0.00
180 - 184	0	0.00
185 - 189	0	0.00

b.

Visual Length bin (cm)	Length freq.	Percent length freq.
10	0	0.00
20	0	0.00
30	5	0.00
40	33	0.00
50	256	0.01
60	2737	0.14
70	4495	0.23
80	4763	0.24
90	3915	0.20
100	2084	0.11
110	776	0.04
120	327	0.02
130	108	0.01
140	21	0.00
150	5	0.00
160	0	0.00
170	0	0.00
180	0	0.00
190	0	0.00

Table 14. Pacific halibut actual and visual length data approximating legal (≥ 82 cm) versus sublegal definitions (IPHC), collected by the WCGOP in the LE sablefish endorsed fixed gear sector.

	Pacific halibut lengths	
	Number	Percentage
Actual length		
< 80 cm	783	50%
≥ 80 cm	771	50%
Visual estimate		
0 - 74 cm	7526	39%
75 - 84 cm	4763	24%
85 - 150 cm	7236	37%

Table 15. Coverage information, bycatch ratios, and bycatch estimates (mt) for Pacific halibut in the nearshore fixed gear groundfish fishery by state. The WCGOP began observing the California nearshore fishery in 2003 and the Oregon nearshore fishery in 2004. Bycatch estimates in this table are not intended to represent mortality values, as discard mortality rates are not available for the nearshore fixed gear fishery.

	Observed							Total fleet catch of nearshore species (mt)	Estimated		
	Fleet observer coverage rate *	Number of observed sets	% of sets with Pacific halibut	Pacific halibut bycatch (kg)	Nearshore species retained (kg)	Pacific halibut bycatch rate	SE		Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
Nearshore fixed gear groundfish fishery sector											
Oregon											
2002	*not observed*		-	-	-	-	-	279	-	-	-
2003	*not observed*		-	-	-	-	-	208	-	-	-
2004	4.9%	207	1.9%	48.9	10,210	0.0048	0.0027	210	1.005	0.002	2.123
2005	6.3%	167	0.6%	32.5	11,419	0.0028	0.0028	180	0.513	0.002	1.520
2006	11.6%	379	1.3%	62.8	19,396	0.0032	0.0016	168	0.543	0.005	1.081
2007	8.9%	242	0.4%	7.8	16,103	0.0005	0.0005	180	0.087	0.002	0.257
2008	7.6%	183	0.5%	27.2	14,285	0.0019	0.0019	189	0.360	0.002	1.066
2009	6.2%	219	2.3%	80.1	13,852	0.0058	0.0028	224	1.298	0.060	2.536
2010	7.6%	210	0.5%	6.1	13,209	0.0005	0.0005	173	0.080	0.002	0.237
2011	8.1%	246	2.0%	89.6	15,891	0.0056	0.0031	195	1.100	0.002	2.275
California											
2002	*not observed*		-	-	-	-	-	380	-	-	-
2003	3.2%	205	0.0%	0.0	8,085	0.0000	0.0000	255	0.000	0.000	0.000
2004	8.0%	422	0.0%	0.0	23,126	0.0000	0.0000	288	0.000	0.000	0.000
2005	4.7%	217	0.9%	79.5	13,108	0.0061	0.0054	280	1.695	0.003	4.665
2006	3.2%	158	0.0%	0.0	8,367	0.0000	0.0000	258	0.000	0.000	0.000
2007	4.5%	224	0.0%	0.0	12,138	0.0000	0.0000	271	0.000	0.000	0.000
2008	2.2%	87	0.0%	0.0	6,543	0.0000	0.0000	293	0.000	0.000	0.000
2009	2.6%	122	0.0%	0.0	6,723	0.0000	0.0000	260	0.000	0.000	0.000
2010	3.2%	117	0.0%	0.0	7,083	0.0000	0.0000	219	0.000	0.000	0.000
2011	3.9%	214	0.5%	77.3	8,448	0.0091	0.0091	216	1.979	0.002	5.857

* Coverage rate in the nearshore sector is defined as the proportion of nearshore target species landings that were observed.

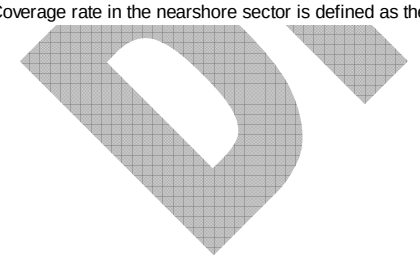


Table 16. Coverage information, bycatch ratios, and bycatch estimates (mt) for Pacific halibut in the pink shrimp trawl fishery. The WCGOP began observing the pink shrimp fishery in 2004, but was not able to observe the fishery in 2006. Bycatch estimates in this table are not intended to represent morality values, as discard mortality rates are not available for the pink shrimp fishery.

	Observed								Estimated		
	Fleet observer coverage rate *	Number of observed tows	% of tows with Pacific halibut	Pacific halibut bycatch (kg)	Pink shrimp retained (kg)	Pacific halibut bycatch rate	SE	Total fleet catch of pink shrimp (mt)	Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
Pink shrimp trawl fishery											
2002	*not observed*		-	-	-	-	-	25,375	-	-	-
2003	*not observed*		-	-	-	-	-	13,887	-	-	-
2004	6.5%	1026	0.0%	0.0	583,266	0.000000	0.000000	8,974	0.000	0.000	0.000
2005	3.9%	509	0.2%	2.3	424,683	0.000005	0.000005	10,862	0.058	0.109	0.172
2006	*not observed*		-	-	-	-	-	8,400	-	-	-
2007	6.2%	951	0.2%	15.3	672,663	0.000023	0.000019	10,935	0.248	0.109	0.649
2008	5.2%	840	0.0%	0.0	805,763	0.000000	0.000000	15,375	0.000	0.000	0.000
2009	6.0%	695	0.0%	0.0	866,905	0.000000	0.000000	14,412	0.000	0.000	0.000
2010	11.6%	1654	0.0%	0.0	2,365,275	0.000000	0.000000	20,327	0.000	0.000	0.000
2011	14.3%	2751	0.1%	27.0	4,216,533	0.000006	0.000004	29,460	0.189	0.295	0.422

* Coverage rate in the pink shrimp trawl fishery is defined as the proportion of pink shrimp landings that were observed.

Table 17. Coverage information, bycatch ratios, and bycatch estimates (mt) for Pacific halibut in the California halibut trawl fishery. The fishery is comprised of a limited entry component and an open access component. Beginning in 2011, the limited entry component of the California halibut fishery is observed under the IFQ groundfish fishery (see above). Bycatch estimates in this table are not intended to represent morality values, as discard mortality rates are not available for the California halibut fishery.

	Observed								Estimated		
	Fleet observer coverage rate *	Number of observed tows	% of tows with Pacific halibut	Pacific halibut bycatch (kg)	California halibut retained (kg)	Pacific halibut bycatch rate	SE	Total fleet catch of California halibut (mt)	Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
California halibut trawl fishery											
Limited Entry Sector											
2002	3.2%	52	0.0%	0.0	3,590	0.0000	0.0000	112	0.000	0.000	0.000
2003	17.0%	206	0.0%	0.0	19,104	0.0000	0.0000	112	0.000	0.000	0.000
2004	16.7%	141	0.7%	3.5	23,447	0.0001	0.0001	140	0.021	0.001	0.062
2005	14.1%	221	0.5%	4.7	27,342	0.0002	0.0002	194	0.033	0.002	0.099
2006	11.7%	224	0.9%	2.9	14,286	0.0002	0.0002	123	0.025	0.001	0.063
2007	12.8%	80	1.3%	8.1	5,419	0.0015	0.0015	42	0.063	0.000	0.188
2008	24.6%	118	8.5%	82.6	9,637	0.0086	0.0030	39	0.336	0.108	0.563
2009	6.0%	29	0.0%	0.0	2,898	0.0000	0.0000	48	0.000	0.000	0.000
2010	11.7%	41	0.0%	0.0	6,396	0.0000	0.0000	55	0.000	0.000	0.000
2011	Observed under IFQ Fishery, see Tables 1 & 2										
Open Access Sector											
2002	*not observed*		-	-	-	-	-	90	-	-	-
2003	4.3%	110	0.0%	0.0	1,977	0.0000	0.0000	46	0.000	0.000	0.000
2004	6.4%	244	1.6%	49.4	5,100	0.0097	0.0058	80	0.776	0.001	1.691
2005	9.7%	360	0.0%	0.0	7,489	0.0000	0.0000	77	0.000	0.000	0.000
2006	*not observed*		-	-	-	-	-	61	-	-	-
2007	6.9%	226	0.0%	0.0	2,694	0.0000	0.0000	39	0.000	0.000	0.000
2008	5.2%	197	0.0%	0.0	2,631	0.0000	0.0000	50	0.000	0.000	0.000
2009	0.7%	30	0.0%	0.0	634	0.0000	0.0000	85	0.000	0.000	0.000
2010	3.5%	111	0.0%	0.0	2,349	0.0000	0.0000	67	0.000	0.000	0.000
2011	15.6%	213	0.0%	0.0	12,504	0.0000	0.0000	80	0.000	0.000	0.000

* Coverage rate in the California halibut trawl fishery is defined as the proportion of California halibut landings that were observed.

Table 18. Discard estimates for all fishery sectors observed by the NWFSC Groundfish Observer Program (WCGOP), 2002-2011. Total discard mortality estimates are also provided when discard mortality rates were available.

	Year	LE bottom trawl (2002-2010)	IFQ Fishery (first year: 2011)						Non-nearshore fixed gear			Nearshore fixed gear*	Pink shrimp*	CA halibut‡*	At-sea Hake*	Total
			Shoreside Hake*	LE CA Halibut*	Bottom Trawl	Midwater Trawl*	Hook and Line	Pot	LE primary	LE non-primary	OA					
Gross discard estimates (mt)	2002	524							144	0.0	-	-	-	0.0	1.1	670
	2003	187							203	0.1	-	0.0	-	0.0	2.6	392
	2004	212							247	0.0	-	1.0	0.0	0.8	1.1	462
	2005	460							229	0.0	-	2.2	0.1	0.0	2.0	694
	2006	391							668	0.0	-	0.5	-	0.0	0.8	1060
	2007	294							131	1.5	22.7	0.1	0.2	0.1	1.2	451
	2008	305							246	2.7	44.3	0.4	0.0	0.3	4.0	603
	2009	385							310	0.2	39.9	1.3	0.0	0.0	0.3	737
	2010	265							140	0.4	33.1	0.1	0.0	0.0	1.6	441
	2011		0.0	0.0	65.2	***	6.1	3.3	269	21.3	17.2	2.0	0.2	0.0	0.6	385
Total discard mortality (mt)	2002	345							23	0.0	0.0	-	-	0.0	1.1	369
	2003	124							32	0.0	0.0	0.0	-	0.0	2.6	160
	2004	133							40	0.0	0.0	1.0	0.0	0.8	1.1	176
	2005	287							37	0.0	0.0	2.2	0.1	0.0	2.0	327
	2006	242							107	0.0	0.0	0.5	-	0.0	0.8	351
	2007	209							21	0.2	3.6	0.1	0.2	0.1	1.2	235
	2008	208							39	0.4	7.1	0.4	0.0	0.3	4.0	259
	2009	251							50	0.0	6.4	1.3	0.0	0.0	0.3	309
	2010	181							22	0.1	5.3	0.1	0.0	0.0	1.6	210
	2011		0.03	0.0	31.3	***	1.0	0.9	22	3.4	2.8	2.0	0.2	0.0	0.6	64

Figure 1. Fish ticket data processing for division into 2011 groundfish fishery sectors after retrieval from the Pacific Fisheries Information Network (PacFIN) database. Grey boxes indicate sectors for which federal observer data is available. Fish ticket processing methods are updated regularly, thus this figure might differ from similar figures in previous reports.

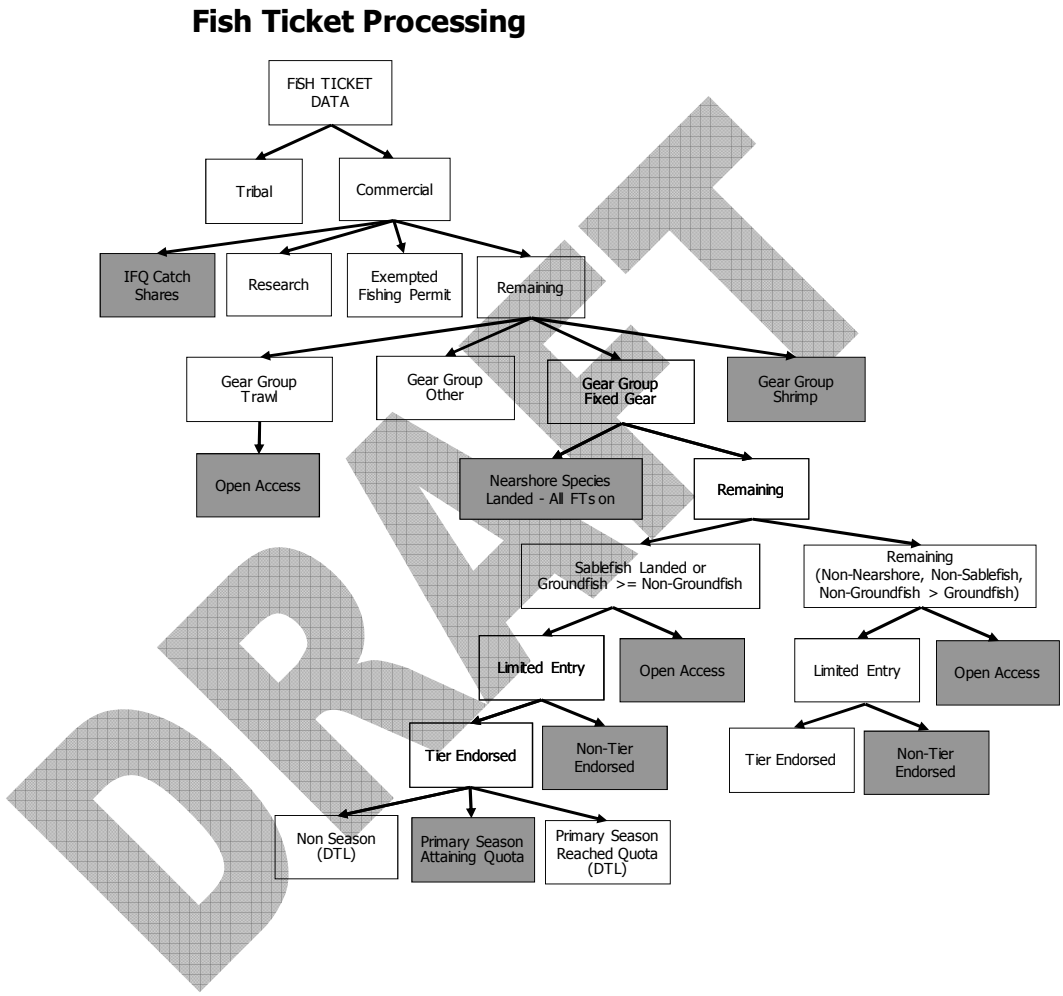


Figure 2a. Spatial distribution of Pacific halibut catch (mt/km^2) observed by the West Coast Groundfish Observer Program, off the U.S. west coast (WA, OR). Gear types observed by the WCGOP include bottom trawl, midwater trawl, shrimp trawl, fixed gear hook-and-line and pot gear. The four catch classifications were defined by dividing the maximum value (2.0697) in half to obtain the 1.0349-2.0697 catch bin. The next lower bin was obtained by dividing the lower bound of the upper bin (1.0348) in half again to obtain the 0.51745-1.0348 catch bin. The remaining observations were allocated into equal proportions into the two lowest classifications. Cells calculated from less than 3 vessels were omitted from the map due to confidentiality.

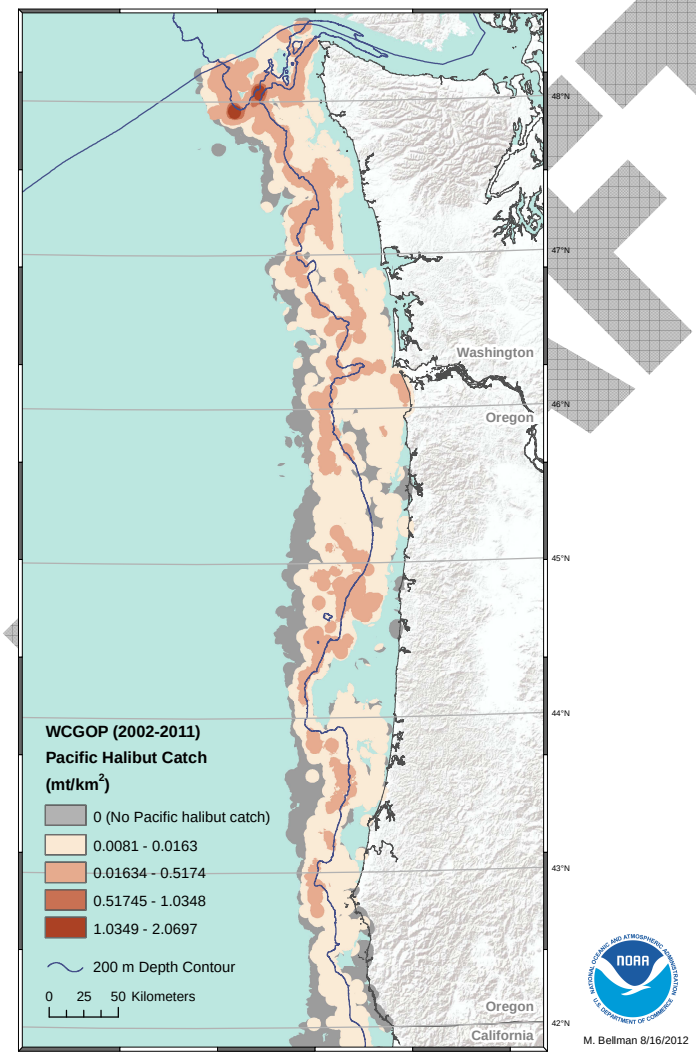


Figure 2b. Spatial distribution of Pacific halibut catch (mt/km^2) and fishing grounds observed by the West Coast Groundfish Observer Program, off the U.S. west coast (CA). See Figure 2a caption for full description.

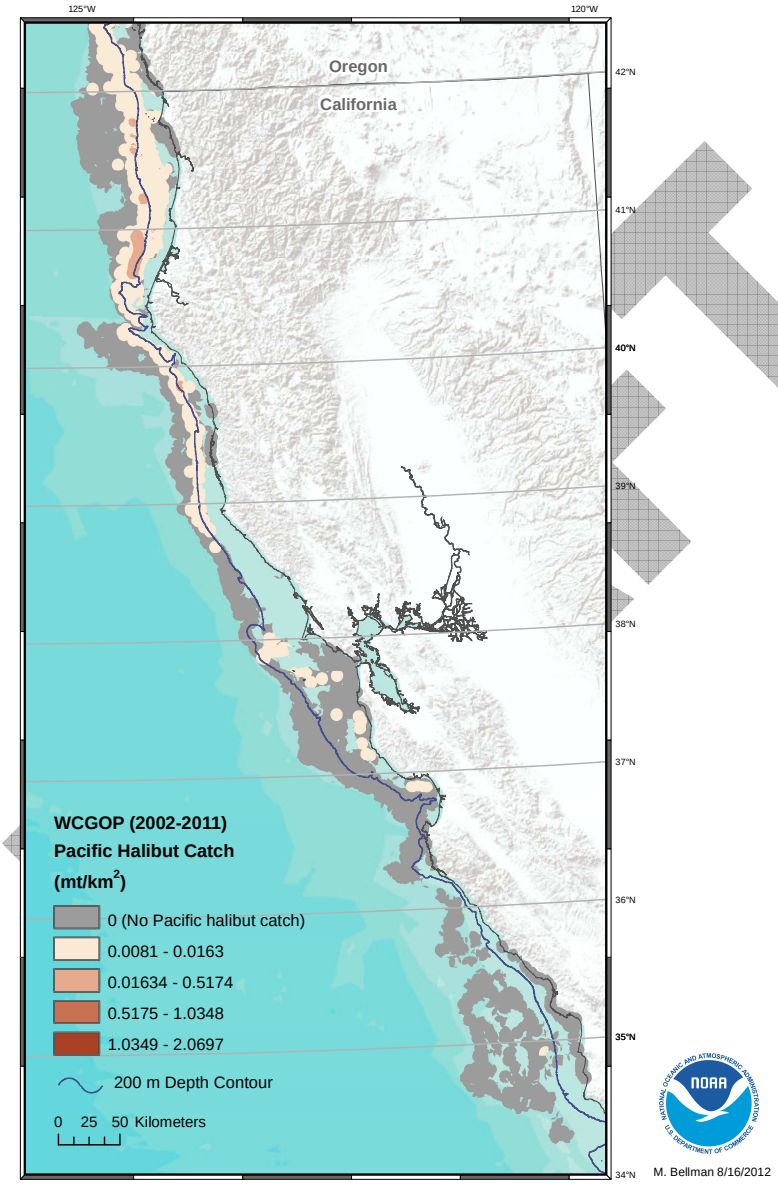


Figure 3. Estimated discard mortality of Pacific halibut in the non-nearshore groundfish fixed gear fishery. Estimates are presented for fixed gear sectors with annual discard estimates exceeding 1 mt, which included all components of the limited entry (LE) sablefish endorsed sector (longline gear (LL) by area and pot gear (POT) coastwide) and the open access (OA) sector using hook-and-line gears. The OA fixed gear sector was only observed in California from 2003-2006 and was not covered in 2002. A fixed average discard rate from 2007 and 2008 data was applied to generate 2002-2006 discard estimates for the OA sector. Although OA 2002-2006 discard estimates are not included in final total mortality summaries, they are shown here for comparison purposes. Other fixed gear sectors include LE non-sablefish endorsed and OA fixed gear vessels fishing with pot gear.

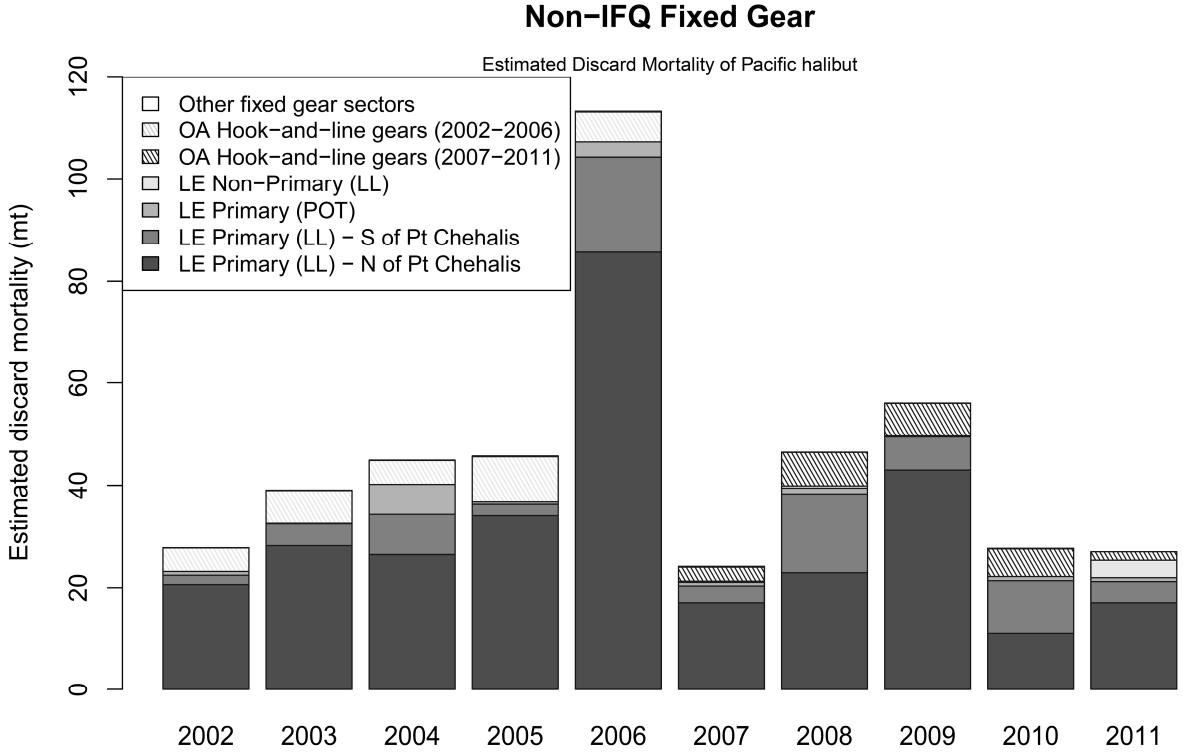
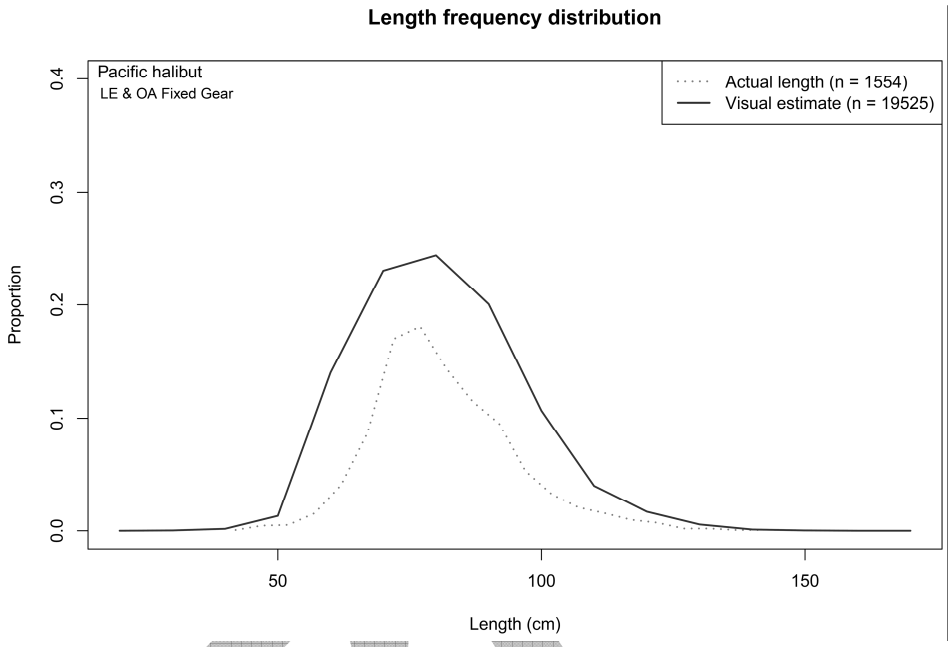


Figure 4. Length frequency distribution of discarded Pacific halibut on WCGOP observed limited entry (LE) and open access (OA) groundfish fixed gear vessels from September 2003 through December 2011. The majority of Pacific halibut lengths collected in this fishery were visual estimates (solid dark line).



APPENDIX A

Weighted catch composition data from the IFQ fishery for bottom trawl and pot gears. The frequency within each length bin was weighted based on the following equation:

$$n_{wghtd_l} = n_l \times \frac{W_{st}}{\sum_l w_{stl}} \times \frac{\sum_t W_{st}}{W_{st}} \times \frac{\hat{W}_s}{\sum_t W_{st}} = n_l \times \frac{\hat{W}_s}{\sum_l w_{stl}}$$

where:
n_l: number of measured fish in length bin l
w_{stl}: total weight of length l fish measured, as determined through the IPHC length-weight relationship
W_{st}: total observed discard weight of Pacific halibut on tow t, in stratum s
$\hat{W}_s$: estimated total discard weight of Pacific halibut in stratum s

Table A1. Weighted length frequency distributions for Pacific halibut in the 2011 IFQ fishery for bottom trawl and pot gears.

	IFQ Fishery 2011			IFQ Fishery 2011			IFQ Fishery 2011	
Length bin (cm)	Bottom Trawl	Pot	Length bin (cm)	Bottom Trawl	Pot	Length bin (cm)	Bottom Trawl	Pot
18	0.0065	0.0000	80	0.0575	0.1033	142	0.0001	0.0000
20	0.0000	0.0000	82	0.0471	0.0504	144	0.0001	0.0000
22	0.0000	0.0000	84	0.0457	0.0459	146	0.0000	0.0000
24	0.0000	0.0000	86	0.0306	0.0329	148	0.0000	0.0000
26	0.0000	0.0000	88	0.0282	0.0297	150	0.0000	0.0000
28	0.0000	0.0000	90	0.0263	0.0455	152	0.0000	0.0000
30	0.0000	0.0734	92	0.0213	0.0173	154	0.0000	0.0000
32	0.0000	0.0000	94	0.0168	0.0149	156	0.0000	0.0000
34	0.0000	0.0000	96	0.0135	0.0123	158	0.0000	0.0000
36	0.0000	0.0000	98	0.0097	0.0098	160	0.0000	0.0000
38	0.0000	0.0000	100	0.0090	0.0194	162	0.0000	0.0000
40	0.0041	0.0578	102	0.0071	0.0020	164	0.0000	0.0000
42	0.0023	0.0000	104	0.0055	0.0019	166	0.0000	0.0003
44	0.0000	0.0197	106	0.0040	0.0000	168	0.0000	0.0000
46	0.0003	0.0000	108	0.0031	0.0028	170	0.0000	0.0000
48	0.0029	0.0000	110	0.0025	0.0016	172	0.0000	0.0000
50	0.0054	0.0063	112	0.0020	0.0010	174	0.0000	0.0000
52	0.0045	0.0000	114	0.0018	0.0022	176	0.0000	0.0000
54	0.0078	0.0103	116	0.0011	0.0004	178	0.0000	0.0000
56	0.0073	0.0044	118	0.0009	0.0009	180	0.0000	0.0000
58	0.0191	0.0121	120	0.0005	0.0024	182	0.0000	0.0000
60	0.0330	0.0605	122	0.0005	0.0023	184	0.0000	0.0000
62	0.0435	0.0501	124	0.0006	0.0000	186	0.0000	0.0000
64	0.0556	0.0174	126	0.0003	0.0000	188	0.0000	0.0000
66	0.0579	0.0109	128	0.0003	0.0007	190	0.0000	0.0000
68	0.0561	0.0172	130	0.0001	0.0006	192	0.0000	0.0000
70	0.0771	0.0680	132	0.0002	0.0000	194	0.0000	0.0000
72	0.0727	0.0726	134	0.0000	0.0006	196	0.0000	0.0000
74	0.0851	0.0433	136	0.0001	0.0005	198	0.0000	0.0000
76	0.0665	0.0147	138	0.0000	0.0002	200	0.0000	0.0001
78	0.0556	0.0595	140	0.0001	0.0000			

Table A2. Percentage of weighted length measurements in each viability condition category, by gear type in the 2011 IFQ groundfish fishery.

