

WASHINGTON DEPARTMENT OF FISH AND WILDLIFE FINAL REPORT ON EXEMPTED
FISHERY PERMIT PROJECT TO CONDUCT ENHANCED YELLOWEYE RECREATIONAL
FISHERY BIOLOGICAL SAMPLING

This report summarizes results of the Washington Department of Fish and Wildlife (WDFW) Enhanced Yelloweye Recreational Fishery Biological Sampling project conducted under the exempted fishing permit (EFP) issued by the National Marine Fisheries Service. This report is intended to fulfill the reporting requirements for EFPs per Pacific Fishery Management Council Operating Procedure 19.

The purpose of this pilot project was to better inform the biological characterization of Yelloweye Rockfish bycatch in Washington's recreational fisheries, which is deficient due to regulations prohibiting the retention of this species. To this end, the EFP allowed WDFW selected vessels to retain Yelloweye Rockfish incidentally caught in Washington's coastal recreational fisheries for delivery and submission to the WDFW for sampling in port. Vessels were subject to all other seasonal, gear, bag limit or other regulations that applied to the recreational fishery.

Background

In 2002, the Pacific Fishery Management Council declared Yelloweye Rockfish overfished under provisions of the Magnuson Stevens Fishery Act. A designation of overfished requires development of a rebuilding plan outlining management actions to meet stock recovery criteria. To achieve rebuilt status, conservation measures including prohibiting catch and area closures have been implemented during ensuing years. Effects of these measures have been two-fold. More than any other single groundfish species, Yelloweye Rockfish constrain both commercial and recreational groundfish fisheries; fishery catch, a customary source of biological and population trend data, is now severely limited or lacking altogether. In particular, almost no current biological information is available from Yelloweye Rockfish bycatch in Washington's recreational fisheries due to the prohibition of retaining recreationally caught Yelloweye Rockfish at any Washington port. In 2019, the Washington Department of Fish and Wildlife (WDFW) began to collect Yelloweye Rockfish bycatch from select recreational vessels for biological information.

The goal of this project was to test a new approach to enhance data collection of the biological characteristics of Yelloweye Rockfish bycatch discards in Washington's recreational fisheries. This is important because there is no observer program in Washington for groundfish recreational fisheries. Managers have little data with which to manage this constraining species. Particularly, total tonnage of released Yelloweye Rockfish bycatch in Washington's recreational fisheries is estimated without any current information on the size of incidentally caught Yelloweye Rockfish. The information gained from this study will be used to address this issue and monitor Yelloweye Rockfish bycatch in the recreational fisheries. This research will also provide information needed to evaluate the fecundity, growth, and population distribution of Yelloweye Rockfish.

Approach

There about 2000 Yelloweye Rockfish discarded annually by recreation anglers in Washington. About 40 percent are from fishing trips targeting Pacific Halibut and another 50 percent from bottomfish trips. Our sampling objective is to obtain 100 to 200 individuals of Yelloweye Rockfish from recreational charter and private anglers in Washington's recreational Pacific Halibut and

recreational groundfish fisheries. Collect biological information from collected Yelloweye Rockfish including length, weight, sex, otolith, DNA, and ovary samples. Document catch location information when possible. These data will provide information on size and age compositions and improve average weight estimation for in-season catch monitoring.

Study vessels conducted rod-reel fishing operations as they typically would during the Pacific Halibut and groundfish seasons; fishing techniques were not modified to accomplish the study. Vessels were allowed to fish anywhere off Washington's outer coast that was legally open to recreational fishing and to retain any catch legally permitted for personal use. Vessels were required to abide by all applicable recreational fishing regulations, except, vessels were permitted to retain all Yelloweye Rockfish bycatch caught while targeting Pacific Halibut, Lingcod, or rockfish during Washington's Pacific Halibut and nearshore groundfish fisheries. Selection of participants considered operators with a history of cooperation with WDFW sampling programs and were selected based on the following criteria: 1) demonstrate solid fish identification skills, 2) substantial historical participation in the recreational halibut and bottom fish fishery, 3) willingness to adhere to study protocols, 4) no groundfish or halibut related violations and, 5) plans for fishing during Pacific Halibut openers or on trips targeting groundfish.

