2023 Proposed CCFRP Otolith Collections

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1   First Pass at Determining 2023 Otolith Collections

The following use only data from 2019, 2021 and 2022 from the reference areas. Drifts that did not see any of the target species are also excluded. I also excluded the following MPA locations, Farallons, Point Conception, Laguna Beach, Trinidad and "BM" (error?).

As a first pass, I looked at the total number of a given species by north and south of Point Conception. I did this because we have been separating assessments at Point Conception for most of the nearshore species, and species compositions and fishing practices are fundamentally different in these two regions.
If there were fewer than 4 of a given species seen across the three years, I excluded them from the collections analysis. I also removed yelloweye rockfish and the olive or yellowtail rockfish category.

I then took the ratios of a species within by CCFRP institution and scaled that to either a collection total for each region of 50 samples (otoliths) or 70% of the total. In an assessment model, we usually exclude any age data with fewer than 30 samples per year.

I realize that we need to scale back some of the collections by programs, e.g., BML, and also figure out if we should lingcod. The NWFSC is currently exploring a comparison of lingcod otoliths reads with spine. Collection of spine is a bit more difficult. There is also an interest in developing post-fillet back calculations for lingcod. What I'd like to hear from each partner, is the maximum number of otoliths you think you could possibly collect. We will also have staff available to process fish (as long as COVID trends the right direction).

For species that are less common, otoliths can still be used to look at growth curves, e.g. copper and quillback this cycle.

I will clean up the tables below and look at a few other metrics including available habitat in the reference sites for each university's site to make sure we're scaling samples approporiately.

This document lives on my Github page and will allow us to reproduce these values as a moving window going forward, and also adjust according to assessment prioritization. The Council will decide a preliminary assessments for the odd year in the prior even year, with final decisions coming in June. That should give us time to adjust these numbers for special collections.

We also have an interest in fin clips, especially for vermilion/sunsets and also blue/deacons.

Table 1: Total angler hours by institution summed across 2019, 2021, 2022.

YEAR	BML	Cal Poly	HSU	MLML	SIO	UCSB
2019	193	172	66	187	97	110
2021	110	112	65	161	39	151
2022	97	139	71	207	143	170

Table 2: Total effort in 2022

Monitoring.Group	Total_AnglerHours	Percent_Effort
BML	97	12%
Cal Poly	139	17%
HSU	71	9%
MLML	207	25%
SIO	143	17%
UCSB	170	21%

Table 3: Total effort in 2019

Monitoring.Group	Total_AnglerHours	Percent_Effort
BML	193	23%
Cal Poly	172	21%
HSU	66	8%
MLML	187	23%
SIO	97	12%
UCSB	110	13%

Table 4: Suggested otolith collections for 2023 CCFRP by species and CCFRP partner

Common.Name	BML	HSU	MLML	Cal Poly	UCSB	SIO	Total
Black Rockfish	10	11	30	0	0	0	51
Black-and-Yellow Rockfish	11	0	7	0	0	0	18
Blue Rockfish	10	3	23	15	50	0	101
Brown Rockfish	31	0	20	0	5	0	56
Calico Rockfish	0	0	0	4	0	16	20
Canary Rockfish	28	20	3	0	0	0	51
China Rockfish	19	9	23	0	0	0	51
Copper Rockfish	21	15	6	9	50	0	101
Deacon Rockfish	38	13	1	0	0	0	52
Gopher Rockfish	10	1	23	18	33	5	90
Kelp Rockfish	0	0	11	17	7	5	40
Olive Rockfish	7	3	21	21	4	5	61
Quillback Rockfish	4	13	0	0	0	0	17
Rosy Rockfish	13	17	14	7	8	5	64
Treefish	0	0	4	7	19	9	39
Vermilion Rockfish	11	9	14	18	18	14	84
Yellowtail Rockfish	20	14	12	6	0	0	52
Honeycomb Rockfish	0	0	0	0	0	45	45
Starry Rockfish	0	0	0	0	4	0	4

Table 5: Number of structures to collect by partner for 2023 CCFRP

Monitoring.Group	total_fish_for_otoliths
SIO	104
UCSB	198
BML	233
Cal Poly	122
HSU	128
MLML	212

