NATIONAL MARINE FISHERIES SERVICE (NMFS) REPORT ON DEEP-SET BUOY GEAR (DSBG) AUTHORIZATION

Updates on NEPA Analysis

NMFS staff are preparing a draft Environmental Impact Statement (DEIS) to analyze the impacts of the Council's range of alternatives (ROA)[1] for authorizing DSBG under the highly migratory species fishery management plan (HMS FMP). This DEIS includes background and description of the proposed action, the Council's purpose and need, the Council's ROA, a description of the affected environment, projected impacts of the various alternatives on the affected environment as well as cumulative impacts, and a review of consistency with other statutes.

NMFS plans to submit a preliminary version of the DEIS for the September 2019 Council meeting. This draft will include background on the proposed action and affected environment, an update to the biological analysis discussed below, and a preliminary analysis of socioeconomic impacts of the Council's ROA. NMFS West Coast Region HMS Branch is currently working with staff from NMFS Southwest Fisheries Science Center (SWFSC) to develop the socioeconomic analysis. This analysis includes impacts to current fishers and fishing communities, impacts to new fishers entering the West Coast swordfish fishery for the first time, and downstream impacts to processors, restaurants, and consumers. NMFS expects to present this analysis in the preliminary version of the DEIS at the September 2019 Council meeting.

Preliminary Biological Analysis of Alternatives

NMFS has processed data from observer records and fisher logbooks for standard DSBG exempted fishing permit (EFP) activity from 2015 through February 2019. These data comprise an integrated dataset that includes observer records for observed trips, and logbook data for trips where an observer was not present. NMFS used this dataset to analyze the impact of the proposed alternatives on species which occur in the action area. The first step was to identify which species "are likely to be affected" by the proposed action. To do so, NMFS used the list of species that have had at least one interaction with DSBG.

Table 1 displays reported total catch as recorded in our analytical dataset. Note that these data are only for the standard configuration of DSBG (i.e., standard buoy gear or SBG). Data for linked buoy gear (LBG) are not available for biological analysis at this time. However, preliminary LBG data indicate there are no species caught using LBG which do not appear in the SBG data.

[1] The Council's final ROA can be found in the March 2019 Briefing Book: https://www.pcouncil.org/wp-content/uploads/2019/02/J1a_NMFS_Rpt1_MAR2019BB.pdf

Table 1

Summary of Reported SBG Catch, 2015-2019						
	2015	**2016**	**2017**	**2018**	**2019***	**TOTAL**
Swordfish	136	474	556	481	13	1660
Bigeye thresher shark	66	57	35	32	0	190
Pelagic thresher shark	0	0	0	2	0	2
Common thresher shark	0	0	0	1	0	1
Shortfin mako shark	0	1	0	1	0	2
Blue shark	3	4	2	1	0	10
Common mola	0	0	0	1	0	1
Opah	2	1	0	0	0	3
Escolar	4	4	3	2	0	13
Humboldt squid	0	0	1	0	0	1
Giant squid	0	0	1	0	0	1
Yelloweye rockfish	0	0	1	0	0	1
Northern elephant seal	1	0	0	1	0	2
Loggerhead sea turtle	0	0	0	1	0	1
Total Days Fished	132	280	325	496	17	1250

** Only includes January & February 2019*

We used these data to estimate catch rates, and used the rates to predict catch under the proposed alternatives. However, we encountered a number of difficulties, because the Council's ROA proposes much higher levels of DSBG fishing effort than have existed to date in the EFP fishery. Because the EFP fishery is not a mature fishery, with the majority of species likely to be affected appearing only sparsely in the data, we made a number of assumptions which may not reflect the characteristics of a fully-authorized fishery in the future. These issues introduce a large degree of uncertainty into our preliminary biological analysis.

Given these issues, simple ratio estimates are not appropriate for predicting catch under the proposed alternatives. Instead, staff from NMFS Sustainable Fisheries Division (SFD) HMS Branch worked with staff from the NMFS SWFSC to adapt a methodology that addresses uncertainty, while producing a range of estimates for catch under each of the alternatives. We employ the statistical approach described in Martin et al., based on Bayesian inference, which uses the existing catch data to estimate the posterior distribution of catch per unit of effort (CPUE), and then simulates the posterior predictive distribution (PPD) of catch under assumed levels of effort for each alternative.[2] We use the PPD under each alternative to produce a 95 percent credible interval for total catch (i.e., the range with a 95 percent probability of including the actual catch, given the effort assumptions and level of uncertainty in the analysis).

Table 2 shows the timing and maximum amount of permit issuance under each alternative of the Council's ROA. Note that 'Limited Entry 3.5' has been designated as the Council's preliminary preferred alternative (PPA). While the Limited Entry regimes under the Council's ROA only

[2] We estimate the posterior predictive distribution of catch rates using Hamiltonian Markov Chain Monte Carlo sampling and an uninformative gamma prior. For more detail, see https://esajournals.onlinelibrary.wiley.com/doi/pdf/10.1890/14-0059.1.

This approach was evaluated by the Council's Scientific and Statistical Committee (SSC); see http://www.pcouncil.org/wp-content/uploads/2015/06/E3a_Sup_SSC_Rpt_JUN2015BB.pdf for a summary of the SSC's review.

apply to the Southern California Bight (SCB), with Open Access allowed elsewhere in the action area, 100 percent of the total DSBG effort to date has been within the Limited Entry SCB area. Therefore, we analyze the maximum number of Limited Entry permits (i.e., 300) for these alternatives. We use 500 permits per year as our analytical basis for the Open Access alternative, based on Council recommendations. However, more than 500 permits could be issued under the proposed Open Access regime.

Table 2

Total Permit Issuance under Council ROA												
Alternative	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**
Open Access	500	500	500	500	500	500	500	500	500	500	500	500
Limited Entry 3.1	25	50	75	100	125	150	175	200	225	250	275	300
Limited Entry 3.2	50	100	150	200	250	300	300	300	300	300	300	300
Limited Entry 3.3	100	200	300	300	300	300	300	300	300	300	300	300
Limited Entry 3.4	300	300	300	300	300	300	300	300	300	300	300	300
Limited Entry 3.5 (PPA)	50	75	100	125	150	175	200	225	250	275	300	300

For each alternative in the Council's ROA, we calculate estimates of total catch during the 12 year "ramp-up" period following authorization (i.e., the length of time for the maximum number of permits to be issued under every alternative), as well as ongoing annual estimates for each year after the maximum number of permits is issued. We present these results for SBG only, due to the aforementioned limitations with LBG data.

The levels of effort under each alternative rely on a number of assumptions. These assumptions are made using data from the 2018 EFP fishery, which we regard as the most appropriate year to represent a year of authorized DSBG fishing. This is because 2018 saw the greatest amount of DSBG permit applications, issued permits, and fishing effort in a complete year to-date. In 2018, the Council recommended 60 permits be issued, NMFS issued 29 permits, and 26 were ultimately fished (i.e., 43 percent of Council-recommended EFPs were actively fished), at an average effort rate of 20.67 days fished per active vessel for the year. For the purpose of estimating future catch, we assume that each active vessel will fish an average of 20.67 days per year (i.e., the average effort per active vessel during 2018). We also assume that 43 percent of all available permits will be fished in a given year, based on the ratio of active to Council-recommended permits for the 2018 DSBG EFP fishing season. Finally, we assume that 83 percent of permitted vessels will fish using exclusively SBG, with the remainder using either exclusively LBG or a combination of SBG and LBG (i.e., because our analytical dataset includes only trips which fished exclusively SBG, we scale our effort estimates down to 83 percent of the total effort, so that our analysis reflects catch rates only for vessels fishing exclusively SBG). Table 3 summarizes our effort assumptions.

Table 3

Effort Assumptions	
Active Fishing	43% of available permits will be acquired & fished
Gear Selection	83% of vessels will fish SBG only
Average Effort	20.67 days fished per active vessel

These effort assumptions are based on a single year of EFP fishing data. The assumptions are highly dependent on factors such as gear preference, opportunity costs of fishing, availability of other sources of fishing and non-fishing revenue, the future status of other West Coast swordfish

fisheries, and other unknown factors. Therefore, we stress that our range of predictions rely on data-limited assumptions from the EFP fishery, and are only useful insofar as the 2018 EFP fishery ultimately resembles the characteristics of an authorized fishery as proposed under the Council's ROA. As more data become available, we hope to update our analysis to improve the reliability of our assumptions and the resulting predictions.

Based on the aforementioned assumptions, we calculate a level of assumed effort for each alternative in the Council's ROA. For the purposes of comparing the limited entry alternatives, we analyze total effort over the 12-year "ramp up" period. To compare the proposed open access and limited entry regimes over the long term, we also analyze levels of ongoing annual effort in each year after the maximum number of permits is issued. Table 4 displays our assumed levels of effort for each alternative, based on the aforementioned assumptions.