When possible, retained Yelloweye Rockfish were collected fresh from the vessels at the end of the fishing day by WDFW staff at the port of landing. When WDFW staff were unavailable at the port of landing, participants froze specimens and delivered them to WDFW within five days of capture. All other legally retained catch was retained by the angler for personal use. Yelloweye Rockfish catch locations were collected from the vessel skipper to the best precision available. WDFW staff coordinated closely with participating private anglers and charter operators to monitor fishing plans and arrange for delivery of any retained Yelloweye Rockfish upon return to port. For any given day (fishing trip) participants will only retain Yelloweye Rockfish if directed to do so in advance by WDFW. WDFW staff will ensure close communication between ports to ensure the number of retained Yelloweye Rockfish did not exceed the study's objective.

Collected fish were biologically sampled, filleted, and donated to a local food bank after processing. Yelloweye Rockfish catch was recorded by landing vessel and catch location, scanned for internal tags, measured (fork length in centimeters), and weighed in grams. Otoliths, a DNA fin clipping and ovary (when applicable) sample was collected from each fish and preserved for later analysis.

Results

Twelve recreational vessels, including five charter and seven private vessels, participated in the project following the terms and conditions detailed under the EFP. All 12 vessels were permitted in 2021 and five continued with the project in 2022. Of the participating vessels, four charter vessels and two private vessels encountered and retained Yelloweye Rockfish (Table 1). Over multiple trips in Washington's 2021 and 2022 recreational fisheries, 179 Yelloweye Rockfish were captured (Table 2) and delivered to the WDFW for biological sampling. Landings were dispersed along the Washington coast (Table 3), including catches from all Washington coastal marine areas (Figure 1).

The project's sampling goal of biologically detailing 200 individual Yelloweye Rockfish was largely achieved over this reporting period. Biological data (length, weight, sex, otoliths) were

collected on all 179 delivered fish. In total, 175 individuals were assessed macroscopically for maturity in the field and 30 ovary samples were collected for histological maturity analysis to be conducted by the Northwest Fisheries Science Center. Genetic fin clip samples were collected and archived from 176 individuals. Additionally, 177 Yelloweye Rockfish were scanned for internal Passive Integrated Transponder tags to facilitate WDFW tag and release research studies; however, no tags were recovered. All biological data, except ages, have been entered into the WDFW Biological Database System (BDS) and have been upload to RecFIN. Ageing will be conducted by WDFW and will be uploaded to the BDS.

The 179 individuals collected ranged in size from 240 to 690 mm FL with an average size of 486.4 mm FL (Figure 2). Most of our sample was composed of medium to large-sized individuals (400-550 mm FL), although some small individuals (<300 mm) were also collected. In terms of total weight, our sample ranged from 270 to 8050 g with an average weight of 2408 g (Figure 3). The length-weight relationship curve ($W = 0.000012 * FL^{3.073}$; $r^2 = 0.9775$) is represented in Figure 4. For the purposes of the main goal of this project, we compared individuals collected through this EFP with those retained by the sport fishery from 2003 to 2022, using the data available in WDFW internal database and in RecFIN database. The 87 individuals extracted from the database ranged in size from 290 to 760 mm FL with an average size of 467.1 mm FL (Figure 5). Most of this sample was composed of medium to large-sized individuals (350-550 mm), although some small individuals (<300 mm FL) were also observed. The average size observed in the EFP is larger than that observed in the individuals retained by sport fishery (Figure 6). The length-weight relationship curve, using the coefficients reported by RecFIN ($W = 0.000000008 * FL^{3.13} * 1000$), is represented in Figure 7. This relationship was used to estimate the majority of weights that are not reported on both databases. For the total weight of individuals retained by sport fishery ranged from 431.3 to 8804.7 g, with an average weight of 2602.2 g (Figure 8). We also observed that the average weight from the individuals collected in through the EFP is higher than that observed in the individuals retained by sport fishery (Figure 9). For the purposes of comparing the "selectivity" of individuals collected by the EFP with those retained by the sport fishery, we observed that Yelloweye Rockfish were approximately the same range of lengths in both but that more Yelloweye Rockfish were between 530 and 650 mm in the EFP (2021-2022) than in the sport fishery (2003-2022) (Figures 10, 11).

Project Challenges and Future Work

Challenges in the conduction of this project included logistical complications with the retrieval of catch from vessels, the administration of multiple permits and supplies to vessels that never delivered Yelloweye Rockfish bycatch, and the limited number of vessels represented by the project. Some of the difficulties realized were addressed over the course of the study, however, the results of this study in any future work will continue to be limited by these constraints.

