State of California
The Resources Agency
Department of Fish and Game

DENSITIES AND SIZE COMPOSITIONS OF RED ABALONE, *Haliotis rufescens*, AT FIVE LOCATIONS ON THE MENDOCINO AND SONOMA COUNTY COASTS, SEPTEMBER 1986

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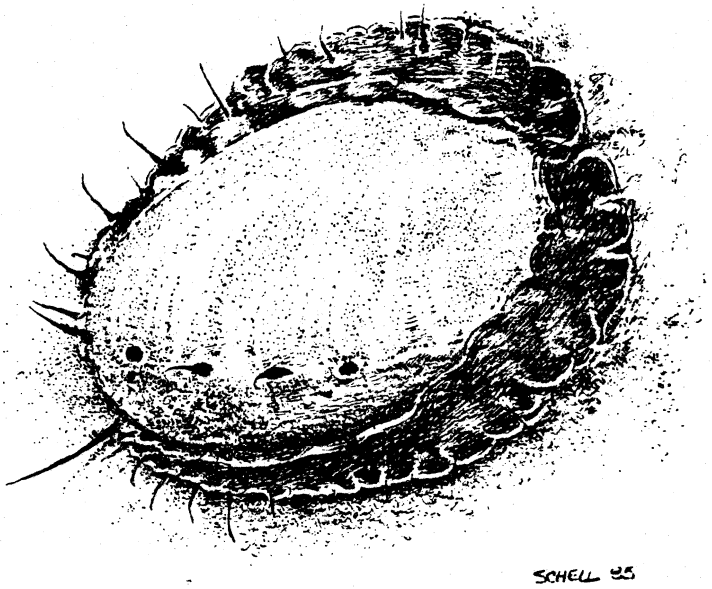

Marine Resources Division
Administrative Report No. 88-5

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ABSTRACT

Red abalone, *Haliotis rufescens*, populations were sampled on 155 transects at five locations along the Mendocino and Sonoma County coast in September 1986. Although abalone occurrence was highly variable, the highest abundance usually occurred in relatively shallow nearshore areas. Size compositions were dominated by large, old abalone with all locations having 50% or more abalone larger than the recreational minimum size. Densities of red sea urchins, *Strongylocentrotus franciscanus*, on the transects were also variable, but high urchin abundance tended to occur at greater depths than high abalone abundance.

[1/] Marine Resources Administrative Report No. 88-5
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ACKNOWLEDGEMENTS

Many people are responsible for gathering the data upon which this report is based. The entire staff of California Department of Fish and Game certified diving personnel should be commended for their conscientious and diligent efforts in the field. Dr. John De Martini of Humboldt State University, and Ashford "Woody" Wood and Walt Saylors of the California Department of Parks and Recreation deserve thanks for lending their skill and knowledge. We would especially like to thank Randy Brannock and the California Abalone Association for providing a group of CAA members who volunteered their time, vessels, and expertise in the Arena Cove area.

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Introduction

Red abalone, *Haliotis rufescens*, are widespread along California's northern coast and support one of the most important recreational fisheries in the area. Nearshore zones off Mendocino and Sonoma counties have extensive abalone habitat and receive a majority of harvesting pressure. Recreational harvest has grown steadily with a tenfold increase in diver effort since 1960. The 1987 recreational harvest is estimated at over 2.2 million lb.[1/]. Commercial abalone harvesting is not permitted on the northern coast. Information from field observations concerning the fishery and the resource as well as harvest characteristics, is required for effective management.

In recent years considerable knowledge has been gained about red abalone growth rates, movement patterns, and reproductive biology at selected locations on the north coast. Recreational catch and effort data were collected by the California Department of Fish and Game (CDFG) at high use sites in 1960 (Miller and Gotshall 1965), in 1972, (Miller, Geibel and Houk 1974, Gotshall et al. 1974) and from 1977 to present.[1/]

Early field surveys to gather information about the abundance and size composition of red abalone were conducted infrequently and only at a few locations. For example, Thompson (1920) reported on the intertidal occurrence of red abalone at 40 locations from Point Saint George (Del Norte County) to Double Point (Marin County). Cox (1962) concluded, after several years of diving surveys, that red abalone were abundant in only limited areas on the north coast. These early observations were hampered

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[1/] K. Karpov. California Dept. Fish and Game

by cumbersome hard-hat diving gear which did not lend itself to quantitative, thorough, or efficient nearshore observations.

Recently, however, surveys using the more adaptable scuba diving techniques have been undertaken. Personnel of the CDFG conducted a stratified random survey of red abalone, in 1971, at Van Damme State Park (Mendocino County) and Fort Ross Reef (Sonoma County). Although estimating the population size proved impractical, valuable information was gained on abundance, depth distribution, and size structure of the red abalone populations at these locations. At the Point Arena area (Mendocino County), in 1971-72, red abalone abundance was sampled at 43 stations in conjunction with a power plant siting survey (Gotshall et al. 1974). In 1975 red abalone abundance was assessed at 33 locations from Russian Gulch (Mendocino County) to Sunken Reef (Sonoma County) (Schultz and Burge 1975). During this survey, timed free-swimming diver counts were used for qualitative assessments and comparisons between areas, but the data are not directly comparable to transect counts or other fixed area counts. Workers from the University of San Francisco (Knapik et al. 1980) sampled red abalone abundance and size structure in depths of 10 m (33 ft) or less at six locations (one unharvested location, one heavily harvested, and four moderately harvested) from Russian Gulch to Van Damme State Park.

In light of the continuing large recreational harvest and the scattered availability of field data, CDFG scheduled an extensive survey of red abalone in 1986. The survey was held September 16-18, at five locations on the Mendocino and Sonoma County coasts, in conjunction with the annual CDFG scuba

recertification course when a large number of divers (≈40) would be available. Additional participants included personnel from the California Abalone Association (CAA), California Department of Parks and Recreation, and Humboldt State University.

The primary objective of the survey was to gather information on the abundance and size structure of red abalone in various depths at each survey location. The relationship of the minimum harvest size limit to the size structure of the abalone population is also examined. Results are compared to previous survey results whenever possible.

Procedure

Survey locations were selected at Point Cabrillo Reserve (Mendocino County), and Van Damme State Park, Arena Cove area, Salt Point State Park and Fort Ross State Park (Sonoma County), (Figures 1-5). The Fort Ross, Van Damme, and Salt Point areas receive heavy harvesting pressure and have been the subject of previous surveys. The Arena Cove area was suggested by the CAA as one with a potential for commercial harvest. Point Cabrillo, a protected reserve location, served as an example of an unharvested area.

Dive teams sampled the red abalone stocks by using 30 x 2 m band transects in four general depth ranges. To simplify counting mechanics, each transect was divided into three 10 m segments. All exposed abalone were counted on each side of each 10 m transect segment, and the maximum shell length of the first 25 abalone on each transect was measured to the nearest mm. Rocks, boulders, and other substrate components were not disturbed while the counts were made. Red sea urchins,

Strongylocentrotus franciscanus, a possible major abalone competitor, were also counted on each transect segment (truncated at ≥100/segment due to priority of abalone sampling). The extent of algal cover, substrate type, and abalone predators were also noted.

Mean densities with standard deviations and size frequency histograms are included for each depth and survey location. Figures presenting these results are numbered and arranged in a north-south geographical order for ease of reference. No attempt is made to provide detailed statistical analysis of the data which may be the subject of a future report. Complete raw data from each transect are presented in Appendix A.

With the exception of the Arena Cove area, a transect site was determined by each dive team depending on accessibility, depth, and sea conditions and without regard to abalone occurrence. Most sampling sites at the Arena Cove area were preselected by the CAA based on a potential of high abalone abundance; the remainder of the sites were in the same general areas as previous Arena Cove surveys (1971-1972).

Results and Discussion

A total of 155 transects, covering 9300 m^2, was completed during the three days of field work. Despite periods of scattered rain, weather and sea conditions did not restrict diving operations.

Abundance

Abalone abundance at each sampling site was quite variable between and within individual transects (Appendix A) and within

each depth range (Figures 6-10). Such variability is characteristic of abalone distributions (Appendix B, Gotshall et al. 1974, Schultz and Burge 1975, Knapik et al. 1980). It results largely from the type of substrate, wave surge exposure level, and preference for particular microhabitats, which consistently provide feeding opportunities and protection. Despite this variability, red abalone were most abundant in relatively shallow nearshore waters from the low intertidal area to depths of approximately 30 ft. Past surveys also show this trend (Appendix B, Gotshall et al. 1974, Schultz and Burge 1975, Knapik et al. 1980).

Although the number of transects was not equal for each depth or location, a general trend of decreasing mean abalone density with increasing depth was apparent at Van Damme, Salt Point and Fort Ross (Figures 7, 9 and 10). Because of the wide standard deviations resulting from variability in abalone occurrence, definite conclusions about abalone depth-abundance patterns would be premature. Nevertheless, the patterns observed during this survey are similar to previous surveys at these and other north coast locations (Appendix B, Gotshall et al. 1974, Schultz and Burge 1975, Knapik et al. 1980). At the Point Cabrillo site (Figure 6) mean density was highest in the deepest depth range. Knapik et al. (1980) also reported increased abalone abundance on deeper transects at Point Cabrillo. This pattern may be due to a bottom configuration which funnels drift algae to deeper zones, thus providing food to support higher numbers of abalone there.[1/] Results from the Arena Cove area

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[1/] S. Schultz, Fort Bragg, CA

(Figure 8) give a clouded picture of abalone depth-abundance because a majority of the stations were preselected as locations with high abalone densities. Differences in sampling technique between the two survey groups (CDFG and CAA) also may have contributed to these results. Gotshall et al. (1974) reported a definite inverse depth-abundance pattern on 43 randomly chosen stations in the Arena Cove area.

A comparison of overall red abalone abundance between sites in this survey shows that transects at Point Cabrillo and Arena Cove had the highest mean abalone densities of 1.21 and 1.37/m^2 respectively. Point Cabrillo has been closed to harvesting since 1971 and we expected to find a high abundance of abalone there. The overall mean density at Point Cabrillo from this survey compares closely to that found there by Knapik et al. (1980) of 1.5/m^2. Interestingly, on the 12 transects completed by CAA volunteers at Arena Cove the mean density was 2.14/m^2 while on 16 transects completed by CDFG at the same sites the mean density was 0.80/m^2. Based on observations at the time, the difference is most likely due to varying experience levels between the two groups in establishing transects without regard for habitat type and/or abalone occurrence. At the Arena Cove area, in 1971-72, Gotshall et al. (1974) reported red abalone density of 0.21/m^2 for 43 stations including 16 in depths greater than 45 ft which had no abalone. Unbiased station selection in the Arena Cove area during this survey might have produced much lower mean densities more comparable with the 1971-72 results.

In this survey, the heavily harvested sites at Van Damme, Salt Point, and Fort Ross, showed overall mean densities of 0.24,

0.43, 0.21/m^2 respectively. These observations compare with 0.12 and 0.94/m^2 for Van Damme and Fort Ross respectively in 1971 Appendix B) and 0.19/m^2 for Van Damme in 1980 (Knapik et al. 1980). The mean density at the Fort Ross site was high in 1971 because that survey was confined to Fort Ross reef. Fort Ross reef also had some of the higher densities in the present survey which covered a greater portion of Fort Ross State Park.

Size Composition

The size frequencies (Figures 11-17) show that the bulk of the exposed abalone on the transects range between 6 and 8 in. (150-200 mm) in shell length. This pattern is similar to many previous samples of exposed abalone (Appendix B, Schultz and Burge 1975, Knapik et al. 1980) and results from the accumulation of numerous age classes as growth slows with age. Size distributions were similar between depth ranges at each survey location. The Arena Cove area had more large abalone (Figure 15) than the other four locations; this may be due to the relative inaccessibility of many of the transect sites. Nearly all of the larger abalone were recorded in the frequencies obtained by CAA volunteers (Figures 13 and 14). This may be another indication of the differing experience levels between the two groups of divers at this location. On the other hand, Point Cabrillo, closed to all harvesting, had a size distribution similar to the three heavily harvested areas, not the expected high frequency of larger abalone. Ault and DeMartini (1987) report a high incidence of red abalone movement at Pt. Cabrillo within and beyond the reserve boundaries. Movement to and from

adjacent areas open to harvest, and the small size of the reserve (2,000 ft. along shore) may contribute to the observed size frequency. We are concerned with the apparent low occurrence of abalone measuring between 5 and 6 in. (125-150 mm) at all survey locations. Abalone of this size represent the strength of incoming year classes which will support the fishery in the future.

The percentages of abalone larger than the recreational minimum size of 7 in. (178 mm) were high at all locations, ranging from 50% at Van Damme to 75% at Arena Cove (Table 1). These percentages are somewhat surprising for the three heavily harvested areas (Van Damme, Salt Point, and Fort Ross), although Schultz and Burge (1975) found that 31 to 60% of the abalone were above the seven-inch minimum. Apparently, harvesting restricted to shorepicking and free-diving leaves a significant proportion of harvestable abalone even in traditional heavy-use areas. Percentages of abalone larger than the commercial minimum size of 7-3/4 in. (197 mm) however, were not as great, ranging from 11% at Point Cabrillo to 40% at Arena Cove.

Red Sea Urchin Densities

The density of red sea urchins ranged from 1.0/m^2 at Van Damme to 3.2/m^2 at the Arena Cove area (Figures 18, 19, 20, 21, 22). Both areas have received considerable sea urchin harvesting pressure since 1985. In general, sea urchin densities were higher in depths greater than 30 ft, but, as with abalone densities, there was considerable variation between and within

individual transects. In most cases, high sea urchin densities usually were not associated with high abalone densities; this lends support to the hypothesis of competitive interaction and exclusion between abalone and sea urchins (Shepard 1973, Tegner and Levin 1982).

Summary

1. A total of 155 transects covering 9,300/m^2 was completed during this survey.
2. The highest mean densities of exposed red abalone were 1.21 and 1.38/m^2 at Point Cabrillo Reserve and the Arena Cove area. The three heavily harvested sites, Van Damme, Salt Point and Fort Ross State Parks had lower densities of 0.24, 0.43, and 0.21/m^2, respectively.
3. Abalone abundance at each sampling site was quite variable between and within individual transects. Despite such variability, abalone were consistently most abundant from the low intertidal zone to depths of approximately 30 ft.
4. The bulk of the exposed abalone population is composed of large individuals between 6 and 8 in. (150-200 mm).
5. The percentage of the abalone larger that the minimum recreational harvest size at the five survey locations ranged from 50 to 75%.
6. Red sea urchin densities ranged from 1.0 to 3.2/m^2 and tended to be higher in depths greater than 30 ft. High sea urchin and abalone densities usually did not occur on the same transect.

LITERATURE CITED

Ault, J.S. and J.D. DeMartini. 1987. Movement and Dispersion of Red Abalone, *Haliotis rufescens*, in Northern California. Calif. Fish and GAme. 73(4):196-213.

Cox, K.W. 1962. California Abalones, Family Haliotidae. Calif. Dept. Fish and Game, Fish Bull. 118, 133 p.

Gotshall, D.W., R.N. Lea, L.L. Laurent, T.L. Hoban, and G.D. Farens. 1974. Mendocino Power Plant Site Ecological Study Final Report. Calif. Dept. Fish and Game, Mar. Resources, Admin. Rep. 74-7, 291 p.

Knapik, T., E. Lynch, M. Nirei, J. Rieger, and J. Schneider. 1980. The Effects of Sportfishing on Populations of *Haliotis rufescens* of Mendocino County California. *In*: The Abalone Resource and its Socio-Economic Importance in Mendocino County, California. E. Lynch, K. Porter, and M. La Phitzondo, Project Directors. 30 p.

Miller, D.J., and D. Gotshall. 1965. Ocean Sportfish Catch and Effort from Oregon to Point Arguello, California. Calif. Dept. Fish and Game, Fish Bull. 130, 135 p.

Miller, D.J., J.J. Geibel, and J.L. Houk. 1974. Results of the 1972 Skindiving Assessment Survey, Pismo Beach to Oregon. Calif. Dept. Fish and Game, Mar. Resources Tech. Rept. 23. 61 p.

Schultz, S.A., and R.T. Burge. 1975. Calif. Dept. Fish and Game, Cruise Rept. 75-KB-10 Abalone Investigations. Calif. Dept. Fish and Game Mar. Resources Region. 9 p.

Shepard, S.A. 1973. Competition Between Sea Urchins and Abalone. Aust. Fish. 32(6):4-7.

Tegner, M.J., and L.A. Levin. 1982. Do Sea Urchins and Abalones Compete in California Kelp Forest Communities? *In*: International Echinoderms Conference, Tampa Bay. J.M. Lawrence Ed. A.A. Balkema, Rotterdam. p. 265-271.

Thompson, W.F. 1920. The Abalones of Northern California. Calif. Fish and Game. 6(2):45-50.

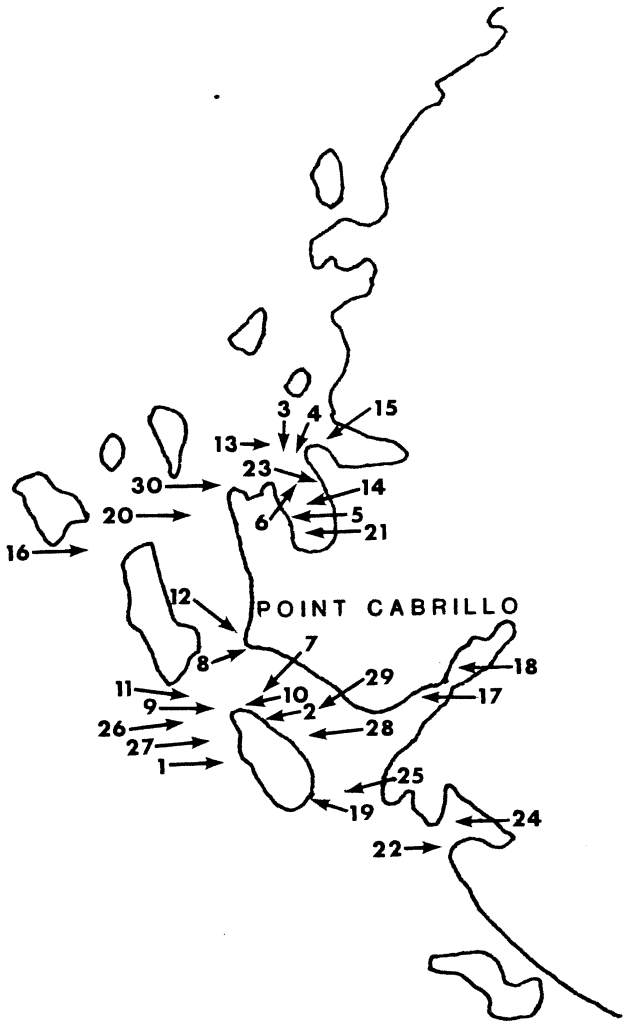


FIGURE 1. Transect locations (at arrows) and numbers for Point Cabrillo Reserve, September 1986.