Table 4

Assumed Effort for Each Alternative

Alternative	12-Yr Rampup	Annual Ongoing
Open Access	44,476	3,706
Limited Entry 3.1	14,455	2,224
Limited Entry 3.2	21,126	2,224
Limited Entry 3.3	24,462	2,224
Limited Entry 3.4	26,686	2,224
Limited Entry 3.5 (PPA)	16,493	2,224

All effort figures in days fished

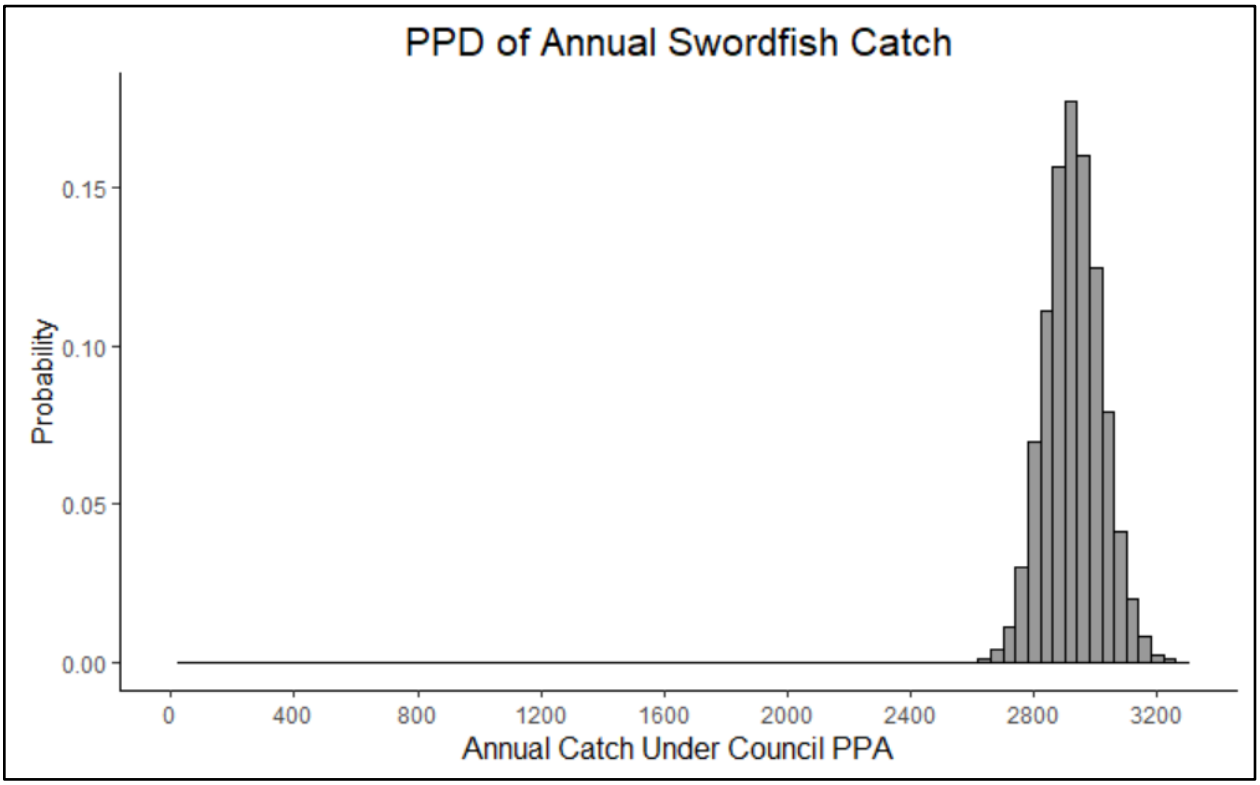
Below are our preliminary estimates of CPUE and predicted total catch for each species, for each alternative in the Council's ROA. For comparison purposes, we provide predictions for both the entire 12-year ramp-up period, and for each year once the maximum number of permits are available. These predictions include the mean and mode of the probability distribution of predicted catch, as well as the quantiles at 2.5 percent, 50 percent, and 97.5 percent (i.e., the lowest, median, and highest values of the 95% credible interval of possible catch values). The mean of each distribution is the weighted average of possible catch values based on the probability of each value (i.e., the average catch in a given year as predicted by our analysis). The mode can be understood as the most likely value in the probability distribution.

We include a histogram of the PPD for catch under the Council's PPA (i.e., the Limited Entry 3.5 alternative).[3] These histograms show the relative probability of catching a given number of each species in a single year, once the maximum number of limited entry permits are made available, given the assumptions and uncertainty in our analysis.

[3] Note that the horizontal axis range for swordfish and bigeye thresher shark is from 0 to 3200. The horizontal axis range for infrequently caught species is from 0 to 60.

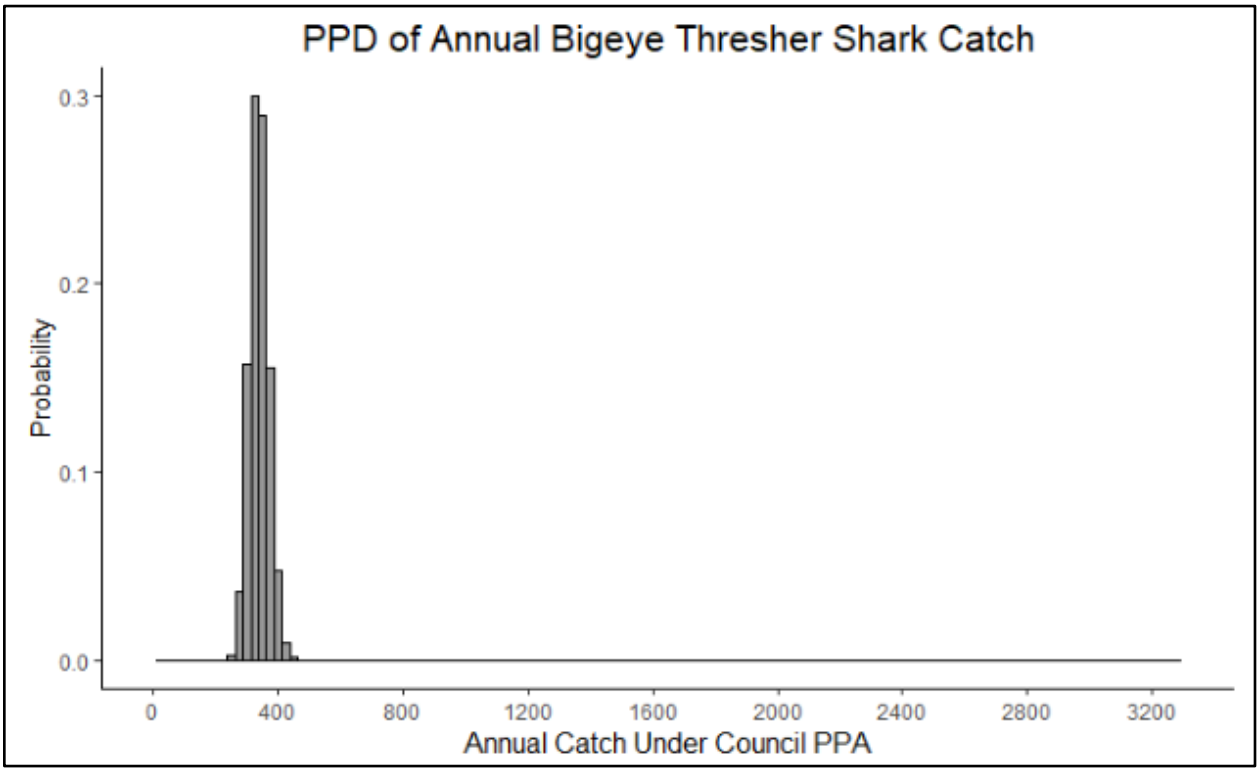
Swordfish

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.01998*	*0.01902*	*0.01996*	*0.02096*	
	Per Day Fished	*1.31574*	*1.25288*	*1.31457*	*1.38080*	
Open Access	12-Yr Ramp-Up	58,543	55,727	58,520	61,438	59,122
	Ongoing Annual	4,877	4,612	4,875	5,150	4,900
LE 3.1	12-Yr Ramp-Up	19,027	18,087	19,019	19,985	18,865
	Ongoing Annual	2,928	2,757	2,926	3,107	2,907
LE 3.2	12-Yr Ramp-Up	27,809	26,447	27,800	29,216	27,651
	Ongoing Annual	2,928	2,756	2,927	3,104	2,945
LE 3.3	12-Yr Ramp-Up	32,198	30,657	32,192	33,828	32,070
	Ongoing Annual	2,927	2,753	2,927	3,104	2,947
LE 3.4	12-Yr Ramp-Up	35,126	33,431	35,120	36,894	35,086
	Ongoing Annual	2,928	2,757	2,926	3,105	2,945
LE 3.5	12-Yr Ramp-Up	21,711	20,649	21,708	22,807	21,720
	Ongoing Annual	2,928	2,756	2,926	3,109	2,910



