

California Collaborative Fisheries Research Program

Data availability for stock assessments

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1 Summary

This document summarizes the data from the California Collaborative Fisheries Research Program (CCFRP) as well as the available data for the four species proposed for stock assessments in 2023, black rockfish (*Sebastes melanops*), copper rockfish (*S. caurinus*), quillback rockfish (*S. maliger*), and yellowtail rockfish (*S. flavidus*).

2 Survey Background

The 1999 Marine Life Protection Act resulted in the creation of a network of Marine Protected Areas (MPAs) along California's coast. The state of California designated both State Marine Reserves (SMRs) and State Marine Recreational Management areas (SMCAs). The SMRs prohibit all recreational and commercial take and SMCAs allow some recreational and/or commercial take that varies by SMCA. A number of MPAs have both an SMR and SMCA, of which the SMR is closer to shore. The California Collaborative Fisheries Research Program, CCFRP, is a fishery-independent hook-and-line survey designed to monitor nearshore fish populations at a series of sampling locations both inside and adjacent to California's network of MPAs [Wendt2009; Starr2015]. The CCFRP survey began in 2007 in collaboration with NMFS scientists and the fishing community. The core area of the survey includes Año Nuevo SMR and Point Lobos SMR sampled by San Jose State University Moss Landing Marine Lab, and Point Buchon SMR and Piedras Blancas SMR sampled by California Polytechnic University San Luis Obispo (Figure 1). In 2017, CCFRP expanded within California to include four additional partners, Cal Poly Humboldt (formerly Humboldt State University), University of California Davis' Bodega Marine Lab, University of California Santa Barbara and Scripps Institution of Oceanography. The CCFRP now monitors 12 MPA and reference area pairs (Table 1). Cal Poly Humboldt samples the furthest north sites, which are south of Cape Mendocino, but the South Cape Mendocino SMR is north of the management line at $40^{\circ}10'N$. There are three nearshore SMCAs north of Cape Mendocino that were not selected for CCFRP due to historical sampling the tiers assigned to the SMRs by CDFW.

The CCFRP survey design is consistent across all partners. Each MPA and reference area consists of a number 500 x 500 m cells that were selected because they contained appropriate rockfish habitat. The survey is restricted to 120 feet to reduce potential effects of barotrauma since the survey was designed as a capture and release survey, with a sub-study tag/recapture program. On any given survey day site cells are randomly selected within a stratum (MPA and/or reference cells).

Commercial passenger fishing vessels (CPFVs) are chartered for the survey and the captain is allowed to search within the cell for a fishing location. During a sampling event, each cell is fished for a total of 30-45 minutes by volunteer anglers. Volunteer anglers are allowed to reel up their lines at any time during a fishing drop if they think they've hooked fish. Anglers can then re-bait and continue fishing until the drop is complete. Each fish encountered can be linked back to an angler. Each angler fishes one line, with two hooks. The jig and bait is assigned to each angler, but an angler may fish with a personal fishing rod.

Table 1: Monitoring groups and the associated MPAs they sample. The abbreviated names will be used throughout most of the tables in this document

Monitoring Group	Abbreviated Name	MPA
Cal Poly Humboldt	Humboldt	South Cape Mendocino
Cal Poly Humboldt	Humboldt	Ten Mile
Bodega Marine Lab	Bodega	Stewarts Point
Bodega Marine Lab	Bodega	Bodega Head
Moss Landing Marine Lab	Moss Landing	Ano Nuevo
Moss Landing Marine Lab	Moss Landing	Point Lobos
Cal Poly SLO	Cal Poly	Piedras Blancas
Cal Poly SLO	Cal Poly	Point Buchon
UC Santa Barbara	UCSB	Carrington Point
UC Santa Barbara	UCSB	Anacapa Island
Scripps Institute Ocean.	Scripps	Swamis
Scripps Institute Ocean.	Scripps	South La Jolla

All fish encountered are measured to the nearest centimeter (fork length).

A total of xxxx fish were tagged since 2007, and the majority of fish are released or descended to depth. Starting in 2017, at the request of NMFS, some fish are retained to collect otoliths and fin clips that provide needed biological information for nearshore species. In 2022, the goal will be to collect 50-100 otoliths for commonly encountered species for use in the 2023 stock assessments.

Due to the nature of the fishery in northern California, Humboldt conducts sampling aboard 6-pack vessels, and therefore has fewer total angler hours per year compared to the other regions (). The COVID-19 pandemic also affect the survey effort, but all partners were able to conduct sampling in 2000 and 2001.