Table 6: Longer table with raw data

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Black Rockfish	BML	2019	North	203	2.2099078
Black Rockfish	BML	2021	North	171	2.4034809
Black Rockfish	BML	2022	North	22	2.0995808
Black Rockfish	Cal Poly	2019	Central	4	1.3318535
Black Rockfish	Cal Poly	2021	Central	1	0.5000000
Black Rockfish	Cal Poly	2022	Central	4	0.4850820
Black Rockfish	HSU	2019	North	77	4.2079416
Black Rockfish	HSU	2021	North	202	6.4680716
Black Rockfish	HSU	2022	North	190	4.5540686
Black Rockfish	MLML	2019	Central	389	4.2255708
Black Rockfish	MLML	2021	Central	477	5.9384010
Black Rockfish	MLML	2022	Central	422	3.8762804
Black Rockfish	UCSB	2021	South	2	0.7692308
Black-and-Yellow Rockfish	BML	2019	North	5	1.6666667
Black-and-Yellow Rockfish	BML	2021	North	21	2.8042328
Black-and-Yellow Rockfish	BML	2022	North	19	1.6711243
Black-and-Yellow Rockfish	Cal Poly	2021	Central	1	0.6666667
Black-and-Yellow Rockfish	Cal Poly	2022	Central	1	0.5682715
Black-and-Yellow Rockfish	MLML	2019	Central	3	0.5980114
Black-and-Yellow Rockfish	MLML	2021	Central	21	2.8024699
Black-and-Yellow Rockfish	MLML	2022	Central	2	0.3329638
Black-and-Yellow Rockfish	UCSB	2019	South	2	0.3076923
Black-and-Yellow Rockfish	UCSB	2021	South	1	0.4615385
Blue Rockfish	BML	2019	North	476	4.1525805
Blue Rockfish	BML	2021	North	344	3.9604359
Blue Rockfish	BML	2022	North	144	3.5162611
Blue Rockfish	Cal Poly	2019	Central	977	8.2070904
Blue Rockfish	Cal Poly	2021	Central	396	6.3859919
Blue Rockfish	Cal Poly	2022	Central	97	1.8102338
Blue Rockfish	HSU	2019	North	54	2.5111033
Blue Rockfish	HSU	2021	North	114	6.3118302
Blue Rockfish	HSU	2022	North	114	4.4491360
Blue Rockfish	MLML	2019	Central	1429	7.9574113
Blue Rockfish	MLML	2021	Central	473	3.3025650
Blue Rockfish	MLML	2022	Central	368	2.3472667
Blue Rockfish	UCSB	2019	South	221	3.4026773
Blue Rockfish	UCSB	2021	South	222	2.8199352
Blue Rockfish	UCSB	2022	South	187	1.7926313
Bocaccio	MLML	2022	Central	2	0.3493891
Brown Rockfish	BML	2019	North	61	1.8121751
Brown Rockfish	BML	2021	North	56	1.4569106
Brown Rockfish	BML	2022	North	56	1.4372981
Brown Rockfish	Cal Poly	2019	Central	2	0.6645613
Brown Rockfish	HSU	2019	North	2	2.0000000
Brown Rockfish	HSU	2022	North	1	0.7500000
Brown Rockfish	MLML	2019	Central	19	1.0373537

