

14: Assessment of the Demersal Shelf Rockfish Stock Complex in the Southeast Outside Subdistrict of the Gulf of Alaska

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Executive Summary

The demersal shelf rockfish (DSR) complex (yelloweye, quillback, copper, rosethorn, China, canary, and tiger rockfish) is a Tier 4 complex and assessed on a triennial cycle, with a full stock assessment typically conducted every third year. This is a partial assessment; a full assessment will be presented in 2021. The DSR complex assessment is based on relative abundance estimates from a remotely operated vehicle, prior to 2012 estimates were made via a manned submersible (*Delta*). Three management areas (SSEO, CSEO, and NSEO) were surveyed in 2018. The recommended acceptable biological catch (ABC) and overfishing level (OFL) for this assessment includes results from the most recent surveys.

Summary of Changes in Assessment Inputs

The following updates have been made to last year's assessment:

Changes in the input data:

Management region specific catch information and commercial fishery average weights were updated for 2019. Relative abundance estimates from the ROV survey were updated for the SSEO, CSEO, and NSEO regions.

Catch information and the average weight of yelloweye rockfish caught in the commercial fishery were updated for 2019 (Tables 14.1 and 14.2).

Changes in the assessment methodology:

There were no changes in the assessment methodology.

Summary of Results

The yelloweye rockfish biomass estimate decreased from 12,029 t to 10,903 t or 16,543 t to 15,085 t for 2019 to 2020 based upon the lower 90% confidence interval or biomass point estimate, respectively (Figure 14.5). The decrease in biomass is driven by a decrease in average weight of yelloweye sampled in the CSEO, NSEO, and SSEO management areas (Table 14.1), as well as a decrease in yelloweye density estimates from the CSEO and NSEO 2018 ROV surveys (Table 14.3, Figure 14.2).

Yelloweye rockfish comprise the largest component of the DSR complex and are managed using the Tier 4 harvest rule. The ABC and OFL for non-yelloweye DSR are calculated using the Tier 6 harvest rule. The Tier 6 ABC and OFL are added to the Tier 4 values for yelloweye to determine the ABC and OFL for the DSR complex. The Tier 6 values for non-yelloweye DSR utilizes catch data from 2010–2014, as this is the only time period with data available from the commercial, sport, and subsistence fisheries. As per

correspondence with the Division of Subsistence on July 24, 2019, due to lack of funding, the subsistence catch data still has not been updated since 2015.

This time period was the only range when all three catch data sets (commercial, sport, and subsistence) overlapped (Table 14.2). The maximum allowable ABC for DSR for 2020 is 303 t (283 t yelloweye + 20 t non-yelloweye), a reduction of 30 tons from the 2019 maximum allowable ABC. The DSR complex is particularly vulnerable to overfishing given their longevity, late maturation, and habitat-specific residency. Therefore, as in previous years, a harvest rate lower than the maximum allowed under Tier 4; $F=M=0.02$ is recommended. The author's recommended ABC is 238 t (218 t yelloweye + 20 t non-yelloweye DSR Tier 6) for 2020. The OFL of $F_{35\%}=0.032$ for 2020 is 375 t.

State of Alaska regulations at 5 AAC 28.160(c)(1)(A) dictate that subsistence DSR removals be deducted from the ABC prior to allocating the TAC to the commercial (84%) and sport (16%) fisheries. In the current assessment, 7 t were deducted from the ABC for DSR from the most recent subsistence harvest estimate from 2015 for a TAC of 231 t; 194 t is allocated to commercial fisheries and 37 t is allocated to sport fisheries for 2020.

Reference values for DSR are summarized in the following table, with the recommended ABC and OFL values based on the lower 90% confidence interval biomass estimate. The stock was not subjected to overfishing last year.

Quantity	As estimated or <i>specified last year for:</i>		As estimated or <i>recommended this year for:</i>	
	2019	2020	2020	2021
<i>M</i> (natural mortality rate)	0.02	0.02	0.02	0.02
Tier	4	4	4	4
Yelloweye Biomass (t)	12,029		10,903	
$F_{OFL}=F_{35\%}$	0.032	0.032	0.032	0.032
$maxF_{ABC}$	0.026	0.026	0.026	0.026
F_{ABC}	0.020	0.020	0.020	0.020
DSR OFL (t)	411	411	375	375
DSR max ABC (t)	333	333	303	303
ABC (t)	261	261	238	238
Status	As determined last year for:		As determined this year for:	
	2017	2018	2018	2019
Overfishing	No	n/a	No	n/a

The non-yelloweye DSR ABCs and OFL are calculated using Tier 6 methodology. Non-yelloweye Tier 6 ABCs and OFL are added to Tier 4 yelloweye ABCs and OFL for total DSR values.

Quantity (Tier 6 for other DSR only)	As estimated or <i>specified last year</i> and <i>recommended this year</i> for:	
	2019	2020
OFL (t)	26	26
ABC (t)	20	20

Area Apportionment

The ABC and OFL for DSR are for the SEO Subdistrict and the biomass estimates, OFL, ABC, and TAC are based on the lower 90% confidence intervals. The State of Alaska manages DSR in the Eastern regulatory area with Council oversight and any further apportionment within the SEO Subdistrict is at the discretion of the State. Updated catch data (t) for DSR in the SEO Subdistrict as of October 21, 2019 NMFS Alaska Regional Office Catch Accounting System via the Alaska Fisheries Information Network (AKFIN) database, <http://www.akfin.org> are summarized in the following table.

Summaries for Plan Team

Species	Year	Biomass	OFL	ABC	TAC ¹	Commercial Catch ²	Recreational Harvest ³	Total Catch ⁴
DSR	2015	10,933	361	225	217	107	48	163
	2016	10,559	364	231	224	117	48	172
	2017	10,347	357	227	220	124	45	169
	2018	11,508	394	250	243	130	40	170
	2019	12,032	411	261	254	122	44	166
	2020	10,903	375	238	231			

¹TAC is for the commercial and recreational fisheries and is calculated after the subsistence estimated harvest is deducted from the ABC.

²Assignment of ADF&G groundfish management areas for DSR bycatch landed in the commercial salmon troll fishery began in 2015. Commercial catch is updated through October 15, 2019.

³Updated recreational harvest (retained harvest plus estimated discard) for SEO as of October 21, 2019. Harvest in 2019 is a preliminary estimate based on the average metric tons harvested from 2016 to 2018.

⁴Total catch is from the commercial (incidental and direct), recreational, subsistence, and research fisheries.

Responses to SSC and Plan Team Comments Specific to this Assessment

The SSC accepts the assessment methodology for the use of the 2019 harvest specifications and agrees with the recommended OFL (Table 1). The SSC also requests further clarification on the authors' reasons for the reduction from maximum ABC. The use of the risk table, as suggested by the PT, may inform whether a reduction from maximum ABC is warranted in the future. In the context of the risk table, the SSC discussed why a buffer larger than maximum ABC was being applied even though some aspects of the uncertainty described in the assessment could be considered "normal" (i.e. Level 1) for this stock and, thus, accounted for by the tier or model. The SSC also requests the authors present assessment results using the biomass point estimate, which would allow for comparison with the current methodology of using the lower 90% interval of the biomass estimate, which began in 1998.

