Swordfish (*Xiphias gladius*) Length Composition Data for the Hawaii Longline Fishery during 1994-2022

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Abstract

This working paper summarizes the available swordfish length composition data for swordfish caught in the Hawaii longline fishery. These data were prepared for submission to the November 2022 ISC Billfish Working Group data preparation meeting and application in the 2023 benchmark stock assessment of Western and Central North Pacific swordfish. Swordfish (*Xiphias gladius*) size frequency data were collected for the Hawaii-based longline fishery during 1994-2022 based on the current Pacific Islands Regional Observer Program (PIROP) data set. Length composition data were separated into shallow-set and deep-set longline sectors to account for differences in species targeting and operational characteristics by sector. The shallow-set longline sector targets swordfish while the deep-set sector typically targets big eye tuna and captures swordfish as bycatch. We evaluated annual and quarterly trends in observed mean lengths and calculated mean weights of swordfish and their variability. Summary length frequency tables showed the number of swordfish measured per 5-cm length bin by year, quarter, and fishery sector for stock assessment modeling. Empirical analyses showed that average size of swordfish captured in the shallow-set sector is consistently larger than in the deep-set sector. Quarterly mean lengths of swordfish in the shallow-set and deep-set sectors averaged 146 cm and 110 cm (eye-fork length) during 1994-2022 while calculated mean weights averaged 67.7 kg and 39.3 kg, respectively. Variability in the size of harvested swordfish was also lower for the shallow-set sector with coefficients of variation (CVs) for length and weight of 22% and 64% in comparison to CVs of 33% and 110% for the deep-set sector. Quarterly mean lengths were relatively stable across years for the shallow-set sector and were more variable for the deep-set sector with larger mean lengths observed in quarter 2. There was an increasing trend in mean lengths and weights of swordfish for both shallow- and deep-set sectors of the Hawaii longline fishery during 1994-2022. In particular, strong serial correlations were observed for annual mean lengths ($\rho_{L,y}$) and weights ($\rho_{W,y}$) of swordfish in both the shallow- ($\rho_{L,y} = 0.70$ and $\rho_{W,y} = 0.71$) and the deep-set ($\rho_{L,y} = 0.65$ and $\rho_{W,y} = 0.65$) longline sectors. We note that the increasing trend in the size of harvested swordfish across the swordfish-targeting shallow-set and tuna-targeting deep-set sectors suggests that some biological aspects of the Hawaii longline fishery system have changed, especially in recent years.

Introduction

This working paper summarizes the available swordfish length composition data for swordfish caught in the Hawaii longline fishery. These size composition data were prepared for submission to the November 2022 ISC Billfish Working Group data preparation meeting and application in the 2023 benchmark stock assessment of Western and Central North Pacific swordfish. Swordfish (*Xiphias gladius*) size frequency data were collected for the Hawaii-based longline fishery during 1994-2022 based on the current Pacific Islands Regional Observer Program (PIROP) data set (PIRO 2017). Length composition data were separated into shallow-set and

deep-set longline sectors to account for differences in species targeting and operational characteristics by sector. The shallow-set longline sector targets swordfish while the deep-set sector typically targets big eye tuna and captures swordfish as bycatch. We provide summaries of annual and quarterly mean lengths and their variability, as well as calculated mean weights, along with a table of swordfish length observations per 5-cm length bin by sector, year, and quarter. We also provide some empirical analyses of the available swordfish size composition data and its temporal patterns by sector in the Hawaii longline fishery.

Methods

Observed eye-fork length (EFL) measurements of swordfish captured in the Hawaii longline fishery were gathered and summarized from the Pacific Islands Region Observer Program database. This summary included all available records of observed longline sets from 1994 to 2022 (Access 17 October 2022). A total of 132,619 swordfish lengths with reported hooks per float were available. The swordfish length data represented landings in both the shallow-set (< 15 hooks per float), or swordfish-targeting, and the deep-set (≥ 15 hooks per float), or tuna-targeting sectors of the Hawaii longline fishery since 2005 (Walsh and Brodziak, 2015). For longline data prior to 2005, the definition of shallow- and deep-set sector operations was determined with an empirical cutoff of 10 hooks per float based on the best available analyses of patterns of multispecies catches and species targeting in the Hawaii longline fishery reported in Sculley et al (2019) and used for the ISC striped marlin stock assessment. We also conducted a sensitivity analysis of the swordfish length composition data using a simplified definition of fishery sectors based on a uniform cutoff of 15 hooks per float for each longline set during 1994-2022. In this case, the magnitude of differences between the quarterly mean length summaries and correlation results with the current analytical cutoff and the simple 15 hooks per float cutoff are reported. Given that the deep-set sector incidentally catches swordfish as a bycatch species, one expects that the fishery selectivity at age and size composition of swordfish from the deep-set sector will differ from that of the shallow-set sector. In this context, we summarized the shallow-set and deep-set length data separately here as in previous swordfish size composition analyses due to the differences in spatial distributions, operations, and targeting of species between the two sectors of the longline fleet (Brodziak and Courtney 2009, Sculley et al. 2017, Sculley et al. 2018).

Estimates of the whole wet weights (W) of individual swordfish were calculated from the length data (cm, EFL) by converting observed lengths (L) to weights (kg) using the weight-length relationship from Uchiyama et al. (1999). This was the length-weight relationship used for female and male swordfish since the 2018 benchmark ISC stock assessment, where the predicted weight at observed length was given by

$$W = 1.299 \cdot 10^{-5} L^{3.0738} \quad (1)$$

We summarized swordfish mean length observations and calculated mean weights by year and

quarter (Quarters are: 1 [Jan-Mar], 2 [Apr-Jun], 3 [Jul-Sep], and 4 [Oct-Dec]), by year, and by quarter for comparison in the shallow- and deep-set sectors. We evaluated whether there were any apparent trends in mean sizes and size variation of swordfish by year and quarter and by year using Pearson correlations (ρ). The relative strengths of associations between quarterly or annual observations of mean lengths and calculated mean weights as well as their variability were also evaluated using correlation analyses.

Results

The partitioning of the PIROP swordfish length dataset led to sample sizes of 118,117 and 14,432 observed swordfish lengths for the shallow- and deep-set sectors, respectively. Time series of mean lengths of swordfish by year and quarter were calculated for each sector (Tables 1 and 2). Mean lengths of swordfish were consistently greater in the shallow-set sector and averaged 146 cm during 1994-2022 in comparison to an average of 110 cm for the deep-set sector[1]. Mean lengths of swordfish harvested in the shallow-set sector were about 2 cm larger than the median length at maturity of about 144 cm for female swordfish (Figure 1a). In comparison, mean lengths of swordfish bycatch in the deep-set sector were substantially lower than the female length at 50% maturity with the exception of quarter 2 when larger swordfish were harvested (Figure 2b). Quarterly length distributions were also more variable for the deep-set sector, which had an average coefficient of variation for length (CV) of 33% in comparison to a CV of 22% for the shallow-set sector. Overall, swordfish harvested the shallow-set sector were larger and showed less variability in their length distributions than swordfish caught in the deep-set sector.

The swordfish quarterly mean length time series by sector both showed moderate increasing trends from the 1990s to the 2020s (Tables 1 and 2, Figure 1). For the shallow-set sector, quarterly mean lengths increased from an average of about 140 cm in the 1990s to over 150 cm in the 2020s (Table 1) and showed decadal increases of 4%, 1% and 4% in mean lengths from the 1990s to the 2020s. Mean lengths of swordfish showed a more increasing trend in the deep-set sector (Table 2), where the mean length averaged about 97 cm in the 1990s, increased to average about 108 cm (+11%) in the 2000s and then to average 113 cm (+5%) in the 2010s and over 130 cm in the early 2020s (Table 2 and Figure 1).

The swordfish calculated mean weight time series by quarter also showed similar trends by sector (Figure 2). The long-term average mean weight was about 67.7 kg for the shallow-set sector but was about 39.3 kg, or about 42% lower in the deep-set sector. The variability in calculated swordfish weights was greater for the deep-set sector, which had a CV for weight of about 110% in comparison to a weight CV of about 64% for the shallow-set sector. Annual time series of

[1] The average mean lengths of swordfish by sector calculated using a cutoff of 15 hooks per float to define sectors prior to 2005 were also equal to 146 and 110 cm for the shallow- and deep-set sectors, respectively. For the shallow-set sector, there were five quarters prior to 2005 where using a cutoff of 15 hooks per float to define sectors changed the mean length by 1% or more and the maximum percent change was 6% in quarter 4 of 1995. Similarly when using a cutoff of 15 hooks per float to define sectors, there were two quarters prior to 2005 where the mean length changed by 1% or more in the deep-set sector and the maximum percent change was 2% in quarter 4 of 1995. Overall, the sensitivity analysis showed that the application of a cutoff of 15 hooks per float to define sectors prior to 2005 had a negligible impact on the observed swordfish size composition data reported by quarter.

mean swordfish lengths and calculated weights showed increasing trends by sector (Figures 3 and 4) with relatively low variability in the annual mean lengths.

The quarterly distributions of mean lengths for the shallow-set sector were similar and fluctuated about an average of about 146 cm with CVs of length ranging from 20% to 23% by quarter (Figure 5a). In contrast, there was a seasonal pattern for the deep-set sector, where the mean lengths in quarter 2 were larger and averaged 145 cm, or roughly equal to the female length at maturity, in comparison to quarters 1, 3 and 4, which averaged 118, 91, and 86 cm, respectively (Figure 5b). Variability in the deep-set length distributions was also higher with CVs of length ranging from 32% to 48%. Quarterly distributions of calculated mean weights showed similar patterns for the shallow-set (Figure 6a) and deep-set sector (Figure 6b), but higher levels of relative variability due to the allometric scaling of weight with length.

The quarterly mean size distributions of swordfish by fishery sector exhibited positive associations in most cases (Table 3). Time series of mean lengths of swordfish by year and quarter showed positive serial correlations for both the shallow-set ($\rho_{L,yq} = 0.41$) and deep-set ($\rho_{L,yq} = 0.30$) sectors. The quarterly calculated mean weight time series also had positive serial correlations for the shallow- ($\rho_{W,yq} = 0.48$) and deep-set ($\rho_{W,yq} = 0.30$) sectors. In contrast, mean lengths were not associated with variability in length for the shallow-set sector (Table 3) but were positively associated with increasing variability for the deep-set sector. Mean lengths and weights were highly positively correlated for both sectors ($\rho_{L,W} = 0.98$), as expected, and the variabilities in the quarterly length and weight distributions were also strongly associated within the shallow- ($\rho_{\sigma_L,\sigma_W} = 0.74$) and deep-set ($\rho_{\sigma_L,\sigma_W} = 0.86$) sectors.

The annual mean size distributions of swordfish by fishery sector were also positively associated (Table 4). Annual time series of mean lengths of swordfish had strong positive correlations for both the shallow-set ($\rho_{L,y} = 0.70$) and deep-set ($\rho_{L,y} = 0.65$) sectors (Figures 3 and 4) and the same was true for the calculated mean weight series for the shallow- ($\rho_{W,y} = 0.71$) and the deep-set ($\rho_{W,y} = 0.65$) sectors[2]. Similar to the quarterly distributions, annual mean lengths were weakly associated with variability in length for the shallow-set sector (Table 4, $\rho_{L,\sigma_L} = 0.31$) but were strongly associated with increasing variability for the deep-set sector (Table 4, $\rho_{L,\sigma_L} = 0.79$). Annual mean lengths and weights of swordfish were highly positively correlated for both sectors ($\rho_{L,W} \geq 0.98$), as expected, and the annual variabilities in length and weight distributions were strongly associated for the shallow- ($\rho_{\sigma_L,\sigma_W} = 0.79$) and the deep-set ($\rho_{\sigma_L,\sigma_W} = 0.91$) sectors.

[2] The correlation results for the quarterly and annual mean size distributions were the same using a cutoff of 15 hooks per float to define sectors prior to 2005. In particular, the pattern of strong positive associations reported in Tables 3 and 4 was replicated in the sensitivity analysis, noting that in this case, Spearman rank correlations were applied and similar results were achieved.

