

TERROR LAKE HYDROELECTRIC PROJECT

REPORT ON MOUNTAIN GOAT STUDIES, 1983

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SUMMARY OF FINDINGS

The results of 3 aerial surveys and other observations of mountain goats around the Terror Lake hydroelectric project, Kodiak, Alaska during 1983 indicated that construction activities in the vicinity of Terror Lake may have affected summer goat distribution while activities on Kizhuyak drainages had no detectable effects. Winter distribution was similar to that noted in 1982 with the major goat winter ranges located in the Wild Creek and Hidden Basin drainages of Ugak Bay. Kidding surveys indicated an overall increase in the percentage of kids from 20% in 1982 to 28% in 1983. This increase was principally evident in the Kizhuyak and Ugak drainages. At least 5 nannies gave birth to kids in the vicinity of project activities in the Kizhuyak drainage and goats were observed in the Falls Creek drainage throughout the year. Summer surveys revealed little change in the overall goat population in the study area, although fewer goats were observed in the Terror and Kizhuyak drainages and more goats were observed in the Ugak drainage in 1983 than in 1982. The decrease in the Kizhuyak drainages was apparently the result of normal movements between drainages at the head of Kizhuyak River and was not project related. The decline in the number of goats in the Terror drainage, however, was correlated with increased project activity at Terror Lake. The increase in goats in Ugak drainages, coupled with decreases in Kizhuyak and Terror drainages, was predicted in Spencer and Hensel (1980). Identical harvests of 3 goats were taken by hunters in the Terror Lake vicinity in 1982 and 1983. Construction activity was not a factor in hunting success or hunter distribution. Continuation of existing research methods is recommended for 1984.

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INTRODUCTION

Studies to monitor the impacts on wildlife of construction and operation of the Terror Lake Hydroelectric project were required by the Federal Energy Regulatory Commission as a condition for project licensing. The requirement for wildlife studies was intended to partially mitigate habitat lost due to project construction. The Alaska Department of Fish and Game (ADF&G) contracted with the Alaska Power Authority to conduct the study on mountain goats (Oreamnos americanus) to delineate movement patterns and seasonal ranges and document any changes which may have been caused by project activities. The study began in 1982 and it is scheduled to continue through the project's construction phase (1982-1984) and two years into the operational stage (1985-1986). Investigations of mountain goats in the Terror Lake hydroelectric project area during 1982 indicated that construction activities had no detectable effects on goat movements or distribution (Smith and Van Daele 1984). This report summarizes investigations conducted in 1983.

Acknowledgements

Several ADF&G employees assisted in the field work and in completing this report. Karl Schneider secured approval for the project and contributed his editorial and supervisory skills. Ben Ballenger assisted with the aerial surveys which were flown by pilots D. Wilson and H. Terry. Hank Hosking of the U.S. Fish and Wildlife Service collected observations by construction personnel and provided useful summaries of progress of construction. Susan Lawler and Susan Malutin typed several drafts of this report.

METHODS

Methods for data collection were similar to those reported in Smith and Van Daele (1984).

A winter distribution survey was done on 10 and 11 March 1983 using a Bell 206B helicopter. This technique was also used on 9 June to locate kidding areas in the vicinity of the project. A third survey, to determine summer