Over the study period, retained fish were typically landed individually and could be landed anywhere on the coast of Washington any day of the week during the fishing season. Since WDFW staff available to facilitate this project was extremely limited, adjustments were made to streamline delivery collections. Permits were written so that vessels had a five-day grace period to deliver catch and allowed for the freezing of catch. Freezers were purchased when needed and stationed at ports where secure locations were available. Fish were retrieved ad hoc by WDFW staff from these freezers or from the participating vessels' freezers when in the area. This reduced the amount of work hours required to collect specimens. However, specific trips out to

distant ports had to be done to sample all fish in a reasonable amount of time. Fish were collected and processed within five days of capture to adhere to the terms and conditions of this EFP, ensure fish were sampled with minimal degradation, and to ensure adequate freezer space. WDFW staff would either reduce hours on their primary fishery sampling projects or accrue overtime to collect these fish. Since catch comes in sporadically in small amounts over the course of the season, hiring new staff just for the purpose of this study was not reasonable. Future study would require additional cost for WDFW staff to collect specimens when dedicated trips to distant ports are required.

Each vessel that participated in this study required administrative work to recruit, permit, onboard, supply, and coordinate landings deliveries. In the initial year of this study, 12 vessels were given EFPs of which only five delivered Yelloweye Rockfish with almost all catch delivered by four charter vessels. Two vessels did not want to continue, and multiple unresponsive vessels were not permitted the following year. The significant effort to maintain the larger roster of vessels in 2021 produced a minimal increase in the number of fish delivered and the number of vessels represented compared to the 2022 season. Additionally, few vessels were recruited to participate in this study that were responsive. Vessels were selected that demonstrated a collaborative attitude and a desire to unbiasedly collect data to support the management of the fishery. The close coordination required of this study limits the number of qualified potential participants in future study. While maintaining a small vessel roster of trustworthy, highly productive, charter vessels ensured quality data collection and made this project manageable, the small number of vessels does restrict the project's representation of the recreational fleet.

Given the practical challenges in sample collections and high overlaps of size distributions of EFP samples and regular sport samples, we plan to discontinue this project until we can solve the challenges mentioned above.

Figures



Figure 1. Washington's coastal marine areas.

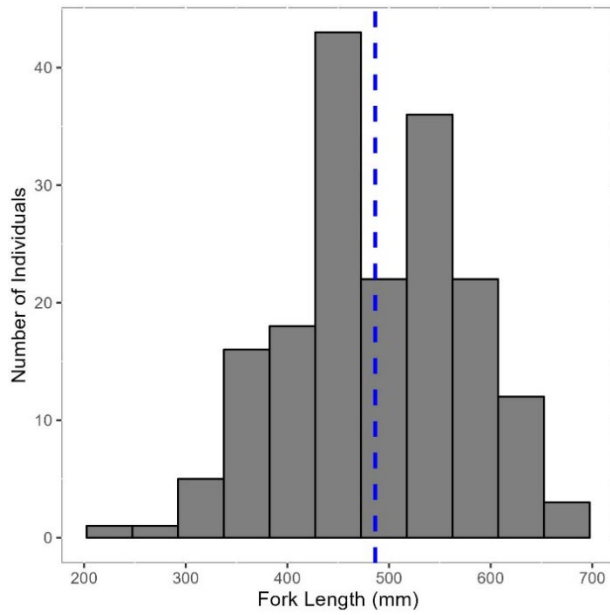


Figure 2: Length frequency histogram for Yelloweye Rockfish collected from EFP study period (2021-2022). The blue dotted line represents the average size.

