DRAFT INFORMATIONAL EXPLORATORY WIDOW ROCKFISH ALLOCATION ANALYSIS: EXCERPTED SECTION FROM GROUNDFISH MANAGEMENT TEAM OVERWINTER ANALYSIS

Executive Summary

At the November 2023 Pacific Fishery Management Council (Council) meeting, the Groundfish Management Team (GMT) was directed to examine modifying the widow rockfish allocation structure for the 2025-26 harvest specifications and management measure process. To inform the Council of their overwinter progress, the GMT provides this excerpted section from the analytical document the Council will receive as part of their April 2024 briefing book materials. Given the complexity of allocation decisions, the GMT requests guidance from the Council on the current options presented in this document.

Widow rockfish was last assessed in 2019, with a catch-only update conducted in 2023. Widow rockfish were estimated to be well above target biomass in 2019, resulting in high annual catch limits (ACL). High attainment since 2019 has resulted in slowly decreasing ACLs as the stock reduces toward the biomass target. In 2025 & 2026, ACLs will be lower than recent mortality in the trawl sector. These declining ACLs are not a conservation issue, but a result of Council-adopted harvest strategy. In 2021, the trawl/non-trawl allocation structure was changed from a 91 percent trawl/9 percent non-trawl split of the ACL to non-trawl receiving a fixed share of 400 mt and trawl receiving the balance of the ACL. There is a 476 mt at-sea set-aside for widow rockfish, however no alternatives have been proposed and analyzed for this set-aside.

The GMT analyzed the following options for Council review:

Trawl/non-trawl allocation proportions:

- **Status Quo Option 1:** a fixed 400 mt of the fishery harvest guideline (HG) is allocated to the non-trawl sector and the remainder is allocated to trawl.
- **Option 2:** a fixed 300 mt of the fishery HG is allocated to the non-trawl sector and the remainder is allocated to trawl.
- **Option 3:** a fixed 200 mt of the fishery HG is allocated to the non-trawl sector and the remainder is allocated to trawl.

Widow rockfish is primarily caught in the midwater rockfish sector, where it plays an important economic role. Option 2 and Option 3 will not prevent economic losses to the trawl sector in 2025 & 2026 but may lessen their impact.

Attainment of widow in the non-trawl sector has been increasing over time, with a high of 38.3 mt in 2018. The Council has increased the opportunity in the midwater shelf fishery with Council action during the 2023-24 harvest specifications cycle to allow for use of non-bottom contact hook-and-line gear (50 CFR 660.330(b)(3)) within the non-trawl Rockfish Conservation Area (RCA), and then again starting in January 1, 2024 with Amendment 32 allowing limited entry fixed gear (LEFG) vessels to harvest to limited entry trip limits. With recent concentrated effort in the non-nearshore commercial fishery, it is anticipated that 2024 will be the highest year on record for

landings of widow rockfish. The recreational fisheries have accounted for the majority of non-trawl widow rockfish mortality in any given year since 2005. While the exact future mortality is highly uncertain, it is anticipated that widow rockfish mortality will increase in all 3 of the states' recreational fisheries in 2024, 2025, and 2026.

1.1 Background

At the November 2023 Council meeting (Agenda Item E.7.a, Supplemental GMT Report 3), the GMT identified that the 2025-26 trawl allocations are expected to be lower than that sector's mortality in recent years (Table 1). Widow rockfish was last assessed in 2019 with the assessment estimating the population well above the biomass target, resulting in high overfishing limits and ACLs that slowly decrease over time as the population size declines toward the target biomass (Adams et al, 2019). In 2023, a catch-only projection was conducted to account for realized catches from 2019 to 2022, resulting in updated ACLs for 2025-26 (Agenda Item G.2, Attachment 14, September 2023). Though the catch-only projection increased the 2025-26 ACLs relative to the previous projections from the 2019 assessment, the ACLs continue to decline given the relatively high attainment of widow rockfish and the consequent slowly decreasing biomass over time. The fishery HG for widow rockfish is currently split between the trawl and non-trawl sectors with the non-trawl sector receiving a fixed allocation amount (400 mt in 2023-24) and the remaining allocated to the trawl sector.