IFQ Fishery 2011

Length	Bottom Trawl			Pot			Length	Bottom Trawl			Pot		
bin (cm)	Excellent	Poor	Dead	Excellent	Poor	Dead	bin (cm)	Excellent	Poor	Dead	Excellent	Poor	Dead
18	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	110	56.3%	11.2%	32.5%	100.0%	0.0%	0.0%
20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	112	56.7%	22.5%	20.8%	100.0%	0.0%	0.0%
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	114	49.8%	25.1%	25.0%	57.6%	0.0%	42.4%
24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	116	60.8%	13.4%	25.7%	0.0%	0.0%	100.0%
26	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	118	55.9%	9.8%	34.3%	0.0%	0.0%	100.0%
28	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	120	47.5%	28.3%	24.2%	100.0%	0.0%	0.0%
30	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	122	54.3%	8.2%	37.5%	100.0%	0.0%	0.0%
32	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	124	39.9%	21.7%	38.3%	0.0%	0.0%	0.0%
34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	126	41.9%	19.3%	38.8%	0.0%	0.0%	0.0%
36	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	128	53.2%	35.4%	11.4%	100.0%	0.0%	0.0%
38	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	130	75.3%	24.7%	0.0%	100.0%	0.0%	0.0%
40	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	132	45.2%	18.4%	36.4%	0.0%	0.0%	0.0%
42	48.7%	51.3%	0.0%	0.0%	0.0%	0.0%	134	79.1%	20.9%	0.0%	100.0%	0.0%	0.0%
44	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	136	25.4%	49.1%	25.4%	100.0%	0.0%	0.0%
46	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	138	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%
48	25.1%	25.1%	49.7%	0.0%	0.0%	0.0%	140	48.9%	51.1%	0.0%	0.0%	0.0%	0.0%
50	29.8%	0.0%	70.2%	0.0%	0.0%	0.0%	142	24.9%	25.4%	49.7%	0.0%	0.0%	0.0%
52	23.0%	42.3%	34.7%	0.0%	0.0%	0.0%	144	59.2%	40.8%	0.0%	0.0%	0.0%	0.0%
54	15.7%	42.8%	41.5%	0.0%	0.0%	100.0%	146	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
56	20.8%	45.3%	33.9%	100.0%	0.0%	0.0%	148	49.4%	0.0%	50.6%	0.0%	0.0%	0.0%
58	19.9%	31.2%	48.9%	67.9%	0.0%	32.1%	150	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
60	32.9%	24.2%	42.9%	57.3%	0.0%	42.7%	152	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
62	37.8%	22.7%	39.6%	38.0%	0.0%	62.0%	154	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
64	39.6%	18.7%	41.7%	34.5%	0.0%	65.5%	156	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
66	36.7%	21.1%	42.3%	50.0%	0.0%	50.0%	158	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
68	42.6%	12.0%	45.4%	69.9%	0.0%	30.1%	160	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
70	41.6%	20.8%	37.7%	62.2%	3.4%	34.4%	162	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
72	38.6%	20.9%	40.5%	77.3%	0.0%	22.7%	164	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
74	40.2%	17.4%	42.4%	69.2%	9.1%	21.7%	166	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
76	45.7%	16.9%	37.4%	43.2%	0.0%	56.8%	168	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
78	41.3%	18.9%	39.8%	59.1%	7.9%	33.0%	170	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
80	45.9%	15.9%	38.2%	57.6%	1.7%	40.7%	172	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
82	45.8%	19.9%	34.3%	86.4%	5.6%	8.0%	174	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
84	50.4%	14.7%	34.9%	59.3%	6.0%	34.7%	176	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
86	44.9%	14.5%	40.6%	85.3%	7.4%	7.4%	178	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
88	41.7%	16.1%	42.2%	92.4%	0.0%	7.6%	180	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	48.5%	16.9%	34.5%	70.5%	0.0%	29.5%	182	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
92	47.0%	17.2%	35.8%	55.8%	22.1%	22.1%	184	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	51.2%	20.1%	28.7%	52.2%	23.9%	23.9%	186	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
96	49.5%	14.6%	35.9%	45.6%	13.4%	41.0%	188	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
98	50.0%	18.2%	31.8%	53.2%	0.0%	46.8%	190	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
100	53.9%	18.2%	27.9%	77.6%	0.0%	22.4%	192	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
102	47.4%	16.1%	36.5%	100.0%	0.0%	0.0%	194	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
104	53.0%	18.8%	28.2%	100.0%	0.0%	0.0%	196	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
106	54.4%	18.4%	27.2%	0.0%	0.0%	0.0%	198	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
108	54.3%	19.9%	25.8%	18.5%	0.0%	81.5%	200	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%

APPENDIX B Inseason Manual Pacific Halibut IBQ Expansions

Table B1. The number of vessels and trips that required manual expansions of P. halibut IBQ weight in the 2011 U.S. west coast groundfish IFQ fishery.

	2011 IFQ Total	**Number manually calculated due to PHLB scenarios**	**Number manually calculated due to unsampled hauls (Trawl)**	**Number manually calculated due to lost trawl gear**	**Number manually calculated due to lost fixed gear**	**Total number of manually calculated discard events**	**% Manually Calculated**
Number of vessels	113	13	16	4	1	24	21.24 *
Number of trips	1164	19	21	4	3	38	3.26

*Percentage of vessels with manually calculated discard may be included in one or more categories

Scenario 1: *Total count of PHLB exists with no length or viability data.*

Resolution: Determine an average mortality weight per individual PHLB in the trip from all sampled hauls. Multiply that average by the total count of PHLB to determine an IBQ.

Scenario 2: *Total count of PHLB exists with actual lengths and no viability data.*

Resolution: Determine catch weight for PHLB using the lengths in the haul and then apply that to the total count for a total weight. Determine CATCH_WEIGHT_MORT for all viabilities (E, P, D) from all other properly sampled hauls in the trip and apply to the CATCH_WEIGHT for IBQ estimate.

Scenario 3: *Total count of PHLB exists with visual estimates of PHLB lengths and no viabilities.*

Resolution: The use of visual lengths was discouraged by the IPHC so the most appropriate method is to determine an average IBQ per individual PHLB in the trip from all sampled hauls. Multiply that average by the total count of PHLB to determine an IBQ.

Scenario 4: *Total count of PHLB exists with visual estimates of PHLB lengths and proper in-hand viabilities.*

Resolution: The use of visual lengths was discouraged by the IPHC, so the most appropriate method here would be to determine an average IBQ per individual PHLB in the trip from all sampled

hauls. Multiply that average by the total count of PHLB to determine an IBQ.

Scenario 5: *Total count of PHLB does not exist without any length or viability data*

Resolution: Confirm PHLB was present in the haul, and no data was collected on them. Determine an average IBQ per haul for all sampled hauls in the trip. This scenario is unlikely and did not occur in 2011.

Scenario 6: *Total count of PHLB does not exist with length and no viability data.*

Resolution: Catch weight for the haul will be determined by taking the measured PHLB sample, convert to weight, divided by the number of fish sampled, multiplied by the average number of PHLB for all sampled hauls in the trip. Then the average mortality rates from the sampled hauls are applied to the calculated PHLB weight. This scenario is unlikely and did not occur in 2011.

Scenario 7: *Total count of PHLB does not exist with length and viability data.*

Resolution: Catch weight for the haul will be determined by taking the lengthed PHLB sample, converted to weight, divided by the number of fish sampled, multiplied by the average number of PHLB for all sampled hauls in the trip. Since viabilities and lengths exist, IBQ can be determined using normal protocols and the calculated catch weight. This scenario is unlikely and did not occur in 2011.

Scenario 8: *Total count of PHLB does not exist with visual length and no viability data.*

Resolution: The use of visual lengths was discouraged by the IPHC so the most appropriate method here would be to determine an average IBQ per haul for all sampled hauls in the trip and apply to this haul as well.

Scenario 9: *Total count of PHLB does not exist with visual length and viability data.*

Resolution: The use of visual lengths was discouraged by the IPHC so the most appropriate method here would be to determine an average IBQ per haul for all sampled hauls in the trip and apply to this haul as well.

Scenario 10: *Observer encounters predated fish that are dead and badly damaged so that accurate biological data cannot be collected.*

Resolution: If properly sampled PHLB exist in the haul they can be used to determine the portion of the catch weight attributed to the predated and non-predated fish. The IBQ for the PHLB not predated would be calculated separately using the data collected in the haul. The IBQ for the predated fish would be the portion of the PHLB catch weight attributed to the predated fish multiplied by the mortality rate for “dead” from the IPHC viability tables for that gear.

If all PHLB in the haul are heavily predated then a catch weight for the haul will need to be determined. This can be done by taking the total count of PHLB in the haul times an average catch weight (not IBQ estimates) per PHLB from other hauls in the trip (or like "sets" if PHLB doesn't exist in any other hauls). The estimated catch weight will then be multiplied by the mortality rate for "dead" from the IPHC viability tables for that gear to determine IBQ. In 2011, there were only two instances where a Pacific halibut IBQ was manually calculated due to sand flea predation.

Table B2. Calculations used in manual Pacific halibut IBQ calculations in the 2011 U.S. west coast groundfish IFQ fishery.

SCENARIO	CALCULATION
1	∑CATCH_WEIGHT_MORT for all sampled hauls x CATCH_COUNT for unsampled haul=PHLB IBQ ∑CATCH_COUNT for all sampled hauls
2	CATCH_WEIGHT = Σ SPECIMEN_LENGTH* x CATCH_COUNT #_PHLB_SAMPLED_IFQ CATCH_WEIGHT_MORT = CATCH_WEIGHT_MORT Σ (E) + CATCH_WEIGHT_MORT Σ (P) + CATCH_WEIGHT_MORT Σ (D) CATCH_WEIGHT_MORT Σ (E) = Σ (SPECIMEN_LENGTH* where VIABILITY = E) for all sampled hauls x CATCH_WEIGHT x (.20**) Σ SPECIMEN_LENGTH* for all sampled hauls CATCH_WEIGHT_MORT Σ (P) = Σ (SPECIMEN_LENGTH* where VIABILITY = P) for all for all sampled hauls x CATCH_WEIGHT x (.55**) Σ SPECIMEN_LENGTH* for all sampled hauls CATCH_WEIGHT_MORT Σ (D) = Σ (SPECIMEN_LENGTH* where VIABILITY = D) for all sampled hauls x CATCH_WEIGHT x (.90**) Σ SPECIMEN_LENGTH* for all sampled hauls
3, 4, 5	∑CATCH_WEIGHT_MORT for all sampled hauls x CATCH_COUNT for unsampled haul=PHLB IBQ ∑CATCH_COUNT for all sampled hauls

6, 7	Average CATCH_COUNT for all sampled hauls = ∑CATCH_COUNT for all sampled hauls
	Total # sampled hauls
	CATCH_WEIGHT = Σ SPECIMEN_LENGTH* x Average CATCH_COUNT for all sampled hauls
	#_PHLB_SAMPLED_IFQ
	
	CATCH_WEIGHT_MORT =
	CATCH_WEIGHT_MORT Σ (E) + CATCH_WEIGHT_MORT Σ (P) + CATCH_WEIGHT_MORT Σ (D)
	
	CATCH_WEIGHT_MORT Σ (E) =
	Σ (SPECIMEN_LENGTH* where VIABILITY = E) for all sampled hauls x CATCH_WEIGHT x (.20**)
	Σ SPECIMEN_LENGTH* for all sampled hauls
	
	CATCH_WEIGHT_MORT Σ (P) =
	Σ (SPECIMEN_LENGTH* where VIABILITY = P) for all sampled hauls x CATCH_WEIGHT x (.55**)
	Σ SPECIMEN_LENGTH* for all sampled hauls
	
	CATCH_WEIGHT_MORT Σ (D) =
	Σ (SPECIMEN_LENGTH* where VIABILITY = D) for all sampled hauls x CATCH_WEIGHT x (.90**)
	Σ SPECIMEN_LENGTH* for all sampled hauls

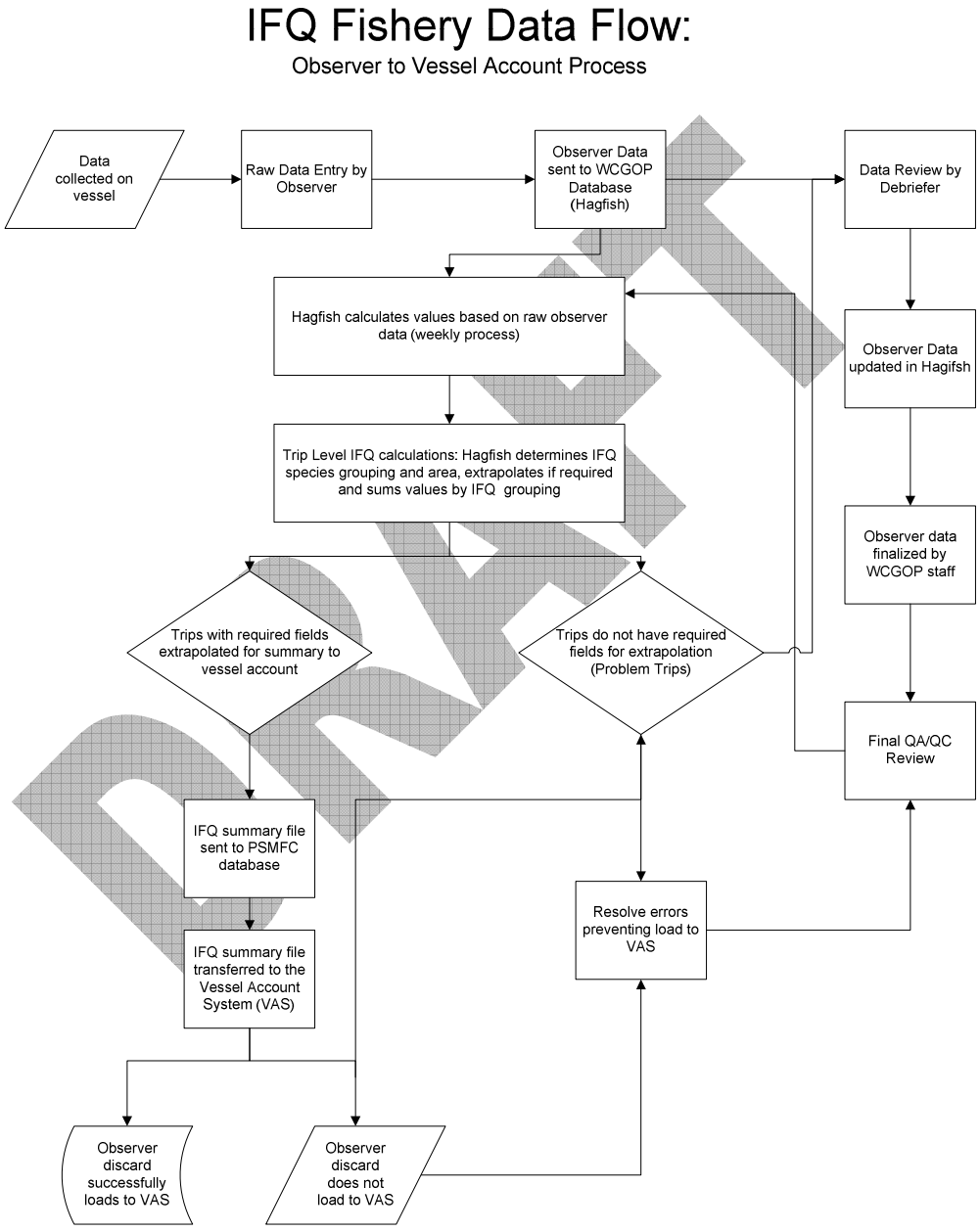
8, 9	PHLB IBQ = ∑CATCH_WEIGHT_MORT for all sampled hauls Total # of sampled hauls
10	CATCH_WEIGHT_MORT = ∑CATCH_WEIGHT _MORT for the properly sampled PHLB + (CATCH_WEIGHT estimate for the predated PHLB* Mortality rate for "dead" for that fishery)

Appendix C. IPHC length weight conversion table for Pacific halibut

Centimeter	Pounds	Kilograms	Centimeter	Pounds	Kilograms	Centimeter	Pounds	Kilograms	Centimeter	Pounds	Kilograms
10	0.02	0.01	71	9.19	4.17	131	66.82	30.31	191	226.70	102.83
11	0.02	0.01	72	9.61	4.36	132	68.48	31.06	192	230.56	104.58
12	0.02	0.01	73	10.05	4.56	133	70.17	31.83	193	234.48	106.36
13	0.04	0.02	74	10.49	4.76	134	71.89	32.61	194	238.45	108.16
14	0.04	0.02	75	10.98	4.98	135	73.66	33.41	195	242.44	109.97
15	0.07	0.03	76	11.44	5.19	136	75.44	34.22	196	246.50	111.81
16	0.07	0.03	77	11.95	5.42	137	77.25	35.04	197	250.60	113.67
17	0.09	0.04	78	12.46	5.65	138	79.08	35.87	198	255.74	116.00
18	0.11	0.05	79	12.99	5.89	139	80.95	36.72	199	258.93	117.45
19	0.13	0.06	80	13.51	6.13	140	82.87	37.59	200	263.17	119.37
20	0.15	0.07	81	14.07	6.38	141	84.79	38.46	201	267.46	121.32
21	0.18	0.08	82	14.64	6.64	142	86.75	39.35	202	271.79	123.28
22	0.20	0.09	83	15.23	6.91	143	88.76	40.26	203	276.17	125.27
23	0.24	0.11	84	15.83	7.18	144	90.79	41.18	204	280.60	127.28
24	0.26	0.12	85	16.45	7.46	145	92.84	42.11	205	285.10	129.32
25	0.31	0.14	86	17.09	7.75	146	94.93	43.06	206	289.62	131.37
26	0.35	0.16	87	17.75	8.05	147	97.05	44.02	207	294.21	133.45
27	0.40	0.18	88	18.41	8.35	148	99.21	45.00	208	298.84	135.55
28	0.46	0.21	89	19.09	8.66	149	101.39	45.99	209	303.51	137.67
29	0.51	0.23	90	19.80	8.98	150	103.62	47.00	210	308.25	139.82
30	0.57	0.26	91	20.53	9.31	151	105.87	48.02	211	313.03	141.99
31	0.62	0.28	92	21.25	9.64	152	108.16	49.06	212	317.86	144.18
32	0.71	0.32	93	22.02	9.99	153	110.50	50.12	213	322.73	146.39
33	0.77	0.35	94	22.80	10.34	154	112.83	51.18	214	327.67	148.63
34	0.84	0.38	95	23.59	10.70	155	115.24	52.27	215	332.65	150.89
35	0.93	0.42	96	24.41	11.07	156	117.66	53.37	216	337.70	153.18
36	1.01	0.46	97	25.24	11.45	157	120.13	54.49	217	342.79	155.49
37	1.10	0.50	98	26.08	11.83	158	122.62	55.62	218	347.93	157.82
38	1.21	0.55	99	26.96	12.23	159	125.16	56.77	219	353.13	160.18
39	1.32	0.60	100	27.87	12.64	160	127.71	57.93	220	358.38	162.56
40	1.43	0.65	101	28.77	13.05	161	130.32	59.11	221	363.69	164.97
41	1.59	0.72	102	29.70	13.47	162	132.96	60.31	222	369.05	167.40
42	1.68	0.76	103	30.67	13.91	163	135.65	61.53	223	374.45	169.85
43	1.81	0.82	104	31.64	14.35	164	138.36	62.76	224	379.92	172.33
44	1.94	0.88	105	32.63	14.80	165	141.12	64.01	225	385.45	174.84
45	2.09	0.95	106	33.64	15.26	166	143.90	65.27	226	391.03	177.37
46	2.25	1.02	107	34.68	15.73	167	146.72	66.55	227	396.67	179.93
47	2.43	1.10	108	35.74	16.21	168	149.54	67.83	228	402.36	182.51
48	2.58	1.17	109	36.84	16.71	169	152.49	69.17	229	408.09	185.11
49	2.76	1.25	110	37.94	17.21	170	155.45	70.51	230	413.91	187.75
50	2.95	1.34	111	39.07	17.72	171	158.42	71.86	231	419.76	190.40
51	3.15	1.43	112	40.21	18.24	172	161.44	73.23	232	425.69	193.09
52	3.35	1.52	113	41.38	18.77	173	164.51	74.62	233	431.66	195.80
53	3.57	1.62	114	42.59	19.32	174	167.60	76.02	234	437.68	198.53
54	3.79	1.72	115	43.81	19.87	175	170.75	77.45	235	443.76	201.29
55	4.01	1.82	116	45.06	20.44	176	173.92	78.89	236	449.91	204.08
56	4.25	1.93	117	46.32	21.01	177	177.14	80.35	237	456.13	206.90
57	4.52	2.05	118	47.62	21.60	178	180.40	81.83	238	462.39	209.74
58	4.76	2.16	119	48.94	22.20	179	183.71	83.33	239	468.72	212.61
59	5.05	2.29	120	50.29	22.81	180	187.06	84.85	240	475.09	215.50
60	5.31	2.41	121	51.65	23.43	181	190.46	86.39	241	481.55	218.43
61	5.62	2.55	122	53.07	24.07	182	193.87	87.94	242	488.05	221.38
62	5.93	2.69	123	54.48	24.71	183	197.36	89.52	243	494.60	224.35
63	6.24	2.83	124	55.93	25.37	184	200.86	91.11	244	501.24	227.36
64	6.57	2.98	125	57.41	26.04	185	204.43	92.73	245	507.92	230.39
65	6.90	3.13	126	58.91	26.72	186	208.03	94.36	246	514.66	233.45
66	7.25	3.29	127	60.43	27.41	187	211.67	96.01	247	521.48	236.54
67	7.61	3.45	128	61.99	28.12	188	214.71	97.39	248	528.36	239.66
68	7.98	3.62	129	63.56	28.83	189	218.50	99.11	249	535.28	242.80
69	8.38	3.80	130	65.17	29.56	190	222.89	101.10	250	542.29	245.98
70	8.77	3.98									

APPENDIX D

Figure D1. IFQ groundfish fishery data flow from the West Coast Groundfish Observer Program (WCGOP) to the Vessel Account System (VAS) of the NW Regional Office.



NOAA FISHERIES

NWFSC

Pacific halibut bycatch in the groundfish fishery (2002-2011)

Northwest Fisheries Science Center
Groundfish Observer Program

September 14, 2012

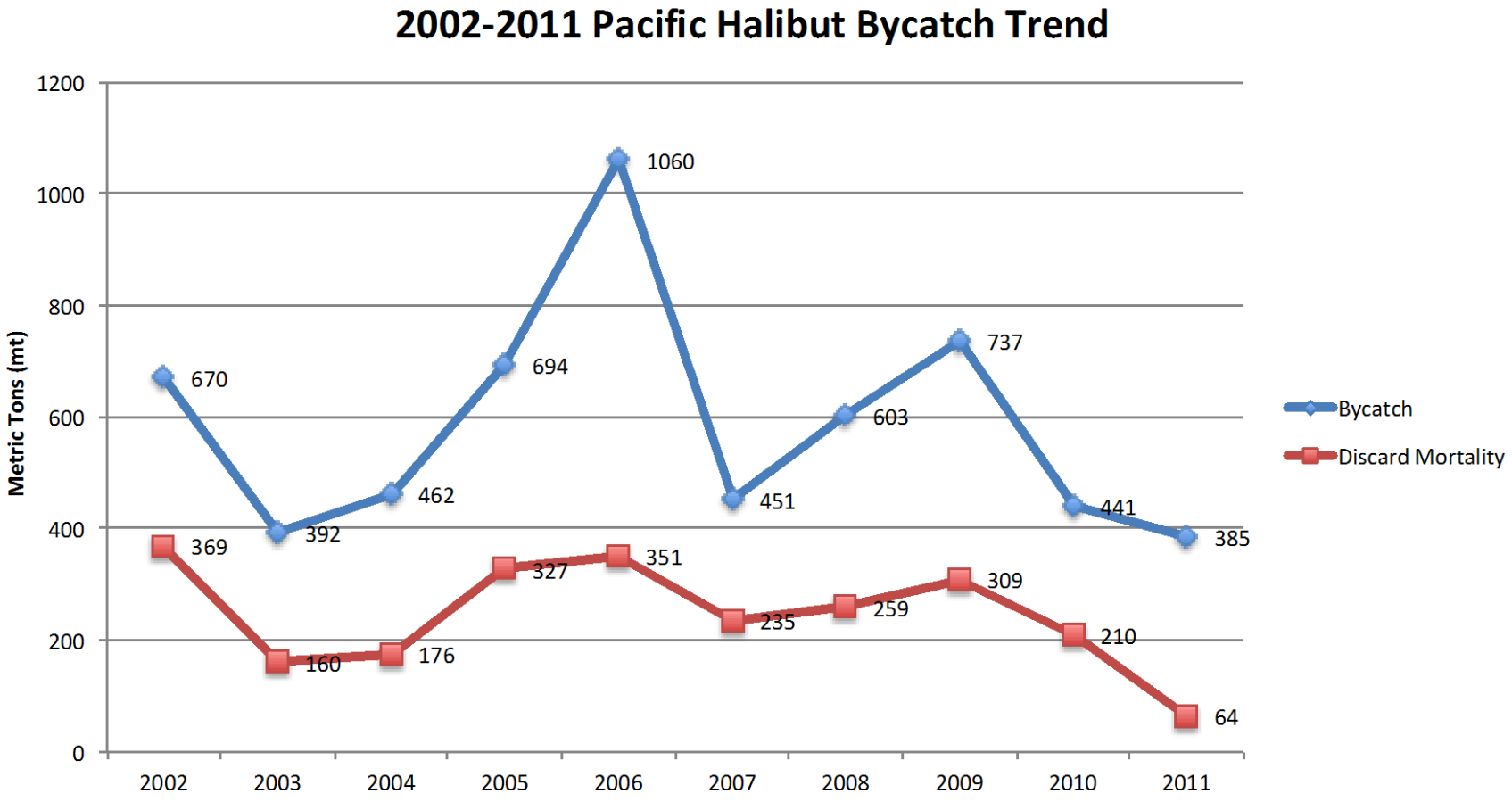
Overview

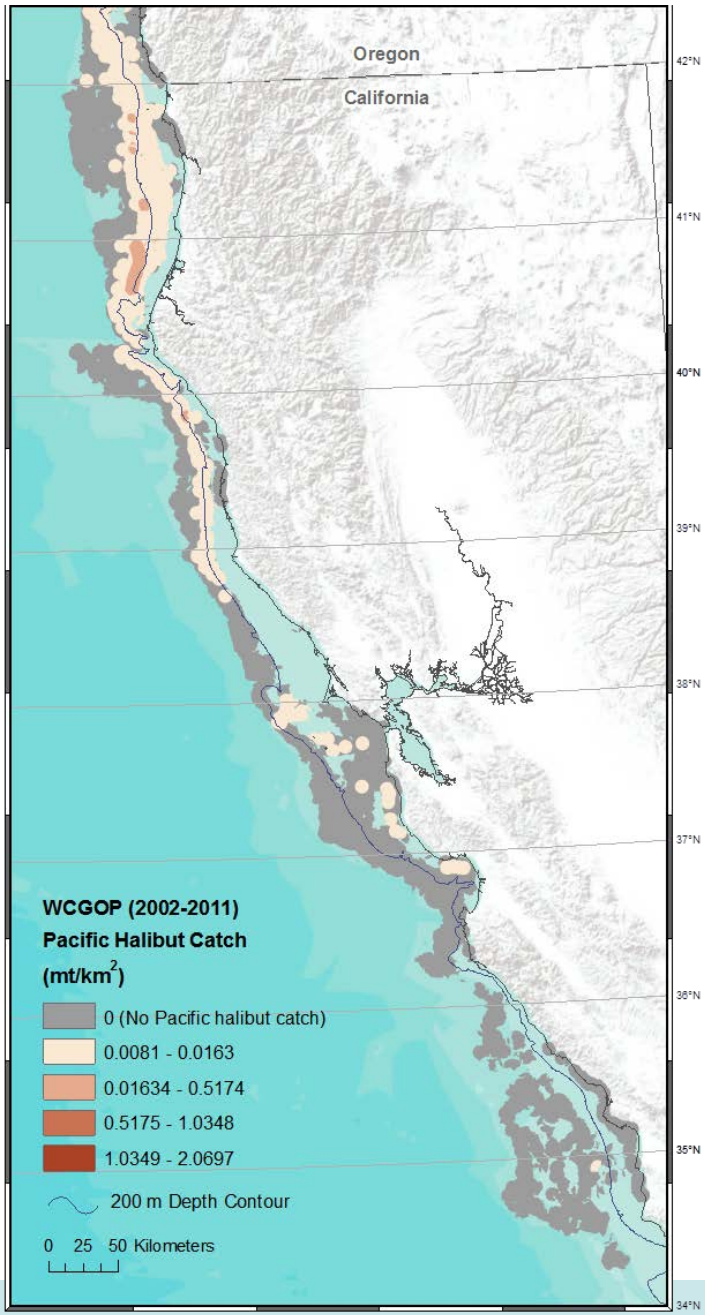
- Summary of Results
- Catch Share Fishery
  - IFQ: In-season and Final
- Non-Catch Share fisheries
- Questions?