The SSC agrees with the ABC lower than the maximum permissible as recommended by the author and PT as an interim measure (Table 1). However, the SSC's motivation for the reduction is due to

continued concerns regarding the long-term trend of this complex and in particular, the infrequency and irregularity of the surveys that provide biomass estimates. The decline in density estimates among multiple management areas is concerning and the overall decline in biomass estimates since the mid-90s (Figure 14.6), with the exception of the slight increase in biomass over the most recent two years, is notable. **As noted in previous years, the SSC looks forward to seeing developments on the age-structured assessment model**, recognizing that the introduction of this ASA model may not address all of the uncertainty issues with this assessment. For the Tier 6 non-yelloweye DSR species, the maximum catch from the years 2010 – 2014 are used for harvest specifications, as these are the only years with commercial, sport and subsistence catch estimates. The SSC requests the authors explore data-limited methods, beyond catch-based approaches, that may better reflect the species population dynamics.

For the last three years, the Alaska Department of Fish and Game (ADF&G) has met biannually as part of a Department Statewide Rockfish Initiative group with the goal of addressing concerns regarding research and management of yelloweye and black rockfish throughout the State. Recently, this group has begun exploring various models that would improve upon the Tier 6 method currently being utilized for DSR species other than yelloweye rockfish. More specifically, the Southeast region has met and will continue to meet soon to identify more accurate methods for management of these species. ADF&G has interest in exploring an ASA model for this species complex, however it should be noted that the paucity of age data and poor understanding of historical catch may preclude the ability to effectively implement such a model. There has been a substantial changeover in staff at ADF&G, as staff gain an increased understanding of this fishery, we will evaluate alternative assessment frameworks.

The SSC recommends comparison of assessment results using the biomass point estimate compared to the current methodology of using the lower 90% confidence interval of the biomass estimate.

The authors explored the risk table approach. This exercise was valuable though some of the questions appear more oriented toward stocks that are managed via an age-structured assessment and difficult to directly apply to a Tier 4 stock. The table below and Figure 14.5 compares the lower 90% confidence interval of the biomass estimate to the biomass point estimate from 2018 to 2020. Ultimately the author chose to use the 90% confidence interval for management purposes due to the uncertainty in the habitat data used for the survey assessment. The author used the more conservative results as a buffer due to this uncertainty in the survey methodology.

Species	Year	Biomass - Lower 90% CI	Biomass - Point Estimate	OFL - Lower 90% CI	OFL - Point Estimate	ABC - Lower 90% CI	ABC - Point Estimate	TAC ₁ - Lower 90% CI	TAC ₁ - Point Estimate
DSR	2018	11,508	15,531	394	523	250	331	243	324
	2019	12,032	16,543	411	555	261	351	254	344
	2020	10,903	15,085	375	509	238	322	231	315

¹TAC is for the commercial and recreational fisheries and is calculated after the subsistence estimated harvest is deducted from the ABC.

²Assignment of ADF&G groundfish management areas for DSR bycatch landed in the commercial salmon troll fishery began in 2015.

Commercial catch is updated through October 15, 2019.

³Updated recreational harvest (retained harvest plus estimated discard) for SEO as of October 21, 2019. Harvest in 2019 is a preliminary estimate based on the average metric tons harvested from 2016 to 2018.

⁴Total catch is from the commercial (incidental and direct), recreational, subsistence, and research fisheries.

Table 14.1. The average weights, number of yelloweye rockfish sampled, and the standard deviation of weights from 1984 to 2019 for each management area (East Yakutat (EYKT), Northern Southeast Outside (NSEO), Central Southeast Outside (CSEO), and Southern Southeast Outside (SSEO)).

Year	EYKT			NSEO			CSEO			SSEO		
	Average Weight	# YE	SD	Average Weight	# YE	SD	Average Weight	# YE	SD	Average Weight	# YE	SD
1984	-	-	-	-	-	-	5.40	124	0.82	-	-	-
1985	-	-	-	-	-	-	1.31	160	0.49	4.58	191	1.00
1986	-	-	-	-	-	-	-	-	-	-	-	-
1987	-	-	-	-	-	-	-	-	-	2.96	30	1.51
1988	-	-	-	3.49	445	1.62	3.17	2,890	1.43	3.39	4,558	1.51
1989	-	-	-	3.15	160	0.98	3.15	1,808	1.44	3.53	323	1.23
1990	-	-	-	-	-	-	3.12	886	1.56	-	-	-
1991	4.11	150	1.35	3.73	252	1.64	2.98	1,200	1.25	2.84	963	1.25
1992	3.56	90	1.18	3.38	50	1.70	3.12	1,410	1.49	3.58	1,900	1.46
1993	3.85	194	1.46	-	-	-	3.54	378	1.62	3.47	1,832	1.79
1994	3.65	427	1.39	3.00	167	1.23	2.79	679	1.16	3.69	1,822	1.27
1995	3.72	400	1.33	14.06	1	-	3.09	533	1.34	3.54	272	1.21
1996	3.52	476	1.17	-	-	-	3.11	710	1.27	3.29	1,387	1.36
1997	3.80	398	1.31	-	-	-	2.76	690	1.23	3.12	462	1.20
1998	3.99	479	1.38	-	-	-	2.82	247	1.36	3.04	482	1.16
1999	3.78	360	1.01	-	-	-	3.05	778	1.18	3.08	357	1.25
2000	3.85	370	1.29	-	-	-	3.21	170	1.01	3.47	895	1.29
2001	4.30	345	1.42	-	-	-	3.26	605	1.17	3.27	221	1.11
2002	-	-	-	-	-	-	3.14	501	1.20	3.42	469	1.25
2003	-	-	-	-	-	-	3.02	444	1.21	3.45	190	1.25
2004	3.81	728	1.40	-	-	-	2.94	211	1.27	3.25	446	1.15
2005	4.13	377	1.58	-	-	-	-	-	-	-	-	-
2006	-	-	-	-	-	-	-	-	-	-	-	-
2007	-	-	-	-	-	-	-	-	-	-	-	-
2008	3.68	552	1.49	4.02	100	1.36	3.21	389	1.24	3.73	180	1.33
2009	3.99	549	1.51	3.35	183	1.34	3.57	559	1.25	3.53	171	1.32
2010	4.24	260	1.62	3.92	172	1.73	3.51	485	1.22	3.38	557	1.12
2011	4.35	481	1.61	3.43	129	1.18	3.22	563	1.24	3.51	249	1.30
2012	4.38	967	1.61	3.24	94	1.26	3.40	866	1.13	3.68	312	1.25
2013	4.06	555	1.55	-	-	-	3.19	566	1.13	3.53	559	1.29
2014	3.69	561	1.14	3.71	123	1.12	3.37	554	1.17	-	-	-
2015	3.96	581	1.38	3.95	312	1.39	3.47	455	1.18	-	-	-
2016	3.93	589	1.46	3.76	575	1.34	3.52	559	1.21	3.32	155	1.22
2017	3.87	572	1.35	3.71	410	1.35	3.57	560	1.14	4.59	31	1.31
2018	3.95	560	1.56	3.54	378	1.28	3.63	739	1.20	4.97	11	0.90
2019	4.08	182	1.67	3.37	40	1.20	3.43	333	1.18	3.49	553	1.25

Table 14.2. Catch (t) of demersal shelf rockfish from research, directed commercial, incidental commercial, recreational and subsistence fisheries in the Southeast Outside Subdistrict (SEO), 1992–2019^a, ABC, OFL and TAC for commercial and recreational sectors combined after estimated subsistence harvest is decremented. Commercial catch includes discards at sea and at the dock and catch retained for personal use.