The status quo fixed amount of 400 mt for the non-trawl sector was adopted as part of the 2021-22 Harvest Specifications and Management Measures package, moving the non-trawl sector allocation from 9 percent of the ACL to a lower fixed amount. The 400 mt was intended to provide as much widow rockfish to the trawl sector as possible, where it is economically important, while accounting for potential growth in offshore midwater rockfish fisheries in the fixed gear and recreational sub-sectors of non-trawl (Agenda Item G.6.a, Supplemental GMT Report 1, April 2020). In 2020, the GMT recommended 300 mt, but the Council ultimately chose 400 mt due to uncertainty in this growth. At the time, the Council was considering providing all non-trawl fisheries greater access to the shelf, where widow rockfish occur, as part of the 2021-2022 biennium (e.g., higher trip limits and reduction of recreational depth restrictions). The Council was also considering future liberalizations such as the now-passed Non-Trawl RCA Modification package (Amendment 32). At the time, however, the trawl allocations were high enough to account for expected trawl mortality, whereas in 2025-26, trawl allocations are going to be lower than recent mortality.

Since 2016, the mortality of widow rockfish by the non-trawl sector has continued to be well below the current allocation of 400 mt, ranging between 4.9 and 38.5 mt. Given the high likelihood of over 90 percent attainment of the trawl allocation, during our overwinter analysis, the GMT analyzed the following options:

1.2 Trawl/Non-trawl Allocation

The following options were analyzed for the 2025-26 widow rockfish trawl/non-trawl allocations:

- **Status Quo Option 1:** a fixed 400 mt of the fishery HG is allocated to the non-trawl sector and the remainder is allocated to trawl.
- **Option 2:** a fixed 300 mt of the fishery HG is allocated to the non-trawl sector and the remainder is allocated to trawl.

- **Option 3:** a fixed 200 mt of the fishery HG is allocated to the non-trawl sector and the remainder is allocated to trawl.

Table 1. Trawl/non-trawl allocations, mortality, and attainments for widow rockfish from 2011-2026. Status quo allocations are 400 mt to non-trawl and the remainder to trawl. GF = groundfish. Source: GEMM total mortality, PacFIN for 2023 landings data and 3 year-average of discard mortality from the GEMM. Washington recreational fishery sector estimates not included.

Year	ACL (mt)	Fishery HG (mt)	Total Directed GF Mort. (mt)	Trawl			Non-Trawl a/		
				Sector Alloc. (mt)	Sector Mort. (mt)	Sector attain.	Sector Alloc. (mt)	Sector Mort. (mt)	Sector attain.
2011	600	539	176	491	175	36%	49	1.9	4%
2012	600	539	241	491	234	48%	49	6.5	13%
2013	1,500	1,411	462	1,284	443	34%	127	19.5	15%
2014	1,500	1,411	727	1,284	711	55%	127	16.4	13%
2015	2,000	1,880	858	1,711	850	50%	169	7.7	5%
2016	2,000	1,880	989	1,711	985	58%	169	3.8	2%
2017	13,508	13,290	6,352	12,094	6,343	52%	1,196	9.5	1%
2018	12,655	12,437	10,556	11,318	10,523	93%	1,119	33.3	3%
2019	11,831	11,583	9,552	10,540	9,523	90%	1,042	29.2	3%
2020	11,199	10,951	8,429	9,965	8,419	84%	986	11.5 b/	1%
2021	14,725	14,477	10,881	14,077	10,869	77%	400	11.7	3%
2022	13,788	13,540	12,117	13,140	12,096	92%	400	20.9	5%
2023	12,624	12,386	10,857	11,510	10,833	94%	400	24.8	6%
2024	11,482	11,244		10,844			400		
2025	11,237	11,019		10,619			400		
2026	10,392	10,174		9,774			400		

- a/ Non-Trawl allocation mortality estimates do not include Washington recreational mortality, because they are not recorded in the GEMM. This is because WDFW's recreational sampling estimates do not report widow rockfish at the species level.
- b/ California Recreational Data from 2020 pulled from GEMM will be incomplete due to CRFS not producing estimates from April-June of that year. When CDFW has provided comprehensive mortality for that year they typically include the average proxy values for the April-June time period. 1.4 mt shown in the GEMM and an average proxy value of 1.7 mt was added to the GEMM value for a more accurate value or 3.1 mt for CA rec in 2020.

