

Rockfishes

Pacific ocean perch (*Sebastes alutus*)

The highest area-specific catch rate for Pacific ocean perch (POP) was in the Western Aleutian area (Table 2). Although POP was always ranked at least third, its overall mean CPUE by area diminished in an easterly direction (Fig. 45). Estimated biomass for the entire survey area surpassed 468,000 t (Table 35) and more than 96% of the total estimated biomass was found in the Aleutian areas. Biomass and mean CPUE increased with depth to about 300 m. Whereas Atka mackerel abundance was highest in the 101-200 m depth interval, the highest concentrations of POP were found in 201-300 m. While catches of over 1,000 kg were common in depths between slightly less than 100 m to slightly more than 300 m, the exceptionally large catches were found between about 180 m and 280 m. POP was captured in 56% of all successful survey tows that were shallower than 300 m.

The highest three stratum-specific mean CPUEs were all found in the 201-300 m depth interval (Table 36, Fig. 45). These occurred in the NW Eastern Aleutian subarea between Atka Island and Adak Island; in the eastern subarea of the Western Aleutian area which contains Buldir Reef, Tahoma Bank, and Walls Plateau; and in the northern subarea of the Central Aleutian area near Segula and Kiska Islands. The highest stratum-specific mean CPUE resulted from the only two tows in the 201-300 m depth interval in the NW section of the Eastern Aleutian area near the NW end of Atka I (Table 36, Fig. 45). Mean lengths and weights increased with depth in both the Aleutian and Southern Bering Sea areas (Table 35). Size composition data show matching male and female frequency modes (22 cm) for juvenile POP, but the primary adult frequency mode (Fig. 46) for males (37 cm) differs from that of females (39 cm). Size compositions by depth interval showed that in 1-100 m small POP predominated, in 101-200 m there was a mix of adult and juvenile sizes, and the two deeper strata contained adults almost exclusively.

Figure 47 shows length-weight relationships for male, female, and combined sexes of POP. The regression curves for the sexes match closely, but the maximum length of females is about 4 cm larger than males.

Table 35--Number of survey hauls, number of hauls with Pacific ocean perch, mean CPUE, biomass estimates with confidence limits, mean weight, and mean length based on the 2002 Aleutian Islands bottom trawl survey, by NPFMC regulatory area and depth interval.

NPFMC area	Depth (m)	Number of trawl hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	95% Confidence limits		Mean weight (kg)	Mean length (cm)
						Minimum biomass (t)	Maximum biomass (t)		
Western Aleutian	1-100	26	7	9.50	4,633	0	14,827	0.114	20.5
	101-200	51	33	170.63	90,733	12,779	168,686	0.448	30.8
	201-300	19	18	611.60	105,417	39,513	171,322	0.612	35.4
	301-500	13	5	4.10	1,342	0	5,702	0.656	35.6
	All depths	109	63	133.06	202,124	103,237	301,011	0.484	31.8
Central Aleutian	1-100	30	4	0.32	186	0	451	0.338	25.9
	101-200	45	27	160.36	73,857	0	190,622	0.737	36.6
	201-300	23	23	298.91	63,036	11,175	114,897	0.862	38.7
	301-500	17	13	8.24	3,279	0	6,931	0.751	37.4
	All depths	115	67	84.85	140,358	13,307	267,409	0.788	37.5
Eastern Aleutian	1-100	16	2	0.02	15	0	38	0.155	20.3
	101-200	47	22	2.18	1,691	501	2,881	0.249	24.7
	201-300	42	39	217.40	106,557	75,247	137,867	0.662	35.8
	301-500	27	17	2.70	1,532	114	2,950	0.659	34.9
	All depths	132	80	43.57	109,795	78,434	141,156	0.646	35.3
All Aleutian Areas	1-100	72	13	2.75	4,833	0	15,030	0.117	20.6
	101-200	143	82	93.99	166,281	35,174	297,388	0.537	32.6
	201-300	84	80	314.88	275,010	189,968	360,053	0.677	36.1
	301-500	57	35	4.76	6,153	1,216	11,090	0.704	36.3
	All depths	356	210	79.44	452,277	297,281	607,273	0.591	33.9
Southern Bering Sea	1-100	30	8	0.37	151	0	418	0.245	25.9
	101-200	16	9	13.75	2,542	0	8,652	0.540	33.2
	201-300	7	7	109.66	6,183	276	12,091	0.617	34.9
	301-500	8	8	71.28	7,435	0	20,509	0.816	37.2
	All depths	61	32	21.80	16,311	1,524	31,098	0.667	35.2

Table 36--Sampling effort, mean CPUE, and estimated biomass with 95% confidence limits (CL) of Pacific ocean perch by NPFMC regulatory area and survey subarea, ranked by descending mean CPUE for the 2002 Aleutian Islands bottom trawl survey.

NPFMC Area	Depth range (m)	Subarea	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Biomass CL	
							Min. (t)	Max. (t)
Eastern Aleutian	201-300	NW Eastern Aleutian	2	2	2,964.95	46,232	0	123,829
Western Aleutian	201-300	E Western Aleutian	10	10	1,084.92	84,993	18,442	151,544
Central Aleutian	201-300	N Central Aleutian	10	10	1,048.28	46,020	0	98,319
Central Aleutian	101-200	N Central Aleutian	8	5	478.91	51,054	0	169,965
Western Aleutian	101-200	E Western Aleutian	23	21	372.38	46,640	0	100,467
Western Aleutian	201-300	W Western Aleutian	9	8	217.23	20,425	4,255	36,594
Eastern Aleutian	201-300	NE Eastern Aleutian	22	20	204.09	40,176	16,553	63,800
Central Aleutian	201-300	SW Central Aleutian	6	6	169.32	7,214	0	23,260
Central Aleutian	101-200	SE Central Aleutian	14	5	140.65	10,574	0	30,735
Eastern Aleutian	201-300	SW Eastern Aleutian	6	5	136.37	9,770	0	20,719
Southern Bering	201-300	Combined Southern Bering	7	7	109.66	6,183	71	12,295
Western Aleutian	101-200	W Western Aleutian	28	12	108.47	44,093	0	101,541
Central Aleutian	201-300	SE Central Aleutian	4	4	97.92	4,674	0	10,354
Southern Bering	301-500	Combined Southern Bering	8	8	71.28	7,435	0	20,843
Central Aleutian	201-300	Petrel Bank	3	3	66.91	5,128	0	17,188
Central Aleutian	101-200	SW Central Aleutian	17	13	59.26	6,236	0	14,123
Eastern Aleutian	201-300	SE Eastern Aleutian	12	12	50.37	10,379	0	26,047
Western Aleutian	1-100	E Western Aleutian	10	5	39.07	4,623	0	14,973
Southern Bering	101-200	W Southern Bering Sea	5	2	35.51	2,378	0	8,969
Central Aleutian	101-200	Petrel Bank	6	4	34.54	5,994	0	21,347
Central Aleutian	301-500	N Central Aleutian	8	7	20.65	2,560	0	6,248
Western Aleutian	301-500	E Western Aleutian	2	2	8.15	1,272	0	14,135
Central Aleutian	301-500	SE Central Aleutian	4	3	6.01	429	0	1,752
Eastern Aleutian	101-200	SE Eastern Aleutian	15	11	5.66	1,076	70	2,083
Eastern Aleutian	301-500	SE Eastern Aleutian	12	10	4.52	1,165	0	2,549
Central Aleutian	301-500	Petrel Bank	3	3	2.34	290	77	503
Eastern Aleutian	101-200	SW Eastern Aleutian	9	4	2.24	506	0	1,260
Southern Bering	101-200	E Southern Bering Sea	11	7	1.39	164	0	398
Eastern Aleutian	301-500	Combined Eastern Aleutian	13	6	1.35	360	0	804
Central Aleutian	1-100	Petrel Bank	4	1	1.04	100	0	417
Southern Bering	1-100	E Southern Bering Sea	27	8	0.62	151	0	419
Eastern Aleutian	101-200	NE Eastern Aleutian	17	6	0.49	98	3	192
Western Aleutian	301-500	W Western Aleutian	11	3	0.41	70	0	172
Central Aleutian	1-100	SE Central Aleutian	7	2	0.40	46	0	126
Central Aleutian	1-100	N Central Aleutian	14	1	0.19	40	0	126
Eastern Aleutian	301-500	SW Eastern Aleutian	2	1	0.17	7	0	101
Eastern Aleutian	1-100	SE Eastern Aleutian	5	2	0.08	15	0	40
Eastern Aleutian	101-200	NW Eastern Aleutian	6	1	0.07	11	0	40
Western Aleutian	1-100	W Western Aleutian	16	2	0.03	9	0	28

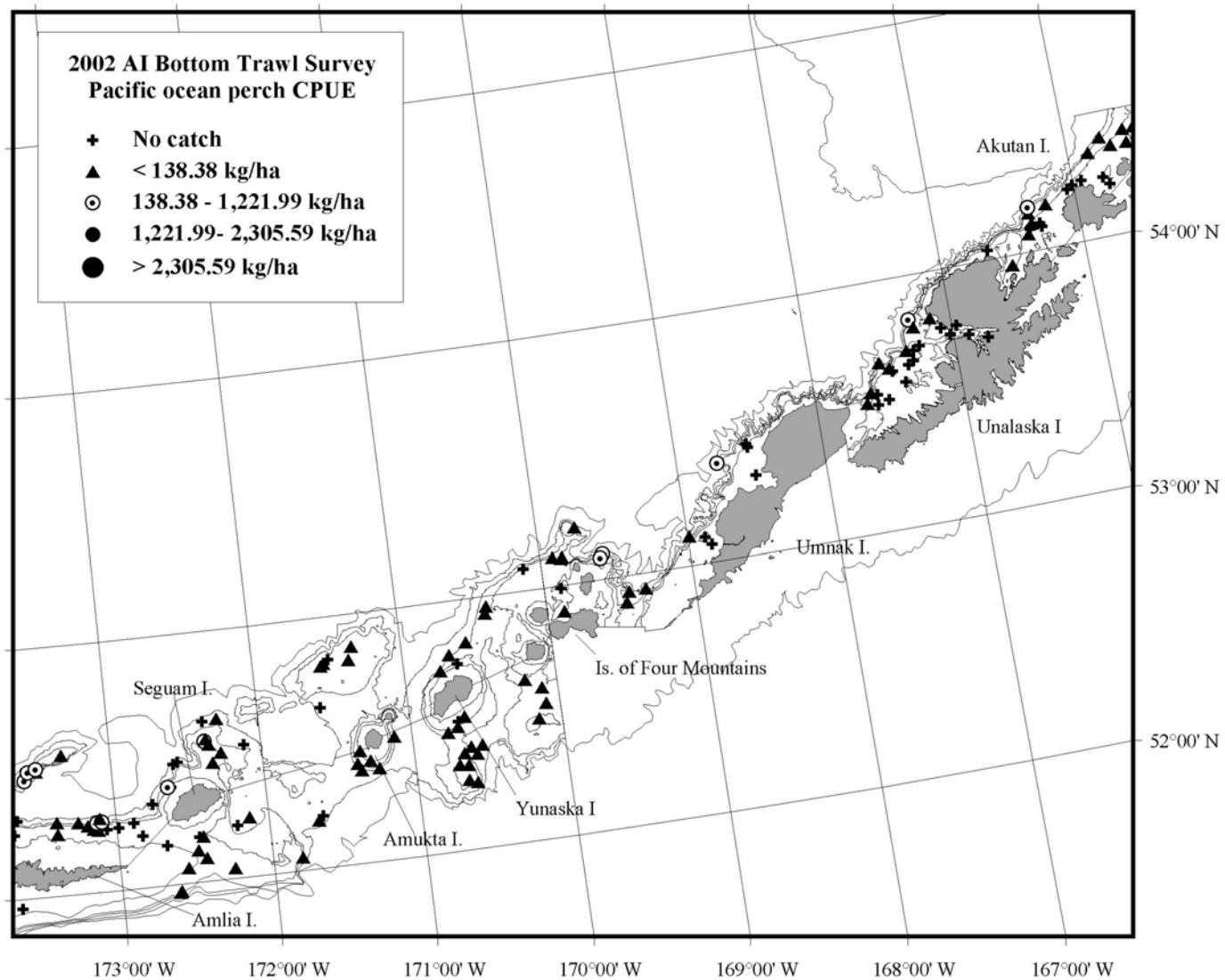


Figure 45.--Distribution and relative abundance of Pacific ocean perch from the 2002 Aleutian Islands bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than mean CPUE, between mean CPUE and two standard deviations above mean CPUE, between two and four standard deviations above mean CPUE, and greater than four standard deviations above mean CPUE.

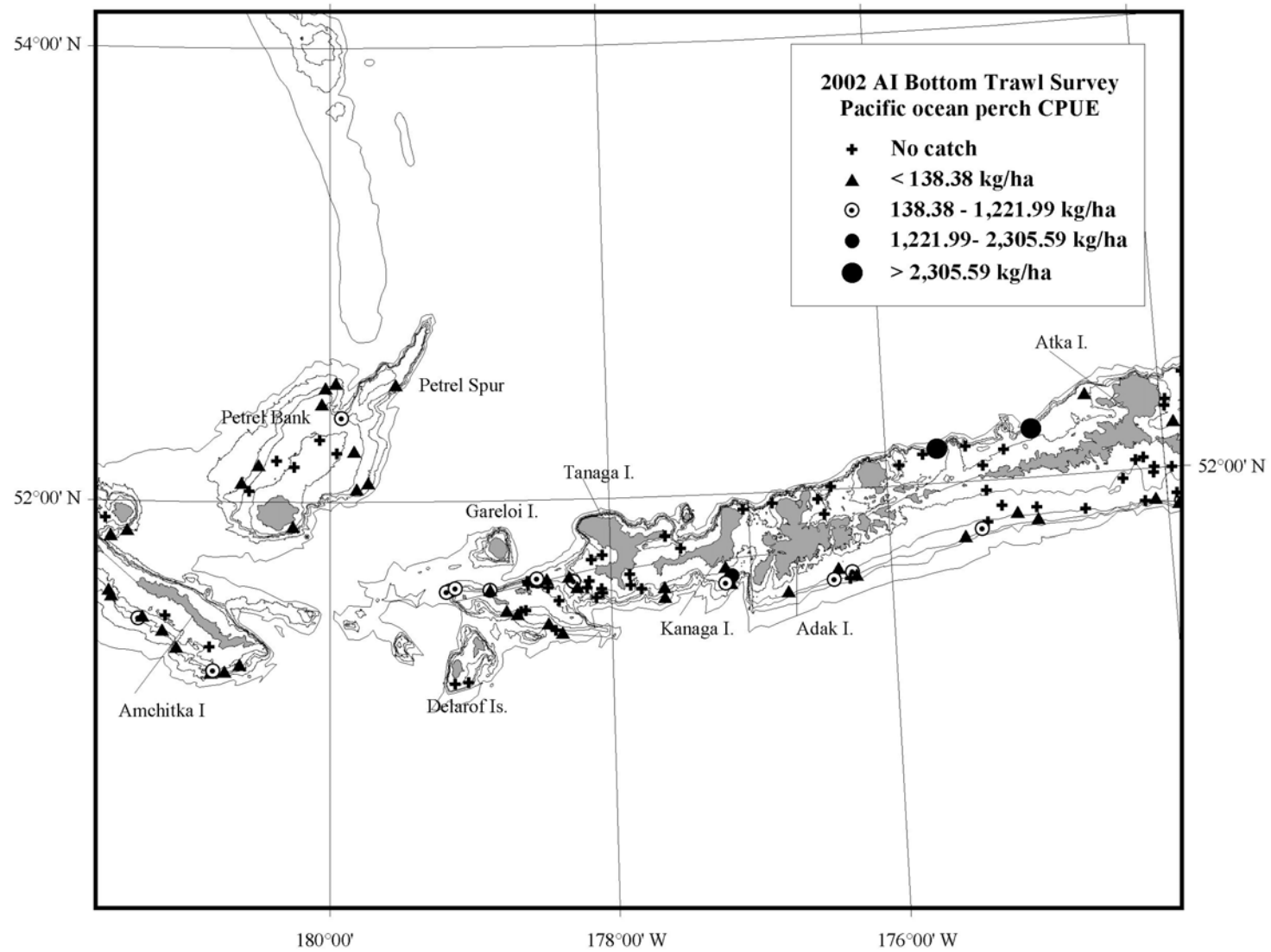


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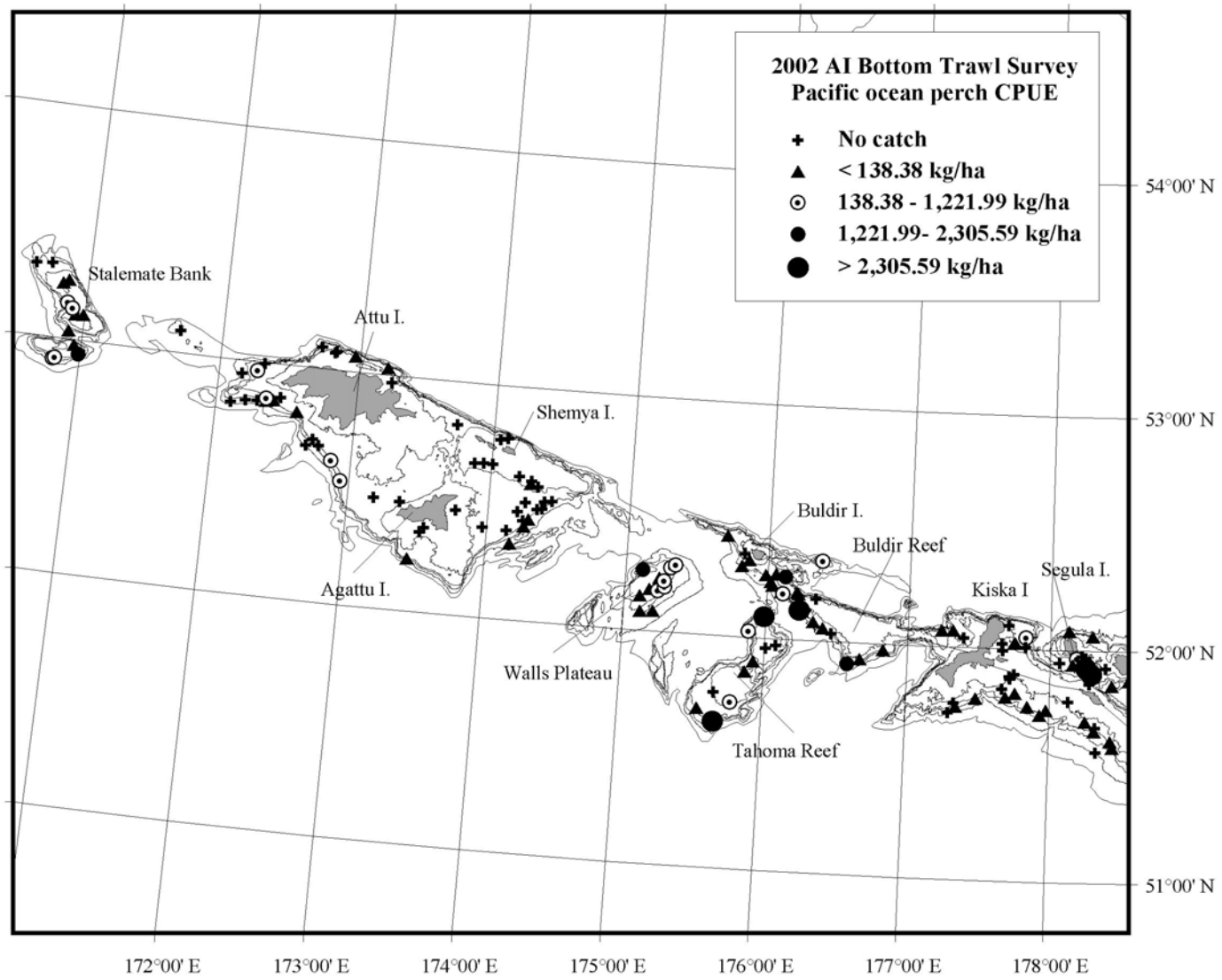