Year	Research	Directed	Incidental ^{d,f}	Recreational ^b	Subsistence ^c	Total ^d	ABC ^{e,g}	OFL ^g	TAC ^g
1992		351	119			478	550		550
1993	13	341	188			534	800		800
1994	4	383	219			604	960		960
1995	13	168	103			271	580		580
1996	11	350	85			436	945		945
1997	16	280	100			380	945		945
1998	2	241	120			361	560		560
1999	2	242	126			367	560		560
2000	8	187	107			295	340		340
2001	7	178	146			324	330		330
2002	2	136	149			285	350	480	350
2003	6	105	169			275	390	540	390
2004	2	173	155			329	450	560	450
2005	4	42	195			237	410	650	410
2006	2	0	203	75		280	410	650	410
2007	3	0	196	60		259	410	650	410
2008	1	42	152	68		263	382	611	382
2009	2	76	139	37		254	362	580	362
2010	7	30	131	52	8	228	295	472	287
2011	5	22	87	36	6	156	300	479	294
2012	4	105	76	46	7	238	293	467	286
2013	4	130	83	34	7	258	303	487	296
2014	5	33	63	40	7	148	274	438	267
2015	4	33	70	48	8	163	225	361	217
2016	4	34	79	48	7	172	231	364	224
2017	5	32	92	45	7	181	227	357	220
2018	6	51	79	40	7	183	250	394	243
2019	8	46	76	44	7	181	261	411	254
2020					7		238	375	231

^aLandings from ADF&G Southeast Region fish ticket database and NMFS weekly catch reports through October 15, 2019.

^bRecreational harvest (retained harvest plus estimated discard) from 2006 to 2008 include EYKT and IBS. These data are not available prior to 2006. Estimate for 2019 is preliminary and is based on an average recreational harvest from 2016–2018.

^cProjected subsistence catch for the fishery year, i.e. 2010 is for the 2010 fishery. These data were not available or deducted from the ABC prior to 2009.

^dData are from reported landings. Full retention of DSR went into effect in 2005, and unreported DSR discard associated with the halibut fishery prior to 2005 is not reported in these totals.

^eNo ABC prior to 1988, 1988–1993 ABC for CSEO, NSEO, and SSEO only (not EYKT).

^fAssignment of ADF&G groundfish management areas for DSR bycatch landed in the commercial salmon troll fishery began in 2015.

^gABC, OFL, and TAC based on lower 90% confidence interval.

Table 14.3. Submersible (1994–1995, 1997, 1999, 2003, 2005, 2007, 2009) and ROV (2012–2013, 2015–2018) yelloweye rockfish density estimates with 95% confidence intervals (CI) and coefficient of variation (CV) by year and management area. The number of transects, yelloweye rockfish (YE), and meters surveyed included in each model are shown, along with the encounter rate of yelloweye rockfish. Values in bold were used for this stock assessment.

Area	Year	# transects	# YEB	Meters surveyed	Encounter rate (YE/m)	Density (YE/km ²)	Lower CI (YE/km ²)	Upper CI (YE/km ²)	CV
EYKT ^a	1995	17	330	22,896	0.014	2,711	1,776	4,141	0.20
	1997	20	350	19,240	0.018	2,576	1,459	4,549	0.28
	1999	20	236	25,198	0.009	1,584	1,092	2,298	0.18
	2003	20	335	17,878	0.019	3,825	2,702	5,415	0.17
	2009	37	215	29,890	0.007	1,930	1,389	2,682	0.17
	2015	33	251	22,896	0.008	1,755	1,065	2,891	0.25
	2017	35	134	33,960	0.004	1,072	703	1,635	0.21
CSEO	1994 ^c	-	-	-	-	1,683	-	-	0.10
	1995	24	235	39,368	0.006	2,929	-	-	0.19
	1997	32	260	29,273	0.009	1,631	1,224	2,173	0.14
	2003	101	726	91,285	0.008	1,853	1,516	2,264	0.10
	2007	60	301	55,640	0.005	1,050	830	1,327	0.12
	2012	46	118	38,590	0.003	752	586	966	0.13
	2016	32	160	30,726	0.005	1,101	833	1,454	0.14
	2018	35	193	33,700	0.006	898	672	1,199	0.14
NSEO	1994 ^c	13	62	17,622	0.004	765	383	1,527	0.33
	2016	36	125	34,435	0.004	701	476	1,033	0.20
	2018	30	95	29,792	0.003	553	388	788	0.16
SSEO	1994 ^c	13	99	18,991	0.005	1,173	-	-	0.29
	1999	41	360	41,333	0.009	2,376	1,615	3,494	0.20
	2005	32	276	28,931	0.010	2,357	1,634	3,401	0.18
	2013	31	118	30,439	0.004	986	641	1,517	0.22
	2018	32	345	31,073	0.011	1,624	988	2,667	0.25

^a Estimates for EYKT management area include only the Fairweather grounds, which is composed of a west and an east bank. In 1997, only 2 of 20 transects and in 1999, no transects were performed on the east bank that were used in the model. In other years, transects performed on both the east and west bank were used in the model.

^b Subadult and adult yelloweye rockfish were included in the analyses to estimate density. A few small subadult yelloweye rockfish were excluded from the 2012 and 2015 models based on size; length data were only available for the ROV surveys (not submersible surveys). Data were truncated at large distances for some models; as a consequence, the number of yelloweye rockfish included in the model does not necessarily equal the total number of yelloweye rockfish observed on the transects.

^c Only a side-facing camera was used in 1994 and earlier years to video fish. The forward-facing camera was added after 1994, which ensures that fish are observed on the transect line.

Table 14.4. Commercial landings (t) of demersal shelf rockfish by species in Southeast Outside Subdistrict from 2010–2019. Discards (at sea and at dock) and personal use included.

Species	2010	2011	2012	2013	2014	2015 ^a	2016	2017	2018	2019 ^b
Canary	0.87	0.34	2.87	2.88	0.26	0.66	1.13	0.53	2.69	0.93
China	0.03	0.02	0.02	0.05	0.02	0.02	0.11	0.03	0.04	0.07
Copper	0.01	0.01	0.04	0.03	0.01	0.01	0.15	0.10	0.08	0.04
Quillback	4.08	1.68	3.79	3.72	1.83	2.47	3.07	2.59	3.16	5.08
Rosethorn	0.00	0.00	0.02	0.04	0.00	0.02	0.17	0.08	0.13	0.05
Tiger	0.28	0.11	0.41	0.31	0.26	0.23	0.32	0.21	0.22	0.13
Yelloweye	155.70	106.16	173.31	205.74	94.05	99.96	108.65	125.39	128.75	123.07
Total (t)	160.97	108.32	180.46	212.77	96.43	103.37	113.60	128.93	135.07	129.37
% Yelloweye	96.73	98.01	96.04	96.70	97.53	96.70	95.64	97.25	95.32	95.13

^aAssignment of ADF&G groundfish management areas for DSR bycatch landed in the commercial salmon troll fishery began in 2015.

^bRepresents preliminary commercial harvest data through October 15, 2019.

Table 14.5. Other FMP groundfish species landed (t) in DSR directed commercial fisheries in the Southeast Outside Subdistrict from 2010–2019. Discards (at sea and at dock) and personal use included.