1.3 Impacts

1.3.1 Trawl Fishery

The five-year average of widow rockfish mortality in the groundfish trawl fishery is 10,375 mt (2019-2023), which is slightly less than the 2025 allocation and slightly higher than the 2026 allocation (Table 1), indicating that the trawl sector will likely fully attain their allocation in the 2025-26 cycle. There is a 476 mt at-sea set-aside for widow rockfish that is deducted from the

trawl allocation before allocating the remainder to the individual fishing quota (IFQ) fishery. There are not currently any alternative at-sea set-asides that have been proposed or analyzed for widow rockfish. Because the at-sea set-aside is fixed, the trawl/non-trawl allocation options for widow rockfish would not impact that fishery. Therefore, the rest of the following analysis is specific to the Shorebased IFQ fishery (hereafter "IFQ").

Widow rockfish is an important target species in the midwater rockfish fishery, which is a portion of the Shorebased IFQ fishery. The vast majority of widow rockfish mortality in the IFQ fishery is attributed to midwater rockfish vessels, which has comprised 24-28 vessels annually since 2017 (Figure 1). Of the 24-48 vessels in the midwater rockfish fishery, around 2-34 percent of their total annual revenue comes from widow rockfish landings, with a median in 2022 and 2023 of approximately 12 percent.

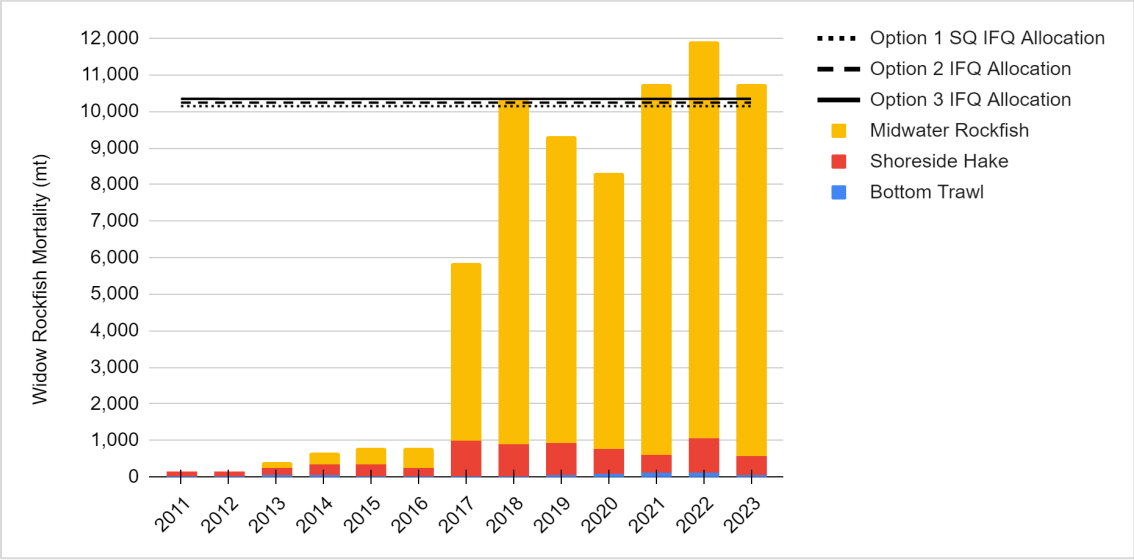

Figure 1.Widow rockfish mortality (mt) by sector of the IFQ fishery, 2011-2023, compared to the 2025 IFQ allocation under the Option 1 (SQ), Option 2, or Option 3 trawl/non-trawl allocation schemes.

After the at-sea set-aside deduction, the resulting IFQ allocations of widow rockfish in 2025 and 2026 are shown in Table 2. Average annual widow rockfish mortality in the IFQ fishery since 2021 has been 998 mt and 1,843 mt higher than the expected 2025 and 2026 IFQ allocations, respectively, under the status quo trawl/non-trawl allocation scheme. Increasing the trawl allocation, and thus the IFQ allocation by 100 mt (Option 2) or 200 mt (Option 3), could lessen the extent of economic losses for midwater rockfish participants as a result of allocation reductions. If all 200 additional metric tons under Option 3 were utilized by the IFQ fishery, the total potential economic gains compared to Option 1 Status Quo equate to $119,048 in ex-vessel revenue, based on the 2023 average price per pound of widow rockfish in the midwater rockfish and bottom trawl fisheries[1]. Under Option 2, the potential economic gains would be $59,524.