Goals of Pacific halibut report

- Provide estimates of Pacific halibut bycatch and discard mortality for observed fisheries.
- Provide information on spatial distribution of Pacific halibut catch
- Provide transparency to in-season Pacific halibut estimation

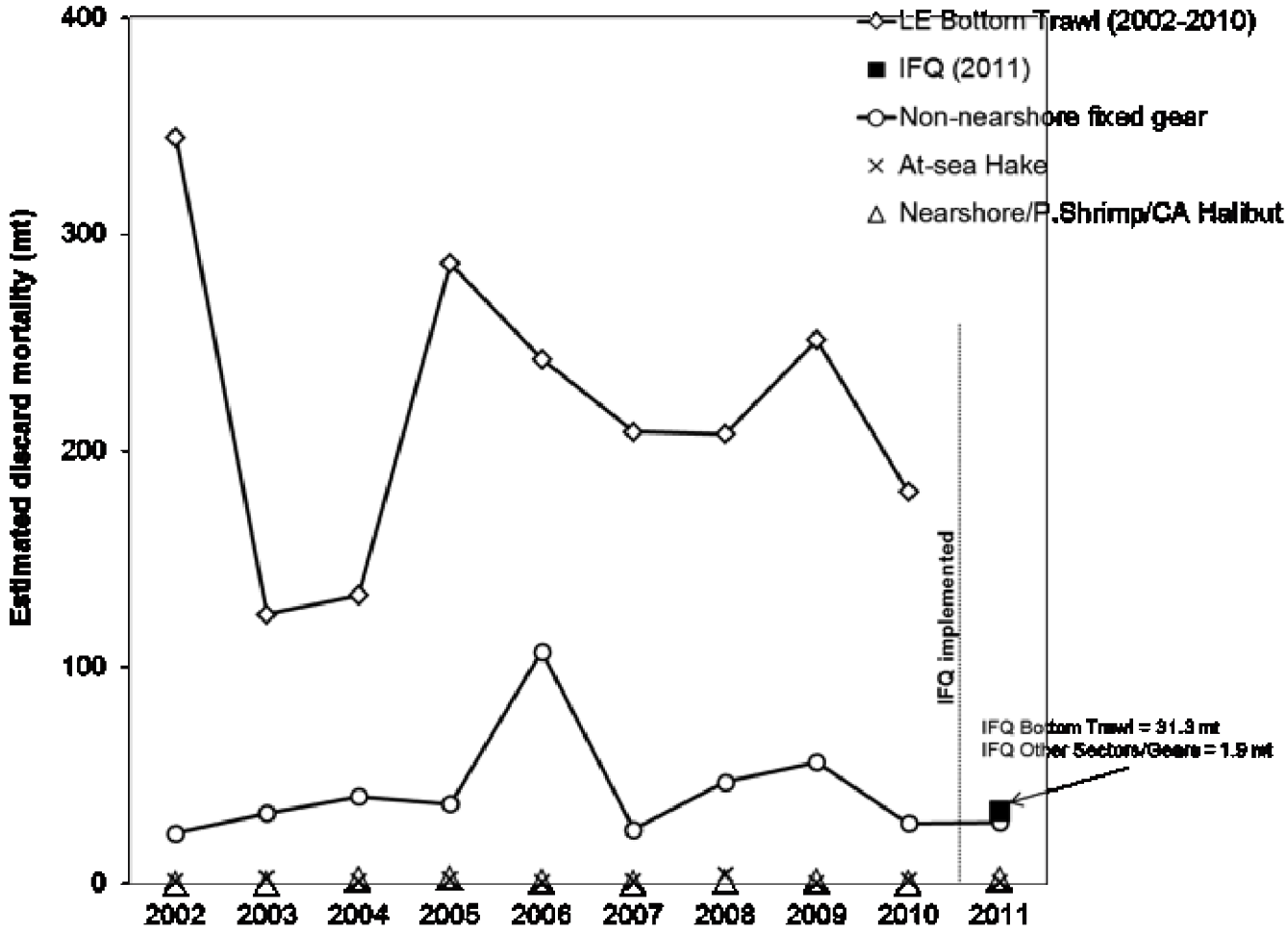
Pacific halibut bycatch 2002-2011





M. Bellman 8/16/2012

Figure ES-1: P. halibut bycatch by fishery



Catch Shares Fishery

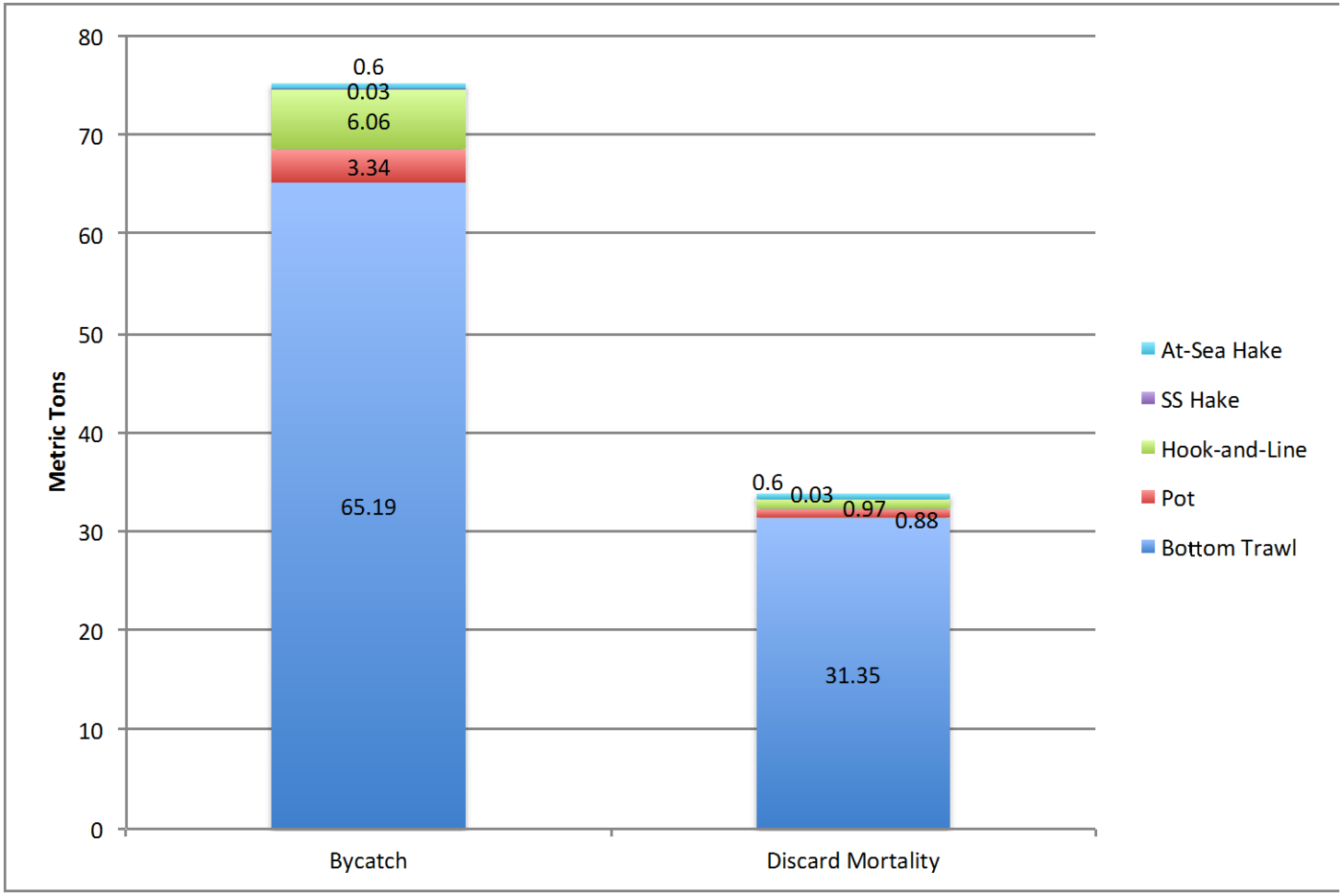
Catch Shares Sectors

- IFQ Fishery
  - Trawl (94%)
    - Groundfish bottom trawl
    - Midwater non-hake trawl
    - CA Halibut trawl
  - Pot (4%)
  - Hook-and-Line (2%)
- SS hake mid-water trawl
- At-Sea Hake

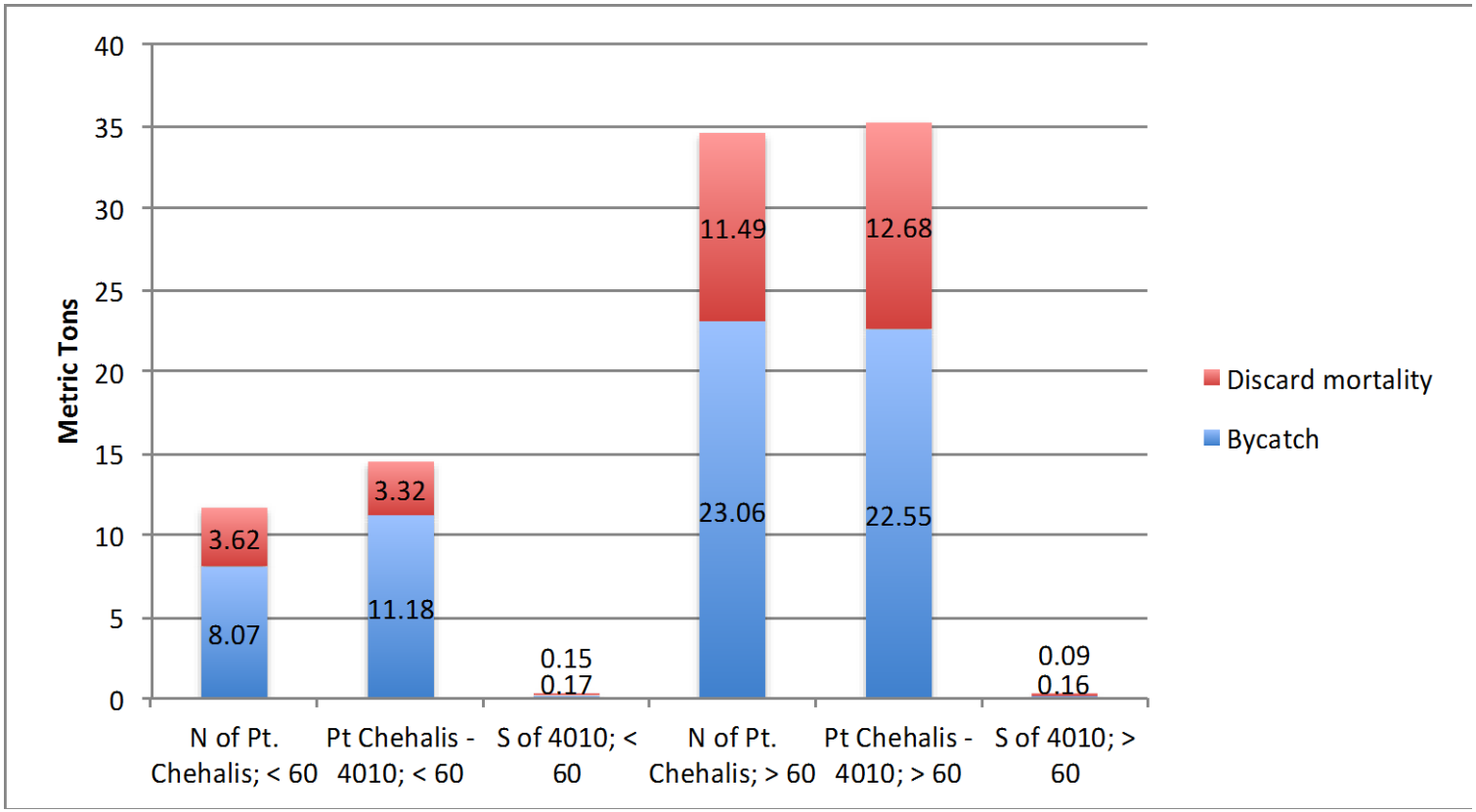
IFQ Fishery Sampling Rates

- 96% of 13142 hauls observed were sampled
- Entire Haul Unsampled = 63
- Partial Haul Unsampled = 491
  - IFQ
    - Flatfish = IFQFF = 28 hauls
    - Mixed = IFQM = 29 hauls

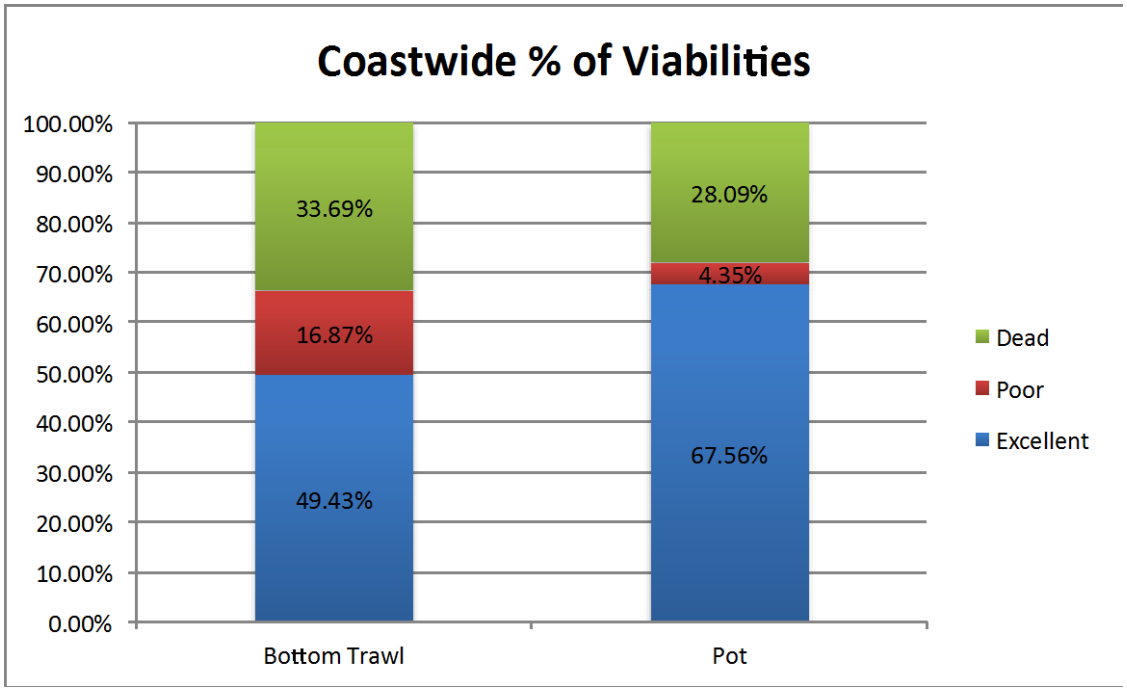
Catch Share bycatch and mortality by sector



Bottom trawl caught halibut bycatch & mortality by area and depth



Pacific halibut condition/viability by gear type



	Trawl	Pot
Excellent	0.20	0
Poor	0.55	1.00
Dead	0.90	1.00

In-season vs Final Estimates of Bycatch & Mortality

Source	Total IBQ mortality of P. halibut (mt)
VAS	32.14
Observer Program	32.99

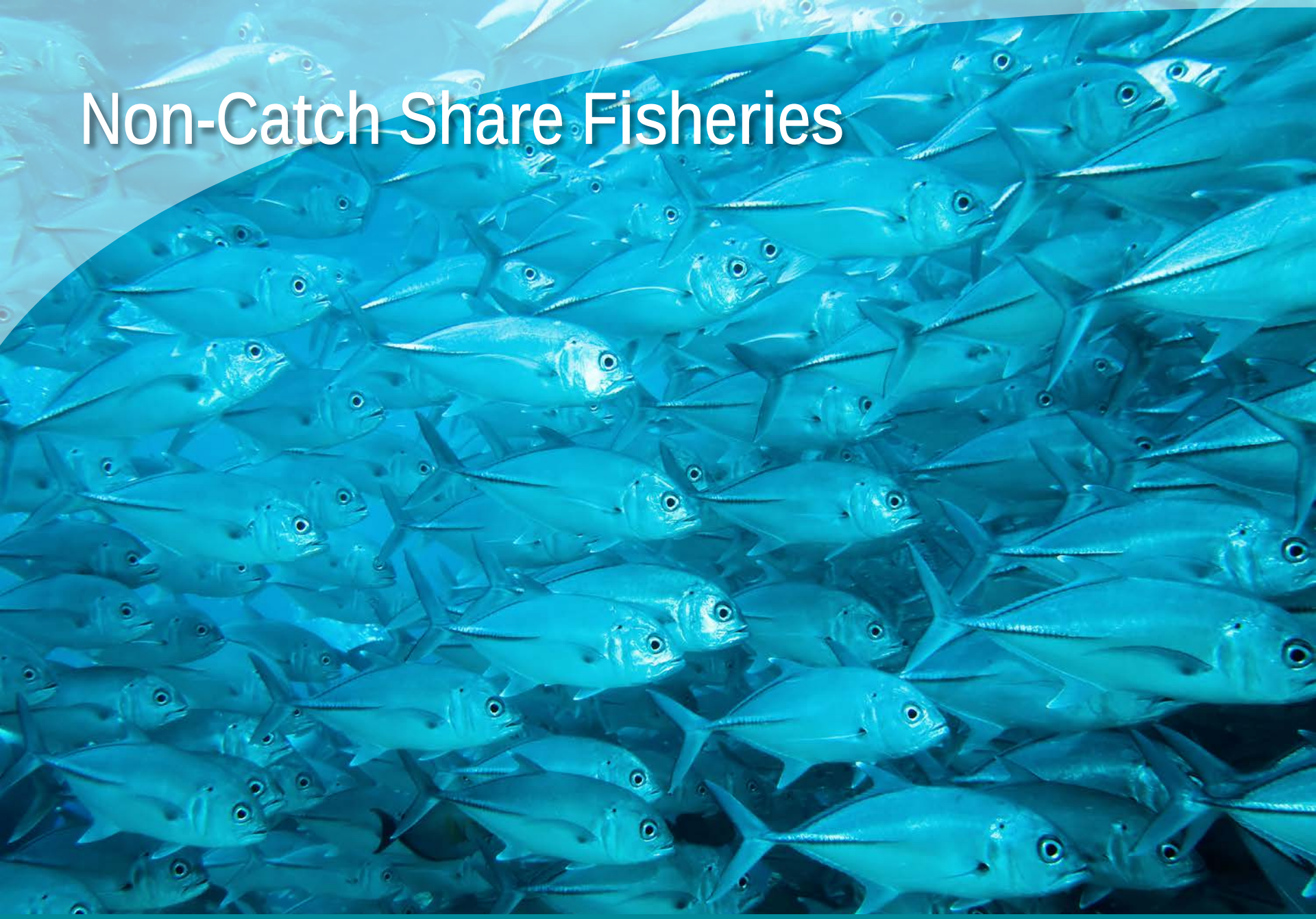
In-season vs. Final

Gear	Count	Length Measurement	Viability
Bottom trawl	all in the haul	actual, all or subset	yes
Pot	all in sampled portion	actual, all or subset	yes
Hook -and- line	all in sampled portion	visual, all or subset	no

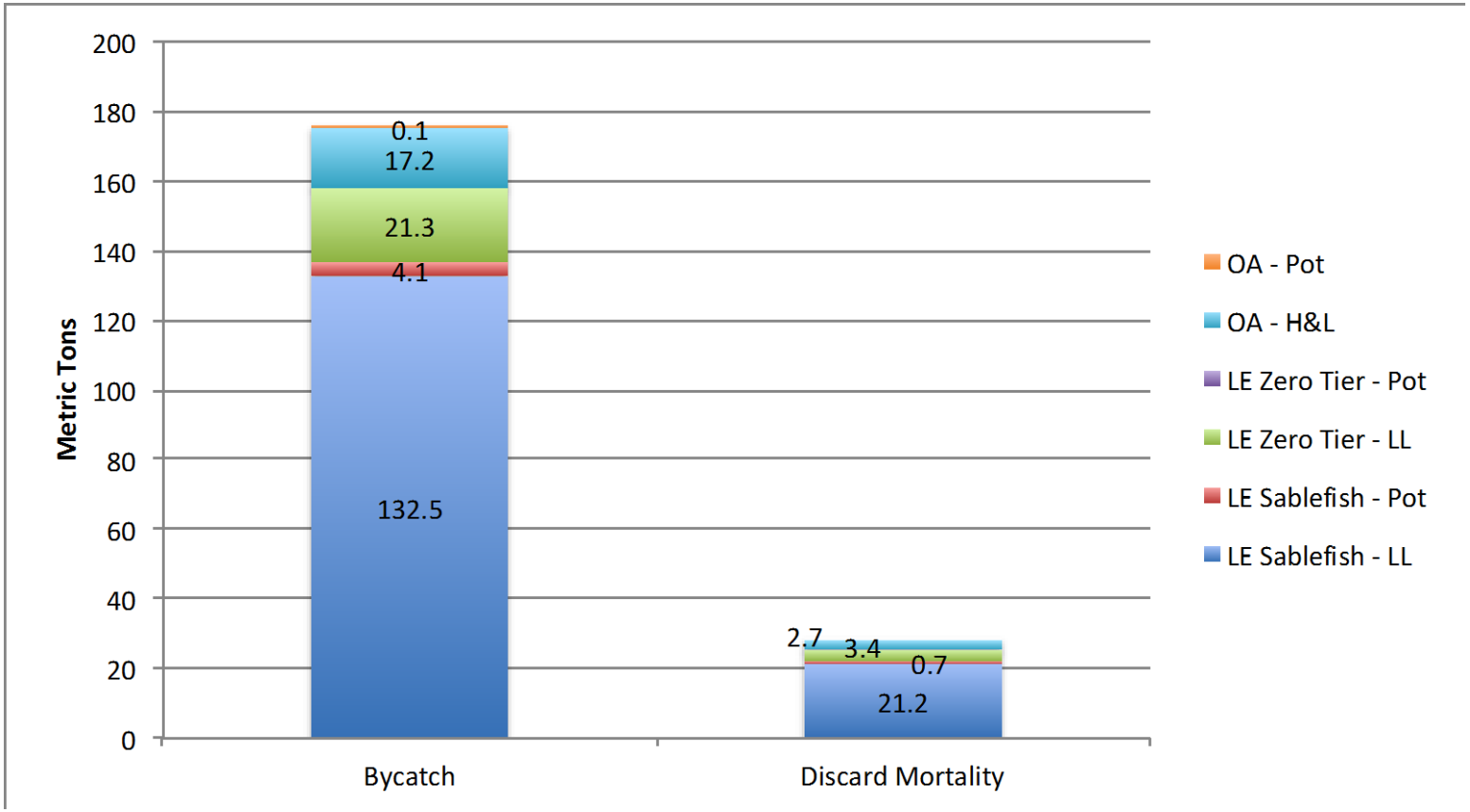
Required data elements by gear type

	2011 IFQ Total	Number manually calculated due to PHLB scenarios	Number manually calculated due to unsampled hauls (Trawl)	Number manually calculated due to lost trawl gear	Number manually calculated due to lost fixed gear	Total number of manually calculated discard events	% Manually Calculated
Number of vessels	113	13	16	4	1	24	21.24 *
Number of trips	1164	19	21	4	3	38	3.26

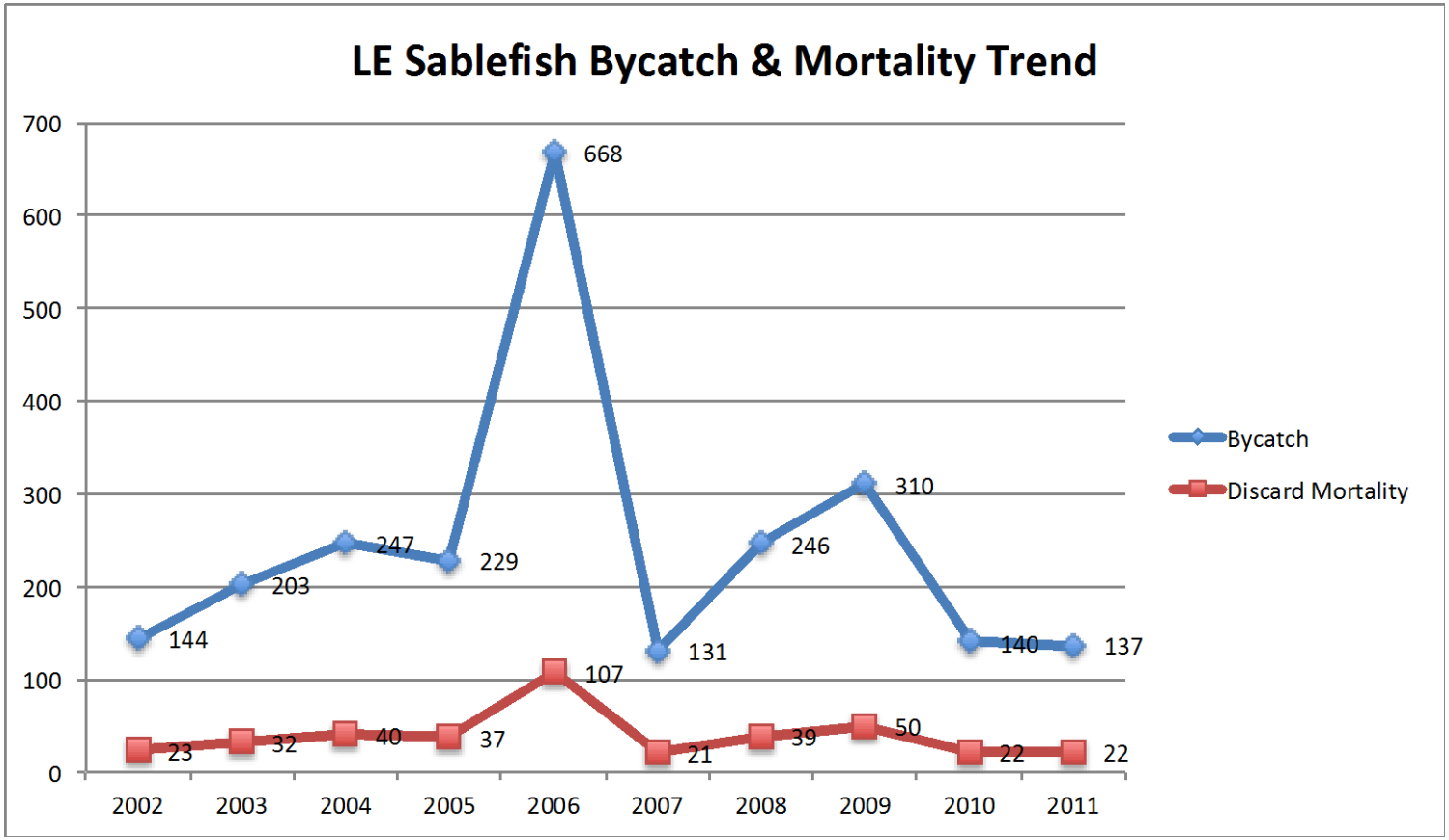
Non-Catch Share Fisheries



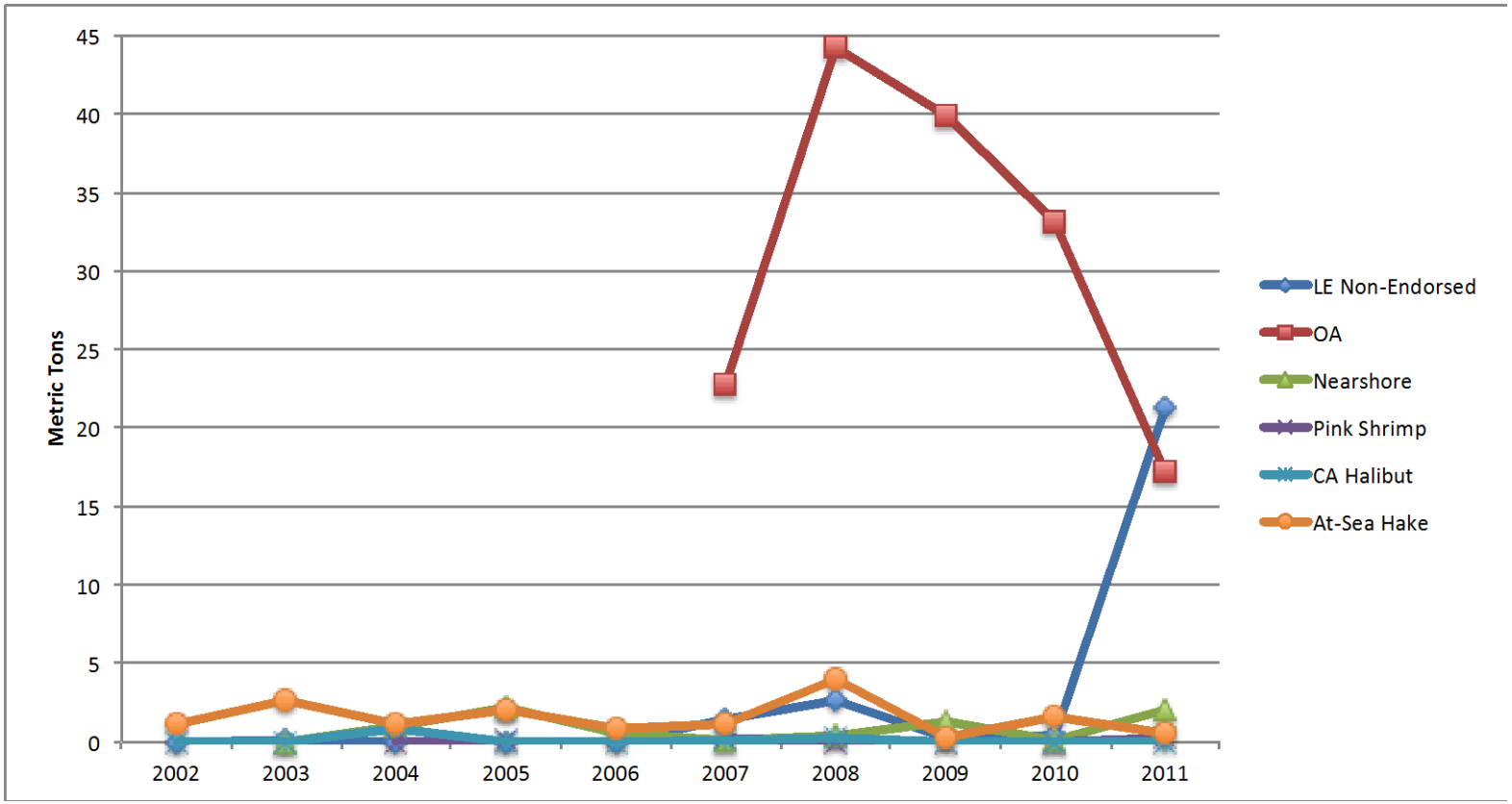
Non-Catch Shares Discard & Mortality by Fishery and Gear Type



LE Sablefish Bycatch & Mortality



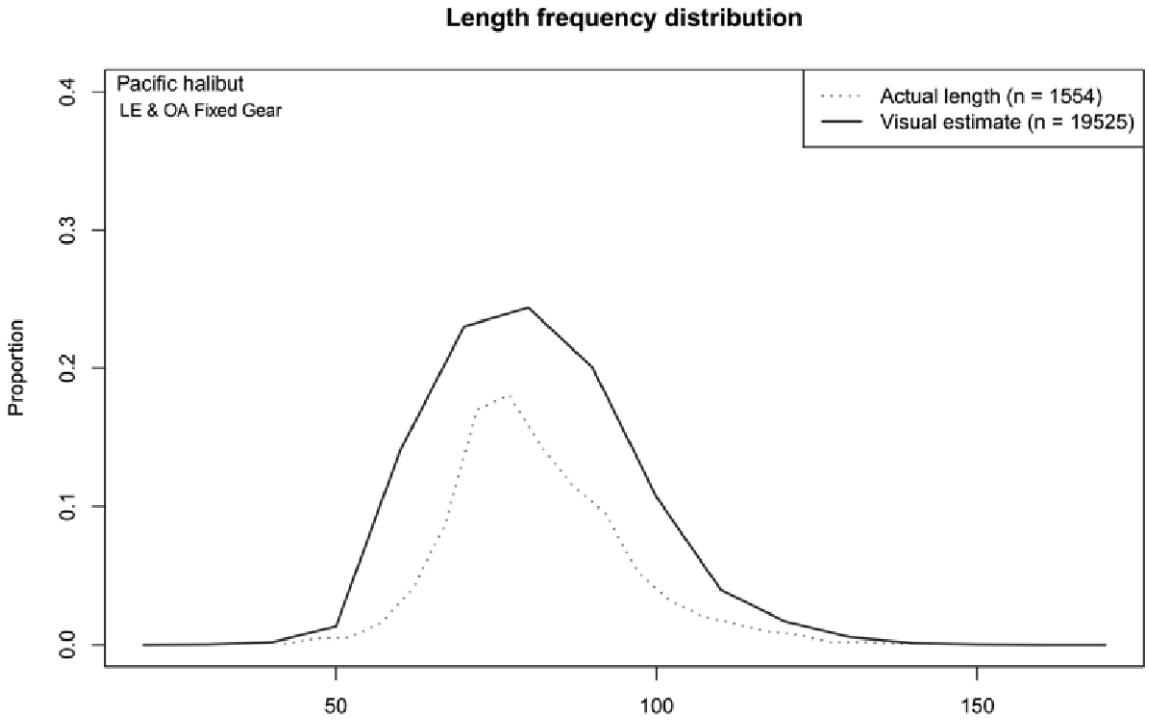
Pacific halibut bycatch in other sectors



Lengths of Pacific halibut in groundfish fishery

	Pacific halibut lengths	
	Number	Percentage
Actual length		
< 80 cm	783	50%
≥ 80 cm	771	50%
Visual estimate		
0 - 74 cm	7526	39%
75 - 84 cm	4763	24%
85 - 150 cm	7236	37%

LE Sablefish only



All lengths collected by observers in west coast groundfish fisheries

Questions??