Table 6: Longer table with raw data *(continued)*

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Brown Rockfish	MLML	2021	Central	29	1.0903884
Brown Rockfish	MLML	2022	Central	64	1.4731689
Brown Rockfish	SIO	2019	South	1	0.3076923
Brown Rockfish	SIO	2021	South	3	0.6349206
Brown Rockfish	SIO	2022	South	6	0.4095238
Brown Rockfish	UCSB	2019	South	13	1.4358974
Brown Rockfish	UCSB	2021	South	1	0.4395604
Brown Rockfish	UCSB	2022	South	6	0.7012987
Calico Rockfish	Cal Poly	2019	Central	1	0.3322259
Calico Rockfish	Cal Poly	2021	Central	7	0.6702619
Calico Rockfish	Cal Poly	2022	Central	6	0.6760562
Calico Rockfish	SIO	2019	South	26	1.0522509
Calico Rockfish	SIO	2021	South	12	0.8075758
Calico Rockfish	SIO	2022	South	27	0.5230159
Canary Rockfish	BML	2019	North	57	1.5591921
Canary Rockfish	BML	2021	North	109	4.3635913
Canary Rockfish	BML	2022	North	64	1.7360041
Canary Rockfish	HSU	2019	North	62	2.4968405
Canary Rockfish	HSU	2021	North	57	2.3458428
Canary Rockfish	HSU	2022	North	48	1.7236162
Canary Rockfish	MLML	2019	Central	7	0.4694076
Canary Rockfish	MLML	2021	Central	6	1.1709987
Canary Rockfish	MLML	2022	Central	11	0.7282766
China Rockfish	BML	2019	North	68	0.7586641
China Rockfish	BML	2021	North	60	1.2575488
China Rockfish	BML	2022	North	21	0.7328182
China Rockfish	Cal Poly	2019	Central	3	0.5337796
China Rockfish	Cal Poly	2021	Central	2	0.5833333
China Rockfish	HSU	2019	North	19	1.6524887
China Rockfish	HSU	2021	North	27	1.5590772
China Rockfish	HSU	2022	North	23	1.1298447
China Rockfish	MLML	2019	Central	29	0.5334113
China Rockfish	MLML	2021	Central	60	0.9763152
China Rockfish	MLML	2022	Central	88	0.7484140
Copper Rockfish	BML	2019	North	57	1.0481411
Copper Rockfish	BML	2021	North	33	1.0886311
Copper Rockfish	BML	2022	North	22	0.7116277
Copper Rockfish	Cal Poly	2019	Central	21	0.5926657
Copper Rockfish	Cal Poly	2021	Central	9	0.6336273
Copper Rockfish	Cal Poly	2022	Central	17	0.6799862
Copper Rockfish	HSU	2019	North	27	1.2968674
Copper Rockfish	HSU	2021	North	27	1.3684186
Copper Rockfish	HSU	2022	North	26	1.6042550
Copper Rockfish	MLML	2019	Central	6	0.7037621
Copper Rockfish	MLML	2021	Central	12	0.5870757
Copper Rockfish	MLML	2022	Central	11	0.6026152
Copper Rockfish	SIO	2019	South	1	0.3076923

Table 6: Longer table with raw data *(continued)*

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Copper Rockfish	SIO	2021	South	4	0.6250000
Copper Rockfish	SIO	2022	South	2	0.2857143
Copper Rockfish	UCSB	2019	South	158	1.6735266
Copper Rockfish	UCSB	2021	South	123	1.1605222
Copper Rockfish	UCSB	2022	South	113	1.1199450
Deacon Rockfish	BML	2019	North	456	5.0817916
Deacon Rockfish	BML	2021	North	240	3.7611986
Deacon Rockfish	BML	2022	North	290	6.2546744
Deacon Rockfish	HSU	2019	North	98	4.8093776
Deacon Rockfish	HSU	2021	North	145	6.4332095
Deacon Rockfish	HSU	2022	North	87	3.0874199
Deacon Rockfish	MLML	2019	Central	7	0.6737005
Deacon Rockfish	MLML	2021	Central	7	0.7777778
Deacon Rockfish	MLML	2022	Central	1	0.3329634
Gopher Rockfish	BML	2019	North	145	1.2936013
Gopher Rockfish	BML	2021	North	270	3.0292968
Gopher Rockfish	BML	2022	North	157	1.9635003
Gopher Rockfish	Cal Poly	2019	Central	401	2.6063087
Gopher Rockfish	Cal Poly	2021	Central	281	2.9146655
Gopher Rockfish	Cal Poly	2022	Central	417	3.4523480
Gopher Rockfish	HSU	2019	North	3	1.5000000
Gopher Rockfish	HSU	2021	North	18	1.9161123
Gopher Rockfish	HSU	2022	North	14	1.3982814
Gopher Rockfish	MLML	2019	Central	344	2.3199944
Gopher Rockfish	MLML	2021	Central	409	2.6515707
Gopher Rockfish	MLML	2022	Central	653	3.4048567
Gopher Rockfish	SIO	2019	South	8	0.3122450
Gopher Rockfish	SIO	2021	South	3	0.6666667
Gopher Rockfish	SIO	2022	South	10	0.3617352
Gopher Rockfish	UCSB	2019	South	20	0.5895150
Gopher Rockfish	UCSB	2021	South	71	1.0958144
Gopher Rockfish	UCSB	2022	South	48	0.6268975
Grass Rockfish	MLML	2021	Central	1	0.7194245
Grass Rockfish	SIO	2019	South	2	0.2666667
Honeycomb Rockfish	SIO	2019	South	26	0.8078218
Honeycomb Rockfish	SIO	2021	South	36	1.8248931
Honeycomb Rockfish	SIO	2022	South	128	1.6984848
Honeycomb Rockfish	UCSB	2021	South	4	0.3959790
Kelp Rockfish	Cal Poly	2019	Central	31	1.1891377
Kelp Rockfish	Cal Poly	2021	Central	18	1.1932611
Kelp Rockfish	Cal Poly	2022	Central	20	0.7110723
Kelp Rockfish	MLML	2019	Central	6	0.5102564
Kelp Rockfish	MLML	2021	Central	22	1.2105749
Kelp Rockfish	MLML	2022	Central	16	0.9672937
Kelp Rockfish	SIO	2019	South	9	0.4444292
Kelp Rockfish	SIO	2021	South	5	0.6333333
Kelp Rockfish	SIO	2022	South	5	0.3061595

