

2022 Proposed CCFRP Otolith Collections

Melissa H. Monk

March 24, 2023

1 First Pass at Determining 2022 Otolith Collections

The following use only data from 2018, 2019 and 2020 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 appropriately.

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 2018, 2019, 2021.

YEAR	BML	Cal Poly	HSU	MLML	SIO	UCSB
2018	173	188	71	175	102	123
2019	199	172	66	187	123	118
2021	106	112	66	160	47	141

Table 2: Total effort in 2021

Monitoring.Group	Total_AnglerHours	Percent_Effort
BML	106	17%
Cal Poly	112	18%
HSU	66	10%
MLML	160	25%
SIO	47	7%
UCSB	141	22%

Table 3: Total effort in 2018

Monitoring.Group	Total_AnglerHours	Percent_Effort
BML	173	21%
Cal Poly	188	23%
HSU	71	9%
MLML	175	21%
SIO	102	12%
UCSB	123	15%

Table 4: Suggested otolith collections for 2022 CCFRP by species and CCFRP partner

Common.Name	BML	Cal Poly	HSU	MLML	UCSB	SIO	Total
Black Rockfish	13	1	9	29	0	0	52
Black-and-Yellow Rockfish	7	4	0	7	0	0	18
Blue Rockfish	7	20	2	23	50	0	102
Brown Rockfish	33	0	0	14	4	0	51
Canary Rockfish	26	0	23	2	0	0	51
China Rockfish	25	0	10	17	0	0	52
Copper Rockfish	19	10	18	5	50	0	102
Deacon Rockfish	38	0	10	3	0	0	51
Gopher Rockfish	11	20	1	21	34	4	91
Kelp Greenling	20	0	5	5	0	0	30
Kelp Rockfish	0	18	0	9	9	14	50
Lingcod	16	8	15	13	15	0	67
Olive Rockfish	6	22	3	21	4	4	60
Quillback Rockfish	0	0	16	0	0	0	16
Rosy Rockfish	7	6	18	14	0	0	45
Treefish	0	6	0	0	15	6	27
Vermilion Rockfish	9	21	11	10	13	6	70
Yellowtail Rockfish	23	6	15	8	0	0	52
Calico Rockfish	0	0	0	0	0	11	11
California Scorpionfish	0	0	0	0	15	12	27
Honeycomb Rockfish	0	0	0	0	0	19	19

Table 5: Number of structures to collect by partner for 2022 CCFRP

Monitoring.Group	total_fish_for_otoliths
SIO	76
UCSB	209
BML	260
Cal Poly	142
HSU	156
MLML	201

Table 6: Longer table with raw data

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Black Rockfish	BML	2018	North	148	2.0770076
Black Rockfish	BML	2019	North	203	2.2099078
Black Rockfish	BML	2021	North	170	2.4460867
Black Rockfish	Cal Poly	2018	Central	14	0.7642880
Black Rockfish	Cal Poly	2019	Central	4	1.3318535
Black Rockfish	Cal Poly	2021	Central	1	0.5000000
Black Rockfish	HSU	2018	North	97	3.2784358
Black Rockfish	HSU	2019	North	77	4.2079416
Black Rockfish	HSU	2021	North	202	6.4680716
Black Rockfish	MLML	2018	Central	313	3.3402957
Black Rockfish	MLML	2019	Central	389	4.2255708
Black Rockfish	MLML	2021	Central	473	5.9587075
Black Rockfish	UCSB	2021	South	2	0.7692308
Black-and-Yellow Rockfish	BML	2018	North	4	0.6944444
Black-and-Yellow Rockfish	BML	2019	North	5	1.6666667
Black-and-Yellow Rockfish	BML	2021	North	21	2.8042328
Black-and-Yellow Rockfish	Cal Poly	2018	Central	10	0.6152691
Black-and-Yellow Rockfish	Cal Poly	2021	Central	1	0.6666667
Black-and-Yellow Rockfish	MLML	2018	Central	2	0.3693182
Black-and-Yellow Rockfish	MLML	2019	Central	3	0.5980114
Black-and-Yellow Rockfish	MLML	2021	Central	21	2.8024699
Black-and-Yellow Rockfish	UCSB	2019	South	2	0.3076923
Black-and-Yellow Rockfish	UCSB	2021	South	1	0.4615385
Blue Rockfish	BML	2018	North	281	2.9794702
Blue Rockfish	BML	2019	North	476	4.1525805
Blue Rockfish	BML	2021	North	341	4.0044781
Blue Rockfish	Cal Poly	2018	Central	1851	11.0306106
Blue Rockfish	Cal Poly	2019	Central	977	8.2070904
Blue Rockfish	Cal Poly	2021	Central	396	6.3859919
Blue Rockfish	HSU	2018	North	78	3.8646997
Blue Rockfish	HSU	2019	North	54	2.5111033
Blue Rockfish	HSU	2021	North	114	6.3118302
Blue Rockfish	MLML	2018	Central	1867	9.9363054
Blue Rockfish	MLML	2019	Central	1429	7.9574113
Blue Rockfish	MLML	2021	Central	472	3.3281428
Blue Rockfish	SIO	2018	South	1	0.5000000
Blue Rockfish	UCSB	2018	South	155	2.9836810
Blue Rockfish	UCSB	2019	South	220	3.5557657
Blue Rockfish	UCSB	2021	South	209	3.3962366
Brown Rockfish	BML	2018	North	22	0.9089595
Brown Rockfish	BML	2019	North	61	1.8121751
Brown Rockfish	BML	2021	North	55	1.5002541
Brown Rockfish	Cal Poly	2019	Central	2	0.6645613
Brown Rockfish	HSU	2018	North	1	0.9375000
Brown Rockfish	HSU	2019	North	2	2.0000000
Brown Rockfish	MLML	2018	Central	10	1.1076328

