

California Collaborative Fisheries Research Program

Data availability for stock assessments

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1 CCFRP Background

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 Marine Protected Areas (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 and Point Lobos sampled by San Jose State University Moss Landing Marine Labs (MLML), and Point Buchon and Piedras Blancas by California Polytechnic University San Luis Obispo (Cal Poly). In 2017, CCFRP expanded coastwide within California, expanding to include four additional partners, Cal Poly Humboldt (CPH; formerly Humboldt State University), University of California Davis' Bodega Marine Lab (BML), University of California Santa Barbara (UCSB) and Scripps Institute of Oceanography (SIO), and xxxx monitored MPA/reference area pairs (Table xx). Cal Poly Humboldt samples the furthest north sites, which are still south of Cape Mendocino. There are three nearshore State Marine Conservation Areas (SMCAs) north of the South Cap Mendocino State Marine Reserve (SMR) that is monitored. However, xxxxx

Insert a table of which universities monitor which MPAs. Insert a maps of the MPAs with the cells.

The CCFRP survey design is consistent across all partners. Each MPA and reference area consists of a number 500 x 500 m cells. The survey is restricted to xxxx 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 when they believe they've hooked fish, re-bait and continue fishing until the the drop is complete. Each fish encountered can be linked back to an angler. Each anglers fishes one line, with two hooks. The jig and bait type may differ....

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 enountered 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.

Tables of the number of positive drops of a species by university partner, inside and outside the MPA