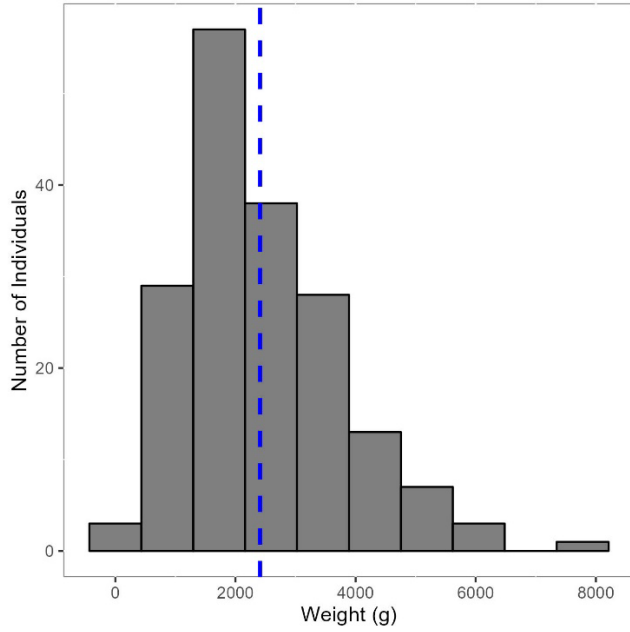


Figure 3: Weight distribution for Yelloweye Rockfish collected from EFP study period (2021-2022). The blue dotted line represents the average weight.

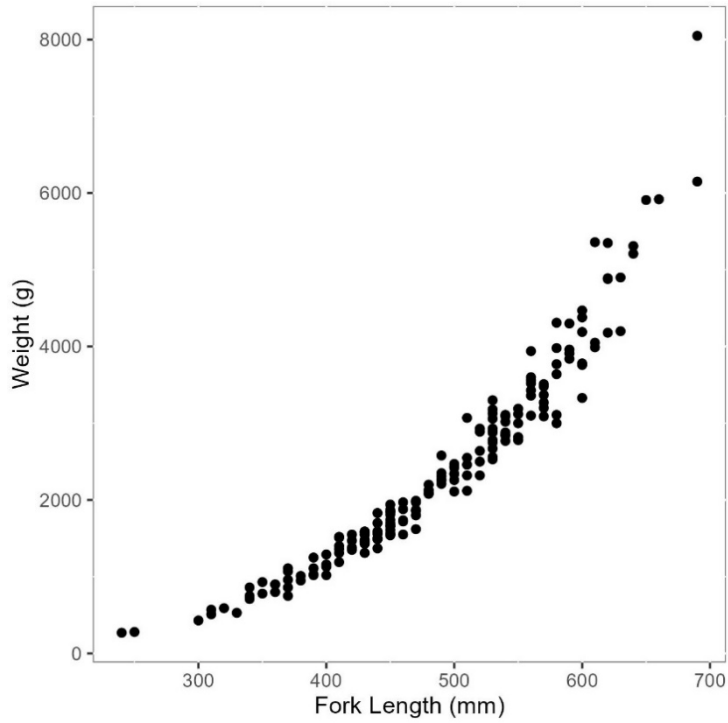


Figure 4: Length-weight relationship for Yelloweye Rockfish collected from EFP period of (2021-2022; n = 179).

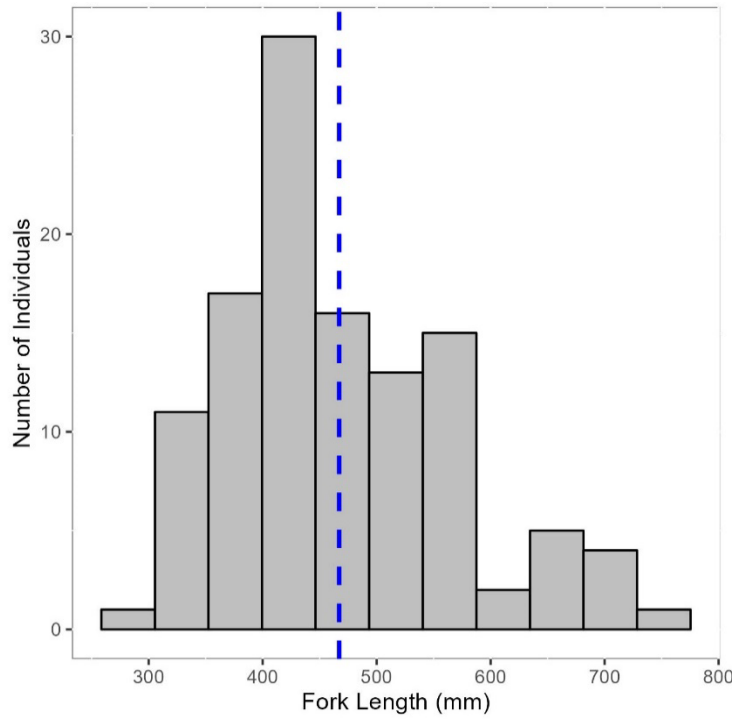


Figure 5: Length frequency histogram for Yelloweye Rockfish retained in the Sport Fishery (2003-2022). The blue dotted line represents the average size.

