TABLES

Table 1. Lake Sutherland kokanee sport catch from creel census, 1960-1993. Sources: 1960-1965 and 1983: Jim Walton, Peninsula College, pers. comm.; 1978-1982 and 1984-1993: Dan Collins, WDFW, pers. comm.

Year	Census days	Anglers	Reported catch	Catch/angler
1960	8	403	101	0.3
1961	23	1,402	2,374	1.7
1962	21	1,309	50	0.0
1963	22	714	52	0.1
1965	12	750	2,391	1.4
1978	^	1,178	0	0.0
1979	^	1,434	488	0.3
1981	^	1,020	230	0.3
1982	^	1,337	245	0.2
1983	^	89	13	0.1
1984	^	851	82	0.1
1986	^	584	1,182	2.0
1987	^	901	480	0.5
1988	^	502	43	0.1
1989	^	671	260	0.4
1990	^	606	154	0.2
1993	^	143	151	1.0

^ Not reported.

Table 2. Adult kokanee distribution on north shore of Lake Sutherland, based on SCUBA survey, November 8, 1993. Data from Appendix D.

Shore km[A]	SONAR traces[B]
2.7-2.9 (mi 1.7-1.8)	6
2.9-3.0 (mi 1.8-1.9)	2
3.0-3.2 (mi 1.9-2.0)	2
3.2-3.4 (mi 2.0-2.1)	7

[A] Defined in glossary and illustrated in Figure 2.
[B] Presumed to represent adult kokanee.

Table 3. Kokanee redd distribution at depth along south shore of Lake Sutherland, based on SCUBA survey, November 8-9, 1993. Data from Appendix D. Redd counts are minimum estimates since mass spawning areas were counted as one redd; individual nests were indistinguishable in such areas.

Dive no.	Shore km[A]						
	0.8-1.0 (mi 0.5-0.6)	0.6-0.8 (mi 0.4-0.5)	0.5-0.6 (mi 0.3-0.4)	0.3-0.5 (mi 0.2-0.3)	0.2-0.3 (mi 0.1-0.2)	0.0-0.2 (mi 0.0-0.1)	7.7-6.7 (mi 4.8-4.2)
1						0	
2					0	0	
3	0	0	1	2			
5							0
6		2	4	2	1	1	
7		0	1	1	1	0	

[A] Defined in glossary and illustrated in Figure 2.

Table 4. Effect of net location on Lake Sutherland kokanee gillnet catch, November 5, 1993. Data from Appendix E. Net catches were significantly different (X^2 = 206.805; P < 0.005).

Shore km[A]	0.7 (mi 0.45)	0.64 (mi 0.40)	0.56 (mi 0.35)	0.2 (mi 0.15)	Total
Net number	2	3	4	1	
Maximum depth (m)[B]	15.5 (51 ft)	12.2 (40 ft)	14.9 (49 ft)	8.5 (28 ft)	
Total kokanee	162	289	372	92	915

[A] Defined in glossary and illustrated in Figure 2.
[B] Bottom depth at end of gillnet farthest from shore.

Table 5. Effect of gillnet mesh size on adult Lake Sutherland kokanee catch and sex ratio, November 5, 1993. Data from Appendix E. Mesh size influenced catch rate (X^2 = 324.773; P < 0.005).

Stretched mesh (in)	Total catch	Percent of all meshes combined	Males	Females	Sex ratio (M/F)
0.75	24	4%	18	6	3.0
1.25	100	15%	85	15	5.7
1.5-1.75	99	15%	73	26	2.8
2-2.5	302	46%	234	68	3.9
3.25-3.5	132	20%	105	27	3.9
Meshes combined	649	100%	515	142	3.6 (78% male)

Table 6. Lake Sutherland cutthroat trout catch from variable-mesh gillnets on November 5, 1993. Data from Appendix E.

Sex	Live	Dead	Total
Male	0	6	6
Female	0	6	6
Not determined	2	5	7
Total	2	17	19

Table 7. Hypothetical locations of kokanee spawning grounds along the shore of Lake Sutherland. Shore km not appearing in table were not shown to support kokanee concentrations by any survey method employed in this study.

Survey method	North shore		Lake outlet (shore km 4.5-5.8 (mi 2.8-3.6))	South shore	
	Shore km 1.8-3.0 (mi 1.1-1.9)	Shore km 3.2-4.5 (mi 2.0-2.8)		Falls Creek area (shore km 0.0-1.0 (mi 0.0-0.6))	Snug Harbor area (shore km 6.7-6.9 (mi 4.2-4.3))
Preliminary SONAR and carcass survey	**Present** (Fig. 3)	**Present** (Fig. 3)	**Not surveyed**	**Present** (Fig. 3)	**Few present** (Fig. 3)
Lake shore foot and canoe survey	**Absent** (Fig. 4)	**Absent** (Fig. 4)	**Present** (Fig. 4)	**Present** (Fig. 4)	**Few present;** part of Falls Creek area group (Fig. 4)
SONAR during SCUBA survey	**Present in partial survey** (Table 2)	**Absent from partial survey** (Table 2)	**Not surveyed**	**Present** (Fig. 5)	**Few present** (Fig. 5)
Live fish seen during SCUBA survey	**Absent from partial survey** (p. 7)	**Absent from partial survey** (p. 7)	**Not surveyed**	**Present** (Fig. 6)	**Present and distinct from Falls Creek group** (Fig. 6)
Redds seen during SCUBA survey	**Absent from partial survey** (p. 7)	**Absent from partial survey** (p. 7)	**Not surveyed**	**Present** (Table 4)	**Absent** (Table 4)

Table 8. Summary of kokanee depth distribution in Lake Sutherland, November 8-16, 1993.

Survey method	Source	Range of depths surveyed (m)	Depth (m) of most frequent occurrence
Redd count along shore on foot or in canoe	p. 6	0-3.7 (0-12 ft)	0.3-0.9 (1-3 ft)
Redd occurrence during SCUBA survey	Figure 9	0.9-17.7 (3-58 ft)	3.7-6.1 and 11.0-12.2 (12-20 and 36-40 ft)
SONAR traces during daylight hours in SCUBA survey	Figure 7	0.9-17.7 (3-58 ft)	Range 3.7-15.5 (12-51 ft); peak at 9.1 (30 ft)
Live fish occurrence during daylight hours in SCUBA survey	Figure 8	0.9-17.7 (3-58 ft)	6.4-7.6 and 11.0-15.5 (21-25 and 36-51 ft)

