

Kenai Peninsula

Brown Bear Studies:

Report of the Interagency Brown Bear Study Team, 1986

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KENAI PENINSULA BROWN BEAR STUDIES :

Report of the Interagency Brown Bear Study Team, 1986.

by

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SUMMARY

This report summarizes work conducted during the 1986 field season on brown bear (Ursus arctos) from the Kenai Peninsula, Alaska. Ground surveys were conducted to assess food presence and abundance in two areas where radio collared bears were relocated. Surveys were also conducted in two areas surveyed in previous field seasons in order to compare brown bear use on a seasonal basis. One salmon stream was surveyed to determine the extent of use by brown bears during the salmon runs. Two areas were surveyed to select potential trap sites. Aerial tracking and snaring efforts were successful and should be considered for future study efforts. A user survey on the Russian River/Resurrection River/Cooper Lake trail system indicated use in this area by recreationists was similar to use in 1985.

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Preface

This is the third and final working report of the Kenai Peninsula Interagency Brown Bear Study Team (IBBST). The group was formed in 1984 following joint meetings between the U.S. Forest Service (USFS), U.S. Fish and Wildlife Service (USFWS), and the Alaska Department of Fish and Game (ADF&G). The group was established to coordinate efforts in collection of scientific information relative to brown bears on the Kenai Peninsula. The major goal of the group was to establish a data base that will aid land managers in meeting the primary goal of maintaining a viable brown bear population on the Kenai Peninsula. This report contains some of that data Base. It was prepared by the interagency group, as a joint effort. C.A. Schloeder and M.J. Jacobs prepared the first draft of the report, while E.E. Bangs and myself did most of the editing. C.A. Schloeder and M.J. Jacobs conducted much of the field work reported in this report. Numerous people assisted with other aspects of the work, and we thank USFWS pilots B. Larned, B. Richey, and W. Soroka for their assistance in tracking bears and providing logistical support. T. Bailey, M. Portner, and T. Schumacher (USFWS) assisted with bear snaring, while J. Schoen and L. Bier (ADF&G) provided technical assistance with snaring techniques. C. Lofsted and M. Hauk, both of Kenai Air Alaska, did an outstanding job of providing logistical support with their helicopter. P. Fencel helped with typing the report, and G. DelFrate drafted the figures. We also wish to acknowledge D. Nelson and S. Hammerstrom (ADF&G) fisheries biologist for use of equipment and facilities, and for information about salmon spawning runs. Everyone involved helped make this report better, and we appreciate that.

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INTRODUCTION

This report summarizes field efforts conducted by the Interagency Brown Bear Study Team (IBBST) on the Kenai Peninsula from May to September, 1986. It updates the 1984 efforts (Bevins et. al. 1985) and 1985 efforts (Risdaul et. al. 1986) and includes recommendations for future field research and management concerning the brown bear on the Kenai Peninsula. This season's objectives were to:

- 1) Finish surveying those salmon streams that had not been surveyed in previous field seasons.
- 2) Conduct ground surveys of locations taken from radio collared brown bears in order to assess types and availability of potential spring bear foods.
- 3) Attempt to trap and radio collar brown bears with Aldritch foot snares along salmon streams with known concentrations of brown bear.
- 4) Continue radio tracking collared bears in order to identify those areas that brown bears are selecting on a daily and seasonal basis.
- 5) Continue monitoring human use and human/bear encounters along the Russian River/Resurrection River/Cooper Lake trail system.
- 6) Attempt helicopter capture of brown bears in Russian River Drainage.

MATERIALS AND METHODS

Ground Surveys

Ground surveys were conducted again this field season (Fig. 1). A salmon spawning stream survey was conducted along a portion of the Ninilchik River. The spawning area was surveyed once and was conducted when salmon numbers were at their peak, when bear sign was presumed greatest. Survey methods used were the same as those used by Bevins et. al. (1985). The Chakok River, Crooked Creek, and the Placer River were not surveyed as previously scheduled.

Brown bear use surveys were conducted along the Cooper Lake trail, Russian River trail, and the South Fork of Snow River. Each area was surveyed once for either 1 day or 3 days. Surveys were conducted from either man-made or game trails, or along the stream bottom. Areas were evaluated primarily by presence or absence of brown bear sign. Information gathered was used to compare with previous years findings (see Bevins et. al. 1985, and Risdahl et. al. 1986).

Habitat evaluation surveys were conducted in two areas known to be used by radio collared bears. These areas were: Skilak Glacier-the glacial flats adjacent to the Skilak River, and the ridge immediately adjacent to the eastern edge of the glacier; Tustumena Glacier-the glacial flats immediately below the glacier, the hills surrounding the southwestern edge of the glacier, portions of Tustumena Lake shore, and a portion of Clear Creek. These areas were evaluated based on presence and abundance of known and suspected bear foods, using the habitat evaluation field form developed by Bevins et. al. (1985). Both surveys were conducted during July. A write-up of each survey, with an accompanying map is included in Appendix 1.

Mapping techniques follow those used by Bevins et. al. (1985). In addition to these areas, surveys were conducted along the lower portions of Benjamin Creek and Goat Creek to select potential trap sites for future attempts to snare brown bears. Write-ups for these surveys are included in Appendix 1.

Bear Observations and Mortality

In 1986 brown bear observations on the Kenai Peninsula made by biologists and the general public were recorded on observation cards (Bevins et. al. 1985). Brown bears sighted by the public were verified by telephone or in person. All observations were mapped (Fig. 2). Harvest data, defense of life and property, and other mortality data for brown bear in 1985 and 1986 were documented.

Helicopter Darting

Several efforts were made in late May and June to locate and helicopter capture brown bear near Russian River and Skilak Glacier. Consistently poor weather conditions in the mountains, persistent snow cover, late green up, and inability to locate bears prevented any successful attempts.

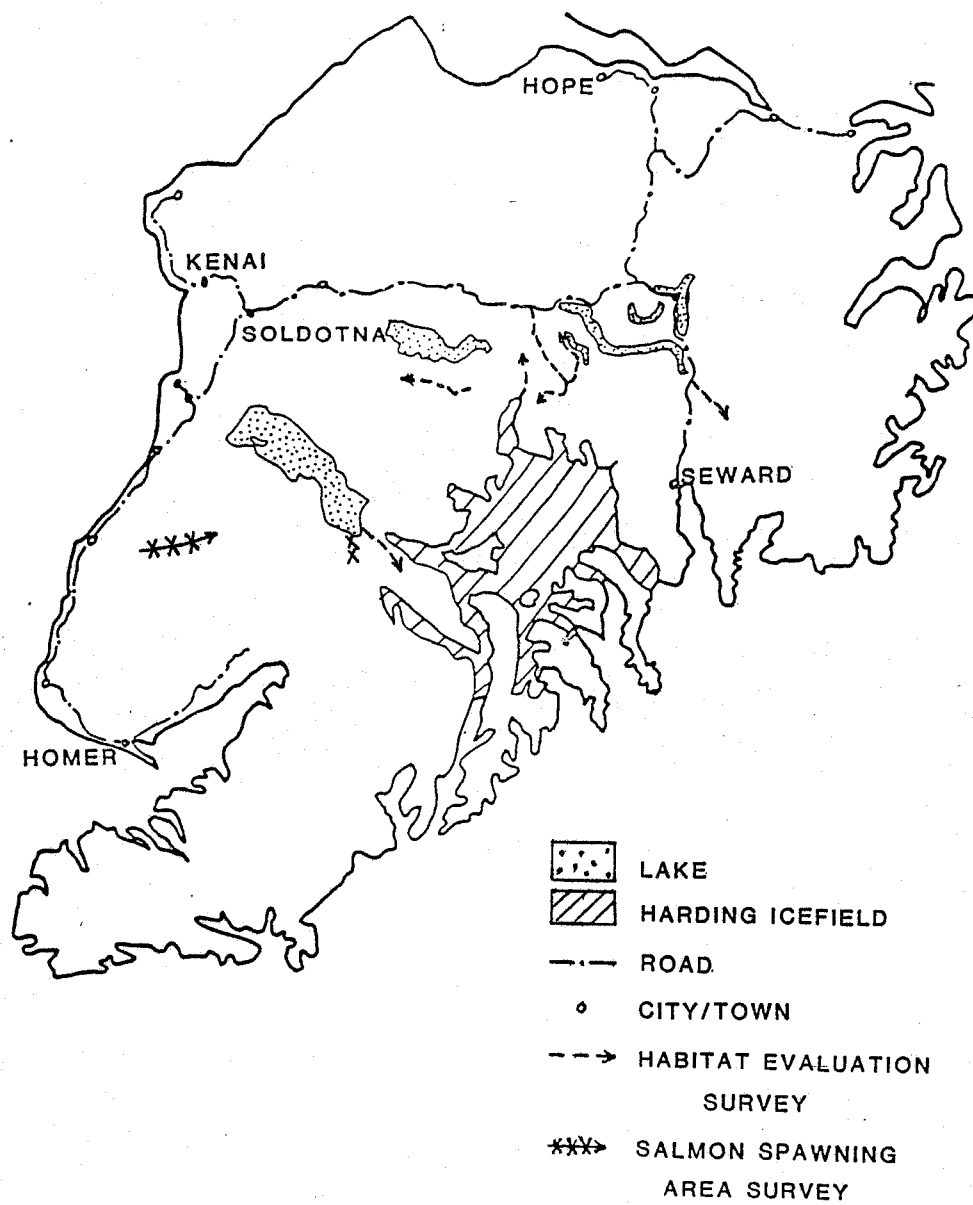


Figure 1. Location of ground survey conducted on the Kenai Peninsula, Alaska, 1986.