Overall, there was an increasing trend in mean lengths and weights of swordfish for both shallow- and deep-set sectors of the Hawaii longline fishery during 1994-2022. In particular, strong serial correlations were observed for annual mean lengths ($\rho_{L,y}$) and weights ($\rho_{W,y}$) of swordfish in both the shallow- ($\rho_{L,y} = 0.70$ and $\rho_{W,y} = 0.71$) and the deep-set ($\rho_{L,y} = 0.65$ and $\rho_{W,y} = 0.65$) longline sectors. We note that the increasing trend in the size of harvested swordfish across the swordfish-targeting shallow-set and tuna-targeting deep-set sectors suggests that some biological aspects of the Hawaii longline fishery system have changed, especially in recent years.

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Table 1. Swordfish mean lengths (cm, eye-fork-length [EFL]), coefficients of variation (CV) of length, and numbers of fish lengths sampled by year and quarter, for the **shallow-set sector** of the Hawaii longline collected by the Pacific Islands Regional Observer Program during 1994-2022.

Year	Quarter	Mean Length (cm, EFL)	CV of Length	Number of Fish Sampled
1994	1	149.0	0.20	600
1994	2	141.2	0.23	674
1994	3	112.4	0.25	119
1994	4	145.5	0.23	556
1995	1	151.3	0.18	777
1995	2	143.4	0.21	891
1995	3	139.7	0.23	218
1995	4	104.3	0.27	25
1996	1	144.1	0.19	506
1996	2	137.7	0.24	817
1996	3	138.7	0.24	349
1996	4	141.4	0.21	840
1997	1	141.7	0.20	1176
1997	2	142.5	0.21	835
1997	3	140.1	0.14	299
1997	4	143.3	0.19	372
1998	1	145.9	0.16	606
1998	2	145.1	0.21	292
1998	3	136.4	0.26	481
1998	4	143.4	0.20	1149
1999	1	144.8	0.20	837
1999	2	149.5	0.22	622
1999	3	134.3	0.24	50
1999	4	145.6	0.19	357
2000	1	150.2	0.20	1259
2000	2	143.1	0.23	1294
2000	3	143.2	0.21	229
2000	4	148.8	0.22	1118
2001	1	144.8	0.19	895
2001	2	130.8	0.29	63
2004	2	131.6	0.31	14
2004	3	138.7	0.30	6
2004	4	152.8	0.21	775
2005	1	141.3	0.22	7524
2005	2	136.7	0.24	9985
2005	3	144.4	0.20	458
2005	4	149.0	0.20	1538
2006	1	143.6	0.20	11224
2007	1	147.4	0.18	4578

Table 2. Continued.

Year	Quarter	Mean Length (cm, EFL)	CV of Length	Number of Fish Sampled
2007	2	141.8	0.21	2294
2007	3	143.9	0.19	236
2007	4	160.8	0.15	332
2008	1	151.8	0.18	3511
2008	2	146.2	0.24	1646
2008	3	144.2	0.20	298
2008	4	158.3	0.16	1285
2009	1	154.0	0.19	2701
2009	2	147.6	0.22	2785
2009	3	147.6	0.21	273
2009	4	161.0	0.19	615
2010	1	154.6	0.18	2900
2010	2	147.5	0.20	1686
2010	3	153.0	0.21	302
2010	4	158.7	0.19	831
2011	1	155.1	0.20	3134
2011	2	144.9	0.24	1453
2011	3	146.3	0.24	164
2011	4	156.9	0.19	678
2012	1	152.0	0.21	2651
2012	2	141.5	0.27	1393
2012	3	143.1	0.25	86
2012	4	151.3	0.19	654
2013	1	153.7	0.20	1751
2013	2	145.8	0.25	856
2013	3	140.4	0.27	24
2013	4	145.4	0.25	922
2014	1	151.0	0.23	2629
2014	2	144.7	0.25	1545
2014	3	153.0	0.22	266
2014	4	138.3	0.22	754
2015	1	143.8	0.21	3284
2015	2	139.6	0.23	1114
2015	3	135.4	0.25	142
2015	4	142.2	0.20	324
2016	1	146.4	0.19	1378
2016	2	138.9	0.25	962
2016	3	141.7	0.23	433
2016	4	151.5	0.17	390
2017	1	151.1	0.19	1856
2017	2	147.6	0.21	1711

Table 3. Continued.

Year	Quarter	Mean Length (cm, EFL)	CV of Length	Number of Fish Sampled
2017	3	152.1	0.19	185
2017	4	153.5	0.20	792
2018	1	153.8	0.20	1731
2018	2	134.2	0.28	168
2019	1	154.5	0.19	1397
2020	1	159.3	0.20	896
2020	2	155.6	0.19	67
2020	3	126.1	0.13	8
2020	4	149.8	0.21	622
2021	1	163.1	0.19	1387
2021	2	155.1	0.23	728
2021	3	133.5	0.47	2
2021	4	154.8	0.22	383
2022	1	163.3	0.20	2214
2022	2	158.1	0.22	720
2022	3	163.6	0.18	230
2017	3	152.1	0.19	185
2017	4	153.5	0.20	792
2018	1	153.8	0.20	1731
2018	2	134.2	0.28	168
2019	1	154.5	0.19	1397
2020	1	159.3	0.20	896
2020	2	155.6	0.19	67
2020	3	126.1	0.13	8
2020	4	149.8	0.21	622
2021	1	163.1	0.19	1387
2021	2	155.1	0.23	728
2021	3	133.5	0.47	2
2021	4	154.8	0.22	383
2022	1	163.3	0.20	2214
2022	2	158.1	0.22	720
2022	3	163.6	0.18	230
Average 1994-1999		140.1	0.21	560
Average 2000-2009		146.3	0.21	2190
Average 2010-2019		147.5	0.22	1158
Average 2020-2022		152.9	0.22	660
Average 1994-2022		145.9	0.22	1231

Table 2. Swordfish mean lengths (cm, eye-fork-length [EFL]), coefficients of variation (CV) of length, and numbers of fish lengths sampled by year and quarter, for the **deep-set sector** of the Hawaii longline collected by the Pacific Islands Regional Observer Program during 1994-2022.

Year	Quarter	Mean Length (cm, EFL)	CV of Length	Number of Fish Sampled
1994	1	113.0		1
1994	2	157.8	0.29	10
1994	3	67.9	0.25	14
1994	4	87.3	0.28	3
1995	1	94.0	0.29	3
1995	2	164.8	0.19	5
1995	3	70.3	0.45	26
1995	4	72.1	0.22	21
1996	1	92.3	0.30	3
1996	2	118.3	0.40	29
1996	3	82.0	0.24	4
1996	4	97.3	0.28	3
1997	1	78.0	0.13	2
1997	2	154.5	0.38	6
1997	3	72.0	0.04	2
1997	4	73.6	0.22	20
1998	1	76.9	0.24	9
1998	2	92.3	0.40	8
1998	3	64.2	0.25	27
1998	4	74.8	0.30	59
1999	1	111.2	0.39	11
1999	2	155.6	0.31	7
1999	3	65.7	0.20	22
1999	4	88.9	0.27	19
2000	1	124.7	0.37	7
2000	2	135.5	0.30	17
2000	3	74.5	0.52	41
2000	4	89.6	0.40	160
2001	1	112.0	0.26	49
2001	2	132.0	0.33	77
2001	3	90.7	0.43	141
2001	4	88.6	0.38	228
2002	1	124.4	0.29	487
2002	2	128.2	0.36	260
2002	3	86.4	0.40	204
2002	4	81.7	0.31	277
2003	1	117.4	0.30	74
2003	2	146.7	0.28	170
2003	3	69.3	0.33	681

Table 2. Continued.

Year	Quarter	Mean Length (cm, EFL)	CV of Length	Number of Fish Sampled
2003	4	79.7	0.28	441
2004	1	98.1	0.31	191
2004	2	111.9	0.44	472
2004	3	96.1	0.45	276
2004	4	83.8	0.32	382
2005	1	114.3	0.26	70
2005	2	153.3	0.25	216
2005	3	91.8	0.47	524
2005	4	85.3	0.29	479
2006	1	110.1	0.33	100
2006	2	134.5	0.35	162
2006	3	96.1	0.42	102
2006	4	94.9	0.32	119
2007	1	111.4	0.20	11
2007	2	127.2	0.39	126
2007	3	96.5	0.49	125
2007	4	81.9	0.36	238
2008	1	113.6	0.33	50
2008	2	168.8	0.22	233
2008	3	110.4	0.46	92
2008	4	92.5	0.34	61
2009	1	121.0	0.25	42
2009	2	141.6	0.33	123
2009	3	109.4	0.38	123
2009	4	99.5	0.35	62
2010	1	120.0	0.33	63
2010	2	146.0	0.30	185
2010	3	102.2	0.50	131
2010	4	82.5	0.37	141
2011	1	106.0	0.35	48
2011	2	158.7	0.25	67
2011	3	78.6	0.47	195
2011	4	78.6	0.24	120
2012	1	115.9	0.31	44
2012	2	135.7	0.38	111
2012	3	116.3	0.43	111
2012	4	87.1	0.36	126
2013	1	113.5	0.29	53
2013	2	152.6	0.30	124
2013	3	81.7	0.50	332
2013	4	82.4	0.32	135

Table 2. Continued.

Year	Quarter	Mean Length (cm, EFL)	CV of Length	Number of Fish Sampled
2014	1	101.0	0.34	58
2014	2	153.3	0.28	129
2014	3	109.7	0.46	171
2014	4	99.7	0.29	129
2015	1	110.4	0.32	76
2015	2	152.4	0.23	174
2015	3	108.1	0.38	151
2015	4	85.8	0.32	131
2016	1	113.4	0.33	134
2016	2	153.3	0.29	146
2016	3	98.7	0.46	150
2016	4	87.5	0.35	139
2017	1	124.6	0.33	91
2017	2	166.4	0.22	172
2017	3	90.1	0.47	163
2017	4	85.6	0.31	182
2018	1	109.5	0.34	130
2018	2	164.6	0.23	236
2018	3	96.6	0.47	120
2018	4	88.1	0.36	189
2019	1	116.3	0.31	66
2019	2	155.9	0.26	161
2019	3	107.8	0.50	115
2019	4	92.2	0.36	119
2020	1	150.6	0.26	93
2020	2	167.7	0.19	48
2020	3	89.4	0.51	105
2020	4	105.8	0.37	83
2021	1	139.0	0.36	58
2021	2	160.0	0.25	182
2021	3	114.6	0.41	113
2021	4	99.9	0.33	124
2022	1	142.8	0.34	72
2022	2	149.3	0.31	130
2022	3	115.7	0.44	99
Average 1994-1999		96.9	0.27	13
Average 2000-2009		108.1	0.35	192
Average 2010-2019		113.2	0.35	133
Average 2020-2022		130.4	0.34	101
Average 1994-2022		109.7	0.33	125

Table 3. Temporal associations as indexed by Pearson correlations between quarterly distributions of swordfish mean length (**mlen**), standard deviation of length (**stdlen**), mean weight (**mwt**), standard deviation of weight (**stdwt**) and the time index year-quarter (**yr.qtr**) for the **shallow-set sector (top)** and **deep-set sector (bottom)** of the Hawaii longline collected by the Pacific Islands Regional Observer Program during 1994-2022. Associations below the critical value at the 95% confidence level were judged to be weak and are italicized.