FIGURES

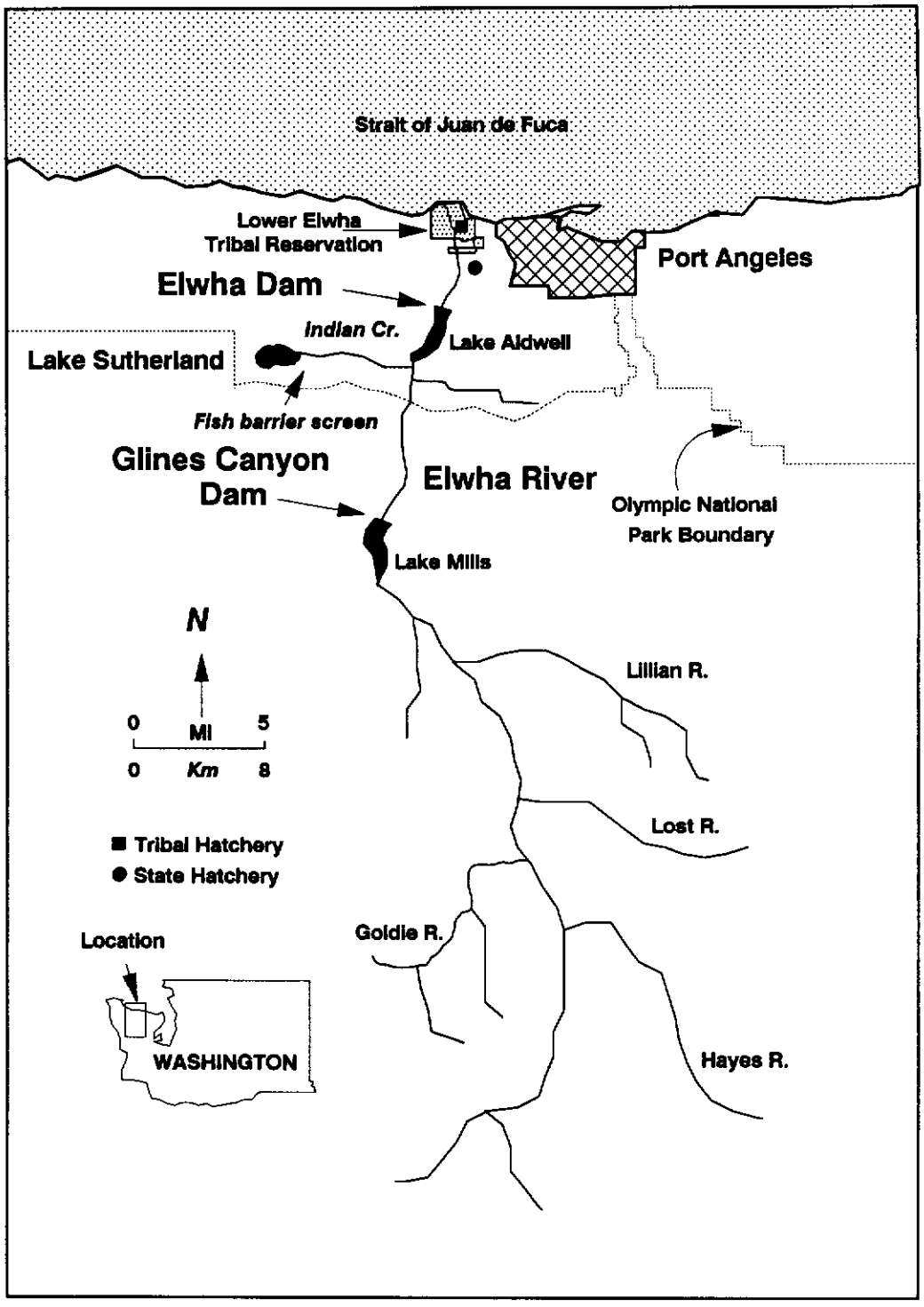

Figure 1. Location of lake Sutherland within the Elwha River basin. Upstream migration of adult salmon is blocked by Elwha Dam. Downstream and upstream migration of juveniles is blocked by a fish screen on Indian Creek.

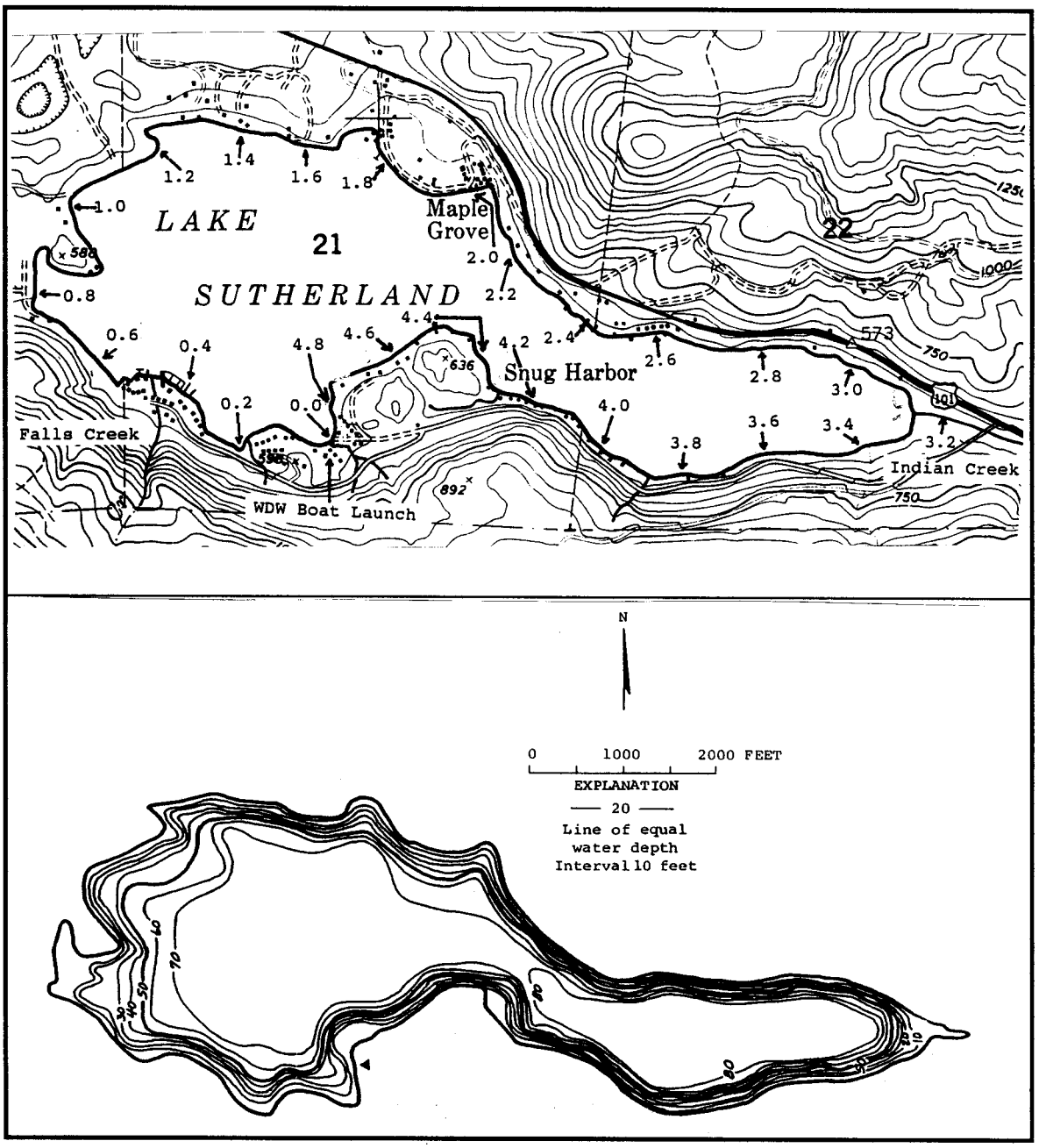

Figure 2. Lake Sutherland, Clallam County, Washington. Top: topography (Source: USGS Lake Sutherland Quadrangle, scale 1:24,000, photorevised 1985); lake shore miles assigned by USFWS for this report. Bottom: depth profile (Source: USGS 1974 survey).