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

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Brown Rockfish	MLML	2019	Central	19	1.0373537
Brown Rockfish	MLML	2021	Central	28	1.0816146
Brown Rockfish	SIO	2018	South	2	0.5562771
Brown Rockfish	SIO	2019	South	2	0.4663462
Brown Rockfish	SIO	2021	South	3	0.6349206
Brown Rockfish	UCSB	2018	South	2	0.4393939
Brown Rockfish	UCSB	2019	South	13	1.4358974
Brown Rockfish	UCSB	2021	South	1	0.4395604
Calico Rockfish	Cal Poly	2018	Central	3	0.3283875
Calico Rockfish	Cal Poly	2019	Central	1	0.3322259
Calico Rockfish	Cal Poly	2021	Central	7	0.6702619
Calico Rockfish	MLML	2018	Central	1	0.4000000
Calico Rockfish	SIO	2018	South	6	1.0000000
Calico Rockfish	SIO	2019	South	26	1.0522509
Calico Rockfish	SIO	2021	South	11	0.7962963
California Scorpionfish	SIO	2018	South	20	0.5526268
California Scorpionfish	SIO	2019	South	20	0.3966239
California Scorpionfish	SIO	2021	South	11	0.6183261
California Scorpionfish	UCSB	2018	South	12	0.7295500
California Scorpionfish	UCSB	2019	South	26	0.7021287
California Scorpionfish	UCSB	2021	South	25	0.6137043
Canary Rockfish	BML	2018	North	38	1.2890478
Canary Rockfish	BML	2019	North	57	1.5591921
Canary Rockfish	BML	2021	North	109	4.3635913
Canary Rockfish	Cal Poly	2018	Central	2	0.6550218
Canary Rockfish	HSU	2018	North	63	2.3221564
Canary Rockfish	HSU	2019	North	62	2.4968405
Canary Rockfish	HSU	2021	North	57	2.3458428
Canary Rockfish	MLML	2018	Central	3	0.6416667
Canary Rockfish	MLML	2019	Central	7	0.4694076
Canary Rockfish	MLML	2021	Central	6	1.1709987
China Rockfish	BML	2018	North	52	0.8230778
China Rockfish	BML	2019	North	68	0.7586641
China Rockfish	BML	2021	North	57	1.2916764
China Rockfish	Cal Poly	2019	Central	3	0.5337796
China Rockfish	Cal Poly	2021	Central	2	0.5833333
China Rockfish	HSU	2018	North	24	1.2553403
China Rockfish	HSU	2019	North	19	1.6524887
China Rockfish	HSU	2021	North	27	1.5590772
China Rockfish	MLML	2018	Central	28	0.9687159
China Rockfish	MLML	2019	Central	29	0.5334113
China Rockfish	MLML	2021	Central	60	0.9763152
Copper Rockfish	BML	2018	North	15	0.5830415
Copper Rockfish	BML	2019	North	57	1.0481411
Copper Rockfish	BML	2021	North	34	1.3822119
Copper Rockfish	Cal Poly	2018	Central	24	0.5100355
Copper Rockfish	Cal Poly	2019	Central	21	0.5926657