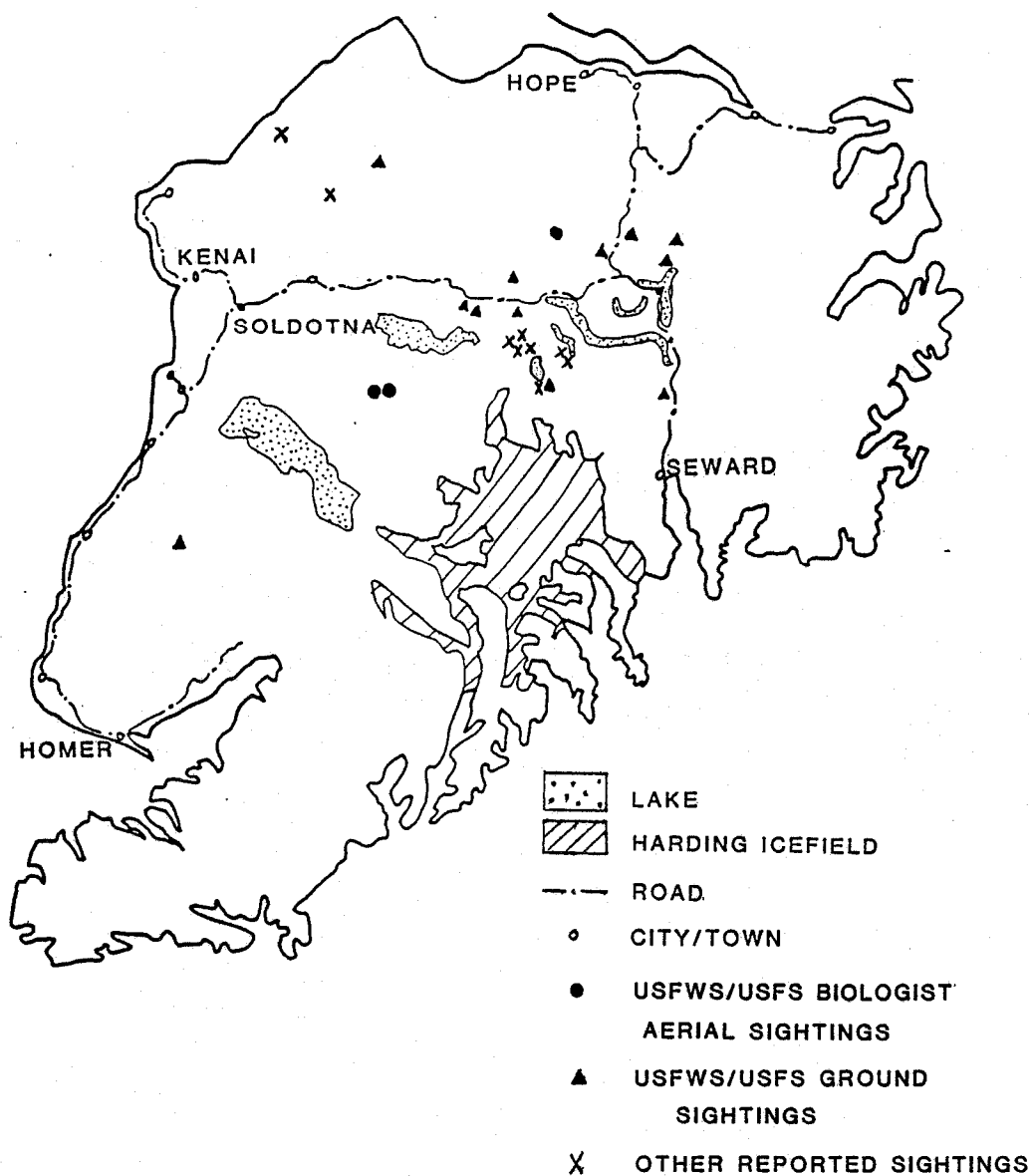


Figure 2. 1986 Brown bear observations on the Kenai Peninsula, Alaska.

Bear Snaring and Tagging Efforts

Brown bears were trapped using Aldritch foot snares following a technique used by John Schoen (ADF&G, Juneau). Tagging procedures followed those described by Schwartz et. al. 1983). The 1/4" (0.63cm) stainless steel cable snares and springs were set and camouflaged in bear trails next to salmon streams. The snare consisted of a lock, stopclamp, 150cm (circum) loop, heavy swivel, and 210cm anchor cable. Stepping sticks were used to direct the bear's foot into the snare and to lift the snare cable 3-5cm above the trigger. Snares were fastened solidly to trees or large roots as close to the swivel as possible (45cm). Each snare was secured to the tree with 2 cable clamps. In addition, a clamp was attached to each snare to prevent the noose from capturing cub or yearling bears. Initially, the clamp was set 30-35cm back from the snare lock, resulting in a 10-13cm diameter loop. The clamp was moved closer to the lock (23-26cm) since it appeared that the larger noose was too large to hold smaller adult brown bear. A trap transmitter was connected to each snare spring by a long cord. When the snare was tripped, a plunger pulled out of the transmitter, doubling the signal pulse.

Relocations of Collared Bears

Radio-collared bears were relocated 100 times using fixed-wing aircraft from April to November 1986.

Russian/Resurrection/Cooper Lake Trail Survey

A survey of human use and bear/human encounters on the Russian River/Resurrection River/Cooper Lake trail system was continued this season. A counter was installed at the Resurrection River trailhead on May 12, and two counters were installed along the Russian River trail on May 13. A counter was installed along the Cooper Lake trail on May 20, but did not function until May 27, due to snow accumulation. All counters were placed at the same locations used in previous years (Appendix 2). Stations with bear observation card questionnaires were also placed at each trailhead at the same locations used in previous years (Appendix 2).

RESULTS AND DISCUSSION

Ground Surveys

Four types of ground surveys were conducted this year; salmon stream surveys, habitat evaluation surveys, brown bear use surveys and surveys for potential snaring sites. Maps of the areas surveyed and detailed information gathered are listed in appendix 1.

Salmon Stream Surveys

Anchor River - Area I :

Area I encompasses the Ninilchik River, Deep Creek, Starski Creek and the Anchor River system (Fig. 3 and 4). We surveyed portions of the south fork of the Ninilchik River from July 15-16. Our survey was conducted during the peak of the king salmon (Oncorhynchus tshawytscha) run. We found bear use to be moderate to heavy even though we did not find many bear killed salmon on the banks. We estimate that there were at least 6 brown bears using the stream during the previous week. We saw one brown bear walking along the creek bottom but it was unaware of our presence.

Although ground surveys were not conducted on the Chakok River, Placer River or Crooked Creek, salmon spawning information was collected.

Crooked Creek receives an early King salmon run that peaks in July. The run begins the 1st or 2nd week of June, with most fish entering at the end of June. The hatchery passes through about 300 per day; total run about 8,000 - 9,000 (Dave Waite per. comm.). The hatchery only lets pass about 2,500 fish above the weir to spawn on their own and retains the others to milk for the hatchery. They let all the Coho salmon (Oncorhynchus kisutch) up to spawn; the number of Coho salmon coming up to spawn has increased over the last 4 years from 536 fish in 1982, to 1898 fish in 1985. The peak of their run is September 24-30. Duration of run is August 23 through September 30. All Sockeye salmon (Oncorhynchus nerka) are stopped at the hatchery. Reported brown bear use on Crooked Creek in T. 1 N, R. 11 W Sec 36; T. 1 S, R. 11 W Sec 1; and T. 1 S, R. 10 W Sec 6,7 was heavy according to Dave Waite.

On the Chakok River more Coho salmon than King salmon spawn. Kings move into the river the last of July to early August. Coho salmon arrive about mid August to mid September. Silver salmon peak at mid August and run past labor day. Estimated escapement is 2,000 - 2,500. At this time, the Alaska Department of Fish and Game (ADF&G), does not conduct spawning ground surveys on the Chakok River (Tom Blend per. comm.).

The Placer River receives an estimated 500 - 1000 Coho in late August through October. It has a few Pink salmon (Oncorhynchus gorbuscha) and Chum salmon (Oncorhynchus keta). Some Sockeye are also present in late July and August (Kurt Nelson per. comm.).

Habitat Evaluation Surveys

Abundance of known and suspected bear foods were recorded in the Skilak river area on 6/30 through 7/2. Section 32, T. 3 N, R. 4 W was of particular interest because it was the den site of a brown bear female. Bear foods of high abundance in the den area were grasses (Graminae) and horsetail (Equisetum sp.). Lady fern (Athyrium Sp.) and other ferns were less abundant. Tracks of a female with yearling appeared to be at least one week old. We collected 3 scats from the area which will be analyzed at a later date. Tracks of a female and a yearling were found on the glacial flats along the river bottom. These were also about 1 week old.