Table 6: Longer table with raw data *(continued)*

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Kelp Rockfish	UCSB	2019	South	17	0.5615385
Kelp Rockfish	UCSB	2021	South	8	0.7229124
Kelp Rockfish	UCSB	2022	South	2	0.4496753
Olive Rockfish	BML	2019	North	48	0.8515778
Olive Rockfish	BML	2021	North	12	0.5858886
Olive Rockfish	BML	2022	North	15	1.1778776
Olive Rockfish	Cal Poly	2019	Central	183	1.8592599
Olive Rockfish	Cal Poly	2021	Central	27	0.8789997
Olive Rockfish	Cal Poly	2022	Central	38	0.7772227
Olive Rockfish	HSU	2019	North	7	1.4307692
Olive Rockfish	HSU	2021	North	14	2.1862810
Olive Rockfish	HSU	2022	North	6	1.4576863
Olive Rockfish	MLML	2019	Central	127	1.1693979
Olive Rockfish	MLML	2021	Central	69	1.1431009
Olive Rockfish	MLML	2022	Central	54	0.8360266
Olive Rockfish	SIO	2019	South	7	0.3276709
Olive Rockfish	SIO	2021	South	5	0.9801865
Olive Rockfish	SIO	2022	South	7	0.3269841
Olive Rockfish	UCSB	2019	South	6	0.3348873
Olive Rockfish	UCSB	2021	South	4	0.3790099
Olive Rockfish	UCSB	2022	South	7	0.4618881
Quillback Rockfish	BML	2019	North	1	0.3333333
Quillback Rockfish	BML	2021	North	5	0.7678571
Quillback Rockfish	BML	2022	North	9	0.5238405
Quillback Rockfish	HSU	2019	North	22	1.3763665
Quillback Rockfish	HSU	2021	North	15	1.3979819
Quillback Rockfish	HSU	2022	North	17	1.3441257
Rosy Rockfish	BML	2019	North	10	0.9668016
Rosy Rockfish	BML	2021	North	11	1.0178571
Rosy Rockfish	BML	2022	North	37	1.0565278
Rosy Rockfish	Cal Poly	2019	Central	7	0.4839990
Rosy Rockfish	Cal Poly	2021	Central	11	0.5972627
Rosy Rockfish	Cal Poly	2022	Central	12	2.0253085
Rosy Rockfish	HSU	2019	North	20	2.0122027
Rosy Rockfish	HSU	2021	North	41	3.0224613
Rosy Rockfish	HSU	2022	North	15	1.7140201
Rosy Rockfish	MLML	2019	Central	21	0.5691056
Rosy Rockfish	MLML	2021	Central	13	0.5916178
Rosy Rockfish	MLML	2022	Central	29	0.8552011
Rosy Rockfish	SIO	2019	South	1	0.3750000
Rosy Rockfish	SIO	2022	South	12	0.4886621
Rosy Rockfish	UCSB	2019	South	3	0.5009713
Rosy Rockfish	UCSB	2021	South	10	0.4068749
Rosy Rockfish	UCSB	2022	South	21	0.9264023
Squarespot Rockfish	UCSB	2019	South	1	0.3409091
Squarespot Rockfish	UCSB	2021	South	1	0.2307692