Other slides

	Year	LE bottom trawl (2002-2010)	IFQ Fishery (first year: 2011)						Non-nearshore fixed gear			Nearshore fixed gear*	Pink shrimp*	CA halibut‡*	At-sea Hake*	Total
			Shoreside Hake*	LE CA Halibut*	Bottom Trawl	Midwater Trawl*	Hook and Line	Pot	LE endorsed	LE non-endorsed	OA					
Gross discard estimates (mt)	2002	524							144	0.0	-	-	-	0.0	1.1	670
	2003	187							203	0.1	-	0.0	-	0.0	2.6	392
	2004	212							247	0.0	-	1.0	0.0	0.8	1.1	462
	2005	460							229	0.0	-	2.2	0.1	0.0	2.0	694
	2006	391							668	0.0	-	0.5	-	0.0	0.8	1060
	2007	294							131	1.5	22.7	0.1	0.2	0.1	1.2	451
	2008	305							246	2.7	44.3	0.4	0.0	0.3	4.0	603
	2009	385							310	0.2	39.9	1.3	0.0	0.0	0.3	737
	2010	265							140	0.4	33.1	0.1	0.0	0.0	1.6	441
	2011		0.0	0.0	65.2	***	6.1	3.3	269	21.3	17.2	2.0	0.2	0.0	0.6	385
Total discard mortality (mt)	2002	345							23	0.0	0.0	-	-	0.0	1.1	369
	2003	124							32	0.0	0.0	0.0	-	0.0	2.6	160
	2004	133							40	0.0	0.0	1.0	0.0	0.8	1.1	176
	2005	287							37	0.0	0.0	2.2	0.1	0.0	2.0	327
	2006	242							107	0.0	0.0	0.5	-	0.0	0.8	351
	2007	209							21	0.2	3.6	0.1	0.2	0.1	1.2	235
	2008	208							39	0.4	7.1	0.4	0.0	0.3	4.0	259
	2009	251							50	0.0	6.4	1.3	0.0	0.0	0.3	309
	2010	181							22	0.1	5.3	0.1	0.0	0.0	1.6	210
	2011		0.03	0.0	31.3	***	1.0	0.9	22	3.4	2.8	2.0	0.2	0.0	0.6	64

" - " Indicates years of incomplete or no observer coverage for which estimates are not available

‡ Since 2011, CA Halibut only includes Open Access sector because the Limited Entry sector is covered under the IFQ Fishery.

* Mortality rate of 100% applied

Table 6: Pacific halibut viability by strata

Year	Gear	Depth (fm)	Management Area	Area	Number				Weighted percentages in each category		
2011					Exc	Poor	Dead	Total	Exc	Poor	Dead
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	522	138	309	969	57%	14%	28%
				Pt Chehalis - 4010	1217	182	201	1600	82%	9%	9%
			S. 4010	S. 4010	0	0	10	10	0%	0%	100%
		> 60	N. 4010	N. Pt Chehalis	1168	455	941	2564	48%	18%	34%
				Pt Chehalis - 4010	1005	562	1204	2771	38%	20%	42%
			S. 4010	S. 4010	7	1	6	14	48%	6%	46%
	Pot		N. 4010	N. Pt Chehalis	53	3	19	75	84%	2%	14%
				Pt Chehalis - 4010	149	10	65	224	69%	5%	26%
			S. 4010	S. 4010	0	0	0	0			

Table 8

Year	Gear or Sector	Depth (fm)	Management Area	Area	Total bycatch (mt)	Total discard mortality (mt)	Estimated legal-sized mortality (mt)	Estimated % legal-sized discarded, by weight
2011								
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	8.07	3.62	1.98	55%
				Pt Chehalis - 4010	11.18	3.32	2.06	62%
			S. 4010	S. 4010	0.17	0.15	0.15	100%
		> 60	N. 4010	N. Pt Chehalis	23.06	11.49	8.11	71%
				Pt Chehalis - 4010	22.55	12.68	8.72	69%
			S. 4010	S. 4010	0.16	0.09	0.09	97%
	Pot		N. 4010	N. Pt Chehalis	1.03	0.17	0.13	77%
				Pt Chehalis - 4010	2.31	0.71	0.53	74%
			S. 4010	S. 4010	0.00	0.00	0.00	
	Hook and Line		N. 4010		6.06	0.97	0.43	45%
			S. 4010		0.00	0.00	0.00	
	Shoreside hake		N. 4010		0.03	0.03	0.00	100%
	LE CA Halibut		S. 4010		0.00	0.00	0.00	

Pacific Halibut Bycatch in the U.S. West Coast IFQ Groundfish Fishery (2011) and non-IFQ Groundfish Fisheries (2002-2011)

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Publication Date:

This document should be cited as follows:

Jannot, J.E., A.W. Al-Humaidhi, M.A. Bellman, N.B. Riley and J. Majewski. 2012. Pacific halibut bycatch in the U.S. west coast IFQ groundfish fishery (2011) and non-IFQ groundfish fisheries (2002-2011). NOAA Fisheries, NWFSC Observer Program, 2725 Montlake Blvd E., Seattle, WA 98112.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

Pacific halibut mortality estimates are provided for 2002 through 2011 from all fishery sectors observed by the Northwest Fishery Science Center Groundfish Observer Program. These included:

- IFQ fisheries (2011-present)
- Limited entry (LE) bottom trawl (2002-2010)
- Groundfish targeting non-nearshore fixed gear (2002-present)
- Nearshore fixed gear (2003-present)
- Pink shrimp trawl (2004-present)
- California halibut trawl (2002-present)
- At-sea Pacific hake (2002-present)

Final estimates are shown in Table ES-1, which is synonymous with Table 21 in the report. In 2011, the IFQ non-hake bottom trawl sector constituted the largest source of discard mortality of Pacific halibut among the sectors analyzed, followed by the non-nearshore fixed gear sector. Within the non-nearshore fixed gear sector, the majority of 2011 estimated discard mortality occurred in the limited entry (LE) sablefish endorsed component, which consists of federally permitted vessels fishing sablefish tier quota during the primary season from April through October. Specifically, discard rates were highest on LE sablefish endorsed vessels fishing with longline gear in the area north of Point Chehalis, Washington. A smaller amount of Pacific halibut mortality also occurred on LE non-sablefish endorsed vessels fishing longline gear and open access (OA) vessels targeting non-nearshore groundfish species with hook-&-line gear.

The 2011 estimate of the IFQ P. halibut discard mortality was only slightly higher (33.2 mt) than the 2011 non-IFQ non-nearshore fixed gear estimate (Figure ES1). Results from prior years indicate that discard mortality of Pacific halibut increased from 2003 through 2006 and then dropped in 2007. Discard mortality increased gradually during the 2007-09 time period, but dropped again in 2010 (Figure ES-1). Pacific halibut discard in the nearshore fixed gear sector, pink shrimp trawl fishery, California halibut trawl fishery, and at-sea Pacific hake fishery represent a very small component of the overall total Pacific halibut mortality.

There are a few significant changes in this (2012) report. First, data are reported from the first year of fishing under IFQ groundfish management (2011). This required revising our methods for estimating Pacific halibut discard, given 100% observer coverage and changes in sampling protocols. We use ratios to estimate the small amount of discard that was not sampled by observers. Note that, in 2011, the LE California halibut sector is covered under the IFQ fishery, whereas the OA California halibut sector is not part of the IFQ fishery. Second, we summarize P. halibut discard mortality by year for the at-sea Pacific hake fishery. The remainder of the 2011 Pacific halibut bycatch estimates were calculated as in the prior report.

Table ES1. Pacific halibut discard mortality estimates (metric tons, 2002-2011) for all sectors observed by the NWFSC Groundfish Observer Program. Discard mortality rates were applied in the bottom trawl fisheries (LE and IFQ), IFQ hook-&-line, IFQ pot, and non-IFQ, non-nearshore fixed gear sectors, for which some information regarding survivorship was available.

Year	LE bottom trawl	IFQ Fishery (first year: 2011)						Non-nearshore fixed gear			Nearshore fixed gear*	Pink shrimp*	CA halibut*‡	At-sea Hake*	Total discard mortality
		Shoreside Hake*	LE CA Halibut*	Bottom Trawl	Midwater Trawl*	Hook and Line	Pot	LE endorsed	LE non-endorsed	OA					
2002	344.8							23.2	0.0	-	-	-	0.0	1.1	392.3
2003	124.4							32.5	0.0	-	0.0	-	0.0	2.6	192.1
2004	133.1							40.2	0.0	-	1.0	0.0	0.8	1.1	216.4
2005	286.5							36.7	0.0	-	2.2	0.1	0.0	2.0	364.2
2006	242.5							107.2	0.0	-	0.5	-	0.0	0.8	458.3
2007	208.8							21.0	0.2	3.6	0.1	0.2	0.1	1.2	256.3
2008	207.8							39.5	0.4	7.1	0.4	0.0	0.3	4.0	298.9
2009	251.1							49.7	0.0	6.4	1.3	0.0	0.0	0.3	358.5
2010	181.0							22.4	0.1	5.3	0.1	0.0	0.0	1.6	232.9
2011		0.03	0.0	31.3	***	1.0	0.9	21.9	3.4	2.8	2.0	0.2	0.0	0.6	64.1
Total	1980.1	0.03	***	31.3	0.00	1.0	0.9	394.3	4.2	25.2	7.6	0.5	1.3	15.3	2833.9

‡ Since 2011, CA Halibut only includes Open Access sector because the Limited Entry sector is covered under the IFQ Fishery.

*Mortality rate of 100% applied

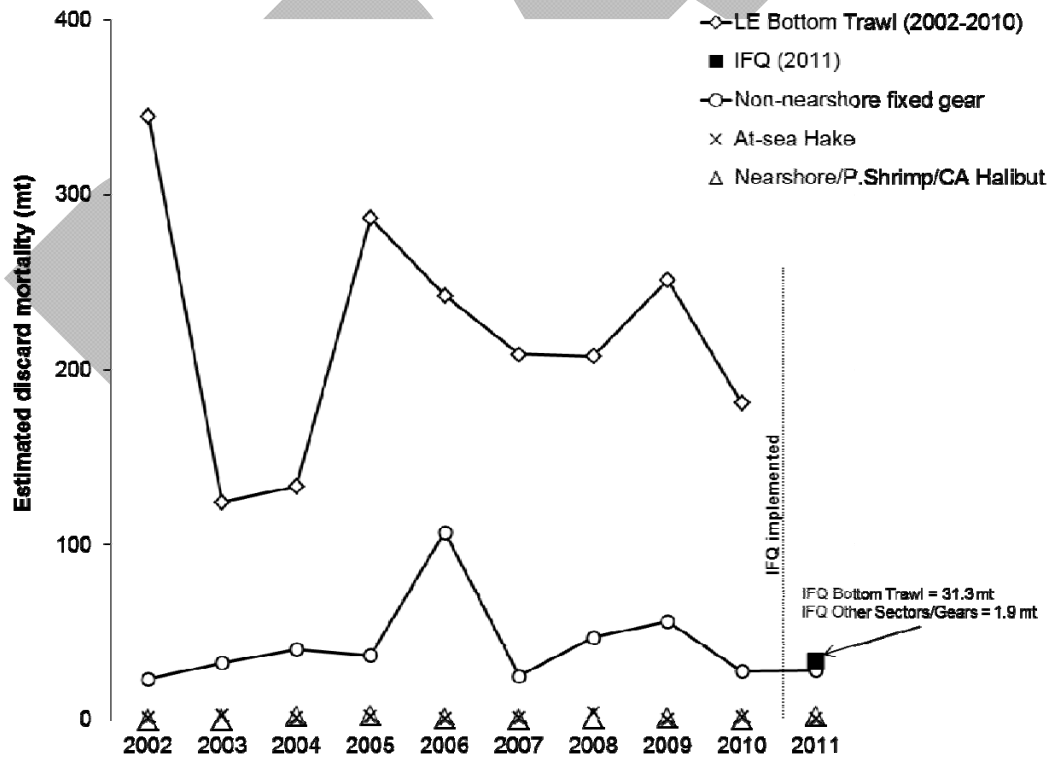
Table ES2. A comparison of 2011 Pacific halibut IBQ total discard mortality (mortality rates applied; mt, north of 40°10′ N latitude) between the Vessel Account System (VAS) and the NWFSC Observer Program final estimation. The two systems use different approaches (see Methods) to estimate P. halibut mortality.

Source	Total IBQ mortality of P. halibut (mt)
VAS	32.14
Observer Program	32.99

Table ES3. Pacific halibut bycatch by month for vessels fishing bottom trawl gear in the IFQ fishery. The number of vessels per area-depth-month stratum do not meet confidentiality requirements; therefore we only present monthly estimates.

Month	Expanded Discard (mt)	Sampled Discard (mt)	Total Bycatch (mt)
Jan	0.16	2.06	2.22
Feb	0.14	3.77	3.91
Mar	0.05	6.33	6.38
Apr	0.03	4.57	4.60
May	0.02	6.90	6.92
June	0.13	4.47	4.60
July	0.68	9.44	10.12
Aug	0.65	13.70	14.34
Sept	0.16	1.86	2.03
Oct	0.12	3.29	3.41
Nov	0.01	1.61	1.62
Dec	0.09	4.96	5.05

Figure ES1. Total estimated P. halibut discard mortality (metric tons) for 2002-2011 from all sectors observed by the NWFSC Groundfish Observer Program. Estimates are not included for sectors and years where there were insufficient observer data.



INTRODUCTION

Pacific halibut (*Hippoglossus stenolepis*) is found in coastal waters throughout the North Pacific. Off the west coast of the United States, it inhabits continental shelf areas (< 150 fm) from Washington to central California (Clark and Hare 1998). This species has long supported a directed commercial fishery in the US and Canada, but it is also caught as bycatch in other fisheries that target demersal species inhabiting similar depths and seafloor habitat types. The objective of this report is to provide estimates of Pacific halibut bycatch in the U.S. west coast groundfish fishery from 2002-2011.

West Coast Groundfish Fishery

The west coast groundfish fishery is a multi-species fishery that utilizes a variety of gear types. The fishery harvests species designated in the Pacific Coast Groundfish Fishery Management Plan (FMP; PFMC 2011) and is managed by the Pacific Fishery Management Council (PFMC). Over 90 species are listed in the groundfish FMP, including a variety of rockfish, flatfish, roundfish, skates, and sharks. These species are found in both federal (> 5.6 km) and state waters (0-5.6 km). Groundfish are both targeted and caught incidentally by trawl nets, hook-&-line gears, and fish pots.

Under the FMP, the groundfish fishery consists of four management components:

Limited Entry (LE) – The LE component includes all commercial fishers who hold a federal limited entry permit. The total number of limited entry permits available is capped and permitted vessels are allotted a larger portion of the total allowable catch for commercially desirable species than non-permitted vessels.

Open Access (OA) – The OA component includes commercial fishers who are not federally permitted. However, California Department of Fish and Game, Oregon Department of Fish and Wildlife, and Washington Department of Fish and Wildlife have instituted permit programs for certain OA sectors.

Recreational – This component includes recreational anglers who target or incidentally catch groundfish species.

Tribal – This component includes native tribal commercial fishers in Washington State that have treaty rights to fish groundfish. Estimates of Pacific halibut bycatch from tribal fisheries are not included in this report.

These four components can be further subdivided into sectors based on gear type, target species, permits and various regulatory factors. This report includes data from the following sectors:

- IFQ fishery (formerly LE bottom trawl and At-Sea Hake, 2002-2010): This sector is subdivided into the following components due to differences in gear type and target strategy:
    - Bottom trawl: Bottom trawl nets are used to catch a variety of groundfish species. Catch is delivered to shore-based processors.

    - Mid-water non-hake trawl: Midwater trawl nets are used to target mid-water non-hake species, primarily yellowtail rockfish. Catch is delivered to shore-based processors.
    - Pot: Pot gear is used to target groundfish species, primarily sablefish. Catch is delivered to shore-based processors.
    - Hook-and-line: Longlines are primarily used to target groundfish species, mainly sablefish. Catch is delivered to shore-based processors.
    - LE California halibut trawl: Bottom trawl nets are used to target California halibut by fishers holding a state California halibut permit and a LE federal trawl groundfish permit. Catch is delivered to shore-based processors.
    - Shoreside hake trawl: Midwater trawl nets are used to catch Pacific hake. Catch is delivered to shore-based processors.
    - At-sea motherships and catcher-processors: Midwater trawl nets are used to catch Pacific hake. Catcher vessels deliver unsorted catch to a mothership. The catch is sorted and processed aboard the mothership. Catcher-processors catch and process at-sea. This component also includes the at-sea processing component of the tribal sector. The tribal sector must operate within defined boundaries in waters off Northwest Washington. The catch can be delivered to a contracted mothership by catcher vessels for processing or be caught and processed by a contracted catcher-processor.
- OA pink shrimp trawl: Trawl nets are used to target pink shrimp. Catch is delivered to shore-based processors.
- OA California halibut trawl: Trawl nets are used to target California halibut by fishers holding a state California halibut permit. Catch is delivered to shore-based processors.
- LE fixed gear (non-nearshore): This sector is subdivided into two components due to differences in permitting and management:
    - LE sablefish endorsed season: Longlines and pots are used to target sablefish. Catch is generally delivered to shore-based processors.
    - LE non-sablefish endorsed: Longlines and pots are used to target groundfish, primarily sablefish and thornyheads. Catch is delivered to shore-based processors or sold live.
- OA fixed gear (non-nearshore): Fixed gear, primarily longlines and pots, is used to target non-nearshore groundfish, primarily sablefish. Catch is delivered to shore-based processors.
- Nearshore fixed gear: A variety of fixed gear, including longlines, pots, fishing poles, stick gear, etc. are used to target nearshore rockfish and other nearshore species managed by state permits in Oregon and California. Catch is delivered to shore-based processors or sold live.

Northwest Fisheries Science Center (NWFSC) Groundfish Observer Program

The NWFSC Groundfish Observer Program observes commercial sectors that target or take groundfish as bycatch. The observer program has two units: the West Coast Groundfish Observer Program (WCGOP) and the At-Sea Hake Observer Program (A-SHOP).

The NWFSC Groundfish Observer Program was established in May 2001 by NOAA Fisheries (NMFS) in accordance with the Pacific Fishery Management Plan (50 CFR Part 660) (50 FR

20609). This regulation requires all vessels that catch groundfish in the US EEZ from 3-200 miles offshore carry an observer when notified to do so by NMFS or its designated agent. Subsequent state rule-making has extended NMFS's ability to require vessels fishing in the 0-3 mile state territorial zone to carry observers.

The NWFSC Groundfish Observer Program's goal is to improve estimates of total catch and discard by observing the shore-based and at-sea groundfish sectors along the U.S. west coast. The WCGOP and A-SHOP observe distinct sectors of the groundfish fishery. The WCGOP observes a number of different sectors of the groundfish fishery, including IFQ shore-based sectors, limited entry and open access (OA) fixed gear, and state-permitted nearshore fixed gear sectors. The WCGOP also observes several fisheries that incidentally catch groundfish, including the California halibut trawl and pink shrimp trawl fisheries. The A-SHOP observes the following Pacific hake, at-sea sub-sectors of the IFQ fishery: catcher-processor, mothership, and tribal vessels. These components of the at-sea Pacific hake/whiting fishery are summarized for the first time in this report.

Pacific Halibut Management and Fishery Interaction

The International Pacific Halibut Commission (IPHC), a body founded through treaty agreement between the US and Canada, sets the Pacific halibut (P. halibut) annual total allowable catch (TAC) for area 2A. The IPHC refers to U.S. waters off the states of Washington, Oregon and California collectively as Area 2A. The TAC is based on bycatch mortality, which takes into account potential survival after being discarded. Regulations for Area 2A are set by NOAA Fisheries Northwest Regional Office. P. halibut catch in Area 2A is divided between tribal and non-tribal fisheries, between commercial and recreational fisheries, and between recreational fisheries in different states (Washington, Oregon and California). The Pacific Fishery Management Council describes this P. halibut catch division each year in a catch-sharing plan. In some years, the LE fixed gear sablefish endorsed sector is allowed to retain and land P. halibut. In all other West Coast commercial groundfish fishery sectors, P. halibut is prohibited and must be discarded at-sea.

In 2011, the limited entry (LE) bottom trawl sector of the U.S. west coast groundfish fishery began fishing under an Individual Fishing Quota (IFQ) management program. An IFQ is defined as a federal permit under a limited access system to harvest a quantity of fish, representing a portion of the total allowable catch of a fishery that can be received or held for exclusive use by a person (MSA 16 USC 1802(23)).

The implementation of the IFQ management program resulted in changes to the methods used for estimating fishing mortality. These changes include:

- Vessels must carry NMFS observers on all IFQ fishing trips.
- Observer sampling priorities.
- The use of multiple gear types fished under a Federal groundfish permit (trawl or fixed gear).

- New programs to monitor landings.
- IFQ quota tracking system.
- Mandatory electronic reporting of shore-based landings.
- Limit of one (1) reporting area (IFQ area) fished per trip.
- IFQs established for a subset of groundfish managed under the Fishery Management Plan (FMP).

Under the IFQ program, Pacific halibut is managed at the permit level, through Individual Bycatch Quota (IBQ) pounds. An IBQ accounts for bycatch mortality, which can assume some level of survivorship. This is the only species managed under IBQ for the west coast groundfish IFQ fishery. Each federal groundfish permit with a trawl endorsement is allocated IBQ pounds for P. halibut caught north of 40° 10' N. latitude. Pacific halibut caught south of 40° 10' N. latitude are not managed as an IFQ program quota.

Data collection and reporting for this fishery is described in the "Pacific Halibut Data Collection in the shore-based IFQ Fishery" and "Inseason IBQ Weight Calculations" sections by gear type. The shore-based IFQ fishery includes all IFQ fishery components with the exception of at-sea motherships and catcher-processors. Motherships and catcher-processors have a bycatch quota for Pacific halibut, but it is not accounted for at the permit level.

With the exception of the IFQ fishery, P. halibut bycatch mortality is accounted for at the fishery sector level only. P. halibut is regularly caught as bycatch in the LE sablefish endorsed fixed gear, LE non-sablefish endorsed fixed gear, and OA fixed gear sectors.

METHODS

Data sources

Data sources for this analysis include onboard observer data (from the WCGOP and A-SHOP), and landing receipt data (referred to as fish tickets). In 2011, observer data was used as the sole source for discard estimation in this fishery. State-collected trawl logbook data from 2011 are not used in this report. A list of fisheries, coverage priorities and data collection methods employed by WCGOP in each observed fishery can be found in the IFQ and Non-IFQ WCGOP manuals (NWFSC 2012). A-SHOP program information and documentation on data collection methods can be found in the observer manual (NWFSC 2012).

The sampling protocol employed by the WCGOP is primarily focused on the discarded portion of catch. To ensure that the recorded weights for the retained portion of the observed catch are accurate, haul-level retained catch weights recorded by observers are adjusted based on trip-level fish ticket records. This process is described in further detail in annual reports produced by the WCGOP (NWFSC 2012) and was conducted prior to the analyses presented in this report.

For data processing purposes, species and species groups were defined (NWFSC 2012) based on management. A complete listing of groundfish species is defined in the Groundfish Fishery Management Plan (PFMC 2011).

Fish ticket landing receipts are completed by fish-buyers in each port for each delivery of fish by a vessel. Fish tickets are trip-aggregated sales receipts for market categories that may represent single or multiple species. They are issued to fish-buyers by a state agency and must be returned to the agency for processing. Fish ticket and species-composition data are submitted by state agencies to the Pacific Fisheries Information Network (PacFIN) regional database. Annual fish ticket landings data were retrieved from the PacFIN database and subsequently divided into various sectors of the groundfish fishery as indicated in Figure 1.

Shore-based IFQ Fishery

The methods used to report inseason IBQ estimates are separate from those methods used to estimate final 2011 fleet-wide P. halibut mortality. However, in 2011, estimates from the two methods resulted in very similar fleet-wide estimates of P. halibut mortality (Table ES2).

Pacific Halibut Data Collection in the shore-based IFQ Fishery

The WCGOP designed sampling methodologies that ensure P. halibut mortality can be estimated, regardless of the limitations imposed by the vessel, catch composition, or catch quantity. Three pieces of information are necessary to estimate Pacific halibut mortality (Table 1):

1. A count of individual P. halibut in the haul or sample
2. Actual or visual length measurements (cm)
3. A viability obtained by physical assessment of individual P. halibut using IPHC designed dichotomous keys that relate the physical condition of the fish to a viability code (Appendices N & O, NWFSC 2012). This is only done for P. halibut caught with bottom trawl or pot gear.

Observers could sample all or a subset of P. halibut caught in a haul/set. The proportion of P. halibut sampled is based on the number of P. halibut caught in the haul/set, the level of assistance provided by the crew, as well as other variables (e.g., physical space, time of day, weather). Sampling and assessment of P. halibut is dependent on crew assistance and cooperation. Regulations prohibit vessel crew from discarding any P. halibut without first notifying the observer. The vessel crew must comply with any and all requests by the observer to ensure proper P. halibut sampling, including but not limited to: modifying P. halibut sorting procedures, assisting the observer by delivering the P. halibut to the observer, and modifying operations to ensure P. halibut sampling is completed. The following table describes the P. halibut data obtained on IFQ-permitted vessels fishing different gear types.

On vessels fishing fixed gear (pot or hook-&-line), observers must sample at least 50% of the gear per set. Actual length measurements are obtained on bottom trawl and pot vessels, but only visual length estimates are made on vessels fishing hook-&-line gear. Visual estimates are done in 10 cm increments (55-64 cm, 65-74 cm, etc.).

Table 1. Data collected from Pacific halibut caught on IFQ vessels using different types of gear.

Gear	Count	Length Measurement	Viability
Bottom trawl	all in the haul	actual, all or subset	yes
Pot	all in sampled portion	actual, all or subset	yes
Hook -and- line	all in sampled portion	visual, all or subset	no

The crew's cooperation is vital to the observer's sampling success when hook-&-line fishing. When an observer is sampling for P. halibut, the crew are not permitted to shake loose or discard any P. halibut before an observer has had an opportunity to estimate the fish length, nor can they restrict the observer's view of the line as it comes out of the water. If requested by the observer, the crew is required to physically hand an individual fish to the observer or slow the gear retrieval.

Viability is assessed at the point of release when returned to sea. On vessels using "resuscitation boxes" or other techniques to increase the likelihood of survival, condition sampling is performed prior to the fish being returned to sea. Observations of several condition characteristics are used to assign each fish to one of three viability categories: Excellent, Poor, or Dead (Appendices N & O, NWFSC 2012, Williams and Chen 2004). Observer field estimates of viability for Pacific halibut discarded in the IFQ fishery by vessels fishing bottom trawl or pot gear are used to compute the total estimated mortality of discarded Pacific halibut. Below we refer to estimated mortality of discarded P. halibut, with appropriate mortality rate applied (Tables 2 & 3 or 100%) in the IFQ fishery, north of the 40°10′ N. latitude line as IBQ weight, or simply, IBQ.

Viability categories are used to assign mortality rates to P. halibut. Mortality rates for vessels fishing bottom trawl gear are based on mortality data collected by Hoag (1975),who found some survivorship among fish in the dead condition category. Mortality rates for vessels fishing pot gear are based on research conducted by the IPHC.

Table 2. Mortality rates used for each of the condition categories (m_c) for IFQ bottom trawl vessels (Clark, Hoag 1992)

m_c	Rate
m_{exc}	0.20
m_{poor}	0.55
m_{dead}	0.90

Table 3. Mortality rates used for each of the condition categories (m_c) for IFQ pot gear vessels (IPHC)

m_c	Rate
m_{exc}	0.00
m_{poor}	1.00
m_{dead}	1.00

Inseason reporting to the Vessel Account System

The Vessel Account System (VAS) is a NOAA, Northwest Regional Office (NWR) database that allows fishers to manage their IFQ quota pounds. On a weekly basis, the WCGOP provided trip-level estimates of discarded P. halibut IBQ to the Pacific States Marine Fisheries Commission (PSMFC). The PSMFC then uploaded the data to the VAS. Occasionally, non-automated (i.e., manual) calculations of P. halibut IBQ were necessary. Manual calculations of P. halibut IBQ occurred as observer program resources allowed and were uploaded directly to the VAS.

In 2011, fishers experienced delays in the reporting of some trips to the VAS. The main cause of IBQ reporting delays to the VAS in 2011 was that the observer did not enter data in a timely manner. While the observer program set a requirement that all trips be entered within three days from the end of the trip, contract observer provider logistics and vessel activity prevented this from occurring. Private third-party companies function as contract observer providers in this fishery. Trip information could also be delayed because a manual calculation was required. A manual calculation was triggered when the observer did not collect all the required data or did not sample all the hauls in the trip. Scenarios triggering a manual calculation and the equations used for those calculations are given in Appendix B.

Fishers were also concerned that IBQ weights could change throughout the year. This was due to the requirement that IBQ weight be reported to the VAS in "near-real-time". "Near-real-time" reporting does not allow sufficient time for data quality control. Therefore, as data moved through the quality control process, changes to one or more of the data elements used to calculate IBQ weight could occur. When this happened, the database recalculated the IBQ weight and resent the data in the next weekly PSMFC upload. After the 2011 observer data had completed the QA/QC process and was finalized, the entire WCGOP dataset was reloaded to the VAS to ensure all discard was accounted for accurately.

The WCGOP database calculates IBQ weight at the haul-level when the observer collects all the required data elements. The calculation is dependent on which gear type is fished.