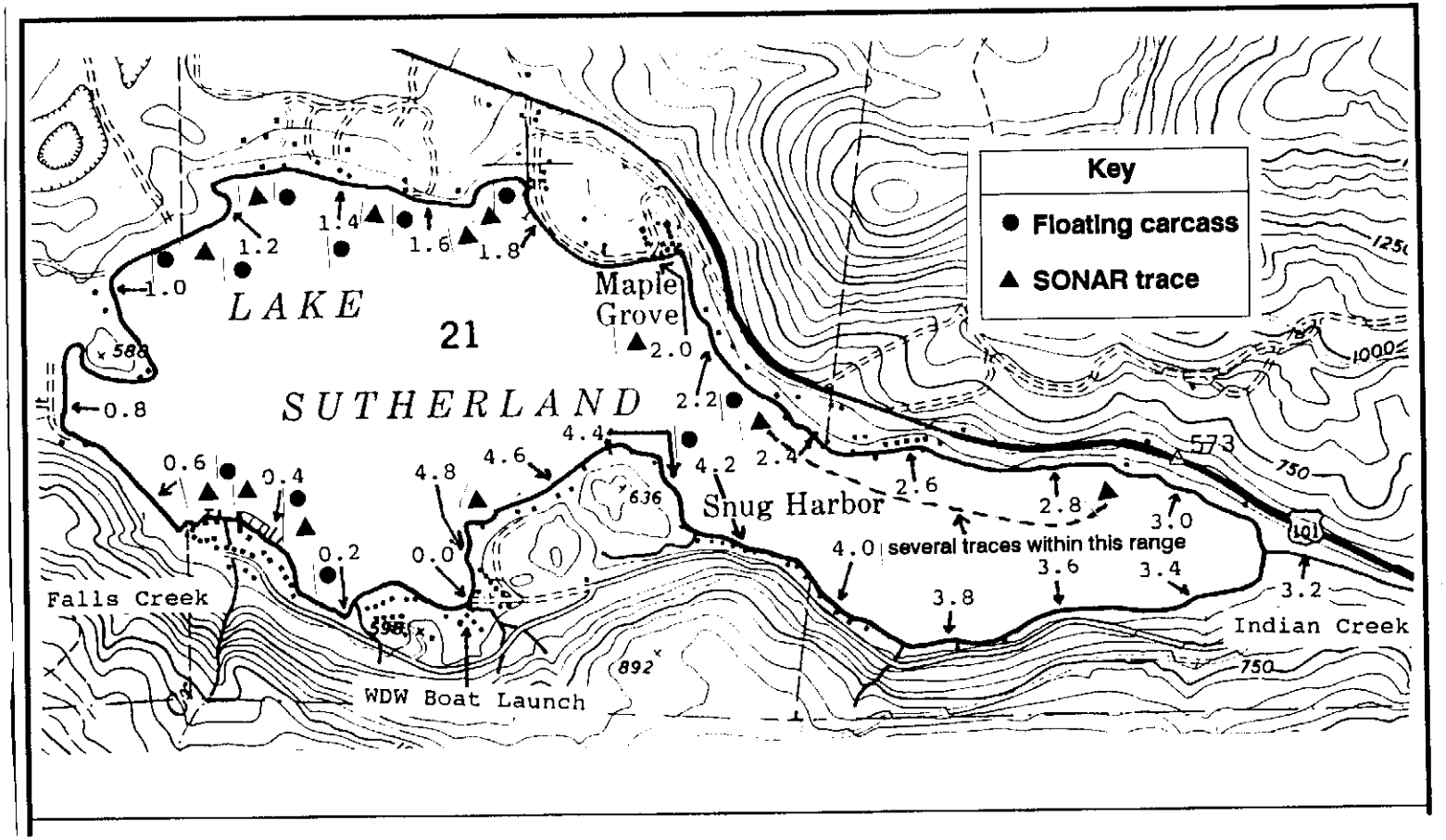

Figure 3. Occurrence of SONAR traces presumed to represent adult kokanee and floating kokanee carcasses recovered offshore on Lake Sutherland, 4 November 1993. Shore miles are defined in glossary and illustrated in Figure 2.