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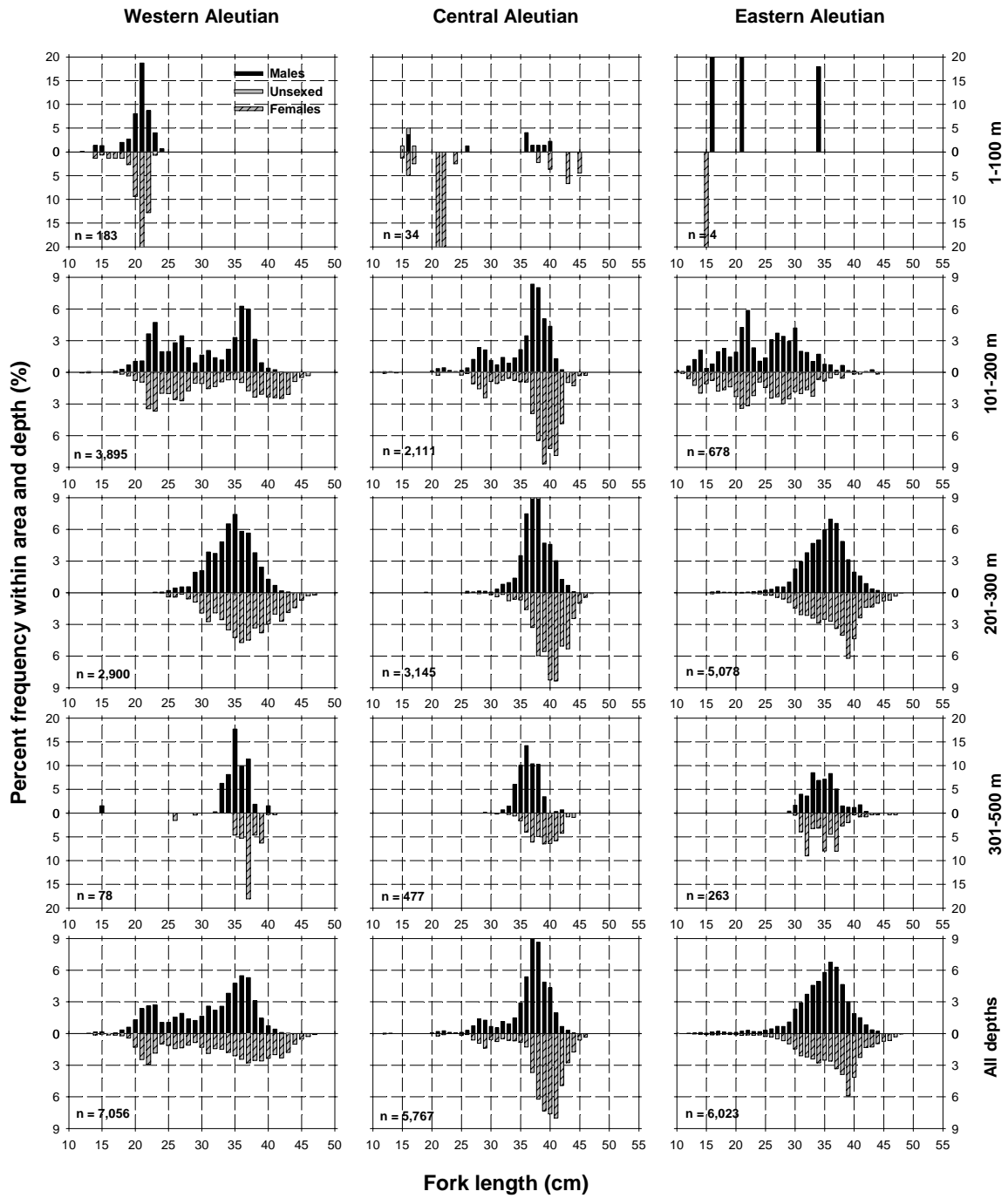


Figure 46.--Size composition of the estimated Pacific ocean perch population from the 2002 Aleutian Islands bottom trawl survey by NPFMC regulatory area and depth interval.

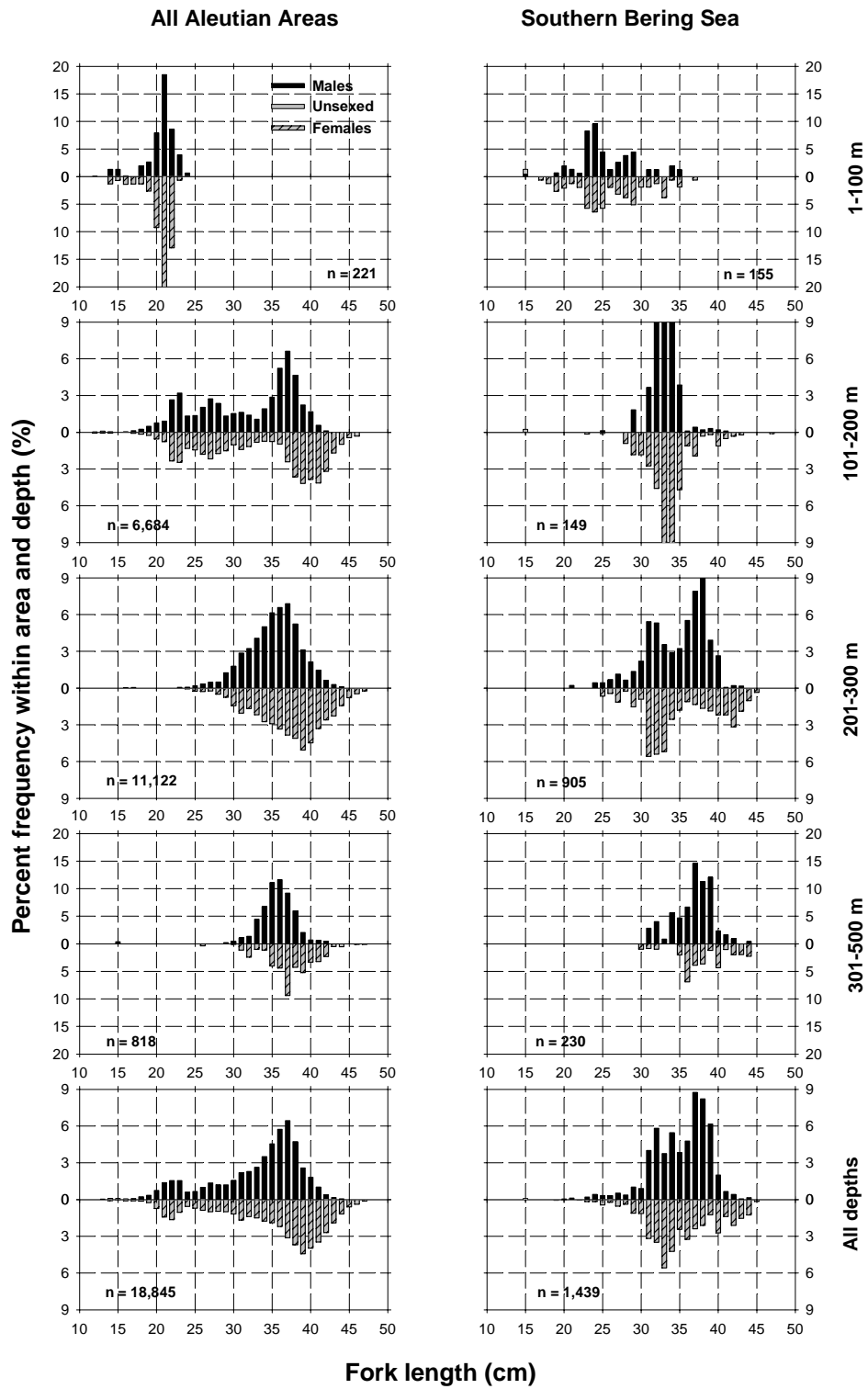


Figure 46.--(Pacific ocean perch, continued).

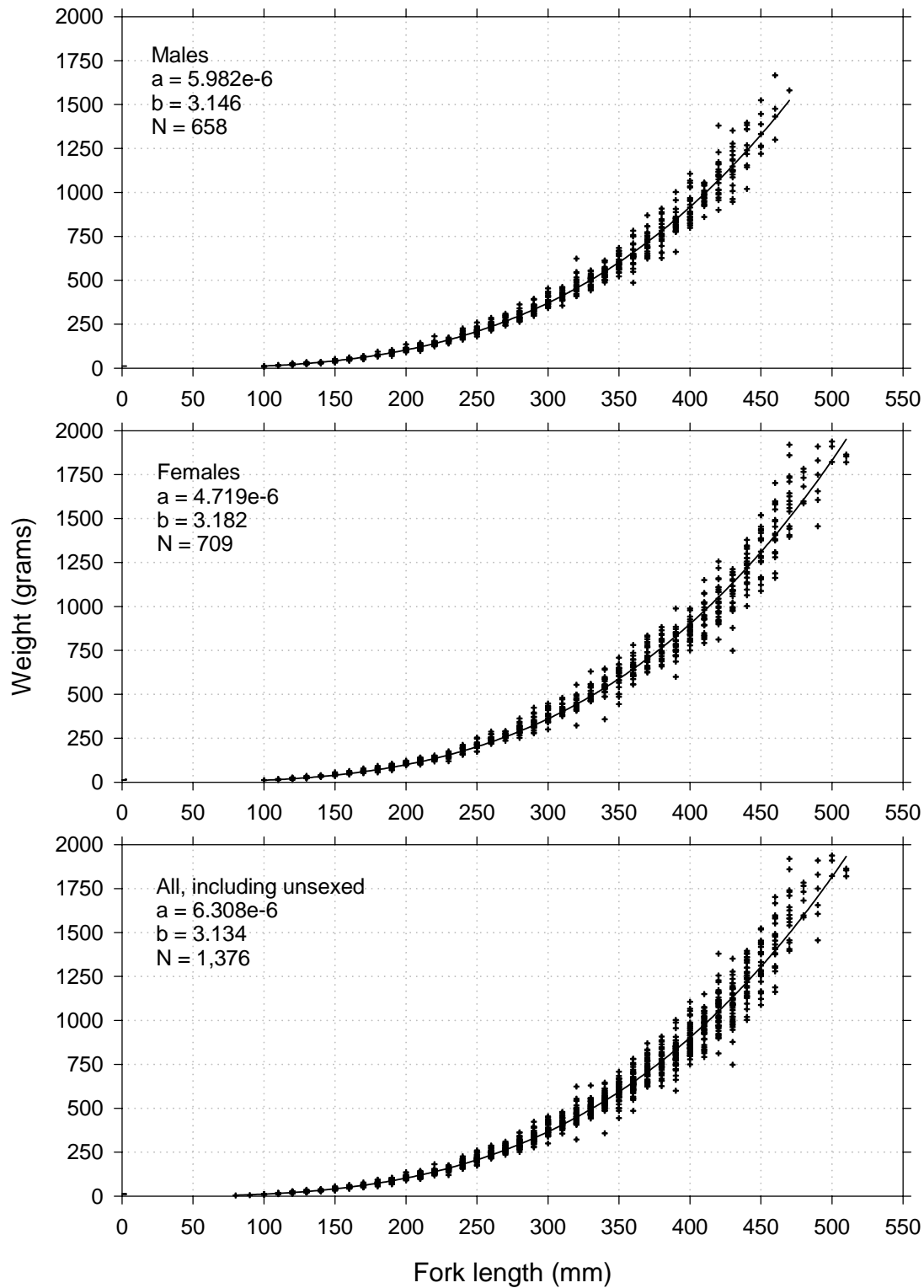


Figure 47.--Length-weight relationship for Pacific ocean perch specimens collected during the 2002 Aleutian Islands bottom trawl survey. The non-linear least squares regression (solid line) was calculated using the formula $Weight(\text{grams}) = a * Length(\text{mm})^b$.

Northern rockfish (*Sebastes polyspinus*)

Northern rockfish relative abundance was highest in the Western Aleutian area and decreased rapidly to the east (Table 2). Figure 8 shows that the largest catches of northern rockfish occurred west of 180° longitude, which bisects the Central Aleutian area. Only one relatively large catch occurred east of 180°, SW of Tanaga Island. Estimated total survey biomass was slightly more than 176,000 t, with about 76% found in the Western Aleutian area (Table 37), and in depths of 101-200 m. Estimated biomass in the Western Aleutian area in the 101-200 m depth interval was 101,000 t, about 10,000 t higher than that of POP (Tables 35 and 37). Northern rockfish were encountered in relatively small numbers in the 201-300 m depth interval and rarely in trawl hauls deeper than 300 m. The distribution by depth is more similar to that of Atka mackerel than POP. Northern rockfish were captured in 42% of all successful survey tows conducted shallower than 300 m, and 49% of all successful tows shallower than 200 m.

The highest catch rate of northern rockfish occurred in 101-200 m in the SW Central Aleutian subarea, between Amchitka and Kiska Islands. All but one tow in that subarea caught northern rockfish (Table 38). The next three highest ranked mean CPUEs were from the Western Aleutian area, notably from Stalemate Bank, Buldir Reef, and Tahoma Reef (Fig. 48). Mean individual length and weight increased with depth to 300 m. In the Western Aleutian area, the size composition modes for both sexes occurred at about 25 and 29 cm in the 1-100 m depth interval and about 30 cm in 101-200 m (Fig. 49). Size compositions in the Central and Eastern Aleutian areas, although representing a smaller biomass, were more heavily weighted toward females with the primary mode closer to 35 cm. The primary modes in the size compositions of both males and females in all Aleutian areas combined were at 30 cm, but larger females represented a greater proportion of the population than larger males.

Figure 50 depicts length-weight relationships for male, female, and combined sexes of northern rockfish. The male and female regression curves are very similar, but the maximum lengths for females are slightly larger than for males.

Table 37.--Number of survey hauls, number of hauls with northern rockfish, mean CPUE, biomass estimates with confidence limits, mean weight, and mean length based on the 2002 Aleutian Islands bottom trawl survey, by NPFMC regulatory area and depth interval.

NPFMC area	Depth (m)	Number of trawl hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	95% Confidence limits		Mean weight (kg)	Mean length (cm)
						Minimum biomass (t)	Maximum biomass (t)		
Western Aleutian	1-100	26	12	68.31	33,315	7,151	59,478	0.237	25.7
	101-200	51	33	190.21	101,145	14,050	188,241	0.384	29.5
	201-300	19	8	0.34	59	0	129	0.417	31.5
	301-500	13	0	-	-	-	-	-	-
	All depths	109	53	88.56	134,519	43,939	225,100	0.333	28.2
Central Aleutian	1-100	30	5	15.37	8,987	0	26,314	0.295	27.0
	101-200	45	24	63.16	29,090	0	59,331	0.526	33.3
	201-300	23	13	0.48	100	38	163	0.491	32.3
	301-500	17	2	0.03	12	0	35	0.491	31.8
	All depths	115	44	23.09	38,189	4,435	71,943	0.444	31.1
Eastern Aleutian	1-100	16	5	1.34	917	0	2,504	0.470	31.4
	101-200	47	17	1.31	1,018	0	2,203	0.604	34.2
	201-300	42	14	2.62	1,286	0	3,532	0.692	36.4
	301-500	27	3	0.04	21	0	45	0.747	37.5
	All depths	132	39	1.29	3,242	349	6,135	0.587	33.9
All Aleutian Areas	1-100	72	22	24.60	43,218	12,604	73,833	0.250	26.0
	101-200	143	74	74.19	131,254	39,432	223,075	0.410	30.2
	201-300	84	35	1.65	1,446	0	3,693	0.656	35.7
	301-500	57	5	0.03	32	3	62	0.628	34.3
	All depths	356	136	30.90	175,950	79,262	272,638	0.355	28.7
Southern Bering Sea	1-100	30	6	0.52	209	0	602	0.382	29.0
	101-200	16	7	0.33	61	6	117	0.461	31.3
	201-300	7	3	0.35	20	0	51	0.698	35.3
	301-500	8	0	-	-	-	-	-	-
	All depths	61	16	0.39	290	0	687	0.410	29.7

Table 38.--Sampling effort, CPUE, and biomass with 95% confidence limits (CL) of northern rockfish, by NPFMC regulatory area and survey subarea, ranked by descending CPUE for the 2002 Aleutian Islands bottom trawl survey.