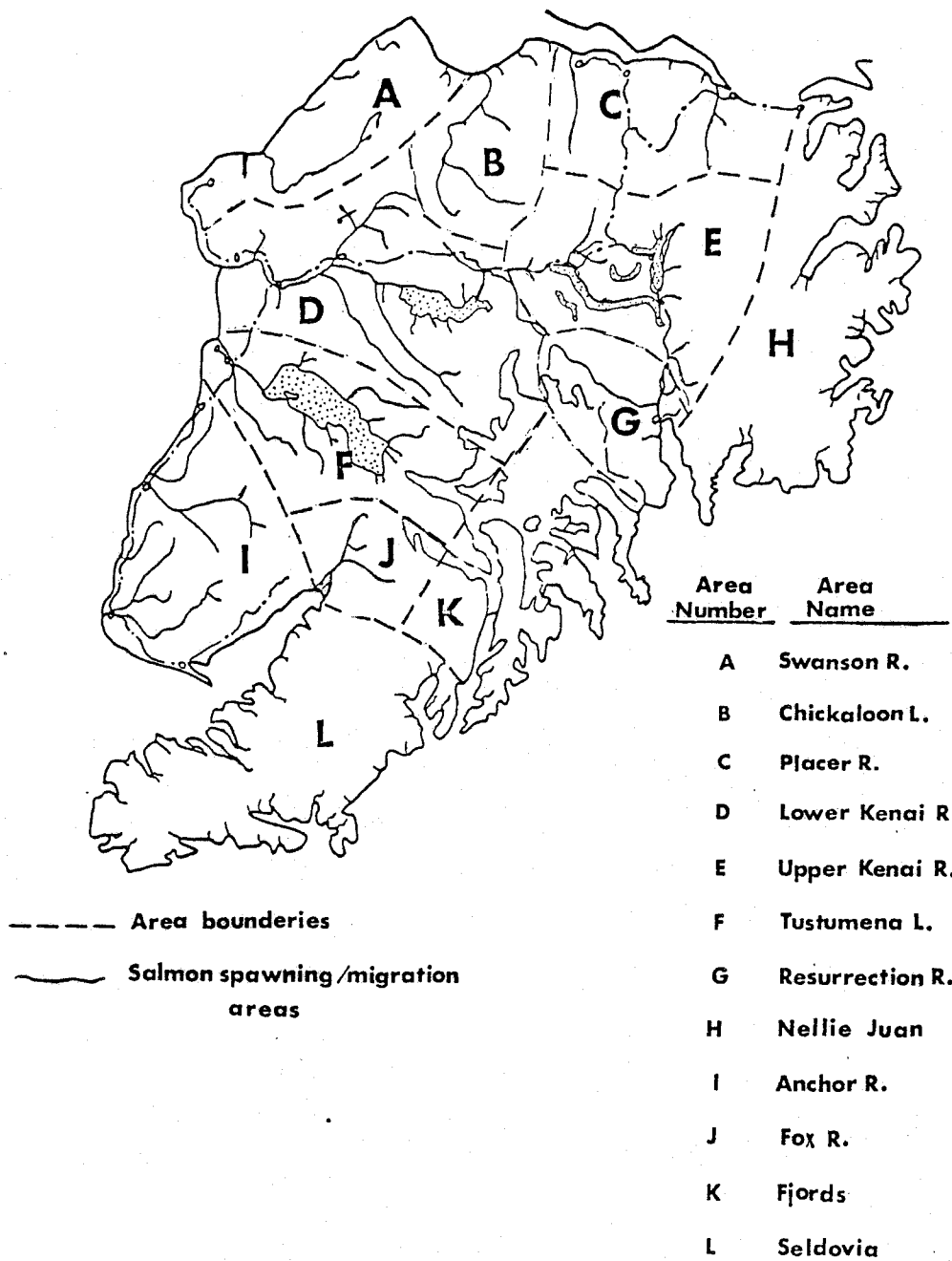


Figure 3. Geographic breakdown of Kenai Peninsula, Alaska. From Bevins et. al. (1985).

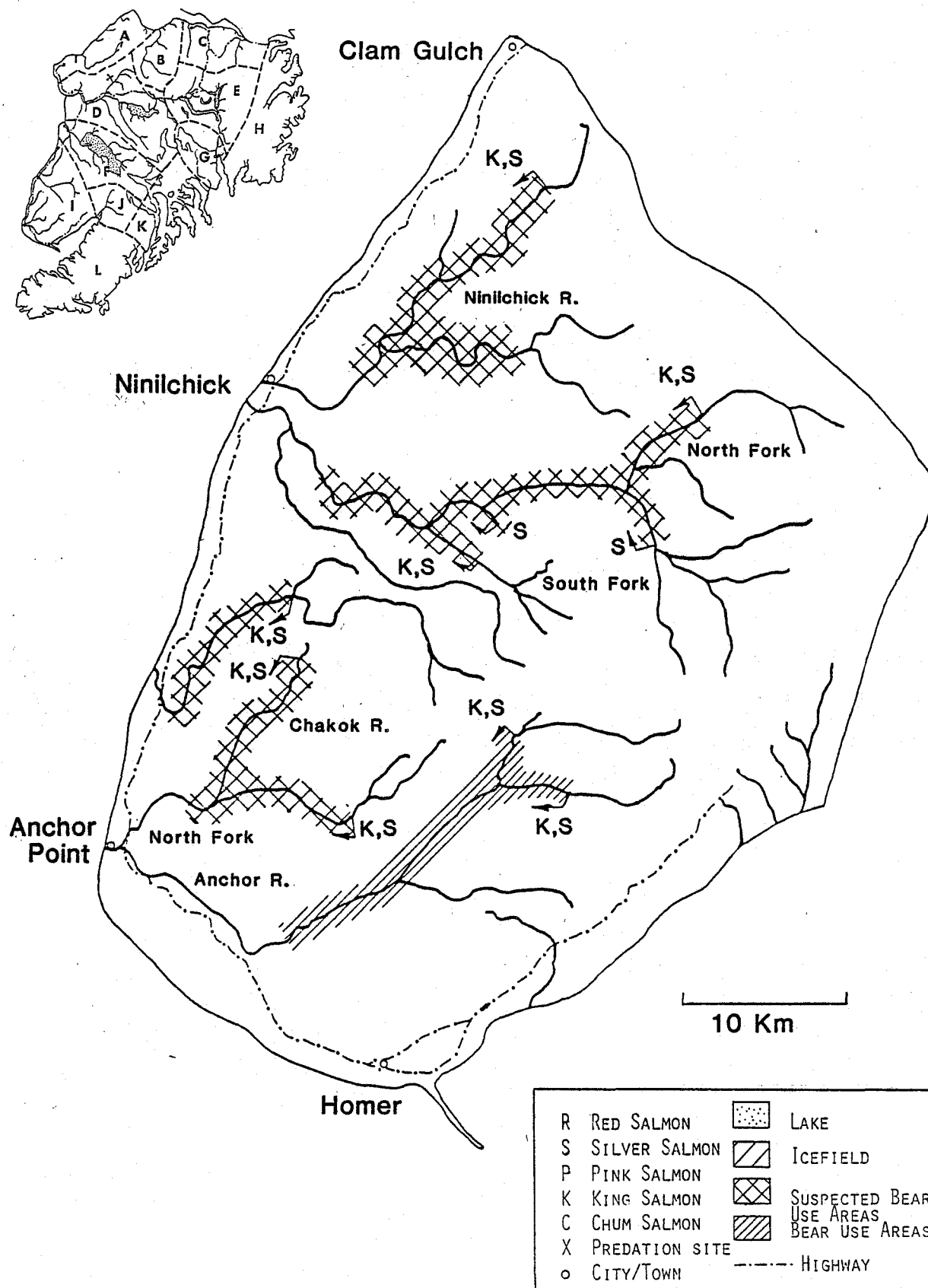


Figure 4. Salmon distribution and brown bear use of salmon spawning areas in Area I (Anchor River), from Bevins et. al. (1985) Revised 1986.

Another den site area was surveyed for abundance of bear foods south of Tustumena Glacier on 7/8-11. Spring foods were in abundance in the hills around Truuli Creek. Grasses and lady fern were most common. As we moved into the alpine, crowberry (Empetrum nigrum), bearberry (Arctostaphylos sp.), blueberry (Vaccinium sp.) and lowbush cranberry (Vaccinium Vitis-idaea) were most abundant. Three scats were collected for future analysis. Tracks of at least 5 individual bears were found along the sandy stream bottom near the glacier. This area receives heavy brown bear use in the spring and the alpine areas offer a good food source in the fall.

The den site areas surveyed had several common characteristics. They were both located in areas which take considerable effort for humans to get to. Steep slopes, rocky outcrops and thick vegetation were similar in both sites. They were located on hills very near a glacier and its glacial flats area.

Brown Bear Use Survey

The South fork of the Snow River was surveyed from June 5-7 to record spring brown bear use. Tracks of a large female with a yearling were observed along the sand and gravel bars going upstream in section 20, T. 2 N, R. 1 E. We found tracks of the same female around a black bear carcass further upstream. The black bear had been fed on by the female and yearling, but was probably a hunter-killed black bear. No other tracks were seen along the river. When surveyed in the spring of 1985, tracks of 4 brown bears had been found. Although use is not as evident in the spring as during the salmon runs, brown bears appear to use the area at this time.

Russian River Trail was surveyed on May 22. Brown bear use was heaviest towards Aspen Flats. Tracks left by 3 individual bears were observed on about a mile of the trail. A single adult's tracks were seen along the trail. Spring bear foods have been documented by Bevins et. al. (1985). In 1984 John Bevins found brown bear were using the area around Aspen Flats to fish for salmon. The U.S. Fish and Wildlife Service (USFWS) located a collared sow this spring in the same area. This year 4 observations of brown bears at or near Aspen Flats have occurred. The area appears to be heavily used by brown bear from spring to fall.

Cooper Lake trail was surveyed June 12. We found most brown bear use near the intersection of this trail with Resurrection River Trail. Tracks of a female with a cub of the year and a single adult's tracks were seen along the trail. Another female, with a yearling, had been on the trail about 1/2 mile from the trailhead. Bear use in this area appeared to be heaviest in the spring. However, fall foods were present.

Surveys For Potential Snare Sites

Benjamin Creek and Goat Creek were surveyed prior to initiating snaring efforts to locate satisfactory shore sites. We checked established bear trails on and away from creeks and flagged suitable locations. Salmon were present in both streams at the time we surveyed. On 6/23 Benjamin Creek had only four king salmon in the portion we examined. Tracks of 1 adult brown bear were present but we did not observe sign of bears feeding on salmon.

On 7/22 Goat Creek was full of Sockeye salmon and bear use was apparent. We observed tracks of a female with a cub of the year and tracks of a female with 2 subadults. The female with the 2 subadults was also observed walking along the south shore of Upper Russian Lake.

Brown Bear Observations and Mortality

During the 1986 field season there were 46 brown bears sighted on 27 separate observations. Sixteen of these observations were made by either Forest Service, or Fish and Wildlife Service employees. The remainder were seen by recreationists or others (Table 1).

In 1985, seventy-three bears were observed on the peninsula, which was nearly twice as many bears as this year. The number of brown bears seen in the Russian/Resurrection/Cooper Lake trail area was the same in 1985 as in 1986; 18 bears. Aerial Surveys of the refuge, to look for brown bears, were not conducted as often this year and probably account for the reduced number of bears sighted outside of the Russian/Resurrection/Cooper Lake trail system.

There were 18 known brown bear mortalities during 1985 (January - December). The sport harvest was 9 males, 5 females, and 1 of unknown sex. This was the highest sport harvest recorded to date. In addition, 2 females were taken in defense of life and property and 1 female was a tagging mortality.