Inseason IBQ Weight Calculations for Bottom Trawl Gear

The sampled P. halibut lengths are converted to weight using the IPHC length-weight conversion table (Appendix C). The total weight of P. halibut in the haul is calculated as:

$$W = \frac{w}{n} \cdot N$$

where, for each haul:
W = total weight of P. halibut
w = sampled weight of P. halibut
n = sampled number of P. halibut
N = total number of P. halibut

IBQ weight for each haul is then calculated as:

$$W_{IBQ} = \sum_c \left(\frac{w_c}{\sum_c w_c} \cdot W \cdot m_c \right)$$

where, for each haul:

c = viability condition category
W_{IBQ} = IBQ weight (mortality rate applied) of P. halibut
W = total weight of P. halibut in haul
w = sampled weight of P. halibut
m = mortality rate (Table 2)

Inseason IBQ Weight Calculations for Pot Gear

The sampled P. halibut lengths are converted to weight using the IPHC length-weight conversion table. Observers are not always able to sample 100% of all gear units due to time constraints and logistics, therefore sample weights need to be expanded to the haul/set level. The total weight of P. halibut in the set is calculated as:

$$W = \left(\frac{w}{n} \cdot N \right) \cdot \left(\frac{P}{p} \right)$$

where, for each set:
W = total weight of P. halibut
w = sampled weight of P. halibut
n = sampled number of P. halibut
N = total number of P. halibut
P = total number of pots fished
p = sampled number of pots

IBQ weight for each set is then calculated as:

$$W_{IBQ} = \sum_c \left(\frac{w_c}{\sum_c w} \cdot W \cdot m_c \right)$$

where, for each set:
c = viability condition category
W_{IBQ}= IBQ weight (mortality rate applied) of P. halibut
W = total weight of P. halibut in set
w = sampled weight of P. halibut
m = mortality rate (Table 3)

Inseason IBQ Weight Calculations for Hook-&-Line Gear

The visual estimates of Pacific halibut length (10 cm increments) are converted to weight using the IPHC length-weight conversion table. Observers are not always able to sample 100% of all gear units due to time constraints and logistics, therefore sample weights need to be expanded to the haul/set level. The total weight of P. halibut in the set is calculated as:

$$W_{IBQ} = \left(\frac{H}{h} \cdot w\right) \cdot 0.16$$

where, for each set:

W_{IBQ}= IBQ weight (mortality rate applied) of P. halibut
w = sampled weight of P. halibut
H = total number of hooks fished
h = sampled number of hooks
0.16 = IPHC mortality rate applied to hook-&-line gear

Inseason IBQ Weight Manual Calculation Scenarios

In 2011, there were a number of scenarios that resulted in the inability to calculate IBQ weight through the automated process (Appendix B). The most prevalent causes were the pre-sorting of P. halibut by the crew and improper sampling. In these scenarios, observer program staff reviewed the trip and calculated IBQ weight manually.

To determine the most appropriate method to manually calculate IBQ weight (Appendix B), the observer program data management team consulted with the IPHC. For bottom trawl and pot gear, the IPHC preferred the use of actually measured fish from other properly sampled hauls within the same trip, rather than the use of visually estimated lengths from the haul. All calculations utilized data from the same trip or a different trip from the same vessel. In other words, there was never a circumstance where data from Vessel A was used to calculate IBQ weight for Vessel B.

In addition to scenarios where the observer did not collect all required data, there were also instances of hauls where P. halibut was not sampled by the observer or all the gear was lost. In these instances, properly sampled hauls were used to estimate IBQ weight for the unsampled haul. Methods for expanding P. halibut weight to unsampled or partially sampled hauls varied by gear type.

To calculate P. halibut IBQ weight for unsampled trawl hauls, the sum of all IBQ weight from other properly sampled hauls is divided by the sum of tow duration (hours) from sampled hauls and multiplied by the tow duration of the unsampled haul.

$$W_{IBQ} = \left(\frac{\sum_t w_{IBQ}}{\sum_t d}\right) \times D$$

where, for each tow:
t = tow
W_{IBQ} = unsampled IBQ weight (mortality rate applied) of P. halibut
w_{IBQ} = sampled IBQ weight (mortality rate applied) of P. halibut
d = tow duration (hr) of sampled haul
D = tow duration (hr) of unsampled haul

To calculate P. halibut IBQ weight when trawl gear is lost (i.e., entire net or codend is lost), the sum of all P. halibut expanded species weight from other properly sampled hauls is divided by the sum of tow durations from sampled hauls, multiplied by the tow duration of the unsampled haul. For lost trawl gear, a mortality rate for the "dead" P. halibut viability condition (0.90) is applied.

$$W_{IBQ} = \left(\frac{\sum_t w}{\sum_t d}\right) \times D \times 0.90$$

where, for each tow with lost gear:
t = tow
W_{IBQ} = IBQ weight (mortality rate applied) of unsampled P. halibut
w = weight of sampled P. halibut
d = tow duration of sampled haul
D = tow duration of unsampled haul
0.90 = mortality rate for "dead" P. halibut viability condition for trawl gear

To calculate P. halibut IBQ weight in unsampled fixed gear sets, the sum of all P. halibut IBQ weight from sets with similar properties (i.e., date, depth, target, gear type, area; determined by WCGOP data managers) is divided by the sum of the number of gear units sampled, and the result is multiplied by the total number of gear units fished from the unsampled set.

$$W_{IBQ} = \left(\frac{\sum_t w_{IBQ}}{\sum_t g}\right) \times G$$

where, for each set:
t = set
W_{IBQ} = unsampled IBQ weight (mortality rate applied) of P. halibut
w_{IBQ} = sampled IBQ weight (mortality rate applied) of P. halibut
g = number of sampled gear units (e.g., hooks, pots)
G = total number of gear units (e.g., hooks, pots) fished in the unsampled set

To calculate P. halibut IBQ weight when fixed gear is lost, the sum of P. halibut weight from the sampled portion of the set, or, if all gear is lost, from sets with similar properties is divided by the sum of units sampled, and the result is multiplied by the total hooks from the unsampled set. For any lost fixed gear, a mortality rate for the "dead" P. halibut viability condition (1.0) is applied.

$$W_{IBQ} = \left(\frac{\sum_t w}{\sum_t g}\right) \times G \times 1.0$$

where, for each set with lost gear:
t = set
W_{IBQ} = unsampled IBQ weight (mortality rate applied) of P. halibut
w = sampled IBQ weight of P. halibut
g = number of sampled gear units (e.g., hooks, pots)
G = total number of gear units (e.g., hooks, pots) fished in the unsampled set
1.0 = mortality rate for "dead" P. halibut viability condition for fixed gear

Final Shore-based IFQ Fishery Bycatch Estimation

We stratified IFQ Pacific halibut bycatch data based on sector (shoreside non-hake groundfish, shoreside Pacific hake, at-sea Pacific hake, and limited entry California halibut) and gear (bottom trawl, mid-water trawl, pot, hook-&-line). Within the shoreside non-hake groundfish sector, we further stratified using area and depth based on gear type (bottom trawl, pot, hook-&-line). We maintained area and depth strata that were applied to bottom trawl, hook-&-line, and pot gear in previous reports (see Table 4 of this report for specific strata; Heery, Bellman 2010, Jannot, Bellman 2011) because prior work had demonstrated that these variables were correlated with Pacific halibut bycatch (Heery et al. 2010). However, we removed the 'retained catch of other species' strata (see Heery et al. 2010) because qualitative information suggested that the incentives of the IFQ system had significantly changed fishing behavior and therefore, the utility of retained species as a stratum will need to be re-evaluated. Observations from IFQ vessels fishing mid-water trawl gear targeting Pacific hake or other mid-water target species were not post-stratified. Similarly, observations of IFQ vessels targeting California halibut with bottom trawl gear were not post-stratified. In addition to the strata described above, we also provide bycatch estimates north and south of the North/South groundfish management line (40°10′ N. lat.) for each sector and gear type.

Despite the 100% observer coverage mandate in 2011, there were some rare occasions (e.g., observer illness) when tows or sets were either only partially sampled, or not sampled. We used ratio estimators to apportion unsampled weight to specific species, including Pacific halibut, within each stratum. To obtain the estimated weight of Pacific halibut (W) when the entire haul or set was unsampled, the unsampled weight, summed across unsampled hauls within the stratum, was multiplied by the ratio of the weight of Pacific halibut (summed across fully sampled hauls within a stratum) divided by the total weight of all species in all fully sampled hauls within a stratum:

$$W = \sum_{p} x_s \times \frac{\sum_f w_s}{\sum_f x_s}$$

where, for each stratum:
s = stratum, which could include, area, depth, gear, and sector
p = unsampled haul
f = fully sampled haul
x = weight of catch
W = estimated weight of P. halibut

w = sampled weight of P. halibut

The unsampled weight of partially sampled hauls or sets was categorized into weight of non-IFQ species (NIFQ) or IFQ species. Unsampled IFQ species weight was further categorized into IFQ flatfish (IFQFF), IFQ rockfish (IFQRF), IFQ roundfish (IFQRD) and IFQ mixed species (IFQM). IFQM included all 2011 IFQ managed species (see 76 FR 27508 for a listing of IFQ species in 2011). NIFQ included all species encountered that were not designated as an IFQ species in 2011 management. IFQFF included all 2011 IFQ flatfish species managed as a complex under the groundfish FMP. North of the 40°10′ North latitude groundfish management line, Pacific halibut would be included in unsampled IFQFF or IFQM categories. South of the groundfish management line, Pacific halibut would only be included in the unsampled NIFQ category.

To obtain the estimated weight of Pacific halibut (W) in partially sampled hauls or sets, the unsampled weight, summed across partially sampled hauls within the stratum, was multiplied by the ratio of the weight of Pacific halibut (summed across fully sampled hauls within a stratum) divided by the weight of all species occurring within a category (NIFQ, IFQFF, IFQM) in all fully sampled hauls within a stratum. Estimated Pacific halibut weight was summed across unsampled categories and then added to the weight of any Pacific halibut that was sampled in the partially sampled hauls:

$$W = \sum_{y}\left(\sum_{p} x_{ys} \times \frac{\sum_{f} w_{s}}{\sum_{f} x_{ys}}\right) + \sum_{p} w_{s}$$

where, for each stratum:
s = stratum, which could include, area, depth, gear, and sector
y = unsampled category (either NIFQ, IFQFF, or IFQM)
p = partially sampled haul
f = fully sampled haul
x = weight of catch
W = estimated weight of P. halibut
w = sampled weight of P. halibut

Expanded weights of Pacific halibut obtained using the equations above for unsampled or partially sampled hauls were then added to the sampled weight of Pacific halibut (from fully sampled hauls) within each stratum to obtain the total Pacific halibut weight per stratum.

Viability analysis

We used observer field estimates of viability for Pacific halibut discarded in the IFQ fishery by vessels fishing bottom trawl or pot gear to compute the total estimated mortality of discarded Pacific halibut by IFQ gear/sector and stratum.

To account for the impact of fish size on survivorship, we computed a weighted mortality rate for each condition category. Length measurements associated with each viability record were converted to weight based on the IPHC length-weight relationship:

$$W = 6.921\times10^{-6} \cdot L^{3.24}$$

where:
L = fork length (cm)
W = weight (lbs., head off, eviscerated)

A discard mortality rate for each condition category was then computed as the proportion of P. halibut sampled weight in a viability category multiplied by the viability category-specific mortality rate (see Tables 2 & 3 above):

$$DMR_{csj} = m_c \times P_{csj}$$

where:
s = stratum, which could include, area, depth, gear, and sector
c = viability condition (Excellent, Poor, Dead)
j = year
m_c = mortality rate
P = proportion of sampled P. halibut weight (w)
DMR = discard mortality rate

Discard mortality rates for each condition category c and stratum s were then multiplied by gross discard estimates to compute total estimated discard mortality for each of the two gear types:

$$F_{sj} = \sum_{c} \left(B_{sj} \cdot DMR_{sj} \right)$$

where:
s = stratum, which could include, area, depth, gear, and sector
c = viability condition (Excellent, Poor, Dead)
j = year
F = total estimated discard mortality
B = estimated bycatch

Viability data are collected from only a subsample of the Pacific halibut that observers encounter. Based on previous evaluations by Wallace and Hastie (2009), we expect that survivorship of Pacific halibut in bottom trawl tows are most directly affected by the length of the tow and the amount of catch that fills the net. These variables are not part of the bycatch ratio stratification process (above), and their use in stratifying viability data would make it difficult to then apply discard mortality rates to initial gross estimates of bycatch. We found that tow duration was directly related to depth, one of the variables used to stratify discard ratios and

initial gross discard estimates for bottom trawl gear. Because depth and tow duration appeared to co-vary, we used depth and area to stratify IFQ viability data collected from bottom trawl gear. For IFQ viability data collected from pot gear, only area is used to stratify the data.

Final estimates of Pacific halibut bycatch and discard mortality are presented in the context of the estimated mortality of legal-sized halibut. This was computed by applying the proportion of sampled P. halibut weight in each depth stratum that was from legal-sized fish (82 cm or larger) to initial estimates. Viabilities were then applied to gross legal-sized discard estimates in the same manner as described above.

Length Frequencies

The length frequency distribution for Pacific halibut in the 2011 IFQ fishery is provided in Table 9. Pacific halibut pose unique challenges for observer sampling. Observers typically measure the length of Pacific halibut and then convert the measurement to weight using the IPHC length-weight conversion table. Occasionally, observers actually weigh individual fish. Sometimes crew members presort the catch by removing Pacific halibut and immediately return them to sea. Vessel crews presort Pacific halibut to increase the likelihood of survival of the discarded fish. Presorting is most prevalent on vessels fishing with hook-&-line gear. If Pacific halibut were brought on-board using hook-&-line gear, almost all individuals would be injured because of their interaction with the vessel 'crucifier' (gear used to strip the bait and any catch off of the hook and gangion line). Therefore, shake-offs prior to the crucifier (a form of pre-sorting) is almost universal on IFQ hook-&-line vessels. Another case of pre-sorting can occur when halibut are too heavy and/or awkward to weigh in observer baskets. In all cases of pre-sorting, random samples are not available. Therefore, observers visually estimate the length of the halibut in ten-centimeter units (40cm, 50cm , 60cm, etc.), which are later converted to weight using the IPHC length-weight conversion table.

Table A1 (Appendix A) provides the actual observed length frequency distributions of discarded Pacific halibut for vessels fishing IFQ using bottom trawl or pot gear. These length frequencies have been weighted based on the ratio of total estimated P. halibut discard weight to the weight of P. halibut that was measured in each stratum (see Appendix A for further details). Because size-specific mortality rates were not available, we were not able to compute the length frequency distribution of discarded fish that died. However, we have summarized the proportion of length measurements in each condition category (Excellent, Poor, and Dead) in Table 2A (Appendix A) to inform size-specific modeling of mortality. The frequency of sampled fish within each condition category was weighted in the same manner as length frequency distributions and then summarized for each 2 cm length bin.

Non-nearshore Fixed Gear Fishery

The WCGOP samples each non-nearshore fixed gear sector through separate random selection processes, with the limited entry (LE) sablefish endorsed season permits receiving the highest level of coverage, then LE non-sablefish endorsed permits, and open access (OA) fixed gear the lowest. LE sablefish endorsed vessels that fish outside of the primary season or that have reached their tier quota in the primary season are not observed. Given this sampling structure

and anticipated differences in variance from one sector to the next, we chose to maintain sector as a stratification variable in our analysis. Testing of alternative stratification schemes (Heery et al. 2010) indicated that latitude and gear type were the most important variables with respect to Pacific halibut bycatch in the non-nearshore fixed gear groundfish fishery. Bycatch estimates were produced separately for each sector and gear combination. Two latitudinal strata were applied to the LE sablefish endorsed longline sector (north and south of Point Chehalis, Washington = 46° 53.30′ N. lat.) because previous modeling demonstrated that these strata significantly improved the fit of predicted bycatch amounts to the amounts observed (Heery et al. 2010). Point Chehalis, WA was used in previous estimates of Pacific halibut bycatch in the LE sablefish endorsed season longline sector because of its relevance to groundfish management and its apparent ability to split out higher bycatch rates off the northern coast of Washington (Heery and Bellman 2009). Evaluations of latitudinal strata for the other fixed gear sectors did not improve the fit of models to an extent that justified their use. Thus, we maintained the same stratification for the other groundfish fixed gear sectors that was used previously (Heery and Bellman 2009; Heery et al. 2010; Jannot et al. 2011).

Discard Estimation

A deterministic approach was used to estimate Pacific halibut discard for all sectors of the non-nearshore groundfish fixed gear fishery. Discard ratios were computed from observer data as the discarded weight of Pacific halibut divided by the retained weight of either sablefish or all FMP groundfish (except Pacific hake), depending on the sector (Table 11; FMP groundfish species: NWFSC 2012). Ratio denominators were identified for each sector of the non-nearshore fixed gear fishery based on the targeting behavior of that sector. Discard ratios were then multiplied by the total sector landed weight of either sablefish or FMP groundfish (except Pacific hake), corresponding to the denominator used to compute the observed discard ratio for each sector. This provided an expanded gross estimate of Pacific halibut discard for each sector. A discard mortality rate (discussed below) was then applied to compute estimated discard mortality.

Total landed weights for each sector are obtained from fish ticket landing receipts. Fish tickets for fixed gear that included recorded weights for sablefish were included in the non-nearshore fixed gear sector. Commercial fixed gear fish tickets with recorded nearshore species weight were not used in this portion of the fixed gear analysis, regardless of whether they included recorded weights for sablefish (Figure 1). In addition, fixed gear fish tickets without recorded sablefish or nearshore species were included in the non-nearshore fixed gear sector only if groundfish landings were greater than non-groundfish landings based on a unique vessel and landing date.

Non-nearshore fixed gear sector fish tickets were partitioned into the three commercial fixed-gear sectors (LE sablefish endorsed season, LE non-sablefish endorsed, and OA fixed gear) through the following process. Commercial fixed-gear fish tickets were first divided out by whether the vessel had a federal groundfish permit (limited entry) or no federal groundfish permit (open access). OA fish tickets were placed in the OA fixed gear groundfish sector. Next, LE fish tickets were separated based on whether the vessel's federal groundfish permit(s) had a sablefish endorsement with tier quota for the primary season or if it was not endorsed (also referred to as 'zero' tier). Fish tickets for all LE sablefish vessels with tier endorsements that

were operating within this period and within their allotted tier quota were placed in the LE sablefish endorsed sector. If LE sablefish endorsed vessels fished outside of the primary season (November through March) or made trips within the season after they had reached their tier quota, the fish tickets were placed in the LE non-sablefish endorsed sector. In addition, fish tickets from non-endorsed LE vessels were also placed in the LE non-sablefish endorsed sector.

Further processing of fish tickets identified and removed the directed commercial Pacific halibut fishery landings from the non-nearshore fixed gear analysis. The directed Pacific halibut fishery occurs for only a few days each year, during 10-hour openings that are designated by the IPHC. LE and OA fixed gear vessels that typically target groundfish can participate in the directed fishery. For most fixed gear vessels, (other than LE sablefish endorsed longline vessels north of Point Chehalis, prior to 2010) this is the only time during which they are allowed to land Pacific halibut. Fish tickets that included Pacific halibut landings on or within the 2 days after a directed fishery opening were considered to be part of the directed fishery and not part of the non-nearshore fixed gear fishery targeting federal FMP groundfish. These fish tickets were removed prior to our analysis. For years prior to 2010, this approach may have resulted in the removal of some non-directed fishery landings north of Point Chehalis, but any bias introduced by this step is considered to be extremely small given the short time period across which fish tickets were removed. In the previous Pacific halibut reports, derby fish tickets were identified as those for which Pacific halibut comprised the largest landed weight on the fish ticket. This filtering step was applied to the area north of Point Chehalis only. Estimates from the previous reports are maintained in the tables (Tables 10, 12-15) and presented here for comparison purposes.

WCGOP observer data were stratified according to sector and gear type (longline and pot/trap). As discussed earlier, one additional latitudinal stratum at Point Chehalis, Washington (46° 53.30' N lat.) was used for the LE sablefish endorsed longline sector. Some retention of Pacific halibut was allowed in the LE sablefish endorsed season in the area north of Point Chehalis up until October 2009. Since October 2009, retention of Pacific halibut north of Point Chehalis has not been permitted (75 FR 23615; 76 FR 14300). The Point Chehalis line was the only latitudinal stratification incorporated into our analysis and was only applied to the LE sablefish endorsed sector. Discard amounts provided for the other two fixed gear sectors represent coastwide estimates.

The number of observed trips, sets, and vessels are summarized for each sector, gear type, and area and depth (where applicable) (Table 10). The landed weight of sablefish and FMP groundfish (excluding Pacific hake) is used as a measure for expanding discard from observed trips to the entire fleet (Table 11). Observed discard ratios were calculated by sector, gear group and area based on the following equation:

$$\hat{D}_s = \frac{\sum_t d_{st}}{\sum_t r_t} \times F_s$$

where:
s: stratum (sector / gear group / area)
t: observed sets

d: observed discard (mt) of Pacific halibut
r: observed retained weight (mt) of sablefish or all FMP groundfish except Pacific hake
F: weight (mt) of retained sablefish or all FMP groundfish excluding Pacific hake recorded on fish tickets in strata *s*
$\hat{D}_s$: Discard estimate for stratum *s*

For all strata, except the LE non-sablefish endorsed longline and the OA sectors, discard ratios were calculated by dividing the stratum discard weight of Pacific halibut by the retained catch weight of sablefish. Retained groundfish was used as the ratio denominator for the LE non-sablefish endorsed longline and the OA sectors because these sectors target a wider range of groundfish species. A broader denominator was therefore necessary to effectively capture the level of fishing effort in these sectors. Please refer to earlier reports for further details of data pooling and discard ratios in prior years of observer coverage.

Where FMP groundfish (excluding Pacific hake) was used to compute discard ratios, any retained weights recorded by the observer not appearing on fish tickets were excluded from the denominator. This prevents double-counting associated with differences in the species codes used by observers and processors. For instance, while observers may record rockfish catch at the species level; various species of rockfish are often grouped, weighed, and recorded together on the fish ticket by the processor under a grouped species code such as NUSP - northern unspecified slope rockfish. In some cases, this difference in species coding prevents observer and fish ticket weights from being matched and adjusted properly. Species coding on fish tickets varies considerably between processors and over time, and it is not possible to make assumptions regarding which individual observer-recorded species likely coincide with species grouping codes on fish tickets. By using only the retained groundfish weight from fish tickets in discard ratio denominators, we prevent double-counting of retained weights. This is not a factor when using a single species in the denominator, such as sablefish, as any retained weights in observer and fish ticket data that share the same species code will match and adjust properly.

Table 12 demonstrates the expansion factors for each fishery sector and gear type. The discard rate applied yielded an expanded gross P. halibut discard estimate for each stratum. If landings were made by a fixed gear sector for which there were no or very few WCGOP observations, the most appropriate observed discard ratio was selected and applied to those landings based on similarities in the fishery management structure, fishing and discard behavior, and the gear fished. The LE sablefish endorsed vessels fishing outside of the primary season with pot gear often land a small amount of groundfish; however, this portion of the fleet is not observed by the WCGOP program. Given similarities in gear type and catch composition, OA fixed gear pot observations were selected as the most appropriate source of information for an observed discard rate (Table 11).

Discard Mortality Rates

Once an initial gross estimate of P. halibut discard had been produced, this value was multiplied by a discard mortality rate (Table 14) to generate a final discard mortality estimate (Table 15 and Figure 3). Ideally, discard mortality would have been approximated based on viabilities in a manner similar to the approach used for IFQ bottom trawl and pot gear. WCGOP observers do

record viability conditions as Pacific halibut are discarded from non-IFQ longline vessels. However, much of the time, Pacific halibut are removed from the line before being brought onboard. This is to ensure safety, as longline vessels are often small, and to have the least possible impact on Pacific halibut survivorship. Because these fish are not typically brought onboard, the observer is not able to effectively assess viability or gain a random sample from Pacific halibut catch. Although viabilities from pot gear would be appropriate to use in estimating discard mortality, bycatch of Pacific halibut in pot gear is infrequent and the sample size of viability conditions from this gear type was too small to utilize in this analysis.

Thus, Pacific halibut viabilities recorded from the non-nearshore fixed gear fishery were not used in our analysis. Discard mortality rates therefore had to be identified through other means. Review of the literature on Pacific halibut bycatch revealed little that could be applied to the entire discard estimate. Several studies have examined the survivorship of Pacific halibut in various conditions (Kaimmer and Trumble 1998, Trumble, Kaimmer 2000). However, without any information on the state of Pacific halibut that were being discarded, the findings from these examinations could not be put to use.

Instead, we relied on discard mortality rates computed for groundfish fisheries off Alaska (Williams 2008). An 18% discard mortality rate was applied to estimates for pot gear, coinciding with the DMR used for the sablefish pot CDQ fishery in Alaska. For longline gear, we used a discard mortality rate of 16%, an average of DMRs over all years for the Bering Sea/Aleutian region longline fishery (Williams 2008).

For additional context, we present the length frequency distribution of Pacific halibut from visual estimates and actual lengths measured in the LE sablefish endorsed sector (Table 16) and the proportion of sampled Pacific halibut discard of legal (>82 cm) and sublegal ($\leq$ 82 cm) sizes in the non-nearshore fixed gear fishery (Table 17). The majority of Pacific halibut lengths recorded in this fishery have been collected through visual length estimation, rounded to the nearest 10 cm. In other words, specimens that are 76 cm and 82 cm are both visually estimated to be 80 cm. With this level of resolution, it was not possible to compute the exact proportion of sublegal versus legal Pacific halibut from visually estimated lengths. Visual estimates were instead summarized in the manner in which they are recorded; with sublegal and legal sized halibut falling within the 75-84 cm length bin. In 2011, observers were instructed to record more actual lengths from randomly sampled Pacific halibut on non-nearshore fixed gear boats, with the help of vessel crew. However, sample sizes from 2011 were too low for use in analyses.

Other Fisheries

Pacific halibut was also observed in the nearshore groundfish fixed gear sector and the pink shrimp and OA California halibut trawl fisheries. Bycatch estimates for these three fishery sectors were computed based on the following equation:

$$\hat{B} = \frac{\sum_t b_t}{\sum_t r_t} \times F$$

where:
b: observed discard (mt) of Pacific halibut on set/haul *t*
r: observed retained weight (mt) of target species on set/haul *t*
F: weight (mt) of retained target species
$\hat{B}$: Bycatch estimate

The nearshore fixed gear fishery targets a variety of groundfish species that inhabit areas shallower than 50 fathoms. All species included in the nearshore target group as listed in the WCGOP data processing appendix were included in the denominator when calculating bycatch ratios for the nearshore fixed gear sector. Pink shrimp and California halibut were considered the target species in their respective fisheries.

Bycatch estimates are presented for the nearshore fixed gear sector, pink shrimp trawl fishery, and the OA portion of the California halibut trawl fishery (LE California halibut is covered under the IFQ fishery). For more information regarding the differences between the two California halibut trawl components, see annual data reports published by the WCGOP (NWFSC 2012). Discard mortality rates were not applied to bycatch estimates for these other fishery sectors due to a lack of information regarding survivorship.

RESULTS

IFQ Fishery

For most strata, 95% or more of the observed IFQ tows or sets were sampled (Table 4). The exceptions were vessels fishing bottom trawl gear: (a) greater than 60 fathoms north of Point Chehalis, WA (87% sampled); (b) less than 60 fathoms between Point Chehalis and 40°10' N. latitude (92% sampled); or (c) less than 60 fathoms south of 40°10' N. latitude (94% sampled; Table 4). Unsampled catch categorized as non-IFQ species represented the largest portion of the unsampled tows or sets (Table 4), as only every third haul or set was required to be sampled for non-IFQ species under WCGOP sampling protocol (NWFSC 2012).

The total estimated weight of Pacific halibut from unsampled tows or sets represents a small fraction (2.2 mt ~ 3%) of the total gross discard weight of P. halibut in this fishery (Table 5). Fifty percent of the total estimated weight (1.1 mt) was from the IFQ mixed species category (Table 5). Most of the remainder was estimated from uncategorized (all species) unsampled catch (0.7 mt). Weight estimated from the IFQ flatfish and non-IFQ species groups represents a very small portion of the total estimated discard weight of Pacific halibut (Table 5). In terms of viability, the majority of individuals were classified as either Excellent or Dead, irrespective of gear type, area or depth (Table 6).

Estimated discard mortality from all sectors and gears of the 2011 IFQ fishery was 87% less than the estimated discard mortality from the 2010 LE bottom trawl fishery (Figure ES1). There are at least two possible explanations for this drop. First, IBQs for P. halibut might have increased fisher incentives to avoid P. halibut bycatch and thereby changed fisher behavior (i.e., fish different grounds or gear differently than in past). Second, during 2011, the fleet was experimenting with P. halibut excluders, including cooperating with NMFS on developing and

testing P. halibut excluders on trawl vessels (Lomeli and Wakefield). Gross bycatch estimates and total discard mortality estimates were largest for vessels fishing bottom trawl gear, north of the 40°10′ N. latitude management line in depths greater than 60 fathoms (Tables 7, 8). This gear-area-depth stratum accounts for ~75% of 2011 Pacific halibut discard mortality in the fishery. The next largest fraction (~21%) of total discard mortality is found in the same gear-area combination in shallow waters (<60 fm). Together, bottom trawl gear fishing north of the 40°10′ N. latitude management line accounts for 96% of the 2011 Pacific halibut discard mortality in the IFQ fishery (Tables 7, 8).

Estimated bycatch weight of P. halibut from the at-sea hake component of the 2011 IFQ fishery was low (0.6 mt) relative to the majority of prior years' reported. At-sea hake sectors reported a range of P. halibut bycatch weight from 0.3 to 4 mt during the period from 2002 to 2011. This is the first report to incorporate P. halibut bycatch weight from at-sea hake sectors of the groundfish fishery.

Non-nearshore Fixed Gear Fishery

From 2010 to 2011, estimated discard mortality of Pacific halibut in the LE sablefish endorsed season longline sector increased in the area north of Point Chehalis, WA but decreased south of Point Chehalis (Table 14). In 2011, north of Point Chehalis fleet-wide sablefish landings decreased slightly but the observed P. halibut discard ratio nearly doubled relative to 2010 (Table 12). This indicates that perhaps vessels were encountering Pacific halibut more frequently in 2011 than in 2010. South of Point Chehalis, 2011 saw a drop in landings and in the discard ratio relative to 2010 values (Table 12), indicating that fishing effort by the LE sablefish endorsed longline sector might have been lower in 2011 relative to 2010 in this area. Increased P. halibut discard mortality north of Point Chehalis and decreased mortality south of Point Chehalis led to a 2011 coastwide estimate very close to the 2010 coastwide estimate for this sector (Table 14 & Figure 3). Gross estimated discard of P. halibut in the LE sablefish endorsed season pot sector was almost the same in 2011 as in 2010 (Table 14).

Discard of Pacific halibut among the non-sablefish endorsed fixed gear sectors (LE and OA) during 2011 showed departures from previous years. First, in 2011, the LE non-sablefish endorsed longline sector showed a marked increase in estimated discard mortality relative to 2010 (Table 14). Conversely, the estimated discard mortality for OA fixed gear vessels fishing with hook-&-line gears in 2011 was about half (17.2 mt) of the discard mortality estimated for the same sector in 2010 (32.6 mt; Table 14). This follows the trend of decreasing estimated discard mortality in this sector since 2008 (Table 14).