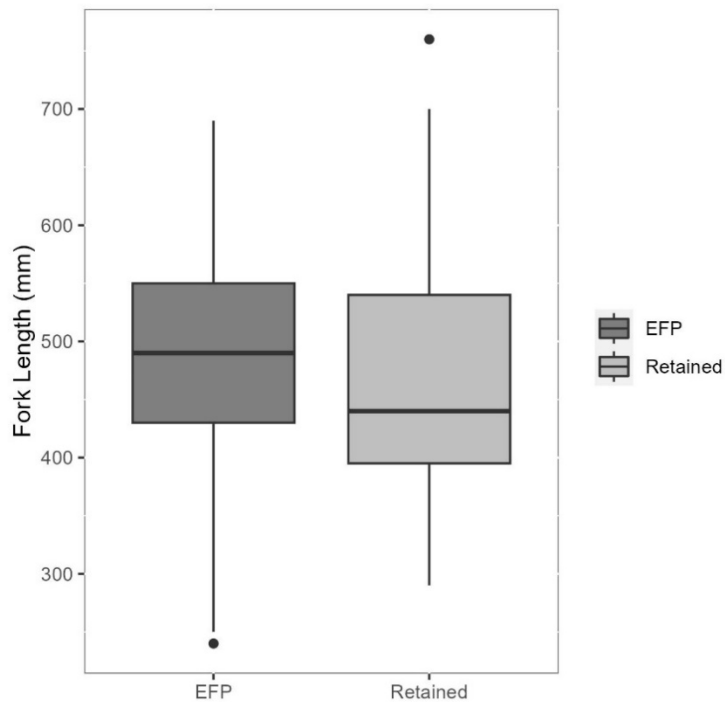


Figure 6: Boxplot comparing sizes (FL mm) for Yelloweye Rockfish collected by the EFP study (2021-2022) and retained in the Sport Fishery (2003-2022), showing the median, third quartile (Q3), and first quartile (Q1) range of the data and data outliers.

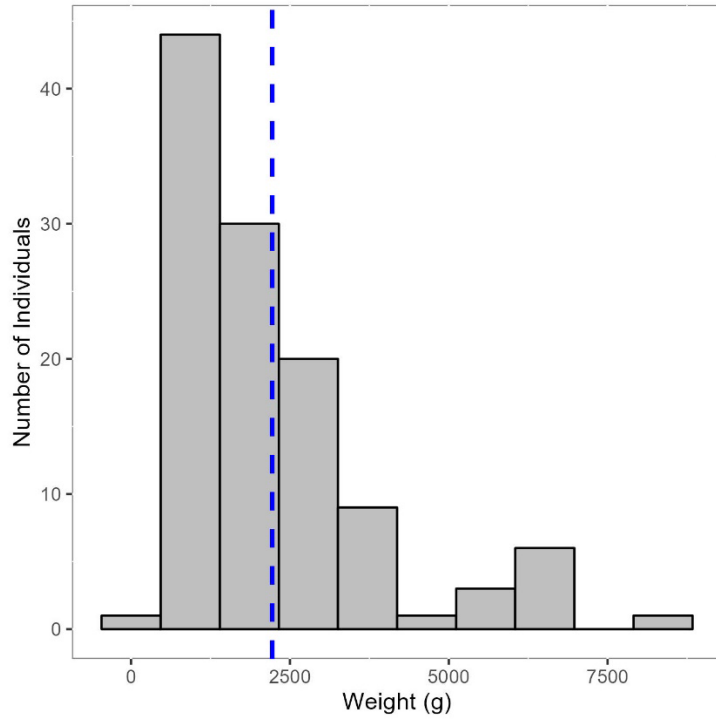


Figure 7: Weight distribution for Yelloweye Rockfish retained in the Sport Fishery (2003-2022). The blue dotted line represents the average weight.