NPFMC Area	Depth range (m)	Subarea	Number of hauls	Hauls with catch	CPUE (kg/ha)	Biomass (t)	Biomass CL	
							Min. (t)	Max. (t)
Central Aleutian	101-200	SW Central Aleutian	17	16	243.28	25,600	0	55,517
Western Aleutian	101-200	W Western Aleutian	28	12	197.46	80,272	0	166,240
Western Aleutian	1-100	E Western Aleutian	10	9	173.46	20,526	0	41,113
Western Aleutian	101-200	E Western Aleutian	23	21	166.66	20,873	5,718	36,028
Central Aleutian	1-100	N Central Aleutian	14	2	38.90	8,190	0	25,599
Central Aleutian	101-200	SE Central Aleutian	14	4	37.58	2,825	0	8,844
Western Aleutian	1-100	W Western Aleutian	16	3	34.63	12,789	0	31,403
Central Aleutian	101-200	N Central Aleutian	8	4	6.23	664	0	1,927
Eastern Aleutian	201-300	NE Eastern Aleutian	22	3	5.74	1,131	0	3,379
Eastern Aleutian	1-100	SE Eastern Aleutian	5	4	5.19	904	0	2,617
Eastern Aleutian	101-200	SE Eastern Aleutian	15	9	5.17	982	0	2,174
Central Aleutian	1-100	SE Central Aleutian	7	1	3.23	376	0	1,297
Central Aleutian	1-100	SW Central Aleutian	5	2	2.60	421	0	1,507
Central Aleutian	201-300	N Central Aleutian	10	6	0.93	41	0	83
Southern Bering	1-100	E Southern Bering Sea	27	6	0.86	209	0	603
Eastern Aleutian	201-300	NW Eastern Aleutian	2	2	0.75	12	0	94
Western Aleutian	201-300	W Western Aleutian	9	5	0.57	53	0	124
Eastern Aleutian	201-300	SE Eastern Aleutian	12	7	0.56	115	0	236
Central Aleutian	201-300	SW Central Aleutian	6	3	0.50	21	0	49
Central Aleutian	201-300	SE Central Aleutian	4	2	0.45	22	0	70
Eastern Aleutian	201-300	SW Eastern Aleutian	6	2	0.41	29	0	97
Southern Bering	101-200	E Southern Bering Sea	11	4	0.38	45	0	99
Southern Bering	201-300	Combined Southern Bering	7	3	0.35	20	0	52
Southern Bering	101-200	W Southern Bering Sea	5	3	0.24	16	0	39
Central Aleutian	201-300	Petrel Bank	3	2	0.22	17	0	64
Central Aleutian	301-500	SW Central Aleutian	2	1	0.09	7	0	96
Eastern Aleutian	101-200	NE Eastern Aleutian	17	4	0.08	17	0	36
Western Aleutian	201-300	E Western Aleutian	10	3	0.07	6	0	13
Eastern Aleutian	1-100	SW Eastern Aleutian	5	1	0.07	13	0	48
Eastern Aleutian	101-200	SW Eastern Aleutian	9	3	0.06	15	0	34
Eastern Aleutian	301-500	SE Eastern Aleutian	12	2	0.06	15	0	37
Central Aleutian	301-500	N Central Aleutian	8	1	0.04	5	0	16
Eastern Aleutian	101-200	NW Eastern Aleutian	6	1	0.03	5	0	18
Eastern Aleutian	301-500	Combined Eastern Aleutian	13	1	0.02	6	0	19

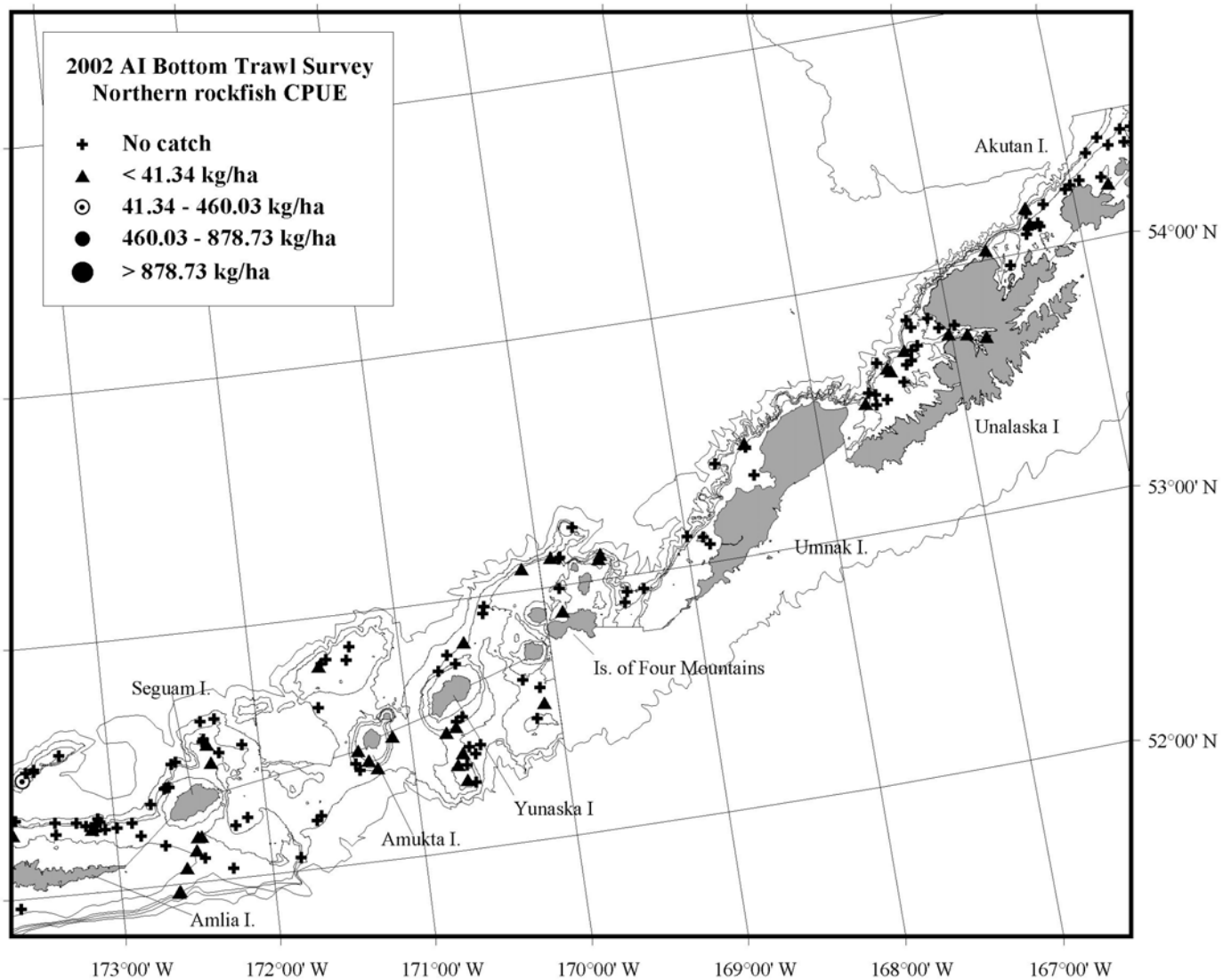


Figure 48.--Distribution and relative abundance of northern rockfish from the 2002 Aleutian Islands bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than mean CPUE, between mean CPUE and two standard deviations above mean CPUE, between two and four standard deviations, and greater than four standard deviations above mean CPUE.

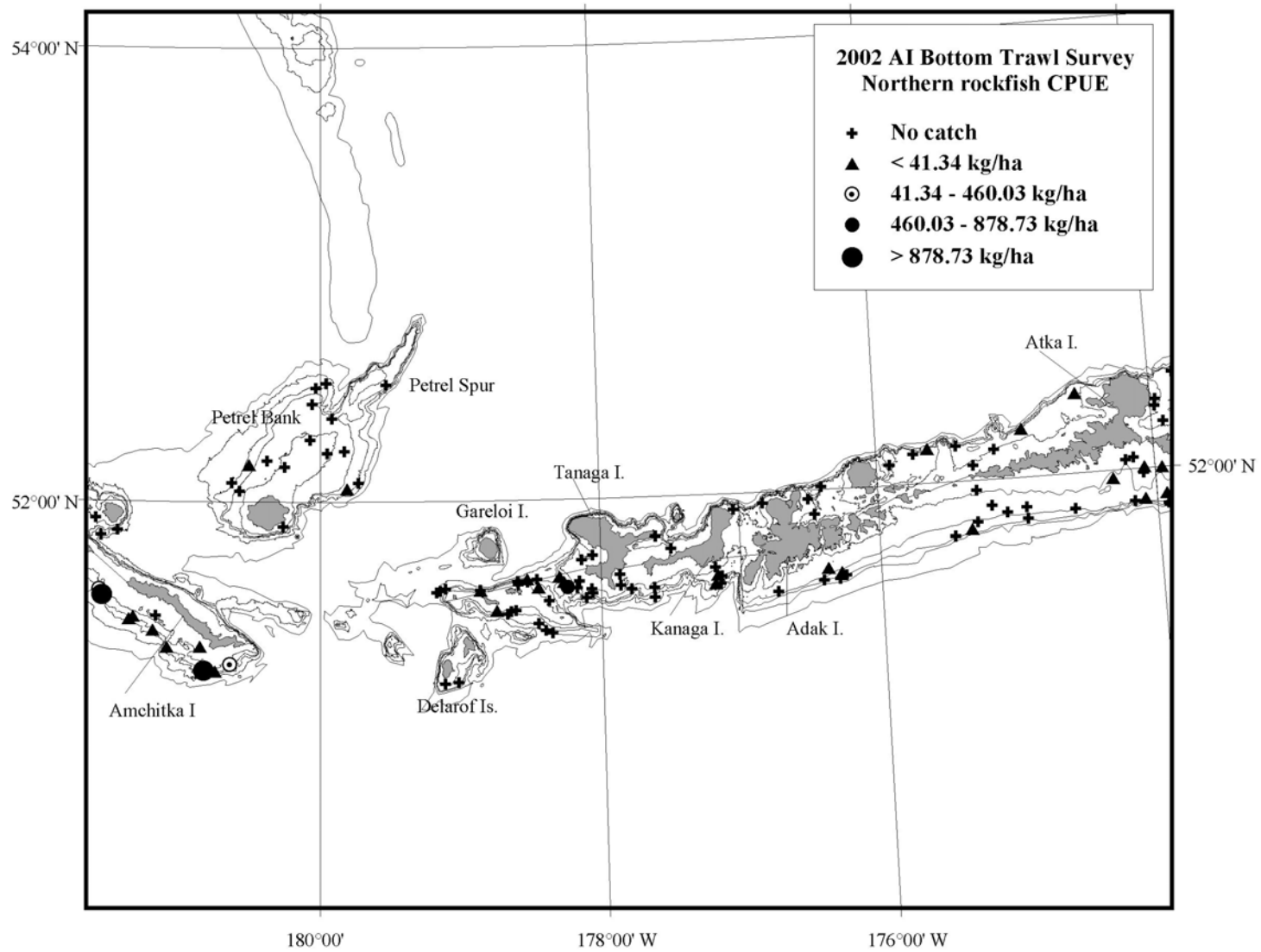


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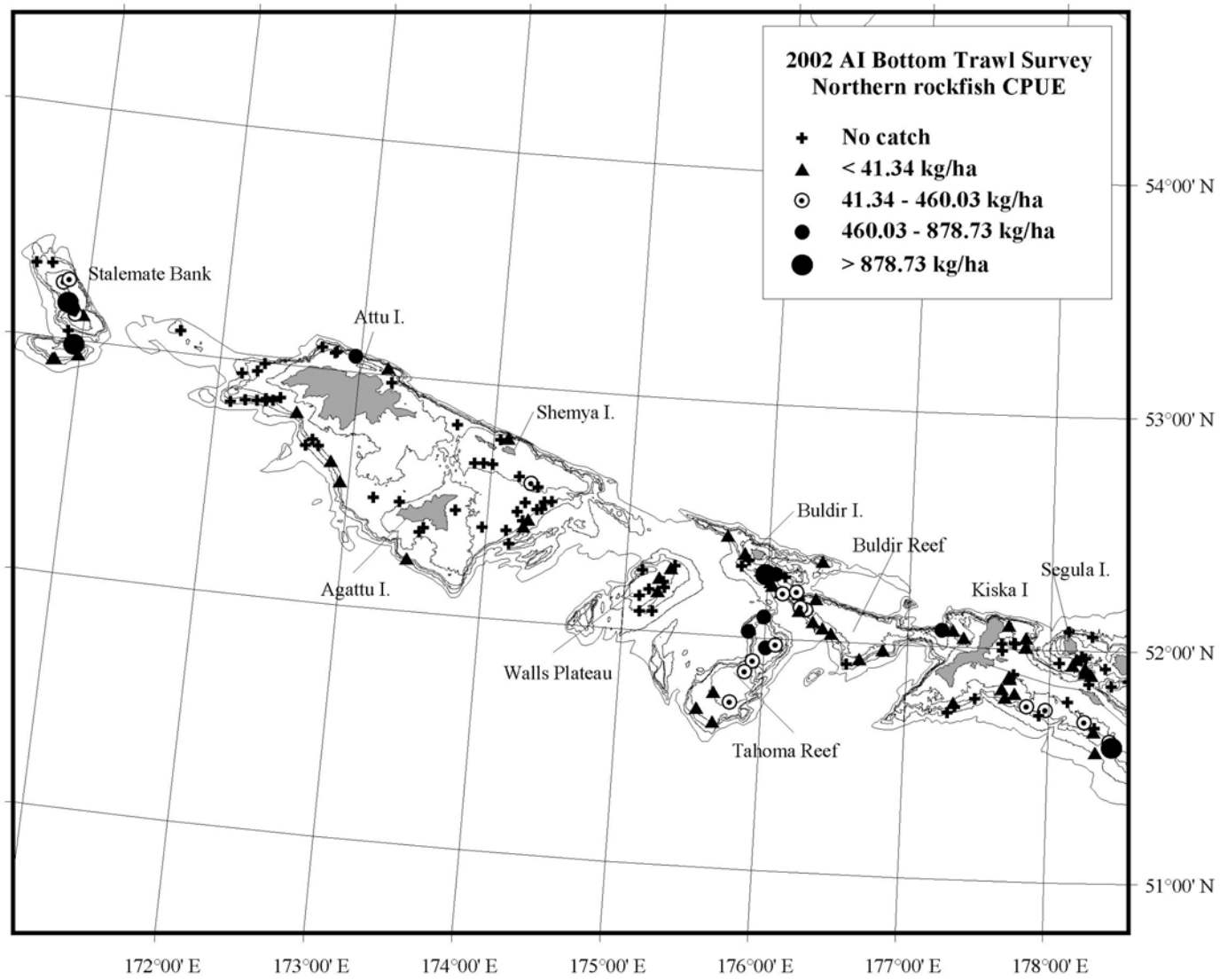


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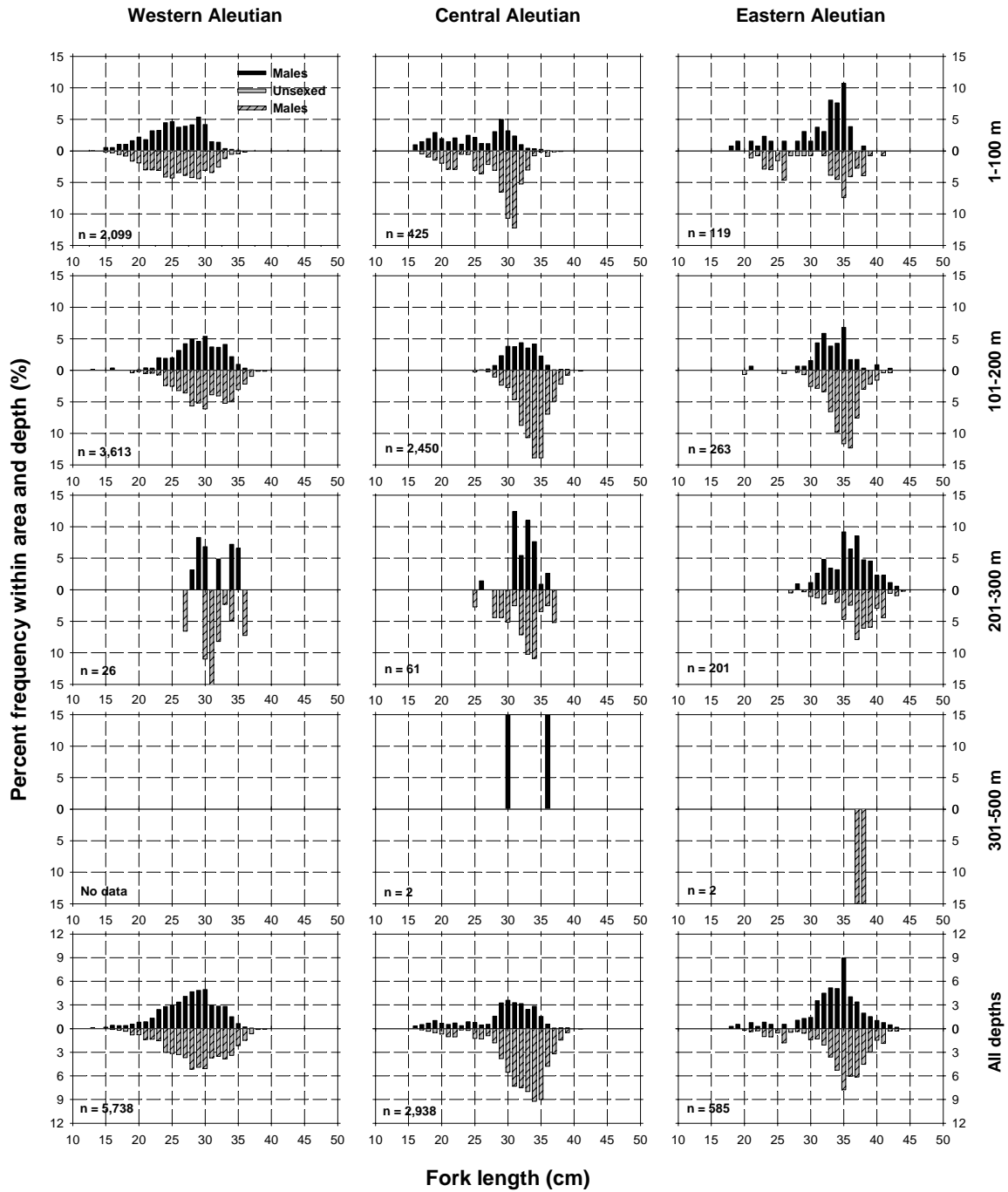


Figure 49.--Size composition of the estimated northern rockfish population from the 2002 Aleutian Islands bottom trawl survey by NPFMC regulatory area and depth interval.

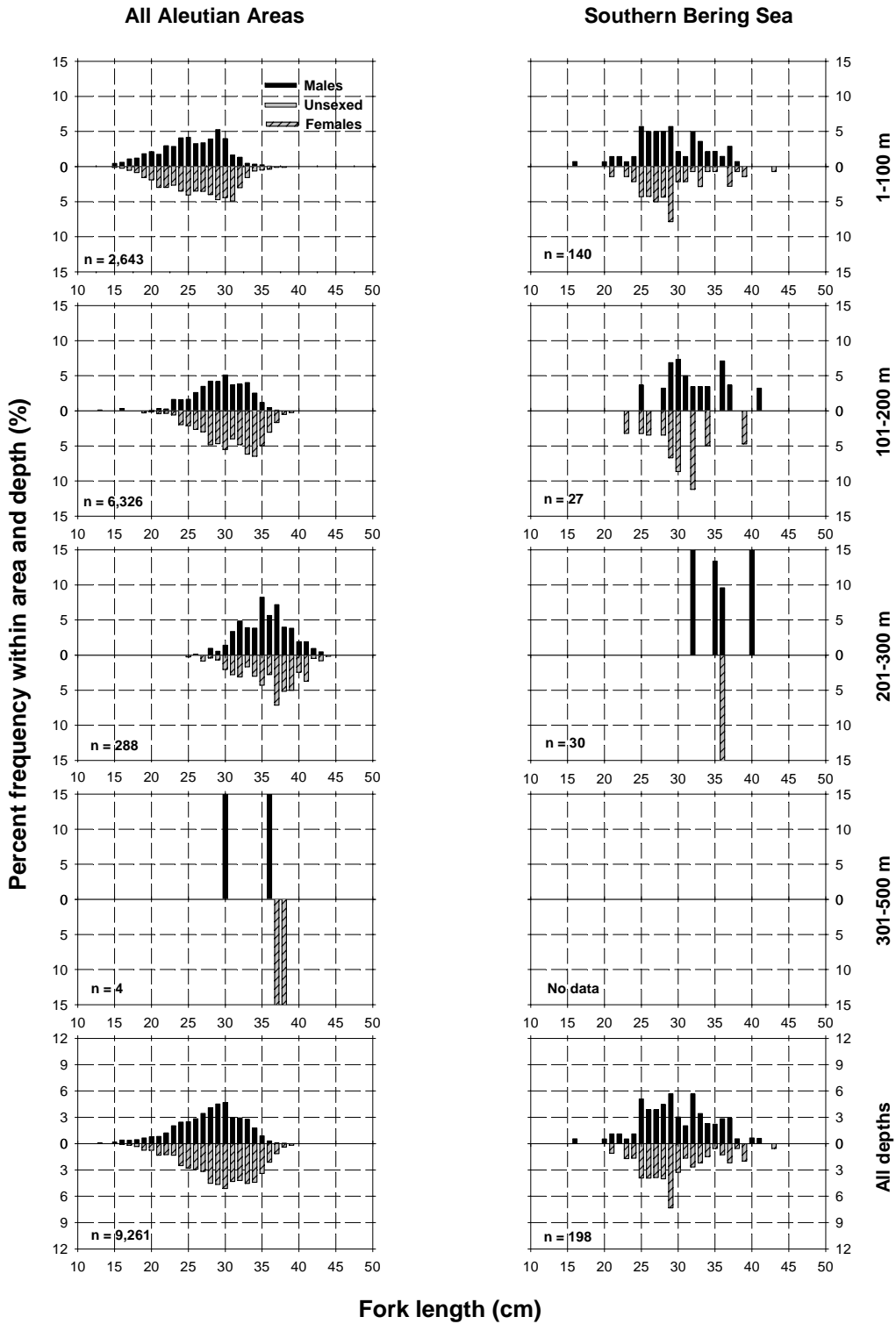


Figure 49.--(Northern rockfish, continued).