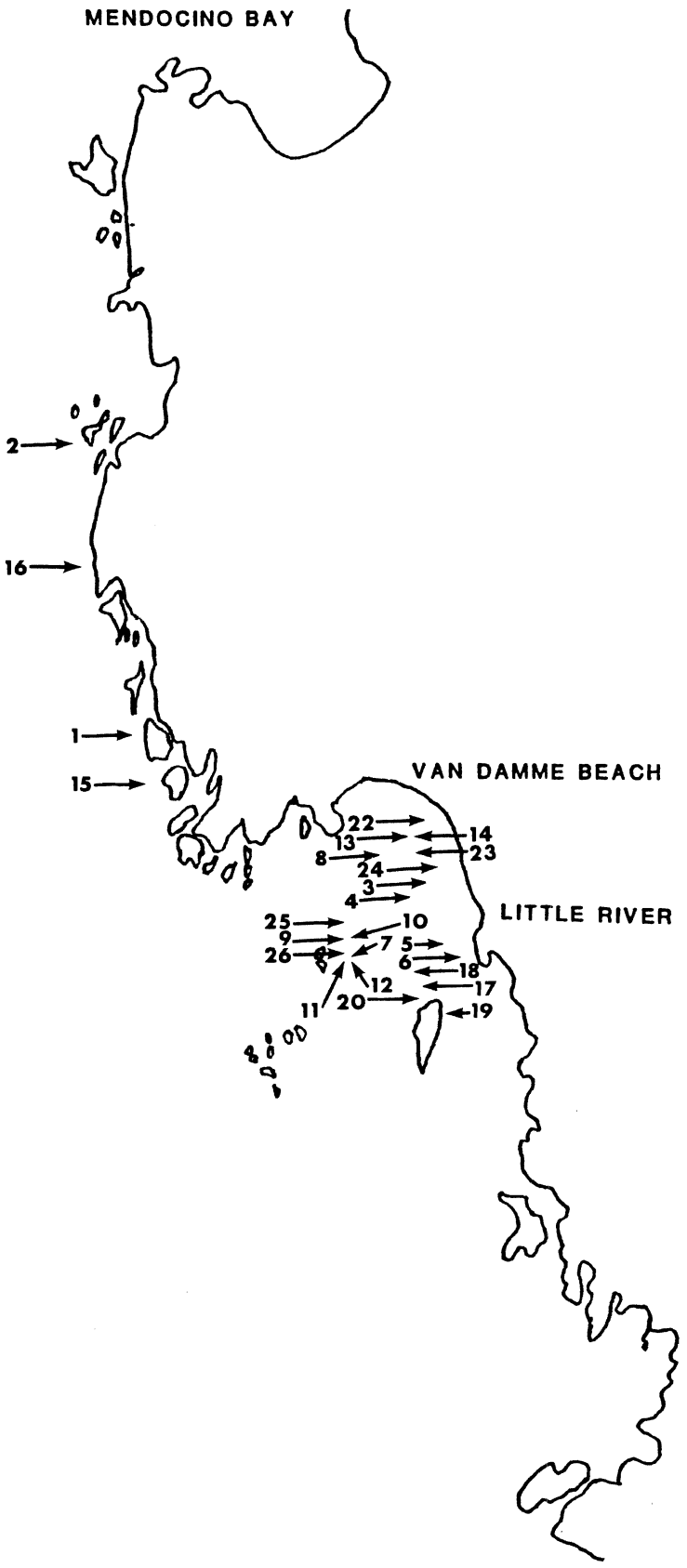


FIGURE 2. Transect locations (at arrows) and numbers for Van Damme State Park, September 1986.

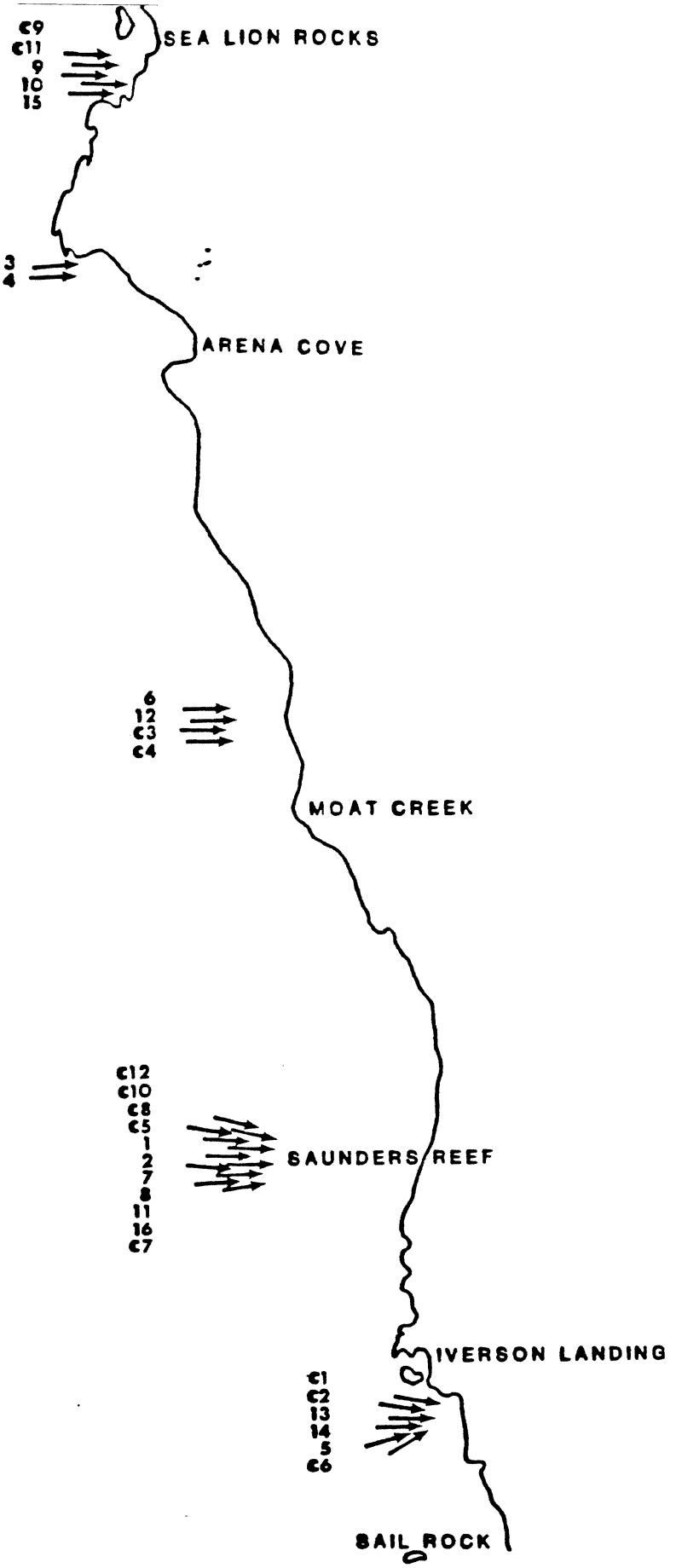


FIGURE 3. Transect locations (at arrows) and numbers for Arena Cove area, September 1986.

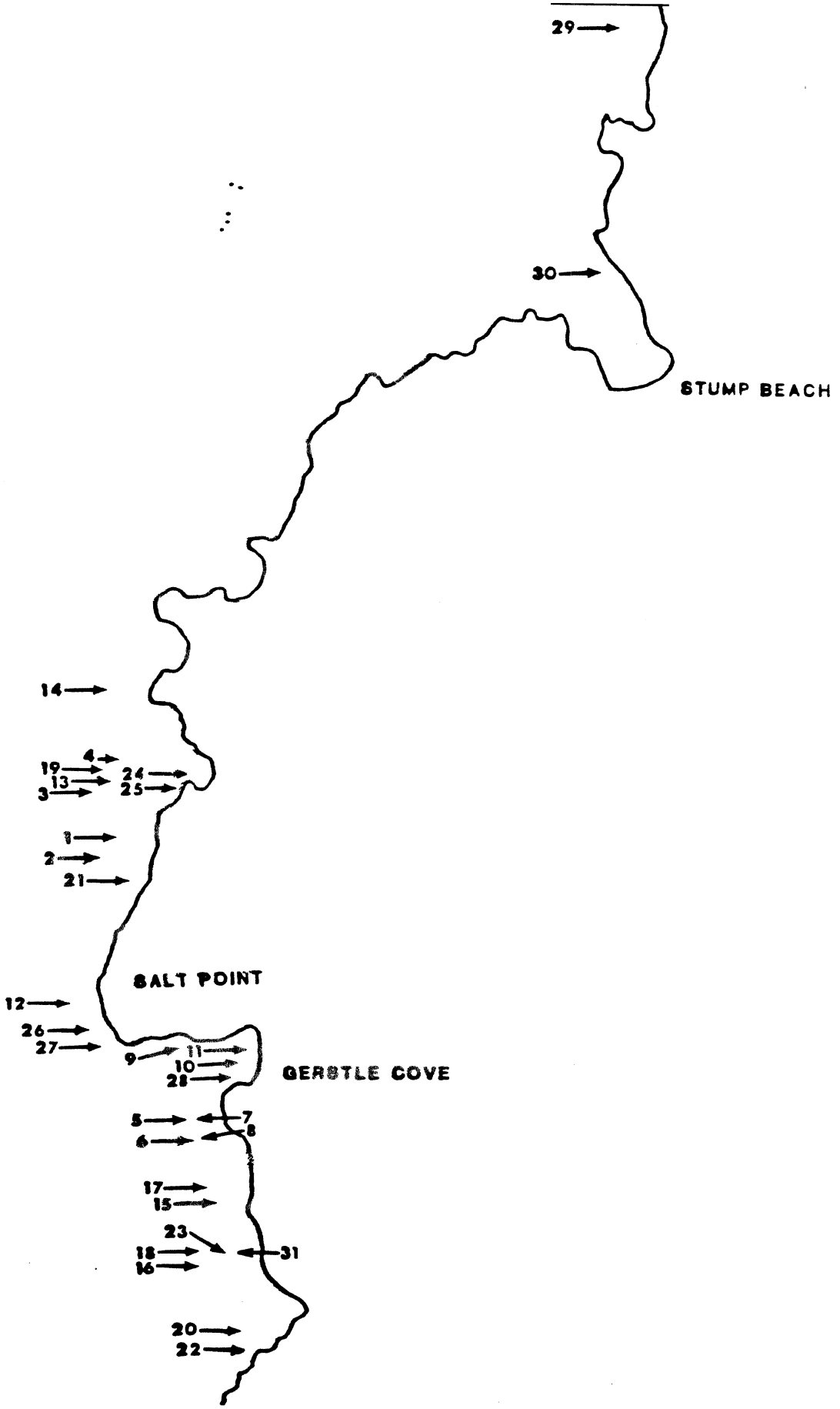


FIGURE 4. Transect locations (at arrows) and numbers for Salt Point State Park, September 1986.

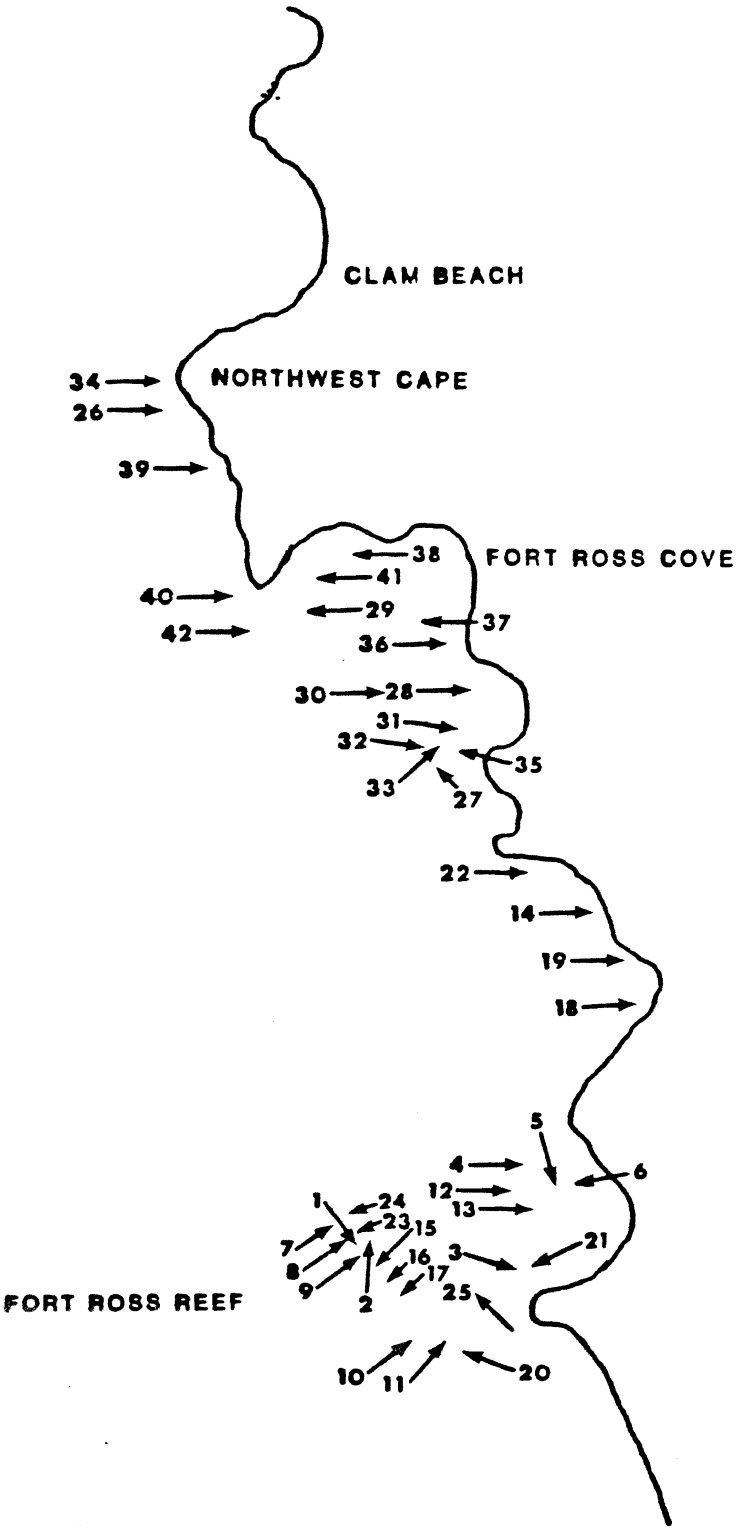


FIGURE 5. Transect locations (at arrows) and numbers for Fort Ross State Park, September 1986.

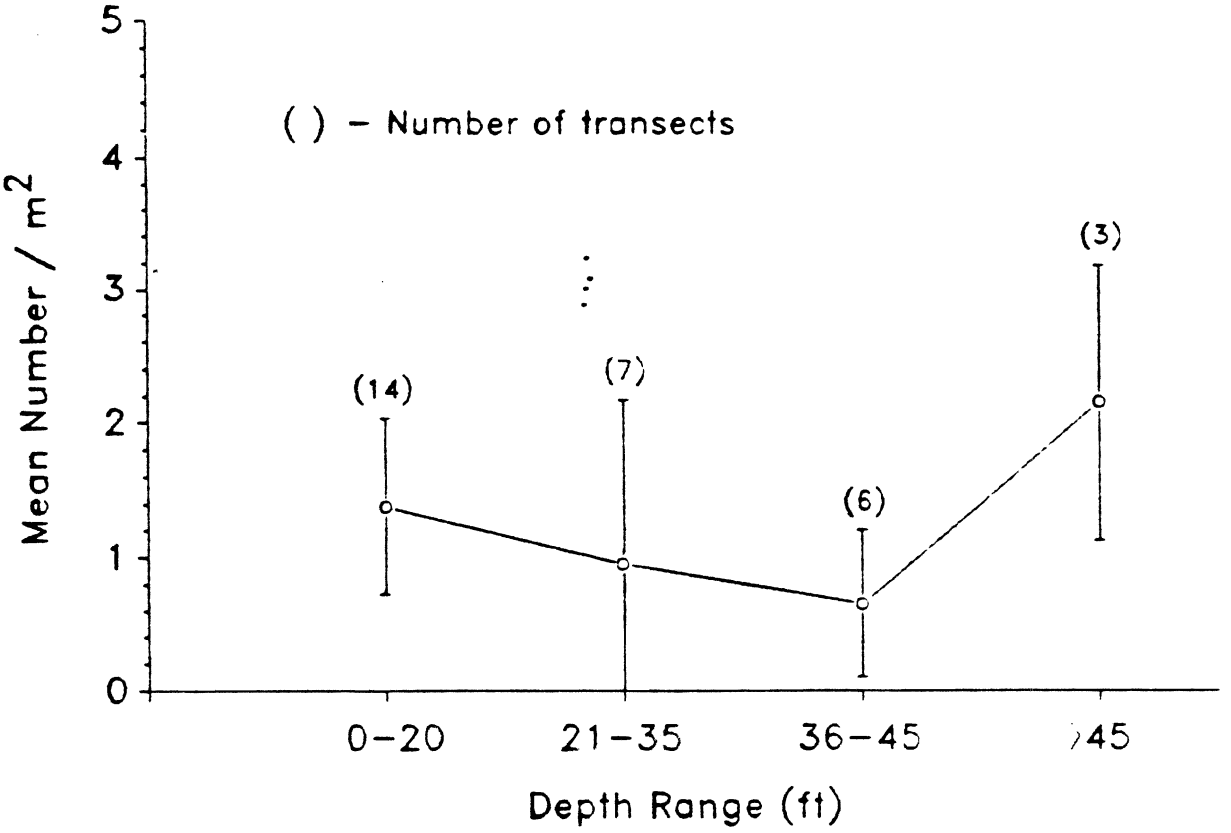


FIGURE 6. Mean number of red abalone/m² (±SD) on transects by depth range at Point Cabrillo Reserve.

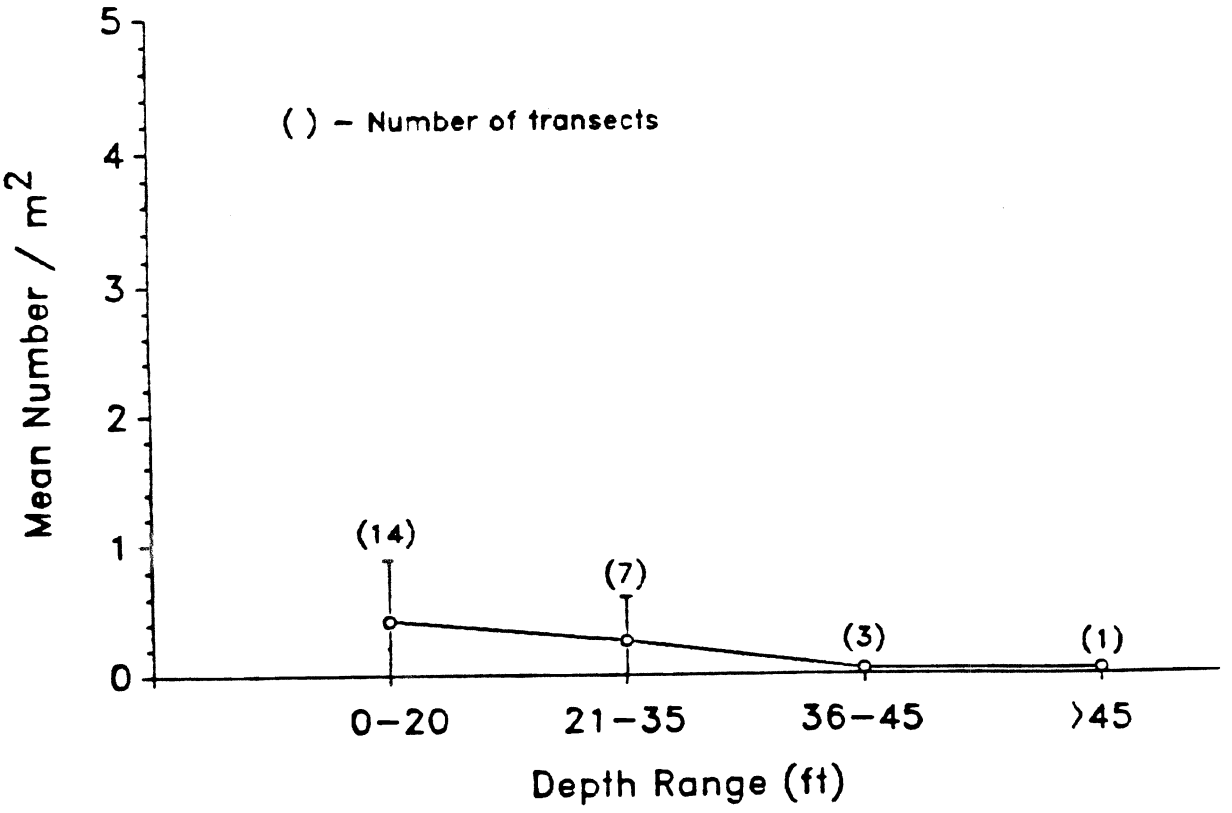


FIGURE 7. Mean number of red abalone/m² (±SD) on transects by depth range at Van Damme State Park.