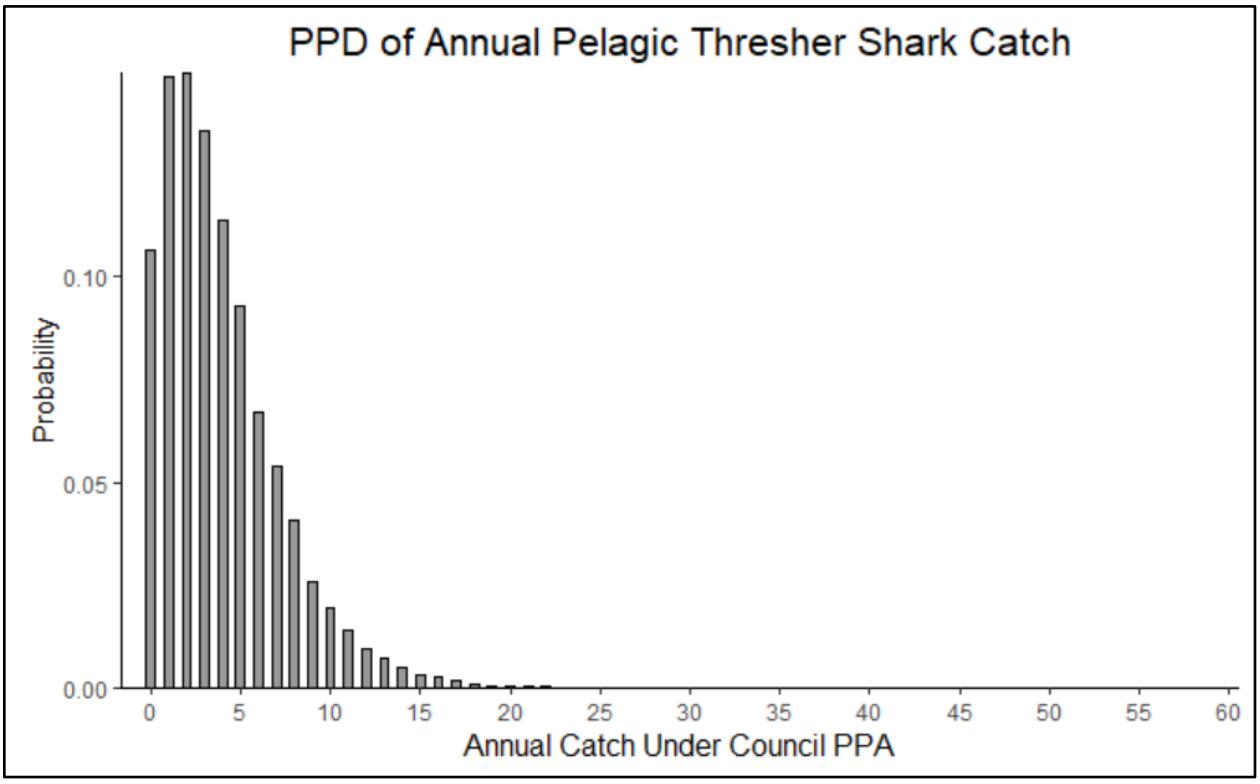
Bigeye Thresher Shark

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00231*	*0.00199*	*0.00230*	*0.00265*	
	Per Day Fished	*0.15224*	*0.13112*	*0.15157*	*0.17479*	
Open Access	12-Yr Ramp-Up	6,764	5,822	6,754	7,784	6,757
	Ongoing Annual	563	474	562	661	561
LE 3.1	12-Yr Ramp-Up	2,198	1,881	2,194	2,535	2,193
	Ongoing Annual	338	280	338	402	344
LE 3.2	12-Yr Ramp-Up	3,213	2,754	3,208	3,705	3,122
	Ongoing Annual	338	281	338	401	340
LE 3.3	12-Yr Ramp-Up	3,720	3,192	3,715	4,285	3,696
	Ongoing Annual	338	281	338	401	332
LE 3.4	12-Yr Ramp-Up	4,058	3,486	4,052	4,674	4,008
	Ongoing Annual	338	280	337	401	334
LE 3.5	12-Yr Ramp-Up	2,508	2,149	2,505	2,895	2,555
	Ongoing Annual	338	280	338	402	343



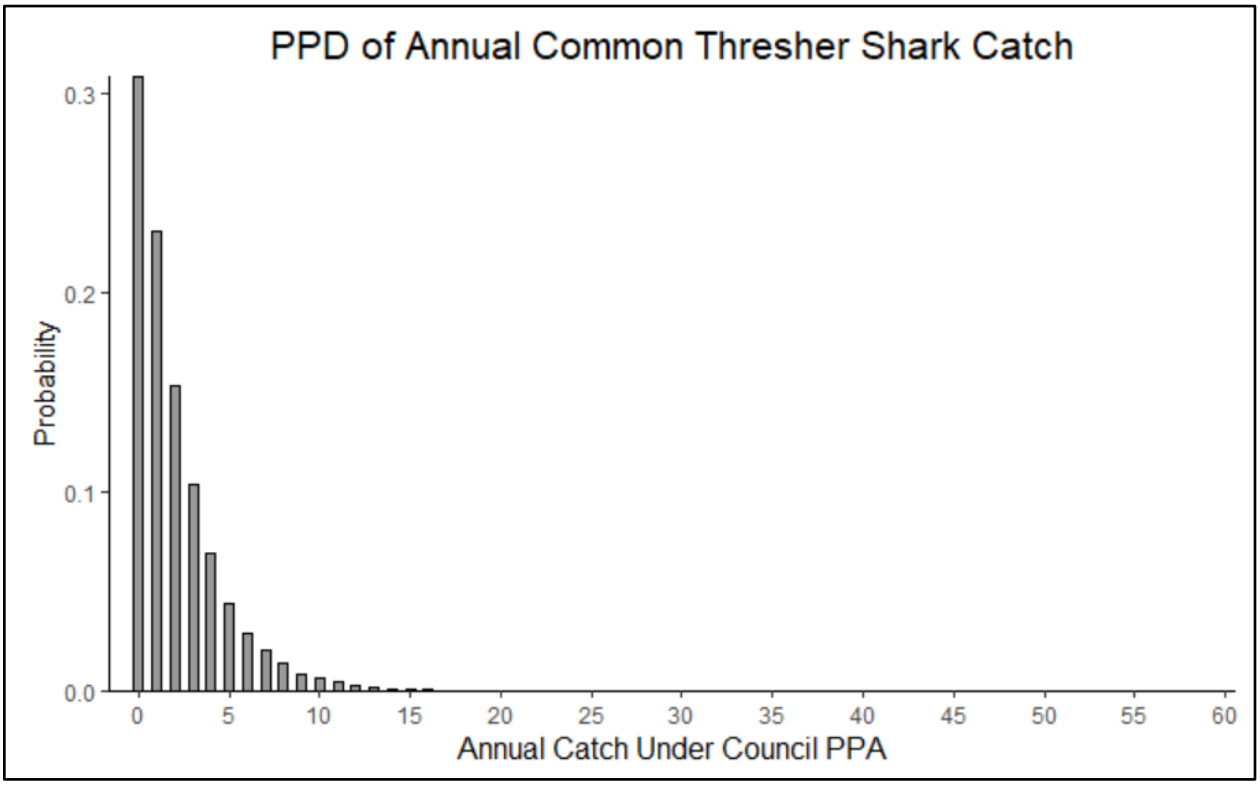
Pelagic Thresher Shark

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00003*	*0.00000*	*0.00002*	*0.00007*	
	Per Day Fished	*0.00173*	*0.00023*	*0.00149*	*0.00461*	
Open	12-Yr Ramp-Up	78	9	66	214	41
Access	Ongoing Annual	7	0	5	19	3
LE	12-Yr Ramp-Up	25	3	21	71	11
3.1	Ongoing Annual	4	0	3	12	2
LE	12-Yr Ramp-Up	37	4	31	103	22
3.2	Ongoing Annual	4	0	3	12	1
LE	12-Yr Ramp-Up	43	5	36	119	22
3.3	Ongoing Annual	4	0	3	12	2
LE	12-Yr Ramp-Up	47	5	40	129	20
3.4	Ongoing Annual	4	0	3	12	1
LE	12-Yr Ramp-Up	29	3	24	82	11
3.5	Ongoing Annual	4	0	3	12	2