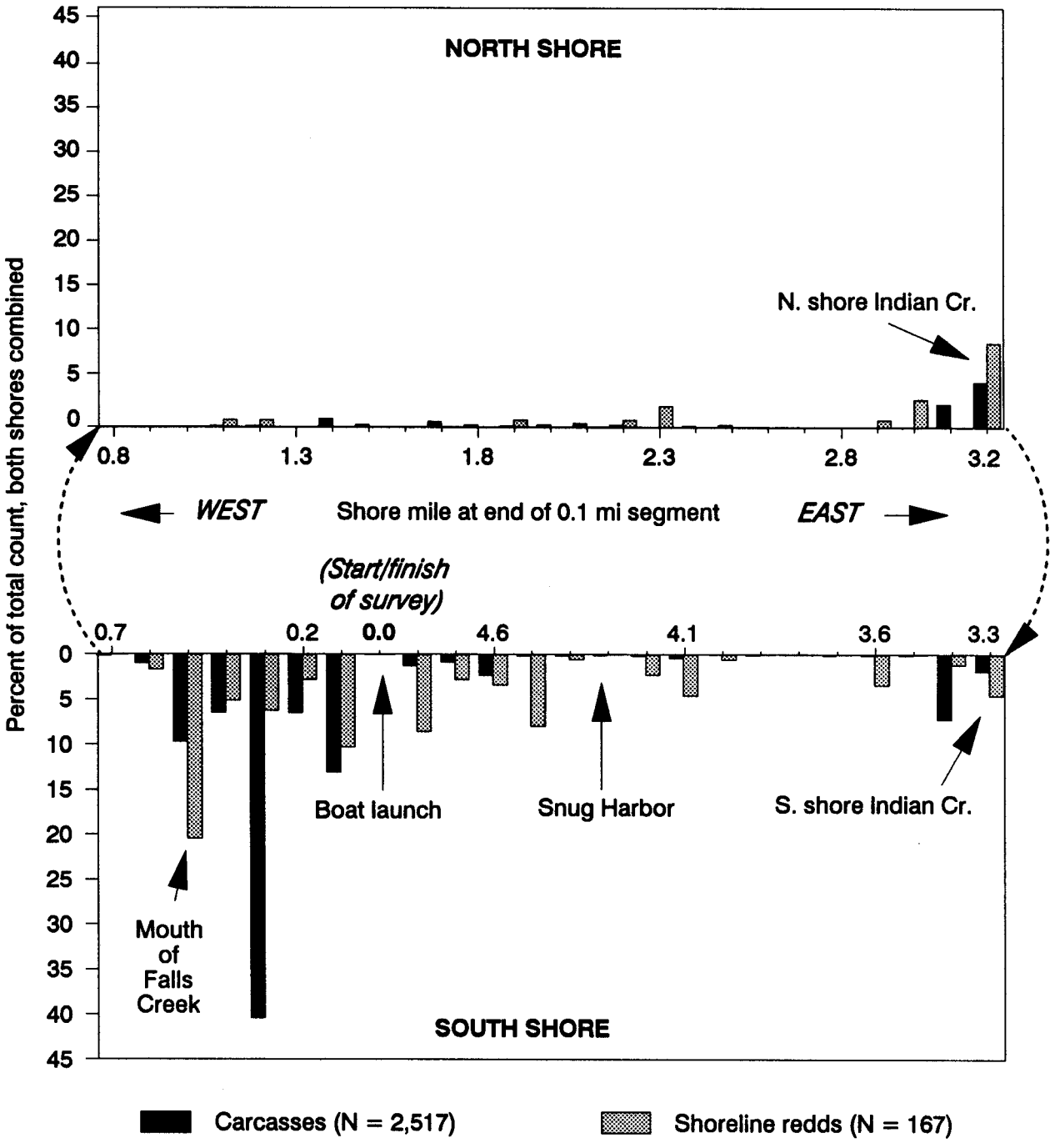

Figure 4. Lake Sutherland kokanee spawning distribution based on carcass and redd counts alongshore, November 16, 1993. Redd count is minimum estimate since mass spawning sites were counted as one redd. Data from Appendix C. Shore miles shown on map in Figure 2.

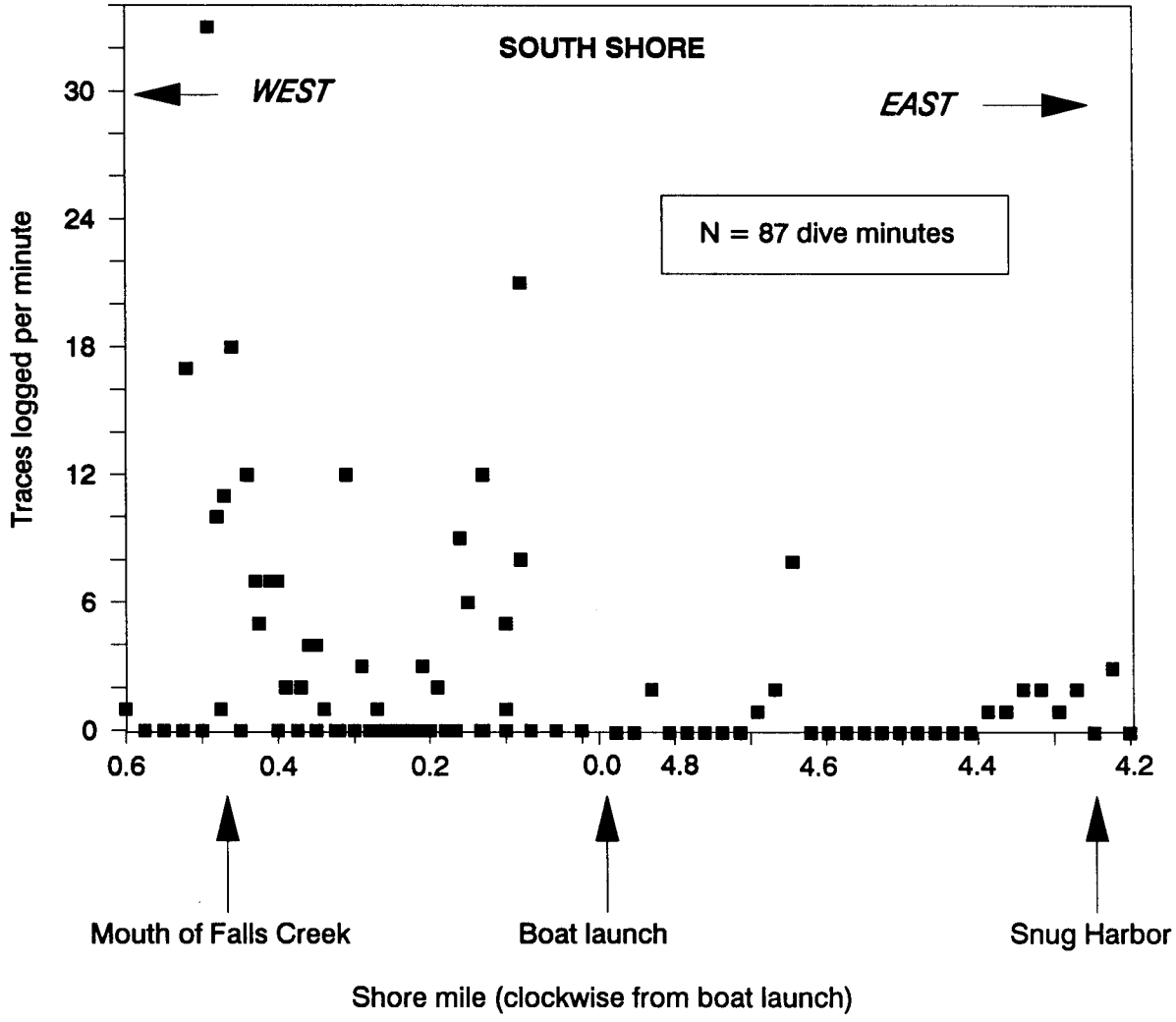

Figure 5. Distribution of SONAR traces along south shore of Lake Sutherland, November 8-9, 1993. Traces presumed to represent adult kokanee. Data from Appendix D. Shore miles shown on map in Figure 2.