Shallow-set sector				
n=96	**mlen**	**stdlen**	**mwt**	**stdwt**
yr.qtr	0.41	*0.21*	0.48	0.40
mlen		*-0.15*	0.98	0.44
stdlen			*0.00*	0.74
mwt				0.57

Deep-set sector				
n=114	**mlen**	**stdlen**	**mwt**	**stdwt**
yr.qtr	0.30	0.39	0.30	0.47
mlen		0.58	0.98	0.84
stdlen			0.59	0.86
mwt				0.87

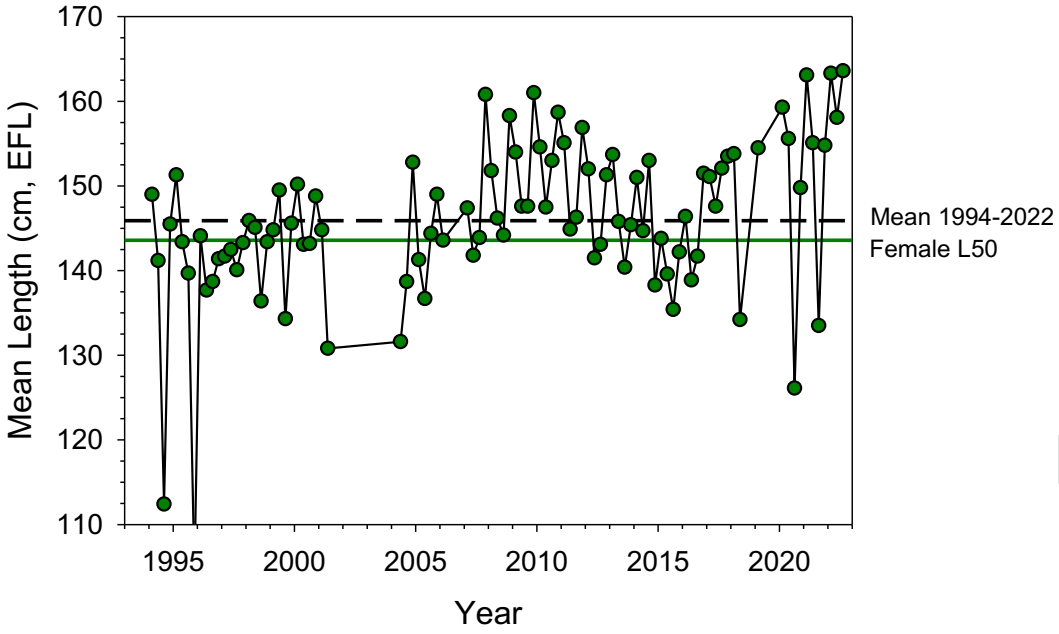
Table 4. Temporal associations as indexed by Pearson correlations between annual distributions of swordfish mean length (**mlen**), standard deviation of length (**stdlen**), mean weight (**mwt**), standard deviation of weight (**stdwt**) and the time index year (**yr**) for the **shallow-set sector (top)** and **deep-set sector (bottom)** of the Hawaii longline collected by the Pacific Islands Regional Observer Program during 1994-2022. Associations below the critical value at the 95% confidence level were judged to be weak and are italicized.

Shallow-set sector				
n=27	**mlen**	**stdlen**	**mwt**	**stdwt**
yr	0.70	*0.34*	0.71	0.63
mlen		*0.31*	0.99	0.71
stdlen			0.43	0.79
mwt				0.79

Deep-set sector				
n=27	**mlen**	**stdlen**	**mwt**	**stdwt**
yr	0.65	0.57	0.65	0.67
mlen		0.79	0.98	0.86
stdlen			0.82	0.93
mwt				0.91

Figure 1. Swordfish observed mean lengths (cm, EFL) by year and quarter for the **shallow-set (a)** and **deep-set (b)** sectors of the Hawaii longline fishery during 1994-2022.

(a) Shallow-set sector



(b) Deep-set sector

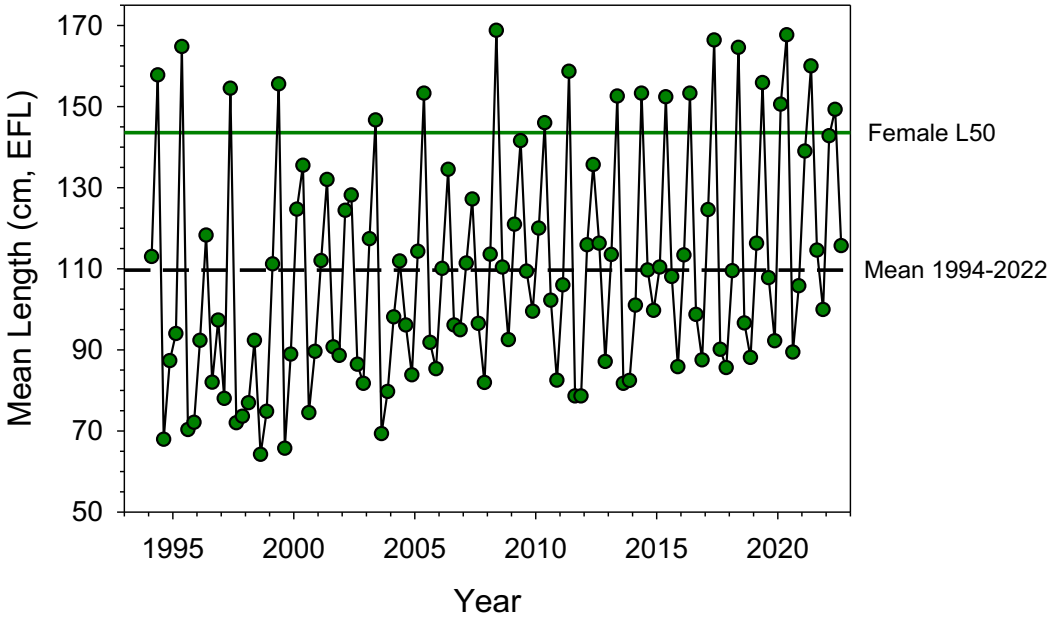
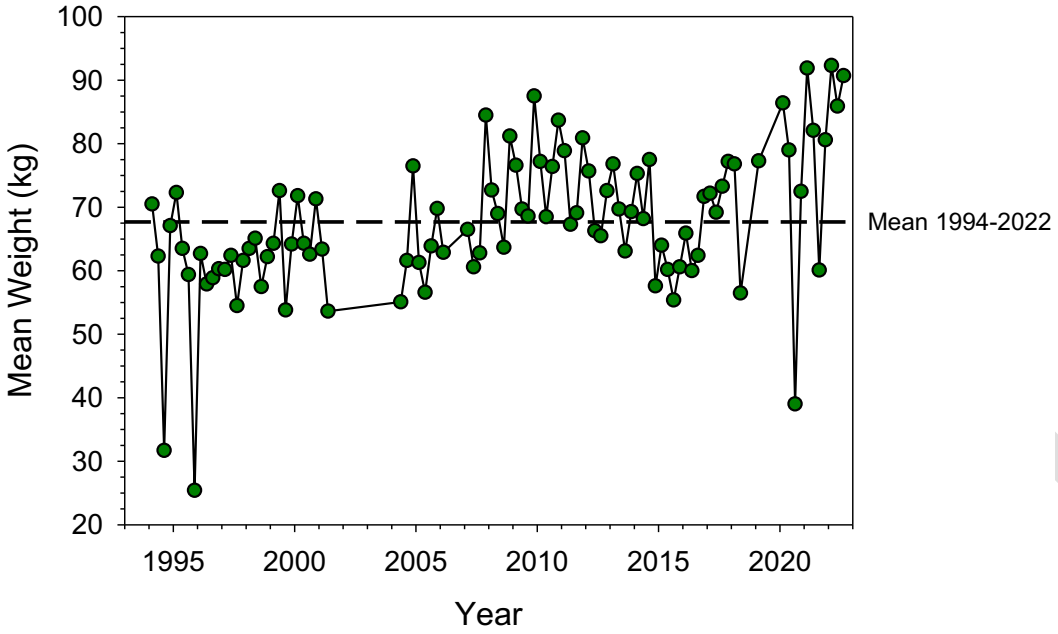


Figure 2. Swordfish calculated mean weights (kg) by year and quarter for the **shallow-set (a)** and **deep-set (b)** sectors of the Hawaii longline fishery during 1994-2022.

(a) Shallow-set sector



(b) Deep-set sector

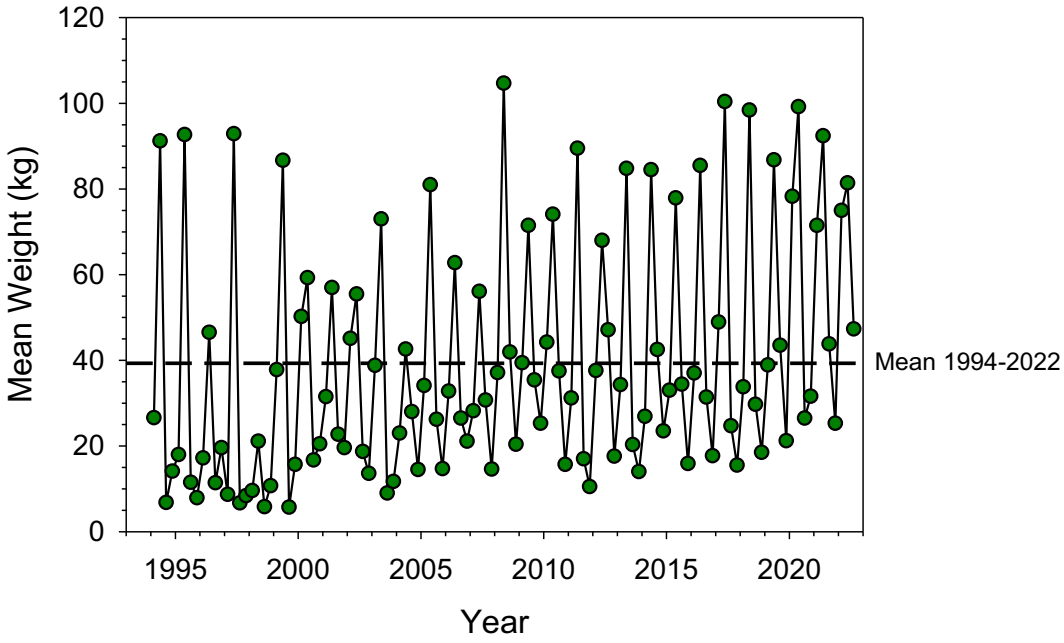
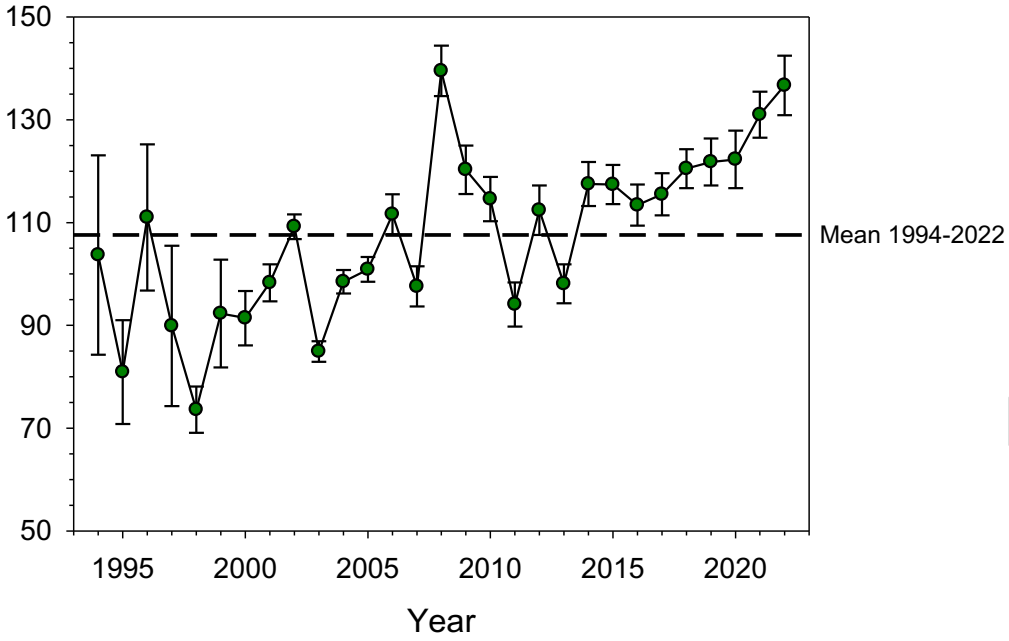


Figure 3. Swordfish observed mean lengths (cm, EFL) by year with error bars showing ±2 standard errors of the mean length for the **shallow-set (a)** and **deep-set (b)** sectors of the Hawaii longline fishery during 1994-2022.