In 1986 (January - December) 14 bears were harvested by hunters, 3 males, 10 females, and 1 of unknown sex. In addition, 2 bears (unknown sex) were taken in defense of life and property and one male was a tagging mortality. Two of the three males killed in the sport harvest were tagged bears. Bear 002 was tagged in 1984 and 010 in 1985.

Bear Snaring and Tagging Efforts

Because of the high costs of tagging brown bears by helicopter darting, we tested the feasibility of capturing bears with snares this year. Snares were set on Benjamin Creek, Goat Creek, and Bear Creek. We captured 4 bears and radio-collared two of them. We snared for 16 days with a total of 123 trap days. The catch rate was 3.25 captures per 100 trap days.

A total of 3.1 hours of helicopter, and 8 hours of fixed wing aircraft time were used as support for bear snaring efforts. This resulted in an estimated cost of \$2,515 for logistic support assuming a charter aircraft rate of \$140.00/hr. for fixed wing aircraft and \$450.00/hr. for the helicopter. An average of \$2,598/captured bear (\$23,382/9 bears) was spent for air support for helicopter capture of brown bear in 1984 and 1985. By foot snaring, air support costs were reduced to \$629/captured bear (\$2,514/4 bears). Actual costs for fixed wing support were less than estimated because refuge aircraft were used.

While air support costs were reduced considerably by snaring over helicopter capture, there were similar person-hours involved. The relatively intensive person-hour effort required by helicopter darting (2 pilots, 2 spotters, and 2 in the helicopter for capture), the numerous occasions people

Table 1. Brown bear observations on the Kenai Peninsula, Alaska, April-September, 1986.

Date	Observer	Location	Status	Comments
4-26	3	T6N R2W S?	1 Adult	on carcass
5-5	1	T7N R4W S18	1 Adult	ran from plane
5-11	2	T5N R1W S14	sow/1 cub	ran away
5-22	3	T3N R4W S12	1 adult	ran away
5-24	3	T3N R3W S10	sow/3 yearlings	unaware
6-2	1	T4N R5W S6	1 adult	unaware
6-3	2	T3N R3W S12	sow/1 yearling	threatened/ran
6-10	3	T5N R2W S11	1 adult	unaware
6-12	3	T3N R4W S2	1 adult	ran away
6-15	3	T3N R4W S3	sow/3 cubs	feeding
6-15	1	T6N R8W S32	1 adult	unaware
6-16	1	T2N R7W S?	1 adult	feeding
6-16	1	T2N R7W S?	2 adults	feeding
6-23	1	T5N R4W S?	sow/1 cub	on carcass
7-9	3	T3N R4W S11	1 adult	ran away
7-14	2	T2N R1W S3	1 adult	ran away
7-15	2	T1S R12W S21	1 adult	unaware
7-19	2	T6N R1E S	2 adults	walked off
7-21	3	T3N R3W S30	sow/2 subadults	ran away
7-22	2	T3N R3W S30	sow/2 subadults	ran away
7-28	1	T8N R7W S28	1 adult	walked off
8-4	3	T7N R9W S19	1 adult	unaware
8-15	1	T4N R5W S6	2 adults	ran away
9-3	3	T3N R3W S19	sow/2 yearlings	1 cub very aggressive
9-11	3	T8N R9W S12	2 adults	unaware
9-12	1	T6N R7W S55	1 adult	walked off
9-19	1	T4N R5W S55	1 adult	crossed road

1 USFWS employee

2 USFS employee

3 OTHER (recreationist, pilot)

stood by to dart but did not because of bad weather or not finding bears, and because snaring was only effective over a short time period, the difference in person-hours of effort/captured bear appeared similar. Also, while helicopter darting required highly experienced personnel, much of the snaring was accomplished by seasonal biologists.

Bear snaring did result in a 25% mortality rate, because one of four bears captured, was euthanized. Only one of nine bears captured by helicopter died resulting in an 11% mortality rate. While a 10% mortality rate is not unusual in helicopter capture operations, the snaring mortality rate we encountered was unusual. Discussions with John Schoen (ADF&G), Will Troyer (NPS), and Gary Alt (Pennsylvania Game Commission) who have captured hundreds of bears indicated that leg hold snaring rarely caused severe injuries and the few bears, released with damaged feet, recovered. Both Alt and Troyer reported that they released bears with injuries as bad or worse than occurred to the bear we euthanized and those bears recovered. The major difference between those studies and the Kenai Peninsula situation is that we were working with brown bear in an area with cabins and high numbers of recreationists. For this reason, we believe that bears with severe snare injuries, such as the one occurring in 1986, may have to be euthanized for public safety reasons even though they may have recovered from the injury. We feel that snare injuries such as occurred in 1986, are highly unusual, and most can be prevented by a few additional precautions while preparing sets such as clearing any small trees, assuring there are no branches or tree forks within 5 m, and setting snares no more than 5cm above the trigger.

On the July 30 - August 3, Benjamin Creek had King Salmon present but brown bear use appeared to be low. No brown bear were caught by snares. Brown bear tracks along the creek appeared to be 1-3 days old. Absence of brown bears could have been caused by human activity in the area. USFWS collected salmon eggs and installed water temperature monitors in Benjamin Creek on July 21. The ADF&G helicopter surveyed the area July 29 and 30. We arrived by helicopter July 30, to set snares. The sets were tripped frequently by black bears. Stoppers on the cable and loop size prevented any black bear from being caught. We believe our stoppers were set too far from the end of the cable (32cm) to hold some smaller brown bears. Snare stoppers were all readjusted to 25cm for the next snaring effort at Goat Creek.

Two brown bears were caught in snares at Goat Creek, August 6-11. On August 8, a yearling female, was caught accidentally when the cable loop cinched above the elbow preventing the cable from slipping off the leg. The bear was processed and brought out of the drug quickly to avoid confrontations with the adult female. The yearling may belong to the female that was radio collared in 1985; bear number 005. On August 9, a large male was captured. The bear weighed about 500 pounds and was very old. The bear remained relatively calm before and during the darting. It was processed and fitted with a radio collar.

We set snares for three nights along Bear Creek on Upper Russian Lake. On September 10, we captured two brown bears. The first was a young female. We processed and radio collared her. She was located by radio several days later on the West side of Goat Creek. Also on September 10, a young male was

caught. After darting the animal we realized it had dislocated the ulna and radius from the wrist on its front leg. The cause of the injury was a small diameter tree (9cm) that was 90cm from the tree where the snare was anchored. The bear wrapped the cable around the smaller tree until the paw was held against it tightly. With the paw in this position the bear was able to force the injury. We euthanized this bear.

Detailed snaring information for each creek appears in appendix 1.

Aerial Surveys and Relocations of Collared Bears

Five brown bears were relocated 100 times in 1986. Two were captured in 1985, and three were captured in 1986. A summary of those observations follows:

Bear 004, an adult male captured in 1985, was relocated 27 times in 1986. He left his den near Fox Lake between April 1 and 11. On April 28, he was by Emma Lake (outside the area he used in 1985), apparently scavenging on caribou that died during the 1986 release near Lake Emma. He traveled extensively, going to Windy Lake in mid-May, again outside the area he used in 1985. By mid-June, he was apparently feeding on salmon in the Funny River. He utilized the Funny River until mid-July, when he began using various salmon streams along the north shore of Tustumena Lake. He entered his 1985 den again in mid-November 1986. Bear 004 used approximately 462 square miles (1200km²) in 1986.

Bear 005, an adult female captured in 1985 on Tustumena Glacier Flats, was relocated 15 times in 1986. She left her den between April 1 and 16. She had all three 3-year-old cubs with her until late May. She was seen near her cubs for the last time in mid-June. She and her cubs were found on the remains of caribou near Lake Emma on May 15. She primarily utilized an area around Tustumena Glacier. She was apparently feeding on salmon in Moose Creek in mid-July. Contact was lost after she was located near Green Lake on July 28, 1986. Bear 005 used approximately 102 square miles (265km²) in 1986.

Bear 007, an adult female captured in 1985, was relocated 37 times in 1986. She was active at her den site in late April. She stayed at the den site for over a month and was believed to have shed her collar. She moved to the Russian River in late June and stayed there until late September, when she moved to the Kenai River. She was on Goat Creek during the snaring effort and we speculate that the yearling (011) snared on August 8, may have been hers. She denned in mid-November about 2 miles east of her 1985 den site but in similar mountainous terrain. Bear 007 used approximately 117 square miles (300km²) in 1986.

Bear 012 was an adult male captured on July 9, 1986, along Goat Creek, above Upper Russian Lake. He was relocated 13 times and traveled widely, apparently fishing the Killey River and Bear Creek. He was found near Soldotna in mid-October and finally denned on the south side of Skilak Glacier in mid-November. Bear 012 used approximately 438 square miles (1135km²) in 1986.

Bear 013 was an adult female, with one cub, captured September 10, 1986, near Upper Russian Lake. She was relocated 8 times, and utilized the upper Russian Lake area (16mi²; 40km²) until she denned along Summit Creek in mid-November. She was seen with a new cub and 2 other adult brown bear, similar to her in size, in late October.

A summary of aerial tracking data in 1986 indicate that brown bear emerged from their dens in early April. Bears did not appear to select any particular habitat in spring, but wandered widely, apparently trying to take advantage of a variety of potential food sources. They appeared to exhibit a strong attraction to carrion. Bears used salmon as soon as they were available and continued their use almost until they denned in mid-November.

Russian/Resurrection/Cooper Trail Survey

For the third consecutive season trail counter information has been gathered to identify trends in visitor use of the Russian/Resurrection/Cooper Lake trail system (Tables 2, 3). Bear observation questionnaire cards provided information about bear/human encounters on the trails. Interpretation of the data follow Bevins et.al. (1985). Calculations appear in appendix 3.

There were approximately 5005 visitors to the trail system this year. Our data collecting started 25 days earlier than in 1985, but was similar to the 1984 season. A comparison of visitor numbers for the past three field seasons is shown in Figure 5.