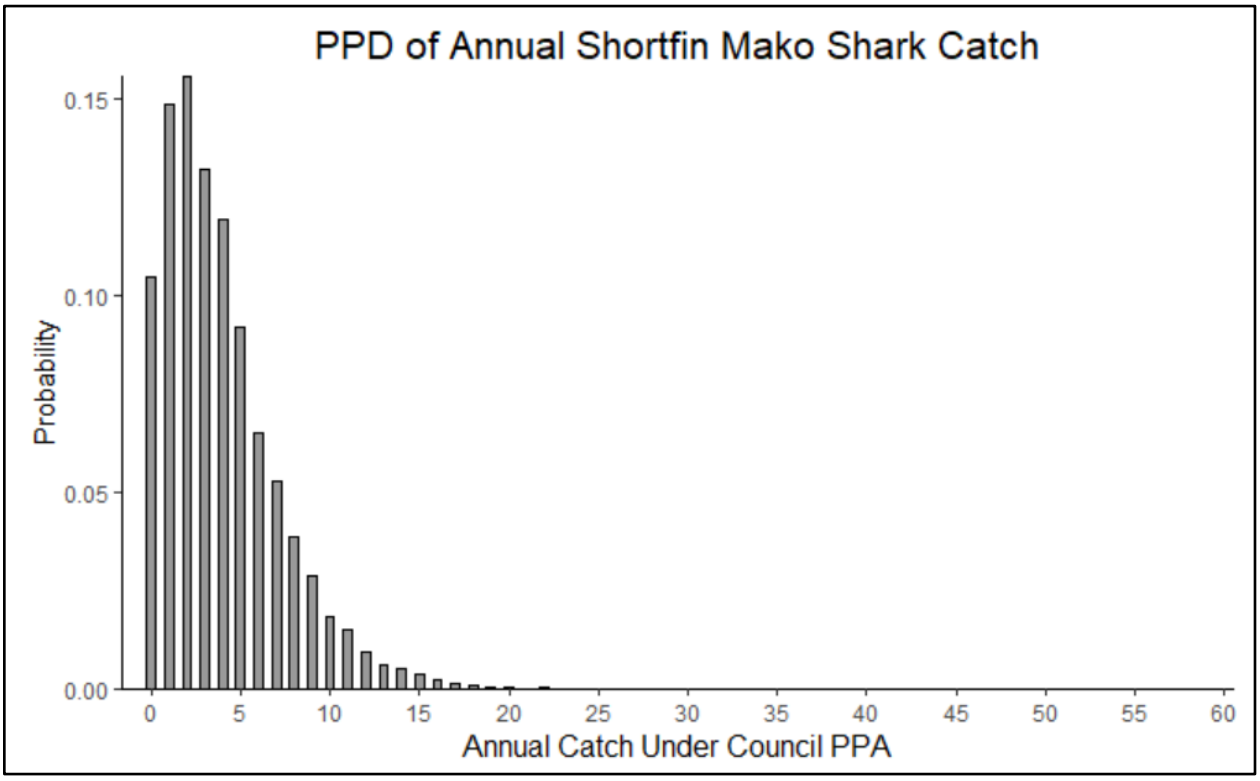
Common Thresher Shark

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00001*	*0.00000*	*0.00001*	*0.00005*	
	Per Day Fished	*0.00092*	*0.00003*	*0.00068*	*0.00310*	
Open	12-Yr Ramp-Up	41	1	30	144	5
Access	Ongoing Annual	3	0	2	13	0
LE	12-Yr Ramp-Up	13	0	10	48	1
3.1	Ongoing Annual	2	0	1	8	0
LE	12-Yr Ramp-Up	20	0	14	70	4
3.2	Ongoing Annual	2	0	1	8	0
LE	12-Yr Ramp-Up	23	0	16	80	3
3.3	Ongoing Annual	2	0	1	9	0
LE	12-Yr Ramp-Up	25	0	18	88	2
3.4	Ongoing Annual	2	0	1	8	0
LE	12-Yr Ramp-Up	15	0	11	54	1
3.5	Ongoing Annual	2	0	1	9	0



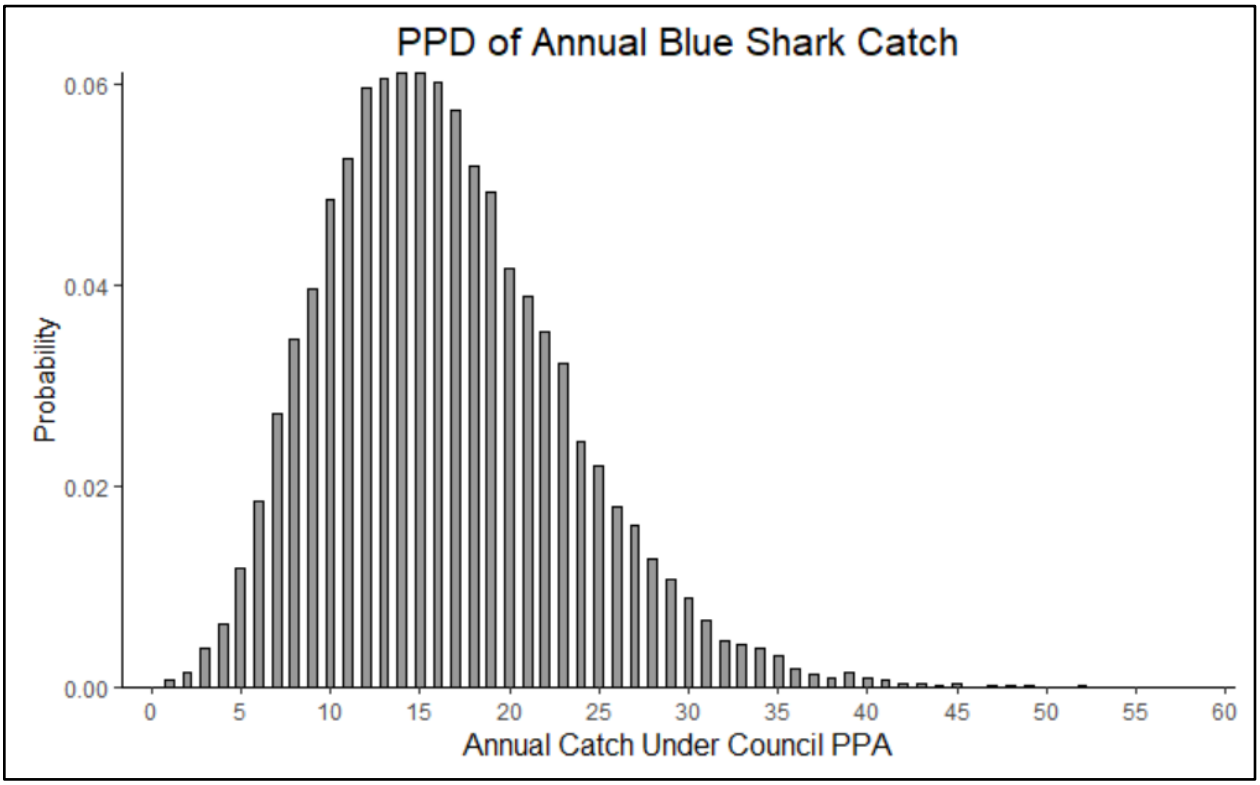
Shortfin Mako Shark

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00003*	*0.00000*	*0.00002*	*0.00007*	
	Per Day Fished	*0.00174*	*0.00026*	*0.00149*	*0.00472*	
Open	12-Yr Ramp-Up	78	10	66	212	55
Access	Ongoing Annual	7	0	5	19	3
LE	12-Yr Ramp-Up	25	3	21	70	13
3.1	Ongoing Annual	4	0	3	12	2
LE	12-Yr Ramp-Up	37	4	31	101	20
3.2	Ongoing Annual	4	0	3	12	2
LE	12-Yr Ramp-Up	43	5	36	116	25
3.3	Ongoing Annual	4	0	3	12	2
LE	12-Yr Ramp-Up	47	6	39	126	28
3.4	Ongoing Annual	4	0	3	12	2
LE	12-Yr Ramp-Up	29	3	24	79	15
3.5	Ongoing Annual	4	0	3	12	2