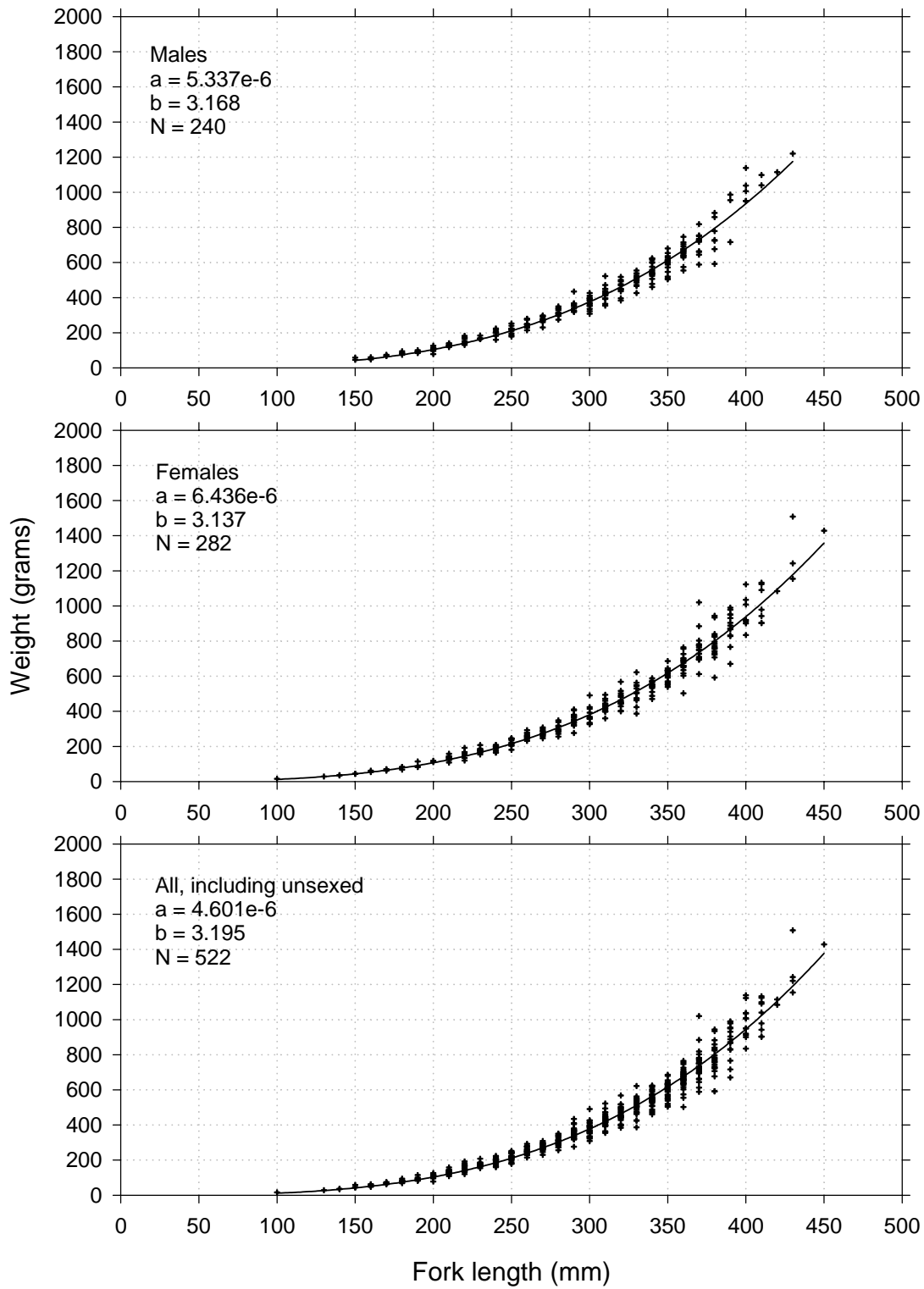


Figure 50.--Length-weight relationship for northern rockfish specimens collected during the 2002 Aleutian Islands bottom trawl survey. The non-linear least squares regression (solid line) was calculated using the formula $Weight_{(grams)} = a * Length_{(mm)}^b$.

Shortraker rockfish (*Sebastes borealis*)

Shortraker rockfish mean CPUE was higher than that of rougheye rockfish in all major survey areas except the Eastern Aleutian area (Table 2). The estimated biomass for this species is distributed by depth similarly to that of rougheye rockfish (Tables 39 and 41). A higher proportion, about 16%, of the total shortraker rockfish biomass estimated from the 1980 U.S.-Japan cooperative Aleutian trawl survey was found in the 501-900 m depth interval (Ronholt et al. 1986). Thus, estimates from the 2002 AFSC survey are likely to have excluded a relatively large part of the shortraker rockfish population. The highest four area-specific mean CPUEs were from the three Central Aleutian subareas, and the far-western section of the Western Aleutian area, all in the 301-500 m depth interval (Table 40). All trawl hauls in those subareas produced catches of shortraker rockfish. Three catches accounted for the entire biomass estimate in the Southern Bering Sea area (Table 39).

Notable individual catches of shortraker rockfish occurred between Unalaska and Umnak Islands, between Adak Island and the Delarof Islands, east of Kiska Island (Segula Island), and on Stalemate Bank (Fig. 51). Given the frequency of catch occurrences, it appears that the south side of the archipelago between Adak Island and the Delarof Islands is an area favorable for shortraker rockfish.

Size compositions of males and females from the combined Aleutian areas were similar, although somewhat more of the largest fish were females (Fig. 52). Females were slightly more abundant (52%) in length frequency samples. The average size of fish in the 301-500 m depth interval was smaller than in shallower depths (Table 39). That depth interval, with its high estimated biomass, most likely contains a broader cross-section of the shortraker rockfish population. Figure 53 presents length-weight relationships for both sexes and combined sexes of shortraker rockfish.

Table 39.--Number of survey hauls, number of hauls with shortraker rockfish, mean CPUE, biomass estimates with confidence limits, mean weight, and mean length based on the 2002 Aleutian Islands bottom trawl survey, by NPFMC regulatory area and depth interval.

NPFMC area	Depth (m)	Number of trawl hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	95% Confidence limits		Mean weight (kg)	Mean length (cm)
						Minimum biomass (t)	Maximum biomass (t)		
Western Aleutian	1-100	26	0	-	-	-	-	-	-
	101-200	51	0	-	-	-	-	-	-
	201-300	19	1	0.24	41	0	133	7.272	74.0
	301-500	13	13	11.94	3,906	0	8,607	1.790	44.0
	All depths	109	14	2.60	3,947	0	8,649	1.804	44.1
Central Aleutian	1-100	30	2	0.09	51	0	135	2.872	54.1
	101-200	45	2	0.45	207	0	669	3.611	56.6
	201-300	23	5	3.01	636	0	1,509	4.318	58.6
	301-500	17	15	19.45	7,745	3,232	12,257	1.896	47.1
	All depths	115	24	5.22	8,638	4,021	13,254	2.005	47.6
Eastern Aleutian	1-100	16	0	-	-	-	-	-	-
	101-200	47	0	-	-	-	-	-	-
	201-300	42	3	0.29	142	0	356	2.081	47.7
	301-500	27	13	4.67	2,655	1,145	4,165	1.810	46.3
	All depths	132	16	1.11	2,797	1,273	4,321	1.822	46.4
All Aleutian Areas	1-100	72	2	0.03	51	0	135	2.872	54.1
	101-200	143	2	0.12	207	0	669	3.611	56.6
	201-300	84	9	0.94	818	0	1,660	3.705	55.6
	301-500	57	41	11.06	14,306	8,060	20,552	1.850	46.1
	All depths	356	54	2.70	15,382	9,066	21,697	1.915	46.4
Southern Bering Sea	1-100	30	0	-	-	-	-	-	-
	101-200	16	0	-	-	-	-	-	-
	201-300	7	1	0.11	6	0	22	2.342	52.0
	301-500	8	2	13.97	1,457	0	3,659	3.780	55.9
	All depths	61	3	1.96	1,463	0	3,666	3.770	55.9

Table 40.--Sampling effort, mean CPUE, and estimated biomass with 95% confidence limits (CL) of shortraker rockfish by NPFMC regulatory area and survey subarea, ranked by descending mean CPUE for the 2002 Aleutian Islands bottom trawl survey.

NPFMC Area	Depth range (m)	Subarea	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Biomass CL	
							Min. (t)	Max. (t)
Central Aleutian	301-500	SE Central Aleutian	4	4	33.05	2,361	1,251	3,471
Central Aleutian	301-500	N Central Aleutian	8	8	30.17	3,740	0	8,333
Western Aleutian	301-500	W Western Aleutian	11	11	20.19	3,455	0	8,210
Central Aleutian	301-500	SW Central Aleutian	2	2	14.27	1,127	0	3,769
Southern Bering	301-500	Combined Southern Bering	8	2	13.97	1,457	0	3,716
Central Aleutian	201-300	N Central Aleutian	10	3	13.65	599	0	1,485
Eastern Aleutian	301-500	SW Eastern Aleutian	2	2	9.22	404	177	631
Eastern Aleutian	301-500	Combined Eastern Aleutian	13	7	5.03	1,343	234	2,451
Central Aleutian	301-500	Petrel Bank	3	1	4.18	517	0	2,741
Eastern Aleutian	301-500	SE Eastern Aleutian	12	4	3.53	909	0	2,070
Western Aleutian	301-500	E Western Aleutian	2	2	2.89	451	0	1,409
Central Aleutian	101-200	N Central Aleutian	8	1	1.88	200	0	674
Central Aleutian	201-300	SE Central Aleutian	4	2	0.76	36	0	105
Western Aleutian	201-300	E Western Aleutian	10	1	0.53	41	0	134
Eastern Aleutian	201-300	SE Eastern Aleutian	12	1	0.45	93	0	297
Eastern Aleutian	201-300	SW Eastern Aleutian	6	1	0.42	30	0	108
Central Aleutian	1-100	Petrel Bank	4	1	0.33	32	0	132
Southern Bering	201-300	Combined Southern Bering	7	1	0.11	6	0	22
Eastern Aleutian	201-300	NE Eastern Aleutian	22	1	0.09	19	0	57
Central Aleutian	1-100	N Central Aleutian	14	1	0.09	19	0	61
Central Aleutian	101-200	SE Central Aleutian	14	1	0.09	7	0	21

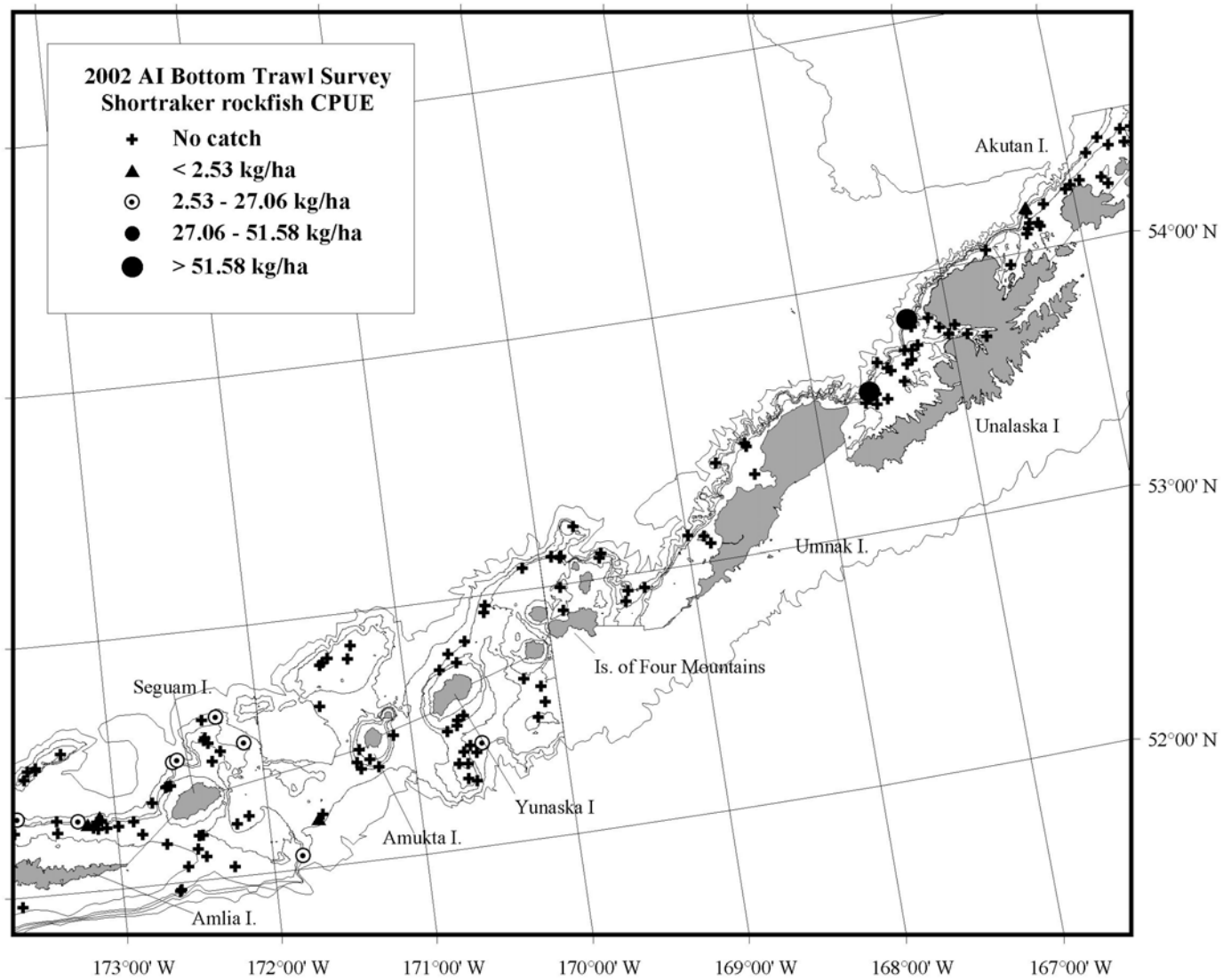


Figure 51.--Distribution and relative abundance of shorttraker rockfish from the 2002 Aleutian Islands bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than mean CPUE, between mean CPUE and two standard deviations above mean CPUE, between two and four standard deviations above mean CPUE, and greater than four standard deviations above mean CPUE.

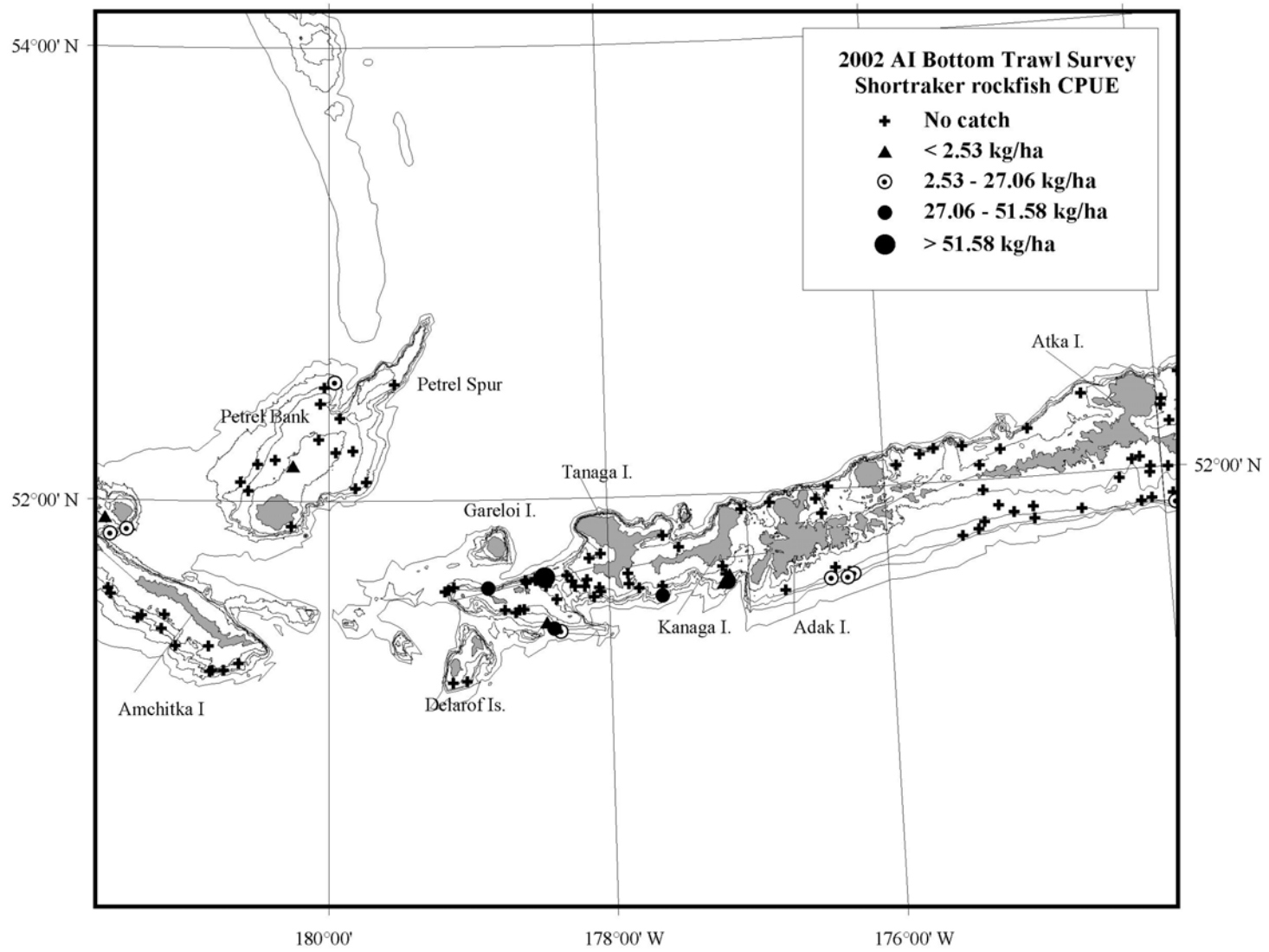


Figure 51.--(Continued).