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

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Copper Rockfish	Cal Poly	2021	Central	9	0.6336273
Copper Rockfish	HSU	2018	North	43	1.6672133
Copper Rockfish	HSU	2019	North	27	1.2968674
Copper Rockfish	HSU	2021	North	27	1.3684186
Copper Rockfish	MLML	2018	Central	9	0.4911290
Copper Rockfish	MLML	2019	Central	6	0.7037621
Copper Rockfish	MLML	2021	Central	12	0.5870757
Copper Rockfish	SIO	2018	South	1	0.2714932
Copper Rockfish	SIO	2019	South	1	0.3076923
Copper Rockfish	SIO	2021	South	4	0.6250000
Copper Rockfish	UCSB	2018	South	199	2.1715171
Copper Rockfish	UCSB	2019	South	155	1.6945201
Copper Rockfish	UCSB	2021	South	109	1.2635476
Deacon Rockfish	BML	2018	North	395	4.4859052
Deacon Rockfish	BML	2019	North	456	5.0817916
Deacon Rockfish	BML	2021	North	232	3.7398768
Deacon Rockfish	Cal Poly	2018	Central	2	0.4310573
Deacon Rockfish	HSU	2018	North	38	2.5164192
Deacon Rockfish	HSU	2019	North	98	4.8093776
Deacon Rockfish	HSU	2021	North	145	6.4332095
Deacon Rockfish	MLML	2018	Central	52	1.5571104
Deacon Rockfish	MLML	2019	Central	7	0.6737005
Deacon Rockfish	MLML	2021	Central	7	0.7777778
Freckled Rockfish	SIO	2018	South	1	0.5000000
Gopher Rockfish	BML	2018	North	94	0.9661742
Gopher Rockfish	BML	2019	North	145	1.2936013
Gopher Rockfish	BML	2021	North	266	3.0428165
Gopher Rockfish	Cal Poly	2018	Central	290	1.8522091
Gopher Rockfish	Cal Poly	2019	Central	401	2.6063087
Gopher Rockfish	Cal Poly	2021	Central	281	2.9146655
Gopher Rockfish	HSU	2018	North	4	0.8536184
Gopher Rockfish	HSU	2019	North	3	1.5000000
Gopher Rockfish	HSU	2021	North	18	1.9161123
Gopher Rockfish	MLML	2018	Central	258	2.3885479
Gopher Rockfish	MLML	2019	Central	344	2.3199944
Gopher Rockfish	MLML	2021	Central	409	2.6515707
Gopher Rockfish	SIO	2018	South	4	0.3385854
Gopher Rockfish	SIO	2019	South	8	0.3122450
Gopher Rockfish	SIO	2021	South	3	0.6666667
Gopher Rockfish	UCSB	2018	South	55	1.0043651
Gopher Rockfish	UCSB	2019	South	20	0.5895150
Gopher Rockfish	UCSB	2021	South	69	1.1602289
Grass Rockfish	MLML	2021	Central	1	0.7194245
Grass Rockfish	SIO	2018	South	1	0.4615385
Grass Rockfish	SIO	2019	South	2	0.2666667
Honeycomb Rockfish	SIO	2018	South	25	1.1412565
Honeycomb Rockfish	SIO	2019	South	26	0.8078218