(a) Shallow-set sector



(b) Deep-set sector

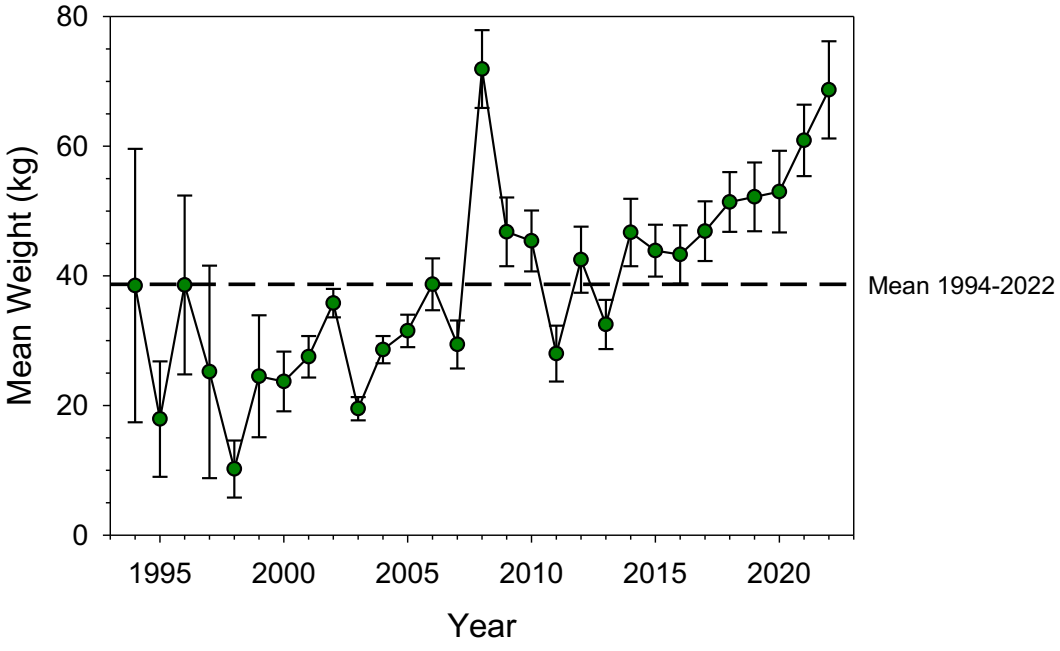
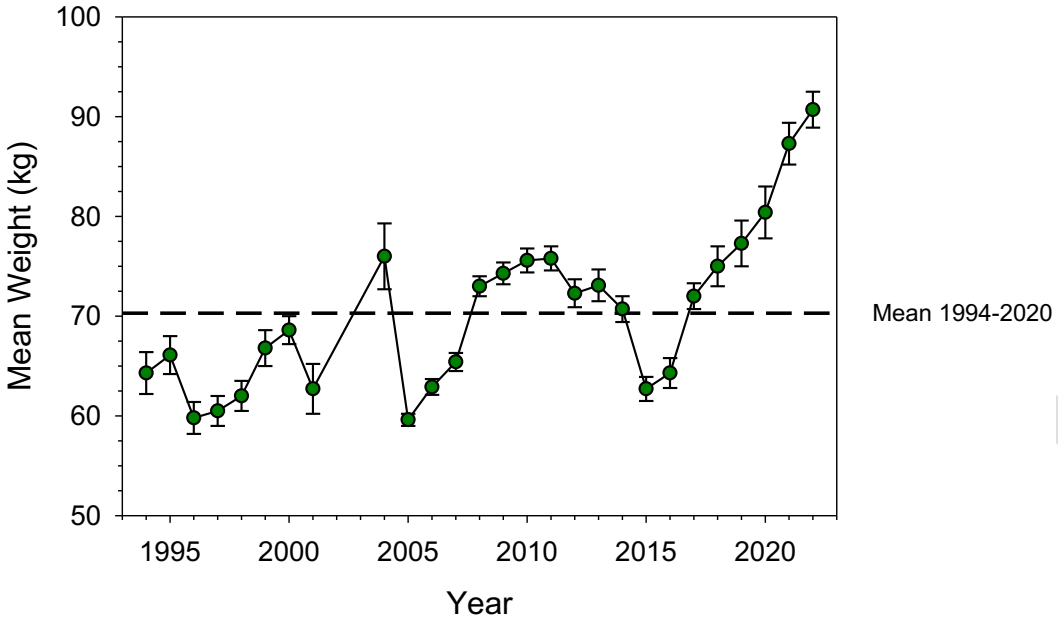


Figure 4. Swordfish calculated mean weights (kg) by year with error bars showing ±2 standard errors of the mean weight for the **shallow-set (a)** and **deep-set (b)** sectors of the Hawaii longline fishery during 1994-2022.

(a) Shallow-set sector



(b) Deep-set sector

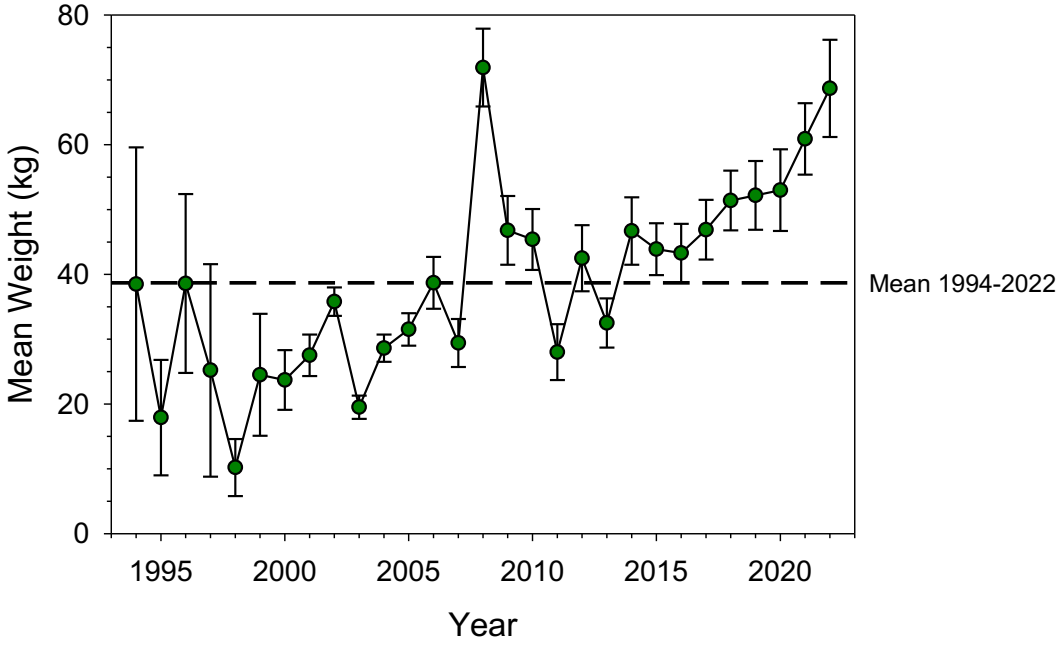
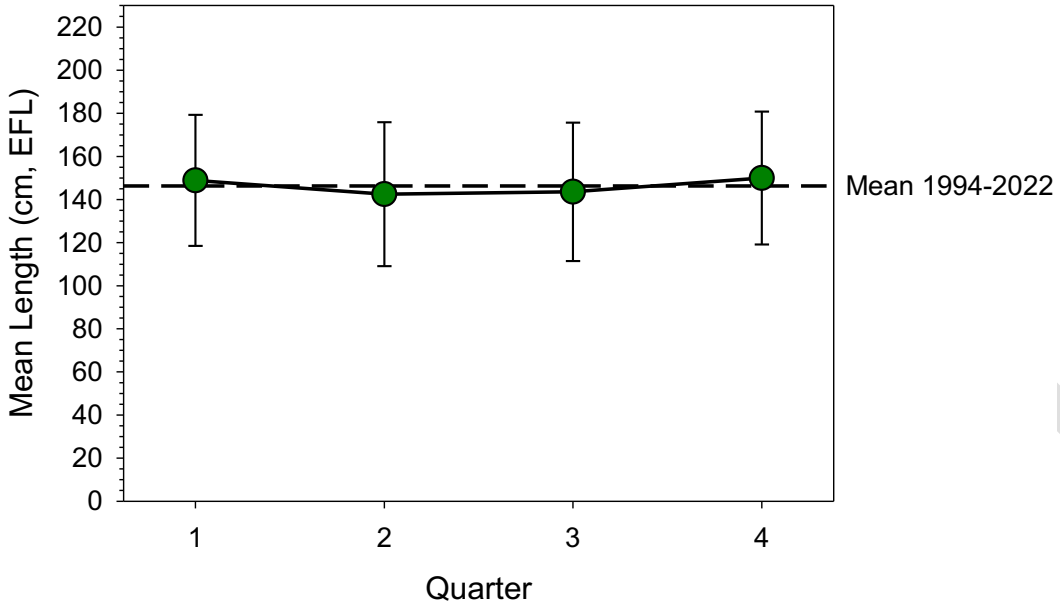


Figure 5. Swordfish observed mean lengths (cm, EFL) by quarter with error bars showing ±1 standard deviation of length for the **shallow-set (a)** and **deep-set (b)** sectors of the Hawaii longline fishery during 1994-2022.

(a) Shallow-set sector



(b) Deep-set sector

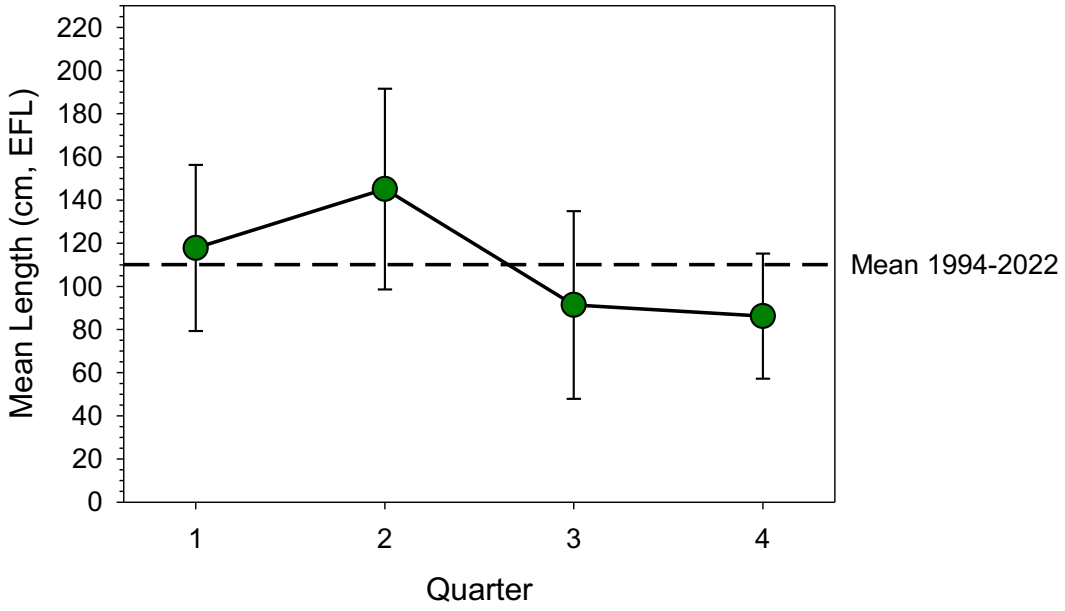
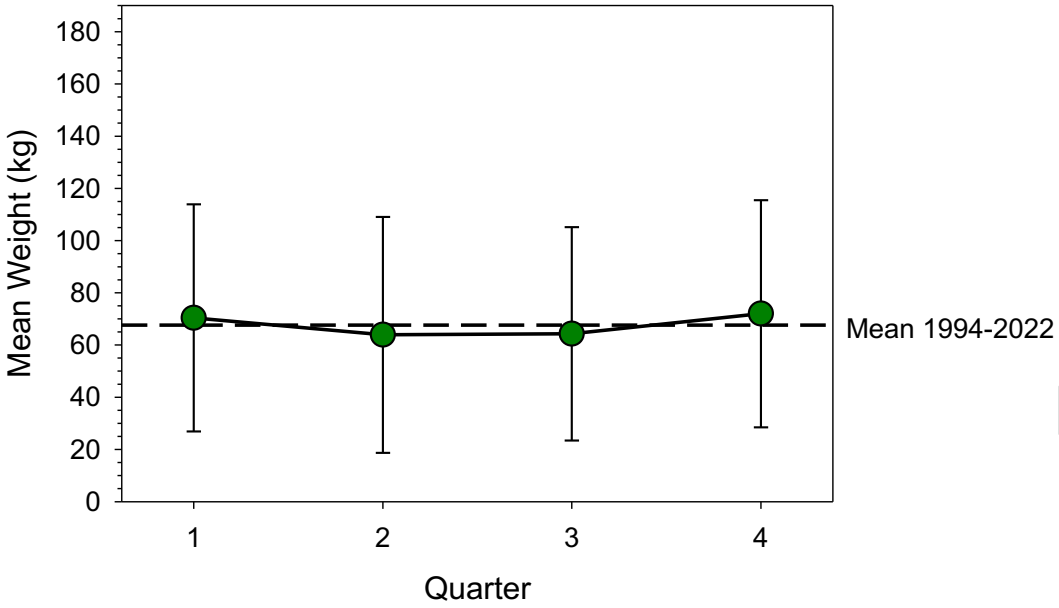
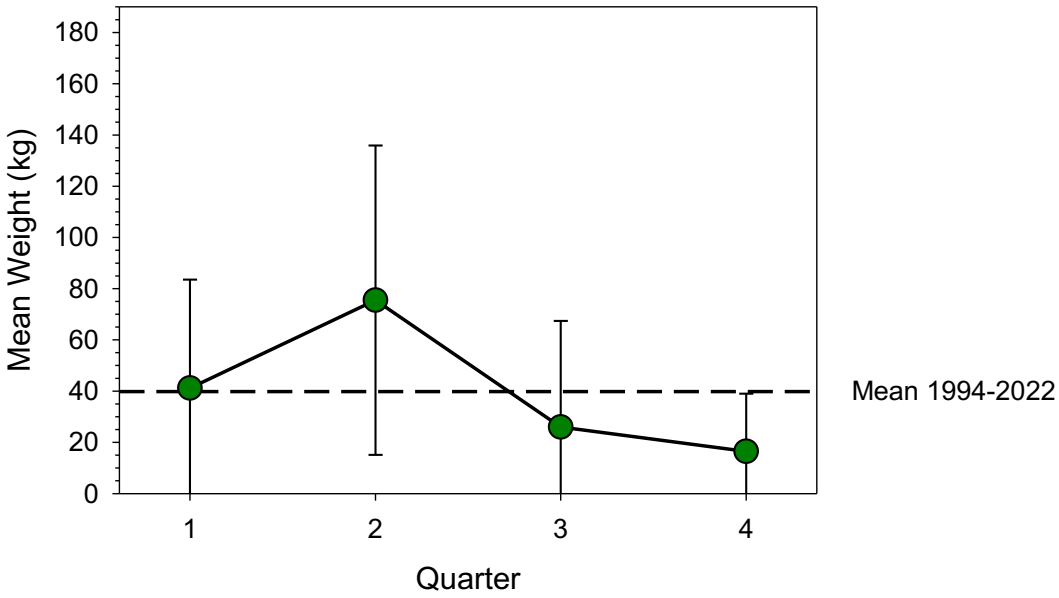


