Pacific Coast Groundfish Fishery 2021-2022 Harvest Specifications and Management Measures

DRAFT SOCIOECONOMIC ANALYSIS

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Preface:

The following socioeconomic analyses will be incorporated into the final 2021-2022 harvest specifications and management measure document for the Council, which will be available June 2020 Council meeting. This information is presented as a stand-alone document to the Council to provide a clear and focused analysis of the groundfish fishery socioeconomic environment as it pertains to the current 2021-2022 harvest specifications and management measure process. Past harvest specifications and management measure documents have incorporated these sections into Chapters 3 and 4 of that document. We maintain that convention here.

3. Affected Environment

3.1 Socioeconomic Environment

Previous Environmental Impact Statements (EISs), Environmental Assessments (EAs), decision documents, section 3.2 in the 2015 EIS for the biennial harvest specifications and management measures, and the Groundfish Stock Assessment and Fishery Evaluation (SAFE) (PFMC 2018) present detailed characterizations of the Pacific coast groundfish fishery. That information is incorporated by reference and updated here.

3.1.1 Groundfish Fishery Sectors

Commercial fisheries on the West Coast are generally considered to have two sectors, the whiting sector and the non-whiting sector. All fisheries that primarily target whiting are contained in the 'Whiting Sector' and all fisheries that do not primarily target whiting are contained in the 'Non-whiting Sector.' It is, however, important to note that some participating vessels in the shoreside portion of the non-whiting sector will, at times, participate in whiting sector fisheries as well. The commercial groundfish fishery comprises the following fishery sectors:

Whiting Sector – These vessels use midwater trawl net in their operations and strictly target Pacific whiting. Within the whiting sector, there are two fishery designations within the whiting sector, at-sea and shoreside. The ex-vessel revenue for the whiting sector, combined, has averaged about $48.7 million per year since the 2015.

> ***At-Sea*** – The at-sea fleet consists of the catcher-processor and mothership sectors. Catcher processors both catch and process whiting at sea; whereas, motherships receives and processes whiting catch supplied by catcher vessels.
>
> ***Shoreside*** – The shoreside fleet consists of vessels who catch, but do not process, whiting. They land their fish at a shore-based processing plant with Westport and Ilwaco, Washington, and Astoria, Oregon, being the principal ports for shoreside landings. Vessel in this whiting subsector fish under the individual fishing quota (IFQ) fishery. Additionally, shoreside whiting vessels also participate as catcher vessels for mothership sector. While these vessels target whiting, it is important to note that this sector is also a segment of the Trawl IFQ fishery and may participate in that fishery as well.

Non-Whiting – This sector of the fishery includes the non-whiting groundfish trawl (bottom and midwater trawl gear) and fixed gear (hook & line, and pot gear) fisheries. The commercial non-whiting sector has average $76.7 million annually since 2015, noting that the highest ex-vessel revenue has historically been derived from sablefish, rockfish, thornyheads, flatfish (e.g. Dover and petrale sole), and lingcod.

> ***Trawl*** – The non-whiting trawl fishery targets groundfish via a two primary gear types; midwater trawl net and bottom trawl net. This sector is managed under the shorebased IFQ program which began in 2011. While trawling IFQ portfolios are made up of a variety of groundfish species, the non-whiting midwater trawl fishery primarily targets widow and yellowtail rockfish while bottom trawlers typically target sablefish, dover sole, thornyheads (i.e. the DTS complex), and other flatfish species. Vessels in this fishery must possess a limited entry permit.
>
> ***Fixed gear*** – This sector targets groundfish via longline (hook gear) and/or pot gear, i.e., 'fixed gear.' Vessel permits are divided between limited entry (LE) and open access (OA) from a regulatory

standpoint, but fishery managers more commonly characterize a "non-nearshore" sector which primarily targets sablefish, a "non-nearshore non-sablefish" sector which targets groundfish other than sablefish, and a "nearshore" sector, which targets various nearshore groundfish species off of Oregon and California. Also included in this designation are a subset of shorebased IFQ vessels known as "gear switchers", which are trawl endorsed vessels that use fixed gear to target such species as sablefish.

***Incidental OA* –** This sector includes a number of non-groundfish fisheries that take groundfish incidentally and have been characterized as groundfish incidental OA for the purpose of management and data presentation**.** In aggregate they account for a very small proportion of groundfish landings and revenue.

A variety of other mostly incidental groundfish sectors have been characterized for the purpose of management and data presentation, but in aggregate they account for a very small proportion of groundfish landings and revenue. Vessels that target non-groundfish species, (e.g. pink shrimp, sea cucumber, etc.) operate under groundfish set-asides, where, in some cases, incidentally, caught groundfish may be retained and sold. Research and exempted fishing permit (EFP) vessels also operate under set-asides and can, in some instances, sell their catch.

Table 3-1 below details the number of active vessels in the commercial fishery by sector and fishery as of 2019 This table was developed from landings information housed by the Pacific Fishery Information Network (PacFIN) and use of the Dahl Sector Code to determine the fishery sector.

Table 3-1. Number of participating vessel, by sector and fishery, and number of processors that are associated with the sector/fishery in 2019. Source PacFIN, February 2020

Sector/fishery	Vessels
Whiting -total	58
• Catcher Processor	9
• Mothership	6
• MS Catcher Vessel	19
• Shoreside	27
IFQ Non-whiting - total	131
• Mid-water trawl	28
• Bottom trawl	66
• Fixed Gear	16
LEFG - total	134
• Sablefish	130
• Nearshore	25
• Other non-nearshore	34
OA - total	592
• Sablefish	171
• Nearshore	280
• Other non-nearshore	259

3.1.2 Revenue Trends for Commercially Important Groundfish

Although the Pacific Coast Groundfish Fishery Management Plan (PCGFMP) includes many species, relatively few account for most of the revenue. For the period covered by Table 3-2, 2003-2019, the top three species groups ranked by revenue [sablefish, Pacific whiting (hake), and Rockfish not elsewhere

identified (NEI)] accounted for 74 percent of total inflation adjusted groundfish ex-vessel revenue. Adding in the next two most important species groups, Dover sole and petrale sole, accounts for another 15 percent of total inflation adjusted groundfish ex-vessel revenue during the 2003-2019 period. Data during the 2017-2018 biennial specifications period show the highest average annual inflation-adjusted landings revenue over the period shown. Revenues from Pacific whiting and Rockfish NEI have been particularly strong in recent years.

Table 3-2. Average annual inflation adjusted ex-vessel revenue, $1,000s by groundfish species. (Source: Groundfish SAFE Table 12b and PacFIN comprehensive ft 01/16/2020).

	2003-2010		2011-2012		2013-2014	
	Revenue	**Percent**	**Revenue**	**Percent**	**Revenue**	**Percent**
Sablefish	$35,819	41%	$45,323	44%	$25,269	29%
P. Whiting	$15,830	18%	$27,337	27%	$29,740	34%
Dover Sole	$9,953	11%	$8,452	8%	$8,163	9%
Rockfish NEI*	$5,856	7%	$6,789	7%	$6,631	8%
Petrale Sole	$6,733	8%	$3,998	4%	$7,016	8%
Thornyheads	$5,615	6%	$4,839	5%	$4,640	5%
Roundfish NEI*	$2,980	3%	$3,191	3%	$2,847	3%
Flatfish NEI*	$3,183	4%	$1,820	2%	$1,660	2%
Other	$1,136	1%	$1,375	1%	$1,325	2%
Total	$87,104	100%	$103,124	100%	$87,291	100%
	2015-2016		**2017-2018**		**2019 (preliminary)**	
	Revenue	**Percent**	**Revenue**	**Percent**	**Revenue**	**Percent**
Sablefish	$41,425	48%	$54,750	47%	$40,252	39%
P. Whiting	$12,470	14%	$23,957	21%	$29,246	28%
Dover Sole	$7,171	8%	$7,044	6%	$5,368	5%
Rockfish NEI*	$7,029	8%	$12,047	10%	$13,862	14%
Petrale Sole	$7,685	9%	$7,897	7%	$6,650	6%
Thornyheads	$4,144	5%	$5,032	4%	$2,995	3%
Roundfish NEI*	$3,529	4%	$3,419	3%	$3,038	3%
Flatfish NEI*	$1,411	2%	$1,061	1%	$604	1%
Other	$1,471	2%	$908	1%	$610	1%
Total	$86,336	100%	$116,116	100%	$102,626	100%

*/NEI indicates species not elsewhere identified.

3.1.3 Landings and Revenue for Commercial Fishery Sector

3.1.3.1 Non-whiting Fishery Sectors

Table 3-3 reports ex-vessel revenue for the main non-whiting fishery sectors. In aggregate, since 2013 the IFQ fishery (trawl and non-trawl) has accounted for 55 percent of non-whiting ex-vessel revenue, followed by the non-nearshore fixed gear fishery (LE and OA, targeting mostly sablefish) accounting for 39 percent. his table excludes shoreside whiting IFQ. Based on the table below the shoreside non-whiting IFQ (trawl and non-trawl) fisheries ex-vessel revenue accounts for an estimated 59 percent of revenue in the non-whiting groundfish fishery. The non-nearshore and nearshore fixed gear fisheries combined account for 39 percent of the ex-vessel revenue and there remaining fisheries OA, EFP, incidental open access (IOA) and research (Res) fisheries, which account for about 2.1 percent of ex-vessel revenue in the non-whiting

groundfish fishery. Overall, ex-vessel revenue has increased since 2015. This portion of the groundfish fishery accounts for, on average, $57 million in ex-vessel revenue on an annual basis.

Table 3-3. Non-whiting groundfish ex-vessel revenue in inflation-adjusted $1,000s, by non-whiting commercial fishery sectors, 2013-2019. (Source: SAFE Table 12b and PacFIN comprehensive ft 03/13/2020).

	Shoreside IFQ Trawl (Non-whiting)	Shoreside IFQ Non-trawl	Non Nearshore Fixed Gear	Nearshore Fixed Gear	Non-fixed gear OA	IOA	EFP, Res., Misc.	Annual Total
2013	$27,164	$2,981	$13,101	$3,920	$56	$90	$1,200	$48,512
2014	$26,169	$4,792	$14,402	$3,855	$75	$134	$461	$48,889
2015	$28,042	$5,528	$17,147	$4,605	$97	$180	$474	$56,073
2016	$27,844	$6,733	$18,850	$3,728	$44	$184	$644	$58,027
2017	$32,303	$6,431	$21,765	$4,173	$31	$196	$1,665	$66,564
2018	$27,032	$4,221	$17,708	$4,133	$33	$166	$1,683	$54,976
2019 a/	*$26,215*	*$4,102*	*$15,025*	*$4,257*	*$30*	*$207*	*$378*	*$50,214*
Average	$27,824	$4,970	$16,857	$4,096	$52	$165	$969	$57,171

a/ 2019 data is considered preliminary.