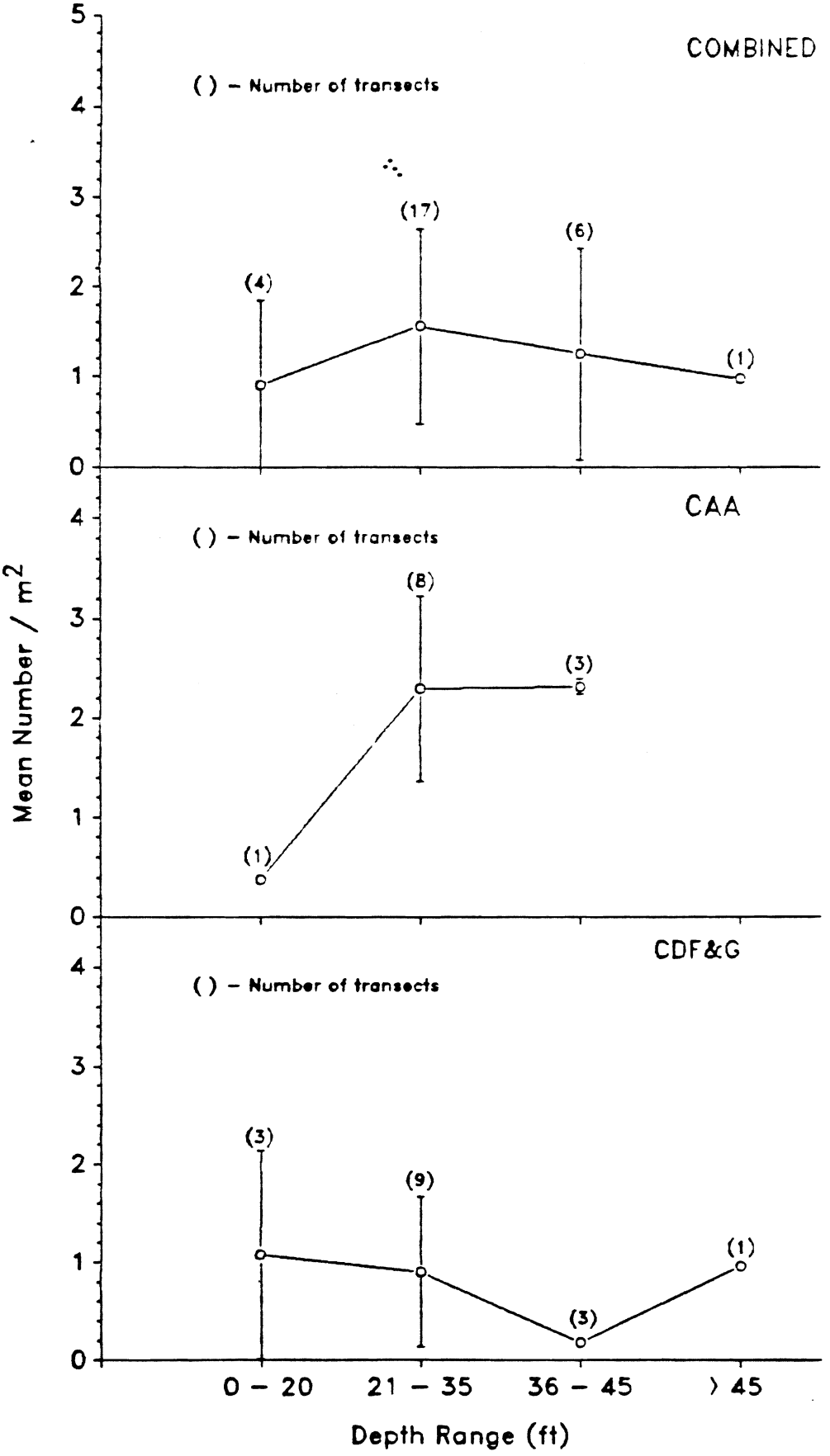


FIGURE 8. Mean number of red abalone/m² (±SD) on transects by depth range at Arena Cove area.

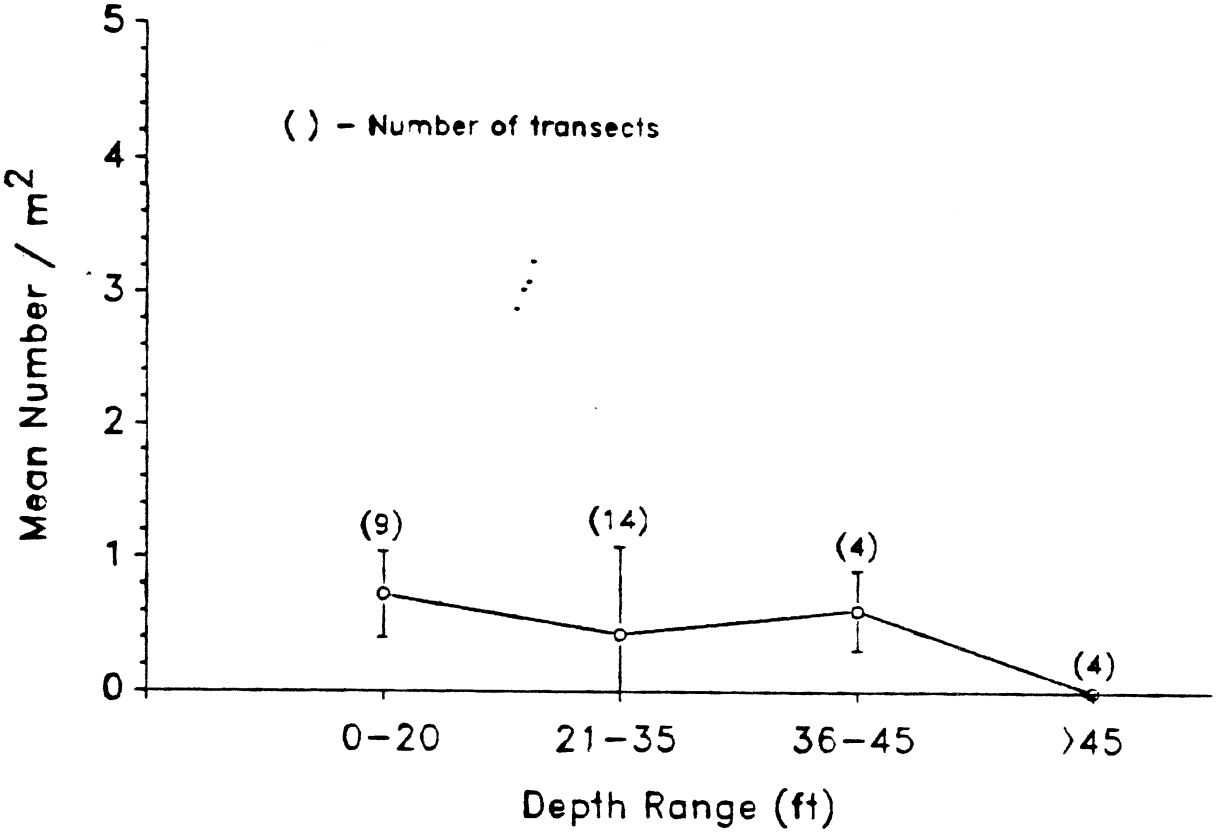


FIGURE 9. Mean number of red abalone/m² (±SD) on transects by depth range at Salt Point State Park.

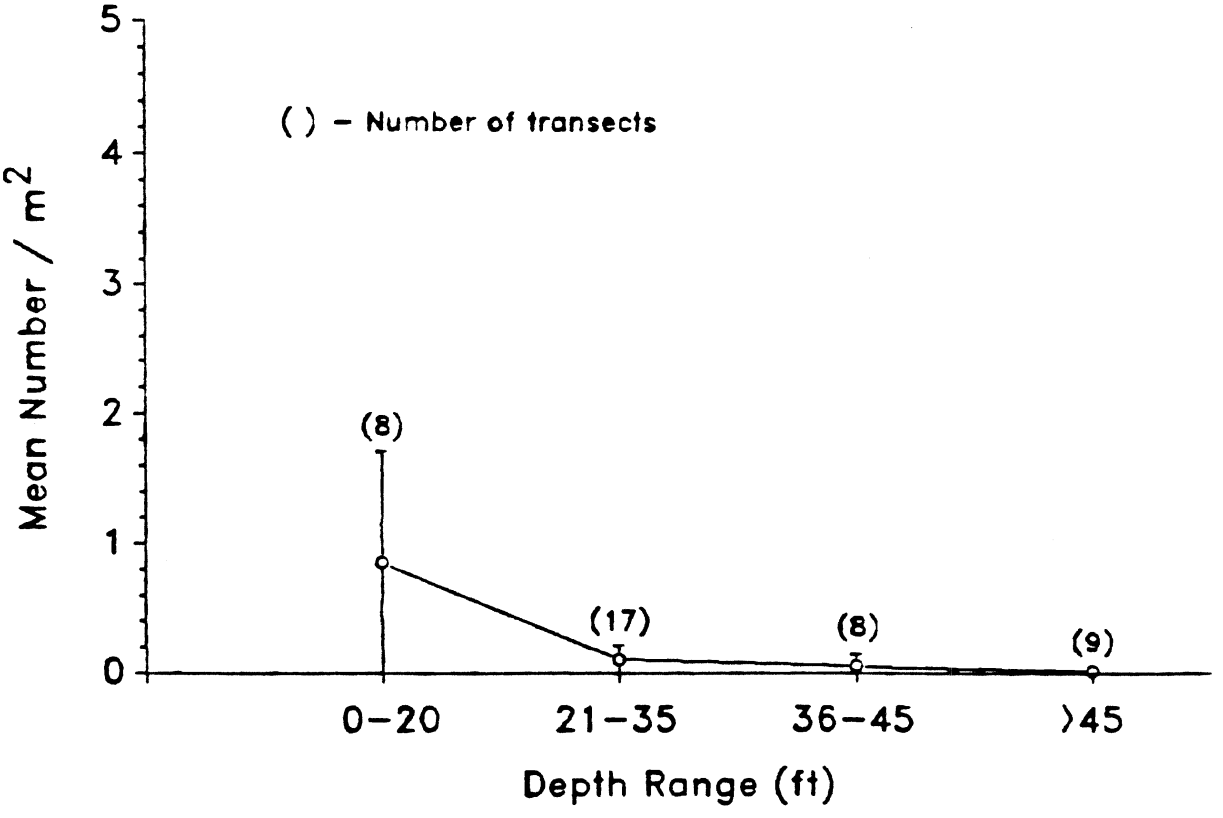


FIGURE 10. Mean number of red abalone/m² (±SD) on transects by depth range at Fort Ross State Park.

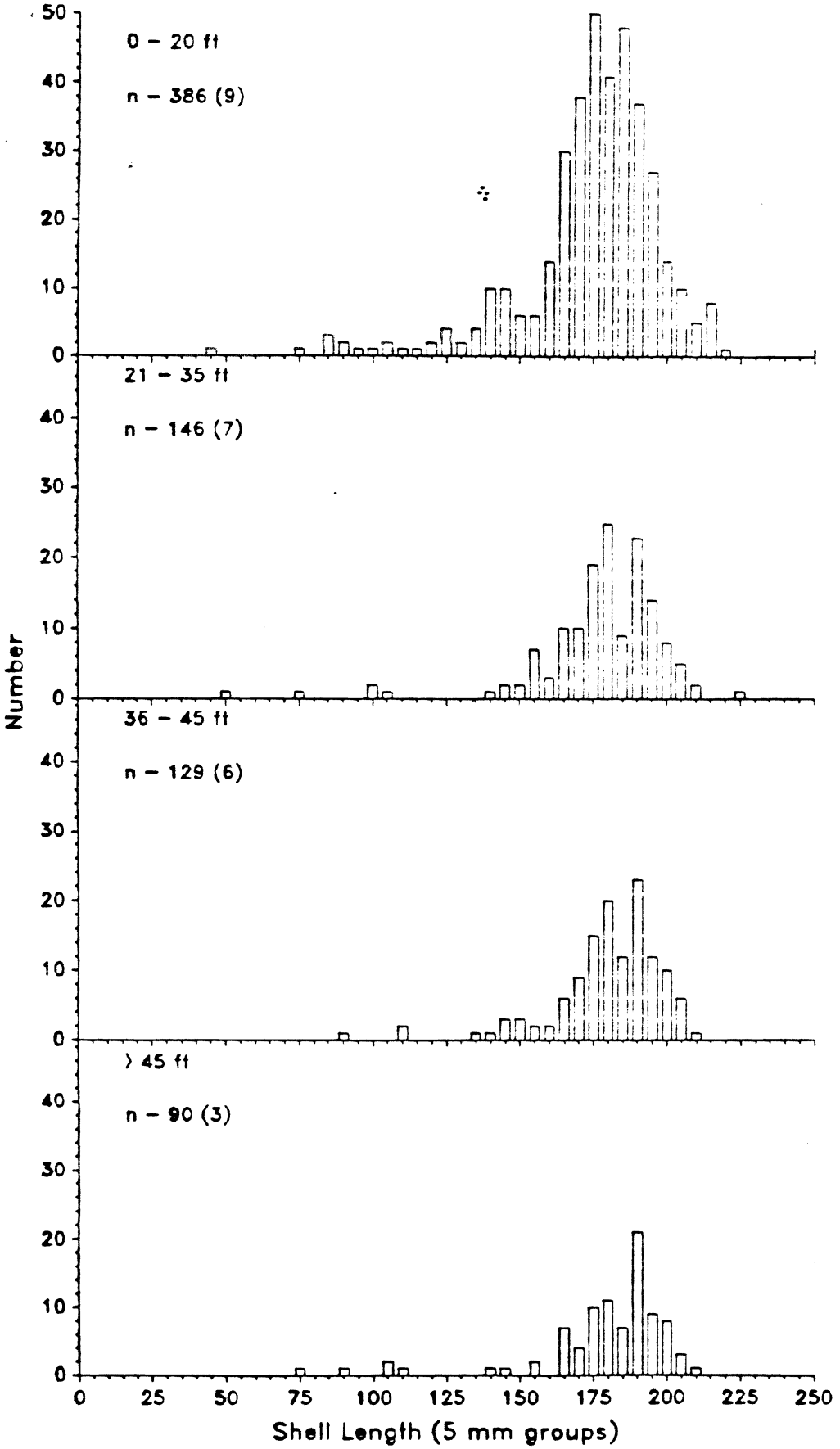


FIGURE 11. Red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Point Cabrillo Reserve.

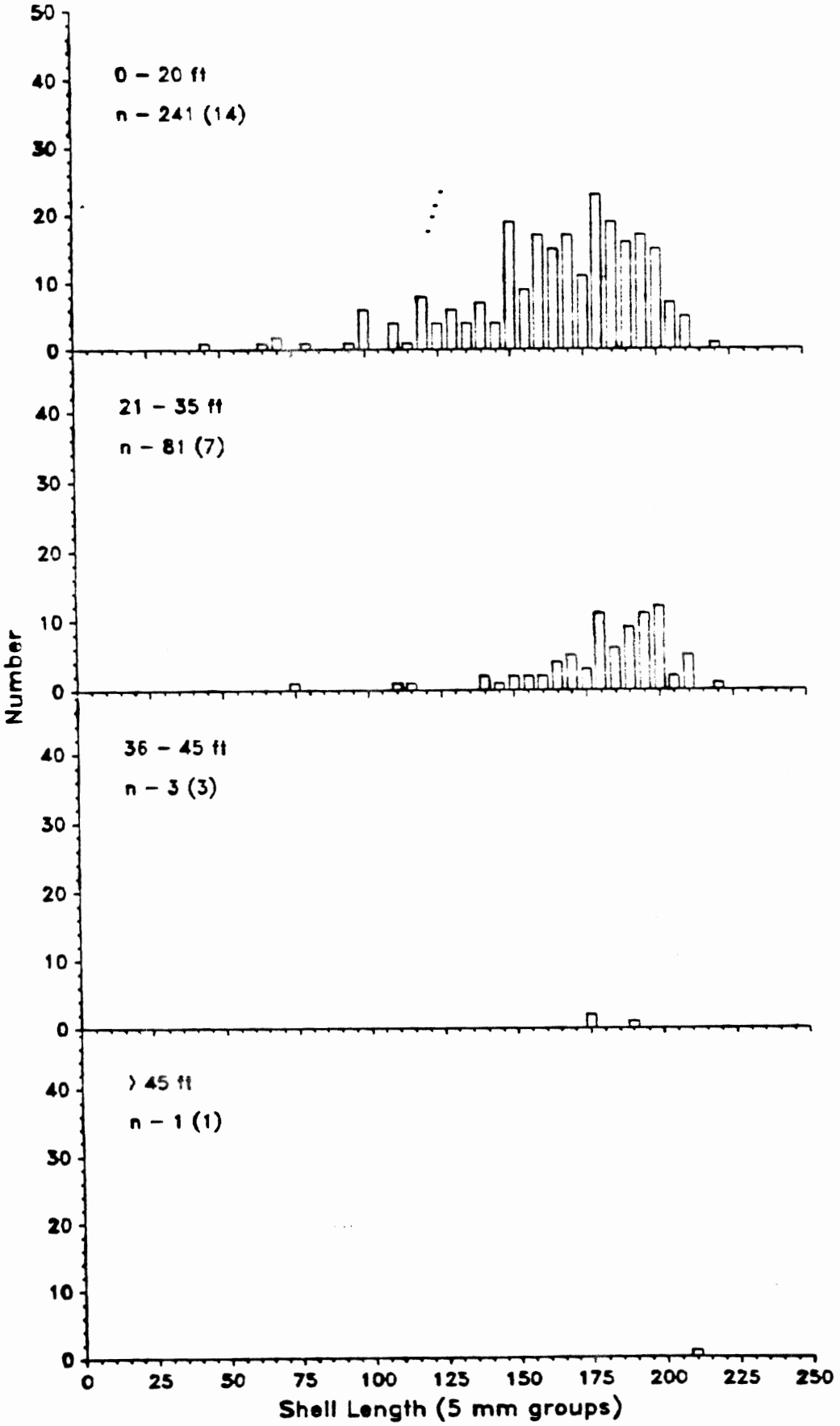


FIGURE 12. Red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Van Damme State Park.