A large source of uncertainty in our estimates of Pacific halibut discard mortality on non-nearshore fixed gear vessels is the actual discard mortality rate applied to initial gross estimates computed from observer data. A small sample size of observed viability data are available from sablefish vessels fishing with pots, but not enough to be used in discard mortality estimation. Instead, we relied on findings from observed pot vessels in Alaska that assign specimens to the same condition codes used for trawl gear and then apply the discard mortality rates assumed by Williams (2008). This informed our decision to increase the discard mortality rate applied to pot estimates to 18% from 16%. As more viability information is collected by WCGOP observers

from pot vessels, we intend to apply this directly to compute discard mortality in a manner consistent with the methods of Williams (2008).

Just as for trawl gear, discard mortality rates have been determined experimentally for Pacific halibut caught with longline gear (Kaimmer and Trumble 1998, Trumble et al. 2000). To apply these rates, Pacific halibut caught on longlines are assigned to one of four condition categories (minor, moderate, severe, and dead) based on the extent of their injuries at the time of release. Kaimmer and Trumble (1998) derived discard mortality rates for each of these categories using mark-recapture data. Their rates were later updated by Trumble et al. (2000) to account for hook sizes that are more consistent with gear used on the West Coast for commercial purposes.

For reasons described earlier, Pacific halibut were infrequently brought onboard observed fixed gear vessels from 2002 to 2010, resulting in a small and potentially biased sample of viability data. Mortality rates specified by Trumble et al. (2000) cannot therefore be used in conjunction with these data to assess overall discard mortality. However, changes were implemented in the 2011 WCGOP data collection protocol that allowed observers on fixed gear vessels to collect a random sample of Pacific halibut from which to gather viability data. Sample sizes for the 2011 calendar year are too low for analytical purposes, but data will continue to be collected in 2012. In the interim, discard mortality rates of 16% for longline gear and 18% for pot gear (Williams 2008) are thought to be the best option currently available.

Other Fisheries

Very small amounts of Pacific halibut bycatch were observed in other fisheries. Even without the application of discard mortality rates, bycatch estimates for the nearshore groundfish fixed gear sector, pink shrimp trawl fishery, and the OA sector of the California halibut trawl fishery made up a minor portion of the total mortality estimate for Pacific halibut. Bycatch estimates of P. halibut for these sectors provided in Tables 18, 19, and 20 are not intended to represent mortality values, as discard mortality rates for these sectors are not available.

SUMMARY & CONCLUSIONS

- In the 2011 IFQ fishery, methods for estimating the relatively small amount of Pacific halibut weight in unsampled and partially sampled hauls were developed for each sector and gear type fished. The weight of P. halibut estimated from these hauls represents ~3% of the total discard mortality of P. halibut in the IFQ fishery.
- Estimated discard mortality from the entire 2011 IFQ fishery represents an 87% decrease relative to the 2010 LE bottom trawl fishery.
- The 2011 estimate of Pacific halibut mortality in the LE non-sablefish endorsed longline sector was much greater than in any prior year. The 2011 OA fixed gear longline sector exhibited a decline in estimated P. halibut mortality relative to the 2010 estimate.
- Estimated P. halibut mortality in all other non-IFQ sectors are well within the range observed in previous years.
- This report represents the first time we present summarized P. halibut discard from the at-sea Pacific hake fishery for the years 2002-2011.

- The spatial distribution of P. halibut catch observed by the WCGOP (2002-2011) off the U.S. west coast is presented for the first time in this report. Gear types represented include a combination of bottom trawl, midwater trawl, shrimp trawl, fixed gear hook-&-line and pot gear.

ACKNOWLEDGEMENTS

The authors gratefully acknowledge the hard work and dedication of observers from the Northwest Fishery Science Center Groundfish Observer Program, as well as all other observer program staff. We also thank the Scientific and Statistical Committee of the PFMC, Jon McVeigh (WCGOP) and Gregg Williams (IPHC) for their contributions to this report.

REFERENCES

Clark WG, Hare SR. 1998. Accounting for bycatch in management of the Pacific halibut fishery. Journal of Fisheries Management 18: 809-821.

Clark WG, Hoag SH, Trumble RJ, Williams GH. 1992. Re-estimation of survival for trawl caught halibut released in different condition factors. International Pacific Halibut Commission, Report of Assessment and Research Activities 1992: 197-206.

Heery E, Bellman M. 2009. Observed and Estimated Total Discard of Pacific Halibut in the 2002-2008 U.S. West Coast Groundfish Non-Nearshore Fixed Gear Fishery. NWFSC, 2725 Montlake Blvd E., Seattle, WA 98112.

Heery E, Bellman M, Majewski J. 2010. Pacific halibut bycatch in the U.S. west coast groundfish fishery from 2002 through 2009. West Coast Groundfish Observer Program. NWFSC, 2725 Montlake Blvd E., Seattle, WA 98112.

Hoag SH. 1975. Survival of Halibut Released After Capture By Trawls. International Pacific Halibut Commission, Scientific Report No 57. p. 18.

Jannot JE, Bellman M, Majewski J. 2011. Pacific Halibut Bycatch in the U.S. West Coast Groundfish Fishery, 2002-2010. West Coast Groundfish Observer Program. NWFSC, 2725 Montlake Blvd E., Seattle, WA 98112.

Kaimmer SM, Trumble RJ. 1998. Injury, condition, and mortality of Pacific halibut bycatch following careful release of Pacific cod and sablefish longline fisheries. Fisheries Research 38: 131-144.

Lomeli MJM, Wakefield WW. A flexible sorting grate to reduce Pacific halibut (Hippoglossus stenolepis) bycatch in the U.S. west coast groundfish bottom trawl fishery. Fisheries Research In Review.

NWFSC 2012. Observer Manuals. NOAA Northwest Fisheries Science Center Groundfish Observer Program; [updated 30 July 2012]; Available from: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/observer_manuals.cfm.

NWFSC 2012. Sector Data Products. NOAA Northwest Fisheries Science Center Groundfish Observer Program[updated August 2012]; Available from: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/sector_products.cfm.

NWFSC 2012. WCGOP Data Processing Appendix. NOAA Northwest Fisheries Science Center Groundfish Observer Program[updated July 2012]; Available from: http://www.nwfsc.noaa.gov/research/divisions/fram/observer/xls/Appendix.xlsx.

PFMC. 2011. Pacific Groundfish Fishery Management Plan for the California, Oregon, and Washington Groundfish Fishery.

Trumble RJ, Kaimmer SM, Williams GH. 2000. Estimation of discard mortality rates for Pacific halibut bycatch in groundfish longline fisheries. North American Journal of Fisheries Management 20: 931-939.

Wallace J, Hastie J. 2009. Pacific halibut bycatch in IPHC area 2A in the 2008 groundfish bottom trawl fishery. NWFSC, 2725 Montlake Blvd E., Seattle, WA 98112.

Williams GH. 2008. Pacific halibut discard mortality rates in the 2006 open access and CDQ groundfish fisheries, and recommendations for discard mortality rates needed for monitoring halibut bycatch in 2008 CDQ fisheries. International Pacific Halibut Commission, Seattle, WA.

Williams GH, Chen D. 2004. Pacific halibut discard mortality rates in the 1990-2002 Alaskan groundfish fisheries, with recommendations for monitoring in 2004. International Pacific Halibut Commission Report of Assessment and Research Activities 2003: 227-244.

Table 4. The number of observed vessels, trips, and tows (or sets); the number of sampled tows (or sets) and Pacific halibut (mt), and the number of unsampled tows (or sets) within each catch category as a function of gear or sector, area and depth stratification in the 2011 U.S. west coast groundfish IFQ fishery. Unsampled portions of the catch can be categorized into IFQ flatfish species, IFQ mixed species (any IFQ species), non-IFQ species, or all species (IFQ & non-IFQ). See text for full definition of each catch category.

	Observed			Sampled		No. of Unsampled Tows within each Category			
Stratum	**No. vessels**	**No. trips**	**No. tows**	**No. tows**	**P. halibut discard (mt)**	**IFQ flatfish**	**IFQ mixed**	**Non-IFQ**	**All Species (IFQ & Non-IFQ)**
Bottom Trawl									
North of Pt. Chehalis									
0 to 60 fm	13	46	306	292	7.28	2	5	10	3
> 60 fm	22	146	1113	965	18.07	3	8	138	6
Pt. Chehalis to 40°10'									
0 to 60 fm	20	137	1135	1045	9.71	12	2	65	19
> 60 fm	56	755	5127	4915	20.16	5	14	178	29
South of 40°10'									
0 to 60 fm	3	23	66	62	0.17	3	0	1	0
> 60 fm	15	241	1376	1338	0.16	3	0	34	3
Pot									
North of Pt. Chehalis	3	12	63	62	1.03	0	0	0	0
Pt. Chehalis to 40°10'	8	75	716	713	2.3	0	0	1	2
South of 40°10'	11	148	738	736	0	0	0	2	0
Hook and Line									
North of 40°10'	6	21	411	402	6.03	0	0	0	1
South of 40°10'	6	71	212	211	0	0	0	1	0
LE California Halibut									
All South of 40°10'	3	63	157	155	0	0	0	2	0
Shoreside Hake									
All North of 40°10'	26	913	1701	1699	0.03	0	0	2	0
Midwater Trawl									
North of 40°10'	**	**	**	**	**	**	**	**	**

** Confidential

Table 5. Values used to calculate the expanded weight (mt) of Pacific halibut (PHLB) from each unsampled category in the 2011 U.S. west coast groundfish IFQ fishery. Unsampled catch weight could be assigned to one of four categories: IFQ flatfish species, IFQ mixed species, non-IFQ species, or all species (IFQ & non-IFQ). The sampled weight (mt), discard ratio, unsampled weight (mt) and estimated Pacific halibut gross discard (mt) are presented within each category, as a function of gear or sector, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA. The sum of expanded weight (mt) is the sum of the estimated gross P. halibut discard across categories. The sampled PHLB in unsampled hauls (or sets) is the sampled weight of P. halibut in partially sampled hauls (or sets). The sum of the PHLB in unsampled hauls is the sum of the expanded weights plus the sampled PHLB in unsampled hauls. The total discard (gross) is the sum of the PHLB in unsampled hauls plus the sampled PHLB.

					IFQ Flatfish				Mixed IFQ Species				Non-IFQ Species				All Species (IFQ & Non-IFQ)							
Gear or Sector	Depth (fm)	Management Area	Area	Sampled PHLB	Sampled	Discard Ratio	Unsampled	Est. Discard	Sampled	Discard Ratio	Unsampled	Est. Discard	Sampled	Discard Ratio	Unsampled	Est. Discard	Sampled	Discard Ratio	Unsampled	Est. Discard	Sum of Expanded Wght.	Sampled PHLB in Unsamp. hauls	Sum of PHLB in Unsamp. hauls	Total Discard
Bottom Trawl	0 -60	N. 4010	N. Pt Chehalis	7.28	58	0.126	0.16	0.02	78	0.094	5.22	0.49	56	0.000	2.66	0.00	133	0.055	2.29	0.13	0.64	0.16	0.80	8.07
			Pt Chehalis - 4010	9.71	90	0.108	0.97	0.10	110	0.088	2.40	0.21	171	0.000	6.76	0.00	281	0.035	5.71	0.20	0.51	0.95	1.46	11.18
		S.4010	S. 4010	0.17	5	0.000	0.04	0.00	5	0.000	0.00	0.00	12	0.014	0.01	0.00	17	0.010	0.00	0.00	0.00	0.00	0.00	0.17
	> 60	N. 4010	N. Pt Chehalis	18.07	102	0.178	1.03	0.18	128	0.141	1.01	0.14	196	0.000	15.03	0.00	325	0.056	4.79	0.27	0.59	4.39	4.99	23.06
			Pt Chehalis - 4010	20.16	168	0.120	0.78	0.09	325	0.062	4.00	0.25	721	0.000	18.25	0.00	1046	0.019	7.54	0.15	0.49	1.90	2.38	22.55
		S.4010	S. 4010	0.16	155	0.000	0.10	0.00	270	0.000	0.00	0.00	217	0.001	2.87	0.00	487	0.000	1.36	0.00	0.00	0.00	0.00	0.16
Pot		N. 4010	N. Pt Chehalis	1.03	1	0.981	0.00	0.00	2	0.676	0.00	0.00	0	0.000	0.00	0.00	2	0.580	0.00	0.00	0.00	0.00	0.00	1.03
			Pt Chehalis - 4010	2.30	2	0.942	0.00	0.00	8	0.290	0.00	0.00	3	0.000	0.00	0.00	11	0.204	0.01	0.00	0.00	0.00	0.00	2.31
		S.4010	S. 4010	0.00	0	0.000	0.00	0.00	6	0.000	0.00	0.00	7	0.000	0.00	0.00	13	0.000	0.00	0.00	0.00	0.00	0.00	0.00
Hook & Line		N. 4010		6.03	7	0.845	0.00	0.00	22	0.276	0.00	0.00	56	0.000	0.00	0.00	78	0.077	0.00	0.00	0.00	0.02	0.02	6.06
		S. 4010		0.00	0	0.000	0.00	0.00	4	0.000	0.00	0.00	21	0.000	0.00	0.00	25	0.000	0.00	0.00	0.00	0.00	0.00	0.00
Shoreside hake		N.4010		0.03	0	0.991	0.00	0.00	521	0.000	0.00	0.00	3	0.000	1.37	0.00	525	0.000	0.00	0.00	0.00	0.00	0.00	0.03
LE CA Halibut		S. 4010		0.00	1	0.000	0.00	0.00	1	0.000	0.00	0.00	74	0.000	0.01	0.00	75	0.000	0.00	0.00	0.00	0.00	0.00	0.00
Midwater Trawl		N. 4010		**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**	**

** Confidential

Table 6. Pacific halibut viabilities in the 2011 groundfish IFQ fishery by gear, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA. The condition of sampled Pacific halibut was identified as Excellent (Exc), Poor, or Dead (Appendices N and O, WCGOP manual 2012), consistent with IPHC protocol. The number of fish in each category was weighted based on the length-weight relationship as described in the Methods.

Year	Gear	Depth (fm)	Management Area	Area	Number				Weighted percentages in each category		
2011					Exc	Poor	Dead	Total	Exc	Poor	Dead
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	522	138	309	969	57%	14%	28%
				Pt Chehalis - 4010	1217	182	201	1600	82%	9%	9%
			S. 4010	S. 4010	0	0	10	10	0%	0%	100%
		> 60	N. 4010	N. Pt Chehalis	1168	455	941	2564	48%	18%	34%
				Pt Chehalis - 4010	1005	562	1204	2771	38%	20%	42%
			S. 4010	S. 4010	7	1	6	14	48%	6%	46%
	Pot		N. 4010	N. Pt Chehalis	53	3	19	75	84%	2%	14%
				Pt Chehalis - 4010	149	10	65	224	69%	5%	26%
			S. 4010	S. 4010	0	0	0	0			

Table 7. Estimated gross discard (mt) and discard mortality (mt) of Pacific halibut in the 2011 groundfish IFQ fishery by gear type, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA. Estimates were allocated to the three condition categories based on information presented in Table 6. DMR = Discard Mortality Rate.

Year	Gear	Depth (fm)	Management Area	Area	Number				Weighted percentages in each category		
2011					Exc	Poor	Dead	Total	Exc	Poor	Dead
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	522	138	309	969	57%	14%	28%
				Pt Chehalis - 4010	1217	182	201	1600	82%	9%	9%
			S. 4010	S. 4010	0	0	10	10	0%	0%	100%
		> 60	N. 4010	N. Pt Chehalis	1168	455	941	2564	48%	18%	34%
				Pt Chehalis - 4010	1005	562	1204	2771	38%	20%	42%
			S. 4010	S. 4010	7	1	6	14	48%	6%	46%
	Pot		N. 4010	N. Pt Chehalis	53	3	19	75	84%	2%	14%
				Pt Chehalis - 4010	149	10	65	224	69%	5%	26%
			S. 4010	S. 4010	0	0	0	0			

Table 8. Estimated Pacific halibut bycatch (mt), discard mortality (mt), legal-sized (82 cm) mortality (mt), and percent of legal-sized discard by weight in the 2011 groundfish IFQ fishery by gear or sector, depth (bottom trawl only), management area, and area north or south of Point Chehalis, WA.

Year	Gear or Sector	Depth (fm)	Management Area	Area	Total bycatch (mt)	Total discard mortality (mt)	Estimated legal-sized mortality (mt)	Estimated % legal-sized discarded, by weight
2011								
	Bottom Trawl	0 - 60	N. 4010	N. Pt Chehalis	8.07	3.62	1.98	55%
				Pt Chehalis - 4010	11.18	3.32	2.06	62%
			S. 4010	S. 4010	0.17	0.15	0.15	100%
		> 60	N. 4010	N. Pt Chehalis	23.06	11.49	8.11	71%
				Pt Chehalis - 4010	22.55	12.68	8.72	69%
			S. 4010	S. 4010	0.16	0.09	0.09	97%
	Pot		N. 4010	N. Pt Chehalis	1.03	0.17	0.13	77%
				Pt Chehalis - 4010	2.31	0.71	0.53	74%
			S. 4010	S. 4010	0.00	0.00	0.00	
	Hook and Line		N. 4010		6.06	0.97	0.43	45%
			S. 4010		0.00	0.00	0.00	
	Shoreside hake		N. 4010		0.03	0.03	0.00	100%
	LE CA Halibut		S. 4010		0.00	0.00	0.00	

Table 9. Pacific halibut length frequencies collected by WCGOP observers during the 2011 groundfish IFQ fishery by gear type. (a) Actual measurement of P. halibut lengths (cm). (b) Visual estimates of P. halibut lengths (cm). Note that there were no actual measurements from vessels fishing with hook-&-line gear. The lower limits on the length intervals are inclusive, while the upper limits are exclusive. Numbers are numbers of individual P. halibut per bin by gear type.

IFQ Fishery 2011

a.

Actual Length bin (cm)	Bottom Trawl	Pot
17-22	1	0
37-42	1	0
42-47	2	1
47-52	12	0
52-57	37	2
57-62	193	9
62-67	586	12
67-72	890	22
72-77	1308	38
77-82	1101	53
82-87	1017	48
87-92	750	41
92-97	584	24
97-102	381	22
102-107	267	4
107-112	174	4
112-117	118	6
117-122	59	3
122-127	39	3
127-132	20	2
132-137	12	2
137-142	5	1
142-147	9	0
147-152	2	0
152-157	0	0
157-162	0	0
162-167	0	0
167-172	0	1
172-177	0	0
177-182	0	0
182-187	0	0
187-192	0	0
192-197	0	0
197-202	0	1

b.

Visual Length bin (cm)	Bottom Trawl	Pot	Hook and Line
30	0	1	3
40	2	2	48
50	3	1	120
60	3	2	237
70	16	4	201
80	12	11	139
90	7	7	68
100	6	7	26
110	1	1	20
120	6	2	11
130	1	1	1
140	3	0	3
150	2	0	1
160	0	0	1

Table 10. Number of observed trips, sets, and vessels by year in the non-nearshore groundfish fixed gear fishery, which includes limited entry (LE) sablefish endorsed season, LE non-sablefish endorsed, and open access (OA) fixed gear sectors.

	LE Sablefish Endorsed			LE Non-Sablefish Endorsed	OA Fixed Gear	
	Longline				Hook-and-line	
Year	North of Pt Chehalis	South of Pt Chehalis	Pot	Longline	Gears	Pot
	Number of observed trips					
2002	23	47	23	11	0	0
2003	25	25	35	130	41	16
2004	13	35	13	62	43	96
2005	31	73	39	35	34	43
2006	31	34	39	121	11	38
2007	36	40	30	158	50	45
2008	17	60	24	122	58	55
2009	13	34	27	138	68	30
2010	18	126	43	226	69	40
2011	18	84	22	201	68	60
	Number of observed sets					
2002	207	181	247	22	0	0
2003	191	158	362	219	49	50
2004	115	205	139	130	53	182
2005	388	275	491	60	37	50
2006	291	159	288	196	12	39
2007	381	136	154	303	66	72
2008	194	345	329	220	68	74
2009	178	109	67	271	101	45
2010	251	503	314	470	104	69
2011	284	389	227	426	100	84
	Number of observed vessels					
2002	9	18	6	4	0	0
2003	8	8	6	17	13	7
2004	6	13	3	14	15	17
2005	10	18	7	11	10	14
2006	9	10	7	21	8	15
2007	9	14	4	36	25	20
2008	6	13	6	32	33	20
2009	4	6	3	34	33	18
2010	5	20	7	38	37	26
2011	7	20	3	38	40	28

Table 11. Expansion factors and WCGOP observed discard rate by gear type for limited entry (LE) and open access (OA) non-nearshore groundfish fixed gear sectors used to expand discard estimates of Pacific halibut to the fleet-wide level.

Fishery		Expansion Factor	Observed Discard Rate Applied	
LE Sablefish Endorsed	Longline Pot	Retained Sablefish	LE Sablefish Endorsed	Longline Pot
LE Non-Sablefish Endorsed	Longline Pot	Retained Groundfish Retained Sablefish	LE Non-Sablefish Endorsed OA Fixed Gear *	Longline Pot
OA Fixed Gear	Hook-and-line Pot	Retained Groundfish	OA Fixed Gear *	Hook-and-line Pot

* No discard ratio or discard estimate was computed in the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California during this time.

Table 12. Total sablefish and groundfish landings (mt) and observed Pacific halibut discard ratios for each sector and gear type in the non-nearshore groundfish fixed gear fishery. Sablefish landings were used as the discard ratio denominator and expansion factor in all cases except the limited entry (LE) non-sablefish endorsed and OA fixed gear sectors, where target species include a variety of groundfish species.

	LE Sablefish Endorsed			**LE Non-Sablefish Endorsed**		**OA Fixed Gear**	
	Longline		**Pot**	**Longline**	**Pot**	**Hook-and-Line Gears**	**Pot**
	North of Pt Chehalis	South of Pt Chehalis					
Expansion factor **Total fleet landings** *(Based on fish tickets)*	*Sablefish landings (mt)*			*Groundfish landings (mt)*	*Sablefish landings (mt)*	*Groundfish landings (mt)*	
2002	390	407	354	452	6	387	108
2003	499	569	604	485	7	547	186
2004	698	654	626	377	6	474	184
2005	641	676	615	519	7	625	376
2006	684	708	611	441	4	487	439
2007	489	607	426	462	9	270	249
2008	385	663	421	652	18	430	238
2009	418	984	487	695	18	671	364
2010	259	1030	503	1021	34	769	302
2011	223	919	377	1238	25	445	255
Observed Pacific halibut discard ratios							
2002	0.3297	0.0283	0.0114	0.0000	*	*	*
2003	0.3532	0.0467	0.0005	0.0003	*	*	*
2004	0.2369	0.0746	0.0526	0.0000	*	*	*
2005	0.3318	0.0204	0.0043	0.0000	*	*	*
2006	0.7827	0.1636	0.0271	0.0000	*	*	*
2007	0.2184	0.0334	0.0092	0.0032	(0.0035)	0.0785	0.0035
2008	0.3715	0.1453	0.0151	0.0041	(0.0010)	0.0986	0.0010
2009	0.6436	0.0413	0.0017	0.0003	(0.0007)	0.0545	0.0007
2010	0.2642	0.0632	0.0088	0.0004	(0.0016)	0.0424	0.0016
2011	0.4780	0.0281	0.0110	0.0172	(0.0003)	0.0305	0.0003

* No discard ratio is provided for the OA fixed gear sector for 2002-2006 because the WCGOP only covered OA vessels in California during this time. Since 2007-2008 OA pot discard rates were used to estimate LE non-endorsed discard, discard ratios for this sector were also excluded.

Table 13. Summary of the percent of observed trips that caught Pacific halibut by sector, gear, and area (where applicable) in the non-nearshore groundfish fixed gear fishery. Observed mean, minimum, and maximum annual catch and discard weight (mt) are provided, along with the percent of Pacific halibut catch weight that was discarded per year.

	LE Sablefish Endorsed			LE Non-Sablefish Endorsed		OA Fixed Gear	
	Longline		Pot	Longline	Pot	Hook-and-Line Gears	Pot
	North of Pt Chehalis	South of Pt Chehalis					
% of observed trips that caught Pacific halibut							
2002	95.7%	46.8%	17.4%	0.0%	--	--	--
2003	100.0%	52.0%	8.6%	0.8%	--	0.0%	0.0%
2004	100.0%	71.4%	38.5%	0.0%	--	0.0%	0.0%
2005	96.8%	58.9%	33.3%	0.0%	--	0.0%	0.0%
2006	100.0%	76.5%	56.4%	0.0%	--	9.1%	0.0%
2007	94.4%	47.5%	33.3%	1.9%	--	26.0%	6.7%
2008	100.0%	78.3%	83.3%	3.3%	--	34.5%	5.5%
2009	84.6%	35.3%	33.3%	7.0%	--	38.2%	10.0%
2010	83.3%	46.8%	51.2%	1.3%	--	21.7%	2.5%
2011	88.9%	42.9%	45.5%	6.0%	--	30.9%	6.7%
Observed annual catch (mt) of Pacific halibut							
Mean	45.4	11.6	2.0	0.3	--	0.9	0.0
Min	12.1	2.3	0.1	0.0	--	0.1	0.0
Max	117.2	36.6	5.4	1.4	--	1.6	0.0
Observed annual discard (mt) of Pacific halibut							
Mean	40.2	11.6	2.0	0.3	--	0.9	0.0
Min	9.5	2.3	0.1	0.0	--	0.1	0.0
Max	109.6	36.6	5.4	1.4	--	1.6	0.0
% of Pacific halibut catch that was discarded							
2002	80.1%	95.5%	100.0%	n.o.c.	--	--	--
2003	82.5%	99.5%	100.0%	100.0%	--	n.o.c.	n.o.c.
2004	79.0%	97.7%	100.0%	n.o.c.	--	n.o.c.	n.o.c.
2005	84.8%	100.0%	100.0%	n.o.c.	--	n.o.c.	n.o.c.
2006	93.5%	97.9%	100.0%	n.o.c.	--	100.0%	n.o.c.
2007	80.6%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2008	87.4%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2009	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2010	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%
2011	100.0%	100.0%	100.0%	100.0%	--	100.0%	100.0%

n.o.c. No observed catch of Pacific halibut and thus a % discarded calculation is not possible.
-- No WCGOP observers were depolyed for the sector/year/gear type combination.

Table 14. Estimated Pacific halibut gross discard (mt) and discard mortality (mt) in the limited entry (LE) sablefish endorsed season, LE non-sablefish endorsed, and open access (OA) fixed gear sectors of the non-nearshore groundfish fishery. Estimated discard mortality (mt) was computed by multiplying a 16% (longline) or 18% (pot) discard mortality rate by gross discard estimates. Discard estimates were not initially computed for the 2002-2006 OA fixed gear sector because the WCGOP only observed OA fixed gear vessels off of California during that time. To produce potential values for these years, a combined discard rate was used from 2007-2008 with coastwide observations.

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
LE Sablefish Endorsed (mt)										
Longline										
North of Pt Chehalis										
Gross discard estimate	128.7	176.2	165.3	212.6	535.5	106.8	143.2	268.8	70.8	106.7
Estimated discard mortality (16%)	20.6	28.2	26.5	34.0	85.7	17.1	22.9	43.0	11.3	17.1
South of Pt Chehalis										
Gross discard estimate	11.5	26.6	48.7	13.8	115.9	20.3	96.3	40.7	65.0	25.8
Estimated discard mortality (16%)	1.8	4.3	7.8	2.2	18.5	3.2	15.4	6.5	10.4	4.1
Coastwide										
Gross discard estimate	140.2	202.7	214.1	226.4	651.4	127.1	239.5	309.4	135.9	132.5
Estimated discard mortality (16%)	22.4	32.4	34.3	36.2	104.2	20.3	38.3	49.5	21.7	21.2
Pot										
Coastwide										
Gross discard estimate	4.1	0.3	33.0	2.6	16.5	3.9	6.4	0.8	4.5	4.1
Estimated discard mortality (18%)	0.7	0.1	5.9	0.5	3.0	0.7	1.1	0.1	0.8	0.7
LE Non-Sablefish Endorsed (mt)										
Longline										
Coastwide										
Gross discard estimate	0.0	0.1	0.0	0.0	0.0	1.5	2.6	0.2	0.4	21.3
Estimated discard mortality (16%)	0.0	0.0	0.0	0.0	0.0	0.2	0.4	0.0	0.1	3.4
Pot										
Coastwide										
Gross discard estimate	*	*	*	*	*	0.03	0.02	0.01	0.05	0.01
Assuming OA fixed gear 07-08 pot discard rate for 2002 - 2006 *	[0.0]	[0.0	[0.0]	[0.0]	[0.0]					
Estimated discard mortality (18%)	*	*	*	*	*	0.0	0.0	0.0	0.0	0.0
OA Fixed Gear (mt)										
Hook-and-line Gears										
Coastwide										
Gross discard estimate	*	*	*	*	*	21.8	44.1	39.6	32.6	17.2
Assuming 07-08 discard rate for 2002 - 2006	[28.7]	[40.3]	[29.3]	[55.8]	[37.4]					
Estimated discard mortality (16%)	*	*	*	*	*	3.5	7.1	6.3	5.2	2.7
Pot										
Coastwide										
Gross discard estimate	*	*	*	*	*	0.9	0.2	0.3	0.5	0.1
Assuming 07-08 discard rate for 2002 - 2006	[0.2]	[0.4]	[0.4]	[0.8]	[0.9]					
Estimated discard mortality (18%)	*	*	*	*	*	0.2	0.0	0.0	0.1	0.0

* The LE non-sablefish endorsed pot sector has not been observed by the WCGOP and therefore estimates are based on discard rates from observed OA fixed gear pot vessels. Because the OA fixed gear pot sector was only observed on a coastwide basis in 2007 and 2008, estimates for LE non-sablefish endorsed pot are only available in these years as well.

Table 15. Estimated Pacific halibut discard mortality (mt) from each sector of the non-nearshore groundfish fixed gear fishery from 2002 through 2011.

	Estimated discard mortality (mt)			
	LE Sablefish Endorsed	LE Non-Sablefish Endorsed	OA Fixed Gear	All Sectors
2002	23.1	0.0	0.0	23.1
2003	32.5	0.0	0.0	32.5
2004	39.5	0.0	0.0	39.5
2005	36.6	0.0	0.0	36.6
2006	106.9	0.0	0.0	106.9
2007	21.0	0.2	3.6	24.8
2008	39.3	0.4	7.1	46.9
2009	49.7	0.0	6.4	56.1
2010	22.4	0.1	5.3	27.8
2011	21.9	3.4	2.8	28.1

Table 16. Pacific halibut length frequencies collected by WCGOP observers during the LE sablefish endorsed fishery, including both pot and longline gear, from 2002-2011. (a) Actual measurement of P. halibut lengths (cm). (b) Visual estimates of P. halibut lengths (cm). Note that observers were only required to collect actual measurements from LE sablefish endorsed vessels in 2011. The lower limits on the length intervals are inclusive, while the upper limits are exclusive. Numbers are numbers of individual P. halibut per bin.

LE Sablefish Endorsed Fishery 2002-2011

a.