The number of otoliths collected by university partner and year

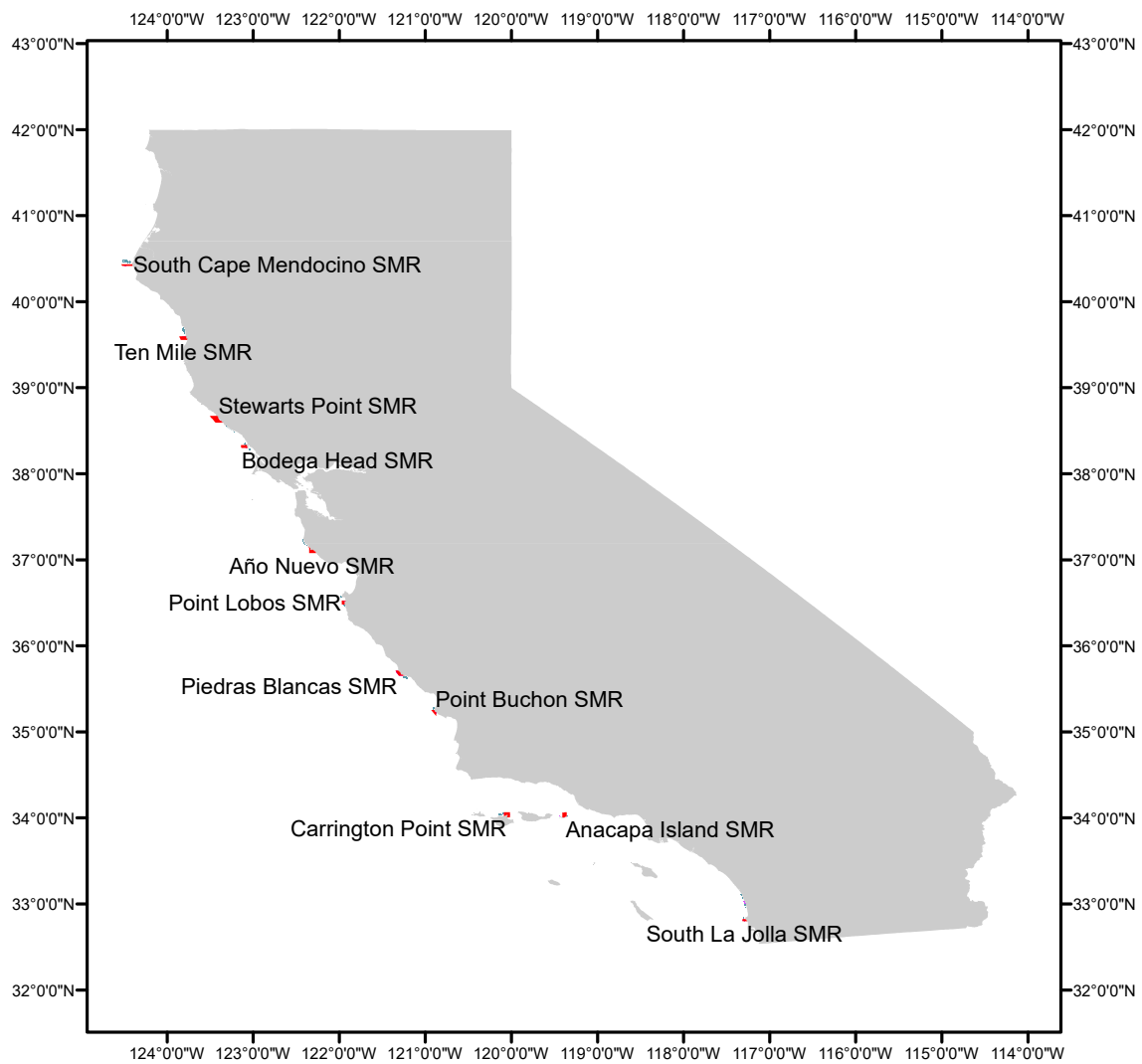


Figure 1: Map of the State Marine Reserves (SMRs) monitored by the CCFRP program.

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

Monitoring Group	Shorthand 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	Año 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

2 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.

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	Año 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)

3 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
Blue Rockfish	774	5112	32437	28979	1899	10
Brown Rockfish	15	749	563	228	25	51
Canary Rockfish	791	845	970	423	2	0
China Rockfish	164	495	1023	112	0	0
Copper Rockfish	365	509	901	1008	2352	46
Deacon Rockfish	1003	4895	2337	343	0	0
Grass Rockfish	0	0	16	1	1	7
Olive Rockfish	111	701	4411	4229	63	74
Quillback Rockfish	220	39	1	1	0	0
Treefish	0	0	35	197	137	139
Vermilion Rockfish	221	369	1484	2723	271	98
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	Año 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	Año 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	Año 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	Año 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%	-	-	-	-

4 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.