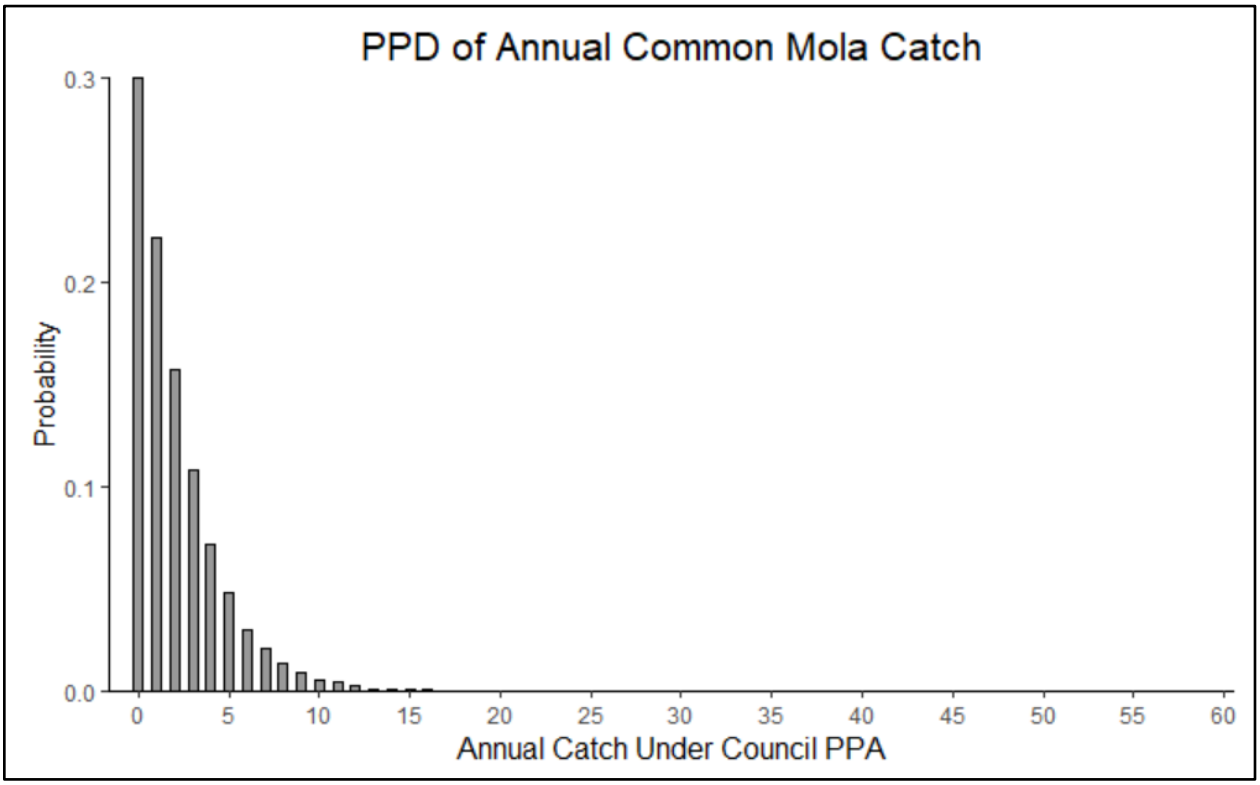
Blue Shark

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00011*	*0.00005*	*0.00011*	*0.00020*	
	Per Day Fished	*0.00734*	*0.00338*	*0.00706*	*0.01288*	
Open Access	12-Yr Ramp-Up	329	150	317	577	305
	Ongoing Annual	27	11	26	51	23
LE 3.1	12-Yr Ramp-Up	107	47	103	189	95
	Ongoing Annual	16	5	16	32	16
LE 3.2	12-Yr Ramp-Up	156	71	150	278	137
	Ongoing Annual	16	6	16	32	14
LE 3.3	12-Yr Ramp-Up	181	80	174	319	136
	Ongoing Annual	16	5	16	32	14
LE 3.4	12-Yr Ramp-Up	197	89	190	350	170
	Ongoing Annual	17	6	16	32	14
LE 3.5	12-Yr Ramp-Up	122	54	118	217	119
	Ongoing Annual	16	6	16	32	14



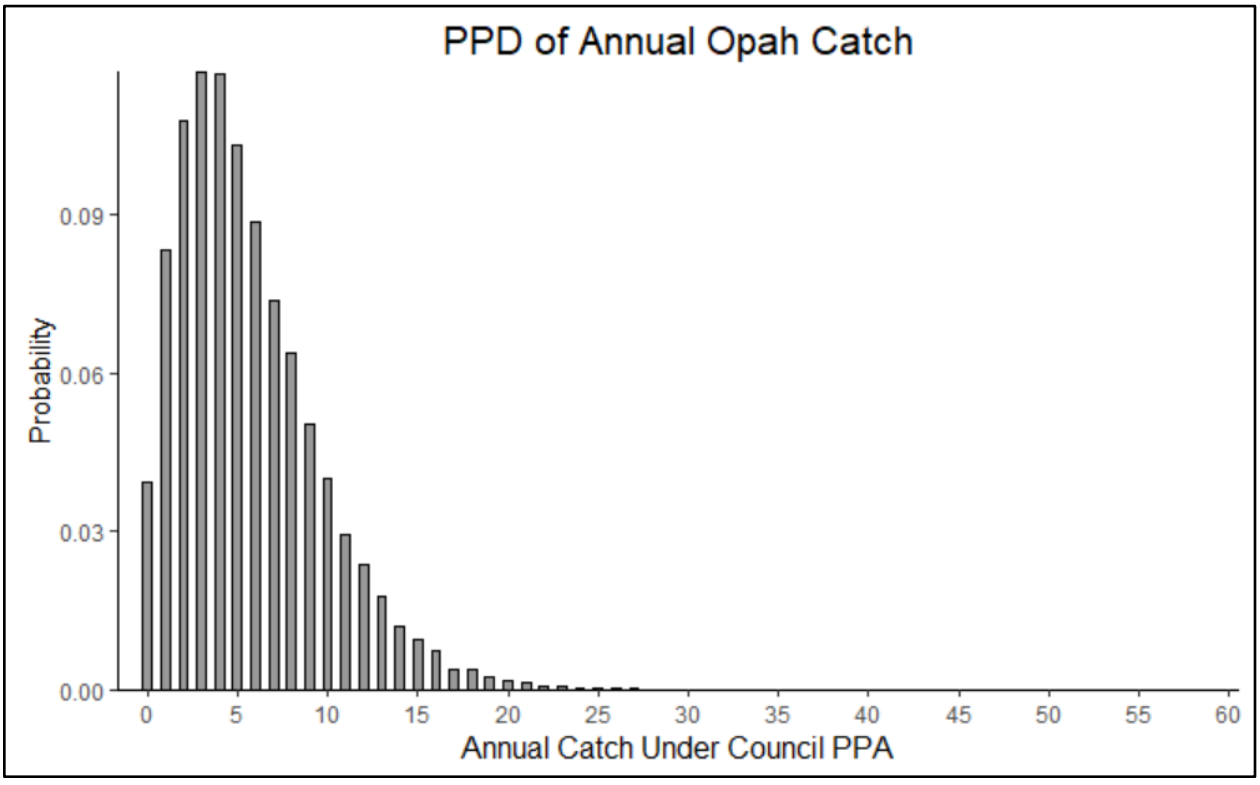
Common Mola

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00001*	*0.00000*	*0.00001*	*0.00005*	
	Per Day Fished	*0.00093*	*0.00003*	*0.00067*	*0.00329*	
Open	12-Yr Ramp-Up	42	1	31	145	3
Access	Ongoing Annual	4	0	2	13	0
LE	12-Yr Ramp-Up	14	0	10	48	1
3.1	Ongoing Annual	2	0	1	9	0
LE	12-Yr Ramp-Up	20	0	15	70	0
3.2	Ongoing Annual	2	0	1	9	0
LE	12-Yr Ramp-Up	23	0	17	81	1
3.3	Ongoing Annual	2	0	1	9	0
LE	12-Yr Ramp-Up	25	0	19	89	1
3.4	Ongoing Annual	2	0	1	9	0
LE	12-Yr Ramp-Up	16	0	11	55	1
3.5	Ongoing Annual	2	0	1	9	0



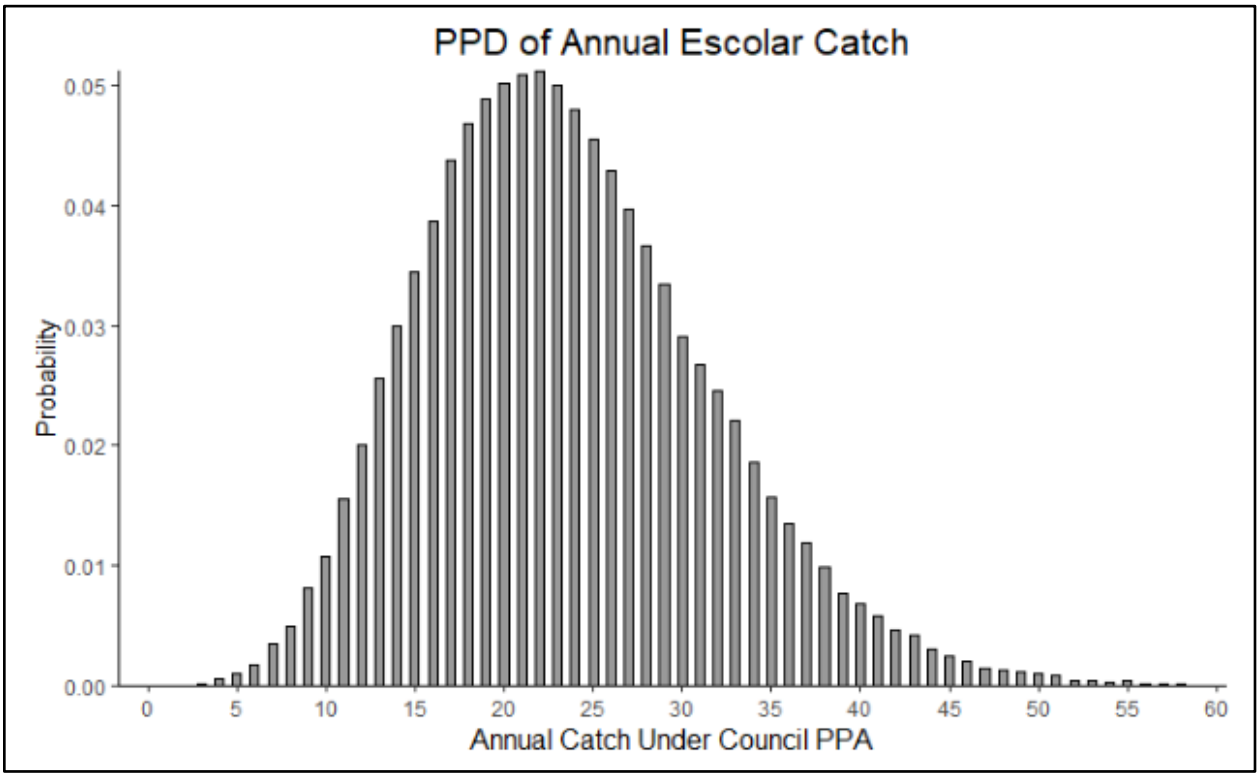
Opah

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00004*	*0.00001*	*0.00003*	*0.00009*	
	Per Day Fished	*0.00254*	*0.00059*	*0.00227*	*0.00590*	
Open Access	12-Yr Ramp-Up	113	23	101	270	73
	Ongoing Annual	9	1	8	24	7
LE 3.1	12-Yr Ramp-Up	37	7	33	89	27
	Ongoing Annual	6	0	5	15	3
LE 3.2	12-Yr Ramp-Up	54	10	48	130	36
	Ongoing Annual	6	0	5	15	3
LE 3.3	12-Yr Ramp-Up	62	12	55	149	47
	Ongoing Annual	6	0	5	15	3
LE 3.4	12-Yr Ramp-Up	68	13	60	163	42
	Ongoing Annual	6	0	5	15	3
LE 3.5	12-Yr Ramp-Up	42	8	37	101	30
	Ongoing Annual	6	0	5	15	3