The Russian River Trailhead was visited by an average of 36 people per day from May 13 to September 4. A total of 3443 people entered and exited through Russian River Trailhead. This was a 15% decrease in visitation from last year. However, we had trail counter failure twice during the summer which probably accounts for a large loss of data since it occurred from 6/29 to 7/6, and from 8/29 to 9/4. The trail counter located along Lower Russian Lake was out of order so many times that the data was unusable.

Resurrection Trailhead also received less visitors than last year. There were about 3 people per day using the trail as opposed to a calculated 4 per day in 1985. This could have been due to the construction of the bridge at Exit Glacier which is very close to the trailhead. Until mid-July there was heavy equipment and materials in front of the trailhead which may have deterred some people from taking the hike.

There was an increase in visitor use on the Cooper Lake Trailhead this year. In 1985, 489 people used the trail between 7/1 and 9/12. This year approximately 884 people used the trail between 7/1 to 9/3. An increase in moose hunters using the area may account for some of this increase.

This year 354 groups, composed of 904 people, filled out bear observation cards. Black bears were observed 37 times totaling 54 bears (Table 4). Eighteen brown bears were spotted on 10 different occasions (Table 5). Brown bear observations were verified by telephone. While the number of brown bears observed were identical, black bear observations were down by nearly 50% in 1986 from the year before. One explanation for this is that the late spring in

Table 2. Estimated visitors to the Russian/Resurrection/Cooper trail system determined by questionnaire and trail counter information, 1986.

Location	# responses	In and Out %	Est. # In and Out/day	In or Out % to:		Est. # In or Out/day to:		Total use per day
				Cooper-Russian-Resurrection	Cooper-Russian-Resurrection	Cooper-Russian-Resurrection	Cooper-Russian-Resurrection	
Lower Russian	675	94%	36	3%	2%	.99	.88	38
Cooper Lake	144	50%	6		33%		3.8	11
Resurrection	84	70%	2	4.7%	25%	.12	.6	3
TOTAL	903	---	44	---	---	1.11	4.4	52

Table 3. Trail counter data for Russian River/Resurrection/Cooper Lake Trail System, May - September, 1986.

Trail counter location	registered counts	# days operating	Periods of operation	average # counts per day
Lower Russian	7069	96	5/13-6/28 7/6-8/29	74
Cooper Lake	1703	100	5/27-9/3	17
Resurrection	420	96	5/12-6/20 6/30-9/3	4

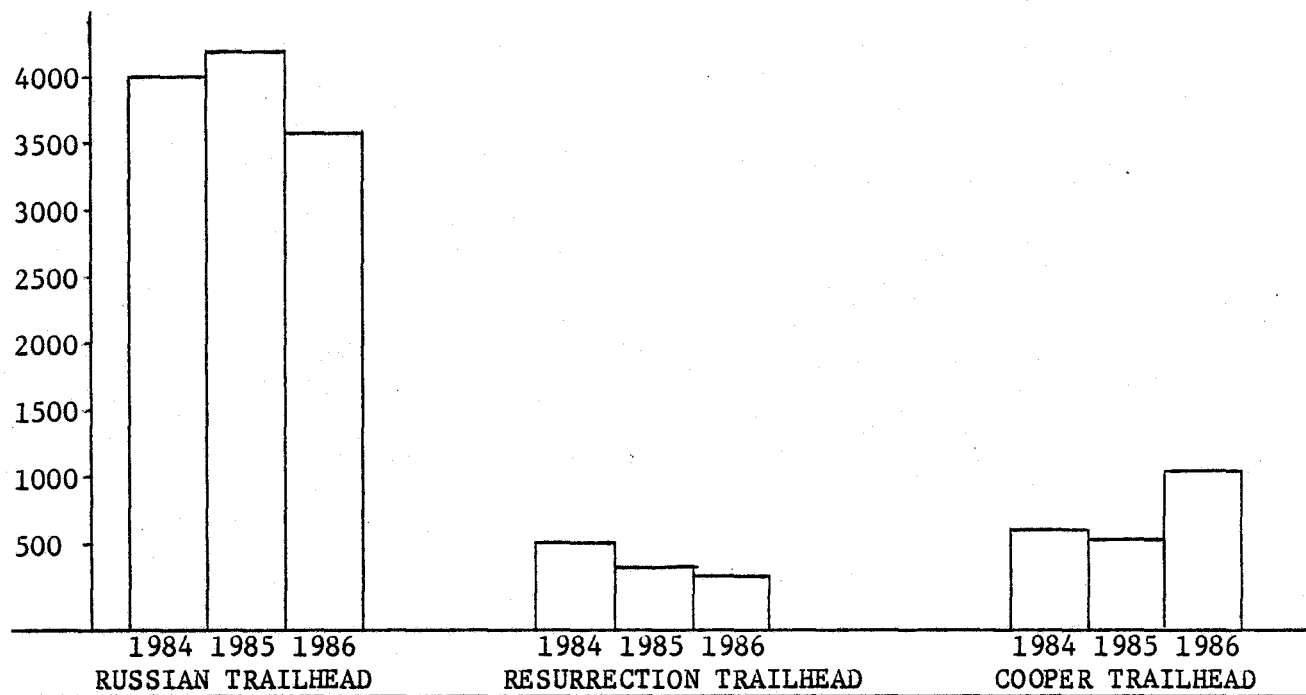


Fig. 5. Combined visitor information for 1984,1985,and 1986 for the Russian River/Resurrection River /Cooper Lake trail system.

Table 4. Black bear observations occurring within the Russian/Cooper/
Resurrection trail system, May-September, 1986.

Date	Number of bears	Distance(ft.)	Location	female w/ cubs	bear's reaction
5-17	1	100	T2N R2W Sec9	no	ran away
5-18	4	300	T3N R3W Sec3	yes	unaware
5-20	1	300	T4N R4W Sec21	no	unaware
5-25	4	300	T3N R3W Sec?	yes	unaware
6-4	4	300+	T3N R3W Sec33	yes	unaware
6-5	2	100	T2N R2W Sec8	no?	aggressive
6-8	1	100	T3N R3W Sec21	no	indifferent
6-9	4	100	T4N R4W Sec16	yes	unaware
6-12	3	100	T4N R4W Sec9	yes	ran away
6-19	2	300+	T4N R4W Sec17	no	unaware
6-19	1	300+	T4N R4W Sec17	no	unaware
6-21	1	300	T4N R4W Sec4	no	ran away
6-21	1	100-300	T4N R4W Sec4	no	ran away
6-22	1	300	T4N R4W Sec8	no	unaware
6-22	1	300+	T4N R4W Sec16	no	unaware
6-25	1	300	T4N R4W Sec16	no	unaware
6-27	1	300	T2N R2W Sec7	no	ran away
7-3	1	100	T3N R3W Sec14	no	ran away
7-3	1	300	T3N R3W Sec17	no	unaware
7-3	1	100	T3N R4W Sec12	no	ran away
7-6	1	300	T4N R4W Sec16	no	unaware
7-7	1	300+	T4N R4W Sec17	no	unaware
7-9	2	100	T4N R4W Sec16	no	ran away
7-14	1	300+	T4N R4W Sec17	no	unaware
7-14	1	300+	T4N R4W Sec15	no	unaware
7-14	1	100	T4N R4W Sec16	no	indifferent
7-18	2	300	T4N R4W Sec16	yes	unaware
7-18	1	100	T3N R3W Sec?	no	unaware
7-20	1	100	T3N R3W Sec12	no	indifferent
7-21	1	100-300	T3N R4W Sec4	no	unaware
7-24	1	100	T3N R3W Sec?	no	ran away
7-29	2	100	T4N R4W Sec16	yes	unaware
7-31	1	300+	T3N R3W Sec18	no	unaware
8-7	1	300+	T3N R3W Sec16	no	unaware
8-13	1	100-300	T4N R4W Sec16	no	unaware
8-14	1	100	T4N R4W Sec9	no	ran away
8-16	1	100-300	T4N R4W Sec4	no	ran away

Table 5. Brown bear observations occurring within the Russian/Cooper/
Resurrection trail system, May-September, 1986.

Date	Number of bears	Distance(ft.)	Location	female w/ cubs	Bear's reaction
5-22	1	100-300	T3N R4W Sec12	no	indifferent
5-24	4	300+	T3N R3W Sec16	yes	unaware
6-12	1	100	T3N R4W Sec2	no	ran away
6-15	4	1000	T3N R4W Sec3	yes	unaware
6-20	1	100	T3N R3W Sec16	no	ran away
7-9	1	100	T3N R4W Sec11	no	ran away
7-12	1	300+	T3N R4W Sec10	no	unaware
7-21	3	300+	T3N R3W Sec30	yes	ran away
8-10	1	300+	T3N R3W Sec12	no	unaware
8-13	1	100-300	T3N R3W Sec17	no	unaware

1985 provided easier viewing of black bears because the leaves were not on the trees and shrubs until later in the season. Encounters with black or brown bears this season were uneventful. The bears were either unaware or ran away from the observers. There was a single report of a pair of black bears one of which was aggressive (i.e. woofed) but never charged. The bears were on a carcass.

CONCLUSIONS AND RECOMMENDATIONS

Ground Surveys

Most of the original objectives have been met with respect to ground surveys over the past three field seasons. Brown bear use has been documented on all but a few rivers used during salmon runs. An effort should be made to document brown bear use on the remaining creeks or rivers not surveyed. The Chakok River is of particular interest because it is not being surveyed by ADF&G biologists at this time. USFWS biologist Jack Dean reported seeing heavy brown bear use this year on Little Indian Creek (Area B, Fig.). This creek is also unsurveyed.

Streams that contain late spawning coho salmon (October) have not been surveyed for bear. These should be surveyed in the future.

Spring habitat selection by brown bears will require further research. Spring bear foods have been documented in habitat evaluation surveys. However, spring foods are nearly uniform in distribution on much of the peninsula. This makes it difficult to determine if selection of specific sites is occurring and to what degree it is occurring.