3.1.3.2 Whiting Fishery Sectors

Table 3-4 reports Pacific whiting catch for non-tribal whiting sectors during 2013 to 2019. Although revenue is generally higher in the whiting fishery than in non-whiting sector fisheries. This may be more a factor of volume, but nonetheless, the whiting sectors, combined, have averaged $53 million in ex-vessel revenue since 2015. In terms of ex-vessel revenue, 2015 was the recent low when compared to other years, but has since increased by a factor of about two since that year (Table 3-5). Although variable year to year, since 2016 total catch has been above the 7-year annual average.

Table 3-4. Pacific whiting catch, mt, by whiting commercial fishery sectors, 2013-2019. (Source: Groundfish SAFE Table 14a, 1/16/2020 and GMT).

Year	Catcher-Processor Total	Mothership Total	Shoreside Whiting Trawl Total	Grand Total	Percent of Annual Average
2013	78,041	52,522	97,634	228,198	85%
2014	103,266	62,038	98,717	264,021	98%
2015	68,484	27,664	58,357	154,505	57%
2016	108,804	65,018	86,176	259,997	97%
2017	137,130	66,257	146,568	349,954	130%
2018	116,050	67,163	130,052	313,265	116%
2019[a/]	116,147	52,648	143,747	312,543	116%
Grand Total	**727,921**	**393,311**	**761,250**	**1,882,482**	
Pct. of Total	**39%**	**21%**	**40%**	**100%**	

a/ 2019 data is considered preliminary.

Table 3-5. Ex-vessel revenue, current dollars, $1,000s, by whiting sectors, 2013-2019, excluding all non-whiting species (Source: Groundfish SAFE Table 14b, 3/13/2020 and GMT).

Year	Catcher-Processor Total	Mothership Total	Shoreside Whiting Trawl Total	Grand Total
2013	$24,124	$16,021	$28,849	$68,994
2014	$26,857	$16,175	$25,891	$68,923
2015	$11,722	$4,611	$10,934	$29,282
2016	$22,229	$12,735	$14,422	$51,402
2017	$25,243	$11,621	$25,729	$64,610
2018	$20,308	$11,563	$22,387	$56,276
2019[a/]	*$24,508*	*$10,790*	*$30,068*	*$65,366*
Annual Ave	$154,991	$83,516	$158,280	$57,836

a/ 2019 data considered preliminary

3.1.3.3 Midwater Trawl Fishery for Rockfish

The rebuilding of canary and widow rockfish has stimulated the reemergence of a fishery using midwater gear to target pelagic rockfish, principally widow and yellowtail rockfish. Widow rockfish was declared overfished in 2001 and declared rebuilt in 2011. Canary was declared overfished in 2000 and declared rebuilt in 2015. While canary was not a target, its frequency as bycatch presented a potential constraint on the midwater fishery. Figure 3-1 shows revenue from landings of widow, yellowtail, and chilipepper rockfish since 1981. From 1994 onward only landings from the non-whiting portion of the midwater trawl fishery are included; data prior to that year may include some whiting trips, however during that time the domestic shorebased whiting fishery was somewhat smaller than it is currently and non-whiting species landings tend to be very low. Therefore, the figure adequately represents the trend for midwater rockfish trawl fishery ex-vessel revenue. The figure shows landings steadily declined beginning the late 1980s, with the exception of 2000 and 2001. The non-whiting midwater trawl fishery essentially ceased while widow rockfish was rebuilding between 2001 and 2011, but has shown notable growth since.

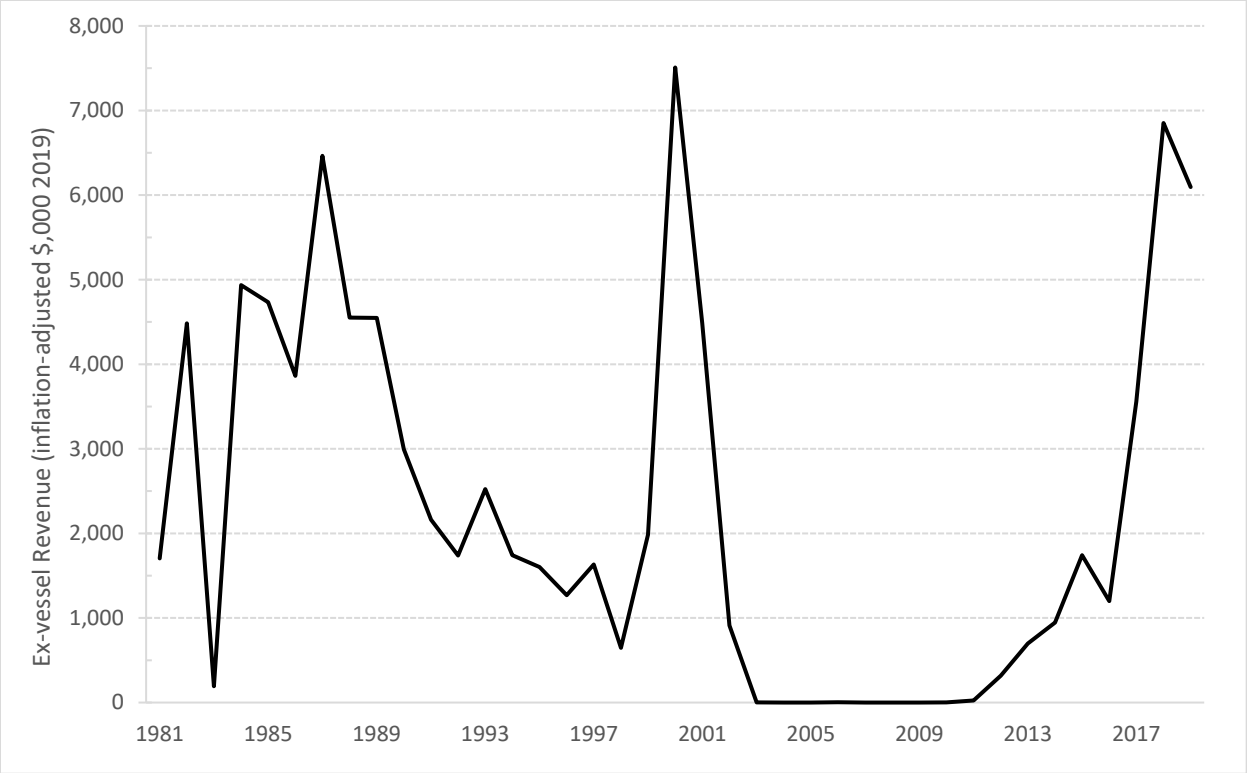

Figure 3-1. Inflation adjusted ex-vessel revenue ($1,000s) from landings of pelagic rockfish (widow, yellowtail, chilipepper), by midwater trawl gear in the non-whiting groundfish trawl sector, 1981-2019. Landings from 2004 to 2009 excluded due to data confidentiality requirements. Landings from 1994-2019 are from the non-whiting trawl sector and EFPs. (Source: PacFIN comprehensive_ft, 1/11/2018 and 1/16/2020).

Table 3-6 provides a snapshot of the pelagic rockfish fishery over the past eight years (2019 data should be considered preliminary). The data include landings made under EFPs which prior to 2017 would have been for purposes other than targeting pelagic rockfish. The fishery has ramped up substantially in recent years. Since 2012, participation (number of vessels) increased by 47 percent and landings revenue by nearly twenty-fold; ex-vessel revenue in 2018 and preliminary ex-vessel revenue in 2019 exceeded $6 million.

Table 3-6. Landings (mt), inflation adjusted ex-vessel revenue, and number of vessels making landings of pelagic rockfish (chilipepper, widow, and yellowtail rockfish) with midwater trawl gear, 2012-2017. (Source: PacFIN comprehensive ft, 1/16/2020).

Values	2012	2013	2014	2015	2016	2017	2018	2019[a/]
Metric tons	249	606	836	1,674	1,138	5,257	11,291	9,732
Thousands of dollars	$318	$698	$945	$1,743	$1,200	$3,558	$6,852	$6,095
Number of vessels	17	12	24	37	10	16	24	25

a/ 2019 data is considered preliminary.

3.1.4 Tribal Fishery

Several Pacific Northwest Indian tribes have treaty rights to fish for groundfish in their usual and accustomed fishing grounds. The Federal government has accommodated these fisheries through a regulatory process described at 50 CFR 660.50. Tribal fishery management is coordinated through the Council process so catches can be accounted for when developing management measures. West Coast

treaty tribes in Washington State have formal allocations for sablefish and Pacific whiting. For other species without formal allocations, the tribes propose set-asides which the Council tries to accommodate while ensuring that catch limits are not exceeded. Whether or not they are formally allocated, tribal catches are accounted for through set-asides, which are deducted from the annual catch limits (ACLs) along with certain other sources of catch to determine the commercial fishery HG. Washington tribes participate in whiting fisheries with both a mothership and shorebased component. Landings and revenue from this fishery cannot be reported due to data confidentiality restrictions.

The tribal non-whiting sector is defined by groundfish landings other than whiting and, thus includes a variety of gear types. While all four coastal tribes have longline fleets, only the Makah Tribe currently has a trawl fleet. Table 3-7 shows ex-vessel revenue in tribal fisheries using hook-and-line and trawl gear. Landings from net and pot gear cannot be reported due to data confidentiality restrictions. Landings from shrimp trawl are not reported because this fishery does not target groundfish although it does land incidentally-caught groundfish. Revenue from groundfish landings in the tribal net, pot and shrimp fisheries averaged less than $70,000 annually during 2013-2018. Hook-and-line gear accounted for nearly two thirds of revenue reported in the table. Excluding 2019, for which data is incomplete, revenue from tribal groundfish hook-and-line and trawl landings has generally increased since 2013, reaching approximately $5.8 million in 2017 and nearly $4.3 million in 2018.

Table 3-7. Treaty non-whiting groundfish ex-vessel revenue for hook-and-line and trawl gear (from groundfish only) 2013-2019, in inflation-adjusted $1,000s. (Source: Groundfish SAFE Table 13b and PacFIN comprehensive ft, 1/16/2020).

Year	Hook-and-Line	Trawl	Total	Pct. of Annual Average
2013	$2,161	$1,777	**$3,938**	**89%**
2014	$3,315	$1,106	**$4,421**	**100%**
2015	$3,311	$1,795	**$5,106**	**116%**
2016	$3,576	$1,864	**$5,440**	**123%**
2017	$3,754	$2,030	**$5,784**	**131%**
2018	$2,529	$1,722	**$4,251**	**96%**
2019[a/]	$1,120	$860	**$1,980**	**45%**
Grand Total	**$19,766**	**$11,154**	**$30,920**	
Pct. of total	**64%**	**36%**	**100%**	

a/ 2019 data is considered preliminary.

3.1.5 Recreational Groundfish Fishery

Recreational fisheries are an important part of fishery-related economic activity. However, it is more difficult to impute the economic value of these fisheries because recreational catch is not sold. Past Groundfish Harvest Specifications documents have characterized recreational fisheries in terms of fishing effort (angler trips) to quantify spatio-temporal differences in West Coast recreational fisheries. Income and employment impacts derived from IOPAC impact coefficients applied to GMT estimates of effort under the integrated alternatives analysis (Agenda Item G.6, Attachment 2, April 2020) are reported in section 4.1.1.