Actual Length bin (cm)	Length freq.	Percent length freq.
27 - 32	0	0.00
32 - 37	0	0.00
37 - 42	0	0.00
42 - 47	1	0.00
47 - 52	7	0.00
52 - 57	8	0.01
57 - 62	24	0.02
62 - 67	63	0.04
67 - 72	135	0.09
72 - 77	264	0.17
77 - 82	281	0.18
82 - 87	223	0.14
87 - 92	178	0.11
92 - 97	148	0.10
97 - 102	82	0.05
102 - 107	50	0.03
107 - 112	32	0.02
112 - 117	24	0.02
117 - 122	15	0.01
122 - 127	11	0.01
127 - 132	3	0.00
132 - 137	3	0.00
137 - 142	1	0.00
142 - 147	1	0.00
145 - 149	0	0.00
150 - 154	0	0.00
155 - 159	0	0.00
160 - 164	0	0.00
165 - 169	0	0.00
170 - 174	0	0.00
175 - 179	0	0.00
180 - 184	0	0.00
185 - 189	0	0.00

b.

Visual Length bin (cm)	Length freq.	Percent length freq.
10	0	0.00
20	0	0.00
30	5	0.00
40	33	0.00
50	256	0.01
60	2737	0.14
70	4495	0.23
80	4763	0.24
90	3915	0.20
100	2084	0.11
110	776	0.04
120	327	0.02
130	108	0.01
140	21	0.00
150	5	0.00
160	0	0.00
170	0	0.00
180	0	0.00
190	0	0.00

Table 17. Pacific halibut actual and visual length data approximating legal (≥ 82 cm) versus sublegal definitions (IPHC), collected by the WCGOP in the LE sablefish endorsed fixed gear sector.

	Pacific halibut lengths	
	Number	Percentage
Actual length		
< 80 cm	783	50%
≥ 80 cm	771	50%
Visual estimate		
0 - 74 cm	7526	39%
75 - 84 cm	4763	24%
85 - 150 cm	7236	37%

Table 18. Coverage information, bycatch ratios, and bycatch estimates for Pacific halibut in the nearshore fixed gear groundfish fishery by state. The WCGOP began observing the California nearshore fishery in 2003 and the Oregon nearshore fishery in 2004. Bycatch estimates in this table are not intended to represent mortality values, as discard mortality rates are not available for the nearshore fixed gear fishery.

	Observed							Total fleet catch of nearshore species (mt)	Estimated		
	Fleet observer coverage rate *	Number of observed sets	% of sets with Pacific halibut	Pacific halibut bycatch (kg)	Nearshore species retained (kg)	Pacific halibut bycatch rate	SE		Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
Nearshore fixed gear groundfish fishery sector											
Oregon											
2002	*not observed*		-	-	-	-	-	279	-	-	-
2003	*not observed*		-	-	-	-	-	208	-	-	-
2004	4.9%	207	1.9%	48.9	10,210	0.0048	0.0027	210	1.005	0.002	2.123
2005	6.3%	167	0.6%	32.5	11,419	0.0028	0.0028	180	0.513	0.002	1.520
2006	11.6%	379	1.3%	62.8	19,396	0.0032	0.0016	168	0.543	0.005	1.081
2007	8.9%	242	0.4%	7.8	16,103	0.0005	0.0005	180	0.087	0.002	0.257
2008	7.6%	183	0.5%	27.2	14,285	0.0019	0.0019	189	0.360	0.002	1.066
2009	6.2%	219	2.3%	80.1	13,852	0.0058	0.0028	224	1.298	0.060	2.536
2010	7.6%	210	0.5%	6.1	13,209	0.0005	0.0005	173	0.080	0.002	0.237
2011	8.1%	246	2.0%	89.6	15,891	0.0056	0.0031	195	1.100	0.002	2.275
California											
2002	*not observed*		-	-	-	-	-	380	-	-	-
2003	3.2%	205	0.0%	0.0	8,085	0.0000	0.0000	255	0.000	0.000	0.000
2004	8.0%	422	0.0%	0.0	23,126	0.0000	0.0000	288	0.000	0.000	0.000
2005	4.7%	217	0.9%	79.5	13,108	0.0061	0.0054	280	1.695	0.003	4.665
2006	3.2%	158	0.0%	0.0	8,367	0.0000	0.0000	258	0.000	0.000	0.000
2007	4.5%	224	0.0%	0.0	12,138	0.0000	0.0000	271	0.000	0.000	0.000
2008	2.2%	87	0.0%	0.0	6,543	0.0000	0.0000	293	0.000	0.000	0.000
2009	2.6%	122	0.0%	0.0	6,723	0.0000	0.0000	260	0.000	0.000	0.000
2010	3.2%	117	0.0%	0.0	7,083	0.0000	0.0000	219	0.000	0.000	0.000
2011	3.9%	214	0.5%	77.3	8,448	0.0091	0.0091	216	1.979	0.002	5.857

* Coverage rate in the nearshore sector is defined as the proportion of nearshore target species landings that were observed.

Table 19. Coverage information, bycatch ratios, and bycatch estimates (mt) for Pacific halibut in the pink shrimp trawl fishery. The WCGOP began observing the pink shrimp fishery in 2004, but was not able to observe the fishery in 2006. Bycatch estimates in this table are not intended to represent morality values, as discard mortality rates are not available for the pink shrimp fishery.

	Observed								Estimated		
	Fleet observer coverage rate *	Number of observed tows	% of tows with Pacific halibut	Pacific halibut bycatch (kg)	Pink shrimp retained (kg)	Pacific halibut bycatch rate	SE	Total fleet catch of pink shrimp (mt)	Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
Pink shrimp trawl fishery											
2002	*not observed*		-	-	-	-	-	25,375	-	-	-
2003	*not observed*		-	-	-	-	-	13,887	-	-	-
2004	6.5%	1026	0.0%	0.0	583,266	0.000000	0.000000	8,974	0.000	0.000	0.000
2005	3.9%	509	0.2%	2.3	424,683	0.000005	0.000005	10,862	0.058	0.109	0.172
2006	*not observed*		-	-	-	-	-	8,400	-	-	-
2007	6.2%	951	0.2%	15.3	672,663	0.000023	0.000019	10,935	0.248	0.109	0.649
2008	5.2%	840	0.0%	0.0	805,763	0.000000	0.000000	15,375	0.000	0.000	0.000
2009	6.0%	695	0.0%	0.0	866,905	0.000000	0.000000	14,412	0.000	0.000	0.000
2010	11.6%	1654	0.0%	0.0	2,365,275	0.000000	0.000000	20,327	0.000	0.000	0.000
2011	14.3%	2751	0.1%	27.0	4,216,533	0.000006	0.000004	29,460	0.189	0.295	0.422

* Coverage rate in the pink shrimp trawl fishery is defined as the proportion of pink shrimp landings that were observed.

Table 20. Coverage information, bycatch ratios, and bycatch estimates (mt) for Pacific halibut in the California halibut trawl fishery. The fishery is comprised of a limited entry component and an open access component. Beginning in 2011, the limited entry component of the California halibut fishery is observed under the IFQ groundfish fishery (see above). Bycatch estimates in this table are not intended to represent morality values, as discard mortality rates are not available for the California halibut fishery.

	Observed								Estimated		
	Fleet observer coverage rate *	Number of observed tows	% of tows with Pacific halibut	Pacific halibut bycatch (kg)	California halibut retained (kg)	Pacific halibut bycatch rate	SE	Total fleet catch of California halibut (mt)	Pacific halibut bycatch (mt)	Lower bound (mt)	Upper bound (mt)
California halibut trawl fishery											
Limited Entry Sector											
2002	3.2%	52	0.0%	0.0	3,590	0.0000	0.0000	112	0.000	0.000	0.000
2003	17.0%	206	0.0%	0.0	19,104	0.0000	0.0000	112	0.000	0.000	0.000
2004	16.7%	141	0.7%	3.5	23,447	0.0001	0.0001	140	0.021	0.001	0.062
2005	14.1%	221	0.5%	4.7	27,342	0.0002	0.0002	194	0.033	0.002	0.099
2006	11.7%	224	0.9%	2.9	14,286	0.0002	0.0002	123	0.025	0.001	0.063
2007	12.8%	80	1.3%	8.1	5,419	0.0015	0.0015	42	0.063	0.000	0.188
2008	24.6%	118	8.5%	82.6	9,637	0.0086	0.0030	39	0.336	0.108	0.563
2009	6.0%	29	0.0%	0.0	2,898	0.0000	0.0000	48	0.000	0.000	0.000
2010	11.7%	41	0.0%	0.0	6,396	0.0000	0.0000	55	0.000	0.000	0.000
2011	Observed under IFQ Fishery, see Tables 1 & 2										
Open Access Sector											
2002	*not observed*		-	-	-	-	-	90	-	-	-
2003	4.3%	110	0.0%	0.0	1,977	0.0000	0.0000	46	0.000	0.000	0.000
2004	6.4%	244	1.6%	49.4	5,100	0.0097	0.0058	80	0.776	0.001	1.691
2005	9.7%	360	0.0%	0.0	7,489	0.0000	0.0000	77	0.000	0.000	0.000
2006	*not observed*		-	-	-	-	-	61	-	-	-
2007	6.9%	226	0.0%	0.0	2,694	0.0000	0.0000	39	0.000	0.000	0.000
2008	5.2%	197	0.0%	0.0	2,631	0.0000	0.0000	50	0.000	0.000	0.000
2009	0.7%	30	0.0%	0.0	634	0.0000	0.0000	85	0.000	0.000	0.000
2010	3.5%	111	0.0%	0.0	2,349	0.0000	0.0000	67	0.000	0.000	0.000
2011	15.6%	213	0.0%	0.0	12,504	0.0000	0.0000	80	0.000	0.000	0.000

* Coverage rate in the California halibut trawl fishery is defined as the proportion of California halibut landings that were observed.

Table 21. Discard estimates for all fishery sectors observed by the NWFSC Groundfish Observer Program (WCGOP), 2002-2011. Total discard mortality estimates are also provided when discard mortality rates were available.

	Year	LE bottom trawl (2002-2010)	IFQ Fishery (first year: 2011)						Non-nearshore fixed gear			Nearshore fixed gear*	Pink shrimp*	CA halibut‡*	At-sea Hake*	Total
			Shoreside Hake*	LE CA Halibut*	Bottom Trawl	Midwater Trawl*	Hook and Line	Pot	LE endorsed	LE non-endorsed	OA					
Gross discard estimates (mt)	2002	524							144	0.0	-	-	-	0.0	1.1	670
	2003	187							203	0.1	-	0.0	-	0.0	2.6	392
	2004	212							247	0.0	-	1.0	0.0	0.8	1.1	462
	2005	460							229	0.0	-	2.2	0.1	0.0	2.0	694
	2006	391							668	0.0	-	0.5	-	0.0	0.8	1060
	2007	294							131	1.5	22.7	0.1	0.2	0.1	1.2	451
	2008	305							246	2.7	44.3	0.4	0.0	0.3	4.0	603
	2009	385							310	0.2	39.9	1.3	0.0	0.0	0.3	737
	2010	265							140	0.4	33.1	0.1	0.0	0.0	1.6	441
	2011		0.0	0.0	65.2	***	6.1	3.3	269	21.3	17.2	2.0	0.2	0.0	0.6	385
Total discard mortality (mt)	2002	345							23	0.0	0.0	-	-	0.0	1.1	369
	2003	124							32	0.0	0.0	0.0	-	0.0	2.6	160
	2004	133							40	0.0	0.0	1.0	0.0	0.8	1.1	176
	2005	287							37	0.0	0.0	2.2	0.1	0.0	2.0	327
	2006	242							107	0.0	0.0	0.5	-	0.0	0.8	351
	2007	209							21	0.2	3.6	0.1	0.2	0.1	1.2	235
	2008	208							39	0.4	7.1	0.4	0.0	0.3	4.0	259
	2009	251							50	0.0	6.4	1.3	0.0	0.0	0.3	309
	2010	181							22	0.1	5.3	0.1	0.0	0.0	1.6	210
	2011		0.03	0.0	31.3	***	1.0	0.9	22	3.4	2.8	2.0	0.2	0.0	0.6	64

" - " Indicates years of incomplete or no observer coverage for which estimates are not available

‡ Since 2011, CA Halibut only includes Open Access sector because the Limited Entry sector is covered under the IFQ Fishery.

* Mortality rate of 100% applied

Figure 1. Fish ticket data processing for division into 2011 groundfish fishery sectors after retrieval from the Pacific Fisheries Information Network (PacFIN) database. Grey boxes indicate sectors for which federal observer data is available. Fish ticket processing methods are updated regularly, thus this figure might differ from similar figures in previous reports.

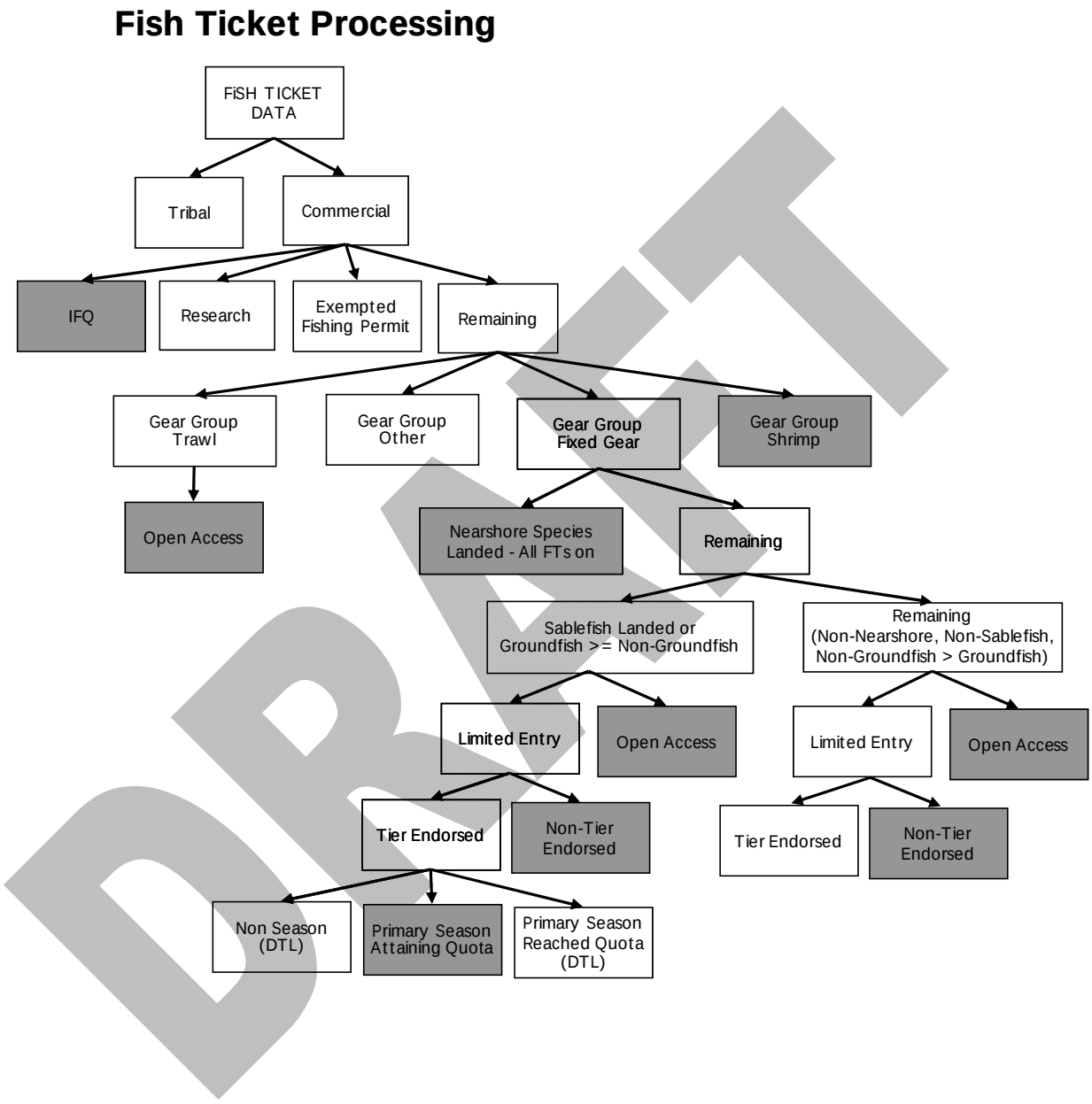


Figure 2a. Spatial distribution of Pacific halibut catch (mt/km^2) observed by the West Coast Groundfish Observer Program, off the U.S. west coast (WA, OR). Gear types observed by the WCGOP include bottom trawl, midwater trawl, shrimp trawl, fixed gear hook-&-line and pot gear. The four catch classifications were defined by dividing the maximum value (2.0697) in half to obtain the 1.0349-2.0697 catch bin. The next lower bin was obtained by dividing the lower bound of the upper bin (1.0348) in half again to obtain the 0.51745-1.0348 catch bin. The remaining observations were allocated into equal proportions into the two lowest classifications. Cells calculated from less than 3 vessels were omitted from the map due to confidentiality.

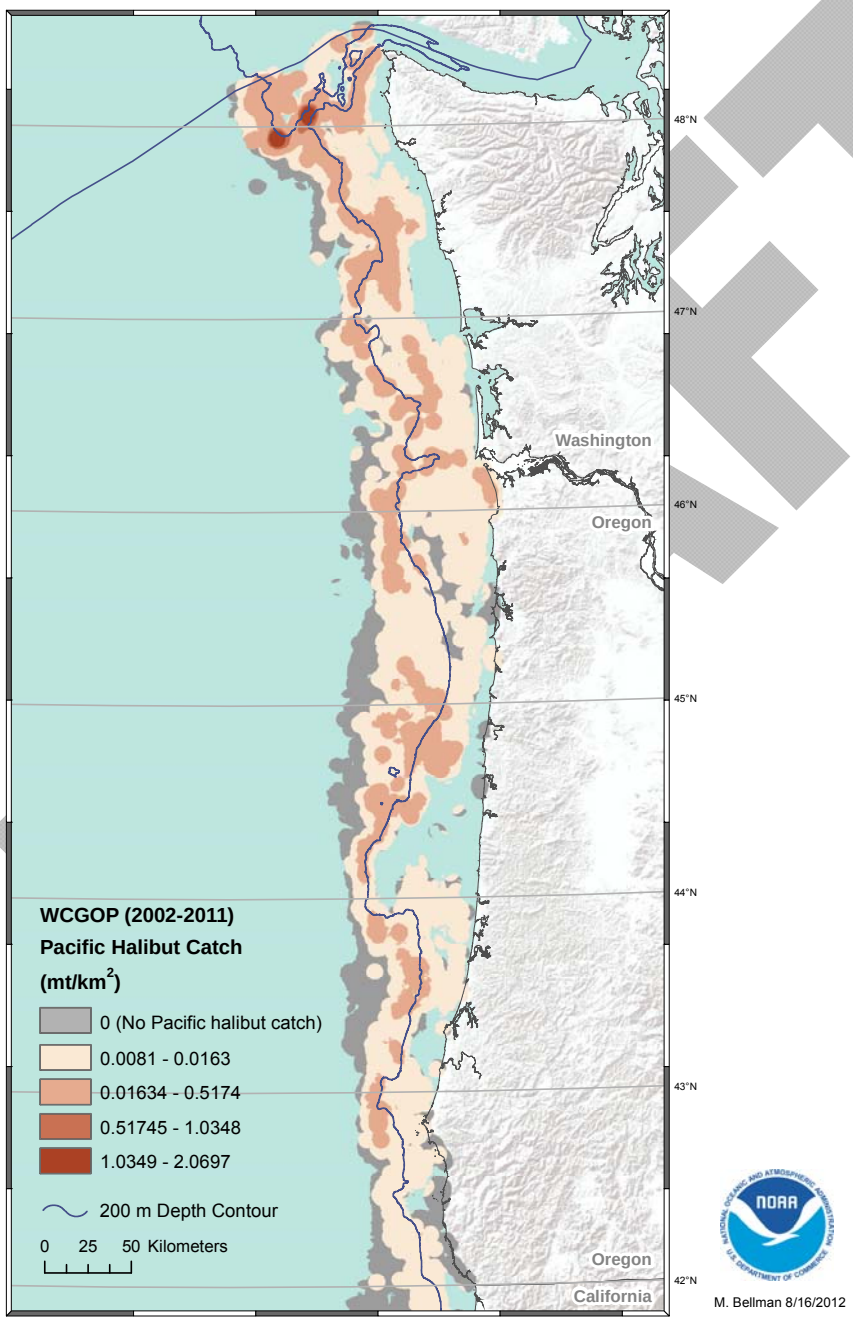


Figure 2b. Spatial distribution of Pacific halibut catch (mt/km^2) and fishing grounds observed by the West Coast Groundfish Observer Program, off the U.S. west coast (CA). See Figure 2a caption for full description.

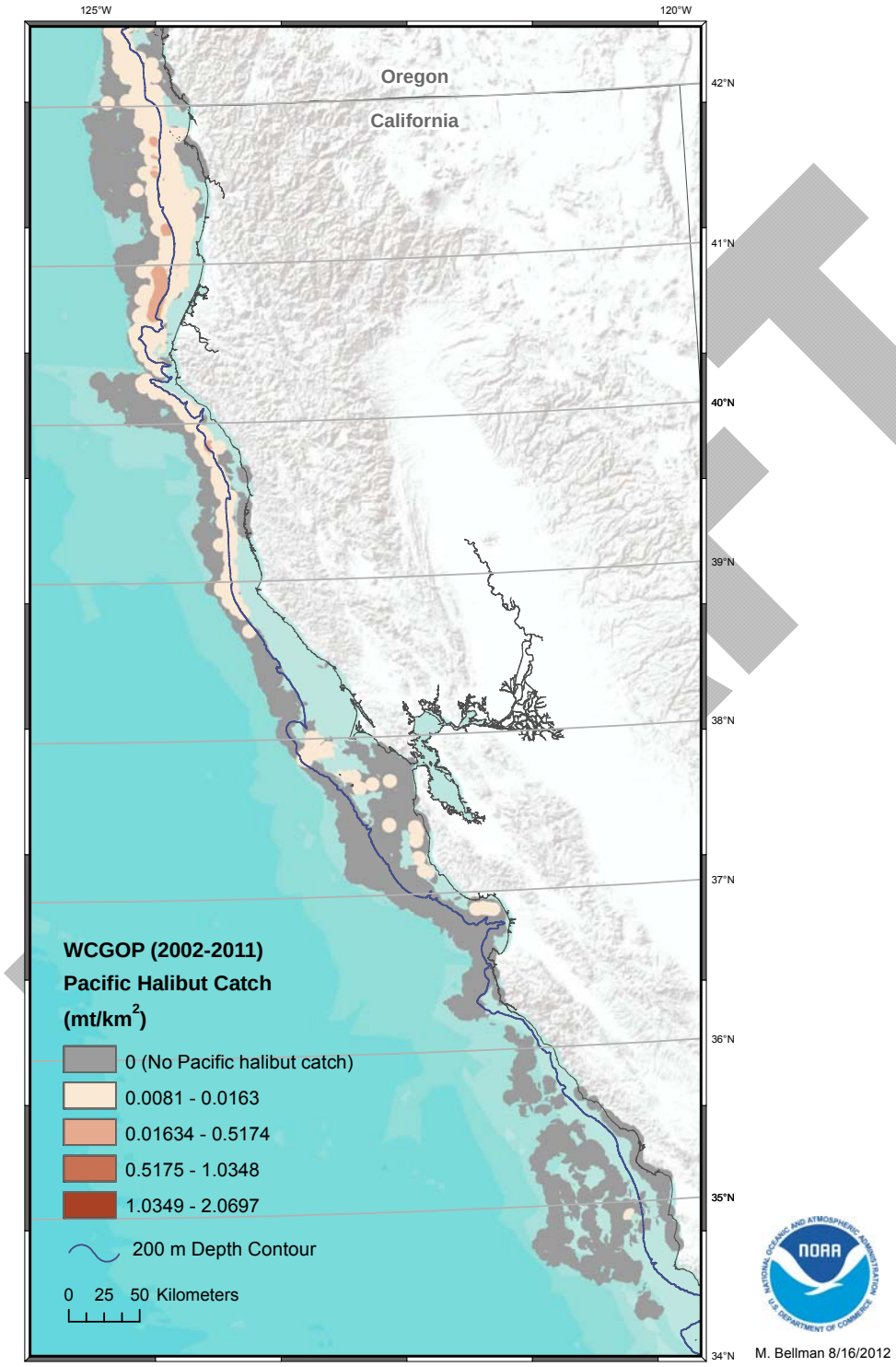


Figure 3. Estimated discard mortality of Pacific halibut in the non-nearshore groundfish fixed gear fishery. Estimates are presented for fixed gear sectors with annual discard estimates exceeding 1 mt, which included all components of the limited entry (LE) sablefish endorsed sector (longline gear (LL) by area and pot gear (POT) coastwide) and the open access (OA) sector using hook-&-line gears. The OA fixed gear sector was only observed in California from 2003-2006 and was not covered in 2002. A fixed average discard rate from 2007 and 2008 data was applied to generate 2002-2006 discard estimates for the OA sector. Although OA 2002-2006 discard estimates are not included in final total mortality summaries, they are shown here for comparison purposes. Other fixed gear sectors include LE non-sablefish endorsed and OA fixed gear vessels fishing with pot gear.

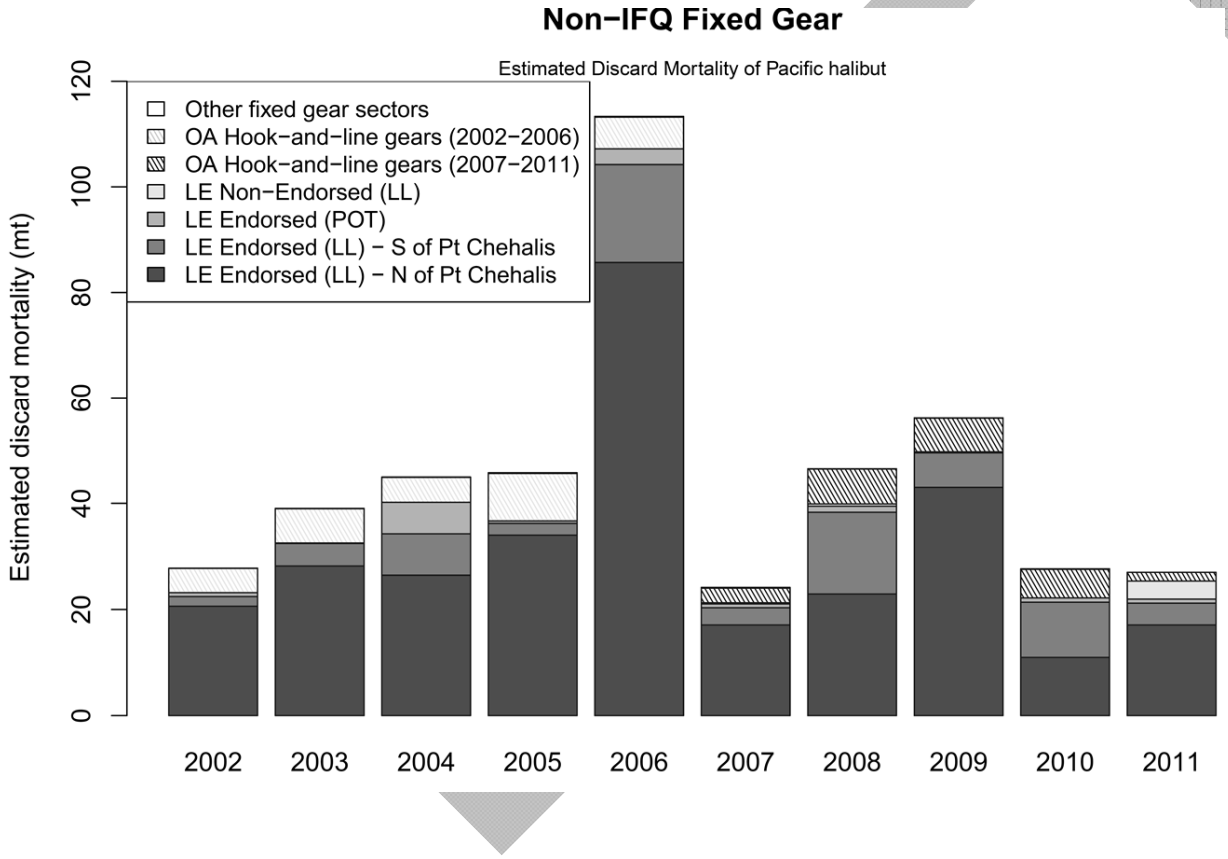
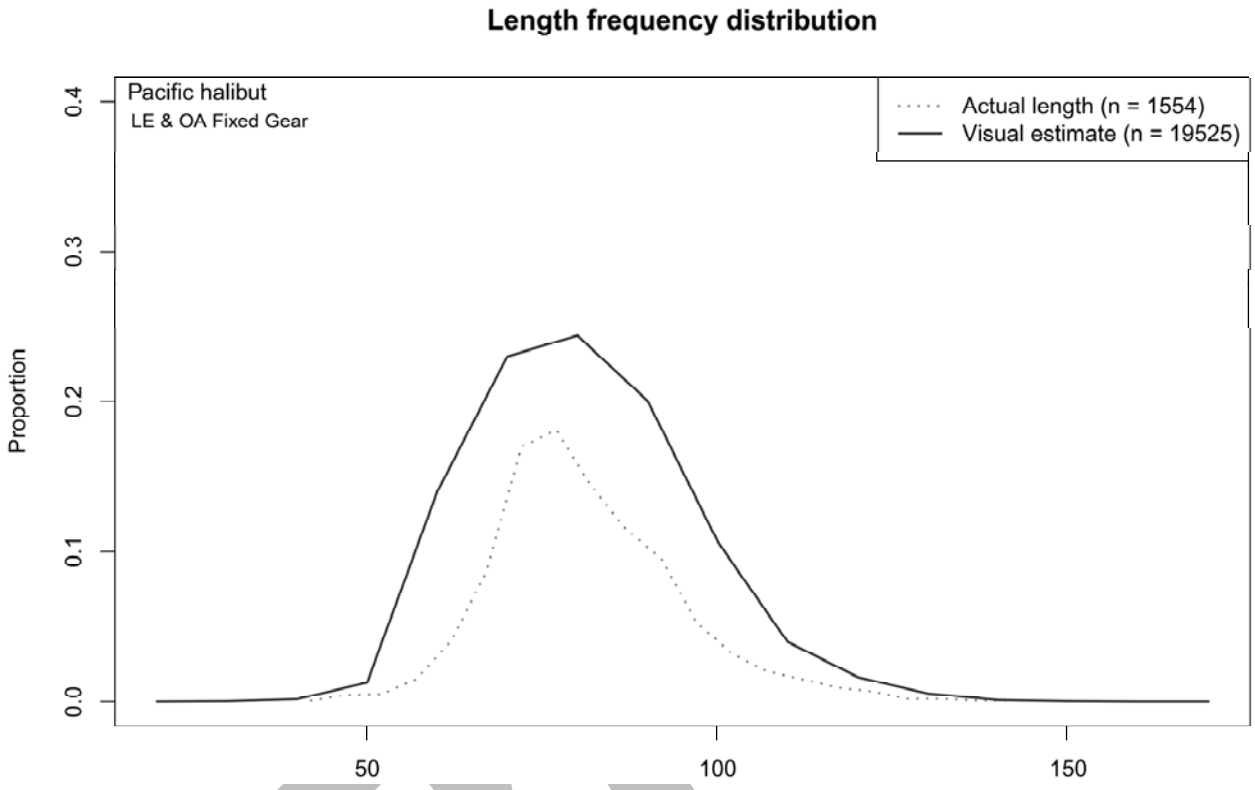


Figure 4. Length frequency distribution of discarded Pacific halibut on WCGOP observed limited entry (LE) and open access (OA) groundfish fixed gear vessels from September 2003 through December 2011. The majority of Pacific halibut lengths collected in this fishery were visual estimates (solid dark line).