3 Available Samples

From 2007-2021 a total of 698 fishing trips were taken, consisting of 9634 fishing drops. When the CCFRP expanded in 2017, some MPAs/sites were fished in only one or two years during an exploratory phase. These included Laguna Beach, the southeast Farallon Islands, Point Conception and Trinidad, which were excluded from this summary since we would not include them in a stock assessment. Fishing drops that drifted outside a cell were also excluded. These site filter result in an available 7910. The final filter removed drifts within a cell that were not fished for at least ten minutes within a sampling occasion, resulting in a total of 7889 fishing drops available for analyses for stock assessments.

Cal Poly Humboldt (formerly Humboldt State University) does not collect depth information at each fishing drop. Depths were interpreted from the California Seafloor Mapping Project (CSMP) 2 m bathymetry for the start and end locations of each fishing drop. There were also xx fishing drops with missing depth data that were added based on the bathymetry.

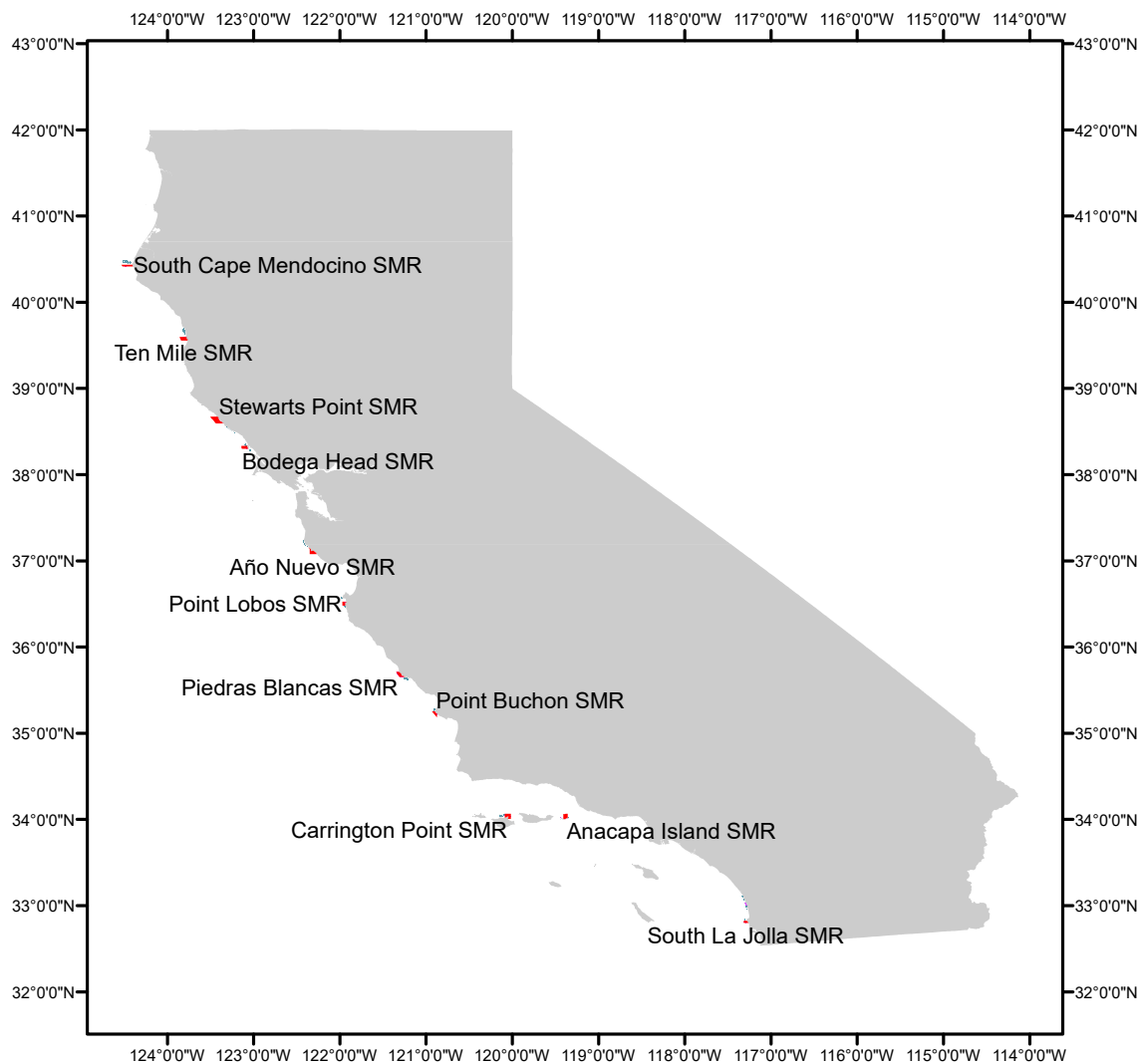


Figure 1: Map of the State Marine Reserves (SMRs) monitored by the CCFRP program.