70 percent of all IFQ quota share accounts (QSA) in 2023 owned some amount of widow rockfish quota shares (QS). Compared to 2023, individual QSA would be allocated anywhere from 34 to

[1] Shoreside hake was excluded, because widow rockfish is considered incidental catch in this fishery and therefore generally fetches a much lower price per pound than in the midwater rockfish and bottom trawl fisheries.

124,547 lbs. less of widow rockfish in 2025 under the Option 1 Status Quo allocation scheme, depending on how much quota share they own (Table 3). The ten QSAs with the largest percentage of allocation shares would be allocated an average of 84,624 lbs. less of widow rockfish per account in 2025 under Option 1 Status Quo, compared to 2023. That equates to an average loss in ex-vessel revenue of $22,848 per account, assuming all of the allocated QPs were used to catch widow rockfish and not leased to other accounts. Option 2 would lessen those losses by approximately $1,700 per account, and Option 3 would lessen them by approximately $3,300 per account. These estimates in ex-vessel revenue losses do not account for the lost opportunity for continued economic growth in the next biennium, as the midwater rockfish fishery has steadily grown in overall landings since its emergence around 2017.

Table 2. 2025 and 2026 IFQ allocations in metric tons (mt) of widow rockfish under the two trawl/non-trawl allocation options.

	2025			2026			Avg. Widow Rockfish IFQ Mortality (mt), 2021-2023
	IFQ Allocation (mt)	Projected Catch (mt)	Attain.	IFQ Allocation (mt)	Projected Catch (mt)	Attain.	
Option 1 SQ	10,143	9,664.0	95%	9,298	8,900.3	96%	11,141
Option 2	10,243	Not Modeled		9,398	Not Modeled		
Option 3	10,343	9,844.7	95%	9,498	9,081.1	96%	

Table 3. Widow rockfish quota pounds (QP) that would be allocated in 2025 to the single quota share (QS) accounts with the largest and smallest 2023 QS percentage, as well as 2025 QP allocations based on the averages of the largest 10 and smallest 10 QSA percentages. QP Allocations are shown across each of the trawl/non-trawl allocation and at-sea set-aside management options. Source: NOAA IFQ Quota Share Account Balance Data

	Account with Single Largest 2023 QS Percentage	Avg. of Largest Ten 2023 QS Percentage Accounts	Avg. of Smallest Ten 2023 Non-Zero QS Percentage Accounts	Account with Single Smallest 2023 Non-Zero QS Percentage
2023 QS Percent	4.13%	2.80%	0.12%	0.001%
2023 QP Allocation (lbs.)	1,048,812	710,739	30,731	282
Option 1 Status Quo QPs (lbs.)	924,265	626,115	26,834	248
Option 2 QPs (lbs.)	933,378	632,288	27,098	251
Option 3 QPs (lbs.)	942,490	638,461	27,363	253
Increase in QPs Allocated Per Account Compared to Option 1 Status Quo				
Option 2 (lbs.)	9,112	6,173	265	2
Option 3 (lbs.)	18,225	12,346	529	5
Avg. Loss in Ex-vessel Revenue Per Account Compared to 2023 (No Action) a/				
Option 1 Status Quo	$33,627.60	$22,848.42	$1,052.32	$9.06
Option 2	$31,167.27	$21,181.74	$980.89	$8.39
Option 3	$28,706.94	$19,515.07	$909.46	$7.73

a/ based on the 2023 average price per pound of widow rockfish in the midwater rockfish and bottom trawl fisheries ($0.27). Shoreside hake was excluded, because widow rockfish is considered incidental catch in this fishery and therefore generally fetches a much lower price per pound than in the midwater rockfish and bottom trawl fisheries.