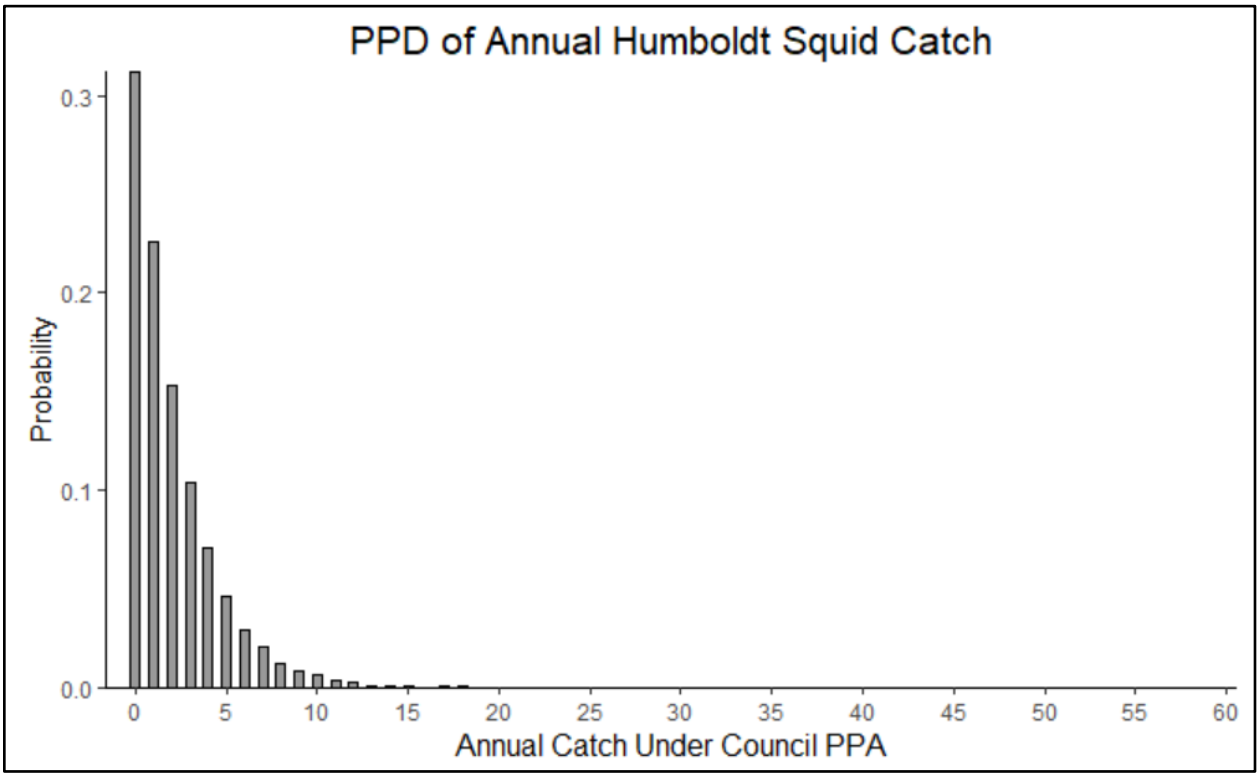
Escolar

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00016*	*0.00009*	*0.00016*	*0.00026*	
	Per Day Fished	*0.01065*	*0.00584*	*0.01037*	*0.01712*	
Open Access	12-Yr Ramp-Up	471	248	458	762	453
	Ongoing Annual	39	18	38	67	37
LE 3.1	12-Yr Ramp-Up	153	79	149	250	145
	Ongoing Annual	24	10	23	42	20
LE 3.2	12-Yr Ramp-Up	224	117	217	364	195
	Ongoing Annual	24	10	23	41	22
LE 3.3	12-Yr Ramp-Up	259	136	252	420	238
	Ongoing Annual	24	10	23	42	21
LE 3.4	12-Yr Ramp-Up	282	149	275	460	265
	Ongoing Annual	24	10	23	42	22
LE 3.5	12-Yr Ramp-Up	175	91	170	285	156
	Ongoing Annual	24	10	23	41	22



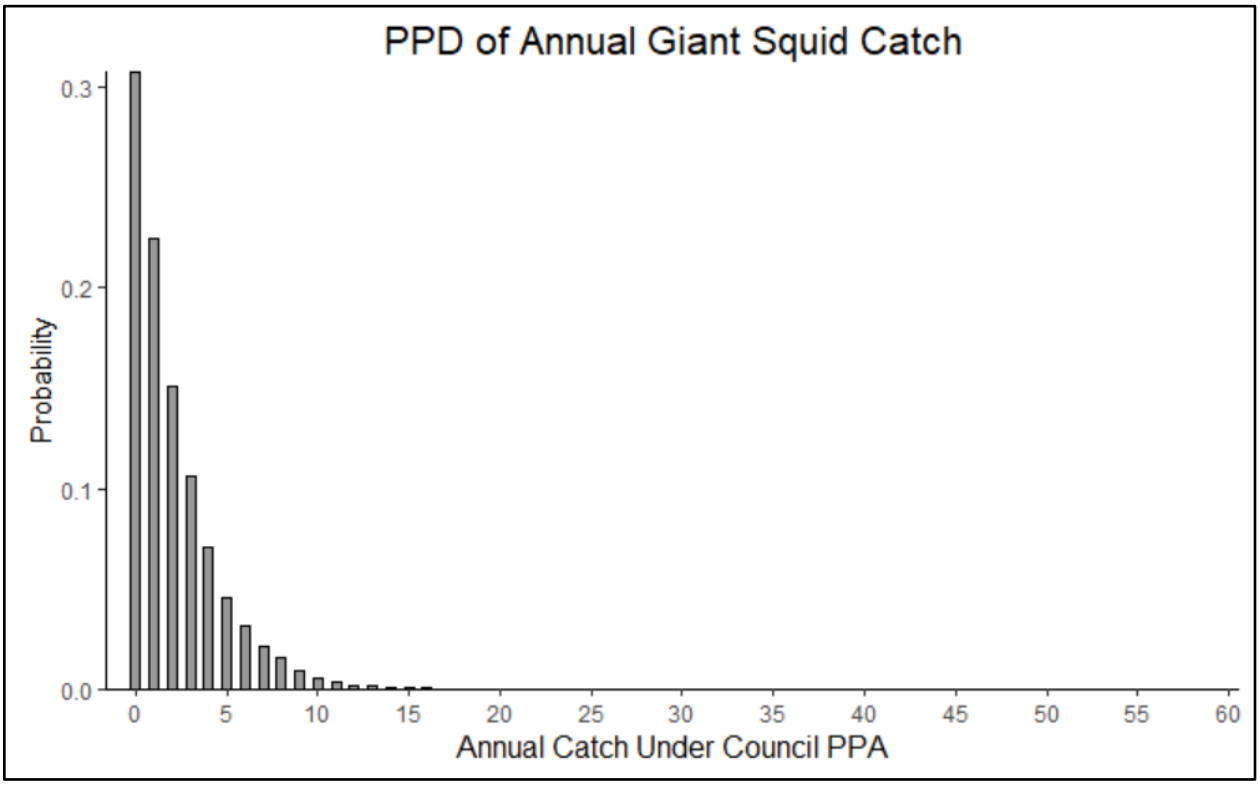
Humboldt Squid

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00001*	*0.00000*	*0.00001*	*0.00005*	
	Per Day Fished	*0.00094*	*0.00002*	*0.00068*	*0.00323*	
Open Access	12-Yr Ramp-Up	41	1	30	146	3
	Ongoing Annual	3	0	2	14	0
LE 3.1	12-Yr Ramp-Up	13	0	10	48	0
	Ongoing Annual	2	0	1	9	0
LE 3.2	12-Yr Ramp-Up	20	0	14	71	2
	Ongoing Annual	2	0	1	8	0
LE 3.3	12-Yr Ramp-Up	23	0	16	82	2
	Ongoing Annual	2	0	1	9	0
LE 3.4	12-Yr Ramp-Up	25	0	18	89	2
	Ongoing Annual	2	0	1	8	0
LE 3.5	12-Yr Ramp-Up	15	0	11	55	2
	Ongoing Annual	2	0	1	9	0