Brown Bear Observations and Mortality

Brown bear sightings in the Russian River/Resurrection River/Cooper Lake trail system were nearly all in the vicinity of Upper Russian Lake. This area appears to contain important components and should be protected. Placement of new cabins or trails should be carefully planned to avoid disturbing brown bear use through the salmon spawning season.

A conscientious effort on the part of all three agencies should be made to continue recording brown bear sightings each year. This will enable us to keep current on existing areas of high brown bear use as well as detecting changes in use areas.

Snaring and Tagging Efforts

The snaring operation was successful for the relatively small effort expended. Snaring was a viable, cost effective way to tag brown bears on the Kenai Peninsula.

During future attempts at snaring brown bears, caution should be taken in choosing an anchor point for the cable. A snared bear should be able to move freely around the tree in a complete circle. Snares should not be anchored to trees that have obstacles that may hang-up the cable.

We found that bears were using the spawning streams the heaviest prior to peak spawning. Snaring attempts should coincide closely to this time of use.

Setting numerous snares for just a few days was a successful method to snare brown bears on salmon spawning streams. In this way the bears using the area were readily caught in the least amount of time. This also keeps human disturbance in the area to a minimum. Trap radios helped reduce disturbance by reducing trips to check the snares.

Russian River/Resurrection River/Cooper Lake Trail Survey

Even with trail counter troubles throughout the summer, the data concerning overall visitor use was extremely similar for the last three years. This can be interpreted two ways. Considering that each year there were losses due to mechanical breakdowns of the trail counters, the total visitors using the trail system appear to be holding at approximately 5000.

Reliability of trail counter operation has not been good. Counters have been vandalized, wires have been severed by rodents, or the machine has simply failed. If trail counter data is to be collected in the future, we suggest a more permanent set-up for installing counters, with closer monitoring of the counter and trail. Counters placed on trees were difficult to anchor solidly. We recommend a 4 x 4 square post anchored in the ground. Ground truthing of data, by having observers at the trailheads, is necessary if more accurate information is to be obtained. Maintaining trail counters should occupy one seasonal person's entire summer.

LITERATURE CITED

- Bevins, J.S., C.C. Schwartz, E.E. Bangs, and K.J. Nelson. 1985. Kenai Peninsula brown bear studies: Report of the Interagency Brown Bear Study Team, 1984. Alaska Dept. Fish and Game, Misc. Publ. 103pp.
- Risdahl G.L., C.A. Schloeder, E.E. Bangs, and C.C. Scwhartz. 1986. Kenai Peninsula brown bear studies: Report of the Interagency Brown Bear Study Team, 1985. Alaska Dept. Fish and Game, Misc. Publ. 92pp.
- Schwartz, C.C., A.W. Franzmann, and D.C. Johnson. 1983. Black bear predation on moose (bear ecology studies). Fed Aid in Wildl. Rest. Final Rep. Proj. W-17-11, W-21-1, and W-21-2. 135pp.

Personal Communications

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APPENDIX 1
FIELD REPORTS

SALMON SPAWNING AREA EVALUATION WRITEUP

Ninilchik River 7/15-16/86

The Ninilchik River receives an annual average escapement of 780 King salmon. The peak of the run occurs in mid July to late July. The King salmon use the south fork of the Ninilchik primarily, with a few occasionally moving up the north fork. The King's spawn as far upstream on the south fork as water depth will allow. A few silvers and steelhead use this system but numbers are unknown.

We surveyed portions of the river from section 30, T 1 S, R 12 W to section 27, T 1 S, R 13 W. The river meanders extensively throughout this bottom, averaging 15 feet wide in most places. The depth varies from a few inches up to 4 feet.

Vegetation along the bottom is mostly tall willows and bluejoint, with some patches of alder and sedges, and dense stands of horsetails. Spruces are found scattered about the bottom, but are more common on the adjacent slopes. Adjacent to the bottom are low knolls which are covered mostly by stands of aspen, cottonwood and spruce. The understory is composed mostly of mosses, low bush cranberry, crowberry and stands of willow and menziesia.

We spent almost the whole time surveying from the stream. We either walked directly in the stream or adjacent to it on the bank. There were occasional gravel or sand bars and we were able to observe bear tracks on them. Before we started our survey we observed a brown bear along the river, in section 21, T 1 S, R 12 W. The bear fled from the approaching helicopter. We later observed a brown bear walking along the bottom, heading upstream in section 26, T 1 S, R 13 W. Because of the color and markings on the bear we believe it to be the same bear that we saw earlier in the day.

The first day we surveyed we counted 83 live salmon. We also observed numerous brown bear tracks along the sand bars. We were able to determine that there were at least 6 bears using this portion of the stream during the previous week. They were a sow with a yearling cub, another sow with a new cub, a single subadult, and a large adult. It appears that the bears were looking for salmon, however, we only found 5 salmon on the banks that were killed by bears. Even though we found extensive use of the banks by bears, it appeared that they either were unable to catch many fish or the fish that were caught were completely consumed by the bears leaving no sign behind.

In section 25, T 1 S, R 13 W we found a dig that had been done by a brown bear. We were unable to determine what it was digging for, but since it was in the sand and we observed hair imprints we feel that it may have been used as a cool bed. A little further downstream from this we found a brown bear trail and rub tree that had brown bear hair in it.

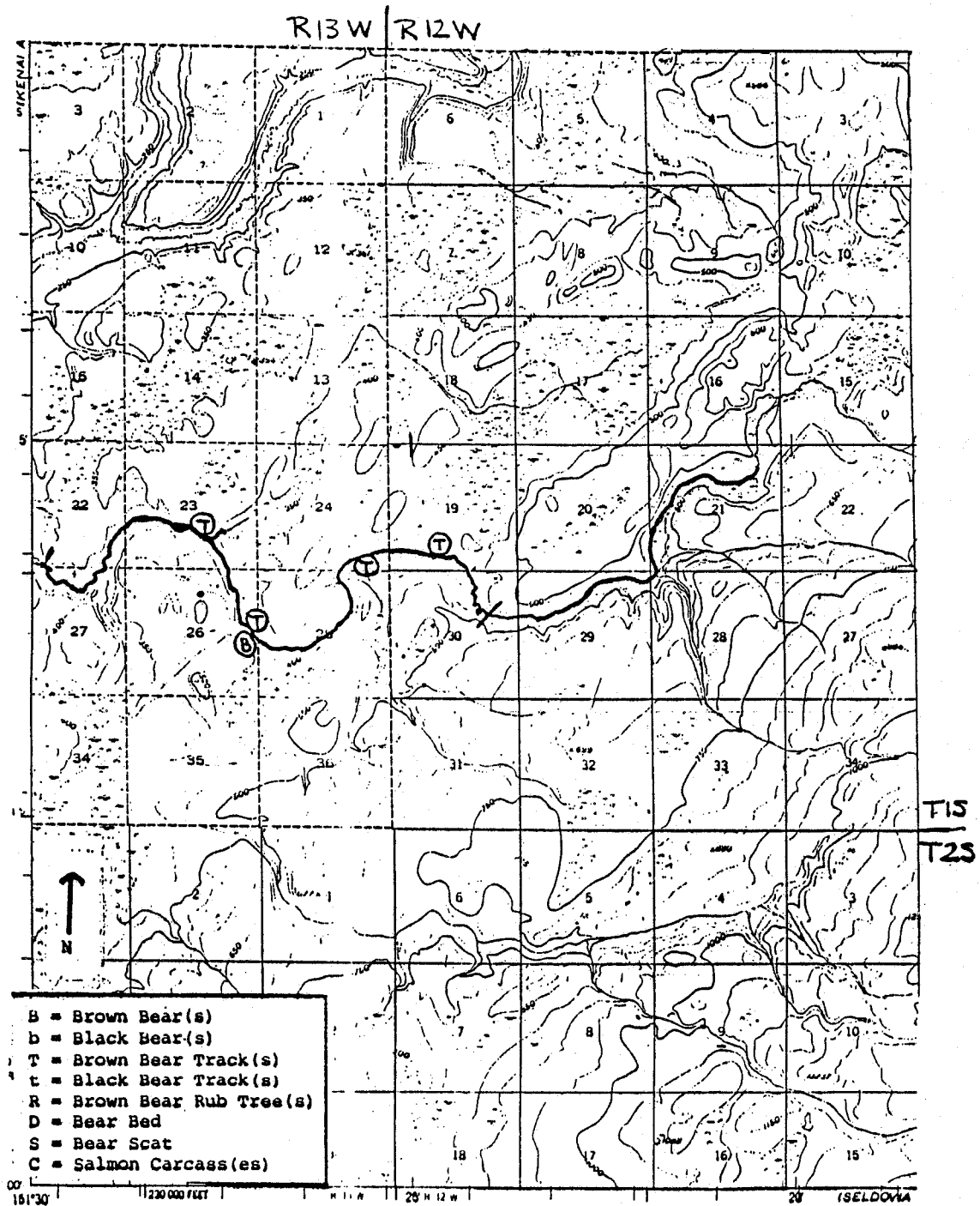
We left the stream bottom close to section 26, T 1 S, R 13 W and traveled along a low knoll that paralleled the river bottom. We observed bear scats along here and we found two cottonwood trees with the bark ripped off and the cambium chewed on by a brown bear(s).

On the second day we surveyed downstream from our campsite. We counted 41 live salmon and only 1 bear killed salmon. It appears that in this area there is enough of an overhanging bank for the fish to hide under and the bears do not spend as much time fishing here.

We collected 1 ovarian fluid sample and 6 kidney samples for the Alaska Department of Fish and Game. We collected these by snagging Kings with a treble hook and dissecting the fish.

Along the lower portions of the Ninilchik development by homeowners has reduced the number of available fishing sites for the brown bears. The upper portion of the river is used during the fall by moose hunters. Although the upper portion is not accessible by roads, there are many seismic lines intersecting it. From what we were able to determine, access is primarily by ATV's.

It appears that the Ninilchik is important to brown bears during the salmon season. The bear's use a large portion of the upper river to fish from. It is not known how long during the salmon season that the bear's use this river.