Table 2: Total angler hours by institution summed across all active years.

YEAR	Humboldt	Bodega	Moss Landing	Cal Poly	UCSB	Scripps
2007	0	0	450	277	0	0
2008	0	0	639	455	0	0
2009	0	0	343	339	0	0
2010	0	0	406	440	0	0
2011	0	0	459	393	0	0
2012	0	0	526	422	0	0
2013	0	0	484	376	0	0
2014	0	0	522	473	0	0
2015	0	0	264	272	0	0
2016	0	0	524	532	0	0
2017	157	92	383	507	137	127
2018	136	353	330	373	230	186
2019	132	403	365	340	222	240
2020	103	143	198	222	227	105
2021	127	219	305	246	271	109

Table 3: Total number of fishing drops by year at each monitored site in the reference areas and inside the MPAs, in parentheses.

YEAR	Cal Poly Humboldt		Bodega Marine Lab		Moss Landing		Cal Poly SLO		UC Santa Barbara		Scripps	
	South Cape Mendocino	Ten Mile	Stewarts Point	Bodega Head	Ano Nuevo	Point Lobos	Piedras Blancas	Point Buchon	Carrington Point	Anacapa Island	Swamis	South La Jolla
2007	-	-	-	-	125(72)	70(93)	-	64(71)	-	-	-	-
2008	-	-	-	-	90(101)	74(82)	30(45)	62(65)	-	-	-	-
2009	-	-	-	-	78(45)	38(45)	38(35)	46(40)	-	-	-	-
2010	-	-	-	-	76(80)	45(48)	44(39)	44(46)	-	-	-	-
2011	-	-	-	-	54(58)	40(49)	42(36)	44(42)	-	-	-	-
2012	-	-	-	-	63(62)	50(48)	40(39)	45(43)	-	-	-	-
2013	-	-	-	-	66(71)	58(53)	41(38)	40(52)	-	-	-	-
2014	-	-	-	-	66(77)	57(55)	46(46)	50(44)	-	-	-	-
2015	-	-	-	-	37(39)	24(27)	-	49(49)	-	-	-	-
2016	-	-	-	-	66(57)	47(50)	47(57)	48(49)	-	-	-	-
2017	38(34)	44(43)	13(9)	15(14)	59(48)	35(37)	44(46)	48(48)	17(17)	14(7)	9(7)	10(21)
2018	36(33)	34(35)	47(54)	36(34)	54(50)	31(34)	34(35)	36(34)	29(26)	21(16)	16(6)	22(28)
2019	34(35)	32(36)	50(60)	41(40)	47(46)	35(38)	34(32)	36(39)	25(27)	19(12)	12(13)	24(23)
2020	30(36)	34(35)	26(46)	43(39)	59(51)	34(44)	35(30)	35(35)	36(36)	23(11)	9(10)	26(33)
2021	37(35)	35(33)	28(41)	38(31)	51(46)	38(41)	32(36)	33(35)	31(35)	20(12)	6(8)	23(28)

4 Species information

We explored data availability for candidate species for the 2023 stock assessment cycle as well as for any other species within the top 30 rockfish species in the Stock Assessment Prioritization spreadsheet provided by the NWFSC. Only one rockfish species within the top 30 species was never observed by observed by CCFRP, . Data summaries are presented for the other 13 species.

Species without a positive identification, e.g., blue and deacon rockfish or yellowtail and olive rockfish, were excluded.

Table 4: Total number of fish encountered by each monitoring group.

Common.Name	Humboldt	Bodega	Moss Landing	Cal Poly	UCSB	Scripps
Black Rockfish	1296	1488	13272	1744	2	0
Copper Rockfish	365	509	901	1008	2352	46
Quillback Rockfish	220	39	1	1	0	0
Yellowtail Rockfish	482	979	1828	1029	6	0

Table 5: Percent of drifts with encounters of Black Rockfish in each at each monitoring location and yerar.