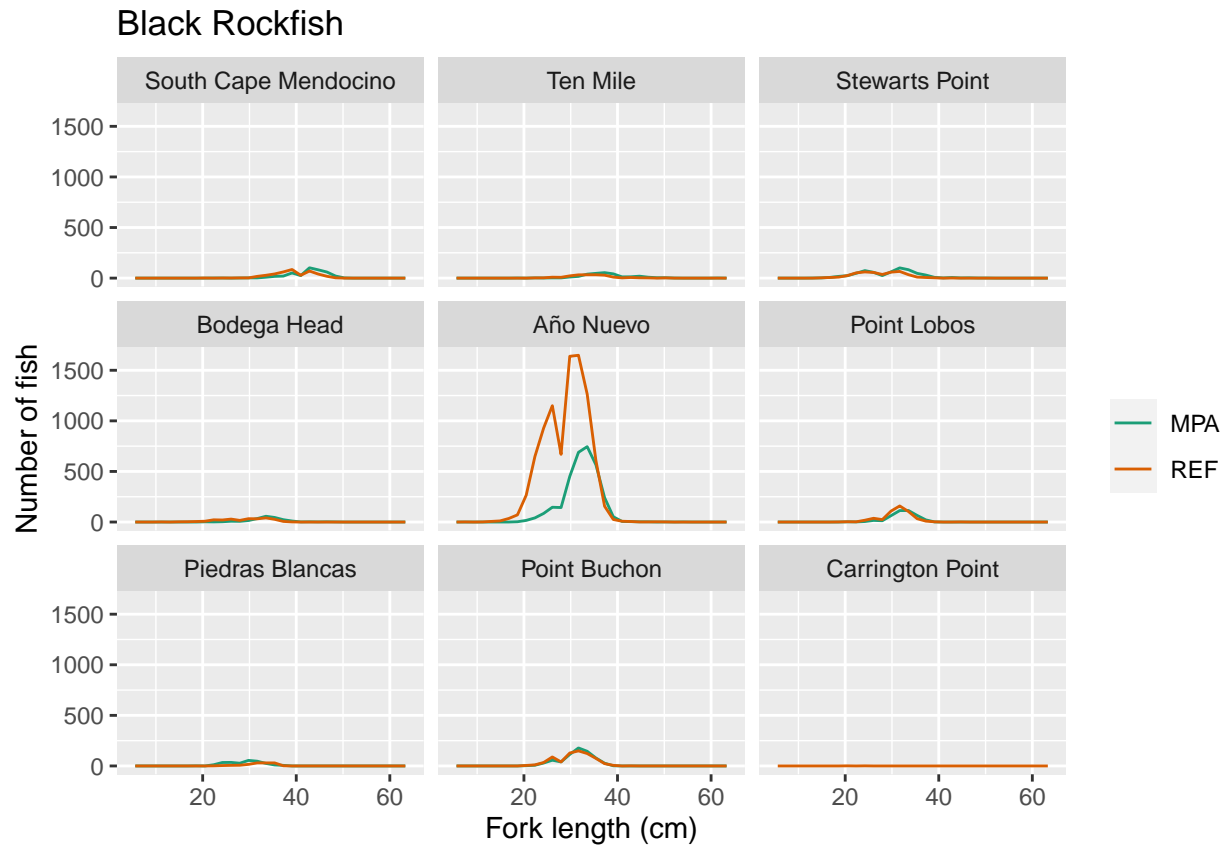


Figure 2: Frequency of fork length (cm) for inside each MPA (MPA) and outside at reference areas (REF)