South Fork of the Ninilchik River

Brown Bear Habitat Evaluation Survey

Area: Skilak River
Personnel: Schloeder/Jacobs

Date 6/30-7/2/86

The initial purpose of this survey was to retrieve a radio collar that was shed by a sow, and to assess foods available in the area that the sow and her yearling cub may have been using after emerging from her den. The day the survey was to begin it was discovered that the sow had not shed her collar and we relocated her in the upper Russian River drainage.

The survey began at Pothole Lake, section 7, T 3 N, R 4 W. The first portion of the survey included the river bottom of Skilak River. The river bottom is mostly braided with wide shores of gravel and sand. Adjacent to these shores are patches of alder and cottonwood interspersed with graminoids and some forbs. Patches of hemlock and spruce occur occasionally along the slopes which are dominated by dense stands of alders. The shoreline occasionally changes, with the river sometimes running immediately adjacent to rock bluffs. Vegetation along these bluffs consists mostly of isolated stands of spruce and hemlock, surrounded by dense stands of alder and occasional stands of willow. The gravel disappears at the base of Skilak Glacier, section 31, T 3 N, R 4 W.

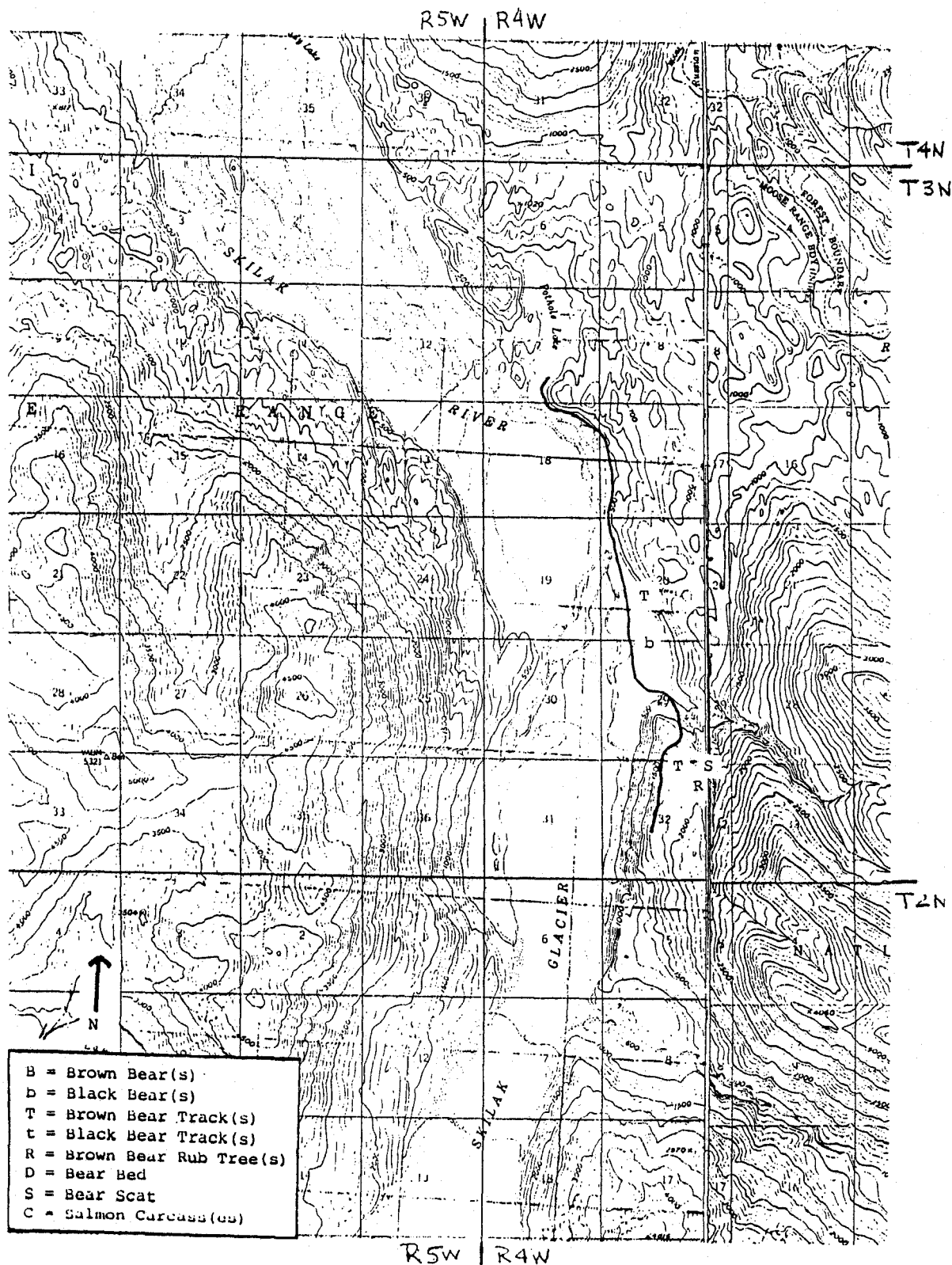
A brown bear sow and yearling cub had wandered all over the river bottom, with the tracks going both upstream and downstream. The tracks appeared to be at least 1 and no greater than 2 weeks old. Moose appear to use this river bottom extensively as a travel route. We also saw evidence of use by wolves.

Segment A of the survey began in section 29, T 3 N, R 4 W, along a stream bottom that exits from a narrow ravine. We entered a cottonwood grove that ran along the stream bottom. Horsetail and bluejoint were common underneath the cottonwoods, while some alder grew in thin patches. We followed a bear trail along the stream bottom and then up the side of the mountain in order to reach the area in which the brown bear sow, her cub, and den were relocated. The trail wound upwards through stands of hemlock and menziesii, with some graminoids and horsetail scattered about. We occasionally saw small patches of elderberry, high bush cranberry and crowberry. Periodically the trail entered dense stands of alder which contained some devils club and ferns.

As the trail approached the top of the ridge the hemlock/spruce stands became fewer and fewer, with the trail winding along through stands composed almost exclusively of alder and devils club. We encountered two wet seeps which contained large amounts of graminoids and horsetails. We also encountered patches of dense willows. Segment A ended in section 32, T 2 N, R 4 W.

Brown bear use on the trail was evident in the form of green vegetation scats and tracks. Bear rub trees were also observed along the way. All trees were spruces that had branches broken off and we found brown bear hair stuck to all the rubs. Samples were taken from 3 of the 8 scats we encountered. Along both of the seeps we found brown bear tracks, and they appeared to be from a sow with a yearling cub. We were unable to locate the den site.

In summary, the area in which the brown bear sow and her cub were spending most of their time upon emerging from the den, up until mid June when it was thought that she had lost her collar, appears to be fairly good habitat for spring feeding. Use by both her and her cub was extensive as evidenced by the well made trail(s) and rub trees. It appears that they were selecting for spring grasses and horsetails because the other bear foods that we observed were not available at the time.



Skilak River

BROWN BEAR HABITAT SURVEY

LOCATION: Skilak River

TRANSECT #: 1

DATE: 7/1/86

OBSERVERS: Schloeder/Jacobs

H = High
M = Medium
L = Low
t = trace

SPECIES	TRANSECT SEGMENT			
	A	B	C	D
Sedge (<i>Carex</i> sp.)				
Other sedge (<i>Cyperaceae</i>)				
Grasses (<i>Graminae</i>)	H			
Horsetail (<i>Equisetum</i> sp.)	H			
Lady Fern (<i>Athyrium</i> sp.)	M			
Other ferns	M			
Cow Parsnip (<i>Heracleum lanatum</i>)				
Angelica (<i>Angelica</i> sp.)				
Dandelion (<i>Taraxicum</i> sp.)				
Mountain Sorrel (<i>Oxyria digyna</i>)				
Wild Cucumber (<i>Streptopus amplexifolia</i>)				
Chocolate Lily				
<i>Astragalus</i> sp./ <i>Oxytropis</i> sp.				
<i>Hedysarum</i> sp.				
Willow (<i>salix</i> sp.)	L			
Cottonwood (<i>Populus trichocarpa</i>)	L			
Blueberry (<i>Vaccinium</i> sp)				
Salmonberry (<i>Rubus spectabilis</i>)				
Crowberry (<i>Empetrum nigrum</i>)	M			
Devil's Club (<i>Oplopanax horridum</i>)	L			
Highbush Cranberry (<i>Viburnum edule</i>)	L			
Lowbush Cranberry (<i>Vaccinium vitis-idaea</i>)				
Bearberry (<i>Arctostaphylos</i> sp.)				
Mountain Ash (<i>Sorbus</i> sp.)				
Currant (<i>Ribes</i> sp.)				
Elderberry (<i>Sambucus racemosa</i>)	L			
Rose/Raspberry (<i>Rosa</i> sp., <i>Rubus</i> sp.)				
Salmon				
Moose				

Brown Bear Habitat Evaluation Survey

Area: Tustumena Glacier
Personnel: Schloeder/Jacobs

Date: 7/8-11/86

Portions of the river bottom and surrounding hillsides were surveyed in order to locate the densite of a radio collared female and her cubs, and to see what potential bear foods were available in the area in order to record their relative densities. Amount of use by other bears was also noted. The survey also included a quarter mile section of Clear Creek, beginning at the mouth where it enters Tustumena Lake, and ending at the first fork in the stream.

Segment A of the survey begins at the shore of Tustumena Lake, section 34, T 1 S, R 8 W. The trail first starts in a small graminoid and sedge meadow. The trail then winds along the old river bottom that is now a mature spruce forest with an understory of crowberry, low bush cranberry and patches of horsetail. As the river bottom becomes drier the understory changes and becomes predominantly covered with mosses and lichens. There is an occasional cottonwood growing throughout this area. At the end of this bottom the trail enters an alder/cottonwood stand before it heads up a small hill.

This trail receives heavy use by both wildlife and humans. We counted 18 scats which appeared to be either composed of green vegetation (horsetail and grasses) and/or crowberries and low bush cranberry. We also found one bear rub that had some brown bear hair on it. Along the Tustumena Lake shore we noted tracks of a female brown bear with a small cub of this year as well as the tracks of 2 subadults that appeared to be traveling together.