YEAR	South Cape Mendocino	Ten Mile	Stewarts Point	Bodega Head	Ano Nuevo	Point Lobos	Piedras Blancas	Point Buchon	Carrington Point	Anacapa Island	Swamis	South La Jolla
2007	-	-	-	-	70%	26%	-	34%	-	-	-	-
2008	-	-	-	-	74%	24%	10%	46%	-	-	-	-
2009	-	-	-	-	78%	10%	2%	30%	-	-	-	-
2010	-	-	-	-	56%	6%	2%	8%	-	-	-	-
2011	-	-	-	-	74%	18%	8%	38%	-	-	-	-
2012	-	-	-	-	82%	20%	14%	58%	-	-	-	-
2013	-	-	-	-	88%	28%	32%	52%	-	-	-	-
2014	-	-	-	-	84%	38%	28%	50%	-	-	-	-
2015	-	-	-	-	86%	50%	-	40%	-	-	-	-
2016	-	-	-	-	86%	36%	22%	32%	-	-	-	-
2017	54%	22%	50%	38%	76%	18%	4%	24%	-	-	-	-
2018	46%	30%	56%	12%	70%	10%	2%	28%	-	-	-	-
2019	44%	26%	56%	36%	68%	2%	4%	6%	-	-	-	-
2020	44%	40%	46%	48%	66%	-	4%	8%	-	-	-	-
2021	60%	48%	68%	48%	76%	2%	6%	4%	2%	-	-	-

Table 6: Percent of drifts with encounters of Copper Rockfish in each at each monitoring location and yerar.

YEAR	South Cape Mendocino	Ten Mile	Stewarts Point	Bodega Head	Ano Nuevo	Point Lobos	Piedras Blancas	Point Buchon	Carrington Point	Anacapa Island	Swamis	South La Jolla
2007	-	-	-	-	2%	30%	-	6%	-	-	-	-
2008	-	-	-	-	2%	16%	38%	10%	-	-	-	-
2009	-	-	-	-	2%	30%	54%	4%	-	-	-	-
2010	-	-	-	-	2%	22%	34%	6%	-	-	-	-
2011	-	-	-	-	6%	30%	38%	2%	-	-	-	-
2012	-	-	-	-	8%	26%	44%	6%	-	-	-	-
2013	-	-	-	-	6%	10%	30%	12%	-	-	-	-
2014	-	-	-	-	6%	42%	54%	6%	-	-	-	-
2015	-	-	-	-	6%	34%	-	10%	-	-	-	-
2016	-	-	-	-	8%	46%	46%	14%	-	-	-	-
2017	22%	24%	22%	32%	4%	38%	46%	10%	98%	38%	12%	20%
2018	60%	24%	30%	24%	8%	44%	52%	22%	100%	36%	4%	8%
2019	26%	26%	32%	54%	6%	46%	60%	20%	100%	36%	4%	10%
2020	34%	34%	28%	38%	2%	44%	56%	22%	98%	50%	-	10%
2021	42%	24%	42%	42%	10%	52%	52%	18%	94%	50%	-	18%

Table 7: Percent of drifts with encounters of Quillback Rockfish in each at each monitoring location and year.

YEAR	South Cape Mendocino	Ten Mile	Stewarts Point	Bodega Head	Ano Nuevo	Point Lobos	Piedras Blancas	Point Buchon	Carrington Point	Anacapa Island	Swamis	South La Jolla
2007	-	-	-	-	-	-	-	-	-	-	-	-
2008	-	-	-	-	-	-	-	-	-	-	-	-
2009	-	-	-	-	-	-	-	-	-	-	-	-
2010	-	-	-	-	-	-	-	-	-	-	-	-
2011	-	-	-	-	-	-	-	-	-	-	-	-
2012	-	-	-	-	-	-	-	-	-	-	-	-
2013	-	-	-	-	-	-	-	-	-	-	-	-
2014	-	-	-	-	-	-	-	2%	-	-	-	-
2015	-	-	-	-	2%	-	-	-	-	-	-	-
2016	-	-	-	-	-	-	-	-	-	-	-	-
2017	20%	20%	4%	10%	-	-	-	-	-	-	-	-
2018	46%	24%	2%	8%	-	-	-	-	-	-	-	-
2019	30%	8%	2%	2%	-	-	-	-	-	-	-	-
2020	28%	14%	4%	4%	-	-	-	-	-	-	-	-
2021	24%	12%	6%	6%	-	-	-	-	-	-	-	-

Table 8: Percent of drifts with encounters of Yellowtail Rockfish in each at each monitoring location and yerar.