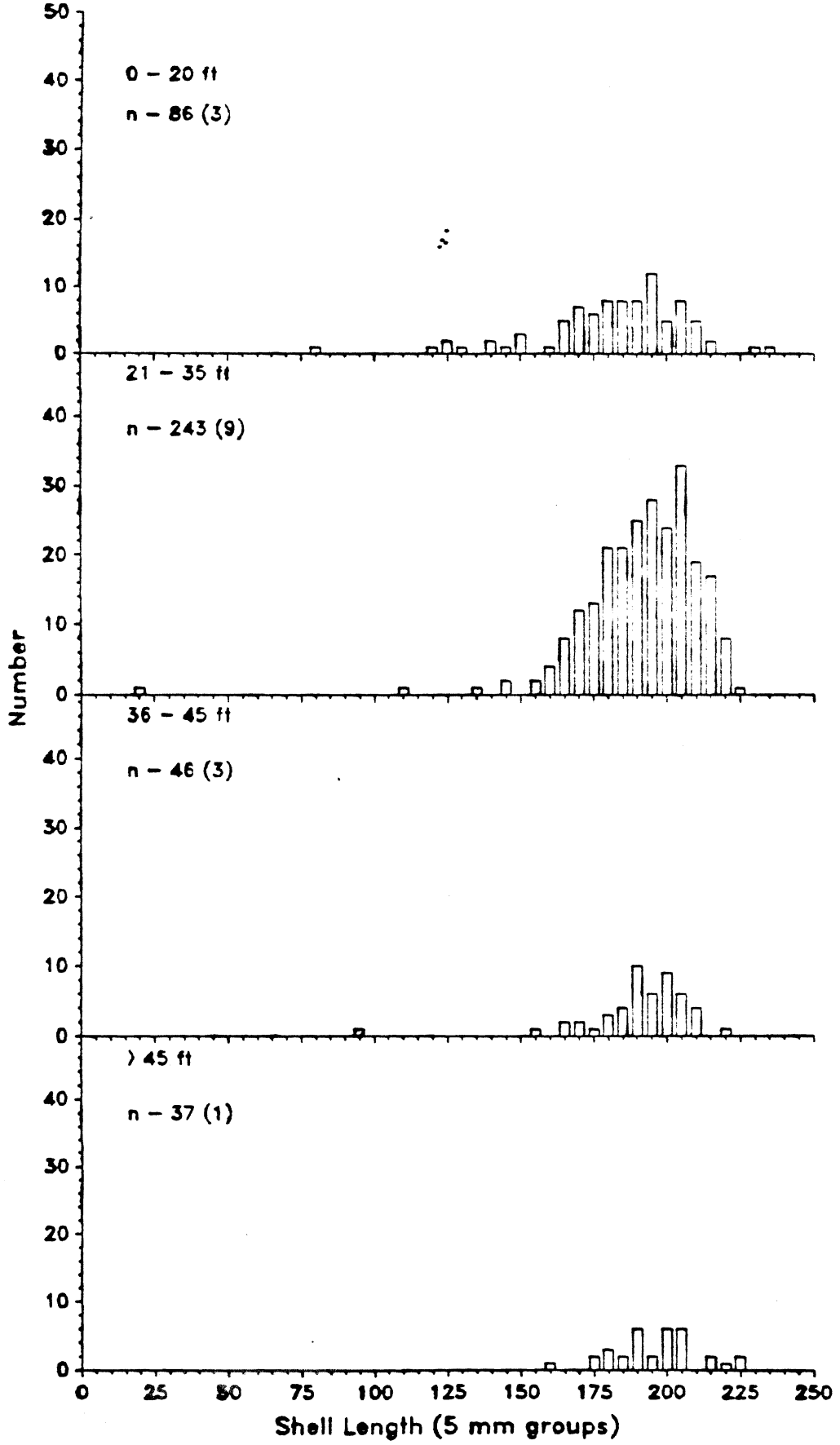


FIGURE 13. Department of Fish and Game red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Arena Cove area.

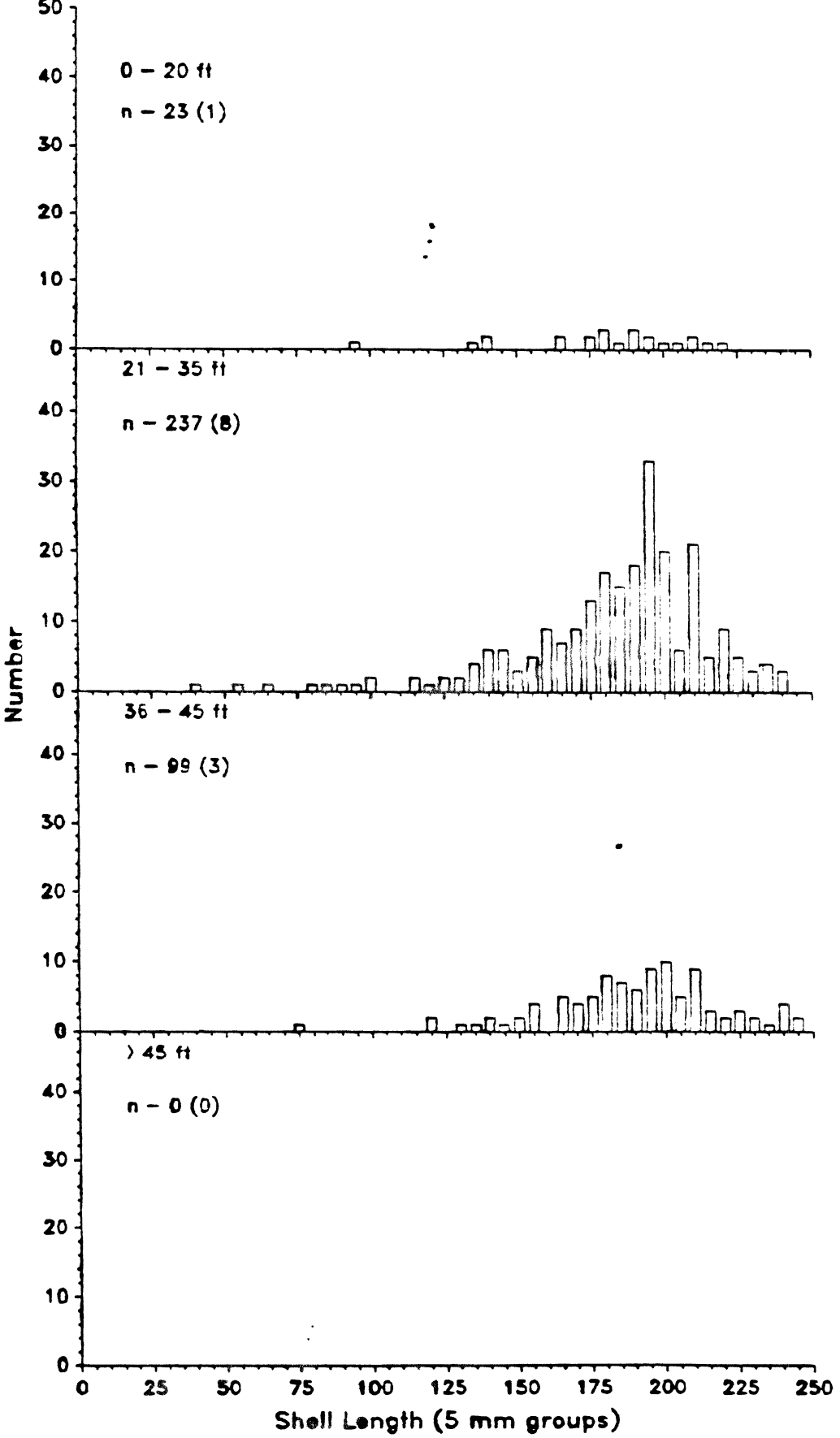


FIGURE 14. California Abalone Association red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Arena Cove area.

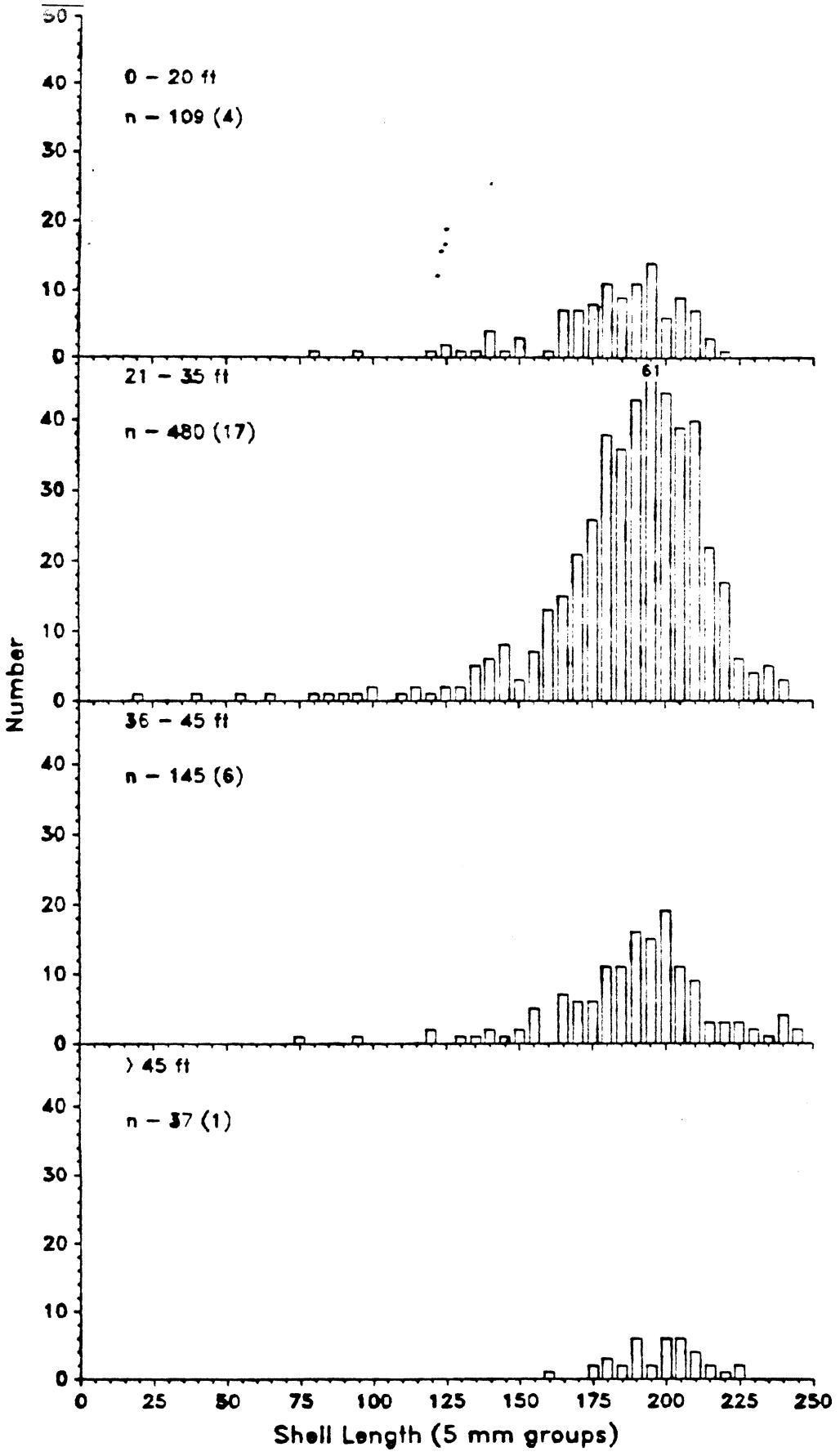


FIGURE 15. Combined (CDF&G and CAA) red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Arena Cove area.

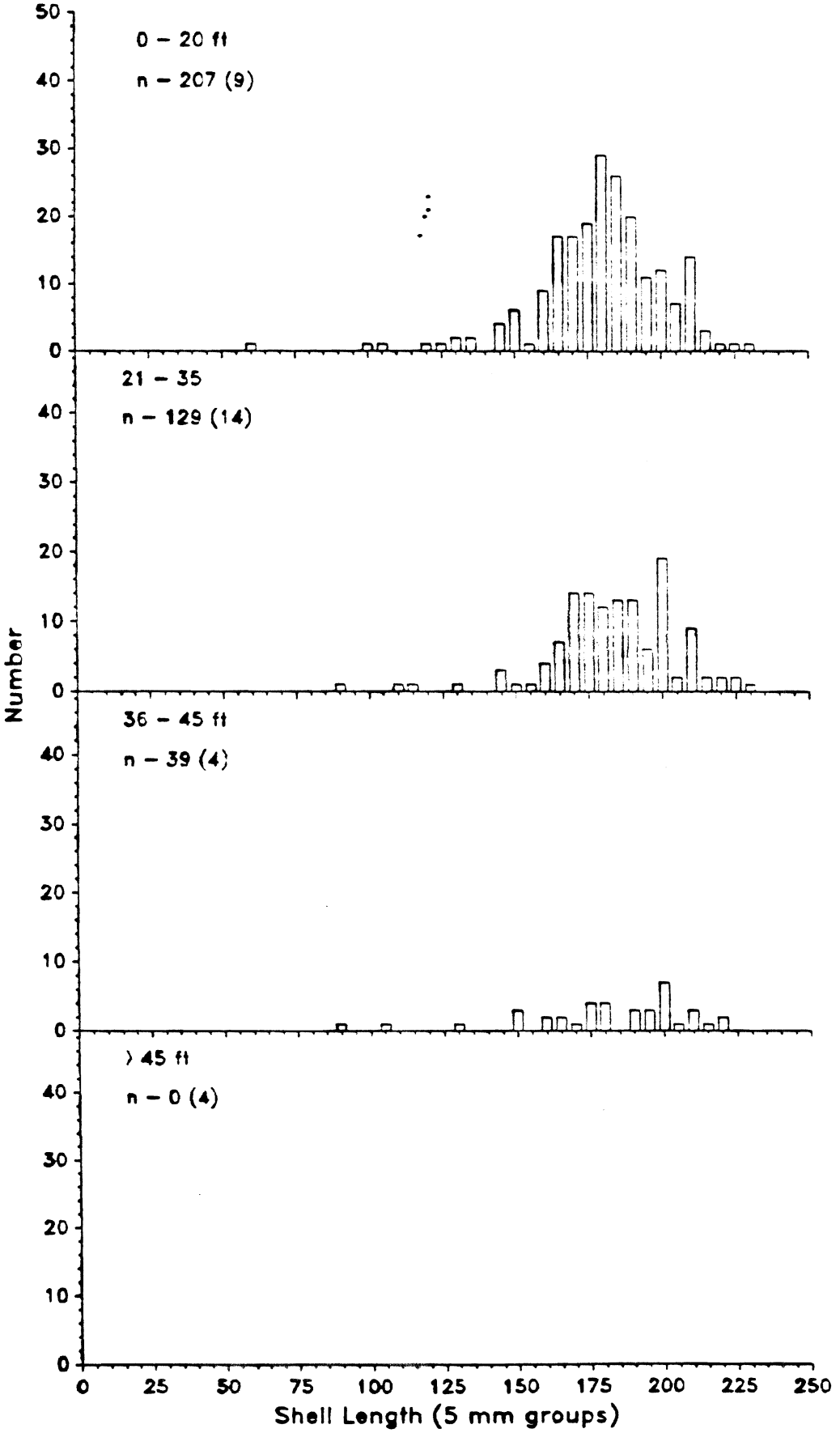


FIGURE 16. Red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Salt Point State Park.

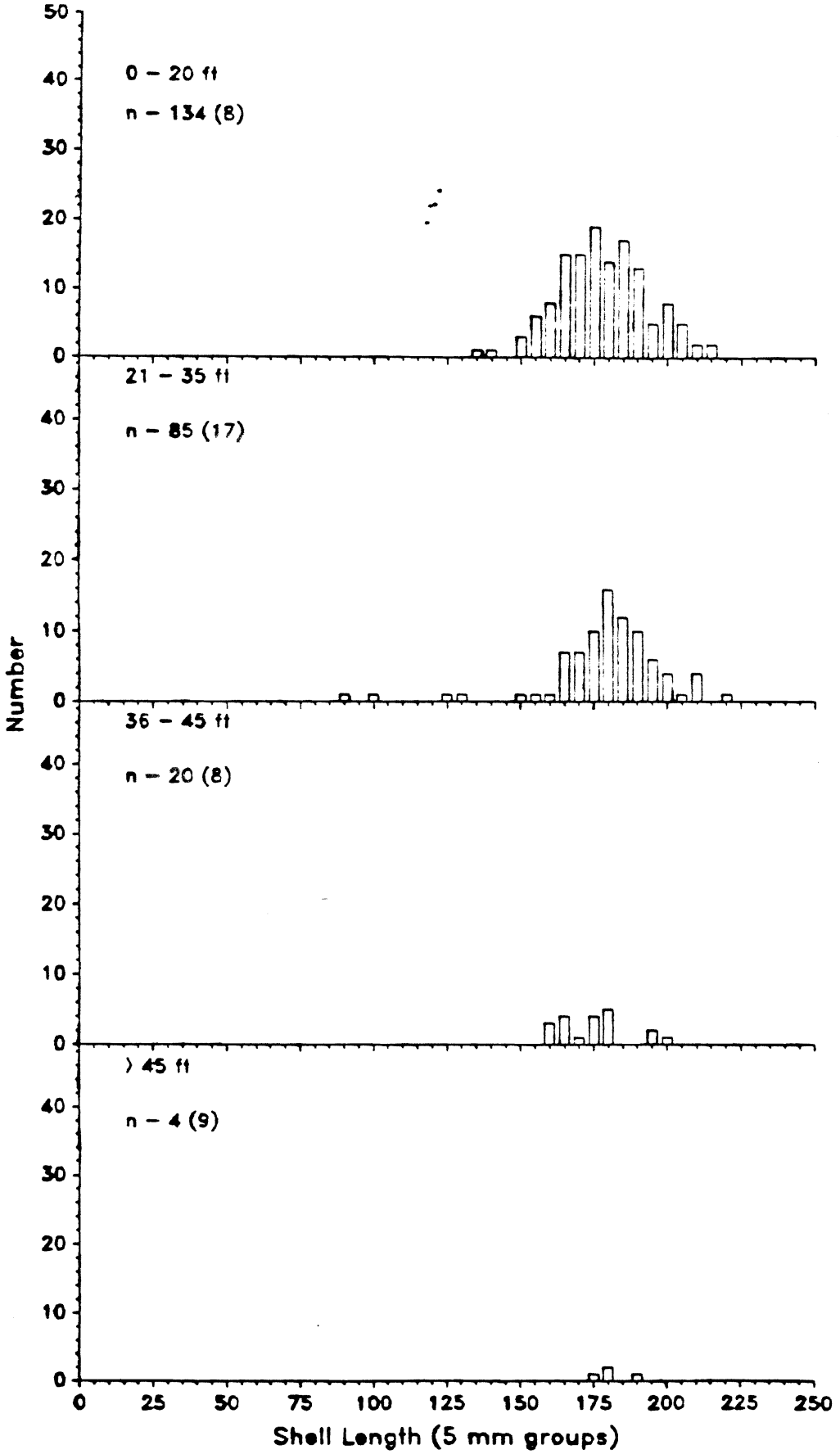


FIGURE 17. Red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Fort Ross State Park.