Species	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Black rockfish	0.14	0.08	0.31	0.85	0.02	0.01	0.06	0.03	0.93	0.34
Bocaccio rockfish	0.02	–	0.03	0.12	0.01	–	–	–	0.03	0.01
Pacific cod	0.88	1.00	2.33	5.10	0.23	0.12	0.01	0.31	4.03	2.32
Redbanded rockfish	0.03	0.06	1.10	1.71	0.01	–	0.14	0.06	0.62	0.33
Dark rockfish	–	–	–	–	–	–	–	–	–	0.01
Dusky rockfish	0.51	0.32	3.84	5.35	2.12	3.23	2.38	2.27	2.32	0.69
Rougheye rockfish	–	–	–	–	–	–	–	–	0.07	0.05
Shortraker rockfish	–	–	–	–	–	–	–	0.01	0.07	0.02
Silvergray rockfish	0.45	0.30	0.66	1.92	0.24	0.07	0.40	0.41	0.67	0.57
Skate, general	–	–	0.18	–	–	–	–	–	–	–
Spiny dogfish shark	–	–	0.17	–	–	–	–	–	–	–
Yellowtail rockfish	0.01	0.04	0.09	0.10	–	–	–	–	0.10	0.04
Total	2.04	1.80	8.71	15.15	2.63	3.43	2.99	3.09	8.84	4.38

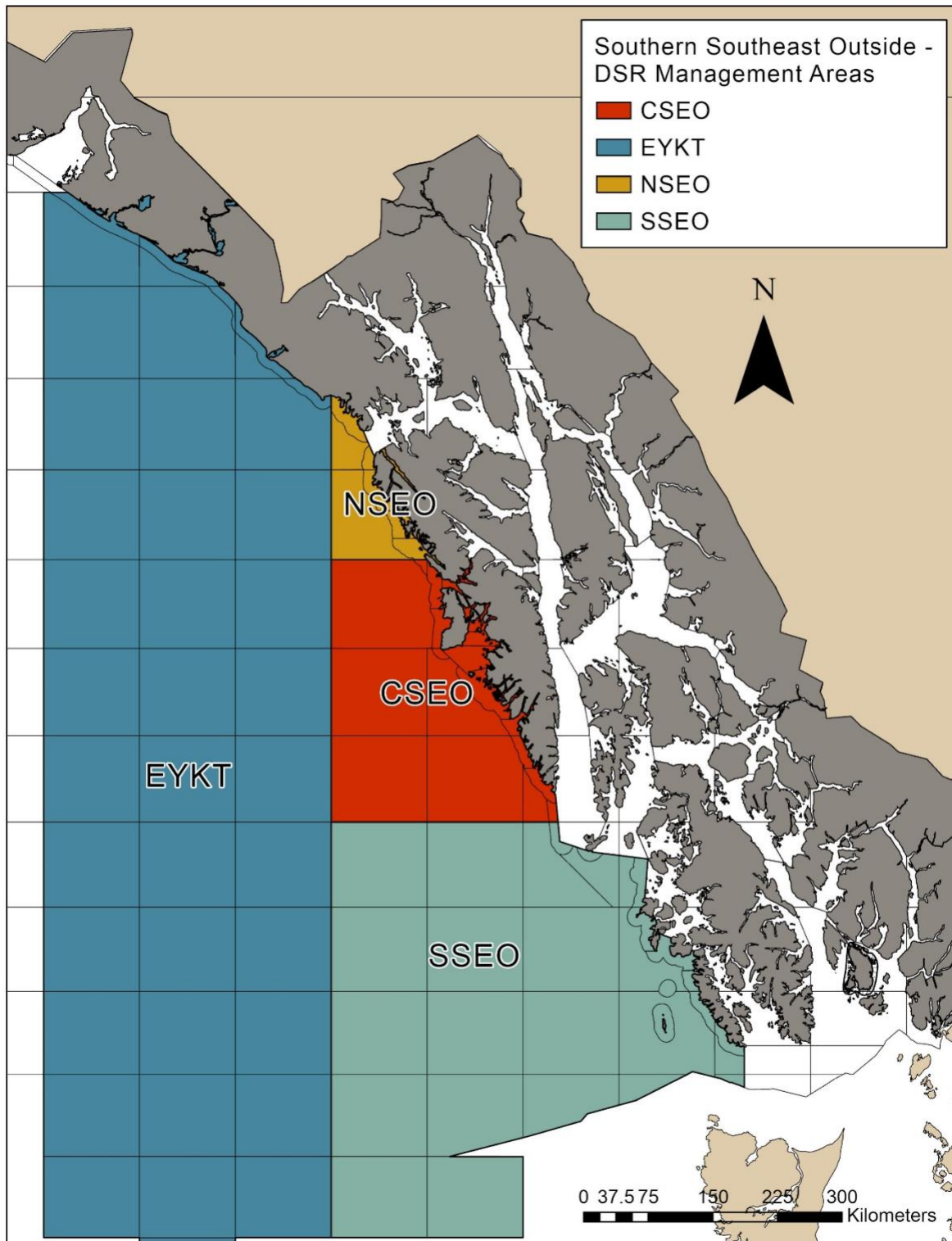


Figure 14.1. The Southeast Outside (SEO) Subdistrict with the Alaska Department of Fish and Game groundfish management areas used for managing the demersal shelf rockfish fishery: East Yakutat (EYKT), Central Southeast Outside (CSEO), Northern Southeast Outside (NSEO), and Southern Southeast Outside (SSEO).