Figure 6. Swordfish calculated mean weights (kg) by quarter with error bars showing ±1 standard deviation of weight for the **shallow-set (a)** and **deep-set (b)** sectors of the Hawaii longline fishery during 1994-2022.

(a) Shallow-set sector



(b) Deep-set sector



Appendixes

Table A1. Number of swordfish length observations (cm, eye-fork length) sampled by 5 cm length bins by year and quarter (35-270, 295 are 5 cm bins, with 275 and 285 are 10 cm bins) for the **shallow-set sector** of the Hawaii-based longline fishery.

Year	Quarter	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
1994	1	0	0	0	0	0	0	0	0	2	6	0	1	2	3	9	13	20	37	44	55	47	46	26	27	31	29
1994	2	0	0	0	0	0	0	0	3	2	7	12	12	17	16	14	22	33	40	53	44	39	57	29	41	37	24
1994	3	0	0	0	0	0	2	5	5	3	0	0	5	9	11	15	12	4	4	7	9	7	1	5	1	4	1
1994	4	0	0	0	0	0	0	3	5	10	2	0	7	7	14	15	14	19	17	21	43	37	34	39	39	29	28
1995	1	0	0	0	0	0	0	0	0	3	3	0	0	2	4	17	25	16	20	45	41	58	56	60	57	51	44
1995	2	0	0	0	0	0	0	0	0	3	12	18	11	8	8	20	33	51	47	36	40	67	63	63	74	59	45
1995	3	0	0	0	0	0	2	0	2	2	1	4	2	6	2	8	7	14	16	6	15	10	16	14	9	5	16
1995	4	0	0	0	0	0	0	2	3	1	0	0	1	3	1	4	1	1	1	1	1	0	1	2	1	0	1
1996	1	0	0	0	0	0	0	0	0	0	5	5	2	3	3	13	11	18	25	44	44	35	32	36	24	38	43
1996	2	0	0	0	0	0	0	0	0	1	3	14	22	47	54	38	30	27	31	41	42	49	45	39	48	40	46
1996	3	0	0	0	0	0	0	0	0	1	4	3	11	16	10	23	17	20	16	15	13	18	13	18	21	20	13
1996	4	0	0	0	0	0	0	0	1	3	2	1	4	6	25	44	55	50	56	41	47	38	52	36	49	61	59
1997	1	0	0	0	0	0	1	0	1	3	3	0	3	4	14	46	71	90	85	86	67	57	68	82	71	77	65
1997	2	0	0	0	0	0	0	0	0	0	4	0	3	9	5	19	46	62	77	92	56	44	41	38	43	34	37
1997	3	0	0	0	0	1	1	0	0	0	0	0	0	0	1	2	2	12	13	21	39	42	29	32	30	20	18
1997	4	0	0	0	0	0	0	1	6	1	4	0	0	0	6	5	3	12	22	29	35	30	29	27	25	28	21
1998	1	0	0	0	0	0	0	0	0	0	3	0	0	0	1	6	10	11	33	44	66	65	53	56	35	47	30
1998	2	0	0	0	0	0	0	0	0	1	4	4	4	1	3	3	5	11	15	18	24	36	15	19	21	12	11
1998	3	0	0	1	1	4	12	19	5	1	2	4	7	17	12	6	6	12	20	17	30	28	35	34	32	27	20
1998	4	0	0	0	0	0	2	2	13	17	11	3	2	6	10	30	42	39	49	55	48	63	101	95	106	95	63
1999	1	0	0	0	0	0	0	0	5	9	27	21	2	10	5	9	16	19	26	20	38	42	58	71	86	90	48
1999	2	0	0	0	0	0	0	0	0	0	3	15	19	7	9	14	17	23	22	24	22	23	34	48	37	33	33
1999	3	0	0	0	0	0	0	0	0	0	1	1	1	6	1	1	6	1	0	2	4	1	4	3	1	1	2
1999	4	0	0	0	0	0	0	0	2	5	3	2	3	1	6	5	9	5	17	18	21	21	27	24	23	29	33
2000	1	0	0	0	0	0	0	0	2	8	10	3	10	7	14	38	37	37	60	58	66	63	57	71	60	72	95
2000	2	0	0	0	0	0	0	0	2	7	13	17	12	17	36	57	72	86	76	63	78	46	43	42	63	59	78
2000	3	0	0	0	0	0	0	0	1	0	0	0	4	0	6	6	12	18	18	16	13	11	7	12	8	6	14
2000	4	0	0	0	0	0	0	4	7	14	18	4	4	6	12	14	23	34	68	62	67	58	66	54	74	58	57
2001	1	0	0	0	0	0	0	0	0	4	4	2	0	1	7	12	19	41	63	73	85	76	58	77	47	42	43
2001	2	0	0	0	0	0	0	0	0	0	3	7	2	0	1	2	4	3	3	8	5	3	2	2	3	2	0
2001	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A1. Continued.

Year	Quarter	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	285	295
1994	1	23	25	30	32	18	19	12	7	6	12	5	3	5	1	0	1	1	1	1	0	0	0	0	0	0
1994	2	20	18	25	23	17	10	13	7	15	5	6	3	1	3	1	3	2	0	0	0	0	0	0	0	0
1994	3	1	2	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	4	30	17	21	18	21	18	13	9	8	7	3	0	2	4	1	1	0	0	0	0	0	0	0	0	0
1995	1	48	39	34	30	35	20	20	12	7	7	8	9	3	2	0	1	0	0	0	0	0	0	0	0	0
1995	2	39	42	29	20	26	14	13	12	9	6	7	3	3	4	2	3	0	1	0	0	0	0	0	0	0
1995	3	12	13	7	3	10	6	0	6	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	1	30	20	19	16	6	6	10	3	3	0	2	3	2	4	0	0	0	1	0	0	0	0	0	0	0
1996	2	36	28	23	18	19	13	24	10	8	10	5	2	4	0	0	0	0	0	0	0	0	0	0	0	0
1996	3	12	16	13	19	10	6	6	5	4	2	3	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	4	30	39	30	30	21	21	13	8	2	5	4	0	3	2	0	0	1	0	0	1	0	0	0	0	0
1997	1	50	44	34	38	29	20	22	14	8	7	2	5	3	3	0	0	2	0	0	1	0	0	0	0	0
1997	2	37	40	28	24	13	20	12	10	8	7	9	5	6	2	0	1	1	2	0	0	0	0	0	0	0
1997	3	12	9	2	4	2	3	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	4	12	15	11	14	9	8	6	5	1	4	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	1	24	22	26	17	11	11	12	9	6	2	4	0	0	0	0	2	0	0	0	0	0	0	0	0	0
1998	2	9	11	10	16	10	7	3	8	4	3	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0
1998	3	30	22	24	18	13	7	3	1	3	4	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0
1998	4	62	56	48	39	16	24	13	13	5	10	3	4	1	0	0	0	2	1	0	0	0	0	0	0	0
1999	1	54	47	25	23	27	16	13	13	4	3	5	4	1	0	0	0	0	0	0	0	0	0	0	0	0
1999	2	35	44	25	20	29	20	14	12	7	13	7	5	5	0	3	0	0	0	0	0	0	0	0	0	0
1999	3	3	3	1	2	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	4	23	17	18	17	12	5	2	5	2	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0
2000	1	91	71	70	57	53	48	22	27	14	10	8	11	6	1	2	0	0	0	0	0	0	0	0	0	0
2000	2	63	79	53	50	33	48	31	23	11	12	15	5	0	1	1	1	1	0	0	0	0	0	0	0	0
2000	3	17	16	3	12	10	7	6	3	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	4	58	51	52	43	56	43	33	35	8	10	5	6	8	4	1	1	0	0	0	0	0	0	0	0	0
2001	1	43	32	33	24	29	27	15	10	8	11	2	3	1	2	1	0	0	0	0	0	0	0	0	0	0
2001	2	2	2	1	1	1	1	0	1	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0
2001	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2002	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A1. Continued.