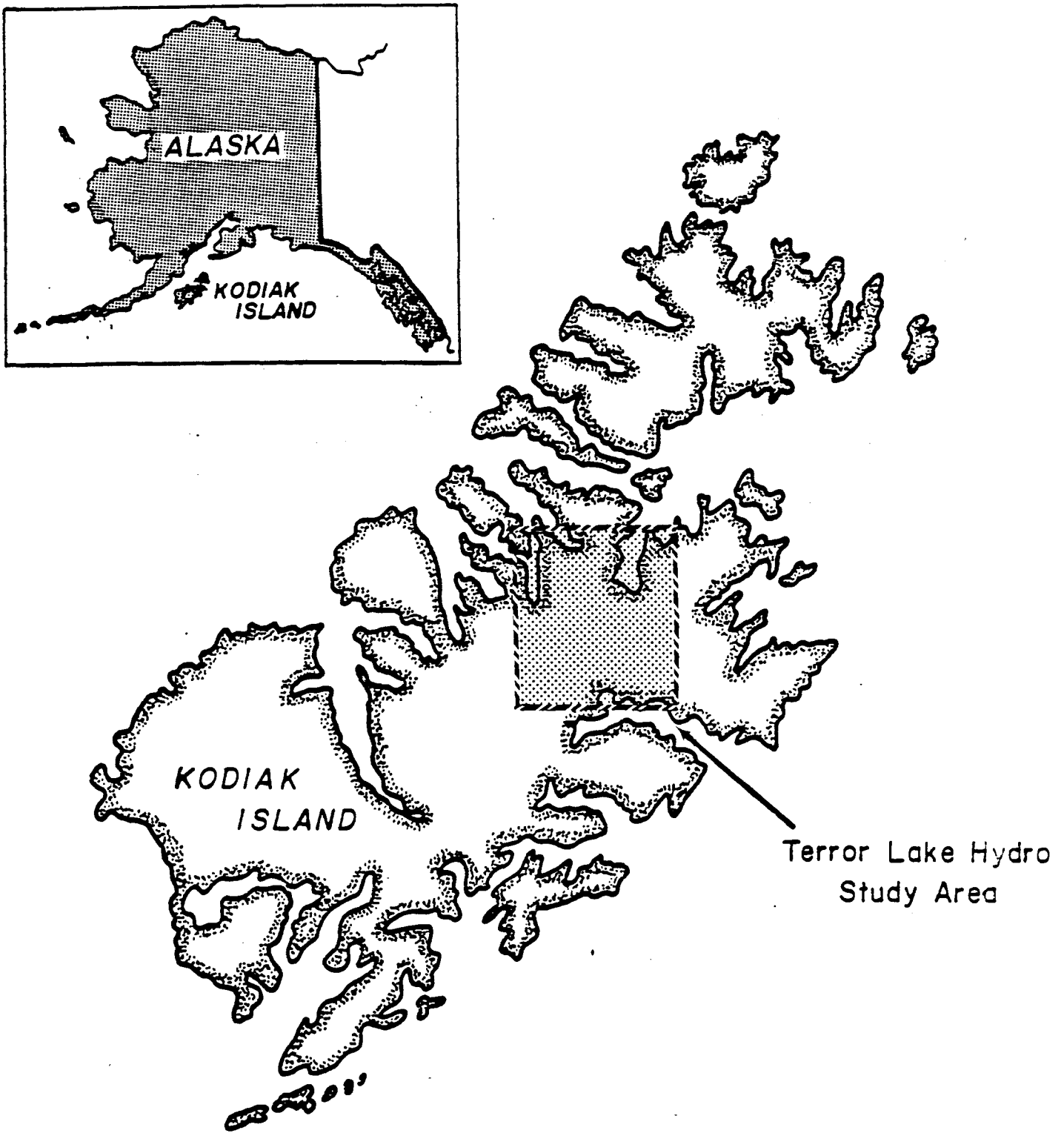


Figure 1. Location of the Terror Lake Hydroelectric Project study area, Kodiak, Alaska.

distribution, was done on 25 and 28 August with a fixed-wing Bellanca Scout with a pilot and one observer. Distribution of goats in 1983 was compared with 1982 survey data and with preconstruction distribution data.

STUDY AREA

A description of the study area (Figure 1) and the Terror Lake hydroelectric project is contained in Smith and Van Daele (1984).

RESULTS AND DISCUSSION

Winter Distribution

Eighty-five goats, 61 adults and 24 kids, were observed during a 4.6 hour survey on 10 and 11 March 1983. Twenty-three observations of groups ranging from 1 to 14 animals were recorded. The goats were located at a mean elevation of 408 m (1339') with a range of 122-914 m (400-3000'). Results of the winter survey are contained in Table 1. Locations of the goat observations are shown in Figure 2.

Results of the 1983 survey were similar to the results of the 1980 and 1982 winter surveys reported by Spencer and Hensel (1980) and Smith and Van Daele (1984). Ninety-two goats were observed during the 1980 survey and 79 in the 1982 survey, compared to 85 goats in 1983. Twenty-seven sightings were made in 1980 and 21 sightings in 1982 compared to 23 sightings in 1983. Thirteen goats were seen in the Kizhuyak drainage in 1983, an increase from only 1 goat during each of the earlier surveys. In 1983, 2 goats were observed on a ridge between the Terror and Uganik river drainages. No goats were found in the Terror Lake drainage during 1980 or 1982. The 1983 mean elevation of 408 m (1339') was comparable to means of 268 m (880') in 1980 and 446 m (1463') in 1982.

Spencer and Hensel (1980) reported that 13 goats were observed west of the powerhouse site on Kizhuyak River during the 1980 winter. A single goat was seen during the 1982 winter survey about 2.5 km (1.6 mi) southwest of the powerhouse site. In 1983, 3 goats were observed 1.6 km (1.0 mi) south of

Table 1. Results of an aerial survey of mountain goat distribution in the Terror Lake study area, Kodiak, Alaska on 10 and 11 March 1983.