The IFQ fishery is managed with annual vessel limits (AVLs) that limit the amount of QPs that may be registered to a single vessel during the year and are calculated as a percent of the total IFQ allocation (50 CFR 660.140(e)(4)(i)). The widow rockfish AVL is 8.5 percent. Figure 2 compares the expected 2025 and 2026 widow rockfish AVLs to vessel-level 2023 widow rockfish catches, averaged across three vessels in each of ten groups, where Vessel Group 1 comprises the three vessels with the highest 2023 catch of widow rockfish. Under all three trawl/non-trawl allocation options, Vessel Group 1 (three vessels) would be unable to reach their 2023 catch levels under the 2025 AVL, and both Vessel Groups 1 and 2 (a total of six vessels) would be unable to reach their 2023 catch levels under the 2026 AVL. The 2026 AVL would be about 158,000 lbs. lower than the 2025 AVL due to a lower IFQ allocation. Compared to the scale of the IFQ allocations in 2025-26, there is minimal difference in AVL impacts between the trawl/non-trawl allocation options.

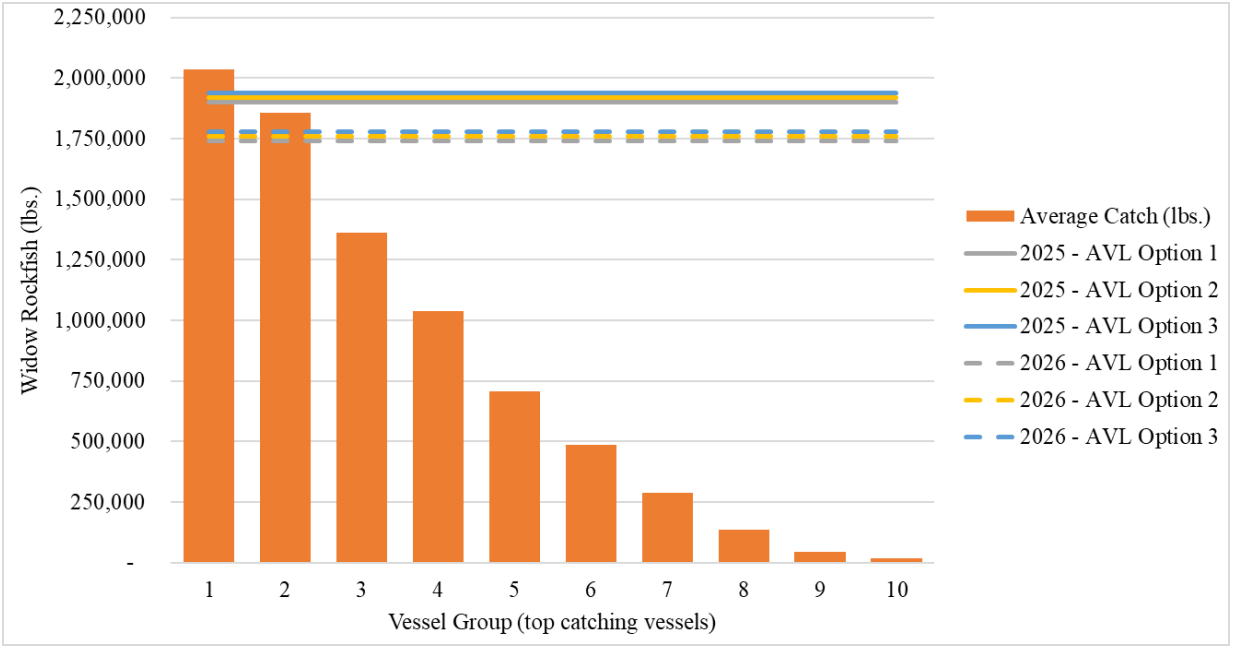

Figure 2. 2023 vessel-level catch of widow rockfish north of 40° 10′ N. lat., averaged across 3 IFQ vessels within each Vessel Group, compared to the 2025 and 2026 annual vessel limits AVLs under trawl/non-trawl allocation Options 1 (SQ), 2, and 3 for widow rockfish. The top 30 IFQ vessels that caught the most widow rockfish were placed in the ten vessel groups, with Group 1 catching the most out of all IFQ vessels.