Year	Quarter	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
2004	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	2	0	0	0	0	0	0	0	0	0	0	1	1	2	0	1	0	2	0	0	1	0	0	2	0	0	0
2004	3	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	1	0
2004	4	0	0	0	0	0	0	0	0	1	2	4	1	9	12	28	34	23	30	28	29	31	34	33	60	46	51
2005	1	0	1	1	1	0	0	1	8	37	64	51	46	117	236	356	436	459	474	405	395	360	390	391	380	367	433
2005	2	0	0	0	2	3	6	15	15	84	190	240	163	154	326	501	644	570	606	522	603	537	488	466	454	453	491
2005	3	0	0	0	0	0	0	0	0	0	1	2	5	8	12	19	17	17	18	32	37	26	24	18	31	23	24
2005	4	0	0	0	0	0	1	0	3	6	4	5	5	12	16	27	41	45	89	97	99	104	74	93	94	86	105
2006	1	0	0	1	0	1	2	6	20	54	95	70	75	90	121	155	252	421	791	938	1021	923	858	652	607	561	528
2006	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	1	0	0	0	0	0	0	2	2	7	22	18	26	45	58	67	95	110	150	192	256	368	503	420	404	328	278
2007	2	0	1	0	0	0	0	0	0	7	30	28	42	32	63	67	76	75	80	106	146	172	189	171	152	164	144
2007	3	0	0	0	0	0	0	0	0	0	2	2	2	3	3	10	5	7	9	12	18	14	17	19	21	23	18
2007	4	0	0	0	0	0	0	0	1	0	0	2	0	2	1	3	2	5	0	3	10	8	12	31	27	31	24
2008	1	0	0	0	0	0	0	0	4	22	23	25	18	20	31	44	44	59	93	132	149	193	250	271	274	300	281
2008	2	0	1	0	3	0	2	3	3	14	36	41	34	36	30	27	40	31	46	74	76	84	83	104	88	115	109
2008	3	0	0	0	0	0	0	0	0	0	2	4	8	4	5	7	6	5	17	7	20	22	33	23	21	14	20
2008	4	0	1	0	0	0	0	0	3	4	2	4	6	3	6	15	13	15	19	19	38	42	66	98	90	122	121
2009	1	0	0	0	1	1	0	1	3	6	16	14	17	27	33	48	58	52	57	83	99	118	145	176	229	198	221
2009	2	0	0	0	1	1	1	0	1	5	18	32	31	53	71	80	111	117	99	102	118	143	160	159	172	168	178
2009	3	0	0	0	0	0	0	0	0	0	0	2	0	6	7	9	10	12	13	13	10	11	16	17	23	16	18
2009	4	0	0	0	0	1	0	0	0	0	1	0	2	2	4	6	17	17	23	24	11	13	20	26	32	44	50
2010	1	0	0	0	0	0	1	2	0	0	6	5	10	23	20	48	59	76	101	117	154	141	175	158	198	177	196
2010	2	0	0	0	0	1	0	0	2	3	2	8	20	13	19	40	73	67	85	88	100	91	109	108	105	104	114
2010	3	0	0	0	0	0	2	3	0	3	1	4	2	3	4	1	2	8	5	11	14	13	20	20	16	14	23
2010	4	0	0	1	0	0	0	0	0	6	7	3	5	1	1	8	12	9	17	24	36	32	53	49	46	58	53
2011	1	0	0	1	0	4	3	5	5	21	29	19	25	17	16	18	33	40	70	105	165	173	226	221	197	179	225
2011	2	0	0	0	0	0	1	0	1	12	24	61	53	26	15	18	37	30	51	48	76	74	104	88	100	80	74
2011	3	0	0	0	0	0	0	0	0	0	4	9	8	7	1	1	2	3	2	2	2	9	11	8	14	10	7
2011	4	0	0	0	0	0	1	1	3	4	9	3	0	2	3	5	7	8	13	16	27	27	46	43	53	51	50
2012	1	0	0	1	0	2	0	1	10	14	34	26	24	22	38	60	70	58	59	75	101	130	169	166	165	180	190
2012	2	0	0	0	0	1	0	1	4	10	26	42	52	42	40	63	69	79	78	31	43	44	58	67	68	64	72
2012	3	0	0	0	0	0	0	0	0	0	0	3	5	5	2	5	3	1	4	1	1	4	0	4	4	8	1
2012	4	0	0	0	0	0	0	0	0	1	3	2	3	6	12	13	19	18	40	32	29	20	28	30	36	45	48
2013	1	0	0	0	0	0	1	1	3	7	13	10	5	16	31	41	44	45	48	48	71	56	85	72	121	132	150
2013	2	0	0	0	0	0	0	0	4	2	11	16	16	11	20	22	42	33	44	48	44	45	54	52	36	22	42
2013	3	0	0	0	0	0	0	0	0	1	0	0	1	1	1	1	1	2	1	1	1	0	0	1	0	1	3
2013	4	1	0	0	0	1	1	3	12	26	24	11	6	8	11	13	23	34	31	52	51	53	49	44	56	48	42

Table A1. Continued.

Year	Quarter	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	285	295
2004	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	2	0	0	0	1	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	3	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2004	4	45	39	50	44	41	13	16	17	8	15	13	4	7	1	3	2	1	0	0	0	0	0	0	0	0
2005	1	358	336	329	227	257	145	89	105	72	62	52	33	23	10	6	4	4	1	2	0	0	0	0	0	0
2005	2	448	386	334	295	286	156	105	139	81	67	38	38	34	18	13	10	2	0	0	1	0	0	0	0	1
2005	3	21	27	25	15	13	12	7	7	15	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	4	90	80	76	61	61	41	40	22	20	13	9	4	4	3	2	2	3	0	1	0	0	0	0	0	0
2006	1	483	495	400	321	296	237	130	157	137	114	67	44	41	21	20	9	4	3	0	0	1	1	0	1	0
2006	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	1	213	182	167	142	145	77	61	71	51	33	23	23	19	11	6	2	1	2	0	0	0	0	0	0	0
2007	2	92	98	83	75	45	43	22	19	26	11	17	3	7	5	3	0	0	0	0	0	0	0	0	0	0
2007	3	7	9	7	5	5	5	3	2	1	2	1	0	2	0	1	1	0	0	0	0	0	0	0	0	0
2007	4	39	21	23	19	17	11	5	15	7	5	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
2008	1	254	246	176	144	115	97	56	49	44	33	13	17	12	6	6	3	2	2	1	0	0	1	1	0	0
2008	2	98	77	75	51	49	61	37	26	29	24	15	8	5	5	3	2	0	0	0	1	0	0	0	0	0
2008	3	18	11	14	10	7	4	2	1	1	5	1	3	1	0	2	0	0	0	0	0	0	0	0	0	0
2008	4	115	95	76	89	75	40	22	25	10	21	12	4	4	6	2	2	0	0	0	0	0	0	0	0	0
2009	1	175	170	158	153	131	68	45	45	42	36	20	20	14	6	4	4	4	2	1	0	0	0	0	0	0
2009	2	162	133	132	115	92	74	45	45	46	42	20	20	11	12	7	4	3	1	0	0	0	0	0	0	0
2009	3	15	17	10	12	9	5	7	1	3	4	1	2	2	0	1	1	0	0	0	0	0	0	0	0	0
2009	4	38	45	35	39	43	24	21	28	13	10	8	6	6	2	0	3	1	0	0	0	0	0	0	0	0
2010	1	173	198	187	149	128	101	68	54	57	38	34	19	12	6	4	0	1	3	0	1	0	0	0	0	0
2010	2	83	66	81	84	51	39	20	22	18	21	14	11	11	6	2	1	2	1	1	0	0	0	0	0	0
2010	3	30	15	16	16	13	10	7	8	10	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
2010	4	53	60	64	66	44	25	26	15	12	13	5	6	8	5	5	1	1	0	0	1	0	0	0	0	0
2011	1	193	208	184	188	128	87	61	61	61	45	33	31	18	16	11	4	5	2	0	1	0	0	0	0	0
2011	2	69	72	65	57	63	26	28	20	25	20	11	4	6	8	1	1	2	0	1	1	0	0	0	0	0
2011	3	7	14	8	6	8	8	6	3	2	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
2011	4	45	52	39	42	29	22	18	12	16	5	11	6	2	3	4	0	0	0	0	0	0	0	0	0	0
2012	1	187	155	158	108	112	59	39	45	45	45	26	20	16	16	13	5	3	1	1	1	1	0	0	0	0
2012	2	60	54	50	40	53	31	23	24	20	20	10	17	10	4	6	6	1	6	2	2	0	0	0	0	0
2012	3	8	4	8	4	5	1	2	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2012	4	55	47	41	25	31	16	13	12	19	4	1	1	2	2	0	0	0	0	0	0	0	0	0	0	0
2013	1	151	131	98	83	69	55	32	19	32	26	17	10	9	12	0	4	1	0	1	1	0	0	0	0	0
2013	2	40	38	38	32	26	16	13	20	12	14	15	11	7	0	4	0	4	0	1	0	1	0	0	0	0
2013	3	2	0	0	2	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	4	42	53	37	39	21	29	18	21	20	12	8	7	3	4	3	2	2	1	0	0	0	0	0	0	0

Table A1. Continued.

Year	Quarter	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160
2014	1	0	1	6	2	1	3	5	9	55	58	30	14	16	26	18	33	50	91	103	156	143	141	149	156	127	143
2014	2	0	0	0	0	1	1	2	2	9	25	41	26	35	31	40	38	59	68	112	91	90	84	69	82	64	74
2014	3	0	0	0	0	0	0	0	0	0	1	8	5	6	4	2	6	7	4	10	13	15	9	11	16	16	13
2014	4	0	0	0	0	0	0	0	4	5	6	5	10	9	10	19	46	56	71	60	47	63	45	30	31	30	36
2015	1	0	0	0	0	1	1	1	2	8	25	19	13	26	59	83	129	172	254	228	240	216	209	169	172	162	158
2015	2	0	0	0	0	0	1	2	1	4	8	21	21	28	26	36	51	58	74	74	76	78	71	56	57	42	65
2015	3	0	0	0	0	1	1	2	3	0	1	1	4	1	5	6	5	7	8	3	14	9	17	7	6	4	4
2015	4	0	0	0	0	0	0	0	4	3	3	1	1	1	3	6	10	10	16	22	38	22	25	27	20	16	18
2016	1	0	0	0	0	0	0	1	2	10	12	10	7	2	12	14	34	21	50	66	110	143	136	118	106	95	53
2016	2	0	0	0	2	4	3	5	2	6	18	28	31	24	14	16	30	27	49	54	63	76	75	54	47	48	41
2016	3	0	0	0	1	0	0	3	1	4	4	8	9	13	13	8	16	12	15	19	26	26	23	22	32	31	28
2016	4	0	0	0	0	0	0	0	0	3	1	0	2	2	5	6	3	5	9	12	16	27	31	31	43	42	36
2017	1	0	0	0	0	0	0	0	1	6	11	13	16	15	27	27	31	42	64	50	87	86	143	149	144	133	153
2017	2	0	0	1	0	0	0	1	3	10	18	23	31	21	31	40	38	43	38	63	82	111	122	118	115	141	112
2017	3	0	0	0	0	0	0	0	1	0	0	1	2	4	3	5	3	5	6	2	7	7	10	10	10	10	17
2017	4	0	0	0	0	0	0	0	1	4	9	5	4	5	10	10	19	21	24	33	39	42	32	42	53	46	61
2018	1	0	0	0	0	0	0	1	5	17	14	14	16	11	14	16	26	41	51	65	67	67	91	95	149	99	120
2018	2	0	0	0	0	0	0	1	2	3	12	12	4	4	1	5	4	9	6	4	9	8	3	7	6	12	6
2018	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	1	0	0	0	0	0	0	0	3	5	13	5	4	10	20	19	27	22	50	42	51	71	78	79	90	81	103
2019	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	1	0	0	0	0	0	0	0	0	3	6	1	2	1	5	8	19	21	32	36	32	38	62	43	47	59	49
2020	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	2	2	1	3	3	3	4	5	3	5
2020	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	2	0	2	1	0	0	0
2020	4	0	0	0	1	1	0	0	4	5	10	5	2	2	1	3	13	16	27	29	39	46	47	45	42	30	41
2021	1	0	0	0	0	0	1	1	0	4	4	7	2	3	6	10	11	23	41	37	62	62	73	70	74	58	98
2021	2	0	0	0	0	0	0	1	0	2	3	11	15	9	4	16	20	23	22	27	37	24	41	44	35	32	33
2021	3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	4	0	0	0	0	0	0	0	1	3	8	2	2	2	5	7	12	5	15	11	11	21	19	31	18	19	21
2022	1	0	0	0	0	1	0	4	0	7	11	2	7	12	15	29	45	45	81	63	65	65	81	81	74	105	125
2022	2	0	0	0	0	0	0	0	1	0	1	11	20	12	7	15	16	17	19	13	23	22	29	24	42	40	36
2022	3	0	0	0	0	0	0	0	0	0	0	1	2	3	0	4	4	4	5	3	11	5	6	10	8	13	12
2022	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A1. Continued.