Recreational fisheries are broadly subdivided between private anglers and those fishing from commercial passenger fishing vessels, commonly referred to as charter vessels. Private anglers fish from shore or from pleasure boats, while charter vessels take paying passengers.

Table 3-8 shows bottomfish/halibut angler trips compared to trips targeting other species. Overall private and charter trips targeting bottomfish/halibut comprised 27 percent of all trips and modes during the 2012-2018 period. Table 3-9 shows the annual average counts of bottomfish/halibut and other trip type marine angler trips by state and reporting area. California accounts for 84 percent of bottomfish/halibut angler trips, with the southern California region accounting for 47 percent of coastwide trips due to its large coastal population and potential year-round fishery. Figure 3-2 shows bottomfish/halibut trips by state and year. The number of bottomfish/halibut marine angler trips peaked in 2014 at 981,000 trips and subsequently declined slightly. Nonetheless, the 869,000 trips in 2018 exceeded the 12-year 2007-2018 average by 11 percent.

Table 3-8. Total coastwide recreational angler trips by type and mode, 2012-2018. (Source: GMT state reps, RecFIN).

Type:	Bottomfish+Halibut		Other Trip Types[a/]		Total	
Mode	Annual Average	Percent of All Trips	Annual Average	Percent of All Trips	Annual Average	Percent
Beach/Bank	0	0%	928,132	26%	928,132	26%
Man-made	77,455	2%	1,031,863	29%	1,109,318	30%
Charter	576,540	16%	150,183	4%	726,723	20%
Private	305,105	9%	473,469	13%	778,574	22%
Total	959,099	27%	2,583,648	73%	3,542,747	100%

a/ Other trip types: Salmon, HMS, combo, other.

Table 3-9. 2012–18 average annual bottomfish plus Pacific halibut marine angler boat trips (private and charter) by reporting area. (Source: GMT state reps, RecFIN).

	Bottomfish + Halibut		Other Trip Types[a/]		Total	
State/Region	Annual Average	Percent of Bottomfish + Halibut Trips	Annual Average	Percent of Other Trips	Annual Average	Percent of All Trips
Washington Subtotal	**39,268**	**4%**	**107,220**	**4%**	**146,487**	**4%**
La Push-Neah Bay	15,338	2%	10,466	0%	25,804	1%
Westport	20,529	2%	40,864	2%	61,394	2%
Ilwaco-Chinook	3,400	0%	55,890	2%	59,290	2%
Oregon Subtotal	**113,480**	**12%**	**91,285**	**4%**	**204,765**	**6%**
Astoria	613	0%	7,787	0%	8,400	0%
Tillamook	18,088	2%	18,091	1%	36,179	1%
Newport	55,185	6%	26,681	1%	81,866	2%
Coos Bay	17,417	2%	24,567	1%	41,984	1%
Brookings	22,177	2%	14,158	1%	36,335	1%
California Subtotal	**806,352**	**84%**	**2,385,143**	**92%**	**3,191,495**	**90%**
North Coast: Humboldt and Del Norte	38,256	4%	58,860	2%	97,116	3%
Wine District: Mendocino	19,331	2%	44,637	2%	63,968	2%
SF District: San Mateo through Sonoma	74,075	8%	308,055	12%	382,130	11%
Central Coast: San Luis Obispo through Santa Cruz	122,147	13%	317,124	12%	439,271	12%
Channel: Ventura and Santa Barbara	97,510	10%	304,403	12%	401,913	11%

	Bottomfish + Halibut		Other Trip Types[a/]		Total	
State/Region	Annual Average	Percent of Bottomfish + Halibut Trips	Annual Average	Percent of Other Trips	Annual Average	Percent of All Trips
South Coast: San Diego, Orange and Los Angeles	455,033	47%	1,352,065	52%	1,807,098	51%
Grand Total	**959,099**	100%	**2,583,648**	100%	**3,542,747**	100%

a/ Other trip types: Salmon, HMS, combo, other.

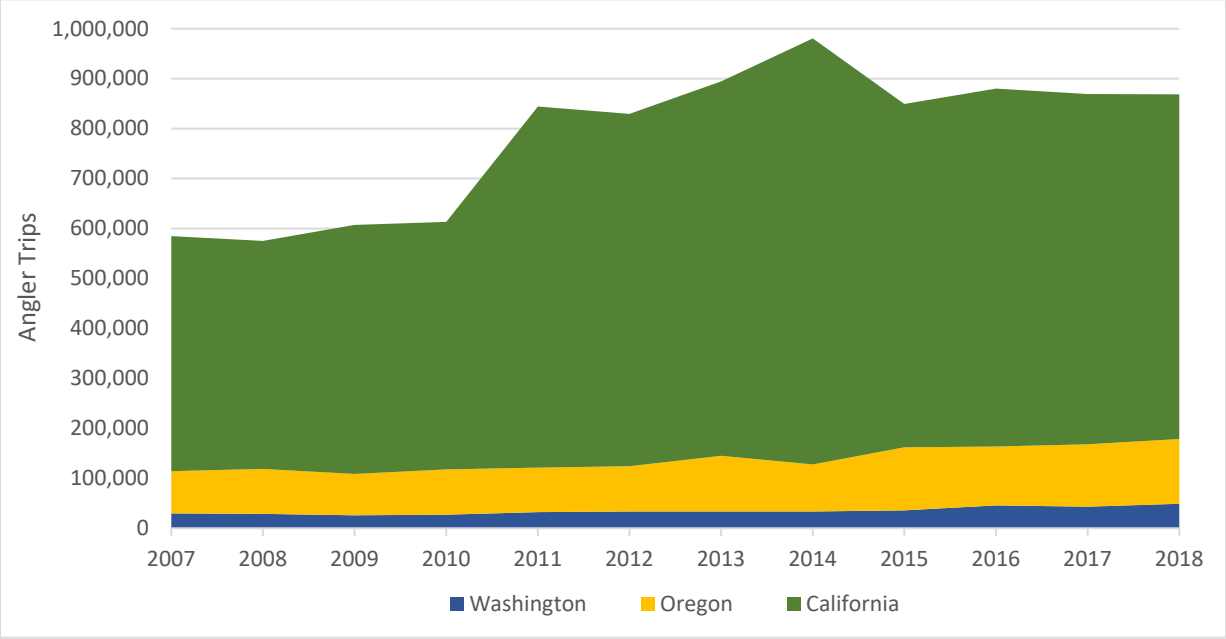

Figure 3-2. Total bottomfish plus Pacific halibut marine angler boat trips (private and charter) by state, 2007 to 2018. (Source: GMT state reps, RecFIN).

3.1.6 Fishing Communities

As in other recent decision documents, involvement by fishing communities in commercial groundfish fisheries is described below in terms of landings and ex-vessel revenue by West Coast Fisheries (IOPAC) port group.[1] IOPAC is also used to evaluate personal income and employment impacts of proposed management measures.

Table 3-10 shows inflation-adjusted ex-vessel revenue from non-tribal groundfish landings in aggregate over 2013-2019 by port group and groundfish fishery sector. Note that in some cases adjacent port groups were aggregated to avoid disclosure of confidential data. Landings and revenue tend to be concentrated in relatively few ports. The four top ranked ports of the 10 shown accounted for 77 percent of coastwide revenue during the period. Astoria-Tillamook is the top-ranked port overall, accounting for 26 percent of coastwide groundfish revenue shown. Newport ranks second at 23 percent of coastwide revenue, and the combined Washington port groups third at 17 percent. Whiting landings occur in only three of the port

[1] See Table 9 in the NOAA Technical Memorandum NMFS-Northwest Fisheries Science Center (Leonard and Watson (2011)) for ports included in these port groups.

areas shown, which are also the top three ranked groundfish ports overall (Astoria-Tillamook, Newport, and Washington). Astoria-Tillamook and Newport also rank first and second, respectively, for revenue from the non-whiting IFQ sector (combining trawl and non-trawl IFQ landings), while Coos Bay-Brookings ranks third by this measure. The combined Washington ports rank first for revenues from the non-nearshore (sablefish) fixed gear fishery followed by Newport, coos Bay-Brookings and Morro Bay-Santa Barbara. Morro Bay-Santa Barbara is top ranked for the nearshore fixed gear fishery followed by Coos Bay-Brookings, Monterey and Crescent City-Eureka.

Focusing on the shoreside IFQ non-whiting sector, Table 3-11 shows revenues from fixed gear landings (often referred to as gear-switching) increasing from approximately 10 percent of the sector total in 2013 to 28 percent in 2018. Preliminary data show fixed gear landings were approximately 31 percent of the IFQ non-whiting sector total in 2019. For data confidentiality reasons revenue from the IFQ fixed gear sector cannot be reported for many individual ports. During 2013-2017 Newport was the dominant port for IFQ fixed gear landings by revenue, followed by Astoria-Tillamook and Morro Bay-Santa Barbara; however, the Washington ports became more prominent during 2018-2019. Coastwide IFQ non-whiting sector fixed gear landings totaled approximately $59 million ex-vessel revenue in inflation-adjusted terms during 2013-2019. Combined ports in the state of Oregon recorded approximately 73 percent of this revenue, Washington ports approximately 30 percent, with the California ports recording the remainder (10 percent) led by Morro Bay-Santa Barbara.

Table 3-10. Total ex-vessel revenue (inflation-adjusted $1,000s) from groundfish landings, 2013-2019, by IOPAC port group and fishery sector. (Port groups have been aggregated to avoid disclosing confidential data, 2019 data is preliminary).

Port Group	Shoreside IFQ Non-whiting[a]	Shoreside IFQ Trawl Whiting	Non-Nearshore Fixed Gear	Nearshore Fixed Gear	Other Directed and Incidental Groundfish	Grand Total	Annual Average
Washington	22,410	41,640	44,295	0	479	108,824	15,546
Astoria-Tillamook	88,805	61,504	8,909	1,256	3,437	163,910	23,416
Newport	50,312	57,236	35,697	519	1,673	145,436	20,777
Coos Bay-Brookings	34,254	-	25,945	8,121	814	69,134	9,876
Crescent City-Eureka	30,235	-	6,934	2,378	63	39,609	5,658
Fort Bragg	14,328	-	11,434	1,419	155	27,336	3,905
San Francisco (incl. Bodega Bay)	4,095	-	8,169	1,155	403	13,822	1,975
Monterey	2,056	-	5,544	2,402	133	10,134	1,448
Morro Bay-Santa Barbara	6,845	-	24,465	10,182	1,100	42,591	6,084
Los Angeles	-	-	3,480	401	167	4,047	578
San Diego	-	-	4,490	129	113	4,732	676

a/ Includes non-trawl IFQ.

Table 3-11. Annual ex-vessel revenue (inflation-adjusted $1,000s) from non-whiting IFQ groundfish landings by gear type (trawl and fixed gear).

Year	Shoreside IFQ Non-whiting Trawl	Shoreside IFQ Non-whiting Fixed Gear
2013	27,567	3,008
2014	26,552	4,385
2015	25,226	5,128
2016	28,339	9,277
2017	32,899	14,430
2018	27,520	10,864
2019[a]	26,212	11,932

a/ 2019 data is preliminary.