YEAR	South Cape Mendocino	Ten Mile	Stewarts Point	Bodega Head	Ano Nuevo	Point Lobos	Piedras Blancas	Point Buchon	Carrington Point	Anacapa Island	Swamis	South La Jolla
2007	-	-	-	-	10%	14%	-	26%	-	-	-	-
2008	-	-	-	-	4%	10%	18%	16%	-	-	-	-
2009	-	-	-	-	16%	26%	20%	26%	-	-	-	-
2010	-	-	-	-	8%	16%	12%	8%	-	-	-	-
2011	-	-	-	-	14%	38%	8%	10%	-	-	-	-
2012	-	-	-	-	10%	30%	12%	20%	-	-	-	-
2013	-	-	-	-	18%	30%	40%	40%	-	-	-	-
2014	-	-	-	-	20%	56%	22%	18%	-	-	-	-
2015	-	-	-	-	22%	50%	-	30%	-	-	-	-
2016	-	-	-	-	24%	30%	28%	16%	-	-	-	-
2017	6%	18%	46%	4%	38%	24%	12%	14%	6%	-	-	-
2018	18%	24%	72%	14%	8%	46%	14%	16%	-	-	-	-
2019	14%	24%	46%	6%	14%	16%	14%	10%	2%	-	-	-
2020	22%	46%	72%	4%	22%	14%	22%	10%	4%	-	-	-
2021	30%	42%	78%	18%	28%	34%	16%	32%	-	-	-	-

5 Length information

The CCFRP measures every fish to the nearest centimeter and distributions of the lengths inside and outside the MPAs by MPA and species are in Figures xxxx. Length data were filtered to the drifts included in the final data set.