APPENDIX A

Weighted catch composition data from the IFQ fishery for bottom trawl and pot gears. The frequency within each length bin was weighted based on the following equation:

$$n_{wghtd_l} = n_l \times \frac{W_{st}}{\sum_l w_{stl}} \times \frac{\sum_t W_{st}}{W_{st}} \times \frac{\hat{W}_s}{\sum_t W_{st}} = n_l \times \frac{\hat{W}_s}{\sum_l w_{stl}}$$

where:
n_l: number of measured fish in length bin l
w_{stl}: total weight of length l fish measured, as determined through the IPHC length-weight relationship
W_{st}: total observed discard weight of Pacific halibut on tow t, in stratum s
$\hat{W}_s$: estimated total discard weight of Pacific halibut in stratum s

Table A1. Weighted length frequency distributions for Pacific halibut in the 2011 IFQ fishery for bottom trawl and pot gears.

	IFQ Fishery 2011			IFQ Fishery 2011			IFQ Fishery 2011	
Length bin (cm)	Bottom Trawl	Pot	Length bin (cm)	Bottom Trawl	Pot	Length bin (cm)	Bottom Trawl	Pot
18	0.0065	0.0000	80	0.0575	0.1033	142	0.0001	0.0000
20	0.0000	0.0000	82	0.0471	0.0504	144	0.0001	0.0000
22	0.0000	0.0000	84	0.0457	0.0459	146	0.0000	0.0000
24	0.0000	0.0000	86	0.0306	0.0329	148	0.0000	0.0000
26	0.0000	0.0000	88	0.0282	0.0297	150	0.0000	0.0000
28	0.0000	0.0000	90	0.0263	0.0455	152	0.0000	0.0000
30	0.0000	0.0734	92	0.0213	0.0173	154	0.0000	0.0000
32	0.0000	0.0000	94	0.0168	0.0149	156	0.0000	0.0000
34	0.0000	0.0000	96	0.0135	0.0123	158	0.0000	0.0000
36	0.0000	0.0000	98	0.0097	0.0098	160	0.0000	0.0000
38	0.0000	0.0000	100	0.0090	0.0194	162	0.0000	0.0000
40	0.0041	0.0578	102	0.0071	0.0020	164	0.0000	0.0000
42	0.0023	0.0000	104	0.0055	0.0019	166	0.0000	0.0003
44	0.0000	0.0197	106	0.0040	0.0000	168	0.0000	0.0000
46	0.0003	0.0000	108	0.0031	0.0028	170	0.0000	0.0000
48	0.0029	0.0000	110	0.0025	0.0016	172	0.0000	0.0000
50	0.0054	0.0063	112	0.0020	0.0010	174	0.0000	0.0000
52	0.0045	0.0000	114	0.0018	0.0022	176	0.0000	0.0000
54	0.0078	0.0103	116	0.0011	0.0004	178	0.0000	0.0000
56	0.0073	0.0044	118	0.0009	0.0009	180	0.0000	0.0000
58	0.0191	0.0121	120	0.0005	0.0024	182	0.0000	0.0000
60	0.0330	0.0605	122	0.0005	0.0023	184	0.0000	0.0000
62	0.0435	0.0501	124	0.0006	0.0000	186	0.0000	0.0000
64	0.0556	0.0174	126	0.0003	0.0000	188	0.0000	0.0000
66	0.0579	0.0109	128	0.0003	0.0007	190	0.0000	0.0000
68	0.0561	0.0172	130	0.0001	0.0006	192	0.0000	0.0000
70	0.0771	0.0680	132	0.0002	0.0000	194	0.0000	0.0000
72	0.0727	0.0726	134	0.0000	0.0006	196	0.0000	0.0000
74	0.0851	0.0433	136	0.0001	0.0005	198	0.0000	0.0000
76	0.0665	0.0147	138	0.0000	0.0002	200	0.0000	0.0001
78	0.0556	0.0595	140	0.0001	0.0000			

Table A2. Percentage of weighted length measurements in each viability condition category, by gear type in the 2011 IFQ groundfish fishery.

IFQ Fishery 2011

Length bin (cm)	Bottom Trawl			Pot			Length bin (cm)	Bottom Trawl			Pot		
	Excellent	Poor	Dead	Excellent	Poor	Dead		Excellent	Poor	Dead	Excellent	Poor	Dead
18	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%	110	56.3%	11.2%	32.5%	100.0%	0.0%	0.0%
20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	112	56.7%	22.5%	20.8%	100.0%	0.0%	0.0%
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	114	49.8%	25.1%	25.0%	57.6%	0.0%	42.4%
24	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	116	60.8%	13.4%	25.7%	0.0%	0.0%	100.0%
26	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	118	55.9%	9.8%	34.3%	0.0%	0.0%	100.0%
28	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	120	47.5%	28.3%	24.2%	100.0%	0.0%	0.0%
30	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	122	54.3%	8.2%	37.5%	100.0%	0.0%	0.0%
32	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	124	39.9%	21.7%	38.3%	0.0%	0.0%	0.0%
34	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	126	41.9%	19.3%	38.8%	0.0%	0.0%	0.0%
36	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	128	53.2%	35.4%	11.4%	100.0%	0.0%	0.0%
38	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	130	75.3%	24.7%	0.0%	100.0%	0.0%	0.0%
40	0.0%	100.0%	0.0%	0.0%	0.0%	0.0%	132	45.2%	18.4%	36.4%	0.0%	0.0%	0.0%
42	48.7%	51.3%	0.0%	0.0%	0.0%	0.0%	134	79.1%	20.9%	0.0%	100.0%	0.0%	0.0%
44	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%	136	25.4%	49.1%	25.4%	100.0%	0.0%	0.0%
46	0.0%	0.0%	100.0%	0.0%	0.0%	0.0%	138	0.0%	100.0%	0.0%	100.0%	0.0%	0.0%
48	25.1%	25.1%	49.7%	0.0%	0.0%	0.0%	140	48.9%	51.1%	0.0%	0.0%	0.0%	0.0%
50	29.8%	0.0%	70.2%	0.0%	0.0%	0.0%	142	24.9%	25.4%	49.7%	0.0%	0.0%	0.0%
52	23.0%	42.3%	34.7%	0.0%	0.0%	0.0%	144	59.2%	40.8%	0.0%	0.0%	0.0%	0.0%
54	15.7%	42.8%	41.5%	0.0%	0.0%	100.0%	146	100.0%	0.0%	0.0%	0.0%	0.0%	0.0%
56	20.8%	45.3%	33.9%	100.0%	0.0%	0.0%	148	49.4%	0.0%	50.6%	0.0%	0.0%	0.0%
58	19.9%	31.2%	48.9%	67.9%	0.0%	32.1%	150	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
60	32.9%	24.2%	42.9%	57.3%	0.0%	42.7%	152	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
62	37.8%	22.7%	39.6%	38.0%	0.0%	62.0%	154	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
64	39.6%	18.7%	41.7%	34.5%	0.0%	65.5%	156	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
66	36.7%	21.1%	42.3%	50.0%	0.0%	50.0%	158	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
68	42.6%	12.0%	45.4%	69.9%	0.0%	30.1%	160	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
70	41.6%	20.8%	37.7%	62.2%	3.4%	34.4%	162	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
72	38.6%	20.9%	40.5%	77.3%	0.0%	22.7%	164	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
74	40.2%	17.4%	42.4%	69.2%	9.1%	21.7%	166	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%
76	45.7%	16.9%	37.4%	43.2%	0.0%	56.8%	168	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
78	41.3%	18.9%	39.8%	59.1%	7.9%	33.0%	170	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
80	45.9%	15.9%	38.2%	57.6%	1.7%	40.7%	172	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
82	45.8%	19.9%	34.3%	86.4%	5.6%	8.0%	174	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
84	50.4%	14.7%	34.9%	59.3%	6.0%	34.7%	176	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
86	44.9%	14.5%	40.6%	85.3%	7.4%	7.4%	178	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
88	41.7%	16.1%	42.2%	92.4%	0.0%	7.6%	180	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
90	48.5%	16.9%	34.5%	70.5%	0.0%	29.5%	182	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
92	47.0%	17.2%	35.8%	55.8%	22.1%	22.1%	184	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
94	51.2%	20.1%	28.7%	52.2%	23.9%	23.9%	186	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
96	49.5%	14.6%	35.9%	45.6%	13.4%	41.0%	188	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
98	50.0%	18.2%	31.8%	53.2%	0.0%	46.8%	190	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
100	53.9%	18.2%	27.9%	77.6%	0.0%	22.4%	192	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
102	47.4%	16.1%	36.5%	100.0%	0.0%	0.0%	194	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
104	53.0%	18.8%	28.2%	100.0%	0.0%	0.0%	196	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
106	54.4%	18.4%	27.2%	0.0%	0.0%	0.0%	198	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
108	54.3%	19.9%	25.8%	18.5%	0.0%	81.5%	200	0.0%	0.0%	0.0%	100.0%	0.0%	0.0%

APPENDIX B Manual Pacific Halibut IBQ Expansions for Inseason Management

Table B1. The number of vessels and trips that required manual expansions of P. halibut IBQ weight in the 2011 U.S. west coast groundfish IFQ fishery.

	2011 IFQ Total	**Number manually calculated due to PHLB scenarios**	**Number manually calculated due to unsampled hauls (Trawl)**	**Number manually calculated due to lost trawl gear**	**Number manually calculated due to lost fixed gear**	**Total number of manually calculated discard events**	**% Manually Calculated**
Number of vessels	113	13	16	4	1	24	21.24 *
Number of trips	1164	19	21	4	3	38	3.26

*Percentage of vessels with manually calculated discard may be included in one or more categories

Scenario 1: *Total count of PHLB exists with no length or viability data.*

Resolution: Determine an average mortality weight per individual PHLB in the trip from all sampled hauls. Multiply that average by the total count of PHLB to determine an IBQ.

Scenario 2: *Total count of PHLB exists with actual lengths and no viability data.*

Resolution: Determine catch weight for PHLB using the lengths in the haul and then apply that to the total count for a total weight. Determine CATCH_WEIGHT_MORT for all viabilities (E, P, D) from all other properly sampled hauls in the trip and apply to the CATCH_WEIGHT for IBQ estimate.

Scenario 3: *Total count of PHLB exists with visual estimates of PHLB lengths and no viabilities.*

Resolution: The use of visual lengths was discouraged by the IPHC so the most appropriate method is to determine an average IBQ per individual PHLB in the trip from all sampled hauls. Multiply that average by the total count of PHLB to determine an IBQ.

Scenario 4: *Total count of PHLB exists with visual estimates of PHLB lengths and proper in-hand viabilities.*

Resolution: The use of visual lengths was discouraged by the IPHC, so the most appropriate method here would be to determine an average IBQ per individual PHLB in the trip from all sampled hauls.

Multiply that average by the total count of PHLB to determine an IBQ.

Scenario 5: *Total count of PHLB does not exist without any length or viability data*

Resolution: Confirm PHLB was present in the haul, and no data was collected on them. Determine an average IBQ per haul for all sampled hauls in the trip. This scenario is unlikely and did not occur in 2011.

Scenario 6: *Total count of PHLB does not exist with length and no viability data.*

Resolution: Catch weight for the haul will be determined by taking the measured PHLB sample, convert to weight, divided by the number of fish sampled, multiplied by the average number of PHLB for all sampled hauls in the trip. Then the average mortality rates from the sampled hauls are applied to the calculated PHLB weight. This scenario is unlikely and did not occur in 2011.

Scenario 7: *Total count of PHLB does not exist with length and viability data.*

Resolution: Catch weight for the haul will be determined by taking the length of the PHLB sample, converted to weight, divided by the number of fish sampled, multiplied by the average number of PHLB for all sampled hauls in the trip. Since viabilities and lengths exist, IBQ can be determined using normal protocols and the calculated catch weight. This scenario is unlikely and did not occur in 2011.

Scenario 8: *Total count of PHLB does not exist with visual length and no viability data.*

Resolution: The use of visual lengths was discouraged by the IPHC so the most appropriate method here would be to determine an average IBQ per haul for all sampled hauls in the trip and apply to this haul as well.

Scenario 9: *Total count of PHLB does not exist with visual length and viability data.*

Resolution: The use of visual lengths was discouraged by the IPHC so the most appropriate method here would be to determine an average IBQ per haul for all sampled hauls in the trip and apply to this haul as well.

Scenario 10: *Observer encounters predated fish that are dead and badly damaged so that accurate biological data cannot be collected.*

Resolution: If properly sampled PHLB exist in the haul they can be used to determine the portion of the catch weight attributed to the predated and non-predated fish. The IBQ for the PHLB not predated would be calculated separately using the data collected in the haul. The IBQ for the predated fish would be the portion of the PHLB catch weight attributed to the predated fish multiplied by the mortality rate for "dead" from the IPHC viability tables for that gear.

If all PHLB in the haul are heavily predated then a catch weight for the haul will need to be determined. This can be done by taking the total count of PHLB in the haul times an average catch weight (not IBQ estimates) per PHLB from other hauls in the trip (or like "sets" if PHLB doesn't exist in any other hauls). The estimated catch weight will then be multiplied by the mortality rate for "dead" from the IPHC viability tables for that gear to determine IBQ. In 2011, there were only two instances where a Pacific halibut IBQ was manually calculated due to sand flea predation.

Table B2. Calculations used in manual Pacific halibut IBQ calculations in the 2011 U.S. west coast groundfish IFQ fishery.

SCENARIO	CALCULATION
1	∑CATCH_WEIGHT_MORT for all sampled hauls x CATCH_COUNT for unsampled haul=PHLB IBQ ∑CATCH_COUNT for all sampled hauls
2	CATCH_WEIGHT = Σ SPECIMEN_LENGTH* x CATCH_COUNT #_PHLB_SAMPLED_IFQ CATCH_WEIGHT_MORT = CATCH_WEIGHT_MORT Σ (E) + CATCH_WEIGHT_MORT Σ (P) + CATCH_WEIGHT_MORT Σ (D) CATCH_WEIGHT_MORT Σ (E) = Σ (SPECIMEN_LENGTH* where VIABILITY = E) for all sampled hauls x CATCH_WEIGHT x (.20**) Σ SPECIMEN_LENGTH* for all sampled hauls CATCH_WEIGHT_MORT Σ (P) = Σ (SPECIMEN_LENGTH* where VIABILITY = P) for all for all sampled hauls x CATCH_WEIGHT x (.55**) Σ SPECIMEN_LENGTH* for all sampled hauls CATCH_WEIGHT_MORT Σ (D) = Σ (SPECIMEN_LENGTH* where VIABILITY = D) for all sampled hauls x CATCH_WEIGHT x (.90**) Σ SPECIMEN_LENGTH* for all sampled hauls
3, 4, 5	∑CATCH_WEIGHT_MORT for all sampled hauls x CATCH_COUNT for unsampled haul=PHLB IBQ ∑CATCH_COUNT for all sampled hauls

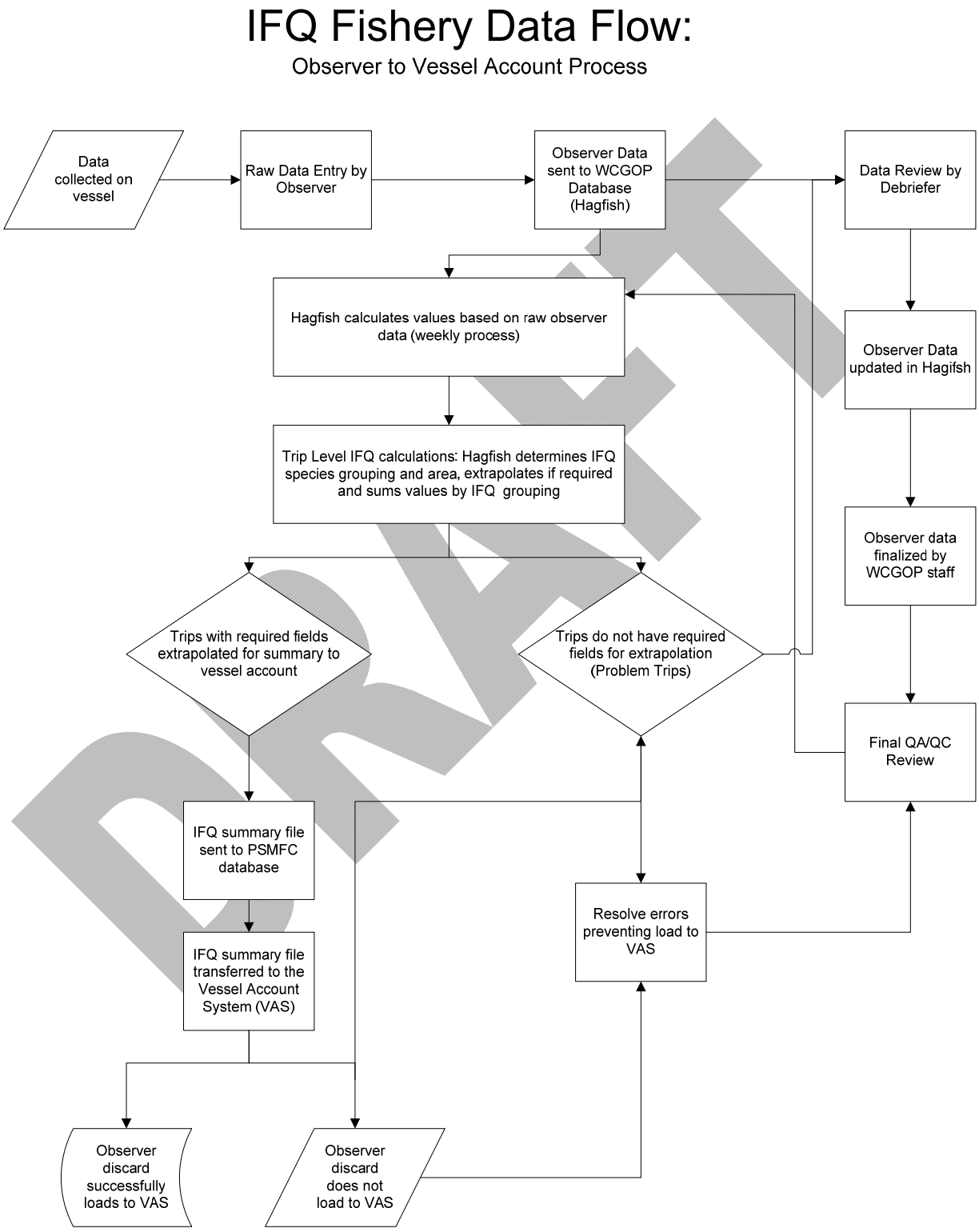
6, 7	Average CATCH_COUNT for all sampled hauls = $\frac{\sum \text{CATCH\_COUNT for all sampled hauls}}{\text{Total \# sampled hauls}}$ CATCH_WEIGHT = Σ SPECIMEN_LENGTH* x Average CATCH_COUNT for all sampled hauls #_PHLB_SAMPLED_IFQ CATCH_WEIGHT_MORT = CATCH_WEIGHT_MORT Σ (E) + CATCH_WEIGHT_MORT Σ (P) + CATCH_WEIGHT_MORT Σ (D) CATCH_WEIGHT_MORT Σ (E) = Σ (SPECIMEN_LENGTH* where VIABILITY = E) for all sampled hauls x CATCH_WEIGHT x (.20**) Σ SPECIMEN_LENGTH* for all sampled hauls CATCH_WEIGHT_MORT Σ (P) = Σ (SPECIMEN_LENGTH* where VIABILITY = P) for all sampled hauls x CATCH_WEIGHT x (.55**) Σ SPECIMEN_LENGTH* for all sampled hauls CATCH_WEIGHT_MORT Σ (D) = Σ (SPECIMEN_LENGTH* where VIABILITY = D) for all sampled hauls x CATCH_WEIGHT x (.90**) Σ SPECIMEN_LENGTH* for all sampled hauls
8, 9	PHLB IBQ = $\frac{\sum \text{CATCH\_WEIGHT\_MORT for all sampled hauls}}{\text{Total \# of sampled hauls}}$
10	CATCH_WEIGHT_MORT = ∑CATCH_WEIGHT _MORT for the properly sampled PHLB + (CATCH_WEIGHT estimate for the predated PHLB* Mortality rate for "dead" for that fishery)

Appendix C. IPHC length weight conversion table for Pacific halibut

Centimeter	Pounds	Kilograms	Centimeter	Pounds	Kilograms	Centimeter	Pounds	Kilograms	Centimeter	Pounds	Kilograms
10	0.02	0.01	71	9.19	4.17	131	66.82	30.31	191	226.70	102.83
11	0.02	0.01	72	9.61	4.36	132	68.48	31.06	192	230.56	104.58
12	0.02	0.01	73	10.05	4.56	133	70.17	31.83	193	234.48	106.36
13	0.04	0.02	74	10.49	4.76	134	71.89	32.61	194	238.45	108.16
14	0.04	0.02	75	10.98	4.98	135	73.66	33.41	195	242.44	109.97
15	0.07	0.03	76	11.44	5.19	136	75.44	34.22	196	246.50	111.81
16	0.07	0.03	77	11.95	5.42	137	77.25	35.04	197	250.60	113.67
17	0.09	0.04	78	12.46	5.65	138	79.08	35.87	198	255.74	116.00
18	0.11	0.05	79	12.99	5.89	139	80.95	36.72	199	258.93	117.45
19	0.13	0.06	80	13.51	6.13	140	82.87	37.59	200	263.17	119.37
20	0.15	0.07	81	14.07	6.38	141	84.79	38.46	201	267.46	121.32
21	0.18	0.08	82	14.64	6.64	142	86.75	39.35	202	271.79	123.28
22	0.20	0.09	83	15.23	6.91	143	88.76	40.26	203	276.17	125.27
23	0.24	0.11	84	15.83	7.18	144	90.79	41.18	204	280.60	127.28
24	0.26	0.12	85	16.45	7.46	145	92.84	42.11	205	285.10	129.32
25	0.31	0.14	86	17.09	7.75	146	94.93	43.06	206	289.62	131.37
26	0.35	0.16	87	17.75	8.05	147	97.05	44.02	207	294.21	133.45
27	0.40	0.18	88	18.41	8.35	148	99.21	45.00	208	298.84	135.55
28	0.46	0.21	89	19.09	8.66	149	101.39	45.99	209	303.51	137.67
29	0.51	0.23	90	19.80	8.98	150	103.62	47.00	210	308.25	139.82
30	0.57	0.26	91	20.53	9.31	151	105.87	48.02	211	313.03	141.99
31	0.62	0.28	92	21.25	9.64	152	108.16	49.06	212	317.86	144.18
32	0.71	0.32	93	22.02	9.99	153	110.50	50.12	213	322.73	146.39
33	0.77	0.35	94	22.80	10.34	154	112.83	51.18	214	327.67	148.63
34	0.84	0.38	95	23.59	10.70	155	115.24	52.27	215	332.65	150.89
35	0.93	0.42	96	24.41	11.07	156	117.66	53.37	216	337.70	153.18
36	1.01	0.46	97	25.24	11.45	157	120.13	54.49	217	342.79	155.49
37	1.10	0.50	98	26.08	11.83	158	122.62	55.62	218	347.93	157.82
38	1.21	0.55	99	26.96	12.23	159	125.16	56.77	219	353.13	160.18
39	1.32	0.60	100	27.87	12.64	160	127.71	57.93	220	358.38	162.56
40	1.43	0.65	101	28.77	13.05	161	130.32	59.11	221	363.69	164.97
41	1.59	0.72	102	29.70	13.47	162	132.96	60.31	222	369.05	167.40
42	1.68	0.76	103	30.67	13.91	163	135.65	61.53	223	374.45	169.85
43	1.81	0.82	104	31.64	14.35	164	138.36	62.76	224	379.92	172.33
44	1.94	0.88	105	32.63	14.80	165	141.12	64.01	225	385.45	174.84
45	2.09	0.95	106	33.64	15.26	166	143.90	65.27	226	391.03	177.37
46	2.25	1.02	107	34.68	15.73	167	146.72	66.55	227	396.67	179.93
47	2.43	1.10	108	35.74	16.21	168	149.54	67.83	228	402.36	182.51
48	2.58	1.17	109	36.84	16.71	169	152.49	69.17	229	408.09	185.11
49	2.76	1.25	110	37.94	17.21	170	155.45	70.51	230	413.91	187.75
50	2.95	1.34	111	39.07	17.72	171	158.42	71.86	231	419.76	190.40
51	3.15	1.43	112	40.21	18.24	172	161.44	73.23	232	425.69	193.09
52	3.35	1.52	113	41.38	18.77	173	164.51	74.62	233	431.66	195.80
53	3.57	1.62	114	42.59	19.32	174	167.60	76.02	234	437.68	198.53
54	3.79	1.72	115	43.81	19.87	175	170.75	77.45	235	443.76	201.29
55	4.01	1.82	116	45.06	20.44	176	173.92	78.89	236	449.91	204.08
56	4.25	1.93	117	46.32	21.01	177	177.14	80.35	237	456.13	206.90
57	4.52	2.05	118	47.62	21.60	178	180.40	81.83	238	462.39	209.74
58	4.76	2.16	119	48.94	22.20	179	183.71	83.33	239	468.72	212.61
59	5.05	2.29	120	50.29	22.81	180	187.06	84.85	240	475.09	215.50
60	5.31	2.41	121	51.65	23.43	181	190.46	86.39	241	481.55	218.43
61	5.62	2.55	122	53.07	24.07	182	193.87	87.94	242	488.05	221.38
62	5.93	2.69	123	54.48	24.71	183	197.36	89.52	243	494.60	224.35
63	6.24	2.83	124	55.93	25.37	184	200.86	91.11	244	501.24	227.36
64	6.57	2.98	125	57.41	26.04	185	204.43	92.73	245	507.92	230.39
65	6.90	3.13	126	58.91	26.72	186	208.03	94.36	246	514.66	233.45
66	7.25	3.29	127	60.43	27.41	187	211.67	96.01	247	521.48	236.54
67	7.61	3.45	128	61.99	28.12	188	214.71	97.39	248	528.36	239.66
68	7.98	3.62	129	63.56	28.83	189	218.50	99.11	249	535.28	242.80
69	8.38	3.80	130	65.17	29.56	190	222.89	101.10	250	542.29	245.98
70	8.77	3.98									

APPENDIX D

Figure D1. IFQ groundfish fishery data flow from the West Coast Groundfish Observer Program (WCGOP) to the Vessel Account System (VAS) of the NW Regional Office.



GROUNDFISH ADVISORY SUBPANEL REPORT ON PACIFIC HALIBUT BYCATCH ESTIMATE FOR USE IN THE 2013 GROUNDFISH FISHERIES

The Groundfish Advisory Subpanel (GAP) listened to a presentation from Ms. Janell Majewski about the Pacific halibut bycatch estimate for use in 2013 groundfish fisheries.

There have been changes to the sampling protocols in the West Coast Groundfish Observer Program (WCGOP) to implement the trawl individual fishing quota (IFQ) fishery. These changes have created logistic problems for the fleet and for the WCGOP.

Members of the GAP were briefed on the delays in returning halibut to the water, which decreases the survivability rate. It was made clear that fishing crews and observers should work together to release halibut as quickly as possible.

GAP members discussed the delay in reconciling halibut mortalities to some vessel accounts in the IFQ fishery. One delay is attributed to the percentage of vessels that require manual calculation of their catch against halibut individual bycatch quota (IBQ) due to partial sampling of their catch. Another delay is attributed to data entry. When observers are on land doing data entry, they aren't available to go to sea, which may decrease the opportunities for boats to fish due to lack of available observers. There is a tradeoff in establishing fishing opportunity or getting timely data entry so accounts can be reconciled.

The GAP also discussed whether 33 mt of halibut was a sufficient value for bycatch in the trawl IFQ fishery in 2013 and that this figure was based primarily on the low halibut bycatch level in 2011. The GAP believes the trawl fishery should not be constrained to this amount due to the risk-averse behavior that prevailed during the inaugural year of the IFQ program. It's important to understand that fishermen will continue to try to ensure halibut survival but that the fleet expects more fishing on the shelf or other areas in which halibut may be encountered in 2013. This may change once quota shares can be traded and made more accessible, but until then, we should be cautious on assuming this low bycatch on a long-term basis.

The GAP continues to recommend 10 percent carry over of surplus or deficit halibut IBQ.

PFMC
09/16/12

Agenda Item F.3.c
Supplemental SSC Report
September 2012

SCIENTIFIC AND STATISTICAL COMMITTEE REPORT ON PACIFIC HALIBUT BYCATCH ESTIMATE FOR USE IN 2013 GROUNDFISH FISHERIES

The Scientific and Statistical Committee (SSC) reviewed the Pacific halibut bycatch report submitted by the Northwest Fisheries Science Center (NWFSC) and Pacific States Marine Fisheries Commission. Dr. Jason Jannot of the NWFSC West Coast Groundfish Observer Program presented the results of the analysis.

There were changes in both data and methodology used for the 2011 estimates of halibut bycatch. Observer data from all fishing sectors were included in the analysis. Data from the new individual fishing quota (IFQ) trawl fishery and at-sea hake fishery were based on nearly every trawl because of the 100 percent observer coverage, negating the need for sector-wide extrapolations that were done in previous years. The species correlation variable used in analyses through 2010 was removed from the 2011 analysis.

The estimate of total halibut discard mortality in the IFQ fisheries is much lower than estimates from limited entry bottom trawl fisheries in previous years. Recent changes in fishing gears and behavior are likely contributing to this reduction. However, some of the reduction could be due to changes in the analysis methodology or reductions in overall fishing effort. The SSC requests a table to compare discard rates for 2010 and 2011 using the strata from the 2010 analysis. The SSC suggests applying the analysis and extrapolation procedures used in previous years to random subsets of the 2011 data to evaluate the potential for methodology-dependent changes in the discard mortality estimate.

Halibut viability estimates used in the mortality rate calculations are based on very old studies, and new research is needed to update the rates for different gear types. The SSC also notes that high variability in the very small discards estimated for non-trawl sectors, which do not have 100 percent observer coverage, is likely due to sampling error.

The SSC supports the use of this report and bycatch estimates for 2013 management. However, the SSC notes that the final report arrived too late for full review, and inferring the cause of the drop in halibut bycatch requires further analysis.

PFMC
09/14/12