4. Direct and Indirect Effects of the Alternatives

4.1 Socioeconomic Environment

4.1.1 Estimated Commercial Ex-Vessel Revenue and Recreational Effort Impacts of the Integrated Alternatives

This section evaluates the effects of the alternatives on fishery participants and fishing communities. As described in Agenda Item G.6, Attachment 2, April 2020, the Status Quo scenario characterizes catch, ex-vessel revenue, and recreational fishing effort in 2019 using the same GMT catch projection methods that were applied under the alternatives. (Section 3.1 supplements this characterization for the commercial fishery sectors with historical landings and ex-vessel revenue amounts recorded in the PacFIN database.)

Status Quo represents the environmental baseline using actual totals and projections based on regulations in place towards the end of 2019. To help illustrate a range of possible socioeconomic effects an assumption about the sector distribution of at-sea whiting catch is used that differs from that used in Agenda Item G.6, Attachment 2, April 2020. That attachment's analysis assumes the reapportionment of unused tribal fishery quota to the non-tribal commercial fishery under all three alternatives[2]. When reapportionment has occurred, as it did in 2019, whiting quota and potential catch were shifted from the tribal sector to the non-tribal sector. Since such shifts generally have occurred late in the year, catch in the shorebased IFQ sector has been only mildly affected. In this analysis the shift in whiting quota is assumed to affect potential catch and revenue in the at-sea tribal sector and the non-tribal at-sea mothership and catcher-processor sectors. Since impacts to the tribal and at-sea whiting sectors are reported only in terms of potential sector ex-vessel revenues, and are not traced through to shorebased communities, any projected effects of whiting quota reapportionment on the at-sea tribal and non-tribal commercial sectors under the alternatives do not extend to estimated community income or employment impacts.

The Status Quo and No Action alternative scenarios assume post-reapportionment 2019 whiting allocations and catch levels, whereas, contrary to what's in Agenda Item G.6, Attachment 2, April 2020) , the two action alternatives (Alternative 1 and Alternative 2) assume whiting allocations prior to any such reapportionment. Compared with No Action, this assumption results in an apparent decline in projected catch and estimated ex-vessel revenue for the at-sea non-Tribal whiting sector under both action alternatives, and an offsetting increase in the at-sea Tribal whiting sector. But, again, these apparent differences are only artifacts of the underlying assumption regarding whiting reapportionment. The effects of the reapportionment do not affect the distribution of estimated community income and employment impacts described below.

The alternatives were constructed to illustrate how conditions may change from Status Quo, both by applying harvest specifications based on default HCRs and compliant management measures (i.e., the No Action Alternative), and varying ACLs and management measures for certain stocks [shortbelly rockfish, black rockfish (Oregon), cowcod (south of 40º10'), petrale sole and sablefish] under the two action alternatives (Alternative 1 and Alternative 2). The ACLs for all remaining stocks are consistent across all alternatives. Also under each alternative, including No Action, there are two scenarios corresponding to use of alternative methods to apportion sablefish between fisheries conducted in the relatively low-attainment Conception area vs relatively high-attainment fisheries conducted north of Conception. Method 1 is based on "status quo" apportionment while Method 2 allots a larger portion of sablefish to the fisheries

[2] See Agenda Item G.6, Attachment 2, April 2020 Section 2.4

north of the Conception area with correspondingly higher projected coastwide landings and associated community economic impacts[3].

For simplicity, fishery and community economic impacts in the following sections are displayed for 2021, the first year of the two-year management cycle, only. Although the totals may be somewhat different in some cases during the second year of the management cycle in 2022, the relative distribution of economic effects and inferences regarding rankings of the alternatives would look very similar.

The 2015 EIS included detailed descriptions of the models and data used to project socioeconomic impacts. Updated documentation of the models may be found in 2020 Groundfish SAFE document. The projection models include:

- GMT catch projection models for different sectors of the commercial groundfish fishery,
- GMT fishing effort (angler trips) projections for the recreational groundfish fishery,
- The landings distribution model (LDM), which is used to assign where commercial landings are likely to occur and the resulting port-level ex-vessel revenues,
- The IOPAC economic impact model used to evaluate the effects of the alternatives on coastal communities (ports where commercial groundfish landings and recreational groundfish effort occur) in terms of personal income generated ("income impacts") and associated employment,
- Net revenue in commercial fishery operations based on projected landings and vessel cost earnings surveys.

The following sections assess socioeconomic impacts in terms of:

- Changes in commercial ex-vessel revenue by fishery sector,
- Change in recreational angler trips by community,
- Change in net revenue by fishery,
- Change in income and employment impacts by community resulting from changes in commercial landings revenue and recreational effort.

4.1.2 Commercial Fisheries

Revenue estimates are based on projected landings estimates from the GMT models referenced above. Table 4-1, Table 4-2, and Table 4-3 compare ex-vessel revenue estimates under the alternatives to Status Quo. All projections assume average ex-vessel prices observed in 2019. Effects are presented by groundfish fishery "sectors," which are described in Section 1.1.1.

A number of caveats apply to modeling commercial fishery impacts. First, effort displaced by management measures is assumed not to switch readily into other fishery sectors or geographic region. Second, landings projection models and economic impact models like IOPAC are calibrated to represent a baseline or "snapshot" of the economy at a particular point in time. Consequently, these models are best able to address impacts of scenarios that are not too far removed from what has occurred in the recent past. Third, catch projections in the IFQ fishery may not reflect the leveraging effect of increases in ACLs for certain "choke" species (those with low ACLs/allocations). A higher or lower allocation of a particularly constraining species may generate more or less actual revenue than is forecast using the current catch projection models. At the same time, market limitations may constrain the extent to which commercial fisheries are able to take advantage of increased allocations. Finally, stock recruitment variability and catch monitoring

[3] Sablefish apportionment Method 1 uses the long-term (2002-2018) average bottom trawl survey biomass distributions while Method 2 uses the rolling 5-year (2014-2018) average survey biomass distributions. The reduction in sablefish apportioned to Conception area fisheries under Method 2 is not projected to affect catch, landings and ex-vessel revenue in that area because historical sablefish attainment rates there are so low (See Agenda Item G.6, Attachment 2, April 2020 Sections 2.3 and 2.5).

uncertainty will contribute to the divergence between actual catches and the projections. Although actual ACL attainment may differ from projections, inseason management measures are routinely applied to prevent ACLs from being exceeded.

As noted above, the Pacific whiting total allowable catch (TAC) is determined annually, consistent with the Agreement with Canada on Pacific Hake/Whiting where 73.88 percent of the TAC is allocated to U.S. fisheries, of which 17.5 percent is allocated to the Tribal sector. Since the TAC and resulting allocation is not determined during the harvest specifications process, a historical TAC (2019) is used to estimate socioeconomic impacts. The actual TACs for 2021 and 2022 could be higher or lower than the assumed value.

Under the No Action and two Action Alternatives, annual average coastwide ex-vessel revenue, including the at-sea sectors, is projected to exceed Status Quo by from $24.5 million to $26.6 million. The very slight differences in projected overall ex-vessel revenue between No Action, Alternative 1 and Alternative 2 are likely to be within the margin of error for these estimates. Approximately half of the projected increase is due to attainment and reapportionment assumptions affecting the at-sea whiting sectors.

Key points regarding estimated ex-vessel revenue impacts by fishery sector are as follows:

- The TAC for Pacific whiting is set annually outside of this harvest specifications process. In this analysis the 2021-2022 TAC and allocations are assumed to be the same as 2019.
    - Projections for the shorebased non-tribal whiting fishery do not vary under the No Action and Action Alternatives. Ex-vessel revenue from shoreside non-tribal whiting landings is estimated to be $28.9 million under Status Quo and all alternatives.
    - For the non-tribal at-sea fisheries, increases under No Action relative to Status Quo reflect assumed 100 percent whiting attainment given the same reapportionment of quota from tribal to non-tribal sectors assumed under Status Quo. The relatively smaller increases for non-tribal whiting sectors under the Alternatives 1 and 2 reflect the assumed original (un-reapportioned) tribal whiting quota. Status Quo ex-vessel revenue for the non-tribal at-sea whiting sectors is $33.8 million. Under No Action the same allocation but assumed higher attainment is projected to result in non-tribal at-sea sector ex-vessel revenue of $46.8 million, while the original (un-reapportioned) whiting quota is projected to result in $42.1 million to the sector under Alternatives 1 and 2.
    - Revenues in the tribal at-sea whiting fishery range from $4 million under Status Quo and No Action to $8.3 million under Alternatives 1 and 2. The difference is due to the assumed whiting reapportionment from tribal to non-tribal sectors under Status Quo and No Action, while no reapportionment is assumed under Alternatives 1 and 2.
- Estimated shoreside IFQ non-whiting fishery ex-vessel revenue ranges from $38.6 million to $39.2 million under the No Action alternatives, and from $39.2 million to $37.9 million under Alternatives 1 and 2, respectively. Under all three alternatives, revenues for this sector are approximately $0.6 million higher under sablefish apportionment Method 2 than under Method 1.
- The limited entry fixed gear and non-nearshore open access sectors target sablefish, with sablefish landings accounting for approximately 85 percent of Status Quo ex-vessel revenue (see Groundfish SAFE Table 8b). Compared with Status Quo both sectors show increased ex-vessel revenue under the No Action and Action Alternatives. The limited entry sector fixed gear realizes greater revenues, estimated to range from $15.6 million to $16.2 million under No Action, and between $16.3 million and $16.9 million under Alternatives 1 and 2 depending on the sablefish apportionment method. Under all alternatives, revenues for the limited entry fixed gear sector are approximately $0.6 million to $0.7 million greater under sablefish apportionment Method 2 than Method 1. Revenues in the non-nearshore open access sector are projected to range from $4.2

million to $4.3 million under No Action, and between $4.3 million to $4.5 million under Alternatives 1 and 2 depending on the sablefish apportionment method. Under all alternatives, revenues for the non-nearshore open access sector are approximately $0.2 million greater under sablefish apportionment Method 2 than Method 1.

- The nearshore open access sector primarily targets rockfish, cabezon, and lingcod with black rockfish accounting for the largest share of any single species (see Groundfish SAFE Table 9b). Annual ex-vessel revenues are estimated to increase by $1.4 million to a total of $5.2 million under the No Action and Action Alternatives. There is no noticeable difference for this sector between sablefish apportionment methods. While the nearshore sector contributes a relatively small portion to shoreside revenue coastwide, it is important in Southern Oregon and Northern and Central California fishing communities.

Table 4-1. Estimated ex-vessel revenues by groundfish harvest sector under the Alternatives (2019 $million).