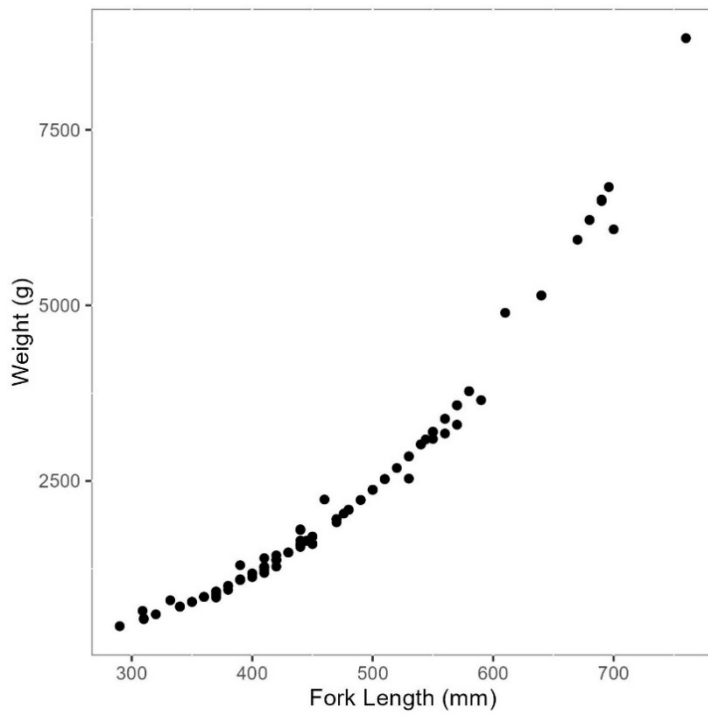


Figure 8: Length-weight relationship for Yelloweye Rockfish retained in the Sport Fishery (2003-2022).

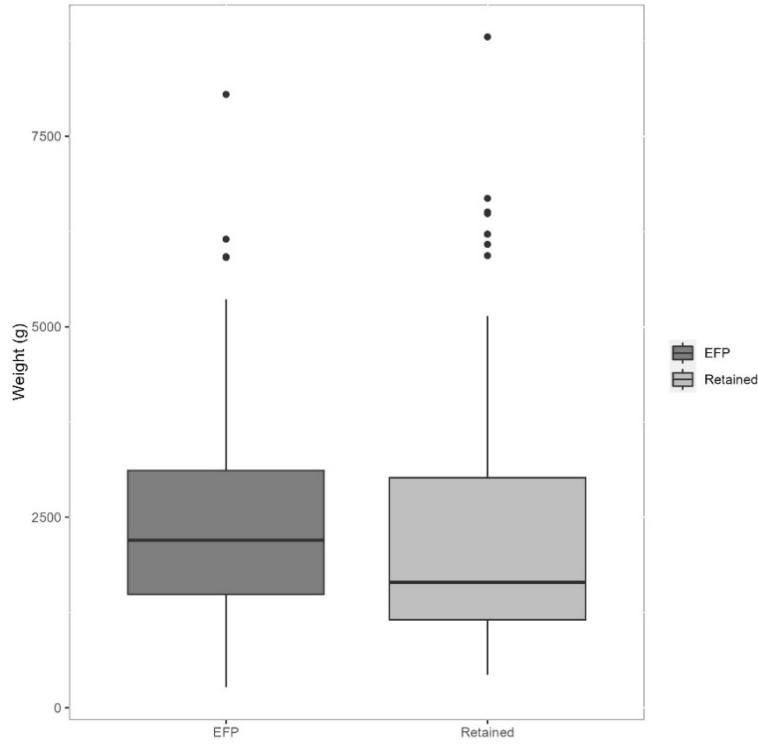


Figure 9: Boxplot comparing weights (g) for Yelloweye Rockfish collected by the EFP study (2021-2022) and retained in the Sport Fishery (2003-2022), showing the median, third quartile (Q3), and first quartile (Q1) range of the data and data outliers.

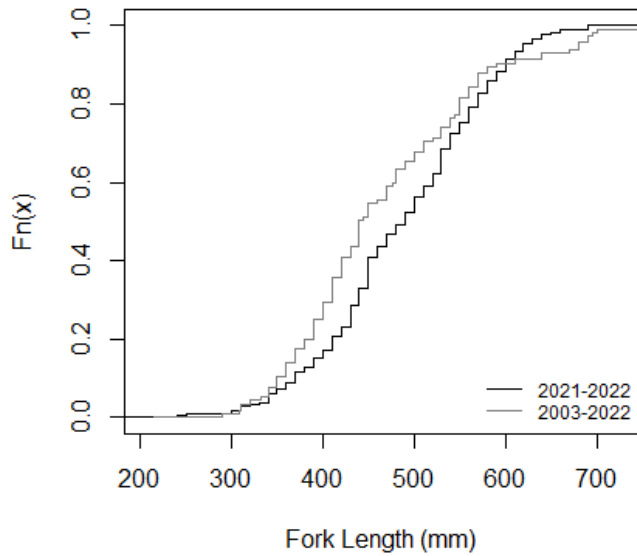


Figure 10: Empirical cumulative distribution function for Yelloweye Rockfish sampled by EFP (2021-2022) and Sport Fishery (2003-2022).