Observation Number	Number of adults	Number of kids	Total Number	Aspect	Elevation (meters)	Drainage
1	2	1	3	E	335	Kizhuyak
2	1	1	2	E	520	Kizhuyak
3	6	2	8	E	365	Kizhuyak
4	1	1	2	E	915	Uganik
5	7	2	9	S	335	Wild Creek
6	2	1	3	S	245	Wild Creek
7	9	4	13	SW	305	Wild Creek
8	1	2	3	SW	305	Wild Creek
9	10	4	14	E	490	Wild Creek
10	2	0	2	E	455	Wild Creek
11	1	0	1	E	395	Wild Creek
12	2	0	2	S	520	Wild Creek
13	3	1	4	SE	425	Wild Creek
14	1	0	1	E	245	Wild Creek
15	3	1	4	E	520	Wild Creek
16	1	0	1	SW	120	Hidden Basin
17	1	0	1	SW	425	Hidden Basin
18	1	0	1	SW	185	Hidden Basin
19	1	1	2	E	335	Hidden Basin
20	1	0	1	SE	395	Hidden Basin
21	2	1	3	E	490	Hidden Basin
22	2	2	4	S	550	Hidden Basin
23	1	0	1	SE	610	Hidden Basin
Totals	<u>51</u>	<u>19</u>	<u>70</u>			

Summary:					
Drainage	Number of adults	Number of kids	Total Number	Mean elevation (meters)	Range in elevation (meters)
Kizhuyak Bay	9	4	13	382	335-518
Uganik Bay	1	1	2	914	914-914
Ugak Bay	<u>51</u>	<u>19</u>	<u>70</u>	<u>422</u>	<u>122-610</u>
	61	24	85	408	122-914