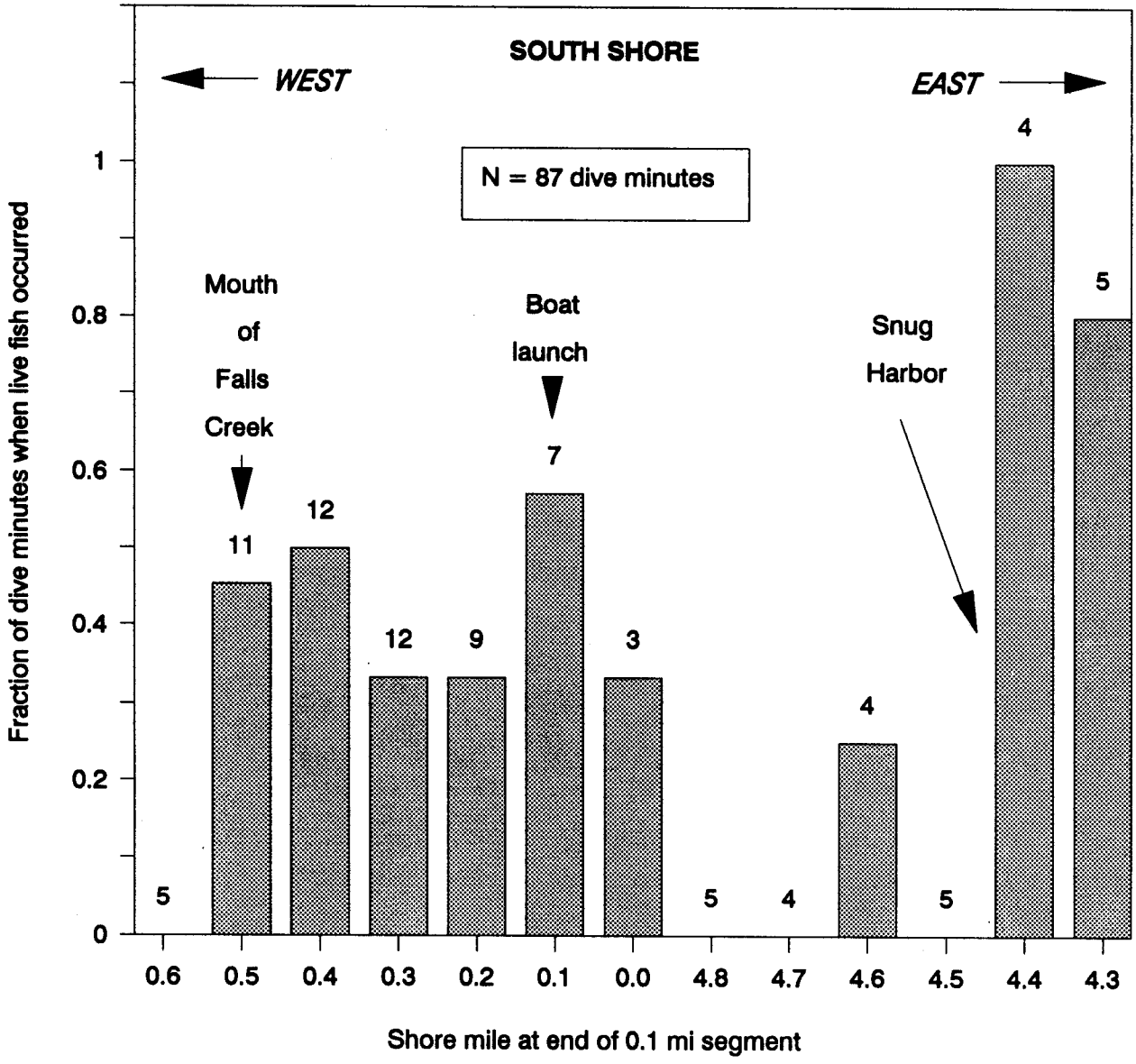

Figure 6. Distribution of live kokanee along south shore of Lake Sutherland during SCUBA survey, November 8-9, 1993. Data from Appendix D. Numbers indicate dive minutes at respective location. Shore miles appear on map in Figure 2. No live fish were seen along north shore.

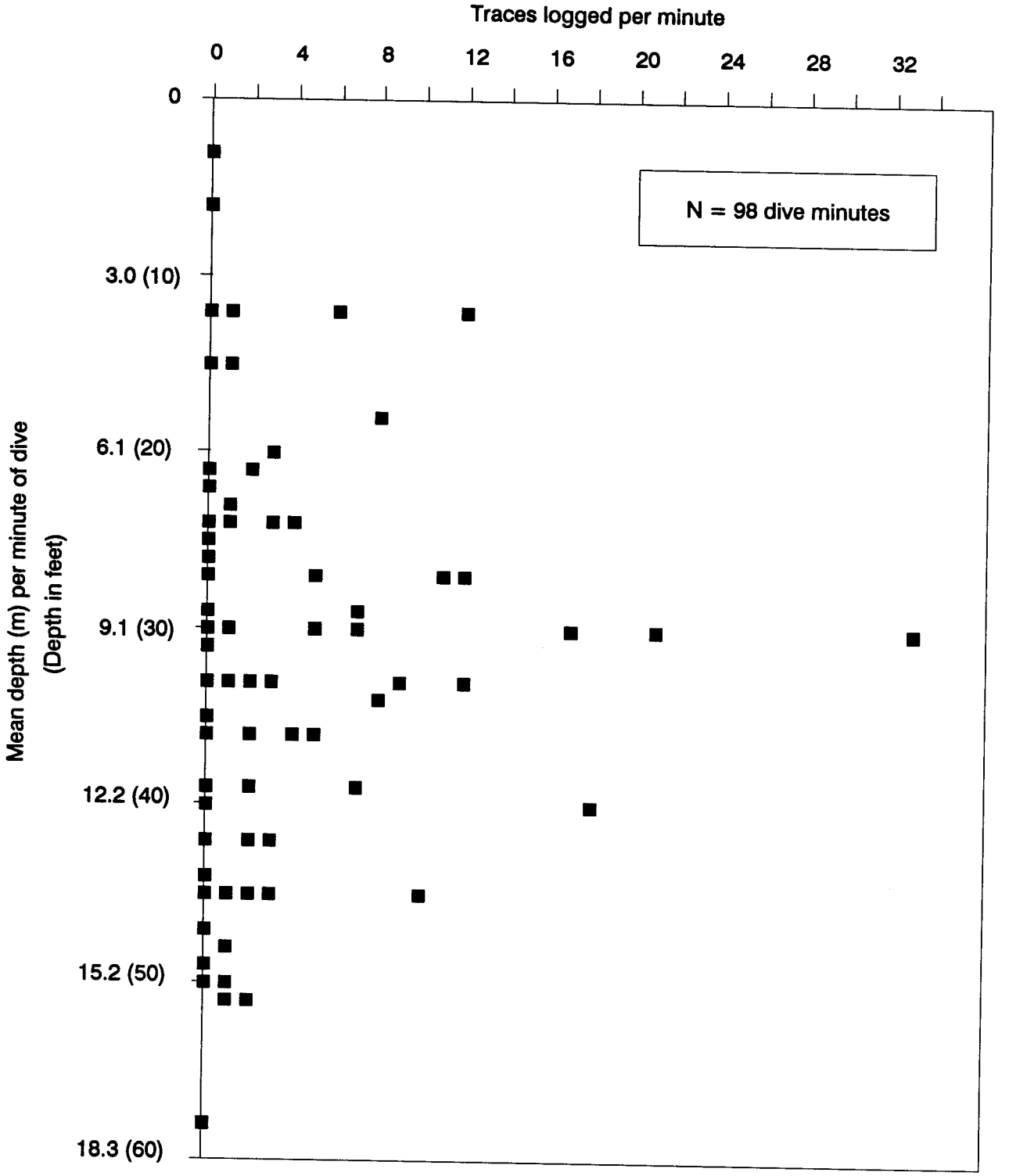

Figure 7. Bottom depths over which traces occurred in SONAR survey in Lake Sutherland, November 8-9, 1993. Traces are presumed to represent adult kokanee. Data from Appendix D.