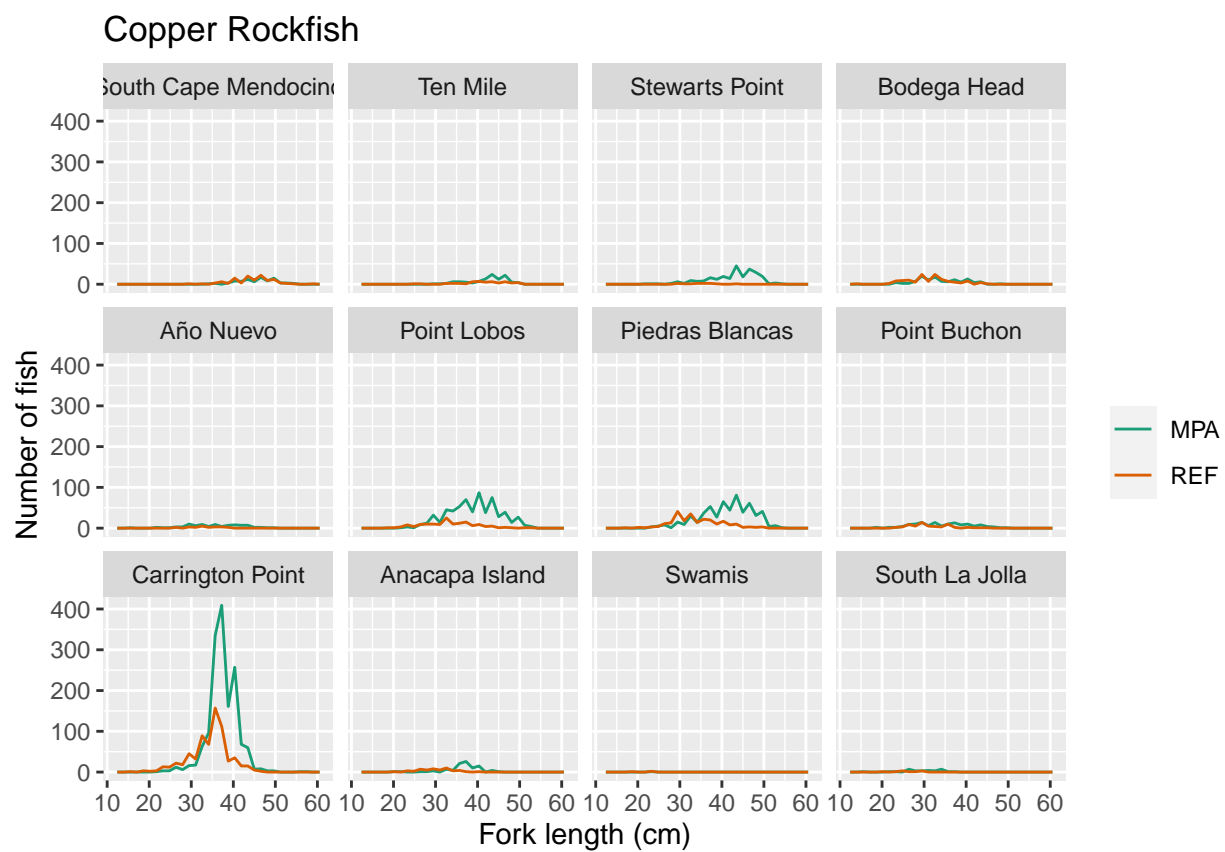


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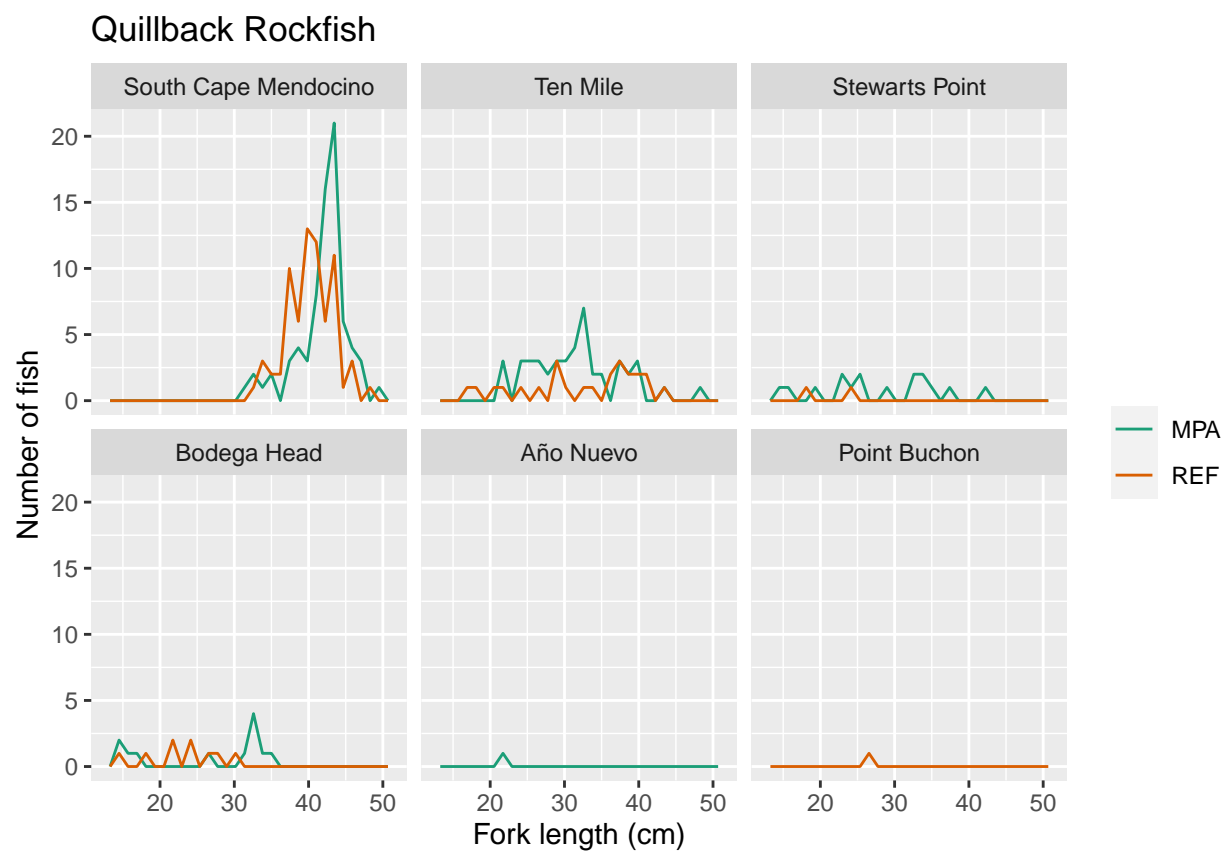