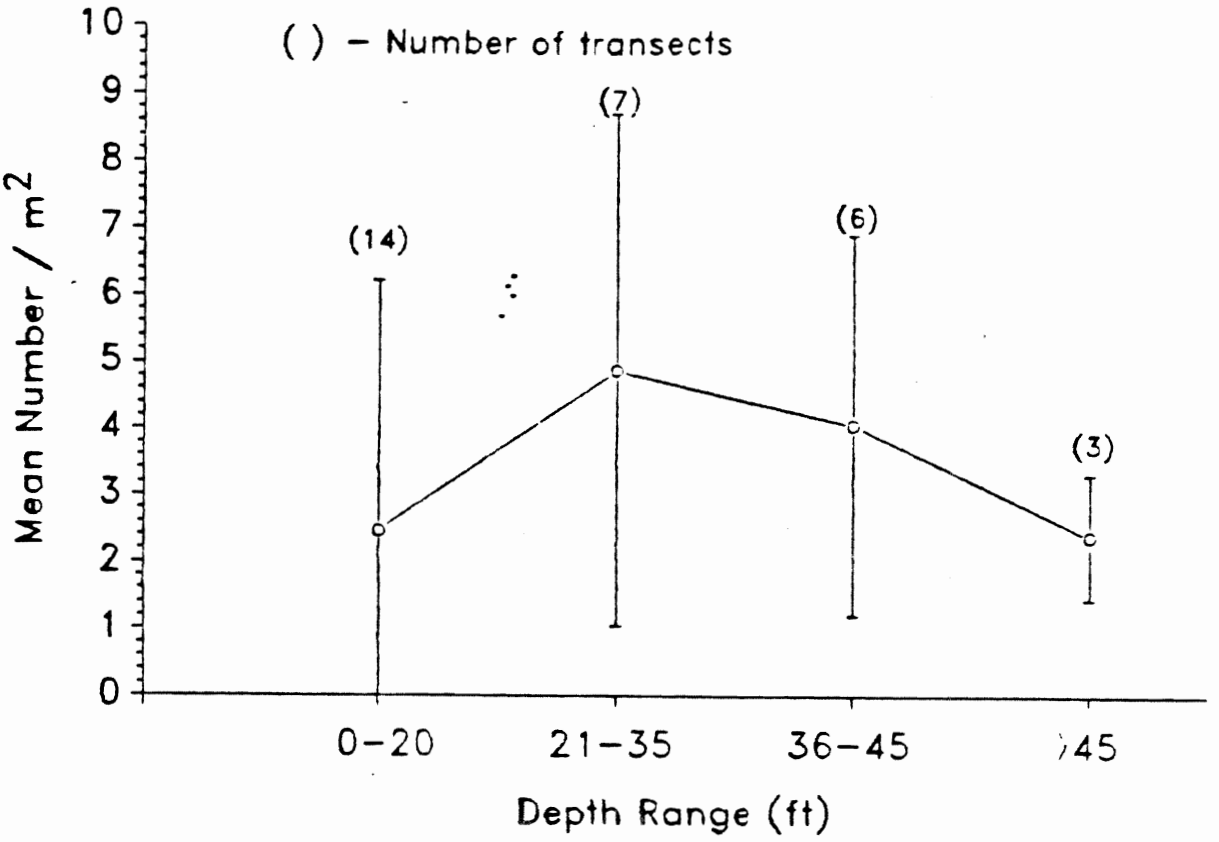


FIGURE 18. Mean number of red sea urchins/m² (±SD) on transects at Point Cabrillo Reserve.

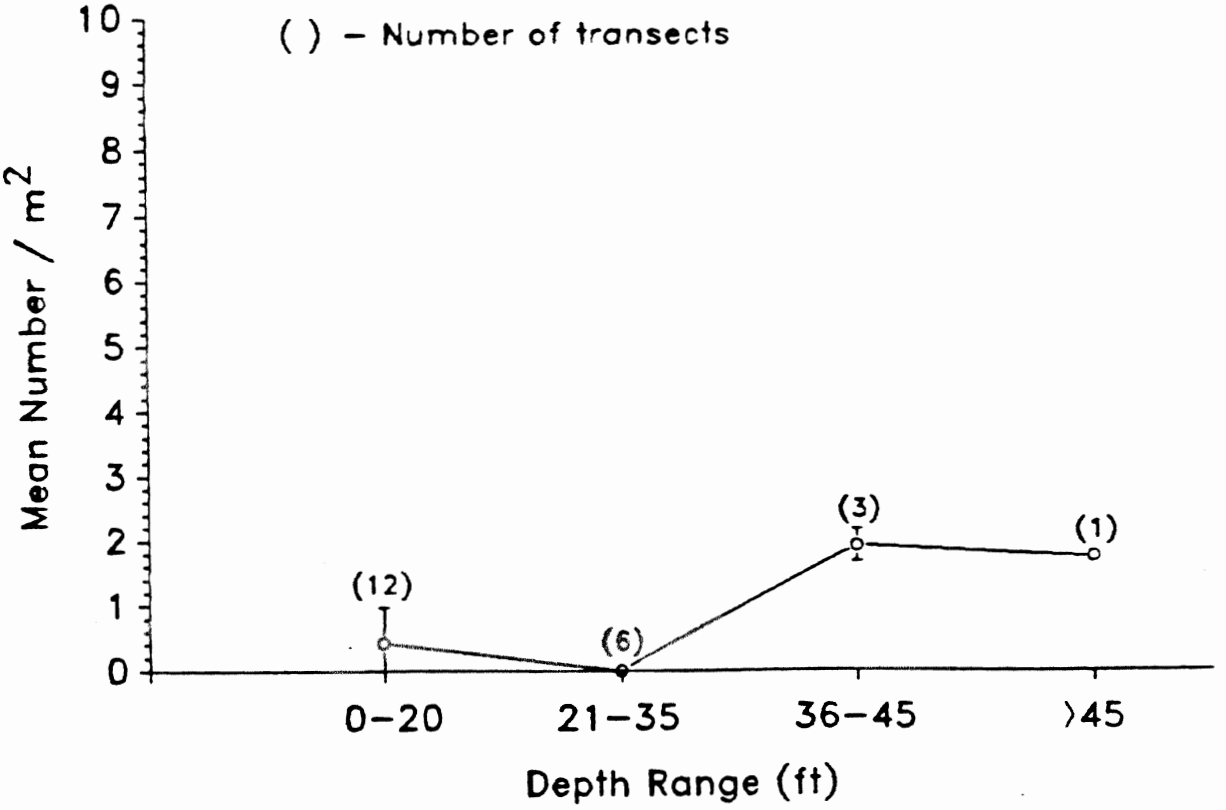


FIGURE 19. Mean number of red sea urchins/m² (±SD) on transects at Van Damme State Park.

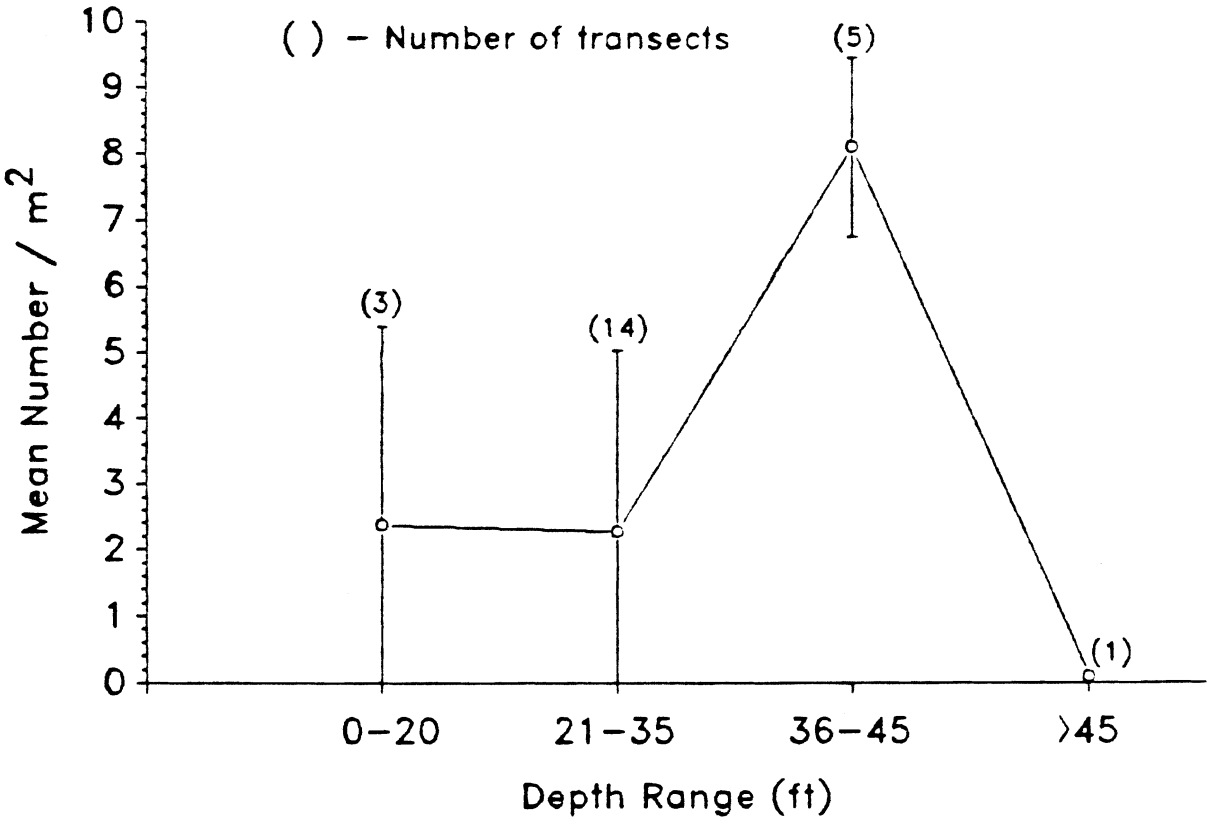


FIGURE 20. Mean number of red sea urchins/m² (±SD) on transects at Arena Cove area.

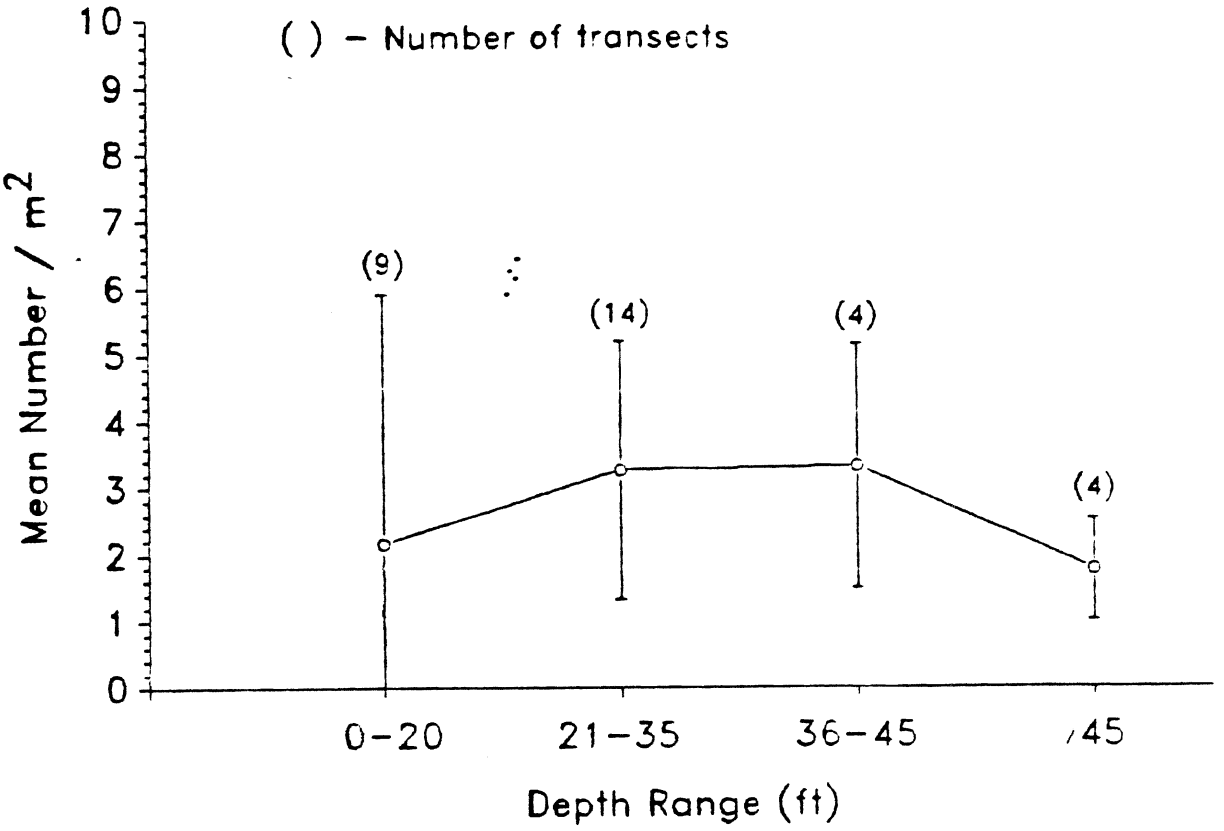


FIGURE 21. Mean number of red sea urchins/m² (±SD) on transects at Salt Point State Park.

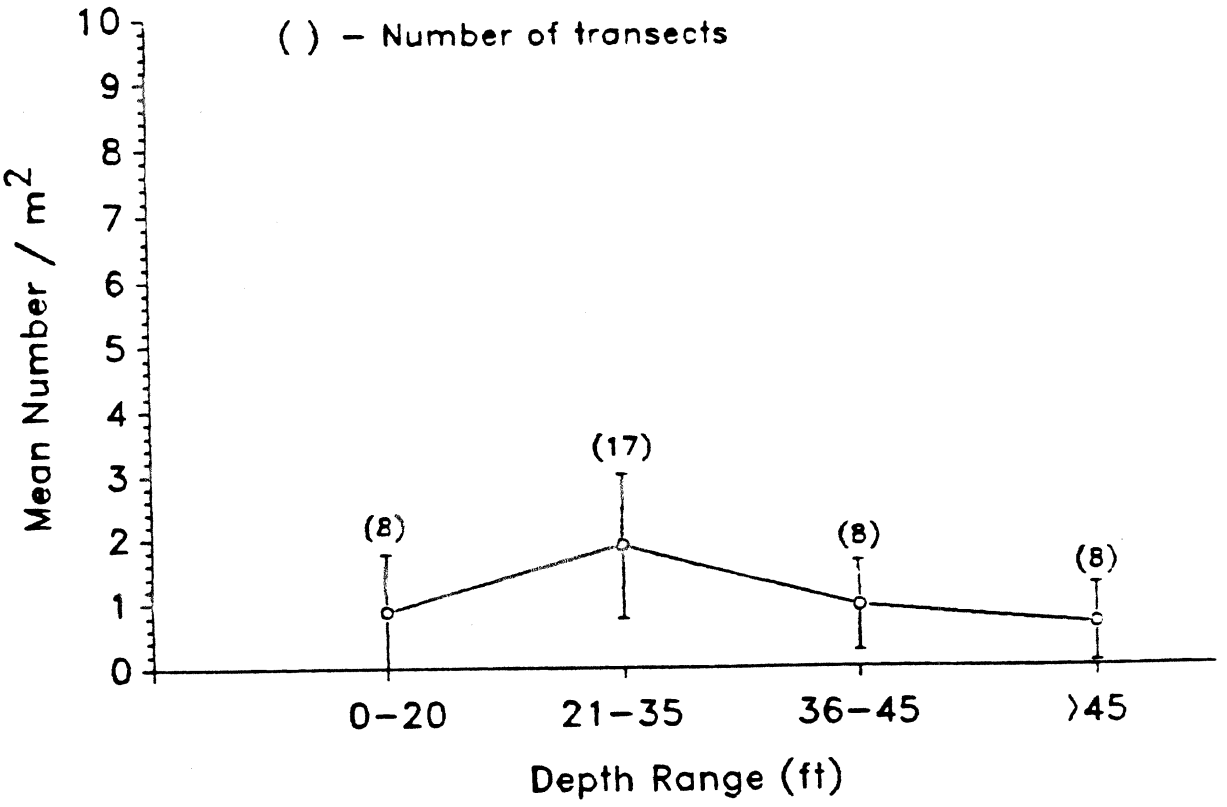


FIGURE 22. Mean number of red sea urchins/m² (±SD) on transects at Fort Ross State Park.

Table 1. Red Abalone Size Composition Relative to Recreational (7 inch) and Commercial (7-3/4 inch) Minimum Sizes From Transects at Five Locations on the Sonoma and Mendocino County Coasts, September 1986.

Area	Depth Range (ft) 0-20	21-35	36-45	> 45	Totals
Pt. Cabrillo					
n	386	146	129	90	751
≥ 7"	192	87	84	60	423
%	50	60	65	67	56
≥ 7-3/4"	39	17	17	12	85
%	10	12	13	13	11
Van Damme					
n	241	81	3	1	326
≥ 7"	103	58	2	1	164
%	43	72	67	100	50
≥ 7-3/4"	31	23	0	1	55
%	13	28	0	100	17
Arena Cove					
n	109	480	145	37	771
≥ 7"	73	360	111	36	580
%	67	75	77	97	75
≥ 7-3/4"	29	198	63	21	311
%	27	41	44	57	40
Salt Pt.					
n	207	129	39	-	375
≥ 7"	130	85	24	-	239
%	63	66	62	-	64
≥ 7-3/4"	40	37	14	-	91
%	19	29	36	-	24
Ft. Ross					
n	134	88	20	4	243
≥ 7"	76	56	9	3	144
%	57	64	45	75	59
≥ 7-3/4"	19	10	2	0	31
%	14	11	10	0	13

APPENDIX A

TRANSECT DATA FROM PT. CABRILLO RESERVE, VAN DAMME STATE PARK, ARENA COVE AREA, SALT POINT STATE PARK, AND FORT ROSS STATE PARK SEPTEMBER 1986

Explanation of Transect Data Display Format

`Area' (- ft): General survey location and depth range.
Location: Transect number referenced to Figures 1-5.
Date: self explanatory
Depth: self explanatory

Transect Counts

Red Abalone: `a' and `b' are counts for each transect side by 10 meter segments. Totals are given for each segment and for entire transect.

Red Urchin: Same format as red abalone.

Red Abalone Lengths (mm): Maximum shell length in mm for up to first 30 red abalone on transect irrespective of side (a/b).

Number: Total abalone measured for each transect.