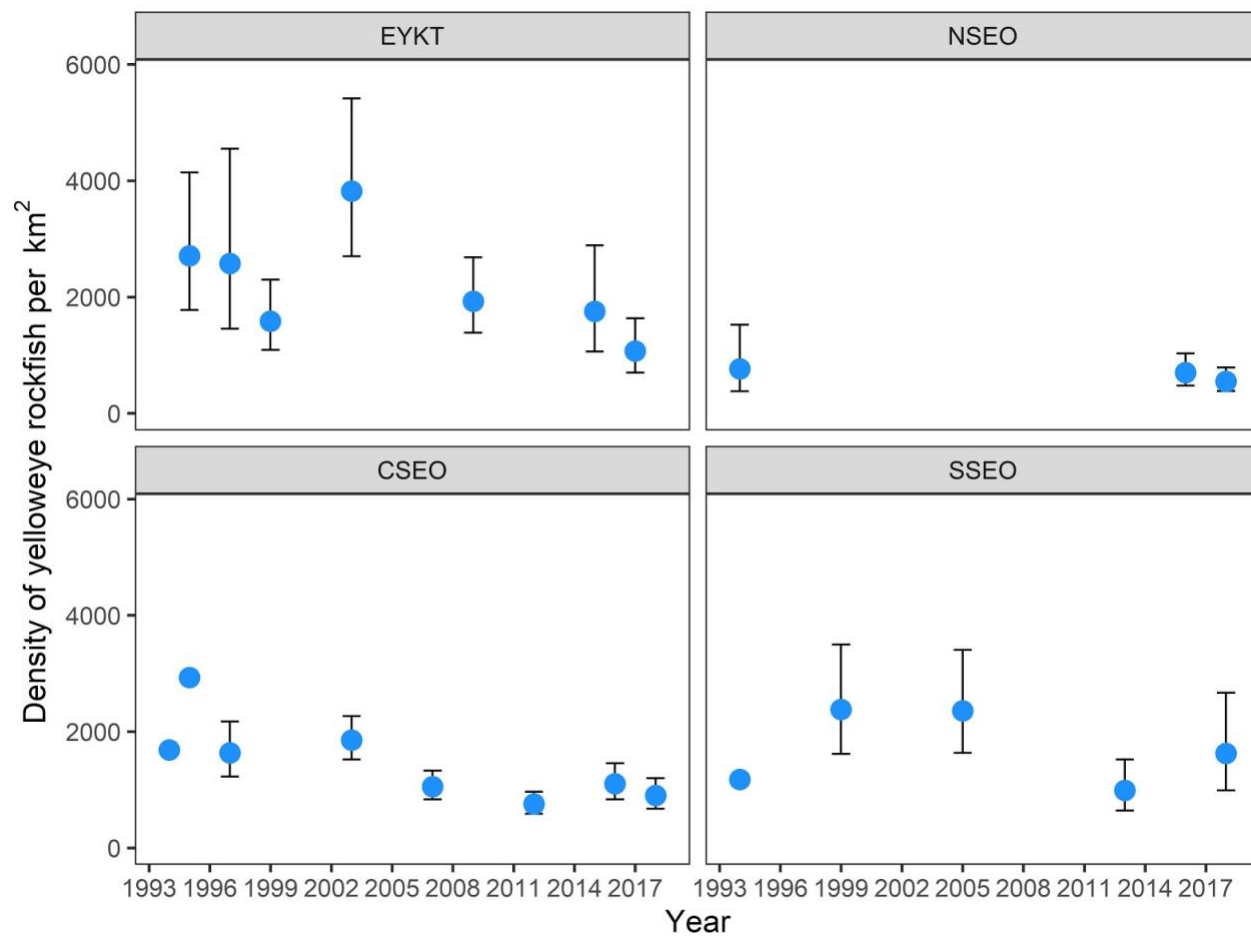


Figure 14.2. Density of yelloweye rockfish predicted by DISTANCE (circles) +/- two standard deviations in each management area (Central Southeast Outside (CSEO), East Yakutat (EYKT), Southern Southeast Outside (SSEO), and Northern Southeast Outside (NSEO)).

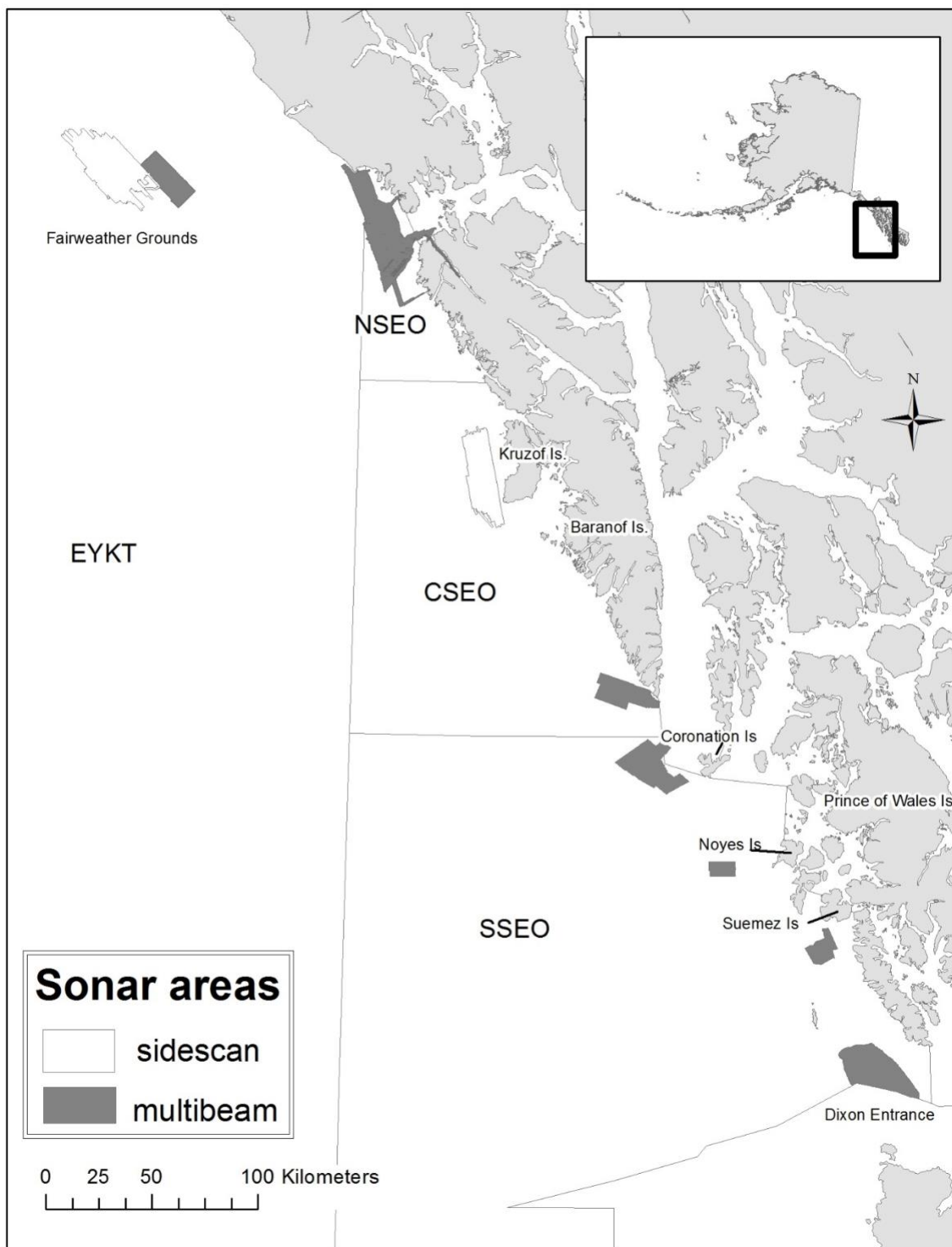


Figure 14.3. Sonar surveys performed in southeast Alaska used to delineate yelloweye rockfish habitat.