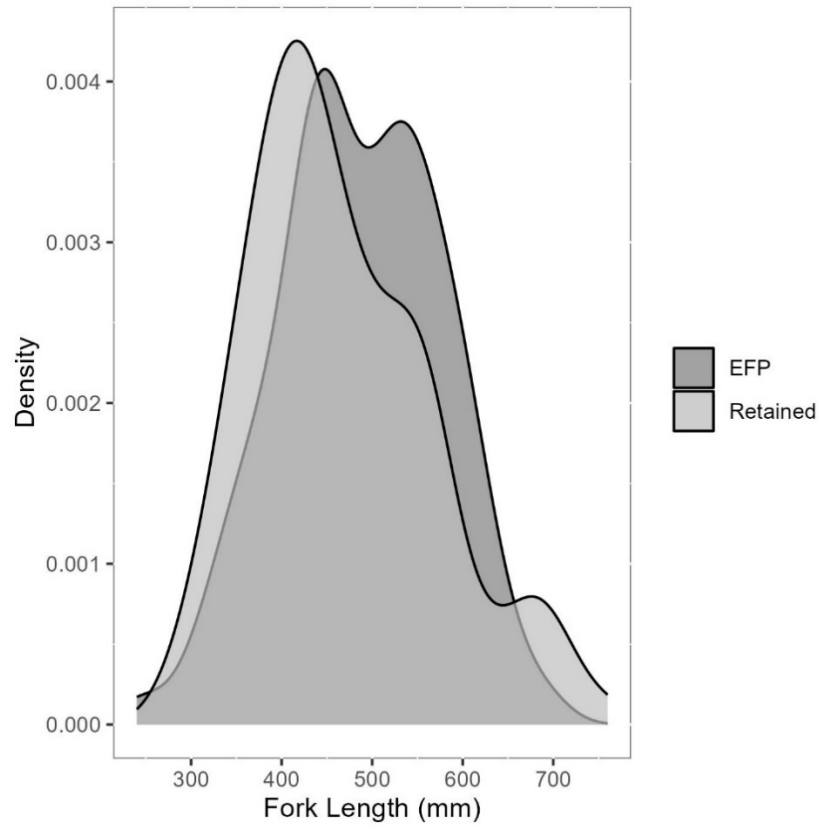


Figure 11: Density curve of length distribution (FL mm) for Yelloweye Rockfish collected by the EFP study (2021-2022) and retained in the Sport Fishery (2003-2022).

Tables

Table 1. Total Yelloweye Rockfish retained for each vessel in 2021 and 2022.

Vessel Number	Vessel Type	2021	2022	Grand Total
520056	Charter	34	30	64
580506	Charter	14	19	33
WN2699NL	Private		3	3
WN6689NT	Charter	27		27
WN7426NU	Private	3		3
WN9183NN	Charter	19	30	49

Table 2. Total Yelloweye Rockfish retained for each EFP trip in 2021 (A) and 2022 (B)