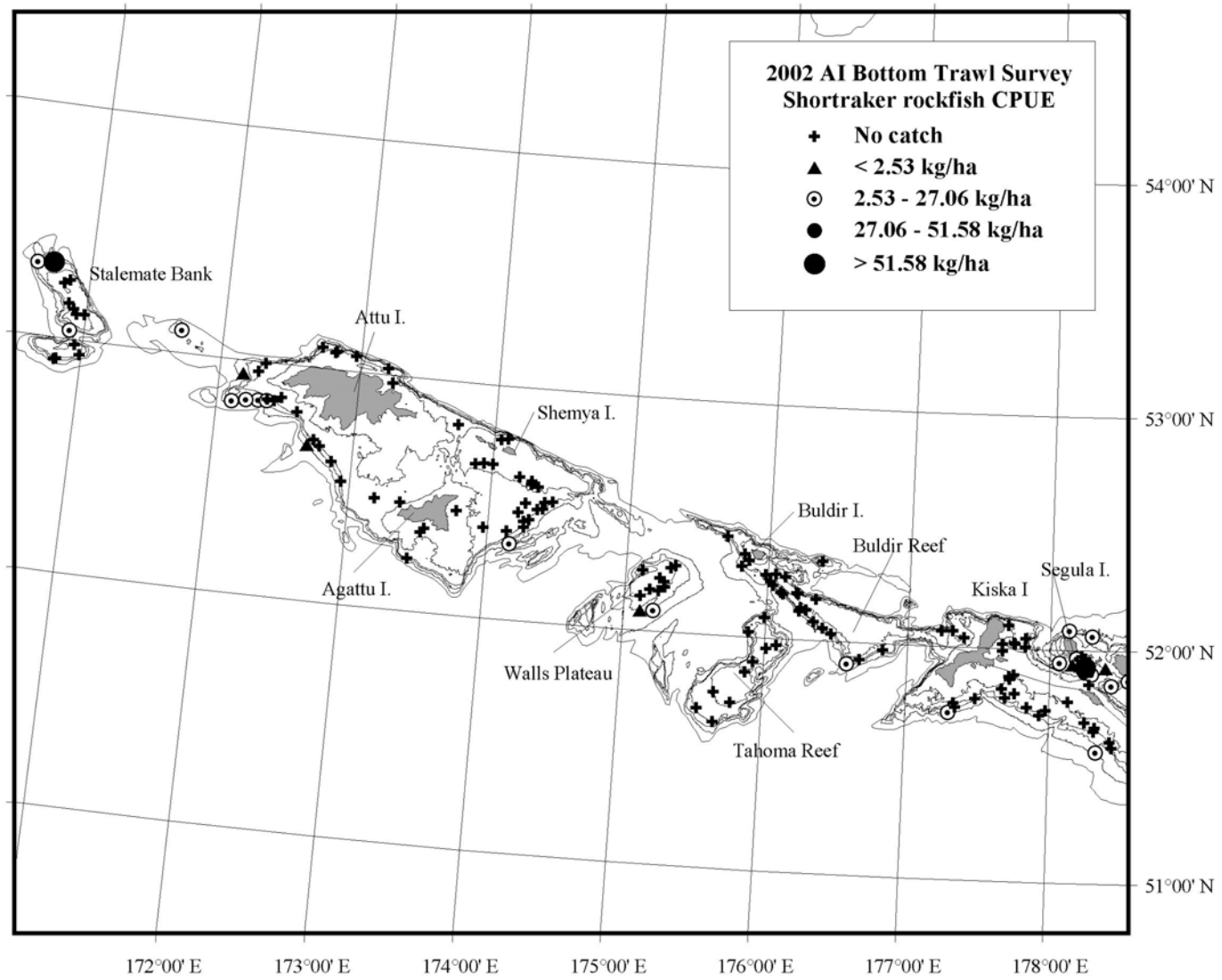


Figure 51.--(Continued).

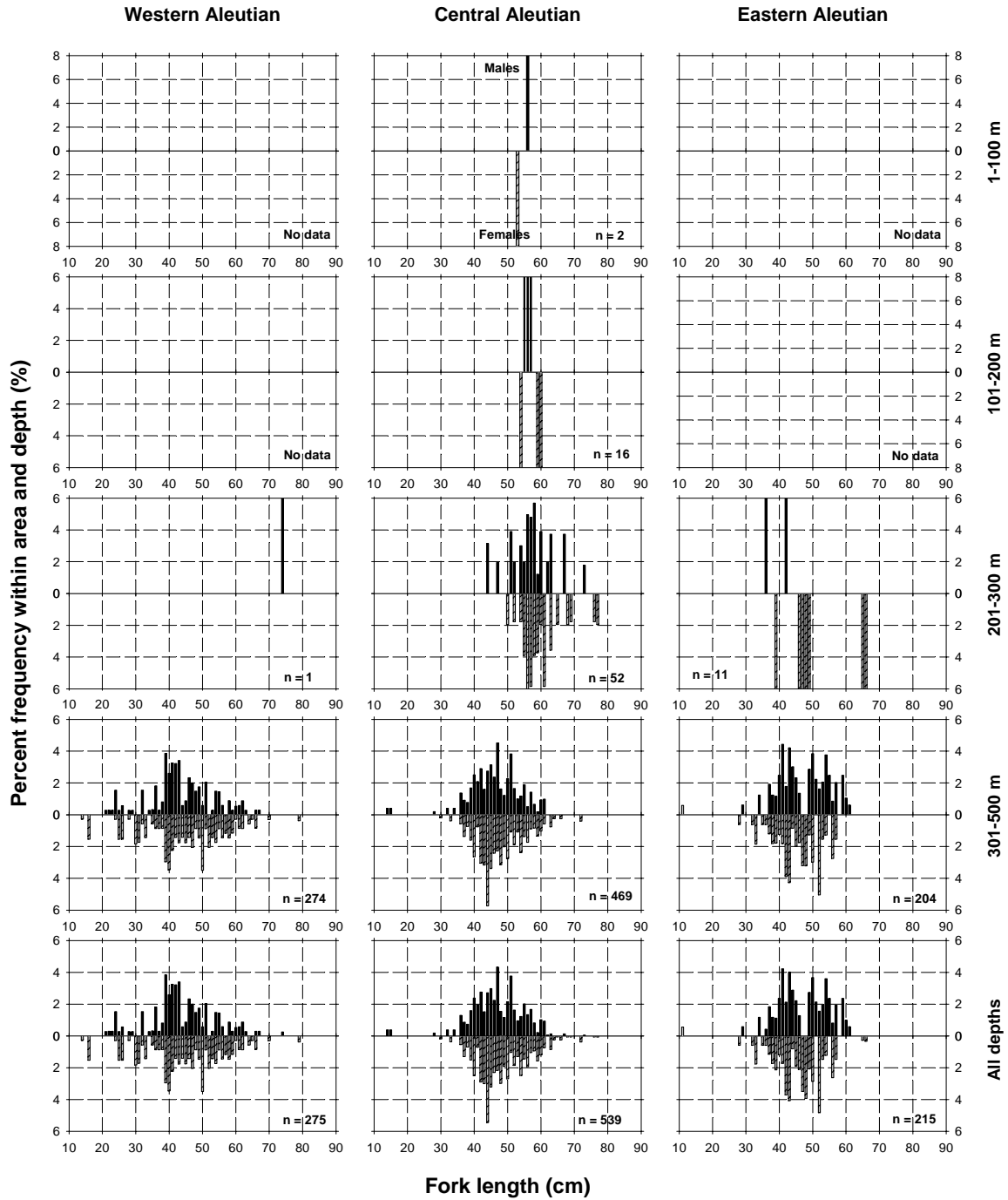


Figure 52.--Size composition of the estimated shorttraker rockfish population from the 2002 Aleutian Islands bottom trawl survey by NPFMC regulatory area and depth interval.

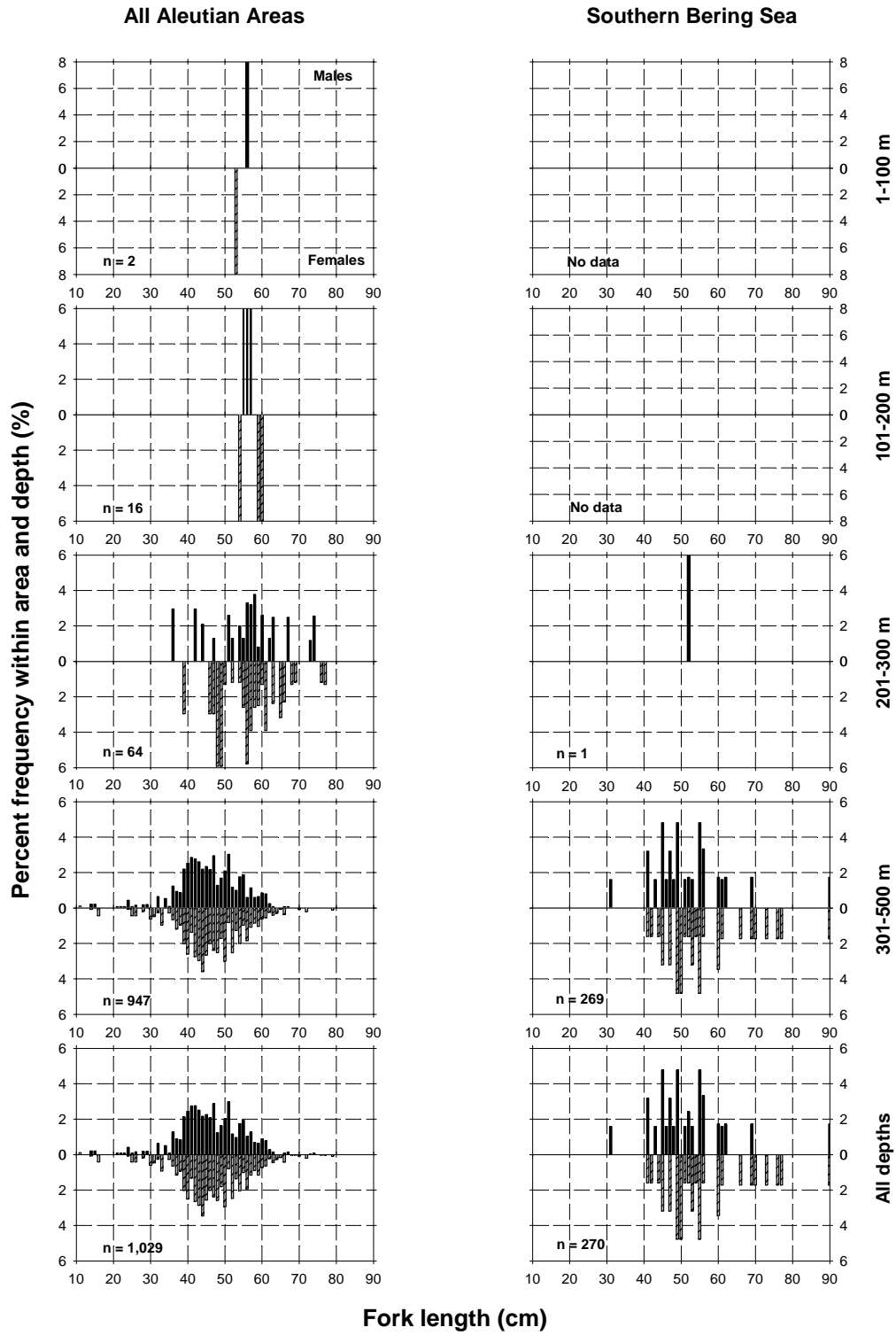


Figure 52.--(Shorttraker rockfish, continued).

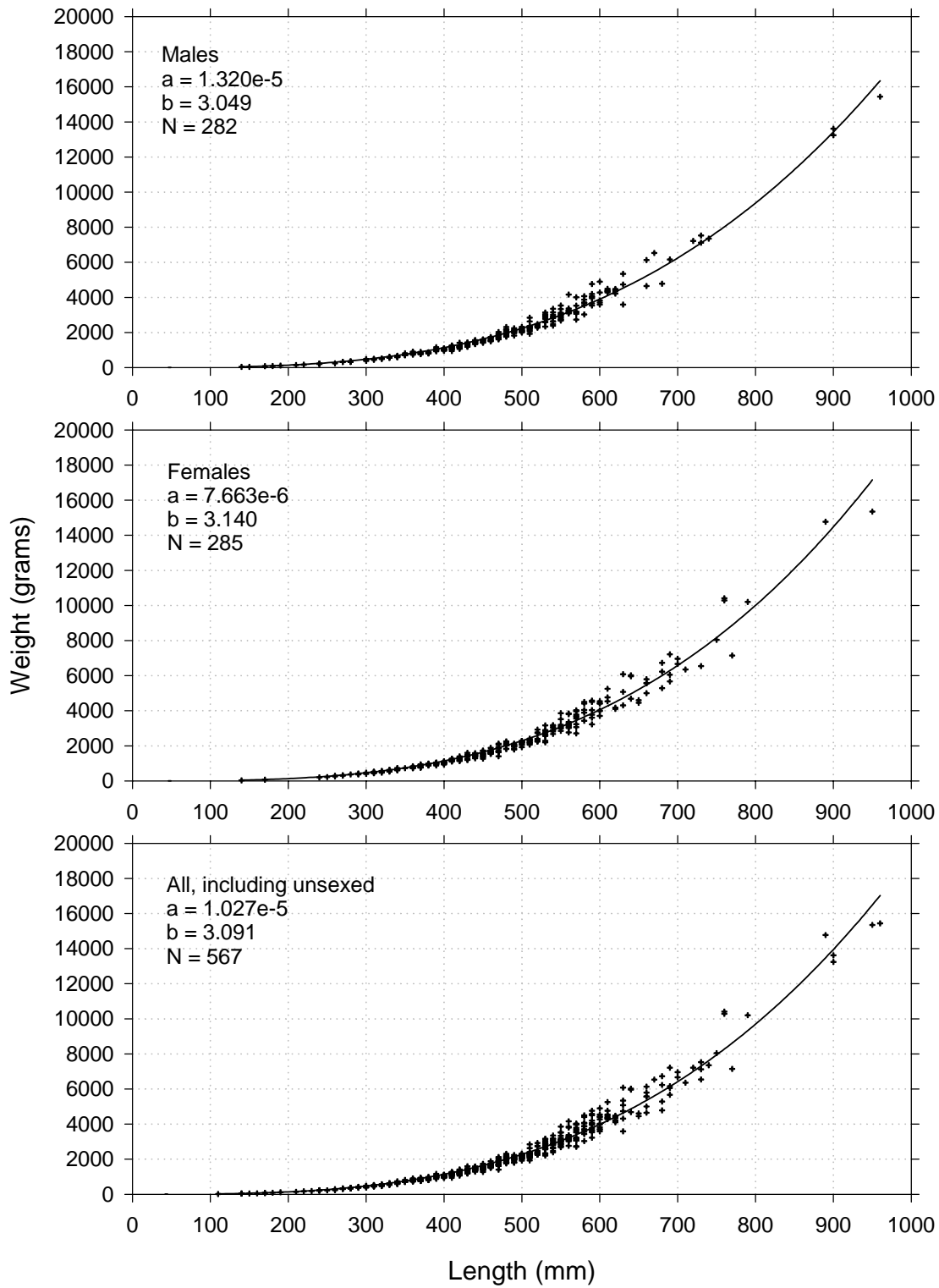


Figure 53.--Length-weight relationship for shorttraker rockfish specimens collected during the 2002 Aleutian Islands bottom trawl survey. The non-linear least squares regression (solid line) was calculated using the formula $Weight_{(grams)} = a * Length_{(mm)}^b$.

Rougheye rockfish (*Sebastes aleutianus*)

Rougheye rockfish mean CPUE was highest in the Central Aleutian area (Table 2). Generally abundance increased with depth with the exception of the Western Aleutian area where mean CPUE was highest in the 201-300 m depth interval (Table 41). The largest average rougheye rockfish lengths and weights were found in the 201-300 m depth interval, with the exception of the Eastern Aleutian area where the largest mean sizes were found in the 301-500 m interval. With the exception of one relatively large catch in each area, abundance in the Southern Bering Sea area and Eastern Aleutian area was relatively small. This survey appears to sample the majority of rougheye rockfish depth distribution, but probably not their preferred rough bottom topography. Ronholt et al. (1986) showed that 74% of the total Aleutian rougheye biomass occurred in the 301-500 m depth interval, and only 2% occurred at depths greater than 500 m.

The highest stratum-specific mean CPUEs were in the 201-300 m and 301-500 m depth intervals in the N Central Aleutian subarea, followed closely by the 301-500 m interval in the SW Eastern Aleutian subarea (Table 42). Notable individual catches of rougheye rockfish were made on the NW corner of Unalaska Island, SE of Atka Island, east of Kiska Island, and on Buldir Reef (Fig. 54).

Combined Aleutian size compositions for males and females mirrored each other to a large extent (Fig. 55), although a second female frequency mode at 46-47 cm was more accentuated than for males. Males outnumbered females slightly, comprising 55% of the measured rougheye rockfish. Figure 56 shows length-weight relationships for rougheye rockfish males, females, and combined sexes.

Table 41.--Number of survey hauls, number of hauls with rougheye rockfish, mean CPUE, biomass estimates with confidence limits, mean weight, and mean length based on the 2002 Aleutian Islands bottom trawl survey, by NPFMC regulatory area and depth interval.

NPFMC area	Depth (m)	Number of trawl hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	95% Confidence limits		Mean weight (kg)	Mean length (cm)
						Minimum biomass (t)	Maximum biomass (t)		
Western Aleutian	1-100	26	0	-	-	-	-	-	-
	101-200	51	3	0.03	14	0	32	0.985	40.5
	201-300	19	6	5.51	950	0	2,839	1.792	46.5
	301-500	13	7	1.11	364	0	899	1.408	41.6
	All depths	109	16	0.87	1,328	0	3,195	1.654	44.8
Central Aleutian	1-100	30	0	-	-	-	-	-	-
	101-200	45	3	0.05	21	0	48	1.397	43.3
	201-300	23	10	4.22	889	0	1,896	1.602	44.9
	301-500	17	15	7.60	3,024	916	5,132	1.423	43.9
	All depths	115	28	2.38	3,934	1,626	6,242	1.460	44.1
Eastern Aleutian	1-100	16	0	-	-	-	-	-	-
	101-200	47	1	0.01	7	0	21	0.444	29.3
	201-300	42	9	0.64	313	0	653	0.945	38.5
	301-500	27	22	4.89	2,779	395	5,163	1.211	41.9
	All depths	132	32	1.23	3,099	691	5,508	1.173	41.4
All Aleutian Areas	1-100	72	0	-	-	-	-	-	-
	101-200	143	7	0.02	42	7	76	0.936	37.6
	201-300	84	25	2.46	2,153	50	4,256	1.519	44.0
	301-500	57	44	4.77	6,167	3,139	9,196	1.318	42.8
	All depths	356	76	1.47	8,361	4,734	11,989	1.362	43.1
Southern Bering Sea	1-100	30	0	-	-	-	-	-	-
	101-200	16	3	0.52	95	0	204	0.403	27.8
	201-300	7	4	1.83	103	0	242	1.067	39.8
	301-500	8	7	10.09	1,053	0	2,437	0.819	44.2
	All depths	61	14	1.67	1,251	0	2,647	0.773	41.6

Table 42.--Sampling effort, mean CPUE, and estimated biomass with 95% confidence limits (CL) of rougheye rockfish by NPFMC regulatory area and survey subarea, ranked by descending CPUE for the 2002 Aleutian Islands bottom trawl survey.