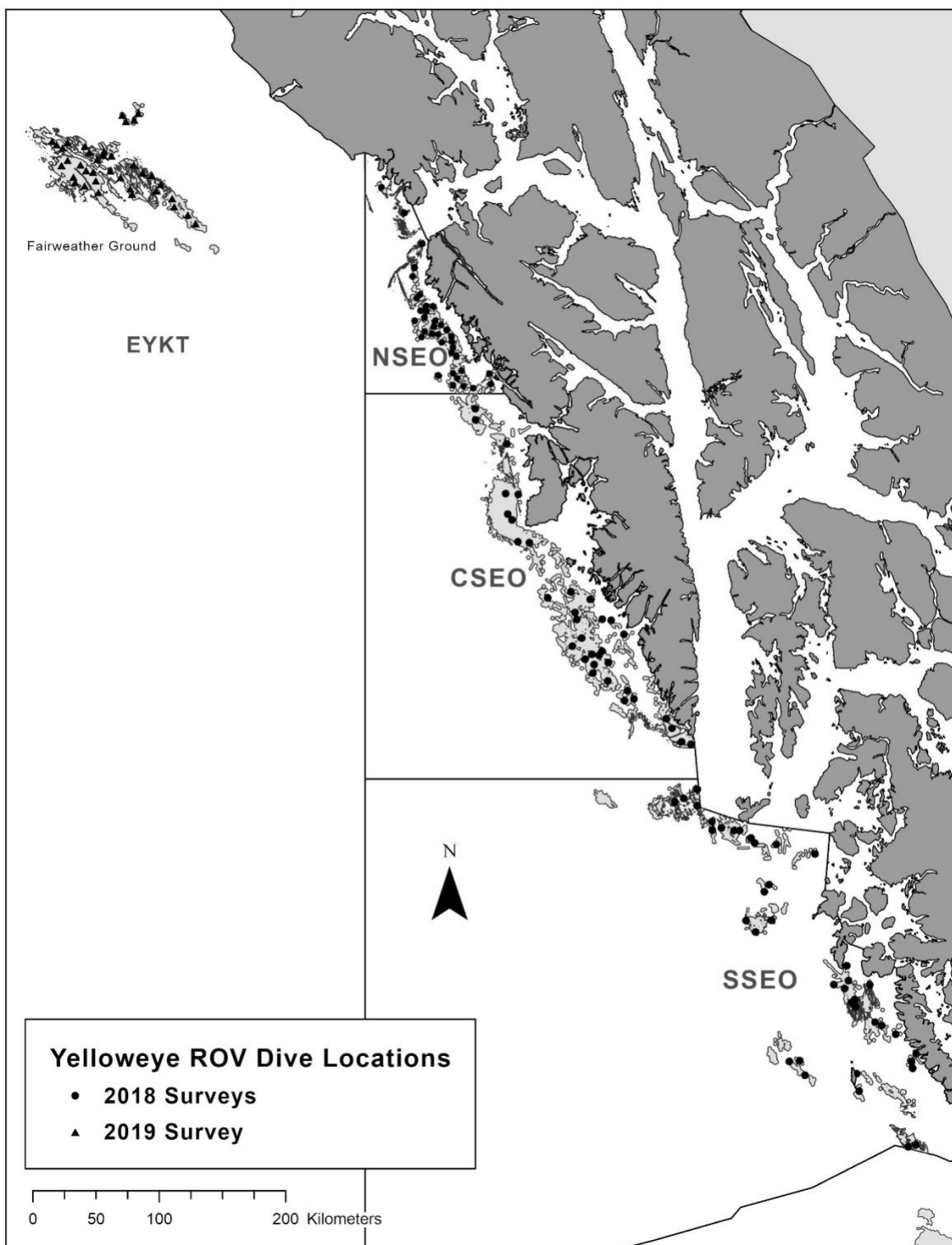


Figure 14.4. ROV transects conducted in Southern Southeast Outside (SSEO), Northern Southeast Outside (NSEO) and Central Southeast Outside (CSEO) in 2018, and East Yakutat (EYKT) in 2019. Southern Southeast Outside (SSEO) will be surveyed again in 2020.

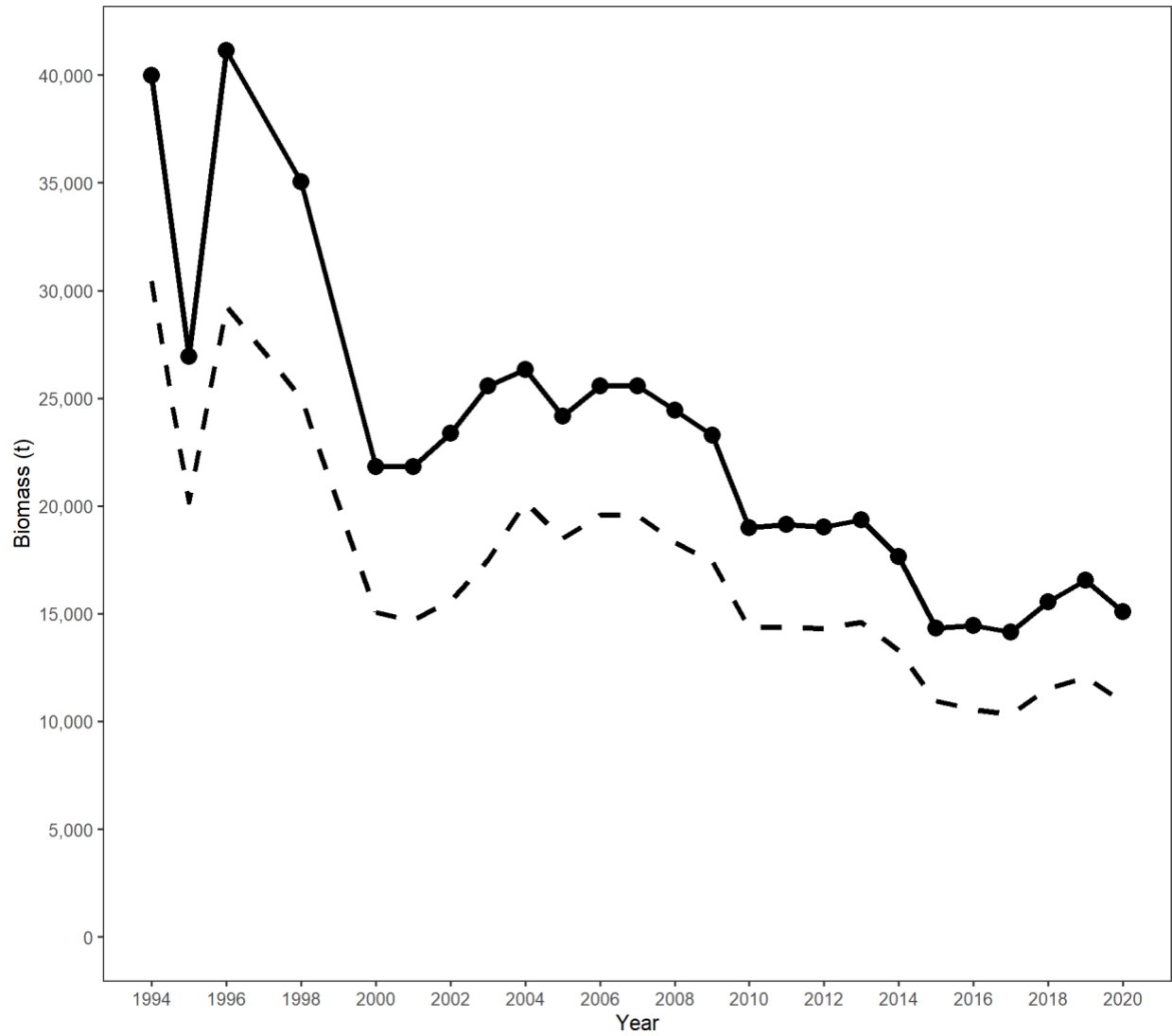


Figure 14.5. Biomass estimates (t) of yelloweye rockfish (solid line) and 90% lower confidence interval (dashed line) for the Southeast Outside (SEO) Subdistrict from 1994–2020.