Mean length: Mean shell length of abalone measured on each transect

Pt. Cabrillo (0 - 20 ft)

Location	PC2	PC5	PC8	PC10	PC14	PC15	PC17	PC18	PC21
Date	16	17	17	18	17	17	18	18	17
Depth (ft)	13	10	13	13	13	18	10	18	15

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	41	14	55	28	9	37	41	11	52	7	15	22	11	4	15	1	1	2	26	6	32	1	10	11	21	25	46
10-20	22	15	37	12	18	30	10	11	21	17	19	36	8	1	9	4	9	13	6	5	11	2	24	26	11	26	37
20-30	33	10	43	14	8	22	14	8	22	19	12	31	14	7	21	6	0	6	17	5	22	10	13	23	3	16	19
			---			---			---			---			---			---			---			---			---
			135			89			95			89			45			21			65			60			102

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	3	3	1	2	3	20	2	22	0	0	0	0	1	1	0	0	0	10	0	10	0	0	0	0	0	0
10-20	1	0	1	22	12	34	28	25	53	2	0	2	56	25	81	8	18	26	0	0	0	0	0	0	27	50	77
20-30	40	13	53	5	3	8	30	30+	60	2	0	2	0	1	1	60	43	103	14	0	14	0	0	0	1	25	26
			---			---			---			---			---			---			---			---			---		---
			57			45			135			4			83			129			24			0			103

Red Abalone Lengths (mm)

	165	185		160	125		160	160		145	135		185	215		185	183		215	191		197	180		140	200	
	165	200		165	140		165	165		160	165		75	172		145	203		85	190		196	190		205	195	
	165	180		175	145		170	165		160	170		85	165		195	133		175	178		140	200		200	175	
	170	180		175	150		170	170		165	170		90	192		173	191		170	196		196	175		200	200	
	170	200		185	175		170	170		165	170		135	164		176	175		165	192		175	185		100	140	
	175	165		185	180		175	175		165	170		195	220		171	200		195	183		194	125		190	125	
	175	165		185	180		175	175		170	170		180	190		171	141		195	217		193	190		180	185	
	180	170		185	185		175	175		170	175		215	193		180	185		140	177		178	180		145	110	
	180	170		185	185		180	175		180	175		185	188					175	178		183	185		215	215	
	185	170		190	185		185	180		180	175		190	144					170	188		186	180		195	150	
	185	175		190	185		185	180		180	175		190	156					185	143		159	170		155	210	
	190	180		195	190		185	185		185	180		145	183					205	178		178	180		105	155	
	190	185		205	190		185	190		175	185		185						175	157		146	210		175	180	
	190	190		205	190		185	195		175	185		160						215	174			160		170	210	
	195	195		205	195		190	195		190	200		145						150	179			205		135	195	
Number			30			30			30			30			27			16			30			28			30
Mean Length			180			180			177			172			168			175			178			180			172

Pt. Cabrillo (0 - 20 ft) Continued

Location	PC23			PC24			PC25			PC29			PC27		
Date	17			17			18			16			18		
Depth (ft)	15			15			15			15			15		
Transect Counts															
Red Abalone															
	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	3	1	4	8	13	21	19	30	49	5	17	22	19	36	55
10-20	14	5	19	6	4	10	24	26	50	13	22	35	10	50	60
20-30	22	10	32	9	2	11	38	26	64	7	12	19	5	5	10
			---			---			---			---			---
			55			42			163			76			125
Red Urchin															
	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	125	200	325	-	0	0	55	80	135	-	-	0	16	0	16
10-20	3	100	103	-	1	1	16	0	16	-	-	0	13	17	30
20-30	1	0	1	-	0	0	12	1	13	143	137	280	13	-	13
			---			---			---			---			---
			429			1			164			280			59

Red Abalone Lengths (mm)

	180	195	205	135	170	175	45	190	185		
	165	200	180	175	170	175	150	175	190		
	120	165	160	185	170	145	160	170	180		
	150	175	205	195	185	180	175	190	180		
	195	170	165	195	175	90	120	185	155		
	170	175	175	170	195	190	150	170	160		
	180	215	180	165	200	165	185	180	260		
	195	175	115	160	175	165	95	180	165		
	180	200	180	185	140	165	185	165	175		
	175	170	185	170	190	175	190	185	165		
	190	170	185	105	140	180	180	165	165		
	160	205	160	145	130	195	175	175	175		
	200	185	185	185	190	205	190	175	195		
	190	85	190	210	180	175	165	180	170		
	165	195	165	195	165	125	175	195	210		
---	---	---	---	---	---	---	---	---	---	---	---
Number			30		30		30		15		30
Mean Length			177		173		169		156		180

Pt. Cabrillo (21 - 35 ft)

Location	PC4	PC7	PC11	PC12	PC22	PC28	PC30
Date	17	17	16	16	17	16	17
Depth (ft)	27	27	30	25	25	25	25

Transect Counts

Red Abalone

	PC4 a	PC4 b	PC4 tot	PC7 a	PC7 b	PC7 tot	PC11 a	PC11 b	PC11 tot	PC12 a	PC12 b	PC12 tot	PC22 a	PC22 b	PC22 tot	PC28 a	PC28 b	PC28 tot	PC30 a	PC30 b	PC30 tot
0-10	0	0	0	8	10	18	32	30	62	0	7	7	20	28	48	4	2	6	1	0	1
10-20	0	1	1	4	5	9	7	3	10	1	4	5	42	34	76	5	9	14	1	0	1
20-30	0	0	0	0	4	4	21	15	36	4	3	7	43	36	79	2	6	8	2	7	9
			---			---			---			---			---			---			---
			1			31			108			19			203			28			11

Red Urchin

	PC4 a	PC4 b	PC4 tot	PC7 a	PC7 b	PC7 tot	PC11 a	PC11 b	PC11 tot	PC12 a	PC12 b	PC12 tot	PC22 a	PC22 b	PC22 tot	PC28 a	PC28 b	PC28 tot	PC30 a	PC30 b	PC30 tot
0-10	100	100	200	17	0	17	19	5	24	18	12	30	-	0	0	55	21	76	-	-	0
10-20	100	100	200	32	0	32	77	93	170	142	71	213	-	0	0	27	17	44	-	-	0
20-30	100	100	200	73	0	73	10	12	22	42	55	97	-	1	1	22	33	55	101	95	196
			---			---			---			---			---			---			---
			600			122			216			340			1			175			196

Red Abalone Lengths (mm)

PC4	PC7	PC11		PC12		PC22		PC28	PC30	
180	165	155	159	180	175	197	150	180	180	155	160
	170	165	190	185	180	165	160	105	175	175	175
	175	170	184	187	177	178	210	175	190	195	200
	175	175	171	225	170	184	180	190	175	185	190
	180	180	140	175	180	190	195	180	175	205	165
	180	180	76	195		165	190	195	155	170	170
	180	190	50	200		178	210	195	190	155	160
	185	190	203	177		197	180	185	185	150	180
	190	190	159	205		178	170	180	170	190	175
	190	190	101	180		184	180	100	165	185	170
	195	190	190	190		190	175	205	185	190	190
	205	195		195		184	165	185	202	180	190
		200				146	165	195	195	190	200
		200				165	195	180	165	195	165
		205				159	170	180	175	201	180

	PC4	PC7	PC11	PC12	PC22	PC28	PC30
Number	1	27	23	20	30	15	30
Mean Length	180	184	170	177	178	179	179

Pt. Cabrillo (36 - 45 ft)

Location	PC1	PC3	PC6	PC13	PC19	PC20
Date	16	17	17	17	16	17
Depth (ft)	40	45	45	37	37	37

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	2	4	6	0	0	0	13	9	22	1	1	2	0	0	0	2	0	2
10-20	8	7	15	0	0	0	5	8	13	6	2	8	1	1	2	10	2	12
20-30	6	10	16	1	0	1	34	26	60	0	1	1	6	41	47	16	13	29
			---			---			---			---			---			---
			37			1			95			11			49			43

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	29	30 +	59	63	30 +	93	0	22	22	140	141	281	12	9	21	21	90	111
10-20	40	23	63	56	30 +	86	30	58	88	78	72	150	0	25	25	0	2	2
20-30	23	30 +	58	68	30 +	98	0	37	37	81	65	146	32	46	78	3	40	43
			---			---			---			---			---			---
			180			277			147			577			124			156

Red Abalone Lengths (mm)

150	200		170		170	150		147	190		90	140		170	200	
160	165				170	165		192	180		170	205		180	190	
165	180				175	175		157	200		180	195		195	190	
165	190				175	175		194	175		110	190		175	175	
165	190				175	185		146			110	175		185	175	
170	185				180	185		167			170	180		200	180	
175	200				180	185					180	170		180	190	
180	205				180	190					190	180		185	195	
185	205				190	190					165	180		175	185	
185	195				190	195					170	175		200	195	
185	195				190	195					180	190		205	190	
190	190				195	195					155	185		190	175	
190	190				195	200					175	190		160	135	
190	190				200	200						190		190	200	
195	180				205	210						150		205	195	

Number	30	1	30	10	28	30
Mean Length	194	170	186	175	168	196

Pt. Cabrillo ( ) 45 ft)

Location	PC9	PC16	PC26
Date	18	17	18
Depth (ft)	50	70	50

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot
0-10	31	8	39	32	23	55	30	8	38
10-20	10	7	17	13	20	33	13	10	23
20-30	4	4	8	25	73	98	37	40	77
			---			---			---
			64			186			138

Red Urchin

	a	b	tot	a	b	tot	a	b	tot
0-10	43	50	93	0	60	60	75	4	79
10-20	10	34	44	5	2	7	70	3	73
20-30	14	22	36	7	4	11	25	0	25
			---			---			---
			173			78			177

Red Abalone Lengths (mm)

165	155		194	190		190	180
165	155		186	190		200	195
175	165		177	190		210	180
175	165		175	175		180	175
185	170		193	160		180	175
185	175		170	90		200	180
185	185		169	75		195	205
190	190		184	190		185	190
190	190		177	110		185	195
190	190		194	185		140	185
190	195		194	105		180	180
190	200		186	105		175	200
195	200		165	145		195	195
195	200		173	195		190	180
200	205		173	205		180	195

Number	30	30	30
Mean Length	184	167	187

Van Damme (0 - 20 ft)

Location	VD3	VD4	VD5	VD6	VD11	VD12	VD13	VD14	VD17
Date	17	17	17	17	17	17	18	18	17
Depth (ft)	15	15	15	15	15	15	15	15	10

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	9	11	20	2	4	6	1	6	7	10	3	13	13	3	16	3	0	3	6	0	6	0	4	4
10-20	0	0	0	0	5	5	0	1	1	2	4	6	12	7	19	0	0	0	4	7	11	10	15	25	2	0	2
20-30	0	0	0	0	3	3	3	3	6	1	5	6	0	5	5	11	18	29	0	0	0	2	1	3	0	4	4
			0			28			13			19			37			45			14			34			10

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	22	0	22	-	-	0	0	-	0	-	-	0	-	0	0	0	0	0	0	7	7	0	-	0
10-20	0	0	0	0	12	12	-	-	0	0	-	0	-	-	0	-	0	0	24	37	61	4	74	78	0	-	0
20-30	0	0	0	0	0	0	-	-	0	1	-	1	-	-	0	-	0	0	0	0	0	0	0	0	0	-	0
			0			34			0			1			0			0			61			85			0

Red Abalone Lengths (mm)

195	195	160	186	165	160	190	175	180	200	195	195	190	180	120	130	170	135
200	200	210	190	175	155	182	140	200	197	130	195	145	180	140	182	150	165
210	175	180	191	125	170	200	160	165	190	185	197	150	167	170	184		152
175	240	160	186	151	110	195	189	190	185	205	195	155	125	175	207		140
180	240	165	172	167	195		120	195	160	210	173	170	100		185		175
140	240	130	103	215	190		135	175	197	200	120		180		185		180
155	185	80	99	210	140		170	195	185	195	195		190		180		140
200	180	185	68	195	120		150	165	200	200	210				160		130
130	185	210	45	190	135		170	185	205	190	125				140		
120	210	189	70	180	190		185	200	200	175	155				195		
175	200	154	150	145	210		100	120	165	200	175				185		
195	240	201	158	165	195		110	190	185	180	205				100		
165	245	217	160	170	180		183	180	200	185	180				190		
175	165	193	135	180	165		140	180	170	170	190						
185	170	157	150	195	200		147	170	180	190	150						
200	180		195					180		220	165						
245	175		159					205		160	167						
235	210							180		165	195						
210								185		145	195						
										160	205						
										200	210						
										170							
										170	205						

Number		37		32		30		19		34		45		12		17		10								
Mean Length		193		157		171		158		184		182		161		166		154								

Van Damme (0 - 20 ft) Continued

Location	VD18	VD19	VD20	VD22	VD26
Date	17	17	17	16	17
Depth (ft)	10	10	10	10	10

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	2	6	8	0	0	0	5	4	9	0	0	0	4	26	30
10-20	3	7	10	2	0	2	1	5	6	2	0	2	24	40	64
20-30	0	2	2	3	0	3	0	0	0	0	0	0	4	13	17
			---			---			---			---			---
			20			5			15			2			111

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	9	9	2	0	2	22	3	25	0	0	0	0	-	0
10-20	24	4	28	3	0	3	5	45	50	0	0	0	0	-	0
20-30	0	2	2	3	0	3	0	0	0	0	0	0	0	-	0
			---			---			---			---			---
			39			8			75			0			0

Red Abalone Lengths (mm)

	120	190		115		130	180		165		125	155
	180	175		120		145	175		120		170	165
	170	100		160		70	150				200	162
	150	160		135		195	150				185	180
	165	150				200	150				155	185
		160				170	155				180	150
		110					160				185	160
		130					150				165	158
		155					180				150	110
		160									175	120
		150									185	200
		150									100	160
											170	190
											200	185
											190	175

Number	17	4	15	2	30
Mean Length	151	133	157	143	166

Van Damme (21 - 35 ft)

Location	VD7	VD8	VD9	VD10	VD23	VD24	VD25
Date	18	16	17	17	16	16	17
Depth (ft)	20	25	35	30	20	20	20

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	0	0	0	5	0	5	6	3	9	0	0	0	0	2	2	8	20	28
10-20	0	0	0	0	0	0	6	4	10	10	4	14	0	0	0	0	0	0	7	8	15
20-30	5	0	5	0	0	0	0	2	2	3	3	6	0	0	0	0	2	2	3	10	13
			---			---			---			---			---			---			---
			5			0			17			29			0			4			56

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	-	0	0	-	0	0	-	-	-	0	0	0	0	0	0	0	0	0
10-20	0	0	0	-	0	0	-	0	0	-	-	-	0	0	0	0	0	0	0	0	0
20-30	0	0	0	-	0	0	-	0	0	-	-	-	0	0	0	0	0	0	0	0	0
			---			---			---			---			---			---			---
			0			0			0			-			0			0			0

Red Abalone Lengths (mm)

	179					180	200		165	210						155		165	205		
	169					210	190		180	175						197		140	185		
	181					190	195		170	155						198		195	200		
	200					200	220		200	200						199		185	180		
	203					150	190		110	210								195	200		
						150	195		195	200								195	180		
						195			160	170								195	190		
						190			210	185								180	185		
						180			190	200								185	180		
						180			160	200								210	170		
									145									205	115		
									195									190	175		
									180									180	75		
									170									170	165		
									190									190	140		
									200												

Number	5	0	16	26	0	4	30
Mean Length	186		188	182		187	177

Van Damme (36 - 45 ft)

Location	VD1	VD2	VD16
Date	16	16	16
Depth (ft)	37	40	40

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	0	0	0	0	0	0
10-20	1	0	1	0	0	0	0	0	0
20-30	2	0	2	0	0	0	0	0	0
			---			---			---
			3			0			0

Red Urchin

	a	b	tot	a	b	tot	a	b	tot
0-10	7	32	39	6	21	27	12	23	35
10-20	2	20	22	14	41	55	16	21	37
20-30	27	13	40	8	23	31	22	37	59
			---			---			---
			101			113			131

Red Abalone Lengths (mm)

176			
178			
192			
Number	3	0	0
Mean Length	182		

Van Damme ( ) 45 ft)

Location	VD15
Date	16
Depth (ft)	45

Transect Counts

Red Abalone

	a	b	tot
0-10	1	0	1
10-20	0	0	0
20-30	1	0	1

			2

Red Urchin

	a	b	tot
0-10	18	8	26
10-20	14	16	30
20-30	36	13	49

			105

Red Abalone Lengths (mm)

	210

Number	1
Mean Length	210

Pt. Arena - DFG (0 - 20 ft)

Location	PA11	PA14	PA15
Date	18	18	18
Depth (ft)	20	16	18

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot
0-10	28	18	46	0	4	4	11	0	11
10-20	10	13	23	5	2	7	12	4	16
20-30	45	23	68	3	2	5	6	8	14
			137			16			41

Red Urchin

	a	b	tot	a	b	tot	a	b	tot
0-10	1	0	1	38	48	86	1	34	35
10-20	3	2	5	105	54	159	0	0	0
20-30	6	14	20	86	21	107	11	2	13
			26			352			48

Red Abalone Lengths (mm)

205	142	80	140	195	
206	198	152	190	205	
210	185	131	217	185	
150	197	170	200	200	
192	212	205	195	165	
184	205	170	191	185	
200	178	175	197	215	
183	165	190	170		
173	185	185	192		
154	195	195	171		
168	168	195	180		
180	210	203	160		
182	190	125	185		
175	180	190	180	190	
146	185	175	195	195	
212	172	177	120	205	
195	195		200	170	
208	180		175	165	
210	185		205	127	

Number	38	16	32
Mean Length	186	170	183

Pt. Arena - DFG (21 - 35 ft)

Location	PA2	PA3	PA5	PA6	PA9	PA10	PA12	PA13	PA16
Date	17	18	17	17	18	18	17	17	18
Depth (ft)	30	26	23	27	29	29	25	22	30

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	38	26	64	0	0	0	4	11	15	17	16	33	3	6	9	1	3	4	5	15	20	0	1	1	15	9	24
10-20	9	27	36	2	3	5	10	15	25	7	12	19	16	2	18	4	5	9	7	6	13	1	3	4	9	11	20
20-30	15	44	59	0	0	0	11	11	22	6	5	11	5	6	11	5	0	5	10	13	23	3	6	9	21	8	29
			---			---			---			---			---			---			---			---			---
			159			5			62			63			38			18			56			14			73

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	1	1	89	59	148	49	18	67	0	1	1	48	41	89	21	25	46	0	0	0	8	62	70	18	18	36
10-20	0	-	0	104	57	161	78	35	113	0	4	4	30	17	47	36	39	75	0	0	0	0	0	0	12	32	44
20-30	0	1	1	37	67	104	6	11	17	0	1	1	39	28	67	47	15	62	1	0	1	4	11	15	30	14	44
			---			---			---			---			---			---			---			---			---
			2			413			197			6			203			183			1			85			124

Red Abalone Lengths (mm)

205	210	157	160	195	185	198	201	220	175	182	175	215	170	170	175	200	230
205	200	149	190	185	180	204	185	182	169	203	169	195	148	175	210	205	203
209	194	206	201	192		210	191	193	205	167	205	184	190	182	203	194	210
224	186	216	210	163		197		210	176	110	176	185	198	190	197	200	155
225	185	173	211	206		200		195	180	190		205	218	175		190	215
212	168			188		192		183		190		197	210	185		220	195
207	205			182		210		201		195		215	188	185		200	205
198	189			182		190		190		168		185		180		203	205
222	174			220		186		190		170		195		175		199	210
209	210			195		218		195		215		217		170		180	236
199	195			201		190		165		168		205		185		160	215
170	205			200		182		170		207		185		170		210	
139	218			195		212		185		221		198		173		190	20
211	206			188		215		205		170		200		205		198	195
215	197			182		205		190		182		183		200		193	165
219				201	192	205	212	175	195	190		175	210	190		203	198
				209	205	207	188	205	190	190		205	205	210		192	195
				172	179	210	183	184	188	193		208	220	215		215	200
				200	182	187	205	198	215	175		200	209	207		203	190
				165	175	215	183	185	205			191	203			220	190

Number	31	10	27	28	30	23	32	27	39
Mean Length	200	187	190	199	191	192	197	198	195

Pt. Arena - DFG (36 - 45 ft)

Location	PA1			PA7			PA8		
Date	17			17			17		
Depth (ft)	40			37			37		

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot
0-10	1	0	1	1	1	2	0	1	1
10-20	5	2	7	5	0	5	2	2	4
20-30	1	6	7	0	3	3	3	0	3
			---			---			---
			15			10			8

Red Urchin

	a	b	tot	a	b	tot	a	b	tot
0-10	66	84	150	100	81	181	100	100	200
10-20	72	54	126	100	38	138	100	100	200
20-30	55	65	120	78	64	142	37	100	137
			---			---			---
			396			461			537

Red Abalone Lengths (mm)

199	198	195	170	
186	208	205	190	
224	205	203	192	
194	197	193	173	
205	189	168	190	
202	200	190		
157	208	205		
193	199	188		
193	197	98		
169	183	202		
200	179			
190	204			
202	202			
193	200			
182	185			
182				
---	---	---	---	---
Number		31	10	5
Mean Length		194	185	183

Pt. Arena - DFG ( ) 45 ft)

Location	PA4
Date	17
Depth (ft)	46

Transect Counts

Red Abalone

	a	b	tot
0-10	42	4	46
10-20	10	1	11
20-30	1	0	1

			58

Red Urchin

	a	b	tot
0-10	2	-	2
10-20	1	1	2
20-30	0	-	0

			4

Red Abalone Lengths (mm)

180	160
190	178
194	179
194	181
194	182
196	185
200	187
200	192
203	194
205	204
205	205
205	213
208	223
211	200
212	206
212	204
216	195
218	
225	
228	
---	---
Number	37
Mean Length	200

Pt. Arena - CAA (0 - 20 ft)

Location	PA9
Date	18
Depth (ft)	17

Transect Counts

Red Abalone

	a	b	tot
0-10	8	2	10
10-20	3	7	10
20-30	1	2	3

			23

Red Urchin

	a	b	tot
0-10	-	-	0
10-20	-	-	0
20-30	-	-	0

			0

Red Abalone Lengths (mm)