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

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Honeycomb Rockfish	SIO	2021	South	27	1.6380952
Honeycomb Rockfish	UCSB	2021	South	2	0.5227273
Kelp Greenling	BML	2018	North	53	0.9009015
Kelp Greenling	BML	2019	North	21	0.4933369
Kelp Greenling	BML	2021	North	10	0.9884354
Kelp Greenling	Cal Poly	2018	Central	1	0.7500000
Kelp Greenling	HSU	2018	North	8	1.0419753
Kelp Greenling	HSU	2019	North	4	1.1845238
Kelp Greenling	HSU	2021	North	7	0.9252780
Kelp Greenling	MLML	2018	Central	8	0.5342887
Kelp Greenling	MLML	2019	Central	4	0.3783166
Kelp Greenling	MLML	2021	Central	9	0.6189325
Kelp Rockfish	Cal Poly	2018	Central	26	0.6281969
Kelp Rockfish	Cal Poly	2019	Central	31	1.1891377
Kelp Rockfish	Cal Poly	2021	Central	18	1.1932611
Kelp Rockfish	MLML	2018	Central	9	0.4917728
Kelp Rockfish	MLML	2019	Central	6	0.5102564
Kelp Rockfish	MLML	2021	Central	22	1.2105749
Kelp Rockfish	SIO	2018	South	45	0.9721512
Kelp Rockfish	SIO	2019	South	9	0.4444292
Kelp Rockfish	SIO	2021	South	5	0.6333333
Kelp Rockfish	UCSB	2018	South	11	0.7590548
Kelp Rockfish	UCSB	2019	South	17	0.5615385
Kelp Rockfish	UCSB	2021	South	8	0.7229124
Lingcod	BML	2018	North	59	0.6882269
Lingcod	BML	2019	North	32	0.6054723
Lingcod	BML	2021	North	23	0.9079521
Lingcod	Cal Poly	2018	Central	23	0.5647113
Lingcod	Cal Poly	2019	Central	17	0.5948597
Lingcod	Cal Poly	2021	Central	11	0.6201106
Lingcod	HSU	2018	North	52	1.5401781
Lingcod	HSU	2019	North	31	1.1458736
Lingcod	HSU	2021	North	23	1.5179207
Lingcod	MLML	2018	Central	35	0.5727916
Lingcod	MLML	2019	Central	35	0.6250646
Lingcod	MLML	2021	Central	21	0.6800350
Lingcod	SIO	2019	South	1	0.3750000
Lingcod	UCSB	2018	South	28	0.8790316
Lingcod	UCSB	2019	South	18	0.5330049
Lingcod	UCSB	2021	South	17	0.7173067
Olive Rockfish	BML	2018	North	37	1.2394818
Olive Rockfish	BML	2019	North	48	0.8515778
Olive Rockfish	BML	2021	North	12	0.5858886
Olive Rockfish	Cal Poly	2018	Central	152	1.2098256
Olive Rockfish	Cal Poly	2019	Central	183	1.8592599
Olive Rockfish	Cal Poly	2021	Central	27	0.8789997

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

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Olive Rockfish	HSU	2018	North	14	1.2547269
Olive Rockfish	HSU	2019	North	7	1.4307692
Olive Rockfish	HSU	2021	North	14	2.1862810
Olive Rockfish	MLML	2018	Central	151	1.3792370
Olive Rockfish	MLML	2019	Central	127	1.1693979
Olive Rockfish	MLML	2021	Central	69	1.1431009
Olive Rockfish	SIO	2019	South	7	0.3276709
Olive Rockfish	SIO	2021	South	2	0.6666667
Olive Rockfish	UCSB	2019	South	6	0.3348873
Olive Rockfish	UCSB	2021	South	4	0.3790099
Quillback Rockfish	BML	2018	North	2	0.5266458
Quillback Rockfish	BML	2019	North	1	0.3333333
Quillback Rockfish	BML	2021	North	5	0.7678571
Quillback Rockfish	HSU	2018	North	29	1.3084904
Quillback Rockfish	HSU	2019	North	22	1.3763665
Quillback Rockfish	HSU	2021	North	15	1.3979819
Rosy Rockfish	BML	2018	North	9	0.8671523
Rosy Rockfish	BML	2019	North	10	0.9668016
Rosy Rockfish	BML	2021	North	11	1.0178571
Rosy Rockfish	Cal Poly	2018	Central	6	0.3469746
Rosy Rockfish	Cal Poly	2019	Central	7	0.4839990
Rosy Rockfish	Cal Poly	2021	Central	11	0.5972627
Rosy Rockfish	HSU	2018	North	15	1.5226729
Rosy Rockfish	HSU	2019	North	20	2.0122027
Rosy Rockfish	HSU	2021	North	41	3.0224613
Rosy Rockfish	MLML	2018	Central	26	0.8209869
Rosy Rockfish	MLML	2019	Central	21	0.5691056
Rosy Rockfish	MLML	2021	Central	13	0.5916178
Rosy Rockfish	SIO	2018	South	1	0.3061224
Rosy Rockfish	SIO	2019	South	1	0.3750000
Rosy Rockfish	UCSB	2019	South	3	0.5009713
Rosy Rockfish	UCSB	2021	South	5	0.3972718
Starry Rockfish	Cal Poly	2021	Central	2	0.5000000
Starry Rockfish	HSU	2021	North	3	1.8690476
Starry Rockfish	MLML	2018	Central	1	0.3991131
Starry Rockfish	MLML	2019	Central	3	0.3574487
Starry Rockfish	SIO	2018	South	1	0.3333333
Starry Rockfish	SIO	2019	South	3	0.4038462
Starry Rockfish	SIO	2021	South	1	0.6666667
Starry Rockfish	UCSB	2018	South	3	0.5238095
Starry Rockfish	UCSB	2019	South	1	0.7500000
Starry Rockfish	UCSB	2021	South	2	0.3636364
Treefish	Cal Poly	2018	Central	6	0.3660209
Treefish	Cal Poly	2019	Central	6	0.4807315
Treefish	Cal Poly	2021	Central	13	0.8749253
Treefish	MLML	2019	Central	4	0.4119875
Treefish	MLML	2021	Central	1	0.4444444