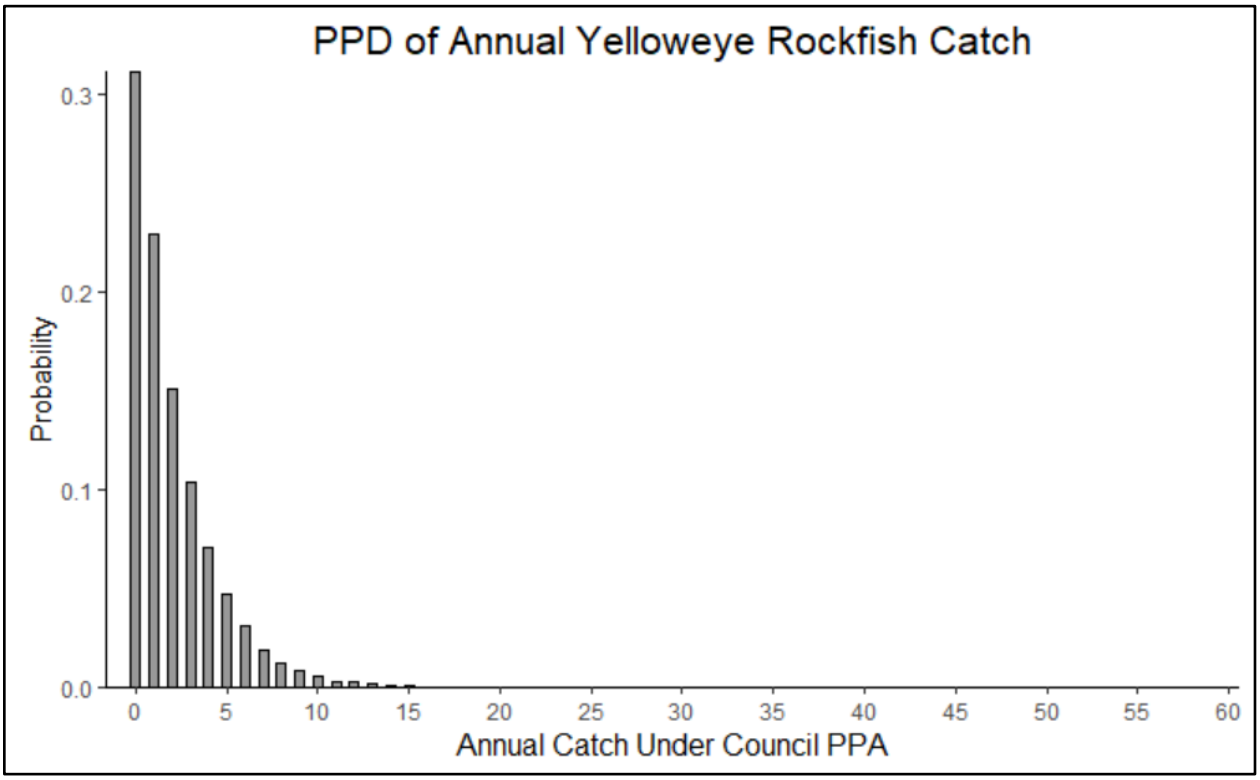
Giant Squid

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00001*	*0.00000*	*0.00001*	*0.00005*	
	Per Day Fished	*0.00093*	*0.00004*	*0.00067*	*0.00318*	
Open Access	12-Yr Ramp-Up	41	1	30	145	9
	Ongoing Annual	3	0	2	13	0
LE 3.1	12-Yr Ramp-Up	13	0	10	49	2
	Ongoing Annual	2	0	1	8	0
LE 3.2	12-Yr Ramp-Up	20	0	14	70	3
	Ongoing Annual	2	0	1	9	0
LE 3.3	12-Yr Ramp-Up	23	0	16	81	4
	Ongoing Annual	2	0	1	9	0
LE 3.4	12-Yr Ramp-Up	25	0	18	88	4
	Ongoing Annual	2	0	1	9	0
LE 3.5	12-Yr Ramp-Up	15	0	11	55	1
	Ongoing Annual	2	0	1	8	0



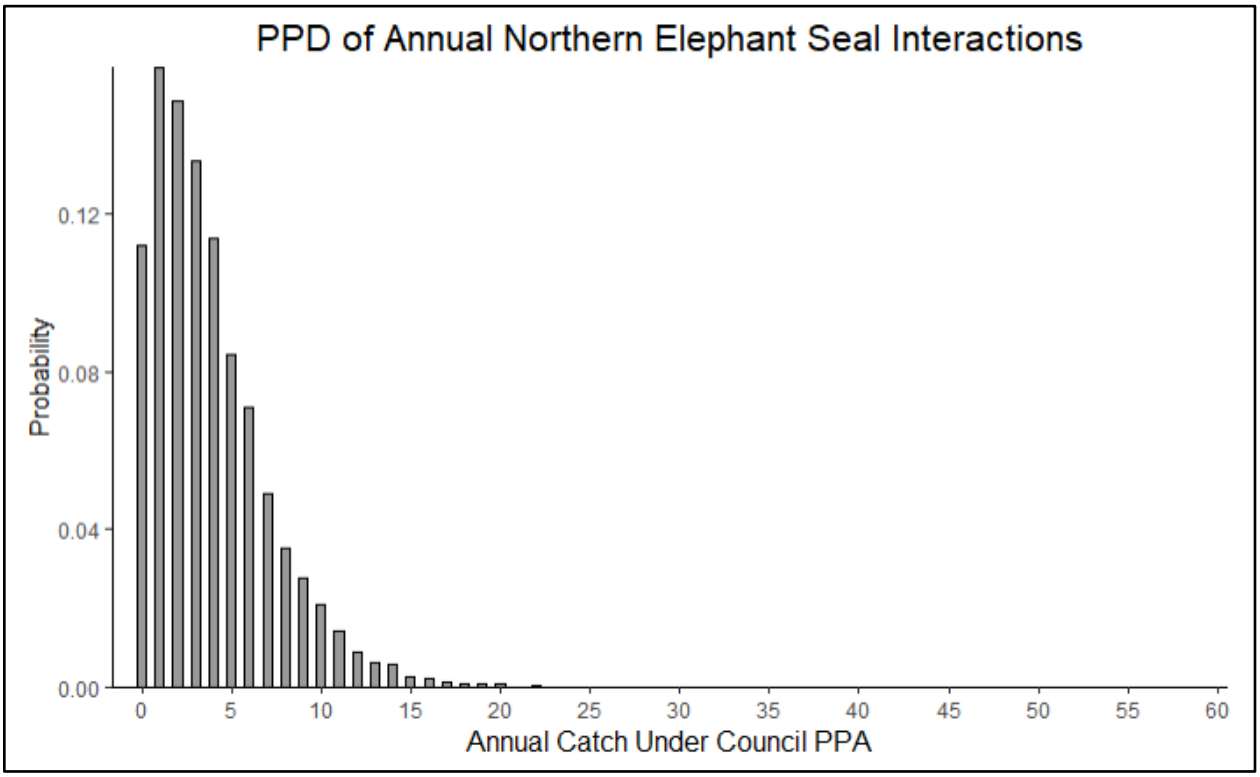
Yelloweye Rockfish

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00001*	*0.00000*	*0.00001*	*0.00005*	
	Per Day Fished	*0.00091*	*0.00003*	*0.00065*	*0.00335*	
Open Access	12-Yr Ramp-Up	41	1	29	144	7
	Ongoing Annual	3	0	2	13	0
LE 3.1	12-Yr Ramp-Up	13	0	9	48	1
	Ongoing Annual	2	0	1	8	0
LE 3.2	12-Yr Ramp-Up	19	0	14	70	2
	Ongoing Annual	2	0	1	8	0
LE 3.3	12-Yr Ramp-Up	22	0	16	80	3
	Ongoing Annual	2	0	1	8	0
LE 3.4	12-Yr Ramp-Up	25	0	18	88	2
	Ongoing Annual	2	0	1	8	0
LE 3.5	12-Yr Ramp-Up	15	0	11	54	2
	Ongoing Annual	2	0	1	8	0