98	200
138	195
140	195
178	220
180	210
184	140
190	210
192	175
205	185
215	165
190	165
180	

Number	23
Mean Length	180

Pt. Arena - CAA (21 - 35 ft)

Location	PA1			PA2			PA3			PA4			PA6			PA8			PA10			PA12		
Date	16			16			17			17			17			17			18			18		
Depth (ft)	32			25			27			30			30			25			30			30		

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	19	13	32	25	40	65	16	15	31	42	36	78	18	27	45	22	24	46	8	10	18	32	43	75
10-20	10	7	17	21	23	44	9	14	23	38	29	67	11	32	43	20	29	49	13	22	35	34	40	74
20-30	7	10	17	23	26	49	16	21	37	28	31	59	10	21	31	26	49	75	6	24	30	21	41	62
			---			---			---			---			---			---			---			---	
			66			158			91			204			119			170			83			211

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	2	40	42	0	-	0	1	-	1	100	86	186	10	9	19	-	-	0	-	-	0	21	10	31
10-20	0	6	6	-	-	0	0	-	0	100	-	100	1	0	1	-	-	0	-	-	0	0	14	14
20-30	12	10	22	-	-	0	0	-	0	81	-	81	10	0	10	-	-	0	-	-	0	0	4	4
			---			---			---			---			---			---			---			---	
			70			0			1			367			30			0			0			49

Red Abalone Lengths (mm)

	170	100		190	240		180	145		230	220		210	190		193	219		192	220		220	195	
	145	190		185	235		180	180		170	195		195	185		224	211		158	170		210	200	
	170	195		155	238		195	166		215	200		210	165		169	199		190	195		190	210	
	195	195		155	210		180	175		120	160		190	210		239	192		200	185		175	185	
	195	200		185	140		185	210		225	150		140	195		224	216		162	160		140	190	
	189	160		180	160		200	195		225	210		190	200		212	231		115	80		210	185	
	195	145		175	170		205	180		185	185		180	195		198	201		165	55		205	210	
	160	175		135	210		125	190		185	195		180	180		193	200		203	195		175	210	
	130	195		115	180		195	185		210	140		195	145		185	174		210			175	185	
	155	200		190	195		200	180		240	210		225	90		99	220		220			210	195	
	160	180		195	198		195	190		125	200		165	195		205	179		172			180	200	
	180	190		150	140		200	220		135	195		185	160		233	227		190			140	195	
	195	85		195	155		175	100		175	225		175	195		199	216		205			135	180	
	65	195		215	170		175	200		200	135		145	160		172	205		40			200	175	
	130	205		165	175		200	212		210	150		200			224	192		200			190	165	
										240							186							
										235							205							
										210														

Number			30			30			30			33			29			32			23			30	
Mean Length			168			180			184			191			181			201			169			199	

Pt. Arena - CAA (36 - 45 ft)

Location	PA5	PA7	PA11
Date	17	17	18
Depth (ft)	40	37	40

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot
0-10	33	21	54	18	40	58	21	19	40
10-20	19	17	36	37	25	62	16	39	55
20-30	26	19	45	6	12	18	27	22	49
			---			---			---
			135			138			144

Red Urchin

	a	b	tot	a	b	tot	a	b	tot
0-10	100	100	200	-	-	0	71	75	146
10-20	-	-	0	-	-	0	-	-	0
20-30	-	-	0	-	-	0	-	-	0
			---			---			---
			200			0			146

Red Abalone Lengths (mm)

195	195		142	232		185	190
200	200		200	228		200	185
210	175		205	219		210	200
175	240		180	213		180	165
180	240		207	205		170	195
140	240		150	198		215	210
155	185		221	190		210	230
200	180		227	173		195	120
130	185		191	159		190	135
120	210		189	79		180	190
175	200		154	226		145	210
195	240		201	224		165	195
165	245		217	209		170	180
175	165		193	209		180	165
185	170		157	186		195	200
200	180			195			
245	175			159			
235	210						
210							

Number	37	32	30
Mean Length	193	192	195

Salt Point (0 - 20 ft)

Location	SP9	SP11	SP20	SP23	SP24	SP25	SP26	SP30	SP31
Date	18	17	16	17	18	18	17	18	16
Depth (ft)	18	18	18	18	18	18	20	20	15

Transect Counts

Red Abalone

	SP9			SP11			SP20			SP23			SP24			SP25			SP26			SP30			SP31		
	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	7	7	14	13	11	24	10	2	12	0	5	5	6	23	29	8	5	13	10	11	21	14	6	20
10-20	1	3	4	12	12	24	2	5	7	2	9	11	6	10	16	1	15	16	3	3	6	7	15	22	5	12	17
20-30	3	4	7	9	4	13	4	7	11	4	15	19	7	4	11	2	4	6	2	5	7	14	19	33	8	14	22
			---			---			---			---			---			---			---			---			---
			11			51			42			42			32			51			26			76			59

Red Urchin

	SP9			SP11			SP20			SP23			SP24			SP25			SP26			SP30			SP31		
	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	66	76	142	1	0	1	11	2	13	0	0	0	10	-	10	0	20	20	20	60	80	0	-	0	0	0	0
10-20	132	113	245	0	0	0	8	1	9	10	0	10	30	-	30	11	0	11	31	80	111	0	-	0	0	0	0
20-30	159	125	284	0	5	5	2	1	3	0	1	1	20	-	20	0	10	10	21	83	104	0	-	0	0	0	0
			---			---			---			---			---			---			---			---			---		
			671			6			25			11			60			41			295			0			0

Red Abalone Lengths (mm)

SP9		SP11		SP20		SP23		SP24		SP25		SP26		SP30		SP31	
180	185	188	189	210	190	175	157	168	185	60	190	195	165	170	190	230	170
175	180	191	200	210	185	188	168	185	200	185	160	135	190	150	180	195	190
168	183	184	210	215	185	180	178	170	180	177	187	167	200	180	180	180	180
185	160	188	180	206	190	178	195	180	175	145	190		210	185	160	180	160
	176	189	168	225	170	199	214	165	180	183	195		170	170	175	170	175
	175	165	187	180	205	171	186	210	145	210	180			150	200	150	160
	174	181	175	128	210	206	180	130	175	165	135			180	210	145	190
	185	187	175	185	175	179	160	160	210	168				195	185	200	165
	195	188	205	170	180	170	190		200	175				200	165	190	150
	180	147	179	170	170	186	203		165					190	150	190	175
	205	196	180	215	195	190			190					180	130	195	180
		211	200	185	195	122			100					185	150	170	165
		174	200	187	183	170			190					200	185	165	200
		106	210	218	190	205			172					220	190		180
		210	207	194	161	178			162					210	190		165
				166										190			

	SP9	SP11	SP20	SP23	SP24	SP25	SP26	SP30	SP31
Number	15	30	31	25	23	16	8	31	28
Mean Length	180	186	189	181	173	169	179	190	177

Salt Point (21 - 35 ft)

Location	SP1	SP4	SP7	SP8	SP10	SP12	SP13	SP14	SP15
Date	16	17	18	18	18	16	16	17	17
Depth (ft)	29	33	28	28	25	35	28	33	30

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	11	15	26	2	0	2	1	0	1	0	0	0	3	7	10	0	0	0	17	8	25	1	1	2	0	0	0
10-20	16	14	30	1	0	1	1	0	1	0	0	0	9	7	16	0	0	0	19	25	44	0	0	0	0	0	0
20-30	15	15	30	2	3	5	2	0	2	0	0	0	12	10	22	0	0	0	33	18	51	0	0	0	1	0	1
			---			---			---			---			---			---			---			---			---
			86			8			4			0			48			0			120			2			1

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	6	7	13	18	44	62	29	58	87	36	16	52	6	75	81	63	31	94	0	0	0	25	40	65	16	13	29
10-20	0	41	41	47	46	93	36	20	56	41	63	104	4	10	14	88	45	133	0	0	0	44	50	94	49	36	85
20-30	25	7	32	35	12	47	43	83	126	34	36	70	38	5	43	67	28	95	0	0	0	51	70	121	44	42	86
			---			---			---			---			---			---			---			---			---
			86			202			269			226			138			322			0			280			200

Red Abalone Lengths (mm)

	226		225	215		160					185	178				190	170		200	165		190					
	200		170	210		200					175	175				170	167										
	150		185	110		200					180	190				180	202										
	210		200			185					180	182				210	172										
	210		195								185	200				200	170										
	155										190	220				185	193										
	224										200	175				210	188										
	118										185	180				175	171										
	185										190	168				190	178										
	165										180	175				190	173										
	190										180	175				200	174										
	160										175	180				200	201										
	175										185	170				185	147										
	210										200	200				200	183										
	170										170	178				215	163										
Number			15			8			4		0				30		0		30			2			1		
Mean Length			182			189			186						184				185			183			190		

Salt Point (21 - 35 ft) Continued

Location	SP17			SP21			SP22			SP27			SP29		
Date	18			16			17			17			18		
Depth (ft)	30			28			28			30			30		

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	1	2	3	10	12	22	0	0	0	0	0	0	0	1	1
10-20	3	1	4	5	8	13	0	3	3	0	0	0	1	0	1
20-30	0	0	0	20	15	35	4	5	9	0	0	0	0	0	0
			---			---			---			---			---
			7			70			12			0			2

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	53	38	91	5	8	13	100	52	152	35	50	85	3	2	5
10-20	105	49	154	44	21	65	25	27	52	38	61	99	1	1	2
20-30	83	49	132	16	4	20	10	5	15	58	75	133	3	0	3
			---			---			---			---			---
			377			98			219			317			10

Red Abalone Lengths (mm)

	180	190		170	166		180	203					200	195	
	90	185		195	168		182	205							
	170	190		200	205			168							
	145			230	193			178							
				185	212			165							
				163	134			175							
				202	214			175							
				195	195			210							
				194	187										
				172	195										

Number	7	20	10	0	2
Mean Length	164	189	184		198

Salt Point (36 - 45 ft)

Location	SP2	SP3	SP19	SP28
Date	17	17	17	18
Depth (ft)	43	38	38	40

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	5	5	1	0	1	6	4	10	4	2	6
10-20	2	2	4	0	0	0	2	4	6	3	3	6
20-30	1	2	3	0	0	0	3	0	3	5	4	9
			---			---			---			---
			12			1			19			21

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	41	66	107	29	19	48	18	6	24	30	25	55
10-20	39	81	120	47	30	77	6	7	13	40	31	71
20-30	53	50	103	22	18	40	2	30	32	51	57	108
			---			---			---			---
			330			165			69			234

Red Abalone Lengths (mm)

190	150		150			210	195		170	180	
190	90					200	200		130	165	
200	200					160	210		150	175	
	205					195	210		180	190	
	196					175	220		160	200	
	175					185	165				
	200					215					
	200					180					
						180					
						175					
						220					

Number	11	1	17	10
Mean Length	181	150	189	170

Salt Point ( ) 45 ft)

Location	SP5			SP6			SP16			SP18		
Date	18			18			18			18		
Depth (ft)	48			48			50			48		

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	0	0	0	0	0	0	0	0	0
10-20	0	0	0	0	0	0	0	0	0	0	0	0
20-30	0	0	0	0	0	0	0	0	0	0	0	0
			---			---			---			---
			0			0			0			0

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	34	25	59	11	14	25	45	2	47	5	5	10
10-20	11	18	29	34	13	47	40	21	61	17	10	27
20-30	23	33	56	0	13	13	12	24	36	11	4	15
			---			---			---			---
			144			85			144			52

Red Abalone Lengths (mm)

Number	0	0	0	0
Mean Length				

Ft. Ross (0 - 20 ft)

Location	FR14	FR17	FR18	FR19	FR25	FR29	FR30	FR38
Date	17	18	16	16	18	17	17	17
Depth (ft)	20	7	11	18	9	13	13	15

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	2	2	28	28	56	15	14	29	7	10	17	21	21	42	11	2	13	0	0	0	2		2
10-20	1	3	4	23	26	49	12	13	25	9	10	19	14	14	28	0	0	0	0	0	0	4		4
20-30	0	1	1	19	32	51	9	25	34	2	11	13	17	16	33	0	0	0	0	0	0	1		1
			7			156			88			49			103			13			0			7

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	33	14	47	0	-	0	0	0	0	1	0	1	3	3	6	5	4	9	18	0	18	10		10
10-20	37	24	61	0	-	0	0	0	0	0	0	0	7	15	22	12	2	14	20	0	20	30		30
20-30	9	19	28	0	-	0	0	0	0	0	2	2	5	4	9	15	3	18	32	9	41	20		20
			136			0			0			3			37			41			79			60

Red Abalone Lengths (mm)

	185	205		190	165		140	190		190	165		177	165		180	173					138		
		190		165	165		163	204		182	198		196	164		186	172					180		
		200		175	180		168	180		178	155		172	200								165		
		205		155	185		172	172		215	153		170	167								185		
		210		185	175		174	178		210	178		188	176								160		
		170			175		178	184		178	185		170	202								192		
					185		179	190		160	184		180	181								175		
					165		179	175		184	173		174	168										
					165		182	163		216	200		195	185										
					170		185	205		208	188		179	173										
					160		188	165		168	178		160	174										
					190		200	178		194	198		195	191										
					190		209	175		150	190		158	155										
				170	185			150		190			180	183										
				165	185			155		202			190	166										
				185	175																			
				160	200																			
				180	185																			
				175	185																			

Number			7			30			28			28			30			4			0			7
Mean Length			195			176			178			185			178			178						171

Ft. Ross (21 - 35 ft)

Location	FR1	FR2	FR3	FR6	FR7	FR8	FR11	FR12	FR13
Date	16	16	17	17	16	16	17	17	17
Depth (ft)	35	27	23	23	34	25	35	28	25

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	1	1	2	1	3	4	10	14	3	0	3	0	2	2	1	0	1	0	0	0	1	0	1	3	0	3
10-20	0	0	0	6	0	6	6	5	11	1	1	2	2	2	4	0	0	0	0	1	1	7	1	8	2	0	2
20-30	1	1	2	0	1	1	2	2	4	1	0	1	1	2	3	1	0	1	0	0	0	0	0	0	2	0	2
			---			---			---			---			---			---			---			---			---
			3			10			29			6			9			2			1			9			7

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	17	5	22	58	46	104	3	5	8	8	25	33	20	28	48	18	27	45	8	12	20	24	29	53	20	28	48
10-20	15	14	29	75	44	119	0	0	0	34	8	42	9	57	66	10	28	38	34	38	72	20	27	47	13	57	70
20-30	21	28	49	24	21	45	0	0	0	22	1	23	23	38	61	27	34	61	12	21	33	18	28	46	20	24	44
			---			---			---			---			---			---			---			---			---
			100			268			8			98			175			144			125			146			162

Red Abalone Lengths (mm)

	176	172		177	190		165	190		180	175		185	195		200			195		190	210		210			
				185	171		180	188		180			188	180		188					178			180			
							180	180		180			190	168							190			180			
							170	160		185				195							175			190			
							150	185		185				178							174			190			
							175	190													170			190			
							185	180													165			195			
							185	200																165			
							180	210																			
							180	180																			
							200	195																			
								210																			
								205																			
								180																			
								175																			

Number		2		4			26			6			8			2			1			8			8		
Mean Length		174		181			184			181			185			194			195			182			188		

Ft Ross (21 - 35 ft) Continued

Location	FR20	FR21	FR22	FR34	FR35	FR36	FR37	FR42
Date	17	17	17	16	16	17	17	18
Depth (ft)	34	30	23	25	25	25	25	25

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	5	5	1	0	1	1	0	1	0		0	3		3	0		0	0		0	1		1
10-20	1	0	1	1	1	2	1	0	1	0		0	0		0	0		0	0		0	4		4
20-30	1	0	1	1	0	1	1	0	1	0		0	0		0	0		0	0		0	0		0
			---			---			---			---			---			---			---			---
			7			4			3			0			3			0			0			5

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	15	26	41	30	45	75	3	0	3	15		15	20		20	3		3	10		10	10		10
10-20	31	48	79	16	15	31	6	10	16	17		17	16		16	13		13	15		15	4		4
20-30	48	39	87	0	0	0	1	9	10	26		26	19		19	4		4	5		5	6		6
			---			---			---			---			---			---			---			---
			207			106			29			58			55			20			30			20

Red Abalone Lengths (mm)

	93	190		165	132		180	180				125										185		
	155	202		175			175					100										210		
		172										195										170		
		166																				165		
																						220		
Number			6			3			3			0			3			0			0			5
Mean Length			163			157			178						140									190

Ft. Ross (36 - 45 ft)

Location	FR4	FR9	FR10	FR26	FR27	FR28	FR33	FR41
Date	18	16	17	17	16	17	18	18
Depth (ft)	45	38	40	38	38	38	43	45

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	1	1	0	0	0	0	0	0	8	5	13	1	0	1	0	1	1	0	0	0	0		0
10-20	0	0	0	0	1	1	0	0	0	2	0	2	1	1	2	0	0	0	0	1	1	0		0
20-30	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0		0
			---			---			---			---			---			---			---			---
			1			1			0			17			3			1			1			0

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	4	10	14	6	14	20	25	6	31	15	-	15	6	3	9	15	1	16	0	5	5	6		6
10-20	1	13	14	11	9	20	23	29	52	18	-	18	10	2	12	10	2	12	6	1	7	4		4
20-30	9	8	17	15	4	19	24	26	50	20	-	20	8	4	12	11	0	11	0	2	2	1		1
			---			---			---			---			---			---			---			---
			45			59			133			53			33			39			14			11

Red Abalone Lengths (mm)

	180			177					170	200		178	168			195			180					
									175	197		180												
									160	165														
									180	160														
									180	165														
									175															
									160															
									165															

Number		1			1			0				13			3			1			1			0
Mean Length		180			177							173			175			195			180			

Ft. Ross ( ) 65 ft)

Location	FR5	FR15	FR16	FR23	FR24	FR31	FR32	FR39	FR40
Date	18	18	18	18	18	18	18	18	18
Depth (ft)	50	55	46	53	49	50	48	50	50

Transect Counts

Red Abalone

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	1		1
10-20	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0		0	1		1
20-30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		0	-		0
			---			---			---			---			---			---			---			---			---
			2			0			0			0			0			0			1			0			2

Red Urchin

	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot	a	b	tot
0-10	9	0	9	-	8	8	0	6	6	11	6	17	18	17	35	0	9	9	5	3	8	3		3	-		0
10-20	0	1	1	-	4	4	0	10	10	21	14	35	11	16	27	0	3	3	4	0	4	1		1	-		0
20-30	0	0	0	-	14	14	0	8	8	17	15	32	29	11	40	0	0	0	6	0	6	3		3	-		0
			---			---			---			---			---			---			---			---			---
			10			26			24			84			102			12			18			7			0

Red Abalone Lengths (mm)

	180																								180		
	190																								175		
Number			2			0			0			0			0			0			0			0			2
Mean Length			185																								178

APPENDIX B

TRANSECT AND SUMMARY DATA FROM VAN DAMME STATE PARK AND FORT ROSS STATE PARK SEPTEMBER 1971

Explanation of Transect Data Display Format

'Area', Date (- ft): General survey location, month/year, depth range.

Station: Arbitrary transect number, no chart reference available.

Transect Counts (30 X 4m): Band transects were 30 X 4 meters.

Red Abalone: Total red abalone count on each transect.

Red Urchin: Total red urchin count on each transect.

Red Abalone Lengths (mm): Maximum shell length in mm of up to first 25 red abalone on each transect.

Number: Total abalone measured on each transect.

Mean Length: Mean shell length of abalone measured on transect.