NPFMC Area	Depth range (m)	Subarea	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Biomass CL	
							Min. (t)	Max. (t)
Central Aleutian	201-300	N Central Aleutian	10	5	19.15	841	0	1,862
Central Aleutian	301-500	N Central Aleutian	8	8	17.41	2,158	74	4,243
Eastern Aleutian	301-500	SW Eastern Aleutian	2	2	15.23	667	46	1,288
Western Aleutian	201-300	E Western Aleutian	10	4	11.62	911	0	2,827
Southern Bering	301-500	Combined Southern Bering	8	7	10.09	1,053	0	2,473
Central Aleutian	301-500	SE Central Aleutian	4	4	8.85	632	0	1,480
Eastern Aleutian	301-500	SE Eastern Aleutian	12	8	6.36	1,638	0	4,032
Eastern Aleutian	201-300	SW Eastern Aleutian	6	2	2.73	195	0	576
Southern Bering	201-300	Combined Southern Bering	7	4	1.83	103	0	247
Eastern Aleutian	301-500	Combined Eastern Aleutian	13	12	1.77	473	236	711
Central Aleutian	301-500	SW Central Aleutian	2	1	1.57	124	0	1,695
Western Aleutian	301-500	W Western Aleutian	11	6	1.48	254	0	538
Central Aleutian	301-500	Petrel Bank	3	2	0.89	110	0	430
Central Aleutian	201-300	SW Central Aleutian	6	3	0.85	36	0	87
Southern Bering	101-200	E Southern Bering Sea	11	3	0.81	95	0	205
Western Aleutian	301-500	E Western Aleutian	2	1	0.70	110	0	1,506
Eastern Aleutian	201-300	SE Eastern Aleutian	12	4	0.52	106	0	222
Western Aleutian	201-300	W Western Aleutian	9	2	0.42	40	0	120
Central Aleutian	201-300	SE Central Aleutian	4	2	0.26	12	0	50
Western Aleutian	101-200	E Western Aleutian	23	3	0.11	14	0	32
Central Aleutian	101-200	SW Central Aleutian	17	2	0.10	11	0	26
Central Aleutian	101-200	N Central Aleutian	8	1	0.10	10	0	35
Eastern Aleutian	201-300	NE Eastern Aleutian	22	3	0.06	12	0	26
Eastern Aleutian	101-200	NE Eastern Aleutian	17	1	0.03	7	0	21

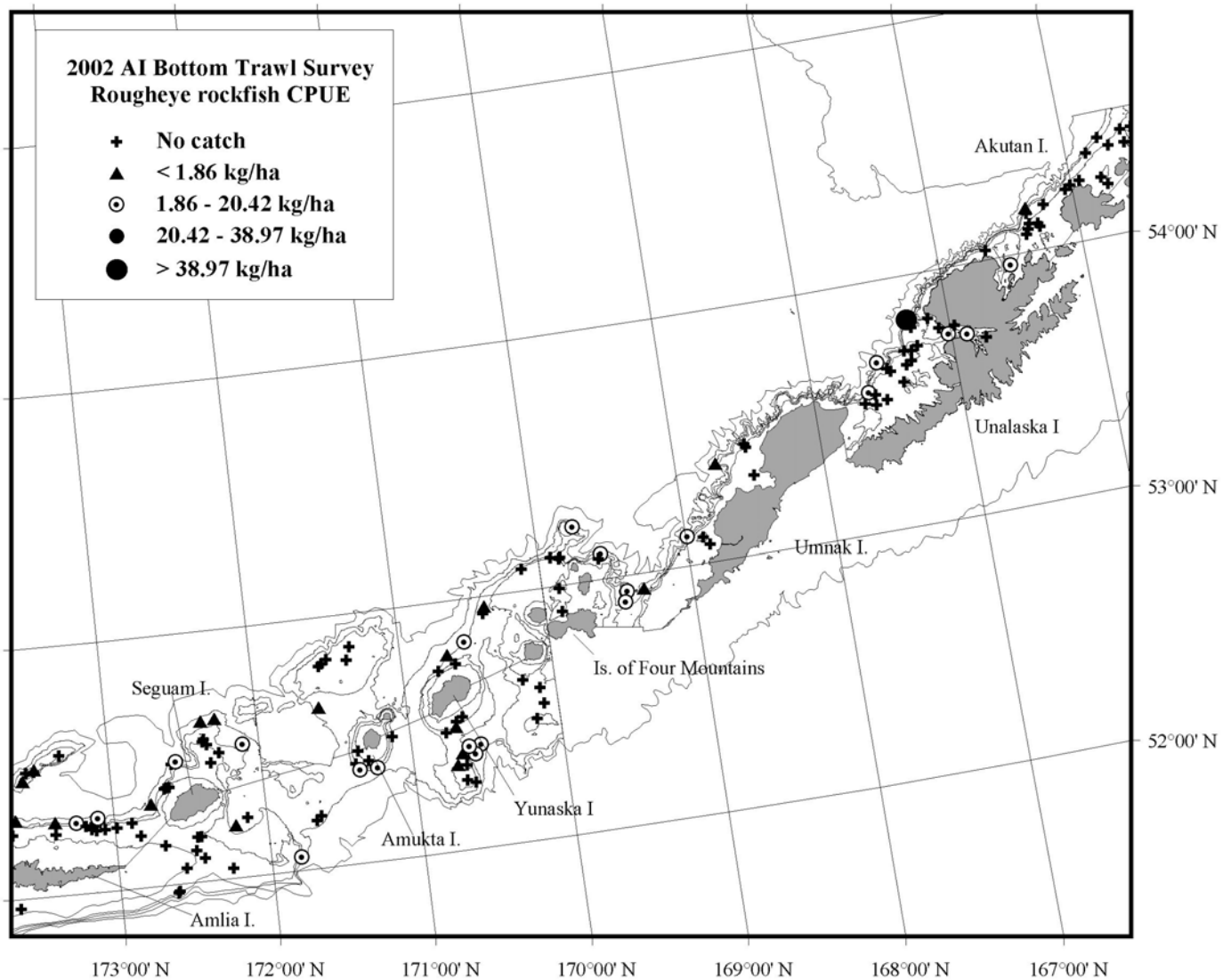


Figure 54.--Distribution and relative abundance of rougheye rockfish from the 2002 Aleutian Islands bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than mean CPUE, between mean CPUE and two standard deviations above mean CPUE, between two and four standard deviations above mean CPUE, and greater than four standard deviations above mean CPUE.

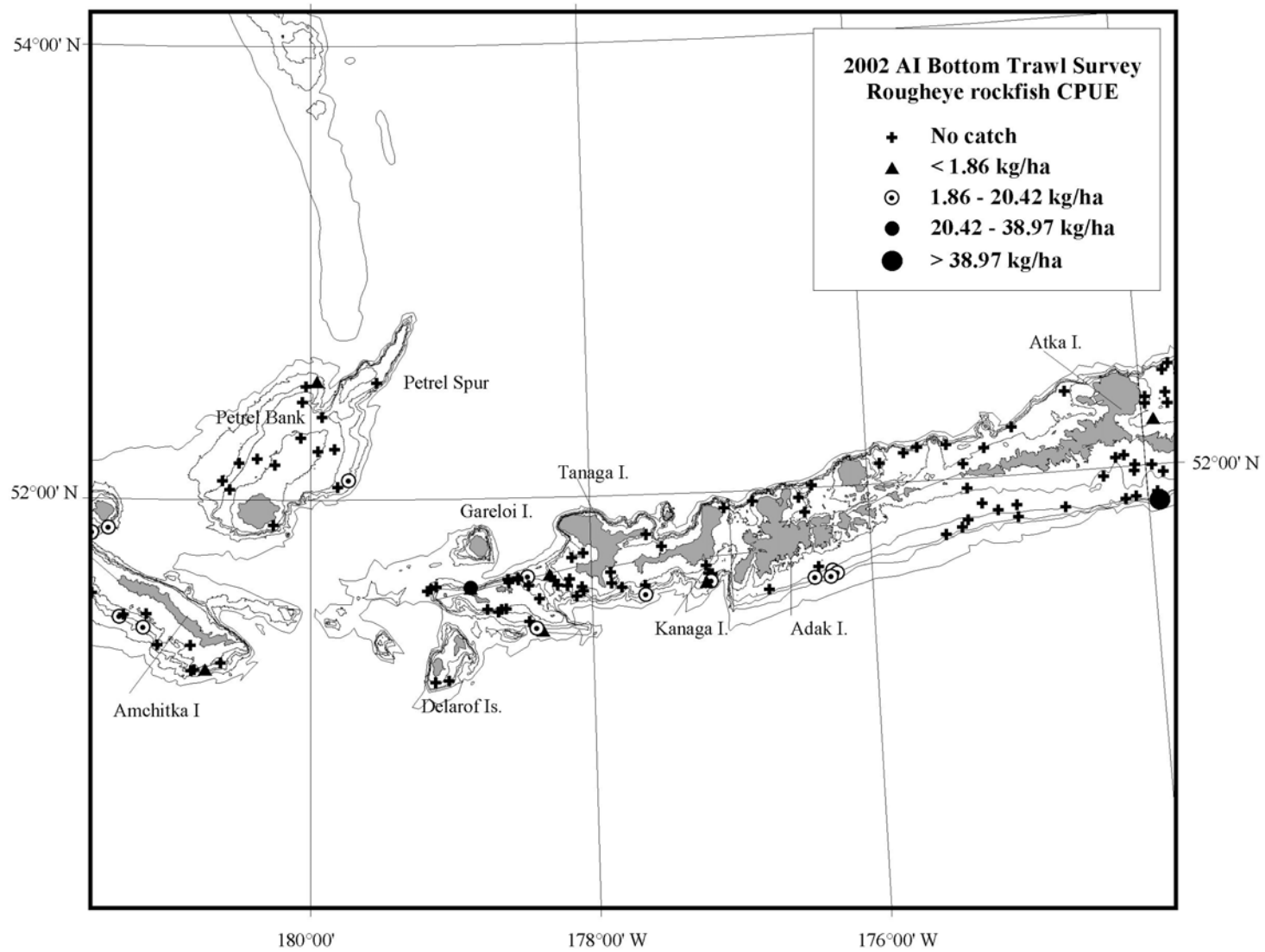


Figure 54.--(Continued).

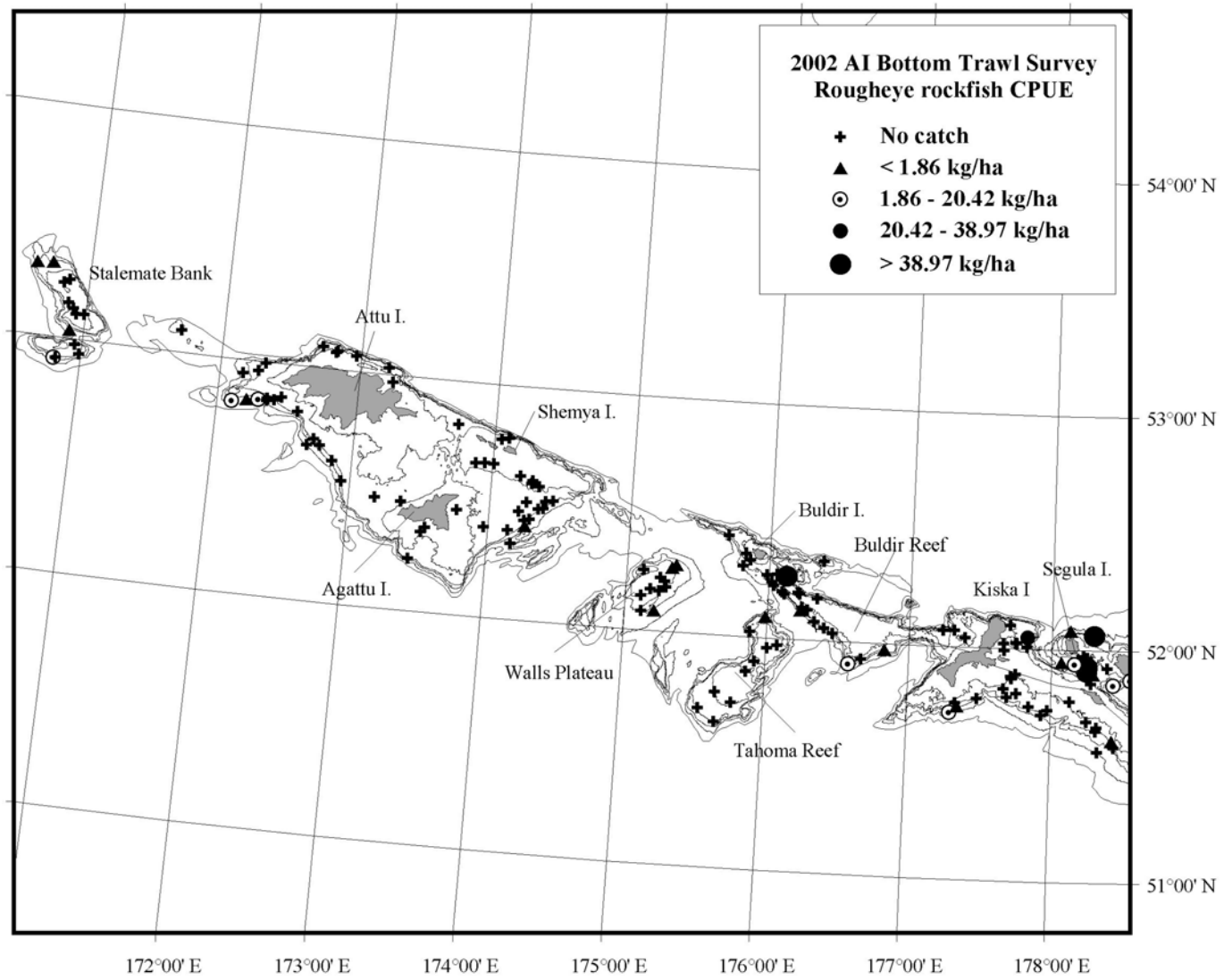


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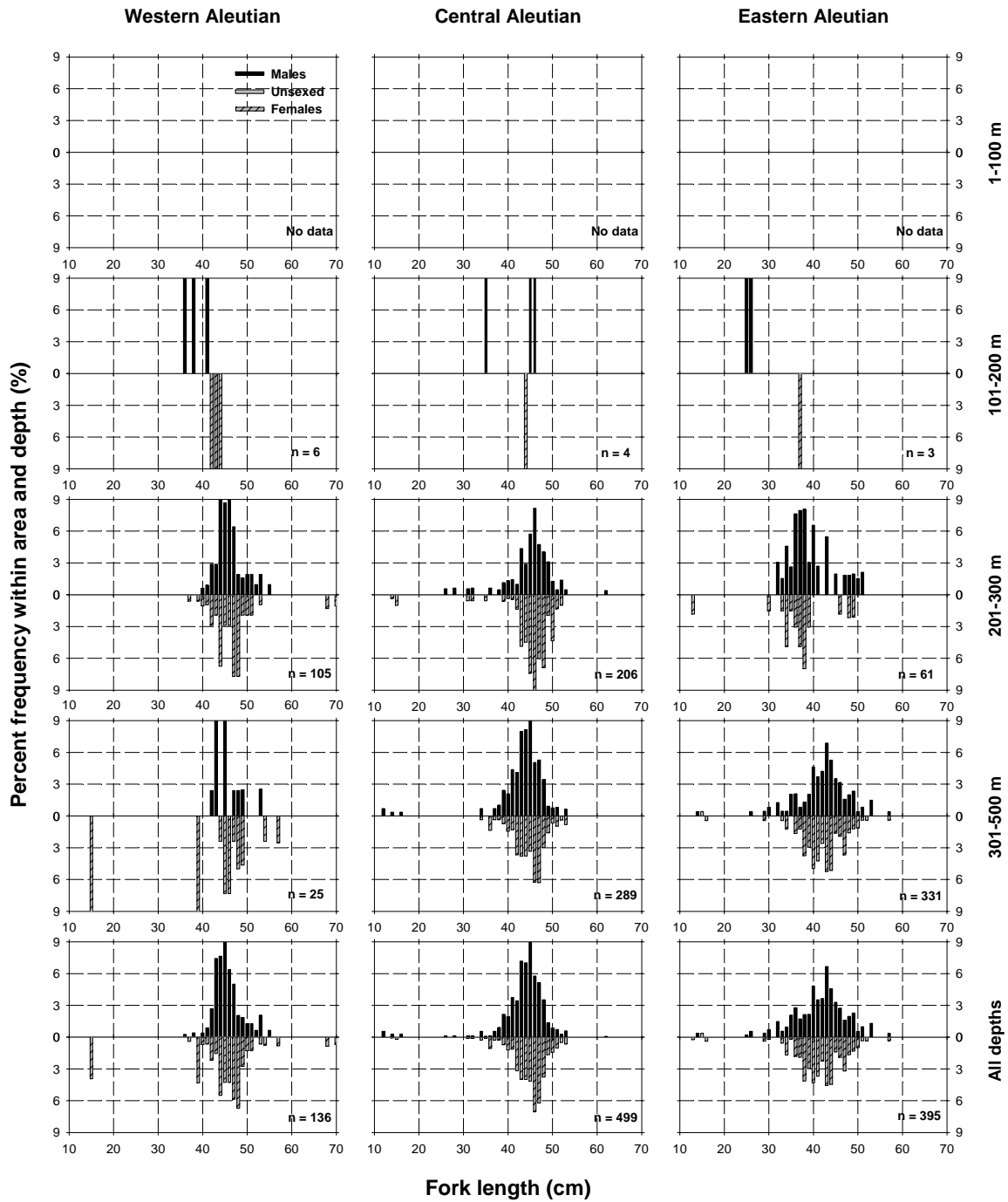


Figure 55.--Size composition of the estimated roughey rockfish population from the 2002 Aleutian Islands bottom trawl survey by NPFMC regulatory area and depth interval.