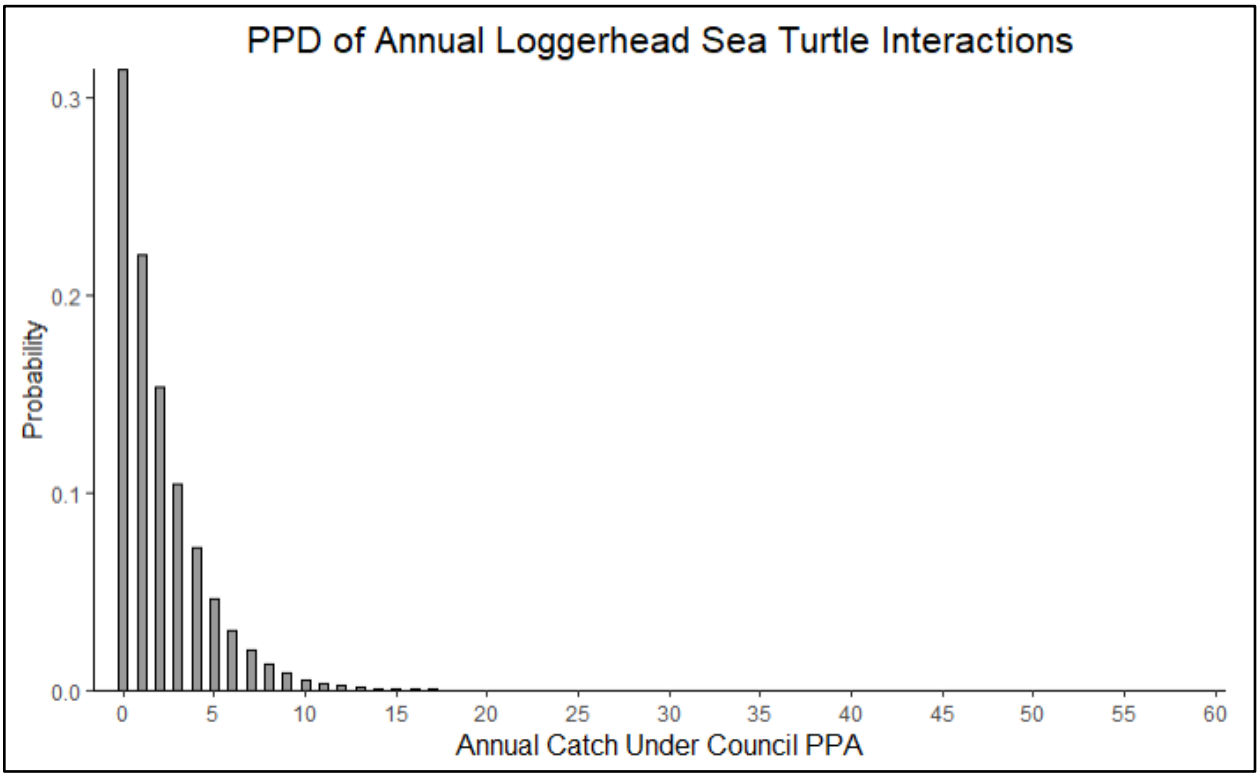
Northern Elephant Seal

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00003*	*0.00000*	*0.00002*	*0.00007*	
	Per Day Fished	*0.00172*	*0.00025*	*0.00146*	*0.00457*	
Open Access	12-Yr Ramp-Up	78	10	67	212	44
	Ongoing Annual	7	0	5	19	3
LE 3.1	12-Yr Ramp-Up	25	3	21	70	14
	Ongoing Annual	4	0	3	12	2
LE 3.2	12-Yr Ramp-Up	37	4	31	102	21
	Ongoing Annual	4	0	3	12	2
LE 3.3	12-Yr Ramp-Up	43	5	37	116	29
	Ongoing Annual	4	0	3	12	2
LE 3.4	12-Yr Ramp-Up	47	6	40	128	29
	Ongoing Annual	4	0	3	12	2
LE 3.5	12-Yr Ramp-Up	29	3	24	79	14
	Ongoing Annual	4	0	3	12	1



Loggerhead Sea Turtle

		Mean	CI 2.5%	Median	CI 97.5%	Mode
CPUE	*Per Hook Hour*	*0.00001*	*0.00000*	*0.00001*	*0.00005*	
	Per Day Fished	*0.00094*	*0.00003*	*0.00065*	*0.00309*	
Open Access	12-Yr Ramp-Up	41	1	30	143	6
	Ongoing Annual	3	0	2	13	0
LE 3.1	12-Yr Ramp-Up	13	0	10	47	1
	Ongoing Annual	2	0	1	8	0
LE 3.2	12-Yr Ramp-Up	19	0	14	70	2
	Ongoing Annual	2	0	1	8	0
LE 3.3	12-Yr Ramp-Up	22	0	16	79	3
	Ongoing Annual	2	0	1	8	0
LE 3.4	12-Yr Ramp-Up	25	0	18	86	5
	Ongoing Annual	2	0	1	8	0
LE 3.5	12-Yr Ramp-Up	15	0	11	54	3
	Ongoing Annual	2	0	1	8	0



Note that our projections for loggerhead sea turtle are based on a single interaction which occurred in 2018, when a turtle was entangled in surface lines under a configuration of DSBG which is no longer allowed. The turtle was released alive and uninjured. NMFS modified the Terms and Conditions of the DSBG EFPs in response to this incident, including requirement of shorter and stiffer surface lines. The impact of this change to the EFP Terms and Conditions to the loggerhead interaction rate is not captured by our current analytical methodology, and we

expect the interaction rate with loggerhead sea turtles in the future may be lower than that indicated by the current analysis.

There are additional species in the action area which may be affected by the proposed action, or which are of concern due to Endangered Species Act (ESA) listing, overfished or overfishing status, interactions in DSBG research trials, or based on discussions with NMFS Protected Resources Division (PRD). Because these species have not yet been observed interacting with DSBG, and do not appear in our analytical dataset, we are not able to produce estimates for potential catch rates. However, we will qualitatively discuss anticipated impacts of the alternatives on these species in our NEPA analysis, and any that are ESA-listed will be included in consultations with NMFS PRD regarding the proposed action. These species may include: yellowfin tuna, Pacific bluefin tuna, humpback whale, sperm whale, Risso's dolphin, beaked whales, gray whale, and leatherback sea turtle.

Discussion

There are a number of sources of uncertainty affecting the above analysis and interpretation of the results. These include:

- *Limited data.* While our analytical methodology is designed to address rare events occurring in a small amount of data, the accuracy of our estimates is hindered by the fact that there has simply been a much lower level of DSBG effort to-date relative to the projected levels under the Council's ROA. In conducting sensitivity analysis, we found that our results are highly sensitive to the amount of data included in the analysis. For example, restricting the analytical dataset to include only data from observer records (i.e., with all logbook data excluded) resulted in a much wider range of estimates, reflecting increased uncertainty. Should our analysis be repeated in the future once more data are available, it is likely that the power of our analysis to accurately predict catch under a fully authorized DSBG fishery will increase.
- *Differences in data sources.* Because our dataset is sourced from both observer records and fisher logbooks, it is subject to potential limitations in the accuracy of self-reported logbook data.
- *Omission of LBG.* Our analysis only accounts for the portion of effort that is expected to fish SBG only, and not LBG effort. Therefore, our estimates only account for approximately 83 percent of the total effort under the Council's ROA, based on our assumptions. As LBG data become available, we hope to update the analysis to include both SBG and LBG together to more fully estimate the effects of the Council's ROA.
- *Effort assumptions.* As described previously, our analysis assumes levels of effort based on characteristics of the DSBG EFP fishery in calendar year 2018. While these assumptions represent the best estimates we can make at this time, it is possible that they will ultimately not be representative of a fully-authorized fishery with dramatically increased numbers of available permits. For example, if a higher or lower percentage of available permits are fished, or a higher or lower percentage of participants fish SBG rather than LBG, this would impact our projections. Our analysis accounts for this uncertainty to some degree by providing a probability distribution of possible catch counts, rather than simple ratio estimates.

- *Species-specific issues.* Some of the species included in our analysis are subject to unique conditions which may affect their interaction rates with DSBG and the accuracy of the estimates in our analysis.
    - Regarding pelagic thresher sharks, we note that this species' presence off Southern California is highly seasonal. It is possible that the probability of catching this species in DSBG is dependent on seasonal conditions such as water temperature, and that the likelihood of its catch in a given year may be higher or lower than that reflected by the single interaction in our dataset.
    - Regarding loggerhead sea turtles, our dataset includes use of gear pre- and post-changes to EFP Terms and Conditions, and the gear requirements in the Council's ROA, intended to reduce the likelihood of sea turtle interactions. As mentioned above, the lone loggerhead sea turtle interaction in our dataset occurred prior to changes to the EFP Terms and Conditions regarding gear configuration. It is possible that interaction rates with loggerhead sea turtles in the future will be different from predictions made using data from before the changes in gear requirements went into effect.

Overall, NMFS' position on the use and interpretation of the aforementioned biological analysis results is to consider them as highly preliminary estimates of the ranges of possible impacts to species which may result from the Council's ROA. While we can reasonably predict that the majority of the catch will consist of swordfish and bigeye thresher sharks, precise quantification of uncommonly-caught finfish catch and protected species interactions is much more difficult due to their low presence in the data, the uncertain nature of our effort assumptions, and other issues discussed previously. This is why we have selected an analytical methodology which accounts for inherent uncertainty in making these types of predictions from a limited dataset. It is important to consider the summary statistics (i.e., the mean, median, and mode of our PPDs) not as absolute, precise estimates, but as points along a wide range of potential outcomes. It is likely that the estimates we present here will change in future iterations of the analysis as more data become available.

APPENDIX - Preliminary DEIS Table of Contents

The following is a preliminary table of contents for the working draft NEPA analysis. These items are subject to change based on discussions with NMFS PRD, General Counsel, and NEPA coordinators. It is provided here to illustrate the breadth and tentative organization of topics to be covered as part of the NEPA analysis for authorizing DSBG.

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