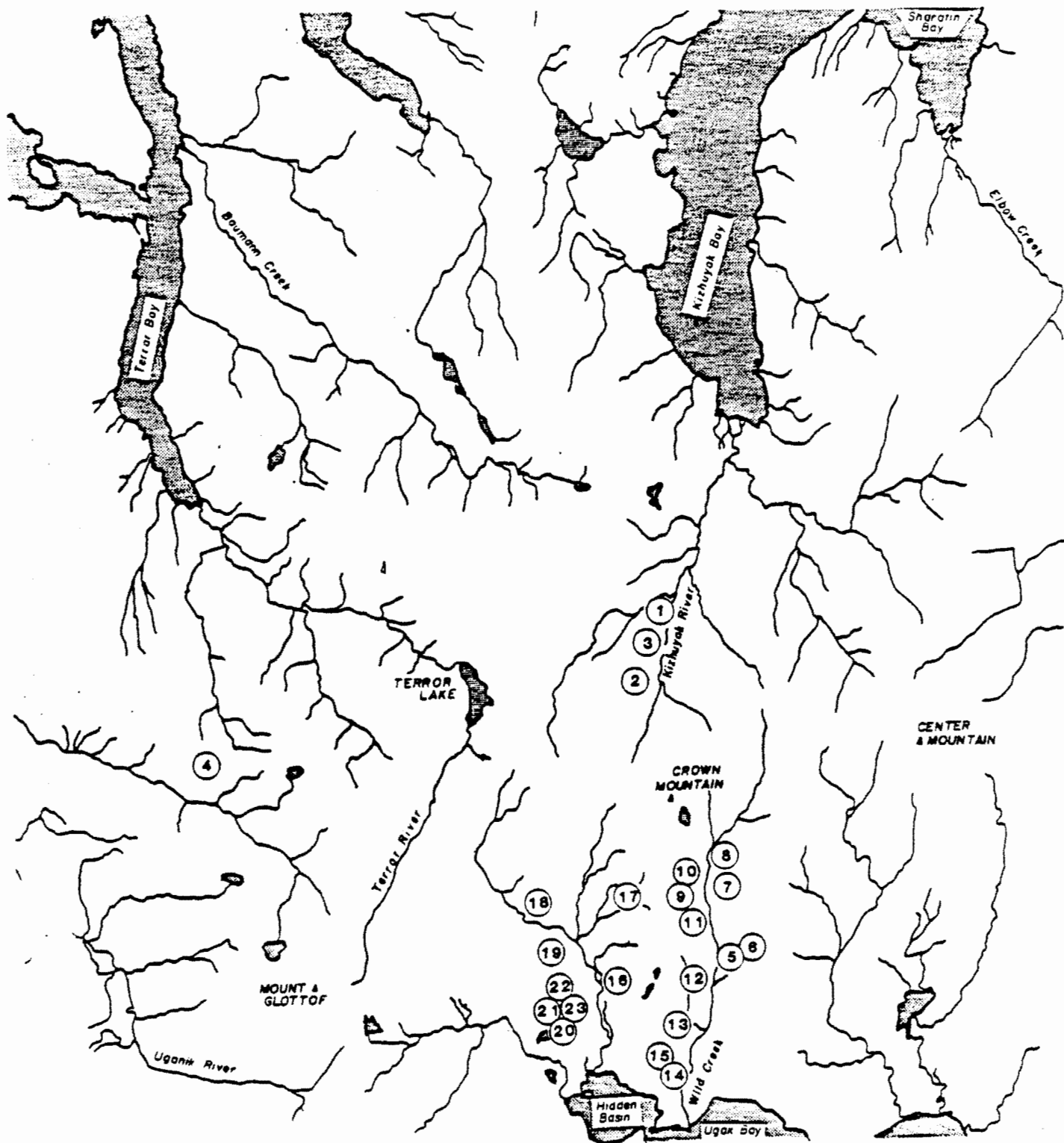


Figure 2. Locations of mountain goat observations from an aerial survey of winter distribution in the Terror Lake study area, Kodiak, Alaska on 10 and 11 March 1983. (1 cm = 2.1 km)

the powerhouse and 8 more were seen 2.9 km (1.8 mi) further upstream along the west side of the Kizhuyak River. These observations indicate that construction activities did not cause goats to avoid Kizhuyak River drainages during the winter of 1983.

The 1983 survey supported previous suppositions that the Wild Creek and Hidden Basin Creek drainages of northwestern Ugak Bay contain the major winter range on Kodiak Island. Seventy of 85 (82%) goats observed were in the Ugak Bay drainages.

Distribution during kidding

Twenty-two observations of post-parturient females or of adult-kid groups were made in a 4.1 hour survey on 9 June, 1983. A total of 234 goats, including 169 adults and 65 kids, was counted. Results of the survey are shown in Table 2. Locations of the goat observations are illustrated in Figure 3.

Nine females with kids were located in the Kizhuyak drainage. Seven females were accompanied by 1 kid each and 2 females had twins. Three of the 7 females, each with 1 kid, were located in the Falls Creek drainage approximately 1.8 km (1.1 mi) southwest of the powerhouse. Another group of 2 females, each with 2 kids was observed 1.4 km (0.9 mi) west of the powerhouse. These goats occupied elevations ranging from 671 to 762 m (2200-2500'). Four females, all with single kids, were found along the slope west of Kizhuyak River south of Falls Creek. Goats in this drainage were located at elevations ranging from 610-945 m (2000-3100'). These observations and those reported in the "Additional goat observations in 1983" section of this report indicate that several goats gave birth close to heavy vehicular and helicopter activity. Smith and Van Daele (1984) reported apparent parturition in this area in 1982 and suggested that goats were provided security from project activities by nearby ridges. Three single goats were observed at the head of the Watchout Creek drainage of Kizhuyak River. These goats were at elevations ranging from 640-945 m (2100-3100'). Kids were not observed in the eastern Kizhuyak drainages during this or previous kidding surveys.

Table 2. Results of an aerial survey of mountain goat kidding distribution in the Terror Lake study area, Kodiak, Alaska on 9 June 1983.

Observation Number	Number of adults	Number of kids	Total Number	Aspect	Elevation (meters)	Drainage
1	1	0	1	NE	945	Kizhuyak
2	2	0	2	NE	640	Kizhuyak
3	9	3	12	E	610	Kizhuyak
4	2	1	3	E	760	Kizhuyak
5	3	0	3	E	730	Kizhuyak
6	1	0	1	E	760	Kizhuyak
7	1	0	1	E	885	Kizhuyak
8	1	0	1	E	945	Kizhuyak
9	1	0	1	E	760	Kizhuyak
10	1	0	1	E	825	Kizhuyak
11	3	3	6	SE	670	Kizhuyak
12	2	4	6	S	760	Kizhuyak
13	1	0	1	S	610	Terror
14	1	0	1	E	565	Terror
15	7	2	9	S	1065	Terror
16	9	1	10	SE	1065	Terror
17	3	3	6	N	1160	Terror
18	3	0	3	N	1190	Terror
19	7	3	10	S	945	Hidden Basin
20	6	0	6	S	670	Hidden Basin
21	2	4	6	SW	640	Hidden Basin
22	9	5	14	E	610	Hidden Basin
23	4	0	4	SE	610	Hidden Basin
24	2	1	3	SE	730	Hidden Basin
25	5	2	7	SE	760	Hidden Basin
26	1	0	1	S	700	Hidden Basin
27	1	2	3	S	700	Hidden Basin
28	4	1	5	S	640	Hidden Basin
29	6	1	7	SE	580	Hidden Basin
30	3	2	5	SW	685	Hidden Basin
31	1	0	1	S	825	Hidden Basin
32	8	5	13	S	610	Hidden Basin
33	6	3	9	SW	750	Wild Creek
34	3	1	4	SW	760	Wild Creek
35	3	1	4	S	640	Wild Creek

Table 2. (continued) Results of an aerial survey of mountain goat kidding distribution in the Terror Lake study area, Kodiak, Alaska on 9 June 1983.