	Status Quo ($ mil)	**No Action**		**Alternative 1**		**Alternative 2**	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	28.9	28.9	28.9	28.9	28.9	28.9	28.9
Non-whiting Trawl+Non-trawl IFQ	34.3	38.6	39.2	38.6	39.2	37.9	38.5
Limited Entry Fixed Gear	14.8	15.6	16.2	16.3	16.9	16.3	16.9
Nearshore Open Access	3.8	5.2	5.2	5.2	5.2	5.2	5.2
Non-nearshore Open Access	3.1	4.2	4.3	4.3	4.5	4.3	4.5
Incidental Open Access	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Tribal (incl. whiting)	3.8	7.8	7.8	7.8	7.8	7.8	7.8
Shoreside sectors' Totals	**88.9**	**100.6**	**101.9**	**101.4**	**102.9**	**100.8**	**102.2**
At-sea Sectors:							
Non-Tribal Whiting	33.8	46.8	46.8	42.1	42.1	42.1	42.1
Tribal Whiting	4.0	4.0	4.0	8.3	8.3	8.3	8.3
At-sea sectors' Totals	**37.8**	**50.8**	**50.8**	**50.5**	**50.5**	**50.5**	**50.5**
TOTAL Groundfish Revenue	**126.7**	**151.4**	**152.7**	**151.9**	**153.4**	**151.2**	**152.7**

Table 4-2. Change in groundfish ex-vessel revenues from Status Quo by groundfish harvest sector under the Alternatives (2019 $million).

	Status Quo ($mil)	**No Action**		**Alternative 1**		**Alternative 2**	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	*28.9*	-0.0	-0.0	-0.0	-0.0	-0.0	-0.0
Non-whiting Trawl+Non-trawl IFQ	*34.3*	+4.4	+4.9	+4.4	+5.0	+3.7	+4.3
Limited Entry Fixed Gear	*14.8*	+0.8	+1.4	+1.5	+2.2	+1.5	+2.2
Nearshore Open Access	*3.8*	+1.4	+1.4	+1.4	+1.4	+1.4	+1.4
Non-nearshore Open Access	*3.1*	+1.0	+1.2	+1.2	+1.4	+1.2	+1.4

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Incidental Open Access	*0.3*	+0.0	+0.0	+0.0	+0.0	+0.0	+0.0
Tribal (incl. whiting)	*3.8*	+4.1	+4.1	+4.1	+4.1	+4.1	+4.1
Shoreside sectors' Totals	***88.9***	**+11.7**	**+13.0**	**+12.5**	**+14.0**	**+11.9**	**+13.3**
At-sea Sectors:							
Non-Tribal Whiting	*33.8*	+13.0	+13.0	+8.3	+8.3	+8.3	+8.3
Tribal Whiting	*4.0*	+0.0	+0.0	+4.3	+4.3	+4.3	+4.3
At-sea sectors' Totals	***37.8***	**+13.0**	**+13.0**	**+12.6**	**+12.6**	**+12.6**	**+12.6**
TOTAL Groundfish Revenue	***126.7***	**+24.6**	**+26.0**	**+25.2**	**+26.6**	**+24.5**	**+26.0**

Table 4-3. Change in groundfish ex-vessel revenues from Status Quo by groundfish harvest sector under the Alternatives (percent).

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	*28.9*	-0.0%	-0.0%	-0.0%	-0.0%	-0.0%	-0.0%
Non-whiting Trawl+Non-trawl IFQ	*34.3*	+12.8%	+14.4%	+12.7%	+14.5%	+10.7%	+12.5%
Limited Entry Fixed Gear	*14.8*	+5.5%	+9.7%	+10.1%	+14.8%	+10.1%	+14.8%
Nearshore Open Access	*3.8*	+35.6%	+35.6%	+36.5%	+36.5%	+36.5%	+36.5%
Non-nearshore Open Access	*3.1*	+33.5%	+38.6%	+39.1%	+44.5%	+39.1%	+44.5%
Incidental Open Access	*0.3*	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%	+0.0%
Tribal (incl. whiting)	*3.8*	+108.1%	+108.1%	+108.1%	+108.1%	+108.1%	+108.1%
Shoreside sectors' Totals	***88.9***	**+13.1%**	**+14.6%**	**+14.1%**	**+15.7%**	**+13.3%**	**+15.0%**
At-sea Sectors:							
Non-Tribal Whiting	*33.8*	+38.4%	+38.4%	+24.6%	+24.6%	+24.6%	+24.6%
Tribal Whiting	*4.0*	+0.0%	+0.0%	+107.4%	+107.4%	+107.4%	+107.4%
At-sea sectors' Totals	***37.8***	**+34.3%**	**+34.3%**	**+33.4%**	**+33.4%**	**+33.4%**	**+33.4%**
TOTAL Groundfish Revenue	***126.7***	**+19.4%**	**+20.5%**	**+19.9%**	**+21.0%**	**+19.3%**	**+20.5%**

4.1.3 Recreational Fisheries

For recreational fisheries, projected marine area angler boat trips taken in groundfish plus Pacific halibut recreational fisheries are compared to Status Quo fishing effort under the proposed management alternatives. Table 4-4, Table 4-5, and Table 4-6 compare projected recreational angler trips under the No

Action and Action alternatives to Status Quo average annual angler effort. Results are shown by coastal regions that are aggregated from statistical reporting regions.[4]

Most of the recreational management options considered have modest effects on projected angler fishing effort. To produce a tractable number economic impact projections that cover the range of possible outcomes, in addition to No Action two Action Alternatives were constructed from the range of management alternatives or options proposed for each state: Washington's and Oregon's Alternative 1 is paired with California recreational Options 1 and 2 (limited seasons and fishing depths), while Washington's and Oregon's Alternative 2 is paired with California recreational Option 3 (year-round all depth fishing). These associations are maintained in this and subsequent sections of the economic analysis. For more information about the proposed recreational management options see Agenda Item G.6, Attachment 2, April 2020 especially Section 2.9 for descriptions of the California recreational Options.

Key points regarding estimated recreational effort impacts by coastal region are as follows:

- Coastwide recreational effort is projected to increase marginally from Status Quo under No Action and Alternative 1. Under Alternative 2 overall recreational fishing effort is projected to increase by 184,700 trips (21.8 percent).
- Recreational fishing effort for the Washington Coast is projected to increase by 7.2 percent from Status Quo under all three alternatives[5]. Washington accounts for 5.8 percent of coastwide Status Quo fishing effort.
- Recreational fishing effort in Oregon is not projected to change from Status Quo under the alternatives. This results from the assumption that, although recreational management measures would change, a response in terms of increased effort is not projected. Due to the presence of more binding constraints, management measure changes such as increased bag limits do not necessarily prompt changes in effort. The combined three coastal regions of Oregon account for 12.2 percent of coastwide Status Quo fishing effort.
- California recreational fishing effort is projected not to change under No Action and Alternative 1 (California recreational Options 1 and 2), but is projected to increase in all regions under Alternative 2 (California recreational Option 3). The Santa Barbara to San Diego region accounts for more than half (57.8 percent) of coastwide Status Quo recreational angler trips, and this region also shows the largest absolute change in effort, an increase of 140,200 trips or 28.8 percent. Increases projected for the other California regions under Alternative 2 are: Crescent City-Eureka 19.4 percent, Fort Bragg-Bodega Bay 4.2 percent, San Francisco area 22.3 percent, and Santa Cruz to Morro Bay 20.7 percent. Note that under Alternative 2 (California recreational Option 3) fishing would be allowed at all depths throughout the year. The combined five management areas of California account for 82 percent of coastwide Status Quo fishing effort.

Table 4-4. Estimated Recreational Effort (halibut+bottomfish) under Status Quo and the Alternatives (thousands of angler trips).

Community Groups	Status Quo	No Action	Alternative 1	Alternative 2
Washington Coast	49.2	52.8	52.8	52.8
Astoria-Tillamook	18.9	18.9	18.9	18.9
Newport	45.9	45.9	45.9	45.9

[4] The Puget Sound region is not shown in these tables because Council managed recreational fisheries do not occur in this region.

[5] This is chiefly due to somewhat relaxed yelloweye rockfish avoidance measures.

Community Groups	Status Quo	No Action	Alternative 1	Alternative 2
Coos Bay-Brookings	38.2	38.2	38.2	38.2
Crescent City-Eureka	25.3	25.3	25.3	30.3
Fort Bragg - Bodega Bay	16.5	16.5	16.5	17.2
San Francisco Area	69.2	69.2	69.2	84.6
SC – Mo – MB*	96.7	96.7	96.7	116.7
SB – LA – SD*	487.0	487.0	487.0	627.2
Coastwide Total	**846.9**	**850.4**	**850.4**	**1,031.7**

*SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

Table 4-5. Estimated change from Status Quo Recreational Effort (halibut+bottomfish) under the Alternatives (thousands of angler trips).

Community Groups	*Status Quo*	No Action	Alternative 1	Alternative 2
Washington Coast	*49.2*	+3.5	+3.5	+3.5
Astoria-Tillamook	*18.9*	-	-	-
Newport	*45.9*	-	-	-
Coos Bay-Brookings	*38.2*	-	-	-
Crescent City-Eureka	*25.3*	-	-	+4.9
Fort Bragg - Bodega Bay	*16.5*	-	-	+0.7
San Francisco Area	*69.2*	-	-	+15.4
SC – Mo – MB*	*96.7*	-	-	+20.0
SB – LA – SD*	*487.0*	-	-	+140.2
Coastwide Total	***846.9***	+3.5	+3.5	+184.7

*SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

Table 4-6. Estimated change from Status Quo Recreational Effort (halibut+bottomfish) under the Alternatives (percent).

Community Groups	*Status Quo (thousand angler trips)*	No Action	Alternative 1	Alternative 2
Washington Coast	*49.2*	+7.2%	+7.2%	+7.2%
Astoria-Tillamook	*18.9*	-	-	-
Newport	*45.9*	-	-	-
Coos Bay-Brookings	*38.2*	-	-	-
Crescent City-Eureka	*25.3*	-	-	+19.4%
Fort Bragg - Bodega Bay	*16.5*	-	-	+4.2%
San Francisco Area	*69.2*	-	-	+22.3%
SC – Mo – MB*	*96.7*	-	-	+20.7%
SB – LA – SD*	*487.0*	-	-	+28.8%
Coastwide Total	***846.9***	+0.4%	+0.4%	+21.8%

*SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

4.1.4 Estimated Commercial Vessel Net Revenue Impacts of the Integrated Alternatives

Table 4-7 provides estimates of net revenues for the 1) Shoreside Whiting, 2) Non-whiting Trawl & Non-trawl IFQ, and 3) Limited Entry Fixed Gear sectors. These are based on the estimated revenues (from Table 4-1), and projected landings from the GMT models. Combined with cost-earnings data collected from surveys fielded by the Economics and Social Science Research program at the Northwest Fisheries Science Center, we use an economic model linking historical landings and costs to construct measures of projected costs and net revenues. These measures are constructed only for sectors with sufficient cost and earnings data coverage to perform the modeling described below.