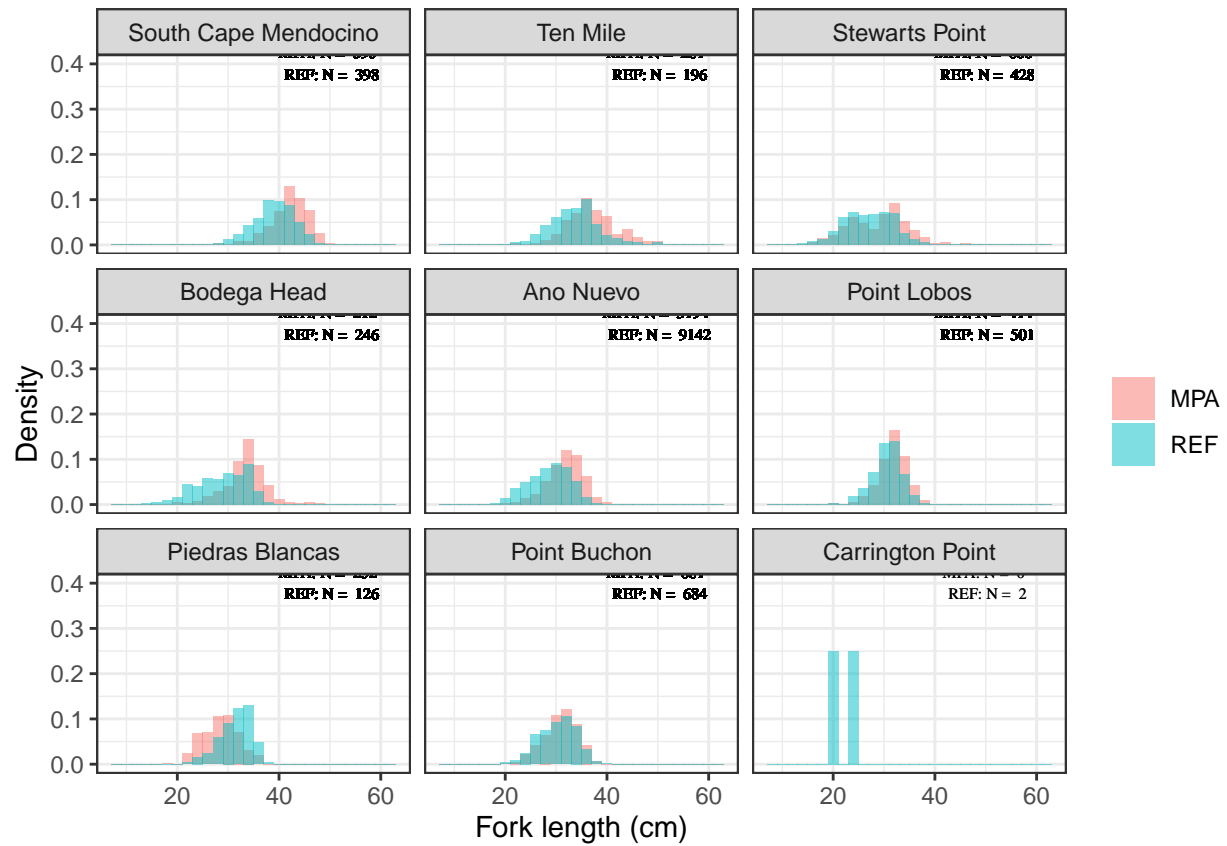


Figure 2: Percent of Black Rockfish by 2 cm fork length bins encountered inside each MPA and outside at reference areas (REF).

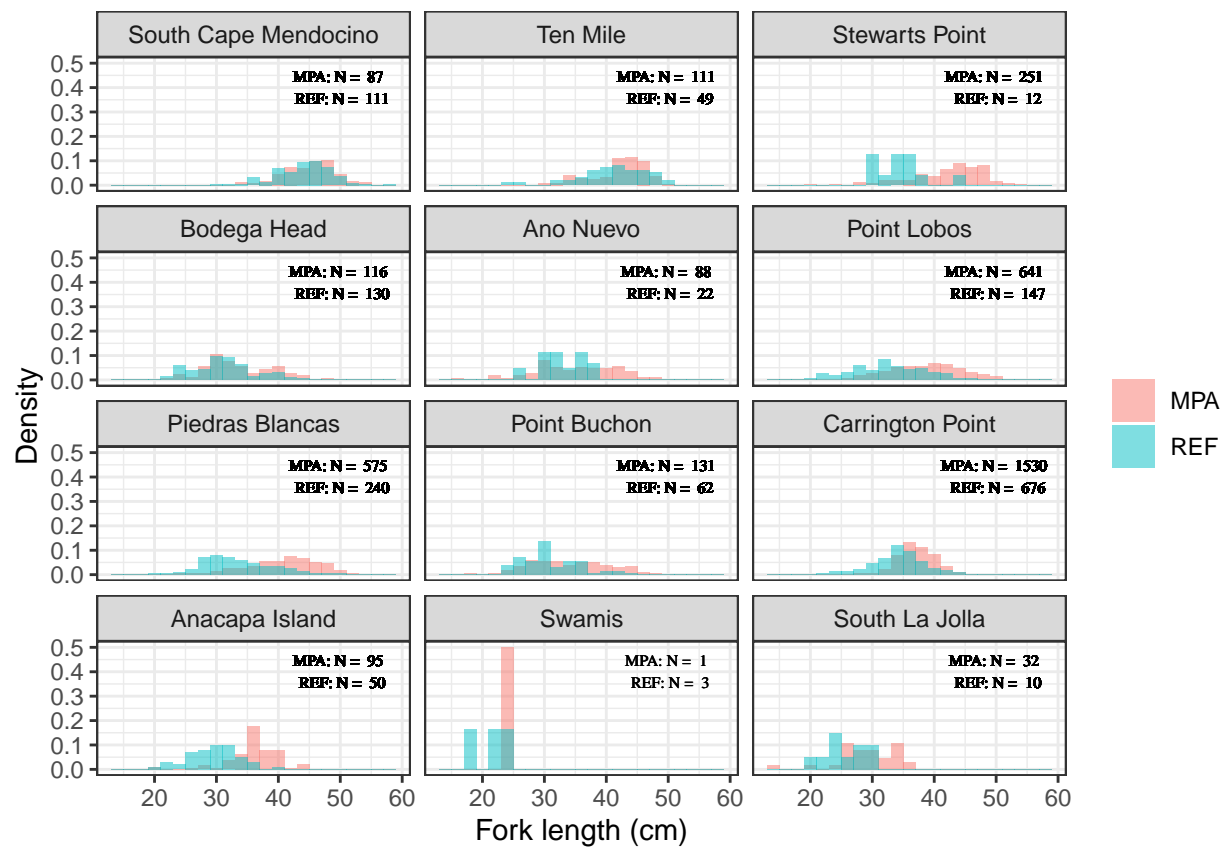


Figure 3: Percent of Copper Rockfish by 2 cm fork length bins encountered inside each MPA and outside at reference areas (REF).