Observation Number	Number of adults	Number of kids	Total Number	Aspect	Elevation (meters)	Drainage
36	5	1	6	S	640	Wild Creek
37	10	11	21	S	670	Wild Creek
38	5	0	5	S	700	Wild Creek
39	7	0	7	S	700	Wild Creek
40	5	0	5	S	750	Wild Creek
41	9	5	14	SW	580	Wild Creek
42	6	0	6	S	365	Wild Creek
Totals	<u>169</u>	<u>65</u>	<u>234</u>			

Summary:

Drainage	No. adults	No. kids	Total no.	Mean elevation (meters)	Range in elevation (meters)
Kizhuyak Bay	27	11	38	705	610-945
Terror River	24	6	30	1065	564-1189
Ugak Bay	<u>118</u>	<u>48</u>	<u>166</u>	<u>667</u>	<u>366-945</u>
	<u>169</u>	<u>65</u>	<u>234</u>	<u>724</u>	<u>366-1189</u>

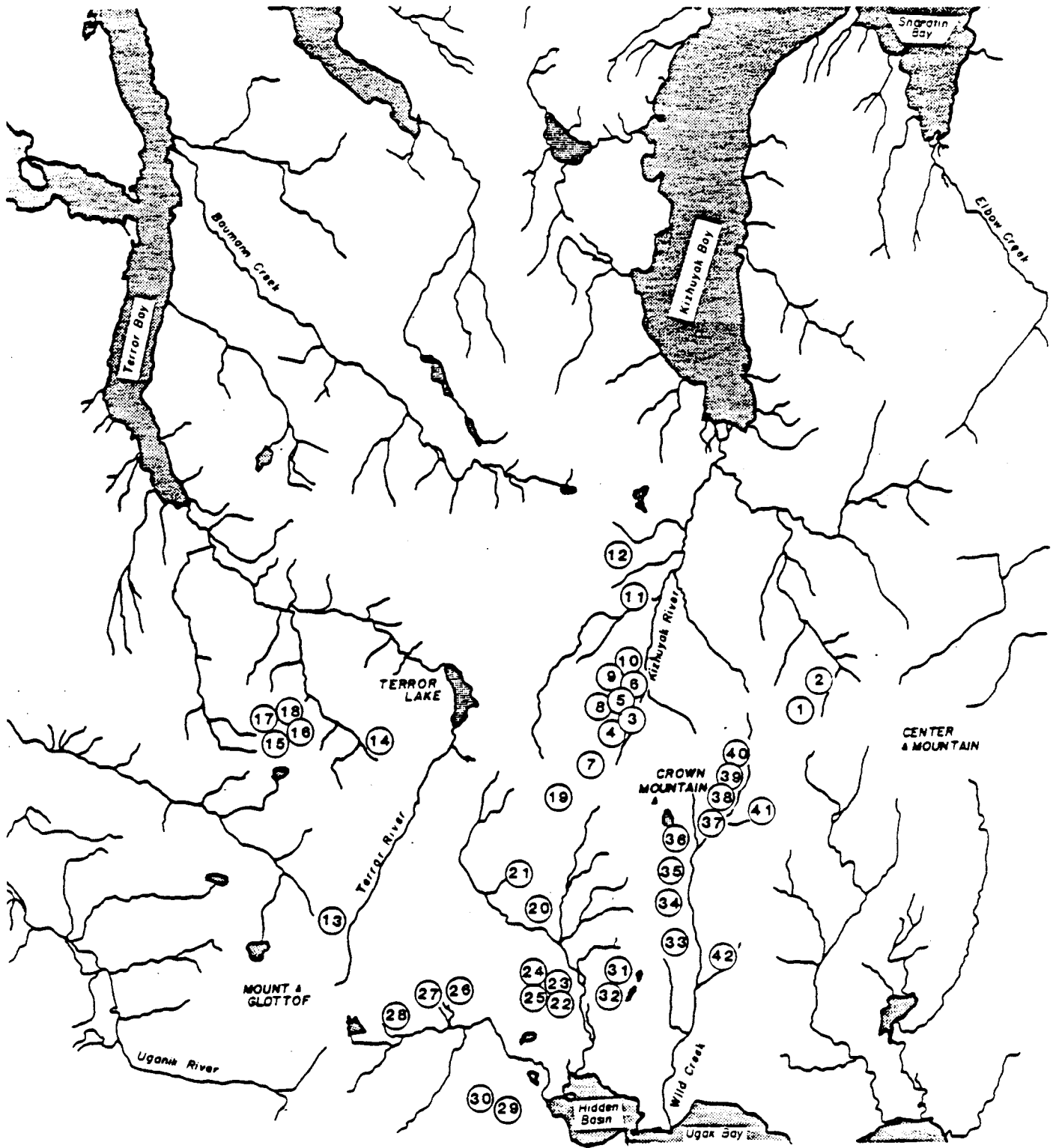


Figure 3. Locations of mountain goat observations from an aerial survey of kidding distribution in the Terror Lake study area, Kodiak, Alaska on 9 June 1983.

(1 cm = 2.1 km)

Five observations of adult-kid groups were made in the Terror River drainage during the June survey. These included 4 females with 1 kid and 1 female with twins. Thirty goats, including 6 kids, were observed. The adult-kid groups were located 6.5 km (4.0 mi) west of Terror Lake in the easternmost drainage into the south side of Terror River. Spencer and Hensel (1980) and Smith and Van Daele (1984) previously reported the occurrence of females with newborn kids in that drainage. Construction activity at Terror Lake prior to this survey included intensive road and dam construction.

Thirteen observations of post-parturient females or adult-kid groups were made in the Hidden Basin Creek and Wild Creek drainages into Ugak Bay. A total of 166 goats, 118 adults and 48 kids, was counted in the Ugak Bay drainages. This represented an increase of 56 goats over the 1982 observations and an increase from 24 kids:100 adults in 1982 to 41 kids:100 adults in 1983.