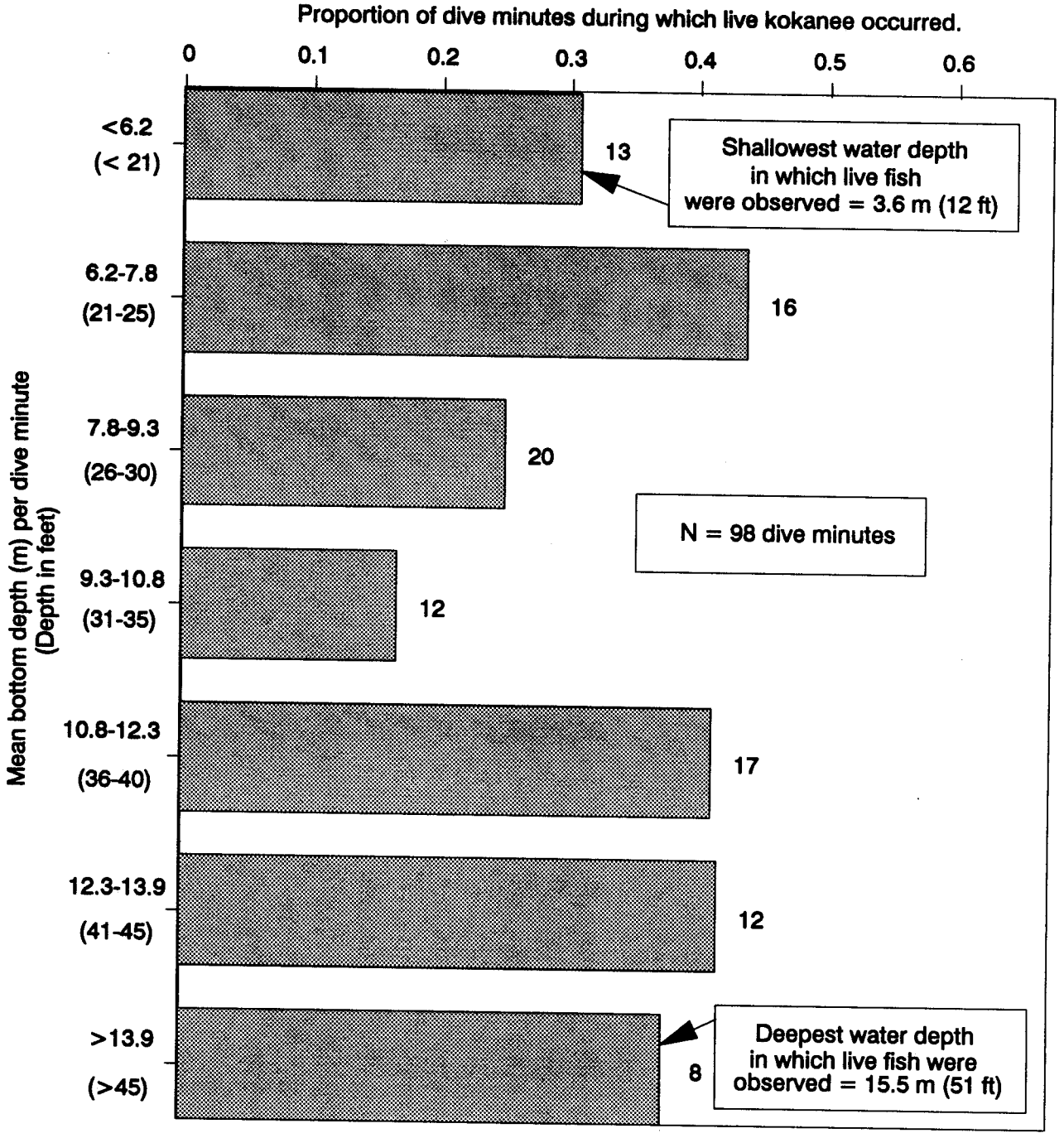

Figure 8. Bottom depth when adult kokanee occurred in SCUBA survey, November 8-9, 1993, 10:30 AM to 3:30 PM. Data from Appendix D. Numbers to right of bar indicate total dive minutes within the given depth range.