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

Common.Name	Monitoring.Group	YEAR	Region	total_fish	avg_annual_cpue
Treefish	SIO	2018	South	7	0.5610578
Treefish	SIO	2019	South	15	0.4560431
Treefish	SIO	2021	South	2	0.5833333
Treefish	UCSB	2018	South	28	0.7404476
Treefish	UCSB	2019	South	19	0.7758641
Treefish	UCSB	2021	South	17	0.4826324
Unknown rockfish	BML	2021	North	1	0.6666667
Vermilion Rockfish	BML	2018	North	6	0.4037594
Vermilion Rockfish	BML	2019	North	28	1.1399823
Vermilion Rockfish	BML	2021	North	17	0.9212291
Vermilion Rockfish	Cal Poly	2018	Central	49	0.5634514
Vermilion Rockfish	Cal Poly	2019	Central	50	0.7269269
Vermilion Rockfish	Cal Poly	2021	Central	27	0.9468120
Vermilion Rockfish	HSU	2018	North	26	1.5743669
Vermilion Rockfish	HSU	2019	North	15	1.3187554
Vermilion Rockfish	HSU	2021	North	22	1.2659485
Vermilion Rockfish	MLML	2018	Central	13	0.6423874
Vermilion Rockfish	MLML	2019	Central	29	0.5419987
Vermilion Rockfish	MLML	2021	Central	18	0.6092897
Vermilion Rockfish	SIO	2018	South	4	0.4523810
Vermilion Rockfish	SIO	2019	South	11	0.4227564
Vermilion Rockfish	SIO	2021	South	10	1.0833333
Vermilion Rockfish	UCSB	2018	South	24	0.7022302
Vermilion Rockfish	UCSB	2019	South	12	0.7957875
Vermilion Rockfish	UCSB	2021	South	19	0.6637640
Widow Rockfish	BML	2018	North	5	1.0151515
Widow Rockfish	BML	2019	North	3	0.3504274
Widow Rockfish	HSU	2018	North	1	1.0714286
Yellowtail Rockfish	BML	2018	North	122	2.1326732
Yellowtail Rockfish	BML	2019	North	69	1.2739839
Yellowtail Rockfish	BML	2021	North	104	2.0458162
Yellowtail Rockfish	Cal Poly	2018	Central	22	0.6041016
Yellowtail Rockfish	Cal Poly	2019	Central	21	0.8394260
Yellowtail Rockfish	Cal Poly	2021	Central	25	1.0818662
Yellowtail Rockfish	HSU	2018	North	75	3.7608848
Yellowtail Rockfish	HSU	2019	North	20	1.5619528
Yellowtail Rockfish	HSU	2021	North	99	3.3817745
Yellowtail Rockfish	MLML	2018	Central	23	0.8240977
Yellowtail Rockfish	MLML	2019	Central	21	1.1338576
Yellowtail Rockfish	MLML	2021	Central	60	1.7293645