The percentage of kids observed during this survey increased from 20% (35 kids/177 goats) in 1982 to 28% (65 kids/234 goats) in 1983. Goats in the Kizhuyak and Ugak drainages experienced an increase from approximately 19% kids in 1982 (19.6% [9 kids/46 goats] for Kizhuyak and 19.1% [21 kids/110 goats] for Ugak) to 29% in 1983 (Kizhuyak = 11 kids/38 goats; Ugak = 48 kids/166 goats). At the same time, the percentage of kids in the Terror drainage declined from 24% (5 kids/21 goats) in 1982 to 20% (6 kids/30 goats) in 1983. These data imply that construction activities in the Kizhuyak drainage had no apparent effect on goat production and road and dam construction did not severely impact goat production in the Terror River drainage.

Summer distribution

During the 6-hour aerial survey of the study area on 25 and 28 August 1983, 236 goats, 182 adults and 64 kids, were counted. This was a slight drop from the 249 goats counted during the 1982 survey. Results of the 1983 survey are shown in Table 3 and locations of goats are illustrated in Figure 4.

Table 3. Results of an aerial survey of mountain goat distribution in the Terror Lake study area, Kodiak, Alaska on 25 and 28 August 1983.

Observation Number	Number of adults	Number of kids	Total Number	Aspect	Elevation (meters)	Drainage
1	2	0	2	E	670	Sharatin
2	1	0	1	E	825	Womens
3	1	0	1	W	945	Kizhuyak
4	3	0	3	N	825	Saltery
5	1	0	1	W	760	Wild Creek
6	1	1	2	W	730	Wild Creek
7	3	0	3	E	855	Saltery
8	38	14	52	SW	855	Wild Creek
9	1	1	2	SE	700	Wild Creek
10	3	2	5	NW	730	Kizhuyak
11	3	0	3	SE	790	Wild Creek
12	1	0	1	N	790	Wild Creek
13	12	1	13	NE	640	Wild Creek
14	1	0	1	E	610	Wild Creek
15	1	1	2	E	700	Wild Creek
16	1	0	1	E	610	Wild Creek
17	2	0	2	E	885	Wild Creek
18	1	1	2	E	790	Wild Creek
19	3	1	4	NE	790	Wild Creek
20	14	4	18	NE	885	Wild Creek
21	5	0	5	SW	825	Wild Creek
22	1	0	1	W	670	Hidden Basin
23	2	0	2	SE	790	Hidden Basin
24	1	2	3	NW	825	Kizhuyak
25	4	2	6	SE	975	Kizhuyak
26	6	2	8	E	1005	Kizhuyak
27	2	1	3	E	1100	Kizhuyak
28	1	0	1	SE	1035	Hidden Basin
29	17	9	26	SW	790	Hidden Basin
30	8	3	11	S	825	Hidden Basin
31	3	0	3	W	1100	Hidden Basin
32	3	0	3	E	915	Hidden Basin
33	1	0	1	SE	1005	Uganik
34	1	0	1	N	1070	Uganik

Table 3. (continued) Results of an aerial survey of mountain goat distribution in the Terror Lake study area, Kodiak, Alaska on 25 and 28 August 1983.