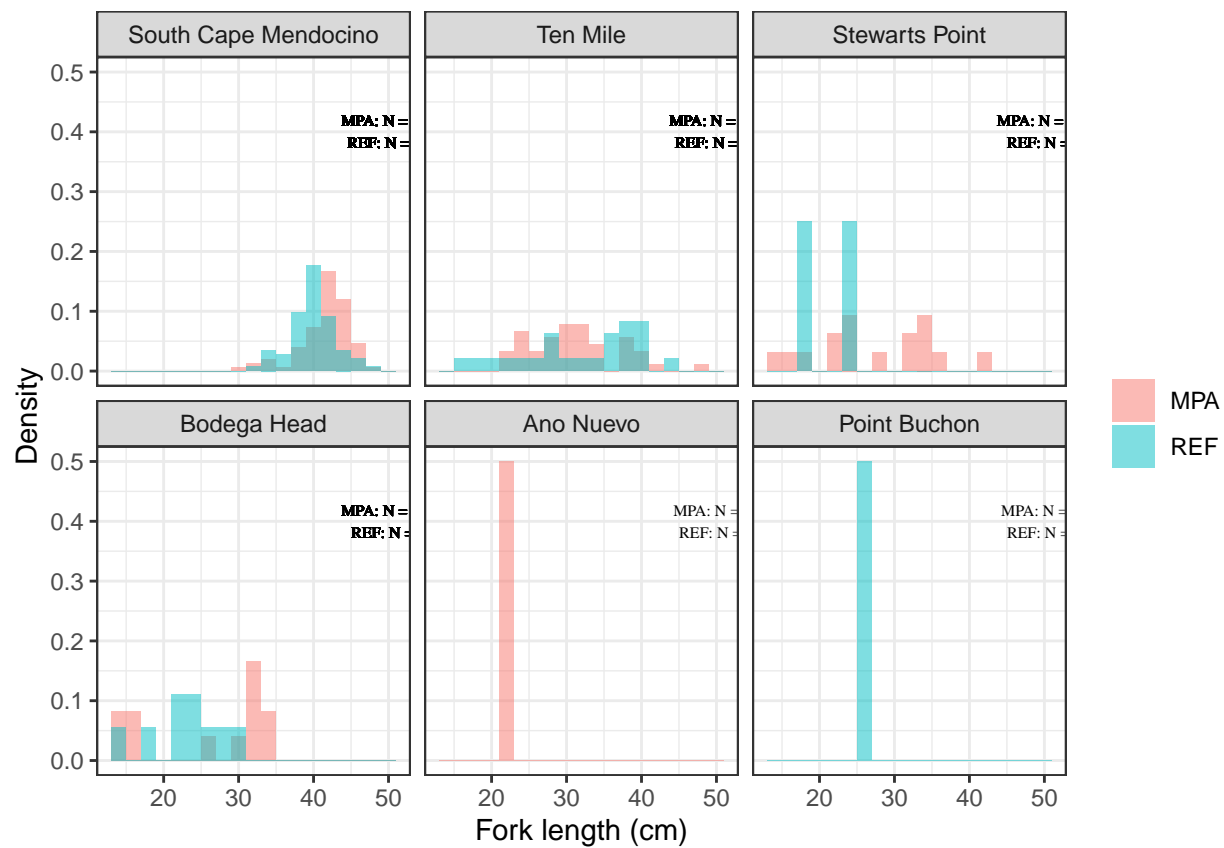


Figure 4: Percent of Quillback Rockfish by 2 cm fork length bins encountered inside each MPA and outside at reference areas (REF).