Table 6: Longer table with raw data *(continued)*

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Starry Rockfish	Cal Poly	2021	Central	2	0.5000000
Starry Rockfish	Cal Poly	2022	Central	2	0.5278475
Starry Rockfish	HSU	2021	North	3	1.8690476
Starry Rockfish	MLML	2019	Central	3	0.3574487
Starry Rockfish	MLML	2022	Central	1	0.4434590
Starry Rockfish	SIO	2019	South	3	0.4038462
Starry Rockfish	SIO	2021	South	1	0.6666667
Starry Rockfish	SIO	2022	South	6	0.4059524
Starry Rockfish	UCSB	2019	South	3	0.7159091
Starry Rockfish	UCSB	2021	South	5	0.4061772
Starry Rockfish	UCSB	2022	South	9	0.8709291
Treefish	Cal Poly	2019	Central	6	0.4807315
Treefish	Cal Poly	2021	Central	13	0.8749253
Treefish	Cal Poly	2022	Central	9	0.6128040
Treefish	MLML	2019	Central	4	0.4119875
Treefish	MLML	2021	Central	1	0.4444444
Treefish	MLML	2022	Central	9	0.4898393
Treefish	SIO	2019	South	15	0.4560431
Treefish	SIO	2021	South	3	0.6919192
Treefish	SIO	2022	South	19	0.4632035
Treefish	UCSB	2019	South	19	0.7521898
Treefish	UCSB	2021	South	24	0.4866991
Treefish	UCSB	2022	South	37	0.5817959
Unknown rockfish	BML	2021	North	1	0.6666667
Vermilion Rockfish	BML	2019	North	28	1.1399823
Vermilion Rockfish	BML	2021	North	17	0.9212291
Vermilion Rockfish	BML	2022	North	19	0.7731985
Vermilion Rockfish	Cal Poly	2019	Central	50	0.7269269
Vermilion Rockfish	Cal Poly	2021	Central	27	0.9468120
Vermilion Rockfish	Cal Poly	2022	Central	32	0.6764804
Vermilion Rockfish	HSU	2019	North	15	1.3187554
Vermilion Rockfish	HSU	2021	North	22	1.2659485
Vermilion Rockfish	HSU	2022	North	13	1.0557610
Vermilion Rockfish	MLML	2019	Central	29	0.5419987
Vermilion Rockfish	MLML	2021	Central	18	0.6092897
Vermilion Rockfish	MLML	2022	Central	38	0.7058854
Vermilion Rockfish	SIO	2019	South	11	0.4227564
Vermilion Rockfish	SIO	2021	South	11	1.0384615
Vermilion Rockfish	SIO	2022	South	36	0.5225564
Vermilion Rockfish	UCSB	2019	South	12	0.7957875
Vermilion Rockfish	UCSB	2021	South	25	0.6141829
Vermilion Rockfish	UCSB	2022	South	37	0.5603321
Widow Rockfish	BML	2019	North	3	0.3504274
Yellowtail Rockfish	BML	2019	North	69	1.2739839
Yellowtail Rockfish	BML	2021	North	105	1.9997415
Yellowtail Rockfish	BML	2022	North	32	1.4289565
Yellowtail Rockfish	Cal Poly	2019	Central	21	0.8394260

Table 6: Longer table with raw data *(continued)*

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Yellowtail Rockfish	Cal Poly	2021	Central	25	1.0818662
Yellowtail Rockfish	Cal Poly	2022	Central	15	0.8112033
Yellowtail Rockfish	HSU	2019	North	20	1.5619528
Yellowtail Rockfish	HSU	2021	North	99	3.3817745
Yellowtail Rockfish	HSU	2022	North	27	1.6031691
Yellowtail Rockfish	MLML	2019	Central	21	1.1338576
Yellowtail Rockfish	MLML	2021	Central	60	1.7293645
Yellowtail Rockfish	MLML	2022	Central	46	1.0150536
Yellowtail Rockfish	UCSB	2022	South	1	0.3333333

1.1 Methods

1.1.1 Query the completed CCFRP database for area, month, day, year, trip, cell, site (from the drift table not the trip table), species, length, tag, and retained. Filter for desired areas (and species optional) based on institution of interest. Copy and paste data to an excel spreadsheet. Create a length column in mm units by multiplying the cm length column by 10. Create R friendly column names (area, month, day, year, vessel, trip, cell, site, species, length_mm, length_cm, tag, retained). Save as CSV.