Observation Number	Number of adults	Number of kids	Total Number	Aspect	Elevation (meters)	Drainage
35	3	0	3	NW	1100	Uganik
36	2	0	2	NE	1130	Terror
37	2	1	3	NW	1070	Terror
38	8	2	10	W	855	Terror
39	3	0	3	SW	640	Terror
40	1	0	1	SE	1035	Hidden Basin
41	1	1	2	N	700	Hidden Basin
42	14	5	19	NW	670	Hidden Basin
Totals	<u>182</u>	<u>54</u>	<u>236</u>			

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Summary:	Number of adults	Number of kids	Total Number	Mean elevation (meters)	Range in elevation (meters)
Drainage					
Kizhuyak Bay	17	9	26	933	732-1097
Terror/Uganik Bays	20	3	23	925	640-1128
Ugak Bay	142	42	184	804	610-1097
Sharatin/Womens Bays	<u>3</u>	<u>0</u>	<u>3</u>	<u>721</u>	<u>671-823</u>
	<u>182</u>	<u>54</u>	<u>236</u>	<u>829</u>	<u>610-1128</u>

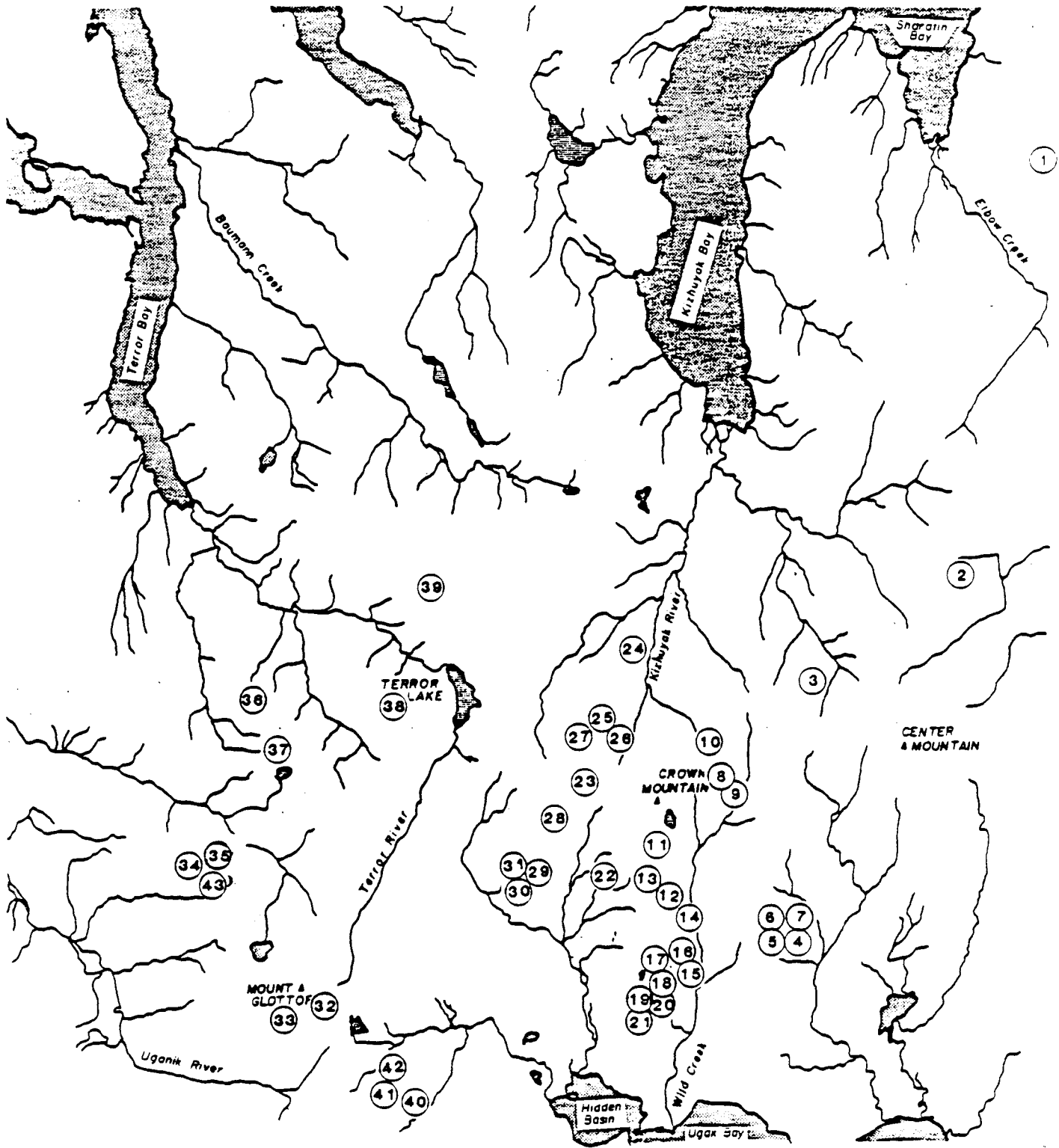


Figure 4. Locations of mountain goat observations from an aerial survey of summer distribution in the Terror Lake study area, Kodiak, Alaska on 25 and 28 August 1983. (1 cm = 2.1 km)

Eighteen goats, 15 adults and 3 kids, were found west of Terror Lake in the Terror River drainage. That represented a decrease from the 30 goats reported in this area in 1982 (Smith and Van Daele 1984), but is comparable to 1980 data (15 goats) (Spencer and Hensel 1980). In 1983 10 goats were seen (56% of those observed in the Terror drainage) on the mountain immediately west of Terror Lake. This was a decline from observations during the 1982 survey when 24 goats (80% of those observed in the Terror drainage) were observed on this mountain.

Numerous construction activities with potential impacts on summer goat distribution were in progress at Terror Lake in July and August, 1983. Dam construction continued and an access road was built on the north side of the lake. A construction camp on the southwestern side of Terror Lake was occupied. Intensive vehicular and helicopter traffic were associated with camp and construction activities.

Five adult goats were observed on the western slopes of Mt. Glotoff and in the upper Uganik River drainage. Thirteen goats were located in that area during the 1982 summer surveys. It is doubtful that the goats absent from the mountain west of Terror Lake moved into this area. Overall the number of goats surveyed in the Terror/Uganik drainages decreased 47% from 1982 (43 goats) to 1983 (23 goats).

The number of goats using the Kizhuyak drainages also declined between the summers of 1982 (75 goats) and 1983 (26 goats) (65% decrease). However, this decline was primarily in the upper reaches of the river where movement between drainages is common. The number of goats observed in the Kizhuyak section of the "primary impact area" of the project (as described by Spencer and Hensel [1980]) increased from 6 in 1982 to 20 in 1983. This suggests that project activities in 1983 did not affect the summer distribution of goats in the Kizhuyak drainage.