Year	Quarter	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	265	270	275	285	295
2014	1	141	161	136	140	112	95	74	62	50	53	26	14	11	9	3	3	1	0	0	2	0	0	0	0	0
2014	2	52	84	54	48	48	42	31	30	25	27	17	15	6	6	6	4	1	4	0	1	0	0	0	0	0
2014	3	14	24	15	14	13	8	4	8	6	6	2	2	2	1	1	0	0	0	0	0	0	0	0	0	0
2014	4	25	24	23	23	14	15	7	13	2	4	11	2	1	3	3	0	1	0	0	0	0	0	0	0	0
2015	1	149	143	134	105	96	52	51	43	44	36	24	21	14	8	6	5	4	1	0	1	0	0	0	0	0
2015	2	36	38	34	22	22	15	19	17	18	12	10	8	5	2	2	1	2	1	0	0	0	0	0	0	0
2015	3	9	3	6	2	2	2	1	3	2	1	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0
2015	4	15	18	11	7	7	5	2	2	3	5	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0
2016	1	57	69	50	48	35	17	12	17	16	24	10	7	7	4	3	0	0	0	0	0	0	0	0	0	0
2016	2	40	34	36	28	22	17	12	13	13	7	3	6	4	5	2	1	1	1	0	0	0	0	0	0	0
2016	3	23	24	15	14	5	8	7	5	3	2	7	3	2	0	1	0	0	0	0	0	0	0	0	0	0
2016	4	21	18	20	12	14	6	4	1	1	4	8	0	6	1	0	0	0	0	0	0	0	0	0	0	0
2017	1	128	104	81	94	70	38	29	30	24	16	20	6	8	2	4	1	0	1	1	1	0	0	0	0	0
2017	2	96	86	74	64	70	26	27	25	17	21	7	5	10	9	2	3	1	3	1	0	1	0	0	1	0
2017	3	13	22	12	12	10	2	6	1	0	3	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2017	4	57	47	49	44	24	23	21	15	8	14	9	10	4	3	1	0	2	0	0	0	0	0	0	1	0
2018	1	124	125	96	106	97	47	33	37	26	22	7	10	8	6	1	5	0	0	1	1	0	0	0	0	0
2018	2	8	9	7	10	6	1	3	2	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2018	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2018	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	1	119	104	86	74	62	49	29	29	19	17	10	9	8	4	0	3	1	0	1	0	0	0	0	0	0
2019	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2019	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	1	51	71	52	58	37	37	16	19	19	14	9	11	7	9	6	4	5	2	3	1	0	1	0	0	0
2020	2	6	2	4	5	1	6	0	1	1	1	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2020	4	21	34	27	30	32	12	11	11	6	13	2	3	6	2	0	0	1	0	0	0	0	0	0	1	1
2021	1	79	94	84	99	83	57	41	35	25	37	25	28	9	17	11	9	4	2	0	0	0	0	1	0	0
2021	2	45	30	40	32	36	21	23	18	15	24	17	12	4	3	3	2	1	0	2	1	0	0	0	0	0
2021	3	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2021	4	20	23	19	15	20	17	12	12	3	7	7	8	3	2	1	0	1	0	0	0	0	0	0	0	0
2022	1	136	169	170	141	162	108	88	67	70	53	41	28	28	17	5	4	2	2	2	3	0	0	0	0	0
2022	2	45	48	38	52	42	32	20	24	14	14	11	11	7	8	3	2	1	0	0	0	0	0	0	0	0
2022	3	12	15	16	23	23	8	17	10	7	4	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0
2022	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A2. Number of swordfish length observations (cm, eye-fork length) sampled by 5 cm length bins by year and quarter (35-255, 275 are 5 cm bins, with 260 is a 15 cm bin) for the **deep-set sector** of the Hawaii-based longline fishery.

Year	Quarter	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
1994	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
1994	2	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	2	0	0	0
1994	3	0	0	0	0	0	0	1	2	5	4	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
1994	4	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
1995	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0
1995	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
1995	3	0	0	0	0	0	1	3	10	7	1	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0
1995	4	0	0	0	0	0	0	0	1	5	8	2	4	0	0	0	0	0	0	0	0	0	0	0	1	0
1996	1	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0
1996	2	0	0	0	0	0	0	0	1	3	3	2	1	0	0	3	0	1	1	0	0	1	2	0	0	0
1996	3	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0
1996	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0
1997	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
1997	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
1997	3	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	4	0	0	0	0	0	0	0	0	5	9	4	0	0	0	0	0	0	0	1	0	1	0	0	0	0
1998	1	0	0	0	0	0	0	0	0	2	3	1	1	0	0	0	1	0	0	0	1	0	0	0	0	0
1998	2	0	0	0	0	0	0	0	1	2	1	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0
1998	3	0	0	0	0	2	1	0	6	9	5	1	1	0	0	0	0	0	0	0	0	0	0	1	0	0
1998	4	0	0	0	0	0	0	1	4	7	13	22	8	0	1	0	0	0	1	2	0	0	0	0	0	0
1999	1	0	0	0	0	0	0	0	0	0	0	1	1	3	1	0	0	2	0	0	0	0	0	0	0	0
1999	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
1999	3	0	0	0	0	0	0	0	6	12	1	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0
1999	4	0	0	0	0	0	0	0	0	2	3	3	2	1	1	0	1	0	3	0	0	0	1	2	0	0
2000	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	1	0	0	0	0	0	0	0
2000	2	0	0	0	0	0	0	0	0	0	1	1	0	0	1	0	0	1	0	1	1	1	2	0	1	1
2000	3	0	0	0	0	1	2	5	9	8	6	1	0	0	0	0	0	0	0	1	0	0	0	2	0	0
2000	4	0	1	0	0	0	0	3	14	28	35	22	4	1	1	1	2	1	1	2	6	6	8	4	6	4
2001	1	0	0	0	0	0	0	0	0	0	1	3	7	5	0	1	0	1	5	4	3	2	6	1	2	1
2001	2	0	0	0	0	0	0	0	3	2	4	2	0	2	2	2	1	1	1	1	3	2	3	8	2	4
2001	3	0	0	0	0	1	2	6	21	20	28	9	0	2	2	0	1	1	2	2	1	2	5	6	5	3
2001	4	0	0	0	0	0	1	4	10	42	44	41	10	2	1	4	9	8	6	1	5	5	6	6	4	5
2002	1	0	0	0	0	0	2	9	24	24	3	3	11	12	10	14	7	11	17	14	21	29	32	40	28	43
2002	2	0	0	0	0	0	4	5	12	16	13	9	3	5	4	7	5	2	5	6	4	3	11	9	14	11
2002	3	0	0	0	0	0	3	10	17	45	34	20	9	2	2	1	1	7	5	2	4	4	5	5	7	6
2002	4	0	0	0	0	0	1	5	14	30	69	56	30	9	2	2	6	8	8	6	4	6	3	5	2	3
2003	1	0	0	0	0	0	0	0	0	1	2	4	9	5	3	2	3	2	2	6	6	1	0	3	5	1
2003	2	0	0	0	0	0	1	3	4	3	2	1	3	2	0	1	2	3	4	5	2	6	11	9	10	6
2003	3	0	0	0	1	1	10	51	132	193	156	54	10	3	3	2	4	7	4	3	3	2	2	2	1	3
2003	4	0	0	0	0	1	0	1	9	61	125	109	50	15	6	2	7	6	10	6	6	8	6	5	5	6

Table A2. Continued.

Year	Quarter	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	275
1994	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	2	0	0	0	1	0	0	1	0	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0
1994	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1994	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	2	0	0	0	1	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1995	3	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1995	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	2	2	1	1	1	0	0	1	1	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1996	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	2	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
1997	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1997	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1998	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
1999	1	0	0	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	2	0	0	0	0	1	0	2	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1999	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2000	2	0	1	0	0	0	2	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2000	3	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2000	4	5	0	1	1	2	1	0	0	2	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2001	1	2	2	1	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	2	6	2	4	5	4	1	2	0	3	1	0	1	0	2	0	0	0	0	0	1	0	0	0	0
2001	3	2	5	4	1	2	2	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2001	4	4	2	0	3	3	1	2	0	0	1	0	0	1	0	0	0	1	0	0	0	0	0	0	0
2002	1	31	27	13	11	13	7	8	9	3	2	1	2	2	1	2	0	1	0	0	0	0	0	0	0
2002	2	14	10	16	11	7	12	5	4	4	6	5	3	2	4	0	3	0	0	1	0	0	0	0	0
2002	3	5	2	3	2	3	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2002	4	2	0	0	1	1	1	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	1	3	2	2	3	2	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2003	2	10	12	5	5	12	6	9	5	4	7	7	3	4	1	0	2	2	0	0	0	0	0	0	0
2003	3	2	1	4	2	2	1	0	2	0	2	1	0	1	0	0	1	1	0	0	0	0	0	0	0
2003	4	4	2	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A2. Continued.

Year	Quarter	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
2004	1	0	0	0	0	0	0	3	4	3	5	8	30	28	33	12	5	4	6	4	5	9	1	5	3	3
2004	2	0	0	0	0	1	4	32	51	41	23	10	0	9	19	23	25	12	7	9	6	8	16	16	11	11
2004	3	0	0	0	0	1	5	17	42	47	23	11	6	0	2	5	11	1	10	4	2	5	12	9	9	5
2004	4	0	0	0	0	0	1	9	27	60	95	44	18	8	6	5	16	13	13	15	9	4	8	6	6	6
2005	1	0	0	0	0	0	0	0	0	0	0	5	6	4	3	3	3	8	6	7	4	5	5	1	4	2
2005	2	0	0	0	0	0	0	0	4	0	1	0	1	2	3	3	4	2	8	7	8	11	3	9	6	11
2005	3	0	0	0	2	3	4	21	70	85	90	49	9	5	4	3	5	8	8	10	13	9	13	13	13	7
2005	4	0	0	0	0	1	0	2	9	47	96	116	51	16	12	12	10	8	9	14	10	13	16	7	8	9
2006	1	0	0	0	0	0	1	6	6	1	0	8	4	6	5	1	3	4	3	4	4	4	6	8	3	3
2006	2	0	1	0	0	0	2	2	3	8	3	7	1	5	4	2	4	1	1	5	6	9	10	9	8	4
2006	3	0	0	0	0	0	1	0	8	23	15	8	4	2	0	0	2	3	3	2	1	2	4	4	3	2
2006	4	0	0	0	0	0	0	0	3	7	23	18	10	5	1	4	1	5	6	4	3	3	3	10	2	3
2007	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	1	1	0	2	0	2	1	1	0
2007	2	1	0	0	1	0	2	7	10	5	4	2	0	2	1	1	2	2	0	0	5	6	5	5	6	8
2007	3	0	0	0	2	1	1	11	17	15	12	3	2	3	1	2	1	4	2	0	2	7	4	3	2	3
2007	4	0	0	1	0	3	2	10	23	41	43	38	7	7	6	7	5	2	0	3	12	4	6	8	3	3
2008	1	0	0	0	0	0	1	0	0	1	1	2	7	5	2	2	1	0	2	4	3	1	1	6	0	1
2008	2	0	0	0	0	0	0	0	1	1	1	1	2	2	3	0	0	3	4	4	1	1	4	11	5	7
2008	3	0	0	0	0	0	4	6	12	10	3	2	3	1	1	0	1	0	0	0	3	2	2	2	4	3
2008	4	0	0	0	0	1	0	3	1	6	10	9	5	2	1	0	4	1	2	3	3	2	1	2	0	3
2009	1	0	0	0	0	0	0	0	0	0	0	2	1	2	2	4	4	1	2	2	1	4	1	2	3	1
2009	2	0	0	0	0	0	0	1	4	5	1	3	2	2	6	3	1	2	1	3	4	3	6	6	4	3
2009	3	0	0	0	0	1	2	7	6	8	10	7	2	1	0	3	1	7	7	4	7	6	3	4	6	4
2009	4	0	0	0	0	0	0	1	4	7	5	9	2	1	1	1	3	2	3	3	4	3	3	2	1	0
2010	1	0	0	0	0	0	1	1	0	1	1	0	3	5	3	6	2	2	3	5	2	1	2	6	2	4
2010	2	0	0	0	0	0	0	6	2	3	5	2	1	4	3	3	5	2	0	5	6	5	3	8	7	8
2010	3	0	0	0	0	4	2	6	20	12	15	6	0	2	1	1	1	1	5	2	1	2	4	2	4	3
2010	4	0	0	0	0	0	4	7	8	17	28	30	13	7	0	2	3	1	3	4	1	2	6	2	0	1
2011	1	0	0	0	0	0	0	0	0	1	3	2	7	6	8	2	0	1	1	0	1	1	1	2	4	1
2011	2	0	0	0	0	0	0	0	0	0	0	1	1	1	3	1	0	0	1	0	1	2	4	3	1	2
2011	3	0	0	0	0	3	8	19	38	36	31	14	5	2	2	1	0	0	2	1	3	3	2	1	1	2
2011	4	0	0	0	0	0	1	2	7	14	27	22	12	8	3	1	3	5	5	5	1	4	0	0	0	0
2012	1	0	0	0	0	0	0	1	0	0	2	0	3	6	4	0	1	1	4	1	2	1	4	1	2	4
2012	2	0	0	0	0	0	0	4	3	7	4	1	2	6	3	3	1	4	5	1	3	2	0	3	1	3
2012	3	0	0	0	0	0	3	1	9	12	5	4	4	3	1	3	2	3	10	1	4	1	2	3	2	4
2012	4	0	0	0	0	1	3	2	9	16	22	22	9	1	0	0	1	4	6	4	7	2	4	2	2	0
2013	1	0	0	0	0	0	0	0	0	0	2	2	7	7	2	1	0	4	4	1	3	2	1	0	5	3
2013	2	0	0	0	0	0	1	3	3	2	1	1	0	2	1	1	1	0	5	5	5	3	4	3	4	3
2013	3	1	0	1	6	1	10	26	52	74	49	25	8	2	3	5	2	2	1	8	2	0	5	2	3	1
2013	4	0	0	0	0	0	0	4	4	11	26	36	18	7	4	1	2	1	2	2	7	1	1	0	1	1

Table A2. Continued.