1.3.2 Non-Trawl Fishery

The U.S. West Coast commercial non-trawl fishery is made up of the nearshore sector and the non-nearshore sector that operate in different depths and under different federal and state regulations. Fishing in federal waters is managed by limited entry trip limits and open access trip limits. Since canary rockfish was declared rebuilt in 2015, there has been development of a mid-water shelf fishery that has been targeting yellowtail rockfish, widow rockfish, and canary rockfish. Although fishermen can target those species individually, they form the basis of the mid-water fishery. This fishery is mostly an open access (OA) fishery because it is being prosecuted with pole gear and the non-bottom contact hook-and-line gear (50 CFR 660.330(b)(3)) within the Non-Trawl RCA. In general, the trajectory of all non-trawl fisheries mortality of widow rockfish has been increasing throughout time (Figure 3). There is also some expectation that LE vessels will start to enter into this fishery, especially given the restrictions in California based on quillback rockfish, however, at this time the GMT has no way of quantifying when and how many vessels will take advantage of this fishery.

In 2023, there was a downturn in the OA fisheries which had been increasing since 2020 (red area; Figure 3). The majority of the landings happened in California, and there were less widow rockfish landings throughout the whole year in 2023, which seemed partly driven by two OA vessels that did not fish in 2023 and made up a large part of the landings prior to that. There was also a big downturn in November and December, possibly due to the inseason actions that took place at the September 2023 meeting. Overall, 2023 seems to be an anomalous year in OA in California, with the expectation being that this fishery will be increasing from 2024 on. Given that two vessels could have impacted the mortality in the OA sector a noticeable amount (from 2022-2023), there is more uncertainty now about what the concentration of effort will be and whether the 2020

decision to maintain 400 mt in the non-trawl sector to account for expansion would be realized in 2025-26.