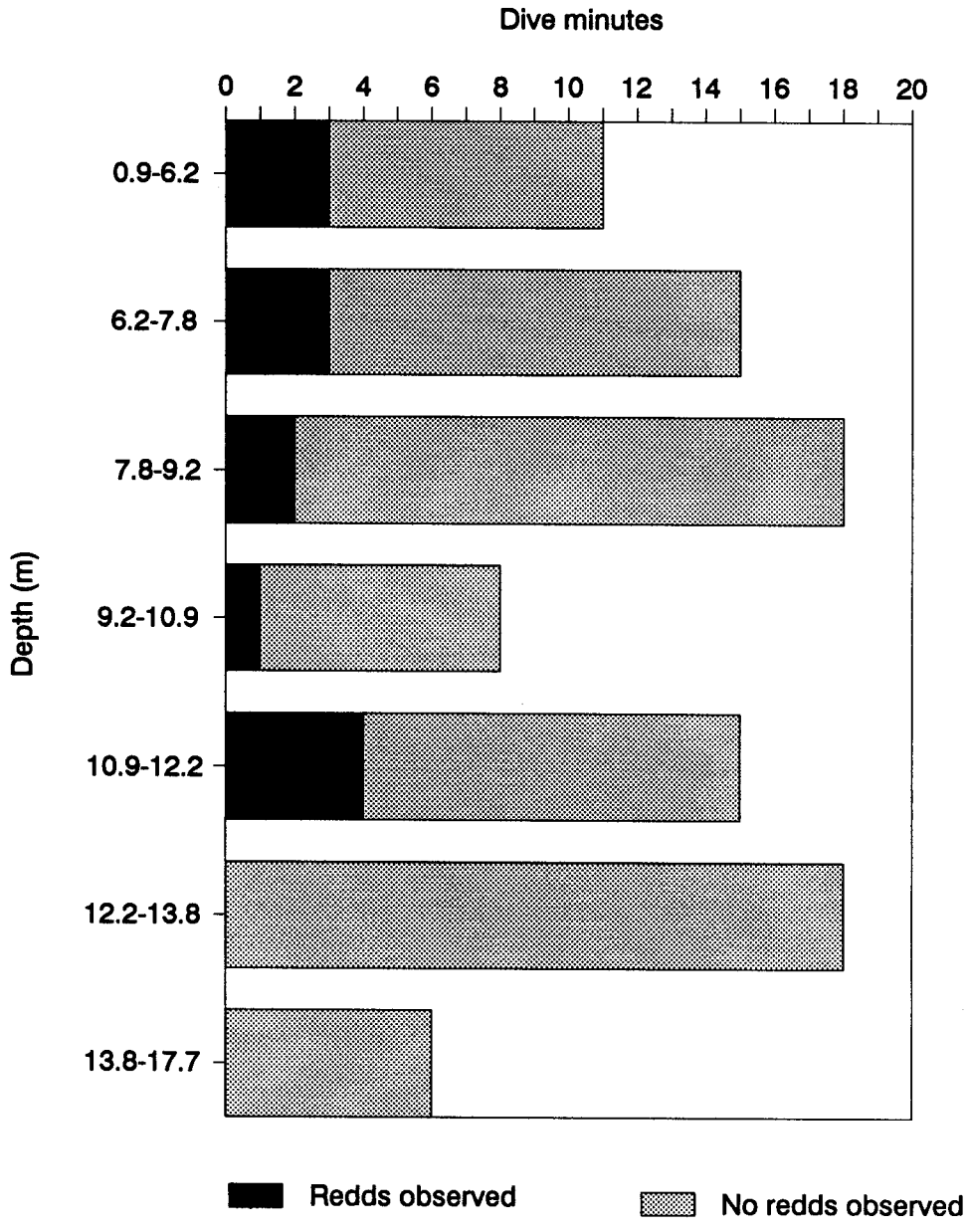

Figure 9. Depth distribution of Lake Sutherland kokanee redds based on SCUBA survey, November 8-9, 1993. Data from Appendix D. Note: Number of dive minutes during which lake bottom could be seen. Shallowest SCUBA observations of redds was at bottom depth of 3.7 m (12 ft). However, shoreline survey indicated many redds at depths of 0.3-0.9 m (1-3 ft). Deepest SCUBA observation of redds was at bottom depth of 12.2 m (40 ft).

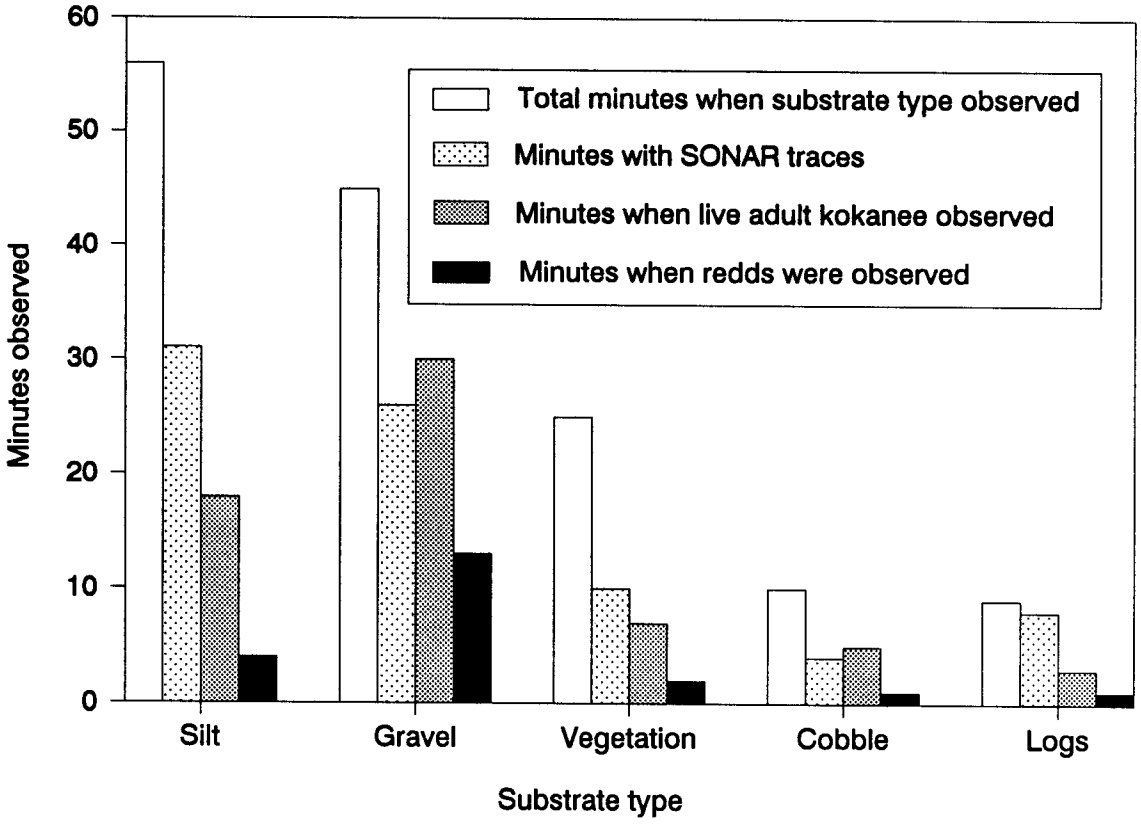

Figure 10. Substrate types and adult Lake Sutherland kokanee occurrence and spawning during SCUBA survey, November 8-9, 1993. Data from Appendix D. Note: Sonar traces are presumed to represent adult kokanee. Substrate category "Gravel" includes categories of "mixed gravel", "pea gravel", and "silty gravel" from "Methods" section of this report. "Vegetation" means Rooted seasonal aquatic plants. "Redds" include mass spawning sites, as defined in glossary. Dive minutes with SONAR traces representing fish were distributed in about the same pattern as dive minutes when divers observed respective substrate types (X^2 = 3.400, P < 0.5). Live adult kokanee had a weak tendency to occur during minutes when divers also reported gravel substrate (X^2 = 8.915, P < 0.1). Kokanee redds occurred primarily during minutes when divers reported gravel substrate (X^2 = 9.466, P < 0.05).