1.1.2 In R, read in CSV. Identify species with large sample sizes or species of interest using the table function. Create an institution and species specific dataframe by filtering for REF site, species (depending on if you already filtered for institution or species in the access query). Change year and retained variables to characters. Create a summary table of length means by retained status and year. Create density plots for each species and year that displays the distribution of lengths of retained fish and non-retained fish. Include mean line for each group on density plot. Create a summary table that displays the number of retained and non-retained fish for each year.

1.1.3 Length measurement techniques: Cal Poly Humboldt: "Pinch" tail for Canary, Blue, Deacon RF., measure natrual splay for other species. Cal Poly Slo, Fork Length. BML, Fork Length. MLML, Natural Splay Total Length. SIO, Natural Splay Total Length. UCSB, Natural Splay Total Length.
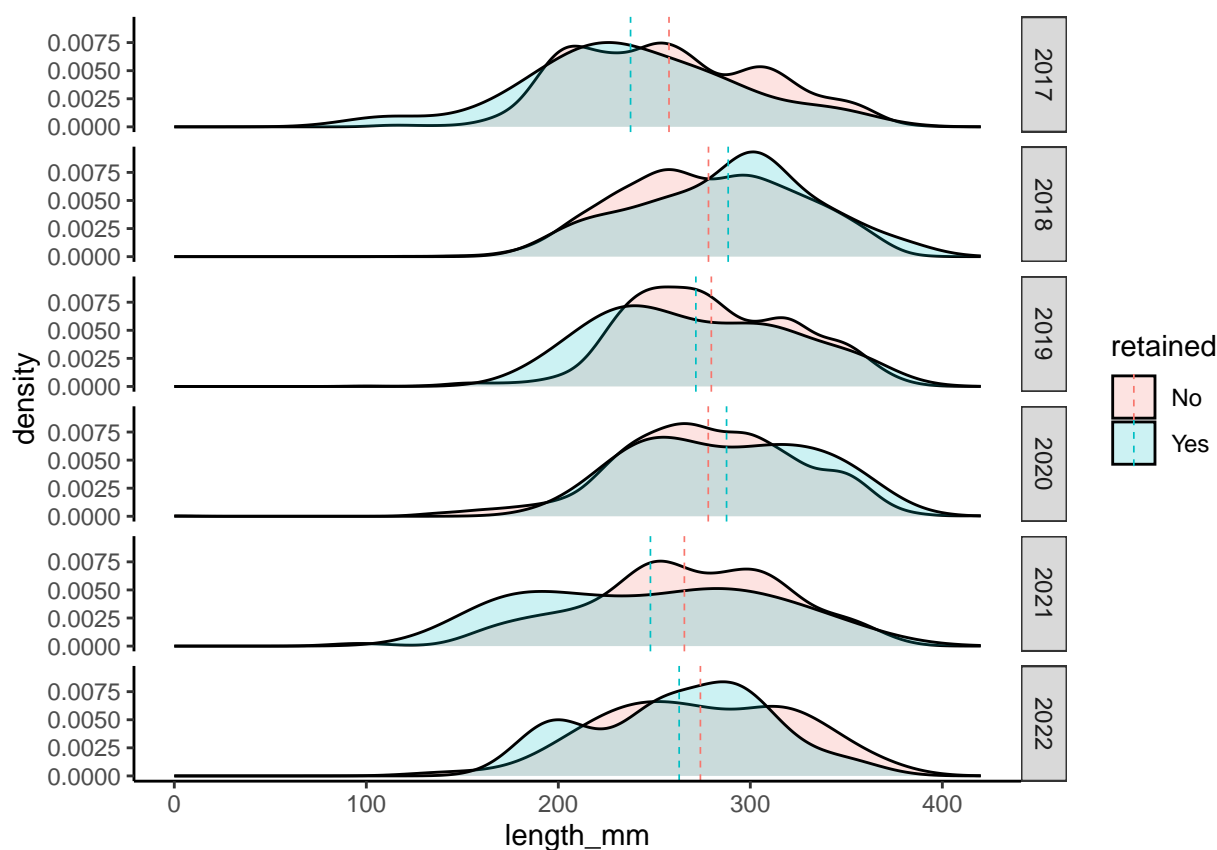
1.2 Cal Poly Blue Rockfish

Table 7: Poly blue

year	No	Yes
2017	2470	21
2018	1881	26
2019	934	43
2020	1014	21
2021	342	54
2022	80	17