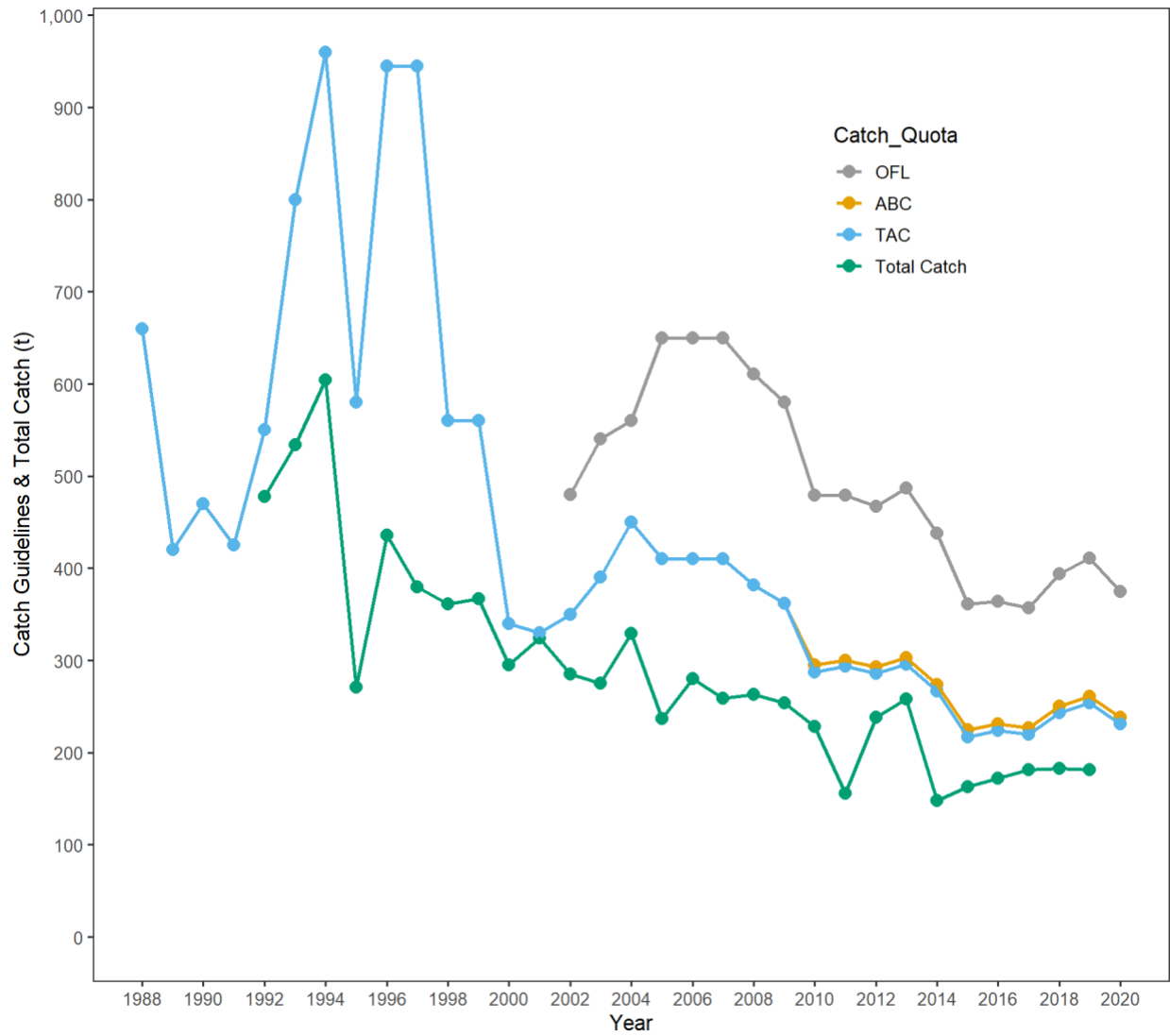


Figure 14.6. DSR catch guidelines (OFL, ABC, and TAC) and total catch for the Southeast Outside (SEO) Subdistrict from 1988–2020.

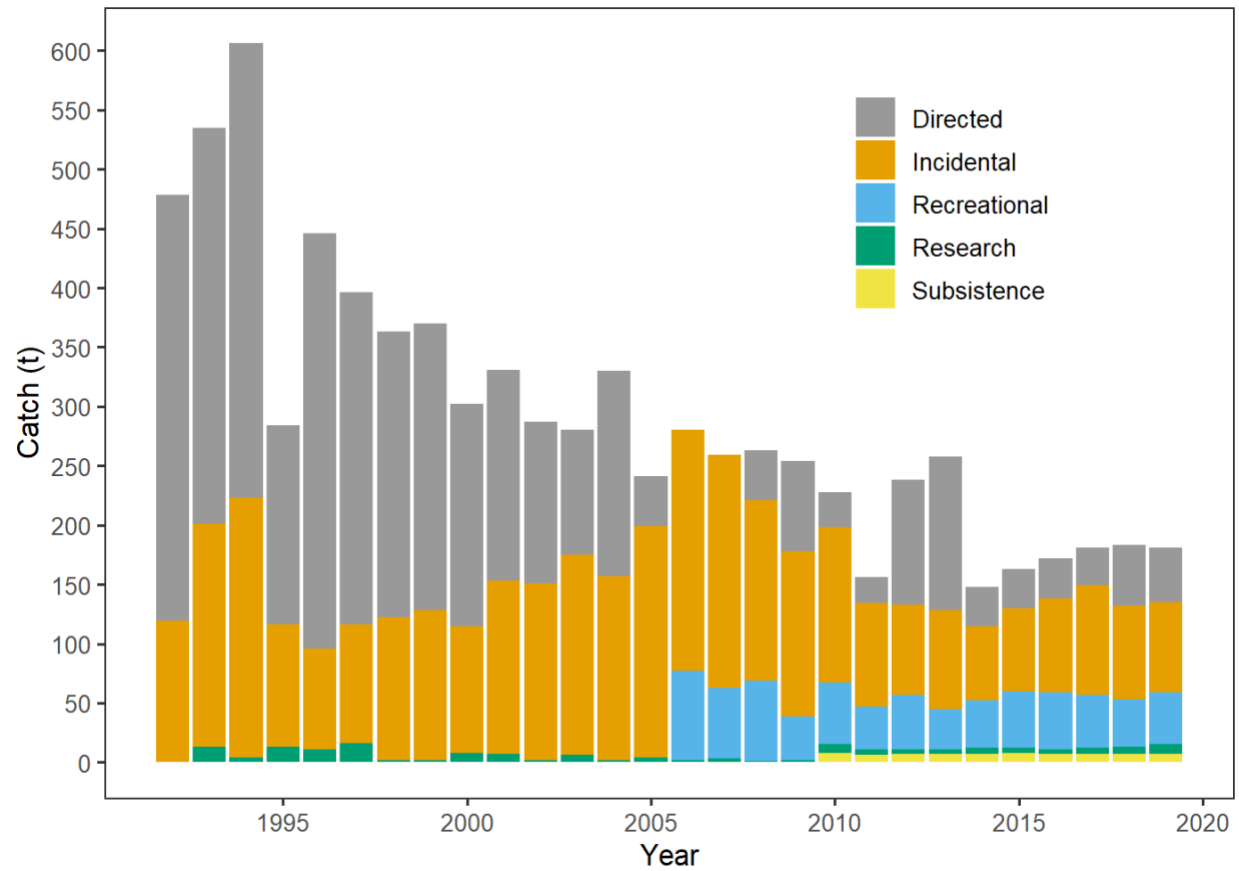


Figure 14.7. DSR catch (t) by fishery type: commercial (direct and incidental), recreational, research (International Pacific Halibut Commission (IPHC) longline survey), and subsistence from 1992–2019.