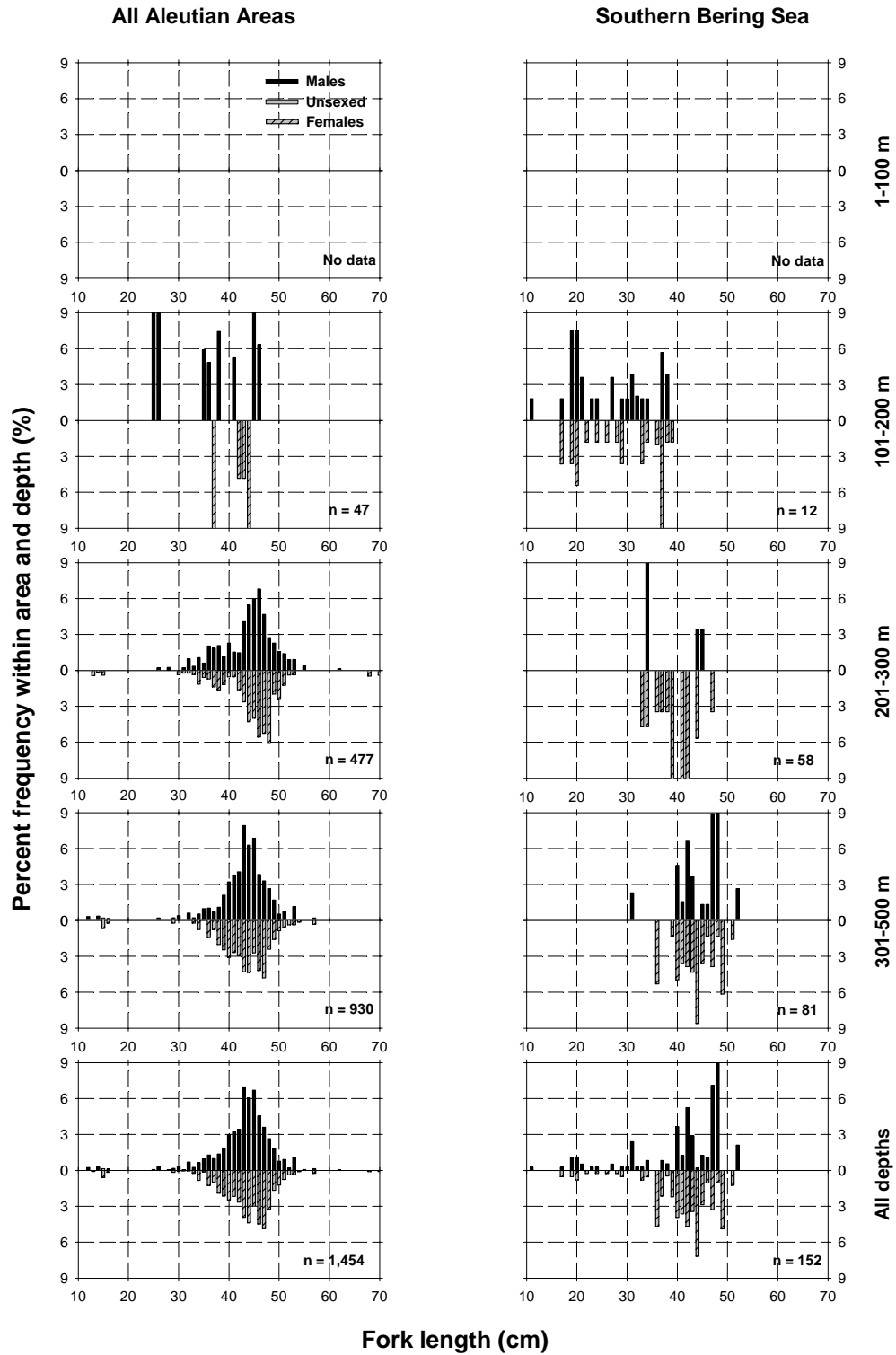


Figure 55.--(Rougheye rockfish, continued).

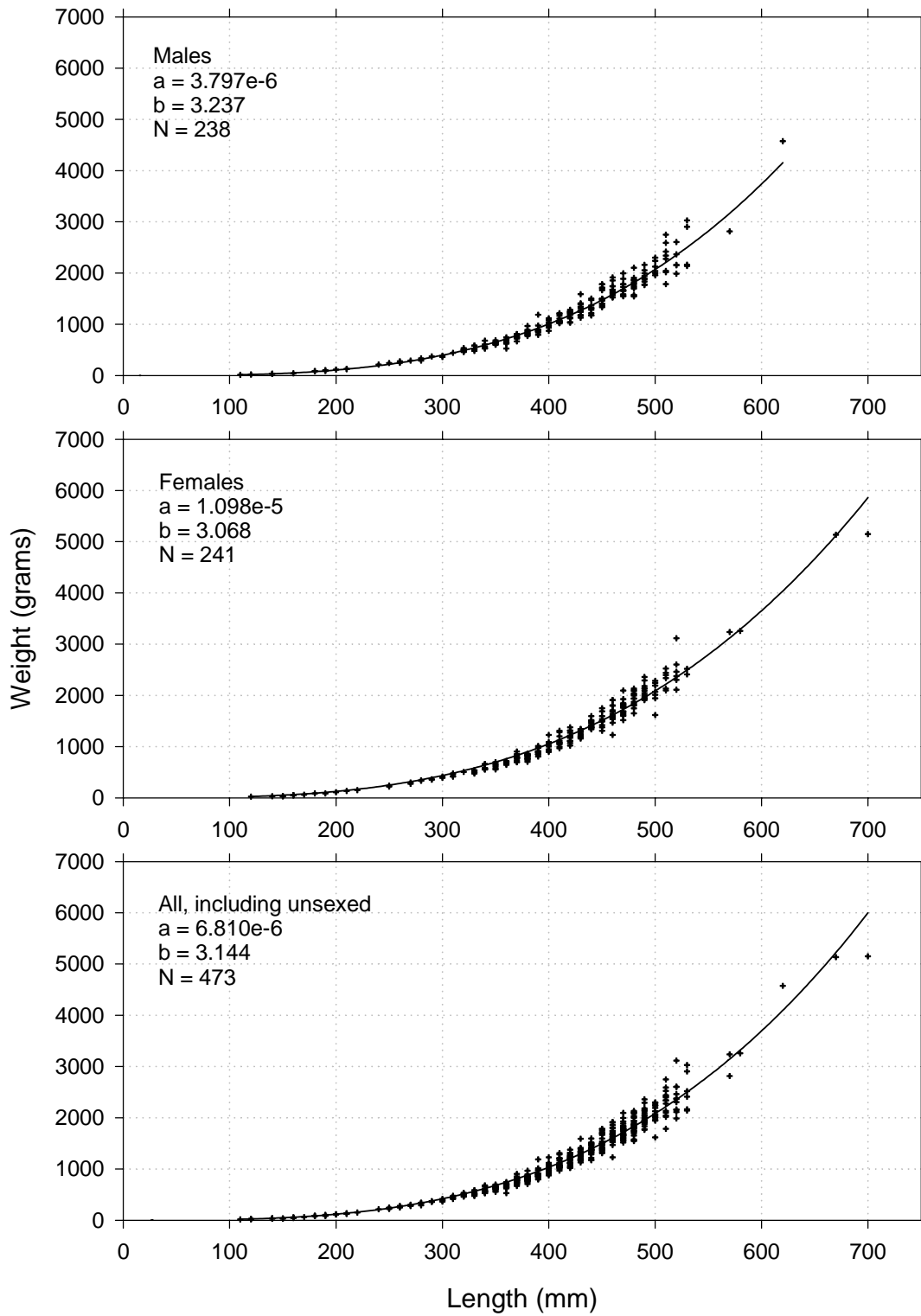


Figure 56.--Length-weight relationship for rougheye rockfish specimens collected during the 2002 Aleutian Islands bottom trawl survey. The non-linear least squares regression (solid line) was calculated using the formula $Weight_{(grams)} = a * Length_{(mm)}^b$.

Shortspine thornyhead (*Sebastolobus alascanus*)

Thornyheads tend to be most abundant in the Western and Central Aleutian areas (Table 2) at depths greater than 200 m (Table 43) and catch rates were highest in the 301-500 m depth interval. They were captured in all trawl hauls in the 301-500 m depth interval in the Western Aleutian area, the SW Central Aleutian subarea, and in almost all hauls in the 201-300 m interval in the SW Central Aleutian subarea (Table 44). They were also common in all strata deeper than 200 m on Petrel Bank. Notable individual catches were made on the small plateau north of the Islands of Four Mountains, south of Kiska Island, on Wall's Plateau, and SW of Attu Island (Fig. 57). Biomass estimates from this survey are very likely underestimates of thornyhead abundance; Ronholt et al. (1986) reported that 68% of the total Aleutian thornyhead biomass was found in the 501-900 m depth interval, a depth zone unsampled by the present survey.

Male and female size compositions share similar ranges in fork lengths, but frequency modes do not mirror each other very closely (Fig 58). Females composed 55% of the measured samples in the Southern Bering Sea area and 50% in the combined Aleutian areas. Generally, females outnumbered males by as much as 8:2 in the 101-200 m depth interval and 6:4 in 201-300 m. Males were more numerous in the 301-500 m interval.

Figure 59 presents length-weight relationships for male, female, and combined sexes of shortspine thornyhead. The nonlinear slope of the females is slightly steeper than the males at lengths greater than about 50 cm indicating that large females are slightly heavier than large males.

Table 43.--Number of survey hauls, number of hauls with shortspine thornyhead, mean CPUE, biomass estimates with confidence limits, mean weight, and mean length based on the 2002 Aleutian Islands bottom trawl survey, by NPFMC regulatory area and depth interval.

NPFMC area	Depth (m)	Number of trawl hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	95% Confidence limits		Mean weight (kg)	Mean length (cm)
						Minimum biomass (t)	Maximum biomass (t)		
Western Aleutian	1-100	26	0	-	-	-	-	-	-
	101-200	51	5	0.27	144	0	316	0.602	32.9
	201-300	19	4	1.73	298	0	937	0.477	32.3
	301-500	13	13	23.85	7,805	0	19,298	0.557	32.4
	All depths	109	22	5.43	8,246	0	19,809	0.554	32.4
Central Aleutian	1-100	30	0	-	-	-	-	-	-
	101-200	45	1	< 0.01	< 1	0	1	0.080	20.0
	201-300	23	8	6.78	1,429	0	3,800	0.498	32.8
	301-500	17	15	10.11	4,025	2,053	5,997	0.477	30.7
	All depths	115	24	3.30	5,454	2,925	7,983	0.483	31.3
Eastern Aleutian	1-100	16	0	-	-	-	-	-	-
	101-200	47	0	-	-	-	-	-	-
	201-300	42	2	0.12	58	0	175	1.470	46.6
	301-500	27	8	0.85	485	0	1,066	1.081	41.7
	All depths	132	10	0.22	543	0	1,133	1.112	42.1
All Aleutian Areas	1-100	72	0	-	-	-	-	-	-
	101-200	143	6	0.08	144	0	316	0.596	32.8
	201-300	84	14	2.04	1,785	0	4,002	0.505	32.8
	301-500	57	36	9.52	12,315	300	24,329	0.538	32.0
	All depths	356	56	2.50	14,243	4,998	23,488	0.534	32.1
Southern Bering Sea	1-100	30	0	-	-	-	-	-	-
	101-200	16	0	-	-	-	-	-	-
	201-300	7	3	3.70	208	0	515	0.443	32.7
	301-500	8	4	7.70	804	0	1,700	0.469	30.4
	All depths	61	7	1.35	1,012	67	1,957	0.464	30.9

Table 44.--Sampling effort, mean CPUE, and estimated biomass with 95% confidence limits (CL) of shortspine thornyhead by NPFMC regulatory area and survey subarea, ranked by descending mean CPUE for the 2002 Aleutian Islands bottom trawl survey.

NPFMC Area	Depth range (m)	Subarea	Number of hauls	Hauls with catch	Mean CPUE (kg/ha)	Estimated biomass (t)	Biomass CL	
							Min. (t)	Max. (t)
Western Aleutian	301-500	E Western Aleutian	2	2	24.14	3,770	0	33,276
Western Aleutian	301-500	W Western Aleutian	11	11	23.58	4,035	1,095	6,975
Central Aleutian	301-500	SW Central Aleutian	2	2	22.75	1,795	0	7,228
Central Aleutian	201-300	SW Central Aleutian	6	4	12.96	552	0	1,418
Central Aleutian	201-300	Petrel Bank	3	2	11.20	858	0	3,717
Central Aleutian	301-500	Petrel Bank	3	2	8.72	1,079	0	3,558
Southern Bering	301-500	Combined Southern Bering	8	4	7.70	804	0	1,723
Central Aleutian	301-500	SE Central Aleutian	4	4	6.25	446	0	904
Central Aleutian	301-500	N Central Aleutian	8	7	5.68	704	161	1,247
Southern Bering	201-300	Combined Southern Bering	7	3	3.70	208	0	526
Western Aleutian	201-300	W Western Aleutian	9	3	3.07	289	0	941
Eastern Aleutian	301-500	SW Eastern Aleutian	2	2	2.73	120	0	1,435
Eastern Aleutian	301-500	SE Eastern Aleutian	12	3	1.14	293	0	833
Eastern Aleutian	201-300	SW Eastern Aleutian	6	1	0.67	48	0	172
Central Aleutian	201-300	SE Central Aleutian	4	1	0.36	17	0	72
Western Aleutian	101-200	W Western Aleutian	28	4	0.34	137	0	309
Eastern Aleutian	301-500	Combined Eastern Aleutian	13	3	0.27	72	0	182
Western Aleutian	201-300	E Western Aleutian	10	1	0.11	9	0	29
Western Aleutian	101-200	E Western Aleutian	23	1	0.05	7	0	21
Eastern Aleutian	201-300	NE Eastern Aleutian	22	1	0.05	10	0	31
Central Aleutian	201-300	N Central Aleutian	10	1	0.04	2	0	6
Central Aleutian	101-200	SE Central Aleutian	14	1	< 0.01	< 1	0	1

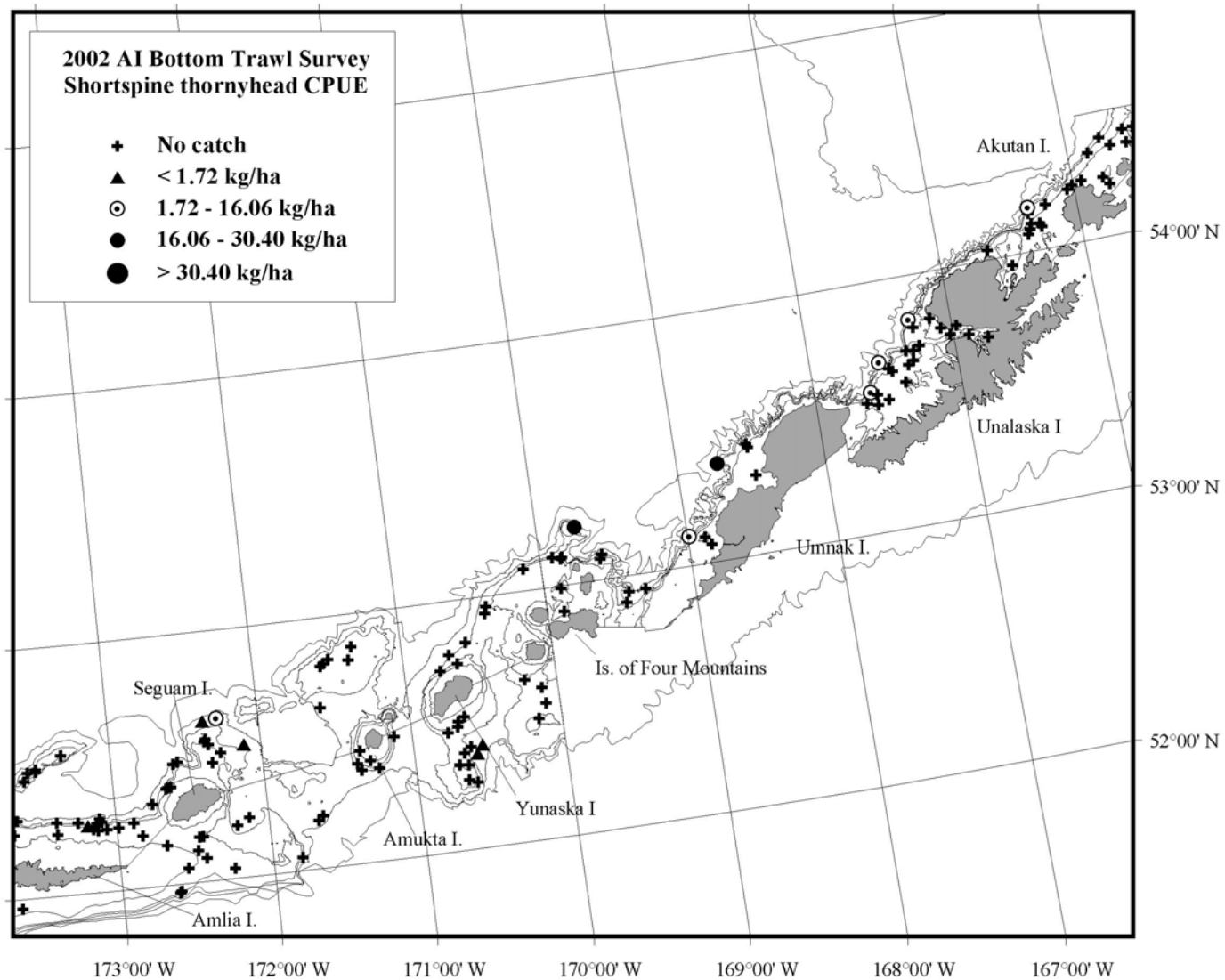


Figure 57.--Distribution and relative abundance of shortspine thornyhead from the 2002 Aleutian Islands bottom trawl survey. Relative abundance is categorized as no catch, sample CPUE less than mean CPUE, between mean CPUE and two standard deviations above mean CPUE, between two and four standard deviations above mean CPUE, and greater than four standard deviations above mean CPUE.