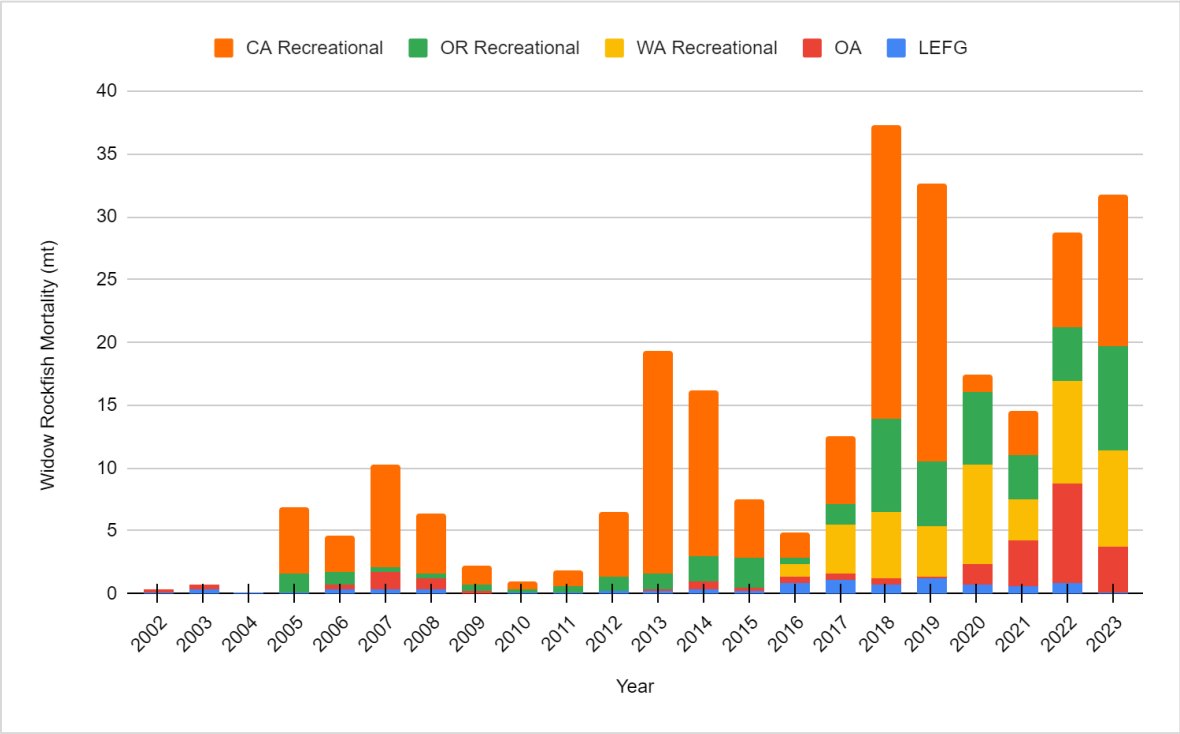

Figure 3.Widow rockfish mortality (mt) by sector of the non-trawl allocation, 2011-2023; 2023 values represent total mortality values (estimated for commercial with the three-year average). Source: 2002-2022 GEMM, 2023 PacFIN; Washington widow rockfish total mortality (mt) values were derived by applying the proportion of unexpanded widow rockfish catch/total unexpanded unidentified catch to expanded Unidentified Fish, RecFIN.

The Council has increased the opportunity in the midwater shelf fishery with Council action during the 2023-24 harvest specifications cycle to allow for use of non-bottom contact hook-and-line gear (50 CFR 660.330(b)(3)) within the non-trawl RCA, and then again starting in January 1, 2024 with Amendment 32 allowing LEFG vessels to harvest to limited entry trip limits. Since these actions have just been taken, it is hard to quantify what the shift in effort will look like in Oregon. Additional action has been taken in California that will impact this fishery. Along with allowing retention within the non-trawl RCA, Amendment 32 reopened the Cowcod Conservation Areas (CCAs), which is an area where commercial widow rockfish occurred pre-CCAs. Reopening this area will provide additional fishing grounds in the next biennium and, given the actions taken to incentivize an offshore commercial fixed gear fishery off California, will increase non-nearshore opportunity.

Amendment 32 occurred simultaneously to Council inseason action for 2024 to reduce quillback rockfish mortality off of California which will concentrate effort on the self and opportunity is limited elsewhere (see Agenda Item E.9.a, Supplemental GMT Report 1, November 2023). With recent concentrated effort in the non-nearshore fishery due to recent management changes at the coastwide level (Amendment 32) and the California level (i.e., closures/gear-specific trip limits related to mitigating quillback rockfish impacts), it is anticipated that 2024 will be the highest year on record for landings of widow rockfish from the nearshore and non-nearshore sectors combined.

Although the non-trawl sector has not attained the 400 mt that was put in place as of 2021, the Council action (Amendment 32) and management measures that are being implemented in California waters to reduce impacts to quillback rockfish have concentrated effort in this non-trawl shelf sector. Given the lower canary rockfish trip limits that are likely going to be present, there is a higher likelihood that participants of the commercial non-trawl sector will increase attainment of widow rockfish over the next few years. This potential action could be viewed in the context of how the fisheries can develop into the future and not the immediate need. Therefore, any display of potential loss in ex-vessel revenue could be viewed as if the fishery developed to where 400 mt were being attained, and any loss was out of the commercial sector (which applies an average price per pound). Option 2 would move 100 mt from the non-trawl, and that potential loss of revenue for a future non-trawl fishery could be as high as $492,894 if the average proportions of catch of the three commercial sectors and the price per lb. was similar in future years. Option 3 would move 200 mt from the non-trawl sector into the trawl sector, and that potential loss of revenue for a future non-trawl fishery could be as high as $984,801 under the same assumptions (Table 4).

Table 4. Averages over the three commercial non-trawl sectors –limited entry (LE), open access (OA), the nearshore– are used to estimate the potential loss in ex-vessel revenue if 200 mt is moved from non-trawl to the trawl sector. Potential loss in ex-vessel revenue is assuming a time in the future where the non-trawl sectors would be attaining the 400 mt, it is also assuming all of the "loss" was felt by the commercial sectors.

	LE	OA	Nearshore
Percent of commercial catch (avg 21-23)	7.68%	78.22%	14.10%
Average price per lb. (21-23)	$1.96	$2.08	$3.25
Option 2: 300 mt partitioned	23.04	234.66	42.3
Option 2: Potential lost Ex-vessel revenue	**$33,185**	**$358,683**	**$101,025**
Option 3: 200 mt partitioned	15.36 mt	156.44 mt	28.2 mt
Option 3: Potential lost Ex-vessel revenue	**$66,241**	**$716,838**	**$201,720**

1.4 Recreational Fisheries

1.4.1 Washington Recreational Fishery

Species-specific estimates of widow rockfish mortality are not available for the Washington recreational fishery. The Washington Department of Fish and Wildlife (WDFW) Ocean Sampling Program (OSP) collects species information when intercepting anglers during dockside interviews. However, the catch estimation procedure combines some species including widow rockfish into a single Miscellaneous category, which is then expanded, renamed, and reported as Unidentified Fish in RecFIN. To evaluate catch and the relative importance of widow rockfish to the recreational fishery, the proportion of widow rockfish comprising the unexpanded estimate of Miscellaneous species was applied to Unidentified Fish total mortality.