A) 2021				B) 2022			
Trip Date	Vessel Number	Yelloweye Rockfish Count	Total Weight (kg)	Trip Date	Vessel Number	Yelloweye Rockfish Count	Total Weight (kg)
4/16/2021	WN6689NT	1	0.28	3/26/2022	520056	1	3.96
4/17/2021	WN6689NT	2	2.11	3/27/2022	580506	2	3.48
4/19/2021	WN6689NT	1	0.57	3/27/2022	520056	3	5.46
4/20/2021	WN6689NT	1	3.52	3/29/2022	580506	2	5.675
4/21/2021	WN6689NT	1	1.11	4/1/2022	580506	1	1.35
5/3/2021	WN6689NT	1	0.59	4/16/2022	520056	2	4.81
5/10/2021	WN9183NN	1	0.86	4/28/2022	WN9183NN	1	5.92
5/12/2021	WN6689NT	1	2.47	4/30/2022	580506	2	7.23
5/16/2021	580506	2	4.2	4/30/2022	520056	2	6.29
5/16/2021	520056	1	2.34	5/1/2022	580506	1	1.55
5/20/2021	520056	2	4.32	5/1/2022	520056	2	6.81
5/21/2021	WN6689NT	1	1.37	5/10/2022	WN2699NL	2	3.06
5/22/2021	WN6689NT	1	1.31	5/13/2022	WN9183NN	3	6.9
5/23/2021	580506	1	2.21	5/20/2022	WN9183NN	1	2.84
5/23/2021	520056	4	9.25	5/21/2022	520056	1	2.12
5/30/2021	580506	2	1.82	5/22/2022	580506	1	4.31
5/30/2021	WN9183NN	2	4.76	5/23/2022	WN9183NN	5	14.64
5/31/2021	WN6689NT	1	2.93	5/26/2022	580506	1	1.62
6/10/2021	WN9183NN	3	4.48	5/26/2022	520056	1	3.76
6/12/2021	520056	1	2.32	5/31/2022	WN9183NN	1	3.09
6/14/2021	580506	1	1.66	6/1/2022	580506	1	5.21
6/17/2021	580506	1	3.11	6/2/2022	WN9183NN	2	5.01
6/17/2021	WN9183NN	1	2.93	6/7/2022	580506	1	0.95
6/17/2021	520056	1	3.33	6/10/2022	520056	1	3
6/21/2021	WN6689NT	1	1.01	6/11/2022	580506	1	4.9
6/24/2021	WN6689NT	1	0.9	6/11/2022	WN2699NL	1	2.44
6/25/2021	520056	2	3.66	6/16/2022	580506	1	2.56
6/28/2021	520056	1	1.8	6/16/2022	WN9183NN	3	8.99
7/3/2021	580506	1	1.61	6/16/2022	520056	6	18.86
7/3/2021	520056	1	1.02	6/18/2022	WN9183NN	4	10.43
7/9/2021	520056	3	8.07	6/18/2022	520056	1	3.02
7/10/2021	580506	1	1.67	6/21/2022	520056	2	5.74
7/10/2021	520056	1	1.49	6/25/2022	580506	1	3.51
7/11/2021	520056	1	3.84	6/26/2022	520056	2	4.62
7/13/2021	520056	3	12.46	6/30/2022	580506	2	7.65
7/16/2021	580506	1	1.55	6/30/2022	WN9183NN	3	4.66
7/16/2021	520056	4	9.98	7/3/2022	580506	1	0.27
7/19/2021	WN6689NT	1	0.75	7/7/2022	WN9183NN	1	1.16
7/21/2021	580506	1	0.51	7/14/2022	520056	2	3
7/22/2021	WN9183NN	2	2.65	7/24/2022	WN9183NN	2	4.61
7/23/2021	WN6689NT	1	3.06	7/30/2022	WN9183NN	1	4.19
7/25/2021	WN9183NN	1	1.47	7/30/2022	520056	1	2.55
7/26/2021	520056	1	2.82	8/1/2022	WN9183NN	2	8.43
7/28/2021	520056	2	2.89	8/1/2022	520056	2	5.77
8/1/2021	520056	2	8.26	8/4/2022	WN9183NN	1	3.91
8/5/2021	WN9183NN	5	19.87	8/5/2022	580506	1	0.75
8/7/2021	WN9183NN	3	11.25	8/13/2022	520056	1	0.43
8/10/2021	WN6689NT	3	4.3	2022 Grand Total		82	221.50
8/11/2021	580506	1	2.27				
8/12/2021	520056	4	7.96				
8/15/2021	WN6689NT	1	0.96				
8/16/2021	WN6689NT	1	1.74				
8/16/2021	580506	2	1.33				
8/26/2021	WN9183NN	1	2.58				
8/29/2021	WN6689NT	1	0.86				
9/3/2021	WN6689NT	2	6.55				
9/10/2021	WN6689NT	1	3.13				
9/10/2021	WN7426NU	3	5.13				
9/12/2021	WN6689NT	1	3.56				
9/23/2021	WN6689NT	1	0.93				
9/24/2021	WN6689NT	1	1.85				
2021 Grand Total		97	209.59				

Table 3. Number of Yelloweye Rockfish retained by Marine Area and year.

	Marine Area 1	Marine Area 2	Marine Area 3	Marine Area 4	Grand Total
2021	6	42	17	32	97
2022	1	48	33		82
Grand Total	7	90	50	32	179