In order to project how changes in future landings may affect costs, we form a model where the landings *L* for groundfish species *s*, as well as their respective interactions, are associated with the natural log of non-labor variable costs *VC*, for the i^{th} vessel in year *t* as seen in equation (1). Key variable costs vary by sector, for example including fuel, bait, ice, food, observer coverage, and electronic monitoring. Intuitively, we might expect costs to increase when a vessel catches a greater quantity of fish, and interactions allow for cost complementarities between species. The economic rationale behind examining the log of non-labor variable costs is that marginal costs increase with landings.[6]

$$\ln(VC_{it}) = \sum_{s=1} L_{its} + \sum_{s=1} \sum_{r=1, r \neq s} L_{its} L_{itr} + \epsilon_{it} \quad (1)$$

Total costs net revenues (*TCNR*) are calculated as revenues (*R*), less projections of non-labor variable costs (*VC*), wages, cost recovery fees (*CR*), buyback fees (*BB*), and fixed costs (*FC*) in equation (2). First, projections of non-labor variable costs are obtained from forecasted catches, applied to our regression results, by species and vessel. Then, to obtain projected wages, we calculate the historical proportion of wages (*wp*) to variable costs net revenues, and apply them to projected variable costs net revenues. The intuition here is that wages are typically paid out as shares of variable costs net revenues. Cost recovery fees and buyback fees were calculated using 2020 rates of 3.0 percent and 3.5 percent respectively. Finally, fixed costs, including vessel and on-board equipment, fishing gear, moorage, and insurance are aggregated from survey data by sector for all vessels that fished in 2019, although a sector-specific mean is applied when a specific vessel is not in the survey sample.

$$TCNR = R - VC - (R - VC) * wp - FC - CR - BB \quad (2)$$

Then, we examine potential differences between proposed alternatives, where Methods 1 and 2 are the different sablefish allocation methods from the GMT models. While additional model details can be obtained from the authors by request, key points regarding estimates of net revenue by fishery sector are as follows:

- Shoreside whiting net revenue is estimated between $8.5 and 8.6 million. The differences in net revenue estimates are the result of variation in the projections in catch of non-whiting groundfish species while targeting whiting.
- The largest percent increase compared to the status quo for groundfish harvesting sectors in aggregate is under Method 2, a result of the increase in sablefish available to the Northern fleet.
- While many estimates of net revenue appear similar across alternatives, we note the 2021 specifications for the Non-whiting Trawl & Non-trawl IFQ and Limited Entry Fixed Gear sectors appear to be an economic improvement compared to the 2019 status quo. The intervals in Figure

[6] Marginal costs might increase with landings if for example there exists a stock effect, such that it becomes harder and harder to find fish as catches increase.

4-1 represent the 5th and 95th percentiles of our sampling distribution and suggest that increases in revenue from increases other groundfish catches could outpace corresponding increases in costs.

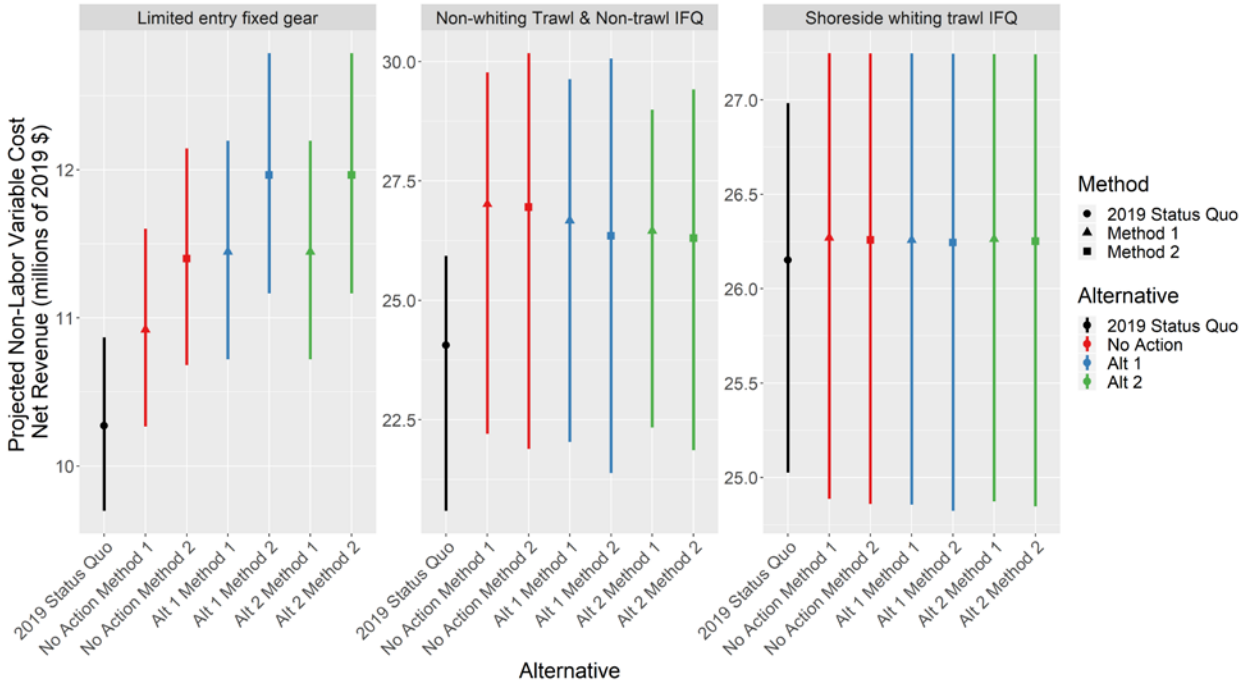

Figure 4-1. Estimated sector-wide total non-labor variable cost net revenues by groundfish harvesting sector under the alternatives, 5th and 95th percentile intervals (2019 $million).

Table 4-7. Estimated vessel net revenues for the whiting, shoreside IFQ, and limited entry fixed gear sectors under the alternatives in millions of dollars (2019 $million) compared to status quo.

	Status Quo ($mil)	**No Action**		**Alternative 1**		**Alternative 2**	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	8.5	8.6	8.6	8.5	8.5	8.6	8.5
Non-whiting Trawl+Non-trawl IFQ	6.7	8.6	8.7	8.5	8.7	8.2	8.4
Limited Entry Fixed Gear	1.7	2.0	2.3	2.4	2.7	2.4	2.7

Table 4-8. Change in groundfish net revenues from Status Quo for the whiting, shoreside IFQ, and limited entry fixed gear sectors under the alternatives in millions of dollars (2019 $million).

	Status Quo ($mil)	**No Action**		**Alternative 1**		**Alternative 2**	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	8.5	+0.1	+0.1	+0.1	+0.1	+0.1	+0.1

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Non-whiting Trawl+Non-trawl IFQ	6.7	+1.8	+2.0	+1.8	+2.0	+1.5	+1.7
Limited Entry Fixed Gear	1.7	+0.4	+0.7	+0.7	+1.0	+0.7	+1.0

Table 4-9. Estimated percent change in groundfish net revenues from Status Quo for whiting, shoreside IFQ, and limited entry fixed gear sectors under the alternatives (2019 $million).

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	8.5	+ 1.0%	+ 1.0%	+ 1.0%	+ 0.9%	+ 1.0%	+ 0.9%
Non-whiting Trawl+Non-trawl IFQ	6.7	+27.4%	+30.2%	+26.5%	+29.3%	+22.2%	+25.0%
Limited Entry Fixed Gear	1.7	+23.4%	+40.6%	+42.3%	+60.9%	+42.3%	+60.9%

Wages shown in Table 4-10 represent projected payments made to both captain and crew. Vessels that are operated by owners may pay their captain a wage or they may choose to receive their compensation as part of the vessel profits. Wage projections are based on actual recorded wages, as such the compensation for captains on vessels that do not pay a captain wage are included in vessel net revenue. Just like the net revenue projections, wages are only available for sectors in which there is sufficient cost and earnings data available. Table 4-11 details the change in wages, in millions of dollars, for the Alternatives compared against status quo. Table 4-12 details the change in wages as a percent for the Alternatives compared against status quo.

Key points regarding estimates of crew and captain wages by fishery sector are as follows.

- Under the two proposed alternatives, wages are projected to increase by $1.2 to $1.7 million in the Non-whiting Trawl & Non-trawl IFQ sector, and between $0.5 and $0.7 million in the Limited Entry Fixed Gear sector, representing approximately 14 and 15 percent increases respectively.
- As we note above, wages are typically paid out as shares of variable costs net revenues. We find wages historically range from approximately 30 to 40 percent of revenue net non-labor variable costs.
- We also examine the proportion of variable and fixed costs to revenue, and find that wages and non-labor variable costs tend to be larger for the Non-whiting Trawl & Non-trawl IFQ and Limited Entry Fixed Gear sector, while fixed costs tend to be larger for the Shoreside Whiting sector.

Table 4-10. Estimated vessel wages (crew and captain) for whiting, shoreside IFQ, and limited entry fixed gear sectors under the alternatives in millions of dollars (2019 $million) compared to status quo

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	10.2	10.3	10.3	10.3	10.3	10.3	10.3
Non-whiting Trawl+Non-trawl IFQ	10.4	12.0	12.1	11.9	12.0	11.6	11.8

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Limited Entry Fixed Gear	4.1	4.4	4.6	4.6	4.8	4.6	4.8

Table 4-11. Estimated change in vessel wages (crew and captain) whiting, shoreside IFQ, and limited entry fixed gear sectors under the alternatives in millions of dollars (2019 $million) compared to status quo.

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	10.2	+0.1	+0.1	+0.1	+0.1	+0.1	+0.1
Non-whiting Trawl+Non-trawl IFQ	10.4	+1.5	+1.7	+1.5	+1.6	+1.2	+1.3
Limited Entry Fixed Gear	4.1	+0.3	+0.5	+0.5	+0.7	+0.5	+0.7

Table 4-12. Estimated percent change in vessel wages (crew and captain) for whiting, shoreside IFQ, and limited entry fixed gear sectors under the alternatives compared to status quo wages. (2019 $million)

	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Shoreside Sectors:							
Whiting	10.2	+ 0.6%	+ 0.6%	+ 0.6%	+ 0.5%	+ 0.6%	+ 0.6%
Non-whiting Trawl+Non-trawl IFQ	10.4	+14.8%	+16.1%	+14.0%	+15.3%	+11.6%	+12.9%
Limited Entry Fixed Gear	4.1	+ 6.3%	+11.0%	+11.4%	+16.5%	+11.4%	+16.5%

4.1.5 Estimated Change in Income and Employment Impacts by Community

Socioeconomic impacts to fishing communities engaged in groundfish fisheries are evaluated based on the changes in personal income (dollar income impacts) and employment (number of jobs) under the alternatives. These effects are functions of the projected changes in commercial landings and recreational effort described above. Comparisons are with respect to Status Quo for the No Action, Alternative 1 and Alternative 2.

For simplification and ease of comparing impacts from commercial and recreational fishing activities, coastal port groups are further aggregated regionally so as to be more consistent with the recreational reporting regions. For a description of the counties included in these regions see page 378 in the 2015 EIS.