In the Ugak drainages the number of goats observed increased 40% between 1982 (131 goats) and 1983 (184 goats). This increase, coupled with the decrease in the Terror and Kizhuyak drainages was predicted in Spencer and Hensel (1980).

Hunting Activities

Goat hunting in the project area is regulated by a limited permit hunt during a 1 September to 31 October season. Three goats, 2 males and 1 female, were reported killed in the Terror Lake vicinity during the 1983 season. Four hunters hunted in the area. The harvest was identical to that reported in 1982 and probably had no impact on goat distribution. The project had no obvious effect on goat hunting activities in 1983.

Additional goat observations in 1983

Project personnel reported 39 observations of mountain goats in the project area in 1983. Thirty-one observations were made in Falls Creek drainage, 5 in the Terror River drainage and 3 in the Kizhuyak River drainage. Goats were reported from Falls Creek throughout the year with group sizes ranging from 1 to 13; most reports (65%) indicated a group size between 3 and 6. As many as 5 kids were noted, including 1 set of twins. The first observation of a newborn kid in the vicinity of the project was on 16 May 1983. The Kizhuyak reports included, 1 group of 3 goats north of Rolling Rock Creek in September and 2 groups (13 and 14 goats) on the ridge southeast of Shotgun Creek in October. In the Terror River drainage, a single goat was observed in April and again in July on the mountain west of Terror Lake. Three observations of 2 goats were reported from north of the river downstream from the dam site.

Distribution of goats in the Terror Lake basin

No goats were observed in the area to be inundated by the Terror Lake dam in 1983. Neither the 1983 aerial surveys nor previous surveys have indicated that goats make significant seasonal movements between the east and west sides of upper Terror River. The Terror Lake basin is apparently not preferred habitat. However, the apparent decline in the number of goats in the Terror River drainage and corresponding increase in the Ugak drainage suggests that some movement may have occurred across the upper portions of Terror River.

Recommendations for further study

Aerial surveys should be continued to monitor seasonal distribution and movements of mountain goats in the Terror Lake hydroelectric project area. Surveys conducted in 1983 to document winter distribution, kidding activities and late summer distribution should be repeated in 1984. Other incidental observations of goats in the study area should continue to be recorded and analyzed to supplement aerial survey information.

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