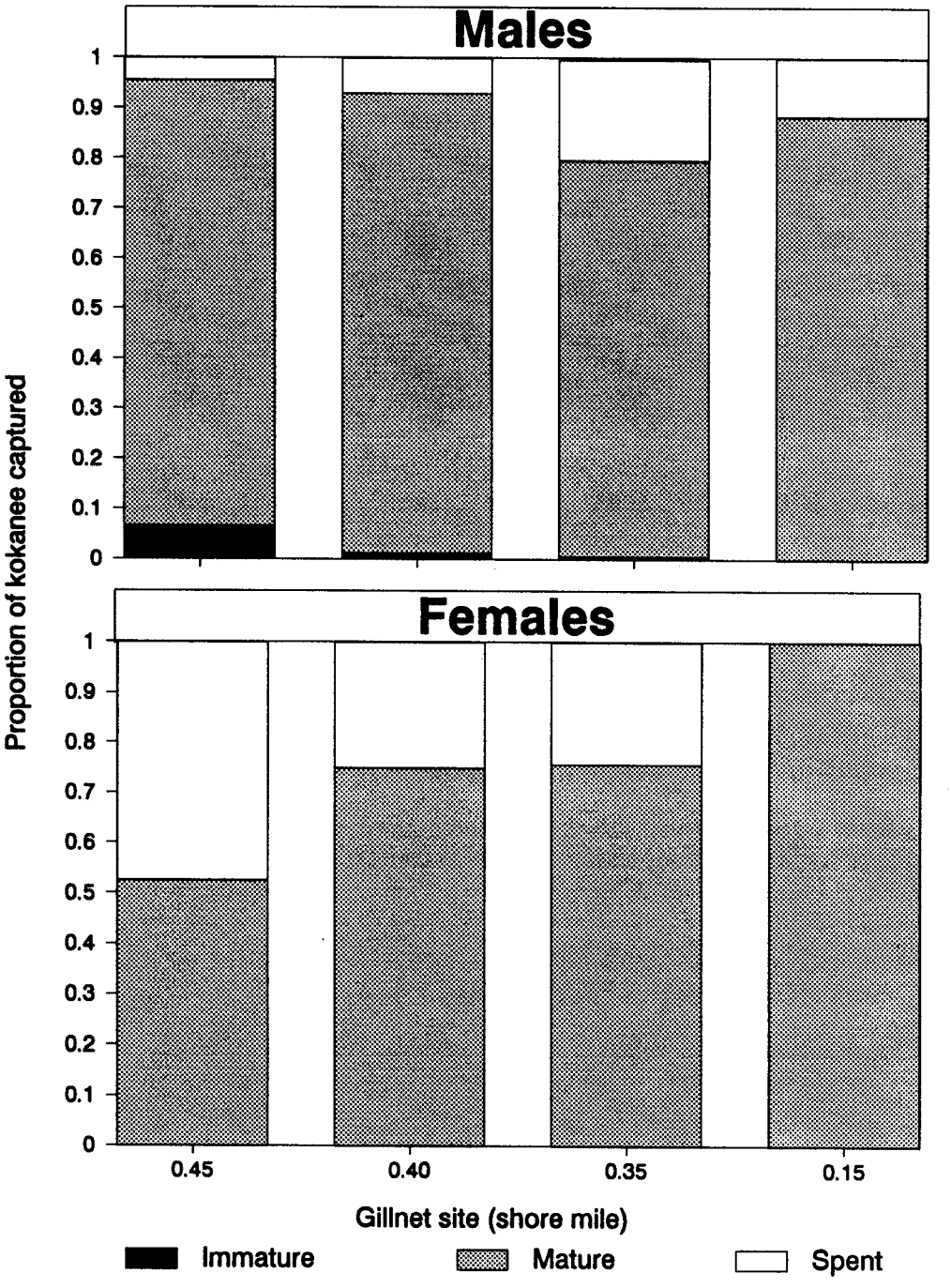

Figure 11. Effect of net location on sexual maturity of Lake Sutherland kokanee, November 5, 1993. Data from Appendix E. Note: "Mature and "spent" fish are defined in glossary. Lake shore miles are illustrated in Figure 2.

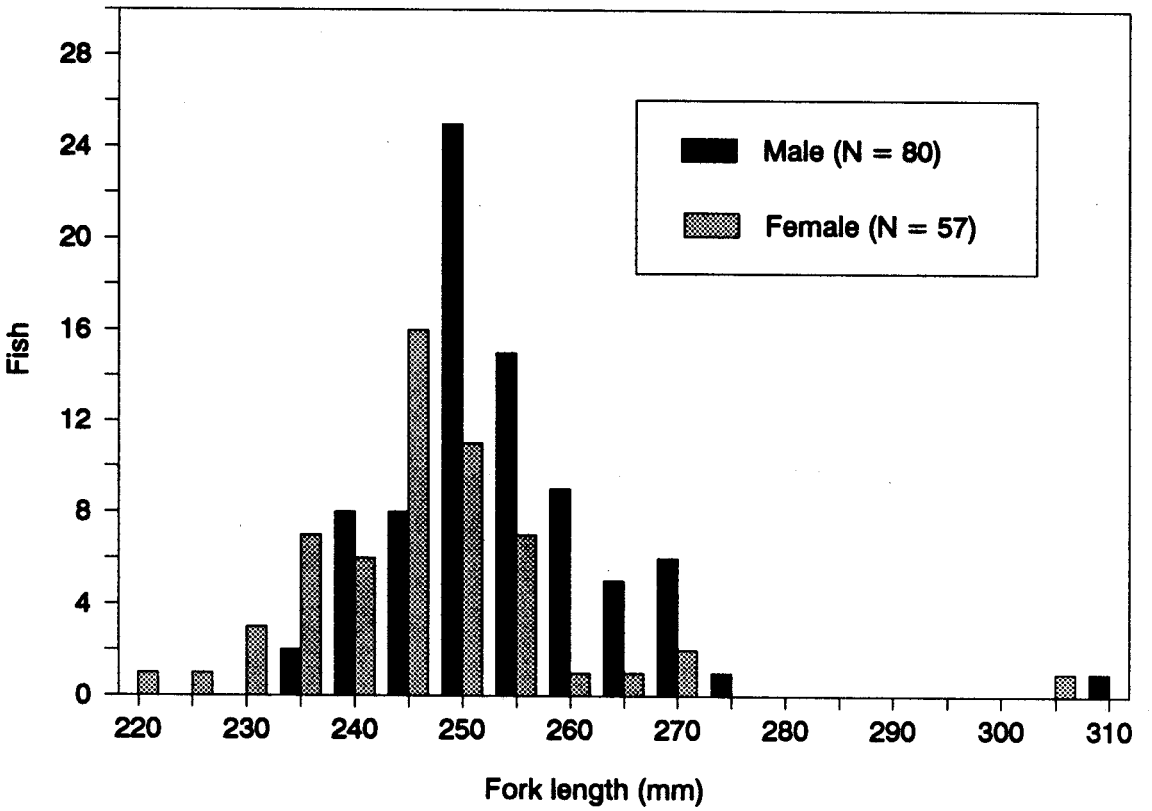

Figure 12. Fork length of adult Lake Sutherland kokanee from variable-mesh gillnet catch, November 5, 1993, near Falls Creek.