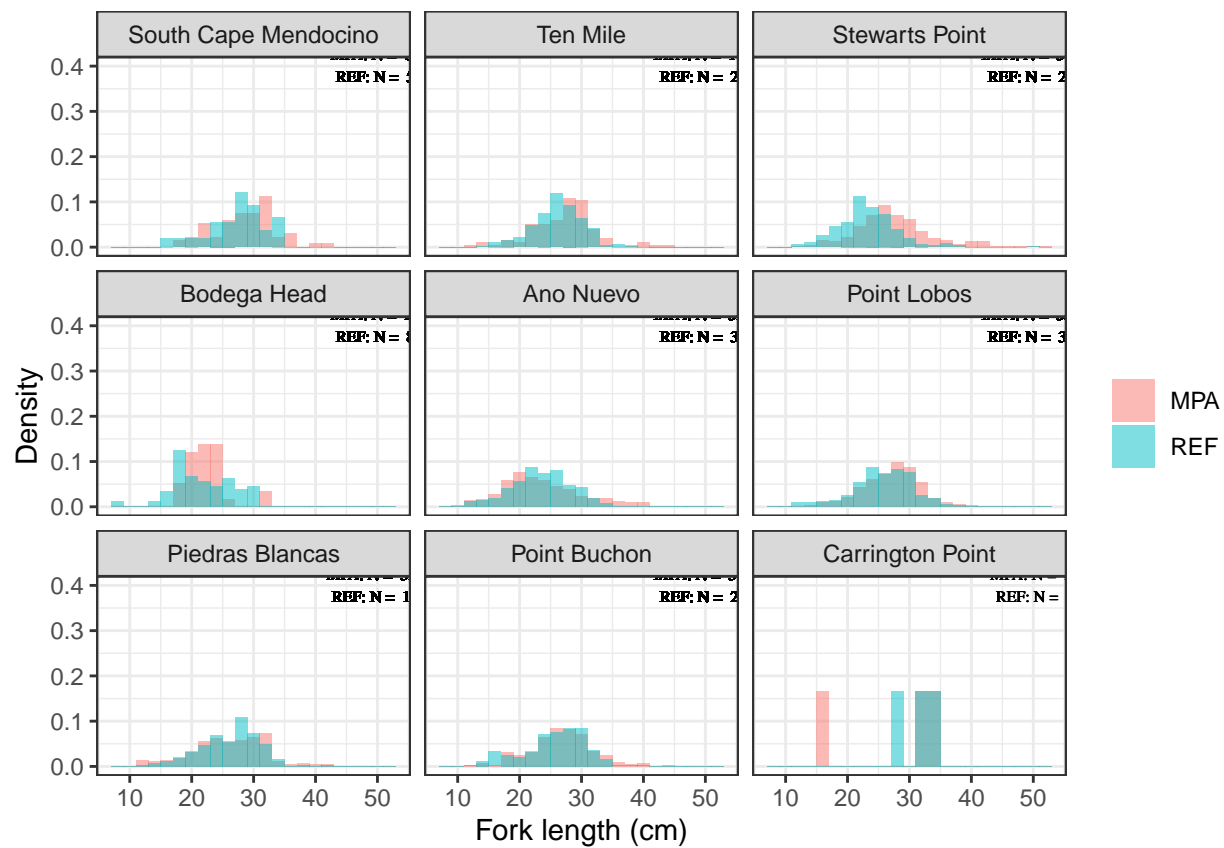


Figure 5: Percent of Yellowtail Rockfish by 2 cm fork length bins encountered inside each MPA and outside at reference areas (REF).

6 Available Otoliths

The number of otoliths collected by university partner and year

Table 9: Total number of fish retained by monitoring group and year.

Common.Name	Bodega	Moss Landing	Cal Poly	Humboldt	NA	UCSB	Scripps
Black-and-Yellow Rockfish	4	6	15	0	0	0	0
Black Rockfish	52	142	14	188	244	0	0
Blue Rockfish	54	316	183	161	69	1	0
Brown Rockfish	11	39	3	2	4	0	0
California Scorpionfish	0	0	0	0	0	0	1
Canary Rockfish	2	3	3	0	0	0	0
China Rockfish	48	38	3	70	31	0	0
Copper Rockfish	17	20	29	105	5	0	0
Deacon Rockfish	59	64	2	133	58	0	0
Gopher Rockfish	90	870	450	24	154	0	1
Honeycomb Rockfish	0	0	0	0	0	0	1
Kelp Greenling	3	11	0	0	0	0	0
Kelp Rockfish	0	17	10	0	0	0	1
Lingcod	0	14	24	0	1	0	0
Olive or Yellowtail Rockfish	0	0	1	0	0	0	0
Olive Rockfish	24	55	32	47	9	0	1
Quillback Rockfish	0	0	0	63	19	0	0
Rosy Rockfish	0	24	1	46	44	0	0
Starry Rockfish	0	0	1	4	0	0	1
Treefish	0	0	25	0	0	0	1
UnID Blue Rockfish	0	0	0	0	1	0	0
Vermilion Rockfish	11	28	31	54	1	0	0
Yellowtail Rockfish	36	19	13	120	27	0	0