Impacts were monetized and converted into income and employment effects using results from the National Marine Fisheries Service (NMFS) Northwest Fisheries Science Center (NWFSC) IOPAC input-output model. Impacts include combined direct, indirect, and induced economic effects resulting from projected changes in recreational angling, commercial fishing, fish processing, and related input supply and industry support activities.

Community impacts from commercial and recreational fishing are displayed separately. Impacts are calculated by applying income and employment multipliers generated using IOPAC regional impact models to the projected levels of local expenditures by commercial harvesters, seafood processors, and recreational anglers under Status Quo and the Alternatives.

Income and employment impacts from Tribal fisheries and also from at-sea Pacific whiting catcher-processor and mothership sectors are not included in the community impact totals for the following reasons:

1. Tribal groundfish harvesting and processing are not included in any of the cost-revenue data collected by NWFSC.
2. While overall estimators of income and employment impacts derived from the at-sea whiting fishery (tribal and non-tribal catcher processors and motherships) have been developed, the detail required to attribute these impacts to particular port groups has not.

That being said, presumably most of the income and employment impacts associated with at-sea whiting fisheries would likely accrue in the Seattle region; while corresponding impacts of shorebased tribal groundfish fisheries most likely accrue in Washington Coast communities.

Economic impact models like IOPAC are calibrated to represent a baseline or "snapshot" of the economy at a particular point in time. Consequently, these models are best able to address impacts of scenarios that are within the range of what may have occurred over the recent past. Analysis of scenarios that represent particularly large departures from the Status Quo may, therefore, result in biased impact estimates.

4.1.6 Commercial Fishery Community Income Impacts

Table 4-8 presents estimates of community personal income impacts by region due to projected commercial groundfish fishing activity under the range of Alternatives. Table 4-9 and Table 4-10 compare estimates under the alternatives relative to Status Quo. Table 4-11 presents the estimated income impacts resulting from recreational groundfish fisheries, with Table 4-12 and Table 4-13 comparing the estimates relative to Status Quo.

Key points regarding estimated income impacts from commercial groundfish fisheries by coastal region are as follows:

- Coastwide estimated personal income impacts from commercial groundfish fishing are estimated to be $152.2 million under Status Quo and projected to increase to between $163.4 million and $166.7 million under the range of alternatives. Under all three alternatives income impacts are more than $2 million higher under sablefish apportionment Method 2 than Method 1. The highest coastwide total and the highest level for each community occur under Alternative 1 Method 2.
- Puget Sound ports show increases ranging from $0.7 million (No Action Method 1) to $1.4 million (Alternative 1 method 2) over Status Quo, or 9.2 percent to 18.0 percent, respectively. Puget Sound ports account for 5 percent of estimated coastwide Status Quo personal income impacts from commercial fishing.
- Oregon and Washington Coast port areas show personal income increases ranging from $0.4 million (Washington Coast under No Action Method 1) to $3.8 million (Astoria-Tillamook under No Action Method 2 and Alternative 1 Method 2). The Coos Bay-Brookings area shows the largest percentage increase in income impacts among Oregon and Washington Coast ports, ranging from 9.1 percent under No Action Method 1 to 15.2 percent under Alternative 1 Method 2. Oregon and Washington Coast ports combined account for 79.1 percent of estimated coastwide Status Quo personal income impacts from commercial fishing.

- All California port groups are projected to see increases from Status Quo under all alternatives ranging from $0.3 million (San Francisco under several alternatives) to $1.5 million (Santa Barbara-San Diego under all alternatives). The largest relative increases in personal income impacts compared to Status Quo are projected for the Santa Cruz to Morro Bay region, ranging from 29.1 percent under No Action Method 2 to 31 percent under Alternative 1 Method 2 and Alternative 2 Method 2. Projected landings by fixed gear fisheries in those ports account for much of the increased income impacts. California ports account for 15.9 percent of coastwide Status Quo income impacts from commercial fishing.

Table 4-8. Commercial fishery income impacts under Status Quo and the Alternatives by community group (2019 $million).

		No Action		Alternative 1		Alternative 2	
Community Groups	**Status Quo**	**Method 1**	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Puget Sound	7.6	8.3	8.7	8.6	9.0	8.5	8.9
Washington Coast	26.5	26.9	27.1	27.1	27.2	27.1	27.2
Astoria-Tillamook	54.6	57.9	58.3	57.9	58.3	57.4	57.8
Newport	29.5	31.3	31.8	31.6	32.1	31.4	31.9
Coos Bay-Brookings	9.8	10.7	11.1	11.0	11.3	10.8	11.2
Crescent City-Eureka	6.5	7.4	7.5	7.4	7.5	7.3	7.4
Fort Bragg – Bodega Bay	3.9	4.3	4.4	4.4	4.5	4.4	4.5
San Francisco Area	3.0	3.3	3.4	3.4	3.4	3.3	3.4
SC – Mo – MB*	3.2	4.1	4.1	4.1	4.1	4.1	4.1
SB – LA – SD*	7.6	9.1	9.1	9.1	9.1	9.1	9.1
Coastwide Total	152.2	163.4	165.4	164.6	166.7	163.4	165.6

* SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

Table 4-9. Change in commercial fishery income impacts (from Status Quo) under the Alternatives by community group (2019 $ million).

		No Action		Alternative 1		Alternative 2	
Community Groups	***Status Quo***	**Method 1**	**Method 2**	**Method 1**	**Method 2**	**Method 1**	**Method 2**
Puget Sound	*7.6*	+0.7	+1.1	+1.0	+1.4	+0.9	+1.3
Washington Coast	*26.5*	+0.4	+0.5	+0.5	+0.7	+0.5	+0.7
Astoria-Tillamook	*54.6*	+3.3	+3.8	+3.3	+3.8	+2.8	+3.3
Newport	*29.5*	+1.9	+2.3	+2.2	+2.7	+2.0	+2.5
Coos Bay-Brookings	*9.8*	+0.9	+1.2	+1.1	+1.5	+1.0	+1.4
Crescent City-Eureka	*6.5*	+0.9	+1.1	+0.9	+1.1	+0.8	+0.9
Fort Bragg – Bodega Bay	*3.9*	+0.4	+0.5	+0.5	+0.6	+0.5	+0.6
San Francisco Area	*3.0*	+0.3	+0.4	+0.3	+0.4	+0.3	+0.3
SC – Mo – MB*	*3.2*	+0.9	+0.9	+1.0	+1.0	+1.0	+1.0
SB – LA – SD*	*7.6*	+1.5	+1.5	+1.5	+1.5	+1.5	+1.5
Coastwide Total	*152.2*	+11.2	+13.2	+12.4	+14.6	+11.2	+13.4

* SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

Table 4-10. Change in commercial fishery income impacts (from Status Quo) under the Alternatives by community group (percent).

Community Groups	*Status Quo ($mil)*	No Action		Alternative 1		Alternative 2	
		Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
Puget Sound	*7.6*	+9.2%	+13.8%	+13.0%	+18.0%	+11.7%	+16.7%
Washington Coast	*26.5*	+1.4%	+2.0%	+2.0%	+2.6%	+2.0%	+2.6%
Astoria-Tillamook	*54.6*	+6.1%	+6.9%	+6.1%	+6.9%	+5.2%	+6.0%
Newport	*29.5*	+6.4%	+7.9%	+7.4%	+9.1%	+6.7%	+8.4%
Coos Bay-Brookings	*9.8*	+9.1%	+12.4%	+11.6%	+15.2%	+10.2%	+13.8%
Crescent City-Eureka	*6.5*	+14.5%	+16.4%	+14.6%	+16.6%	+12.4%	+14.5%
Fort Bragg – Bodega Bay	*3.9*	+9.4%	+12.9%	+12.6%	+16.3%	+11.8%	+15.6%
San Francisco Area	*3.0*	+9.7%	+12.0%	+10.3%	+12.7%	+8.5%	+11.0%
SC – Mo – MB*	*3.2*	+29.2%	+29.1%	+30.7%	+31.0%	+30.7%	+31.0%
SB – LA – SD*	*7.6*	+19.6%	+19.6%	+19.6%	+19.6%	+19.6%	+19.6%
Coastwide Total	*152.2*	+7.4%	+8.7%	+8.1%	+9.6%	+7.4%	+8.8%

* SC – Mo – MB = Santa Cruz, Monterey and Morro Bay; SB – LA – SD = Santa Barbara, Los Angeles and San Diego.

4.1.7 Recreational Fishery Community Income Impacts

Recreational income impacts are derived from changes in recreational fishing effort (angler trips) and associated expenditures. See Recreational Fisheries section, above, for discussion regarding change in projected fishing effort due to management changes. Table 4-11 shows recreational income impacts under the alternatives; Table 4-12 shows the incremental change; Table 4-13 shows the percentage change.

For purposes of comparing economic impacts in this section, Washington's and Oregon's Alternative 1 is paired with California recreational Options 1 and 2 (limited seasons and fishing depths), while Washington's and Oregon's Alternative 2 is paired with California recreational Option 3 (year-round all depth fishing). Key points regarding estimated income impacts from recreational groundfish fisheries by coastal region are as follows:

- Coastwide recreational fishing income impacts are projected to increase by 0.3 percent ($0.5 million) under No Action and Alternative 1, and by 24.6 percent ($38.7 million) under Alternative 2.
- The Washington Coast shows relative increases under No Action, Alternative 1 and Alternative 2 of 7.3 percent ($0.5 million). This is the only region showing a change from Status Quo under No Action and Alternative 1.
- Recreational fishing income impacts are projected to be the same as Status Quo in all regions in Oregon across all Alternatives.
- Impacts would increase for all California regions under Alternative 2 (which assumes year-round fishing in all depths - California option 3). Under Alternative 2 the Santa Barbara to San Diego region shows the largest absolute change in income impacts, an increase of $32.2 million. This is also the largest relative increase in projected income impacts (29 percent) under the range of Alternatives. The next largest relative increases in income impacts are shown in the San Francisco Area (22.4 percent, $2.7 million), Santa Cruz to Morro Bay (20.5 percent, $2.7 million), and Crescent City-Eureka (19.4 percent, $0.4 million), all under Alternative 2. Fort Bragg-Bodega Bay shows an increase under Alternative 2 of 5.7 percent ($0.1 million).

Table 4-11. Recreational fishery income impacts under Status Quo and the Alternatives by community group ($ mil.).

Community Groups	*Status Quo ($ mil)*	No Action	Alternative 1	Alternative 2
Washington Coast	6.2	6.7	6.7	6.7
Astoria-Tillamook	1.3	1.3	1.3	1.3
Newport	5.8	5.8	5.8	5.8
Coos Bay-Brookings	2.5	2.5	2.5	2.5
Crescent City-Eureka	2.2	2.2	2.2	2.6
Fort Bragg - Bodega Bay	2.4	2.4	2.4	2.5
San Francisco Area	12.2	12.2	12.2	14.9
SC – Mo – MB*	13.4	13.4	13.4	16.1
SB – LA – SD*	111.2	111.2	111.2	143.4
Coastwide Total	**157.1**	**157.6**	**157.6**	**195.8**

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-12. Change in recreational fishery income impacts from Status Quo under the Alternatives by community group ($ mil.)