Year	Quarter	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	275
2004	1	4	1	4	0	4	2	2	0	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0
2004	2	8	18	15	12	15	10	11	7	8	4	7	5	3	4	2	2	2	0	1	0	1	0	0	0
2004	3	8	10	5	2	4	2	6	3	3	2	3	1	0	1	0	0	0	0	0	0	0	0	0	0
2004	4	5	6	3	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2005	1	2	1	1	2	1	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
2005	2	19	14	8	11	10	8	6	7	5	11	10	4	5	4	1	1	1	0	1	1	0	0	2	0
2005	3	6	6	7	6	8	10	5	8	2	3	3	2	3	3	3	1	0	1	0	1	0	0	0	0
2005	4	4	5	2	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	1	7	4	1	2	2	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2006	2	4	3	7	5	5	8	6	7	1	2	2	5	4	2	0	1	0	1	0	2	0	0	0	0
2006	3	2	2	2	2	4	1	2	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2006	4	0	1	4	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2007	2	6	10	4	3	1	2	3	4	5	2	3	2	1	3	0	0	1	0	0	0	0	0	0	0
2007	3	1	5	2	3	0	3	1	3	0	1	0	0	1	0	0	1	2	0	0	0	0	0	0	0
2007	4	1	2	3	0	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
2008	1	1	3	1	1	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0
2008	2	11	16	11	10	24	12	7	11	13	5	10	10	13	8	6	5	2	0	3	1	0	1	1	0
2008	3	5	5	2	2	4	2	1	4	5	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0
2008	4	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	1	1	2	0	2	2	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2009	2	6	3	4	6	6	4	5	6	4	5	1	0	1	0	2	3	2	0	0	1	1	0	0	0
2009	3	6	5	1	4	2	6	2	1	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0
2009	4	4	0	1	0	1	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2010	1	1	3	1	1	0	0	0	0	1	1	0	0	1	0	2	0	1	0	0	0	0	0	0	0
2010	2	9	11	14	8	13	6	10	8	3	3	5	6	3	4	0	1	1	0	0	0	2	0	0	0
2010	3	3	3	2	3	3	4	1	2	2	0	3	0	0	2	0	4	0	0	0	0	0	0	0	0
2010	4	2	1	1	0	0	0	1	1	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2011	1	1	1	0	1	1	3	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
2011	2	6	4	1	5	5	3	4	2	1	2	4	3	1	1	1	1	0	1	0	0	0	1	0	0
2011	3	1	3	5	1	2	2	1	2	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
2011	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2012	1	1	2	0	1	1	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
2012	2	2	3	5	4	4	2	9	4	4	4	0	3	3	1	3	0	2	1	0	0	0	0	0	0
2012	3	0	3	2	4	2	4	3	7	0	1	1	1	3	2	1	0	0	0	0	0	0	0	0	0
2012	4	1	1	1	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2013	1	1	5	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2013	2	5	3	3	6	5	5	5	9	9	5	7	1	5	2	3	1	0	0	0	0	0	0	1	0
2013	3	3	3	4	6	3	3	6	2	1	2	2	0	2	4	0	0	1	0	0	0	0	0	0	0
2013	4	3	0	2	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

Table A2. Continued.

Year	Quarter	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145
2014	1	0	0	0	0	0	1	0	1	1	0	3	7	12	7	3	5	1	4	1	0	3	0	1	1	3
2014	2	0	0	0	0	0	0	0	0	1	3	4	0	4	0	3	2	5	2	2	1	2	8	4	6	4
2014	3	0	0	0	0	1	8	3	7	22	13	7	4	3	2	4	3	4	6	8	9	4	5	5	4	2
2014	4	0	0	0	0	0	0	1	3	5	11	14	18	7	2	4	6	9	15	5	7	9	5	2	2	2
2015	1	0	0	0	0	1	0	4	0	0	1	3	4	8	4	4	5	1	8	3	6	2	3	4	2	2
2015	2	0	0	0	0	0	0	0	0	0	1	0	1	3	4	2	2	4	1	4	6	8	9	6	6	9
2015	3	0	0	0	0	0	1	5	7	12	19	8	3	4	1	3	3	10	4	6	7	14	7	4	3	4
2015	4	0	0	0	0	0	0	1	5	9	21	31	18	12	2	2	2	1	7	2	2	2	1	1	2	2
2016	1	0	0	0	0	0	1	0	0	1	1	12	12	15	7	6	5	7	8	5	5	5	5	6	5	1
2016	2	0	0	0	1	1	0	0	2	2	0	0	1	3	4	7	2	1	0	3	6	3	4	12	5	5
2016	3	0	0	0	0	0	1	6	14	27	15	11	3	4	3	4	2	3	2	2	6	1	4	5	5	4
2016	4	0	0	0	0	0	0	0	3	7	36	31	14	10	6	2	3	4	6	1	1	1	1	2	0	1
2017	1	0	0	0	0	0	0	0	0	2	1	7	6	5	5	1	3	7	4	4	1	4	3	7	3	0
2017	2	0	0	0	0	0	0	0	0	0	1	1	0	2	1	1	1	1	3	5	0	5	4	3	13	8
2017	3	0	0	0	0	3	3	6	21	21	25	20	7	5	4	4	3	3	1	0	2	1	2	1	4	5
2017	4	0	0	0	0	0	0	2	3	8	31	48	31	11	4	3	2	2	8	3	0	6	4	1	3	1
2018	1	0	0	0	0	0	0	0	0	1	7	8	21	10	8	4	7	6	4	6	4	8	3	4	1	3
2018	2	0	0	0	0	0	0	0	0	2	0	0	3	1	3	4	1	1	8	4	10	5	8	6	3	11
2018	3	0	0	0	0	2	1	7	20	14	14	5	2	3	1	0	3	1	2	3	3	5	7	3	2	1
2018	4	0	0	0	0	0	2	3	2	18	32	43	21	9	4	7	2	4	4	2	10	5	4	1	2	3
2019	1	0	0	0	0	0	0	0	0	0	1	3	5	4	6	3	4	5	4	4	2	3	3	1	1	2
2019	2	0	0	0	0	0	1	0	0	1	2	0	1	3	5	4	3	3	6	2	0	5	10	4	3	5
2019	3	0	0	0	1	0	4	5	17	11	10	5	0	0	1	6	2	2	5	1	1	5	1	0	1	1
2019	4	0	0	0	0	1	0	1	4	9	24	23	8	3	2	2	8	2	5	4	3	0	2	3	4	5
2020	1	0	0	0	0	0	0	0	0	0	1	0	3	1	1	0	2	2	1	5	2	5	4	8	8	3
2020	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	4	1	2	1
2020	3	0	0	1	2	0	3	6	11	15	15	12	6	1	1	3	1	1	3	0	0	1	1	0	1	2
2020	4	0	0	0	0	1	1	1	1	5	6	12	11	2	1	1	0	4	5	1	4	4	5	2	2	2
2021	1	0	0	0	0	0	0	0	0	1	1	3	5	3	3	2	1	1	0	3	2	1	0	2	4	0
2021	2	0	0	0	1	0	0	0	0	0	1	0	0	1	4	11	1	6	3	2	5	3	6	4	7	6
2021	3	0	0	0	0	0	1	1	4	9	9	9	5	3	3	4	2	5	7	1	5	1	4	3	1	2
2021	4	0	0	0	0	0	0	1	1	7	13	19	15	4	2	2	5	6	7	7	5	5	4	6	2	6
2022	1	0	0	0	0	0	0	0	0	0	1	2	2	2	4	3	1	7	2	4	3	2	1	0	2	2
2022	2	0	0	0	0	0	1	1	2	3	2	1	2	1	2	6	5	0	3	3	6	4	5	1	8	5
2022	3	0	0	0	0	0	1	3	5	12	10	3	5	1	2	1	2	2	3	3	5	2	2	1	2	4
2022	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Table A2. Continued.

Year	Quarter	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	245	250	255	260	275
2014	1	1	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
2014	2	7	7	5	5	4	3	8	7	6	2	5	4	3	1	1	1	1	3	2	1	0	0	0	0
2014	3	6	3	5	2	6	2	1	0	3	1	1	2	3	4	1	0	0	1	0	1	0	0	0	1
2014	4	2	0	0	1	1	0	0	1	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0
2015	1	0	2	1	1	1	1	2	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
2015	2	14	11	7	10	6	6	12	3	6	7	2	4	2	3	4	3	0	1	0	0	0	0	0	0
2015	3	6	4	3	1	2	3	5	2	4	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0
2015	4	1	3	1	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2016	1	4	0	4	3	3	3	1	2	3	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0
2016	2	5	6	6	10	3	5	11	3	7	1	2	6	3	1	5	3	3	3	0	0	0	1	0	0
2016	3	2	4	1	4	0	1	2	4	1	1	0	1	1	1	1	0	0	2	0	0	0	0	0	0
2016	4	0	2	2	3	2	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2017	1	2	2	3	2	4	1	4	2	2	2	0	2	1	0	1	0	0	0	0	0	0	0	0	0
2017	2	6	17	5	9	8	14	4	11	3	9	9	5	2	7	1	2	4	1	1	0	3	0	1	0
2017	3	0	2	4	1	4	1	2	3	2	1	1	1	0	1	2	0	0	0	0	0	0	0	0	0
2017	4	2	3	2	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2018	1	0	1	2	4	4	4	2	1	0	1	1	0	1	0	0	0	0	1	0	0	0	0	0	0
2018	2	10	10	15	10	12	16	12	18	12	6	11	6	4	5	6	6	3	2	2	1	0	0	1	1
2018	3	3	3	3	2	0	1	1	1	1	0	2	1	0	1	0	0	0	0	0	0	0	0	1	0
2018	4	2	0	1	1	0	2	1	1	1	1	1	0	0	0	1	0	0	0	0	0	0	0	0	0
2019	1	2	0	3	1	0	0	3	0	1	0	1	0	0	1	1	0	0	0	0	0	0	0	0	0
2019	2	10	4	3	15	8	8	9	7	11	4	4	1	7	3	1	3	1	0	2	2	0	0	0	0
2019	3	3	3	0	2	3	3	5	2	4	1	4	0	0	1	2	0	1	0	0	1	0	0	0	0
2019	4	2	1	2	0	0	1	0	1	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2020	1	5	5	2	4	4	4	3	5	3	1	0	0	0	2	2	2	2	1	2	0	0	0	0	0
2020	2	4	1	1	2	1	4	2	6	2	3	2	2	0	0	3	2	0	0	0	0	0	0	0	0
2020	3	1	2	2	1	2	1	1	3	1	0	0	2	0	0	0	2	0	0	0	0	0	0	0	0
2020	4	0	3	2	1	2	0	0	3	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
2021	1	1	1	1	1	2	3	2	1	1	2	2	1	1	1	2	2	1	0	0	0	0	0	0	0
2021	2	6	6	9	10	9	9	10	9	9	12	5	7	4	5	2	4	1	1	1	0	0	0	2	0
2021	3	0	3	3	4	5	0	5	1	2	3	1	2	0	0	0	2	0	1	0	0	0	0	0	0
2021	4	1	3	0	1	0	1	2	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
2022	1	1	3	2	0	1	1	9	2	2	1	1	1	2	0	2	1	0	0	1	0	0	1	1	0
2022	2	5	3	1	3	4	5	10	5	9	5	3	2	5	2	4	0	0	2	2	0	0	0	0	0
2022	3	2	2	4	2	2	0	6	1	2	1	3	2	2	0	0	1	0	0	0	1	0	0	0	0
2022	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0