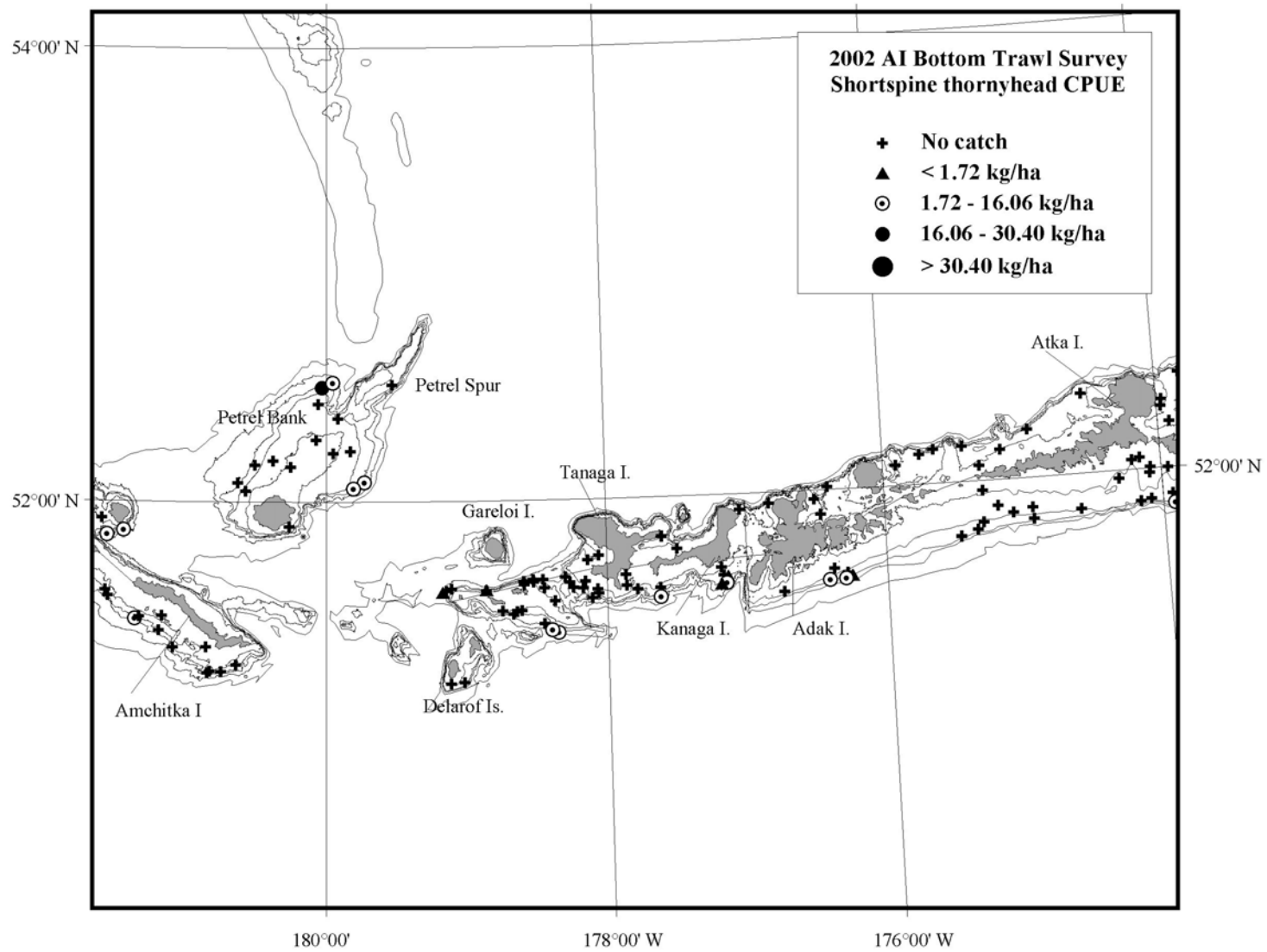


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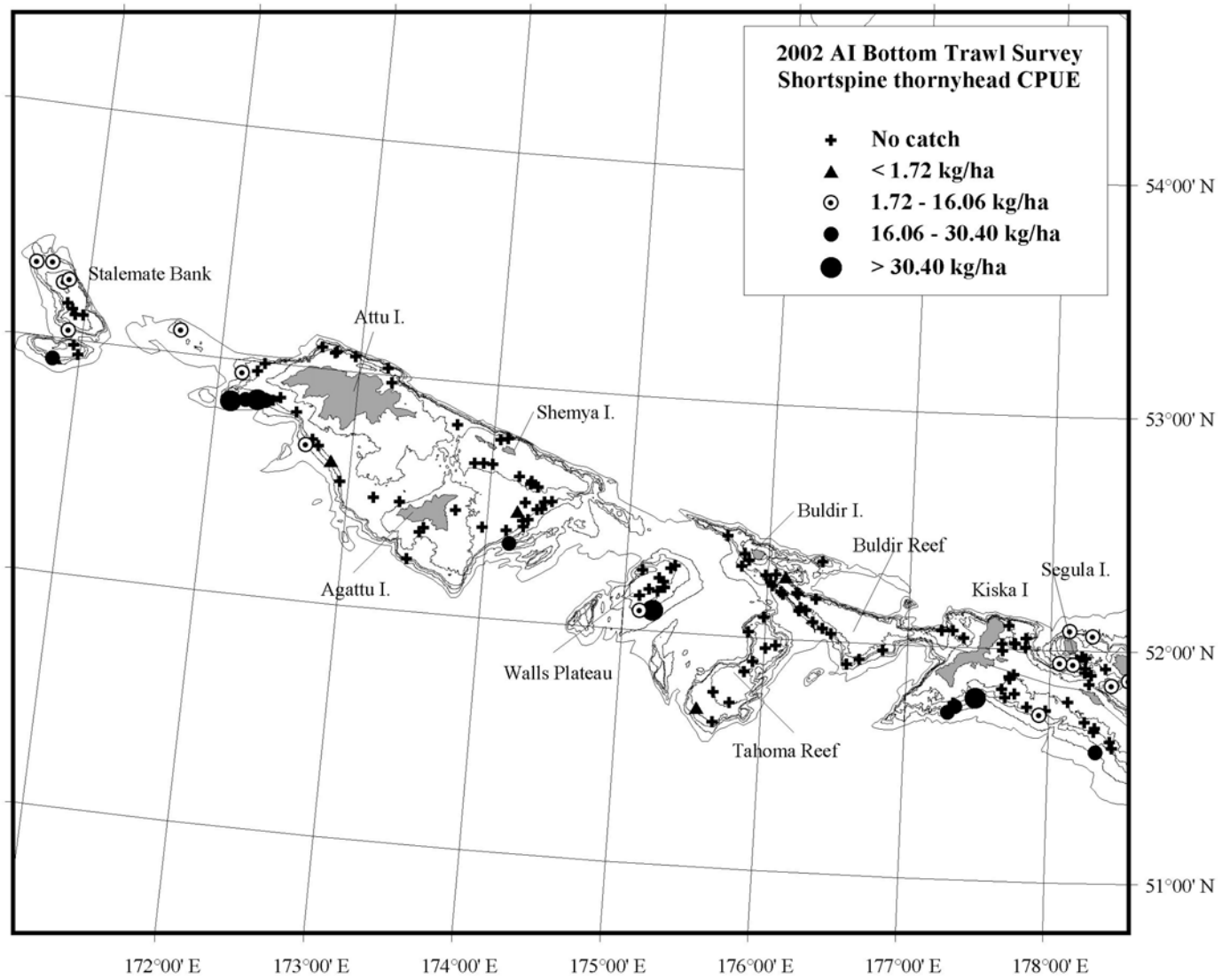


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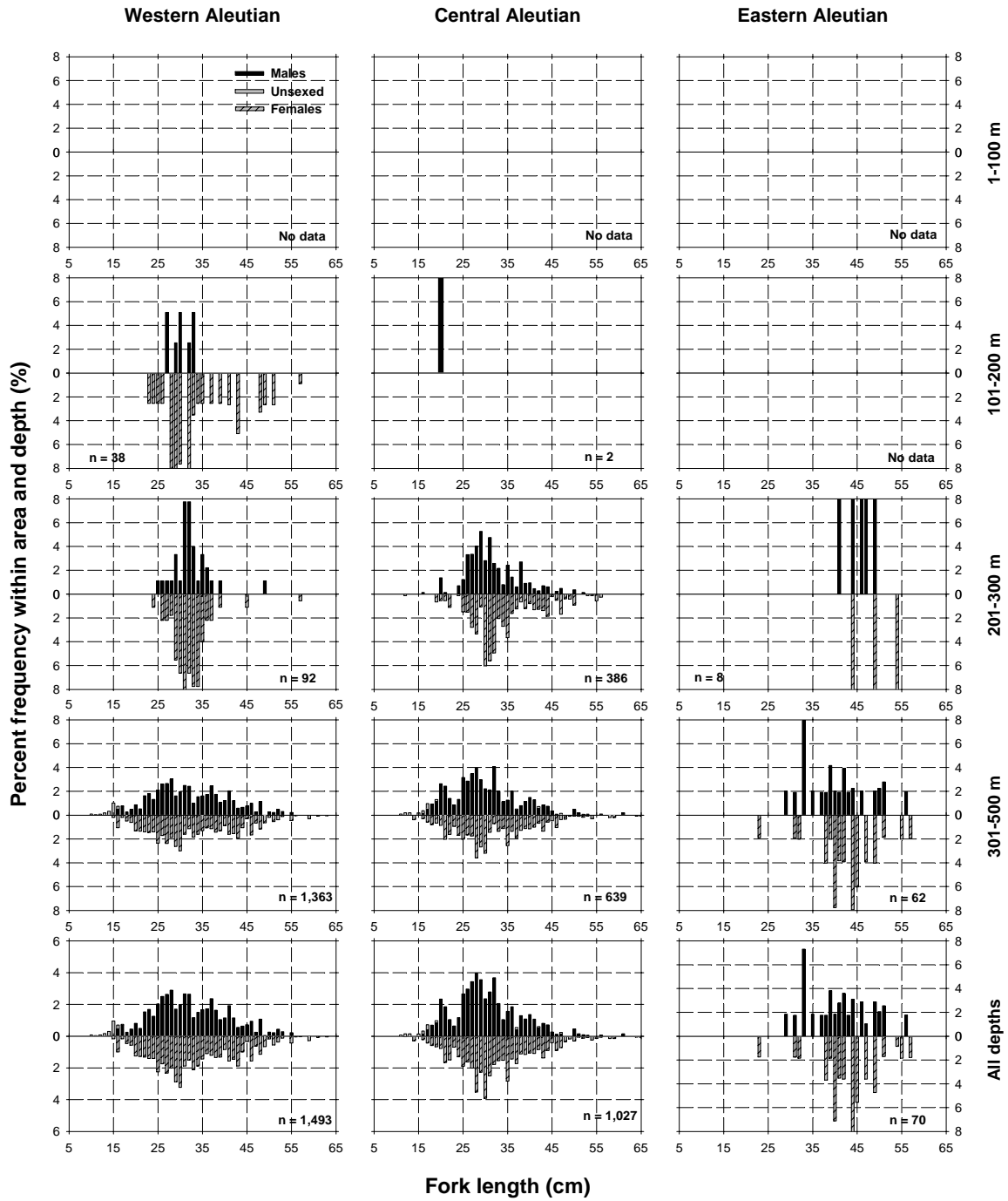


Figure 58.--Size composition of the estimated shortspine thornyhead population from the 2002 Aleutian Islands bottom trawl survey by NPFMC regulatory area and depth interval.

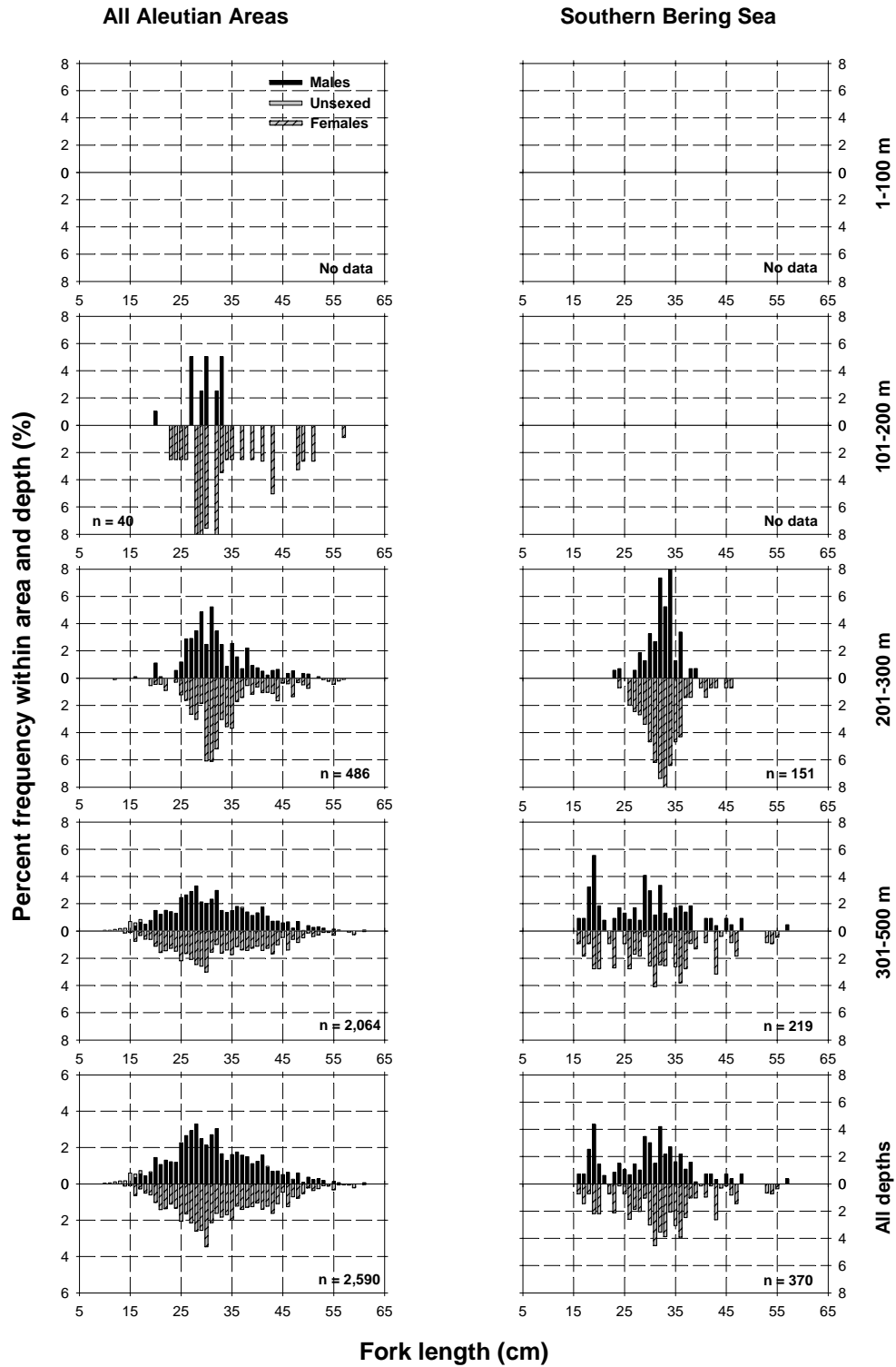


Figure 58.--(Shortspine thornyhead, continued).

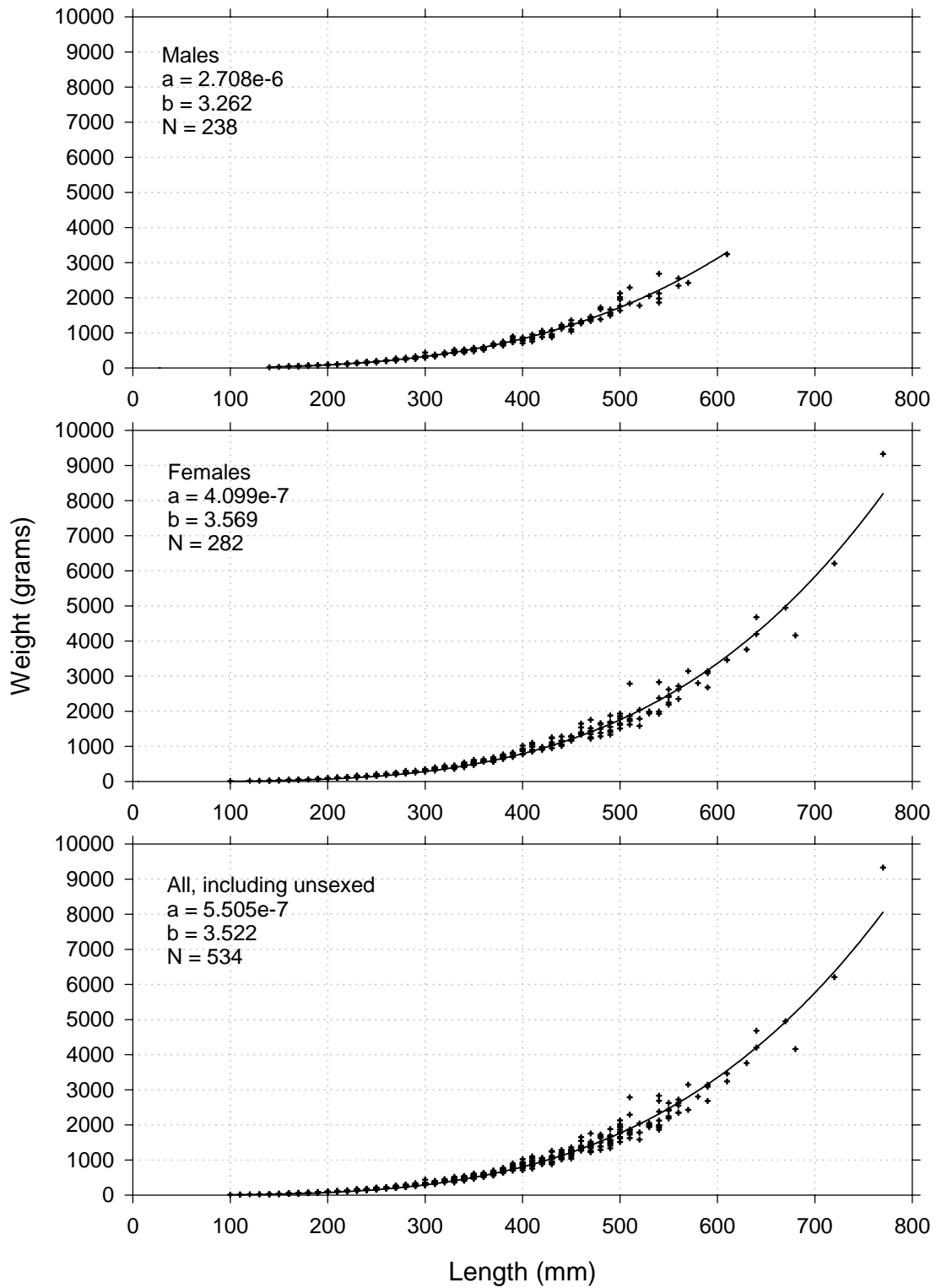


Figure 59.--Length-weight relationship for shortspine thornyhead specimens collected during the 2002 Aleutian Islands bottom trawl survey. The non-linear least squares regression (solid line) was calculated using the formula $Weight(\text{grams}) = a * Length(\text{mm})^b$.

Dusky rockfish (*Sebastes variabilis*)

Light and dark dusky rockfish were treated as the same species until the 1997 Aleutian Islands bottom trawl survey. Recent taxonomic studies have verified that the two are separate species.

Dusky or “light dusky” rockfish comprise a very minor part of the survey total rockfish catch. It is of interest to managers and some scientists who study this species. Most commonly captured in the Central and Eastern Aleutian areas, total estimated biomass was slightly more than 600 t (Table 45). Abundance was highest in the 1-100 m and 101-200 m depth intervals. Mean fish size generally increased with depth. Unweighted length frequencies for males and females are presented in Figure 60.

Dark rockfish (*Sebastes ciliatus*)

Dark or “dark dusky” rockfish comprise an even smaller component of Aleutian trawl survey catches than do dusky rockfish. Limited to the 1-100 m depth interval, they were found mostly in the Western Aleutian area, and to a much lesser extent in the Southern Bering Sea area. Estimated biomass was 315 t (Table 46).