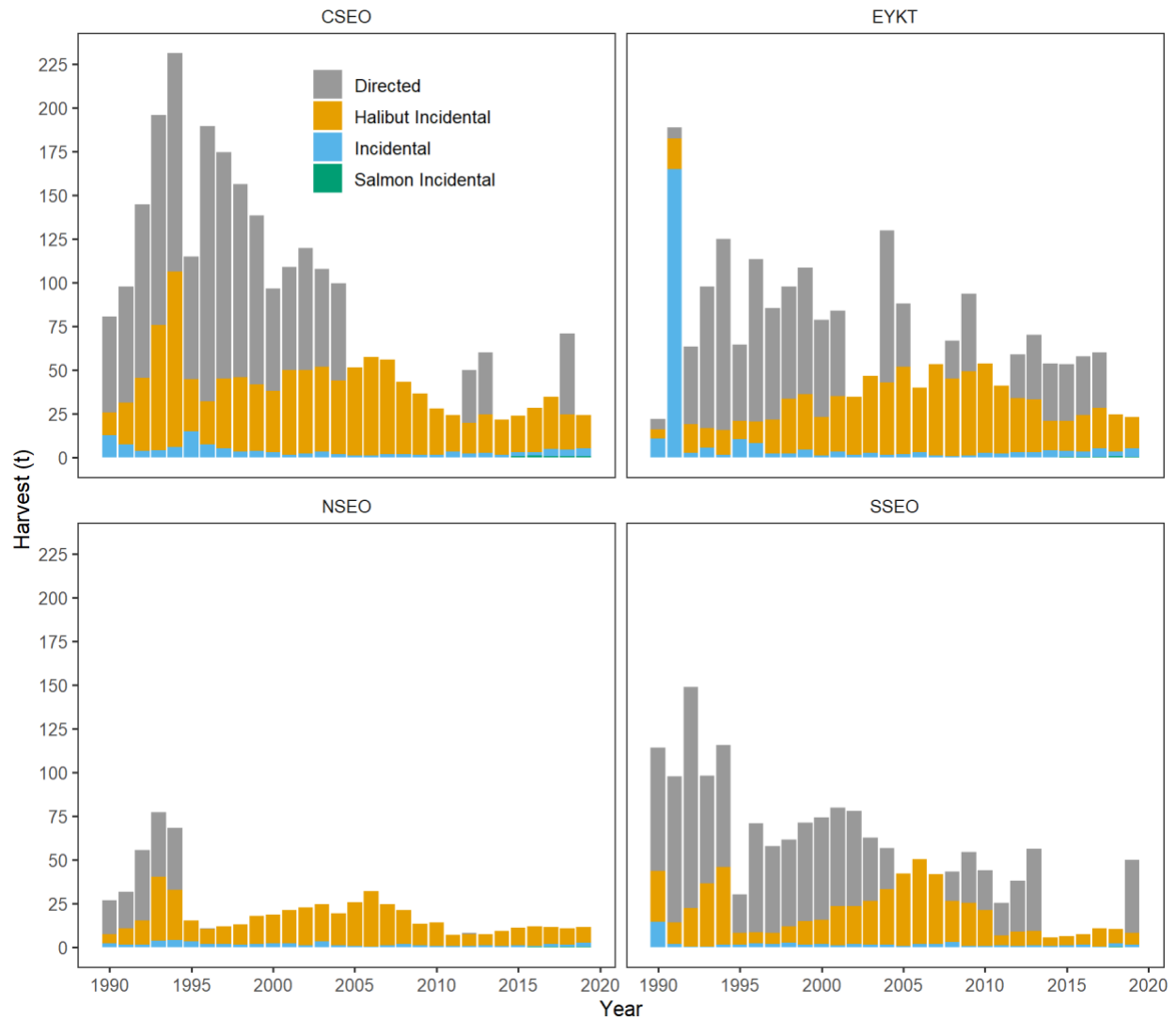


Figure 14.8. Directed commercial fishery catch, incidental catch from the halibut fishery, and incidental catch from sablefish, lingcod, Pacific cod, and salmon fisheries (t) of DSR in the Southeast Outside (SEO) Subdistrict groundfish management areas: East Yakutat (EYKT), Northern Southeast Outside (NSEO), Central Southeast Outside (CSEO), and Southern Southeast Outside (SEO) from 1992–2019.

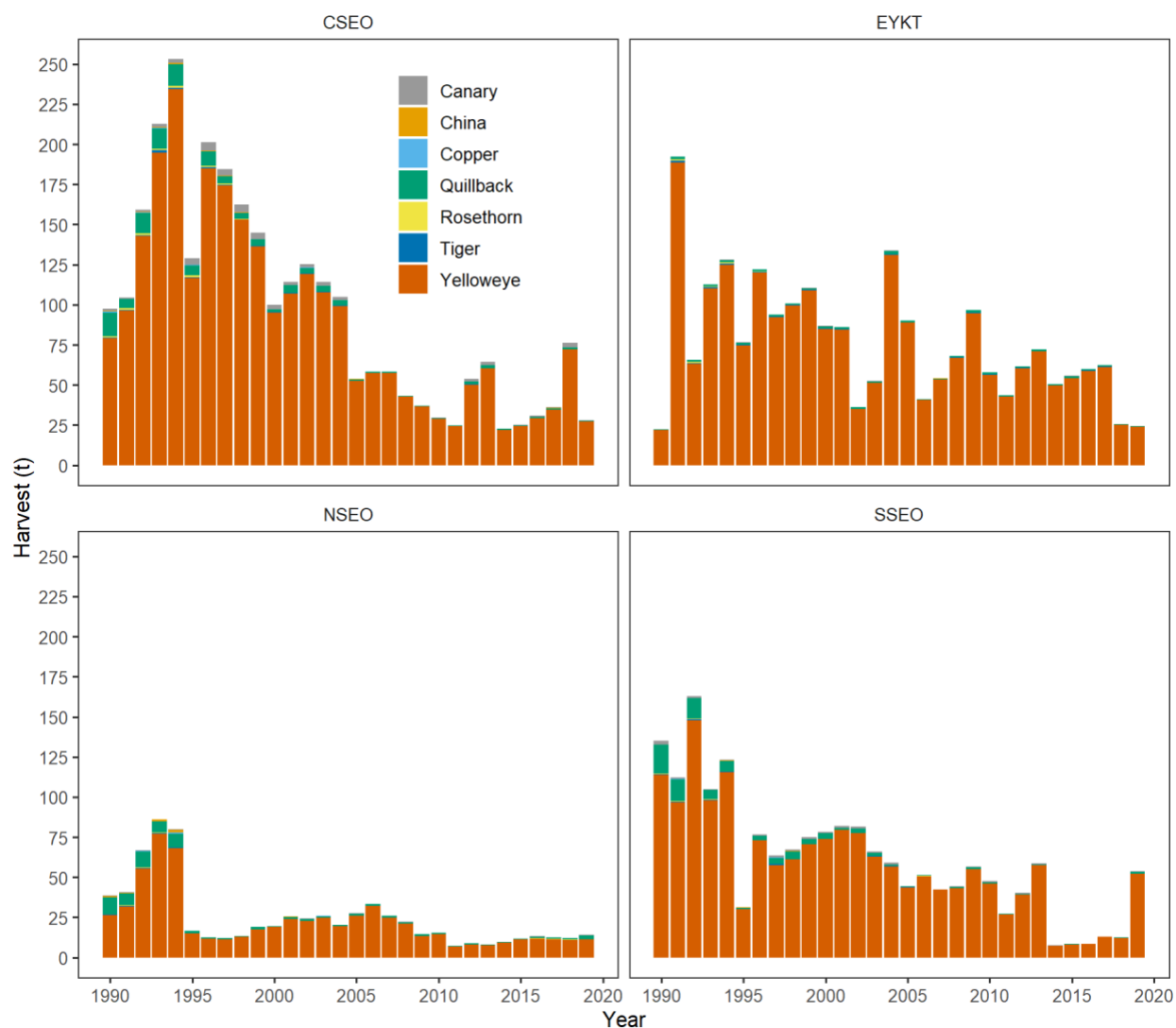


Figure 14.9. Commercial DSR harvest by species for Southeast Outside (SEO) Subdistrict groundfish management areas: East Yakutat (EYKT), Northern Southeast Outside (NSEO), Central Southeast Outside (CSEO), and Southern Southeast Outside (SEO) from 1992–2019.