Van Damme, Sept. 1971, (0 - 10 ft, intertidal)

Station	1	2	3	4	5
Transect Counts (30 x 4 m)					
Red Abalone	47	2	36	13	21
Red Urchin	0	0	130	450	10
Red Abalone Lengths (mm)					
	198	138	183	196	172
	177	172	168	195	201
	135		160	194	133
	173		171	186	207
	159		167	178	151
	196		141	173	174
	123		204	164	191
	189		151	153	192
	166		185	146	184
	159		179	112	163
	181		171	104	150
	104		151		148
	178		167		182
	177		149		98
	178		1e3		200
	177		173		174
	157		160		191
	186		125		212
	202		190		171
	187		159		197
	151		175		188
	170		178		
	195		163		
	197		104		
	162		152		
Number	25	2	25	11	21
Mean Length	171	155	214	164	175

Van Damme, Sept. 1971, (10 - 20 ft)

Station	1	2
Transect Counts (30 x 4 m)		
Red Abalone	4	8
Red Urchin	688	500
Red Abalone Lengths (mm)		
	181	140
	170	185
	156	166
	156	165
		154
		158
		161
Number	4	7
Mean Length	166	161

Van Damme, Sept. 1971, (20 - 30 ft)

Station	1	2
Transect Counts (30 x 4 m)		
Red Abalone	5	46
Red Urchin	0	340
Red Abalone Lengths (mm)		
	128	192
	186	179
	190	174
	157	186
	211	174
		202
		182
		195
		182
		189
		176
		205
		181
		180
		119
		182
		180
		185
		195
		199
		179
		201
		188
		177
Number	5	26
Mean Length	174	183

Van Damme, Sept. 1971, (30 - 40 ft)

Station	1	2
Transect Counts (30 x 4 m)		
Red Abalone	2	3
Red Urchin	299	114
Red Abalone Lengths (mm)		
	150	113
	165	167
		229
Number	2	3
Mean Length	158	170

Van Damme, Sept. 1971, ( ) 40 ft)

Station	1	2
Transect Counts (30 x 4 m)		
Red Abalone	0	0
Red Urchin	41	130
Red Abalone Lengths (mm)		
Number	0	0
Mean Length		

Ft. Ross, Sept. 1971, (0 - 10 ft, intertidal)

Station	1	2	3	4	5	6	7	8	9	10	11	12
Transect Counts (30 x 4 m)												
Red Abalone	11	0	21	1	160	0	17	0	0	11	0	15
Red Urchin	17	0	1	0	42	3	108	0	0	3	10	39
Red Abalone Lengths (mm)												
	188	167			182		187					165
		164			210		196					92
		176			183		174					85
		120			190		170					163
					187		161					171
					151		196					162
					156		212					182
					152		164					190
					189		174					168
					186		164					
							192					
							210					
							158					
							194					
Number	1	4	0	0	10	0	14	0	0	0	0	9
Mean Length	188	152			179		182					153

Ft. Ross, Sept. 1971, (10 - 20 ft)

Station	1	2	3	4	5
Transect Counts (30 x 4 m)					
Red Abalone	399	20	26	13	25
Red Urchin	3	165	222	215	5
Red Abalone Lengths (mm)					
	186	179	168	190	173
	187	186	216	166	167
	181	191	155	212	181
	185	182	161	159	196
	190	190	147	189	224
	164	192	170	191	213
	207	162	123	203	172
	197	182	181	217	156
	173	192	193	197	187
	187	189	176	203	217
	180	162	194	186	163
	173	155	173	190	204
	200	200	197	190	187
	161	190	200	190	156
	190	189	187		168
	166	181	155		207
	183	181	184		162
	185		169		172
	183		188		149
	170		191		195
	189		194		162
	174		178		211
	205		170		178
			176		195
					185
Number	23	17	24	14	25
Mean Length	183	183	177	192	183

Ft. Ross, Sept. 1971, (20 - 30 ft)

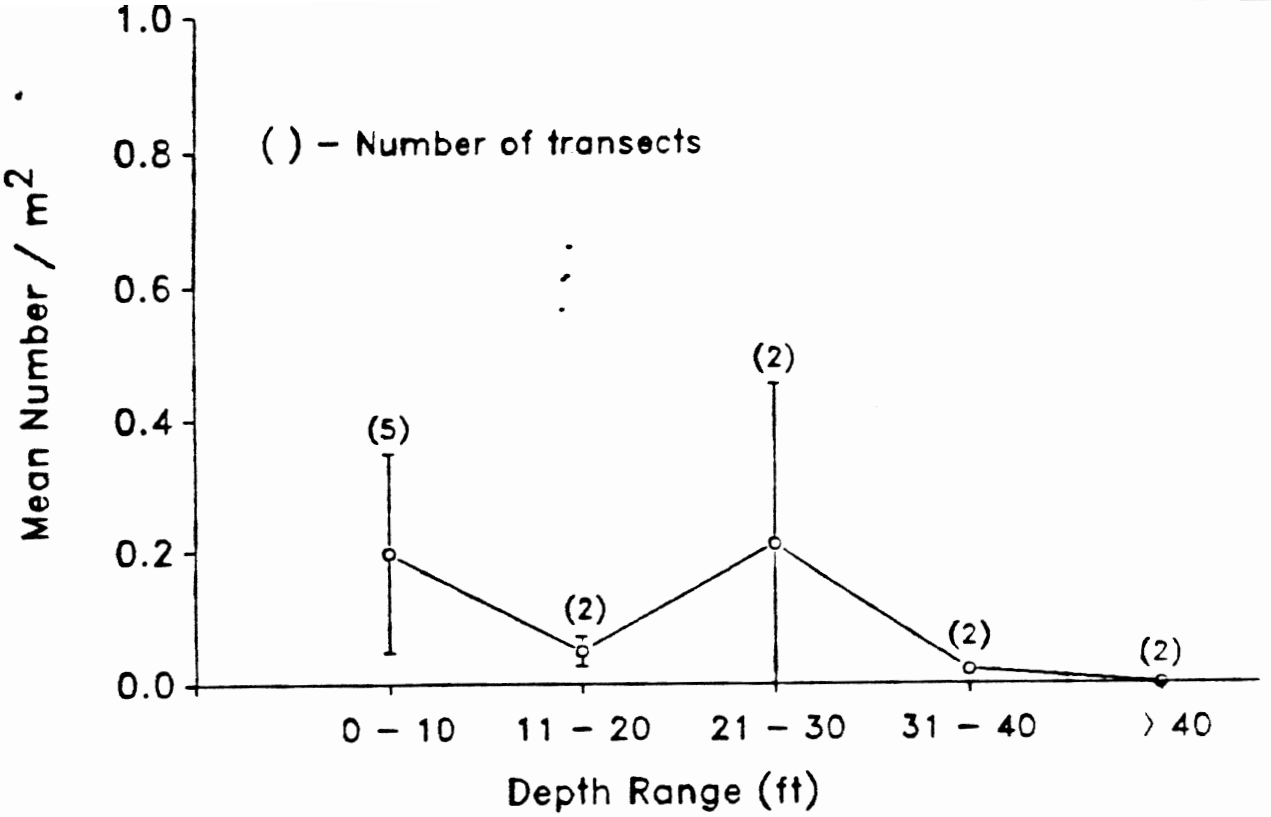
Station	1	2	3	4	5	6	7	8
Transect Counts (30 x 4 m)								
Red Abalone	3	13	7	0	1	19	3	2
Red Urchin	229	36	75	0	147	31	173	70
Red Abalone Lengths (mm)								
	156	166	176		145	200	150	185
	165	179	197			199	139	180
	210	177	186			195	201	
		173	174			199		
		187	176			204		
		172	186			203		
		191	185			166		
		177				194		
		170				190		
		216				209		
		196				162		
		184				186		
		201				182		
						215		
						177		
						182		
						212		
						216		
						195		
Number	3	13	7	0	1	14	3	2
Mean Length	177	184	183		145	193	163	183

Ft. Ross, Sept. 1971, (30 - 40 ft)

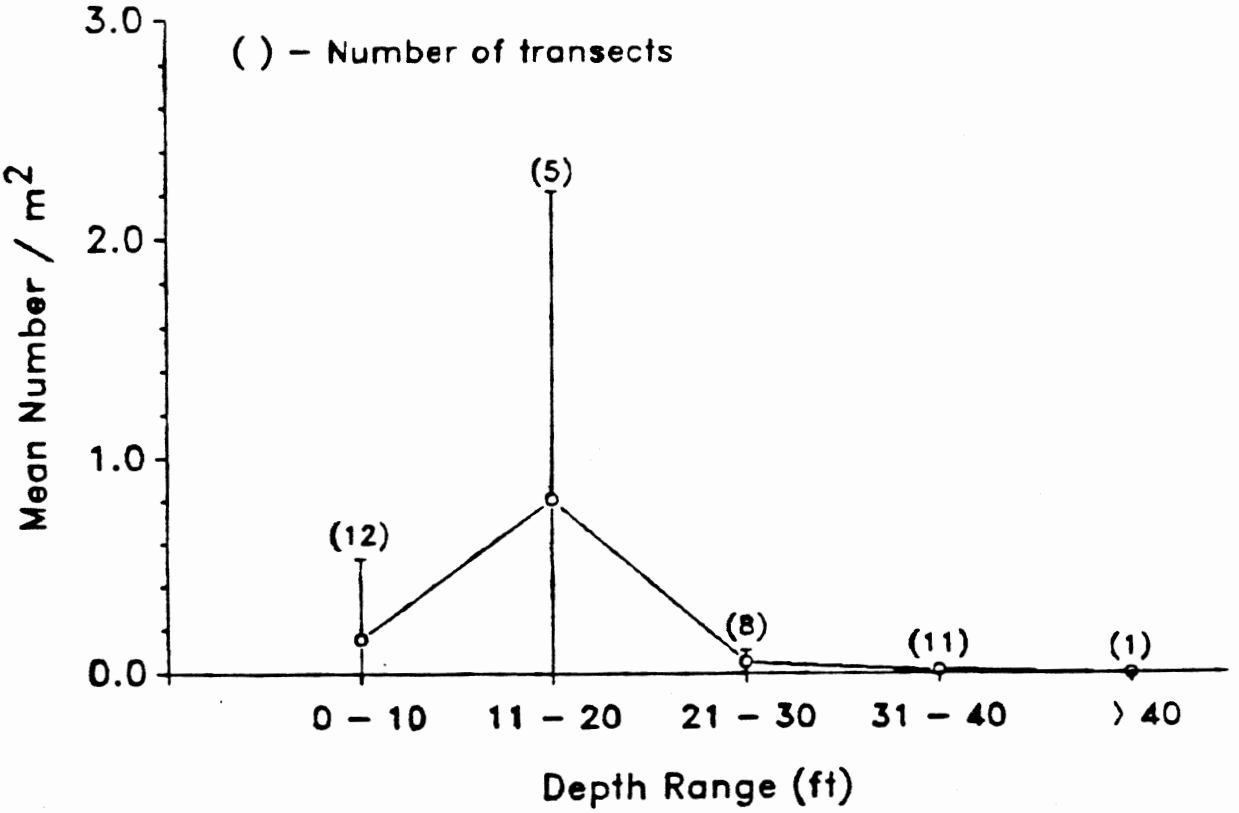
Station	1	2	3	4	5	6	7	8	9	10	11
Transect Counts (30 x 4 m)											
Red Abalone	4	8	0	0	0	1	0	2	0	0	0
Red Urchin	156	165	150	144	230	115	242	150	150	30	0
Red Abalone Lengths (mm)											
	199	163				171		170			
	177	178						185			
	187	198									
	157	180									
		231									
		196									
		166									
		186									
Number	4	8	0	0	0	1	0	2	0	0	0
Mean Length	180	187				171		178			

Ft. Ross, Sept. 1971, ( ) 40 ft)

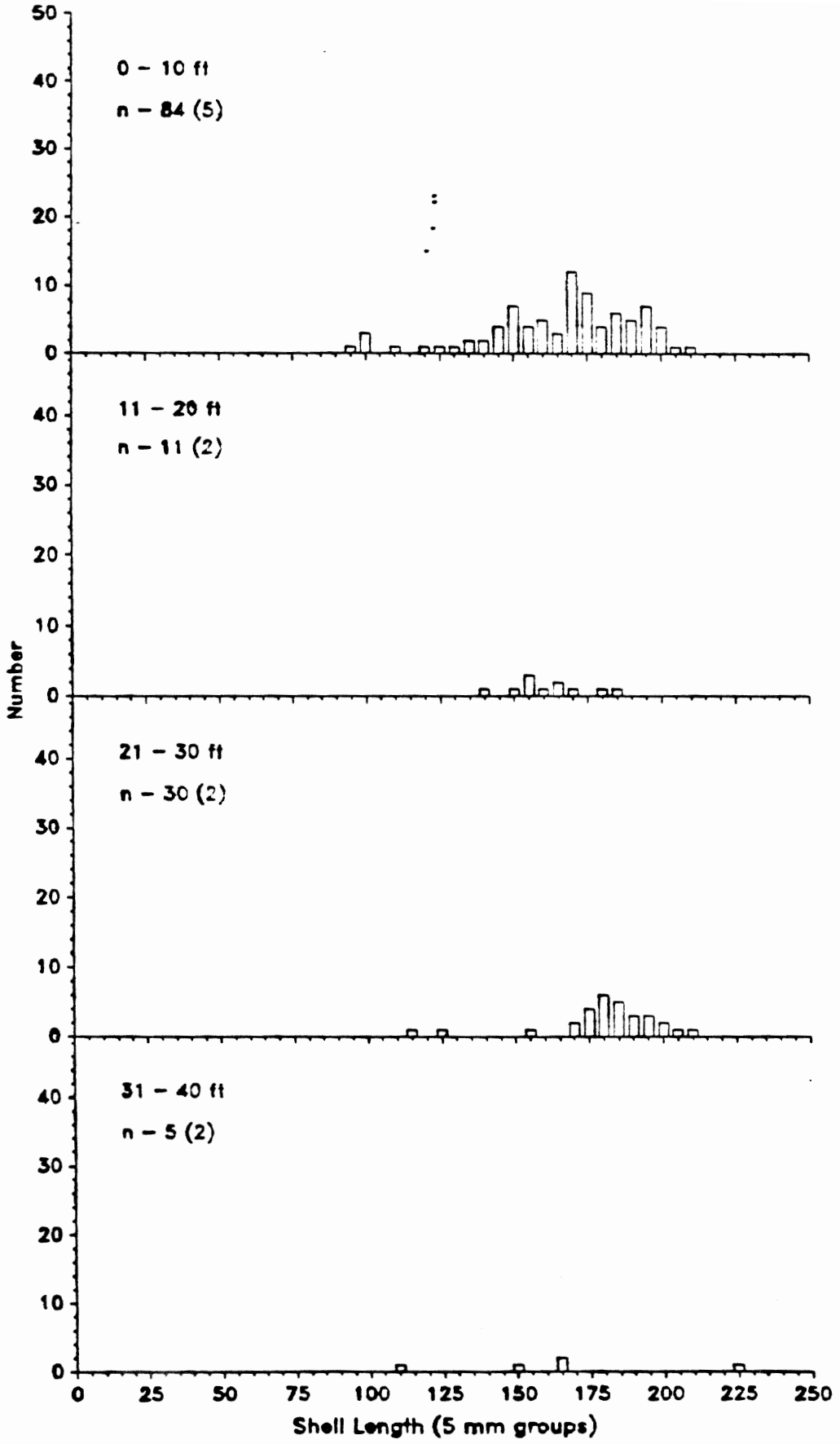
Station	1
Transect Counts (30 x 4 m)	
Red Abalone	0
Red Urchin	163
Red Abalone Lengths (mm)	
Number	0
Mean Length	



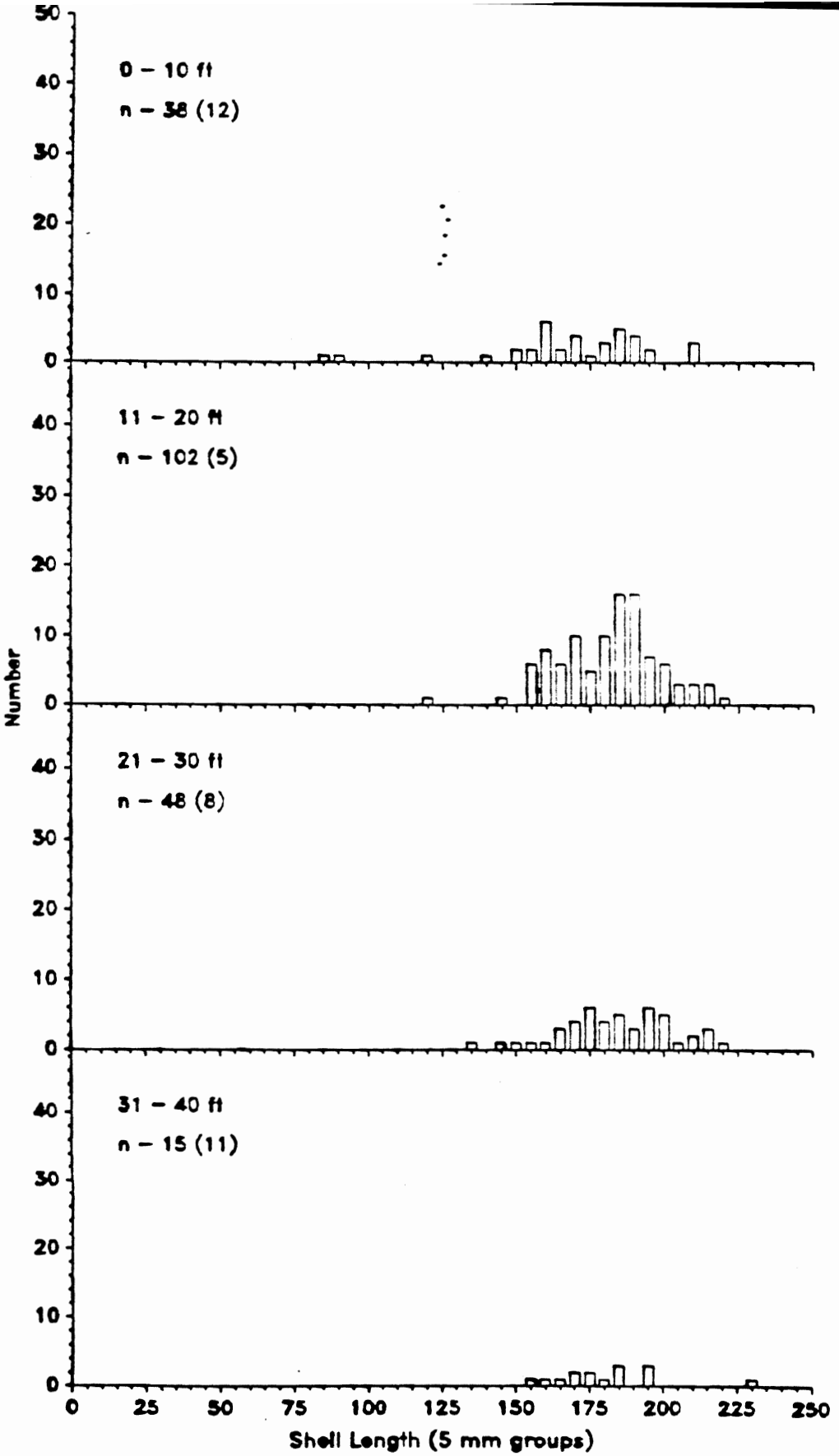
Mean number of red abalone/m² (±SD) on transects by depth range at Van Damme State Park, September 1971.



Mean number of red abalone/m² (±SD) on transects by depth range at Fort Ross State Park, September 1971.



Red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Van Damme State Park, September 1971.



Red abalone size frequencies by depth range (n=number measured, ( )=number transects) at Fort Ross State Park, September 1971.