Community Groups	*Status Quo ($ mil)*	No Action	Alternative 1	Alternative 2
Washington Coast	*6.2*	+0.5	+0.5	+0.5
Astoria-Tillamook	*1.3*	-	-	-
Newport	*5.8*	-	-	-
Coos Bay-Brookings	*2.5*	-	-	-
Crescent City-Eureka	*2.2*	-	-	+0.4
Fort Bragg - Bodega Bay	*2.4*	-	-	+0.1
San Francisco Area	*12.2*	-	-	+2.7
SC – Mo – MB*	*13.4*	-	-	+2.7
SB – LA – SD*	*111.2*	-	-	+32.2
Coastwide Total	*157.1*	+0.5	+0.5	+38.7

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-13. Change in recreational fishery income impacts from Status Quo under the Alternatives by community group (percent).

Community Groups	*Status Quo ($ mil)*	No Action	Alternative 1	Alternative 2
Washington Coast	*6.2*	+7.3%	+7.3%	+7.3%
Astoria-Tillamook	*1.3*	-	-	-
Newport	*5.8*	-	-	-
Coos Bay-Brookings	*2.5*	-	-	-
Crescent City-Eureka	*2.2*	-	-	+19.4%
Fort Bragg - Bodega Bay	*2.4*	-	-	+5.7%
San Francisco Area	*12.2*	-	-	+22.4%

Community Groups	*Status Quo ($ mil)*	No Action	Alternative 1	Alternative 2
SC – Mo – MB*	*13.4*	-	-	+20.5%
SB – LA – SD*	*111.2*	-	-	+29.0%
Coastwide Total	*157.1*	+0.3%	+0.3%	+24.6%

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

4.1.8 Commercial Fishery Community Employment Impacts

Table 4-14 shows projected employment impacts due to the commercial groundfish fishery under the alternatives; Table 4-15 and Table 4-16 show the change in commercial fishery impacts relative to Status Quo in terms of dollars and percentage, respectively. Key points regarding estimated employment impacts from commercial groundfish fisheries by coastal region are as follows:

- Compared to Status Quo, coastwide employment impacts from commercial groundfish fishing are estimated to increase under the alternatives by from 224 jobs (No Action Method 1) to 278 jobs (Alternative 1 Method 2), increases of 9.6 percent to 11.9 percent respectively. Under all three alternatives, coastwide employment impacts are at least 30 jobs higher under sablefish apportionment Method 2 than Method 1. The highest coastwide total and the highest level for each community group occur under Alternative 1 Method 2.
- Puget Sound ports show increases from Status Quo ranging from eight jobs (No Action Method 1) to 15 jobs (Alternative 1 Method 2), increases of 9 percent to 17.9 percent respectively.
- Washington Coast ports show increases from Status Quo ranging from five jobs (No Action Method 1) to 11 jobs (Alternative 1 Method 2), increases of 1.4 percent to 3 percent respectively.
- Combined Oregon ports show increases from Status Quo ranging from 81 jobs (Alternative 2 Method 1) to 110 jobs (Alternative 1 Method 2), increases of 6.2 percent to 8.3 percent respectively.
- Combined California ports show increases from Status Quo ranging from 128 jobs (No Action Method 1) to 142 jobs (Alternative 1 Method 2), representing increases of 22.1 percent to 24.6 percent respectively.
- Individual port groups with the largest estimated absolute job increases under the individual Alternatives are: No Action - Astoria-Tillamook (50 jobs under Method 2), Alternative 1 - Astoria-Tillamook and Santa Cruz to Morro Bay both with 50 jobs under Method 2, and under Alternative 2 - Santa Cruz to Morro Bay with 50 jobs under Method 2.

Table 4-14. Commercial fishery employment impacts under Status Quo and the Alternatives by community group (number of jobs).

Community Groups	Status Quo (*$mil*)	No Action		Alternative 1		Alternative 2	
		Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
Puget Sound	86	93	97	97	101	96	100
Washington Coast	364	370	372	372	375	372	375
Astoria-Tillamook	712	758	762	757	762	750	755
Newport	408	432	438	437	443	434	441
Coos Bay-Brookings	196	209	214	214	220	213	218
Crescent City-Eureka	107	131	133	131	133	130	132
Fort Bragg – Bodega Bay	109	129	133	134	138	133	138
San Francisco Area	64	72	74	73	74	72	74

Community Groups	Status Quo ($mil)	No Action		Alternative 1		Alternative 2	
		Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
SC – Mo – MB*	113	161	161	162	162	162	162
SB – LA – SD*	186	213	213	213	213	213	213
Coastwide Total	2,344	2,569	2,598	2,590	2,622	2,575	2,607

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-15. Change in commercial fishery employment impacts from Status Quo under the Alternatives by community group (number of jobs).

Community Groups	*Status Quo ($mil)*	No Action		Alternative 1		Alternative 2	
		Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
Puget Sound	*86*	+8	+12	+11	+15	+10	+14
Washington Coast	*364*	+5	+8	+8	+11	+8	+11
Astoria-Tillamook	*712*	+46	+50	+45	+50	+38	+43
Newport	*408*	+24	+30	+29	+35	+26	+33
Coos Bay-Brookings	*196*	+14	+19	+19	+24	+17	+22
Crescent City-Eureka	*107*	+24	+26	+24	+26	+23	+25
Fort Bragg – Bodega Bay	*109*	+21	+25	+25	+29	+25	+29
San Francisco Area	*64*	+8	+9	+9	+10	+8	+9
SC – Mo – MB*	*113*	+49	+49	+49	+50	+49	+50
SB – LA – SD*	*186*	+27	+27	+27	+27	+27	+27
Coastwide Total	*2,344*	+224	+254	+246	+278	+231	+263

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-16. Change in commercial fishery employment impacts from Status Quo under the Alternatives by community group (percent).

Community Groups	*Status Quo (# of jobs)*	No Action		Alternative 1		Alternative 2	
		Method 1	Method 2	Method 1	Method 2	Method 1	Method 2
Puget Sound	*86*	+9.0%	+13.7%	+12.9%	+17.9%	+11.7%	+16.7%
Washington Coast	*364*	+1.4%	+2.1%	+2.2%	+3.0%	+2.2%	+2.9%
Astoria-Tillamook	*712*	+6.4%	+7.1%	+6.3%	+7.0%	+5.3%	+6.1%
Newport	*408*	+5.9%	+7.4%	+7.0%	+8.7%	+6.4%	+8.1%
Coos Bay-Brookings	*196*	+7.0%	+9.6%	+9.6%	+12.3%	+8.7%	+11.4%
Crescent City-Eureka	*107*	+22.3%	+24.0%	+22.8%	+24.7%	+21.4%	+23.3%
Fort Bragg – Bodega Bay	*109*	+19.0%	+22.8%	+22.8%	+26.9%	+22.6%	+26.6%
San Francisco Area	*64*	+12.5%	+14.6%	+13.6%	+15.8%	+12.4%	+14.7%
SC – Mo – MB*	*113*	+43.2%	+43.2%	+43.8%	+44.0%	+43.8%	+44.0%
SB – LA – SD*	*186*	+14.5%	+14.5%	+14.5%	+14.5%	+14.5%	+14.5%
Coastwide Total	*2,344*	+9.6%	+10.8%	+10.5%	+11.9%	+9.8%	+11.2%

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

4.1.9 Recreational Fishery Community Employment Impacts

Table 4-17 shows projected employment impacts due to the recreational groundfish fishery under the alternatives; Table 4-18 and Table 4-19 show the change in recreational fishery impacts relative to Status Quo in terms of dollars and percentage, respectively.

For purposes of comparing economic impacts in this section, Washington's and Oregon's Alternative 1 is paired with California recreational Options 1 and 2 (limited seasons and fishing depths), while Washington's and Oregon's Alternative 2 is paired with California recreational Option 3 (year-round all depth fishing). Key points regarding estimated employment impacts from recreational groundfish fisheries by coastal region are as follows:

- No change from Status Quo in coastwide recreational fishing employment impacts are projected under No Action and Alternative 1 except for an increase of 14 jobs on the Washington Coast under both alternatives.
- Under Alternative 2 coastwide recreational fishing employment impacts are projected to increase over Status Quo by 618 jobs (22.6 percent), with increases of 14 jobs (7.4 percent) on the Washington Coast and 604 jobs (27 percent) in all areas of California combined (Note: Alternative 2 assumes California Option 3, year-round fishing in all depths).
- Under all three alternatives employment impacts from recreational fishing effort are projected to be the same as Status Quo in all areas of Oregon.
- The largest absolute change in employment impacts is an increase of 504 jobs in the Santa Barbara to San Diego region under Alternative 2. This is also the largest relative increase (29 percent) in projected effort in any region under the range of alternatives.

Table 4-17. Recreational fishery employment impacts under Status Quo and the Alternatives by community group (number of jobs).

Community Groups	*Status Quo (# of jobs)*	No Action	Alternative 1	Alternative 2
Washington Coast	189	202	202	202
Astoria-Tillamook	52	52	52	52
Newport	175	175	175	175
Coos Bay-Brookings	79	79	79	79
Crescent City-Eureka	37	37	37	44
Fort Bragg - Bodega Bay	41	41	41	44
San Francisco Area	188	188	188	231
SC – Mo – MB*	236	236	236	285
SB – LA – SD*	1,738	1,738	1,738	2,242
Coastwide Total	2,734	2,748	2,748	3,352

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-18. Change in recreational fishery employment impacts from Status Quo under the Alternatives by community group (number of jobs).

Community Groups	*Status Quo (# of jobs)*	No Action	Alternative 1	Alternative 2
Washington Coast	*189*	+14	+14	+14
Astoria-Tillamook	*52*	-	-	-
Newport	*175*	-	-	-
Coos Bay-Brookings	*79*	-	-	-
Crescent City-Eureka	*37*	-	-	+7
Fort Bragg - Bodega Bay	*41*	-	-	+2
San Francisco Area	*188*	-	-	+42
SC – Mo – MB*	*236*	-	-	+48
SB – LA – SD*	*1,738*	-	-	+504
Coastwide Total	*2,734*	+14	+14	+618

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

Table 4-19. Change in recreational fishery employment impacts from Status Quo under the Alternatives by community group (percent).

Community Groups	*Status Quo (# of jobs)*	No Action	Alternative 1	Alternative 2
Washington Coast	*189*	+7.4%	+7.4%	+7.4%
Astoria-Tillamook	*52*	-	-	-
Newport	*175*	-	-	-
Coos Bay-Brookings	*79*	-	-	-
Crescent City-Eureka	*37*	-	-	+19.4%
Fort Bragg - Bodega Bay	*41*	-	-	+6.0%
San Francisco Area	*188*	-	-	+22.4%
SC – Mo – MB*	*236*	-	-	+20.4%
SB – LA – SD*	*1,738*	-	-	+29.0%
Coastwide Total	*2,734*	+0.5%	+0.5%	+22.6%

* SC – Mo –MB: Santa Cruz – Monterey – Morro Bay; SB – LA – SD: Santa Barbara – Los Angeles – San Diego.

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