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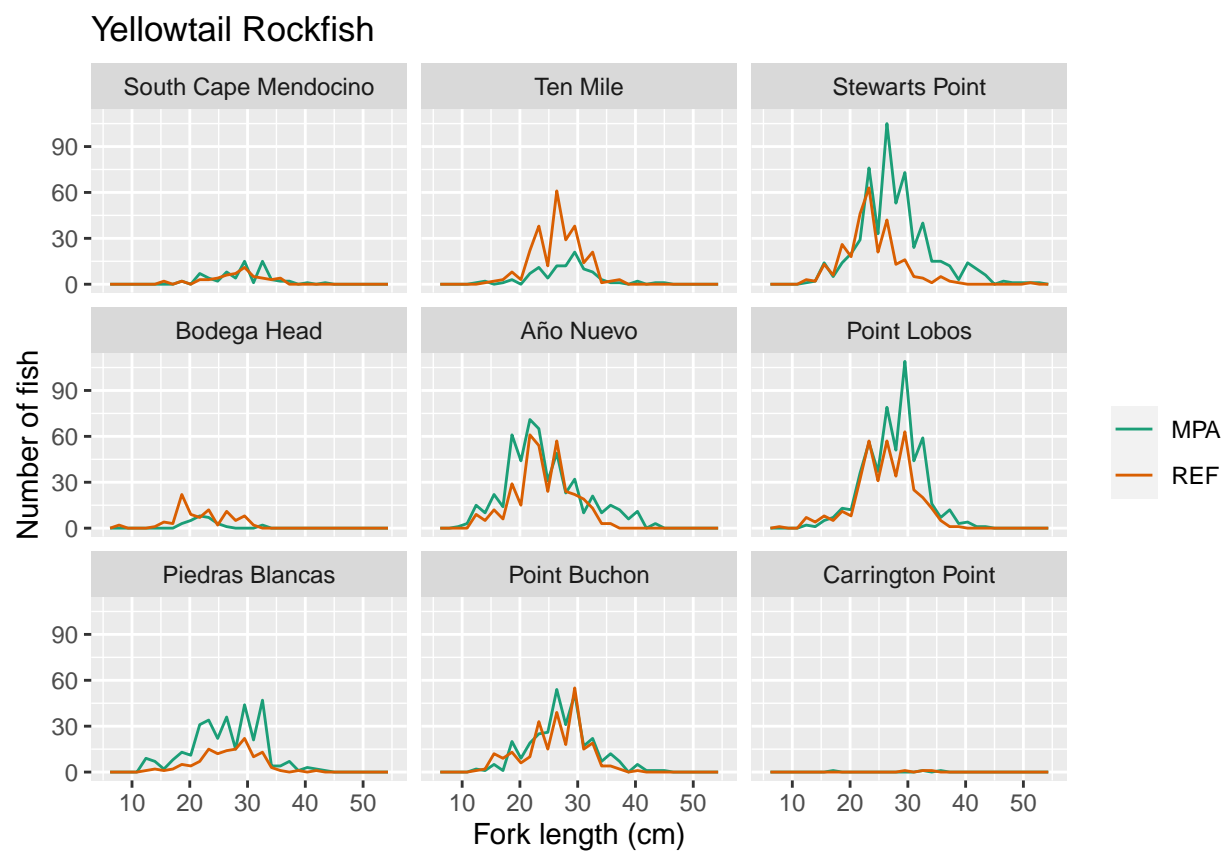


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