Using this approach, Washington recreational widow rockfish catch was internally estimated to be 8 mt in 2022 and in 2023 (Table 5). These compare to an average catch of 4 mt from 2016 through 2021. This increase is likely due to relaxed depth restrictions implemented in 2021 that expanded deepwater fishing opportunities. Widow rockfish are not a primary target but caught incidentally by anglers fishing for lingcod and yellowtail.

Actions taken to address management needs of other species (e.g., canary rockfish) in the recreational fishery in 2025-2026 will likely impact widow rockfish encounters and retention in the recreational fishery as much or more than specific actions to address widow rockfish. If actions reduce deepwater fishing opportunity, widow rockfish retention could be expected to decrease, particularly if management measures include area closures. Actions that reduce rockfish daily sub-bag limits might be taken for canary rockfish may be less impactful to widow rockfish catch unless that spurs targeting widow rockfish.

Table 5. Washington internal estimates of widow rockfish mortality (mt) in the Washington recreational fishery from 2016-2023. Source: WDFW OSP data and RecFIN.

Year	Unidentified Fish mortality (mt)	Estimated Widow rockfish mortality (mt)
2016	4	1
2017	10	4
2018	15	5
2019	15	4
2020	12	8
2021	7	3
2022	25	8
2023	25	7

1.4.2 Oregon Recreational Fishery

In Oregon, the development of the longleader fishery has led to increases in widow rockfish catch, with the highest catch happening in 2023 (8.2 mt, Figure 3, Table 6). Depending on how anglers respond to management action taken with canary rockfish and black rockfish, it is anticipated that the Oregon recreational sector will catch more widow rockfish into the future for two reasons; (1) lowering the bag limit for nearshore rockfish to minimize black rockfish impacts may cause more anglers to go offshore and fish with longleader gear and (2) if a sub-bag limit of canary rockfish is implemented, anglers will look to displace any lost canary rockfish with either yellowtail or widow rockfishes.

Table 6. Oregon recreational total mortality (metric tons [mt]) of widow rockfish from 2014-2023. (Source: RecFIN)

Year	Mortality (mt)
2014	2.0
2015	2.3
2016	0.5
2017	1.7
2018	7.4
2019	5.3

Year	Mortality (mt)
2020	5.8
2021	3.5
2022	4.2
2023	8.2

1.4.3 California Recreational Fishery

In the California recreational fisheries, the shift towards offshore only fishing (seaward of 50 fm) to reduce impacts to quillback rockfish may have driven an increase in recreational catch. Widow rockfish catch was 7.5 mt in 2022 and increased to 11.3 mt in 2023 (California Recreational Fishery Survey (CRFS) estimates Jan-Dec, Table 7). If the offshore-only recreational fisheries off California continue into the future, the expectation is for the recreational fishery is similar or increasing widow rockfish catch.

Table 7. Widow rockfish mortality in California recreational fisheries from 2015 through 2023.

Year	Mortality (mt)
2015	4.7
2016	2.0
2017	5.4
2018	23.4
2019	22.0
2020	3.1[a/]
2021	3.6
2022	7.5
2023	11.3[b/]

a/ Data from 2020 pulled from RecFIN will be incomplete due to CRFS not producing estimates from April-June of that year. When CDFW has provided comprehensive mortality for that year they typically include the average proxy values for the April-June time period. 1.4 mt shown in RecFIN and an average proxy value of 1.7 mt was added to the RecFIN value for a more accurate value or 3.1 mt for CA rec in 2020.

b/ RecFIN does not include December 2023 CRFS estimates as of 2/15/2024. Dec 2023 CRFS estimate was added to the value currently in RecFIN.

PFMC
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