Segment B includes a small hill and portions of the river bottom in section 36, T 1 S, R 8 W, and section 1, T 2 S, R 8 W. This segment is a mosaic of alder, graminoids, forbs and horsetail. Occasionally there are patches of small cottonwoods. The adjacent hillsides are all steep sided cliffs with spruce, cottonwoods, alders, and some patches of willow. There are a few wet seeps that contain ferns, horsetail and graminoids. Another portion of this segment runs through a steep gorge in section 6, T 2 S, R 7 W. Alders dominate with an understory of grasses and some devil's club.

Along sandy portions of the river bottom we observed tracks of at least 5 different bears. One was a brown bear sow with a new cub, 2 subadults, and one large lone adult. Throughout the patches of graminoids and horsetail we found 4 scats that were composed of green vegetation. We collected a sample from 2 of them since they appeared to be fairly recent.

Segment C begins in section 6, T 1 S, R 7 W, on a bench above the edge of Tustumena Glacier. This bench is composed of alders, willow patches, graminoids and forbs. From this bench we headed up the hillside. The area along the hillside is composed of patches of willow, alder, spruce, graminoids, trace amounts of high bush cranberry, raspberry, horsetail and spirea, and many ferns. We occasionally encountered a few devil's club, mountain ash and elderberry.

This segment was not very good for observing sign since the vegetation was already too tall, however we were able to find one scat that was composed of green vegetation and crowberries.

Segment D started as soon as we entered the alpine in section 7, T 1 S, R 7 W. The alpine zone is not very high in elevation and is characterized by rolling hills. The plant community is composed mostly of crowberry and bearberry, with an occasional patch of blueberry, dwarf willow and dwarf birch. In some wetter areas we found horsetail and graminoids.

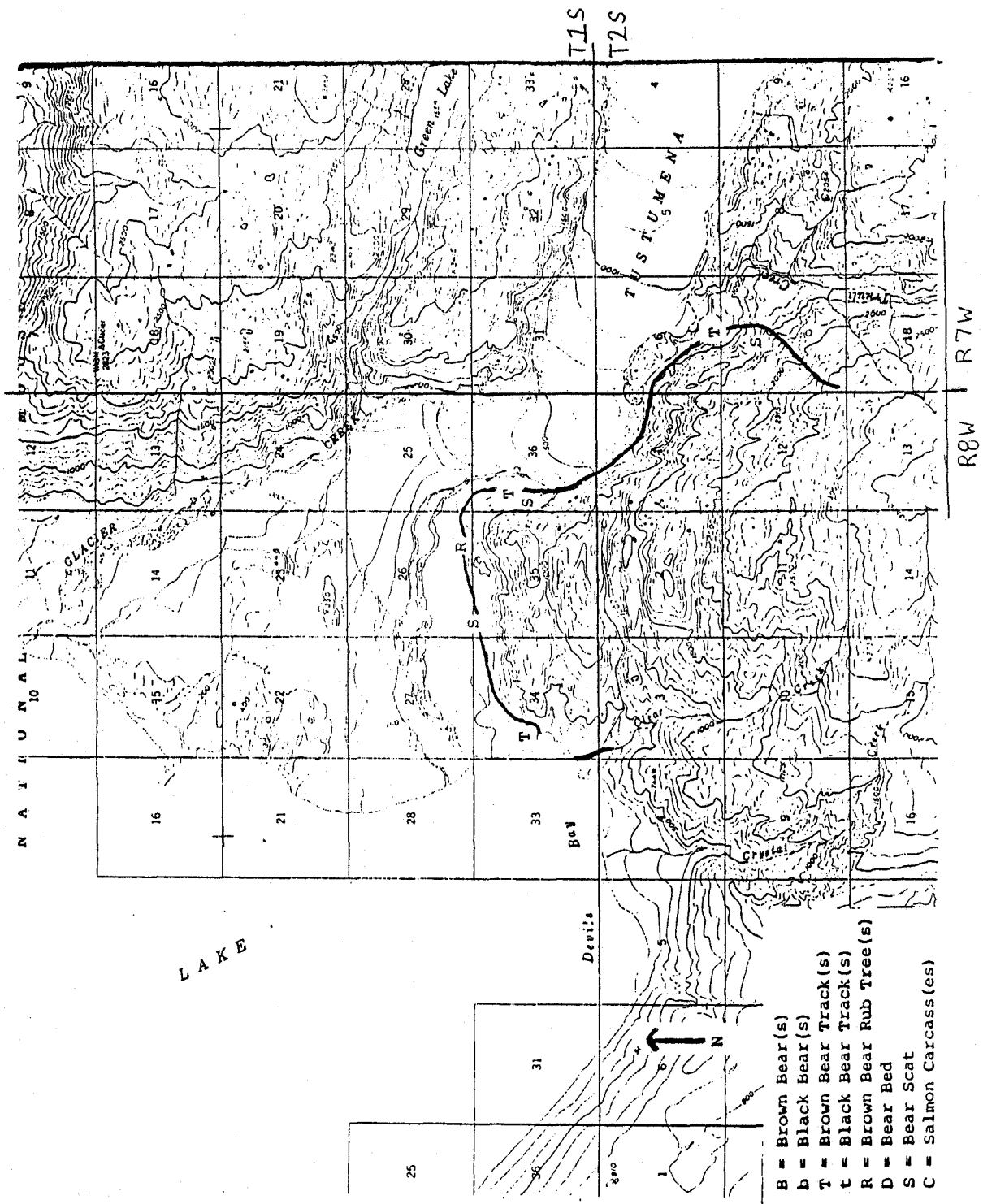
We did not see any bear sign in this area even though we appeared to be close to the area in which the sow was relocated. We did find a game trail that appeared to be used by goats.

We were unable to get across Truuli Creek to survey the opposite side for the den. The depth and strength of the creek made it impossible to cross. It did appear that the vegetative community was similar to the side that we were able to survey.

After surveying along the glacier area we returned to Tustumena Lake and went over to Clear Creek. We started walking upstream, in the creek bottom, while observing the creek sides for bear activity. The red salmon appeared to be at the peak of their run and we estimate that there were at least 600 fish spawning in the stream. The banks were littered with dead salmon, some killed by bear, while others died a natural death. All sign that we observed was from a black bear sow and her yearling cub which we ran into within a quarter mile from the mouth of Clear Creek. Both the sow and cub fled when we got within 20 feet of them. We then encountered another bear about 75 yards further upstream from them. This bear also fled when it became aware of our presence. The survey was terminated at this point.

In summary, the Tustumena Glacier river bottom and surrounding hillsides receive heavy use by brown bears in the spring time as evidenced by the amount of bear scat and tracks. Spring foods are in abundance, and the variety of berries available in the alpine offer a ready source of food in the fall.

Tustemena Glacier



BROWN BEAR HABITAT SURVEY

LOCATION: Tustumena Glacier

TRANSECT #: 2

H = High
 M = Medium
 L = Low
 t = trace

DATE: 7/8-10/86

OBSERVERS: Schloeder/Jacobs

SPECIES	TRANSECT SEGMENT			
	A	B	C	D
Sedge (<i>Carex</i> sp.)	L			
Other sedge (<i>Cyperaceae</i>)				
Grasses (<i>Graminae</i>)	M	H	H	L
Horsetail (<i>Equisetum</i> sp.)	L	H	L	M
Lady Fern (<i>Athyrium</i> sp.)		M	M	M
Other ferns		M	M	M
Cow Parsnip (<i>Heracleum lanatum</i>)				
Angelica (<i>Angelica</i> sp.)				
Dandelion (<i>Taraxicum</i> sp.)				
Mountain Sorrel (<i>Oxyria digyna</i>)				
Wild Cucumber (<i>Streptopus amplexifolia</i>)				
Chocolate Lily				
Astragalus sp./Oxytropis sp.				
Hedysarum sp.		H		M
Willow (<i>salix</i> sp.)			M	M
Cottonwood (<i>Populus trichocarpa</i>)	T	T	L	
Blueberry (<i>Vaccinium</i> sp.)				M
Salmonberry (<i>Rubus spectabilis</i>)				
Crowberry (<i>Empetrum nigrum</i>)	H			H
Devil's Club (<i>Oplopanax horridum</i>)			T	
Highbush Cranberry (<i>Viburnum edule</i>)			L	
Lowbush Cranberry (<i>Vaccinium vitis-idaea</i>)	H			M
Bearberry (<i>Arctostaphylos</i> sp.)				H
Mountain Ash (<i>Sorbus</i> sp.)			L	
Currant (<i>Ribes</i> sp.)				
Elderberry (<i>Sambucus racemosa</i>)			L	
Rose/Raspberry (<i>Rosa</i> sp., <i>Rubus</i> sp.)			L	
Salmon				
Moose				

Brown Bear Use Survey

Area: South Fork Snow River
Personnel: Schloeder/Jacobs

Date: 6/5-6/7/86

The first 9.5 miles of the river bottom were surveyed in order to compare amount of activity in spring with activity documented in mid-September and October in the 1984 and 1985 field season. The survey also included the three known spawning streams documented in 1984 (and again in 1985), and the surrounding alder shrubfields and alpine slopes.

The survey began 3.5 miles upstream from where the Snow River's 2 forks join, section 20, T 2 N, R 1 E. From the start of the survey the river bottom is mostly braided, with wide shores of gravel and sand. Immediately adjacent to these shores are wet meadows of willow, grasses and sedges interspersed with groves of cottonwood and sitka spruce. The shore line changes slightly in section 33, T 2 N, R 1 E. The gravel disappears along the edges and is replaced by dense patches of willow and alder with occasional groves of cottonwoods and sitka spruce. For a review of available bear foods along the river bottom refer to the 1985 Brown Bear Habitat Evaluation Report (Risdaal et al. 1986).

Brown bear sign was first observed at the start of the survey. A large female and yearling cub had traveled along the gravel and sand bars heading upstream. We continued to observe these bear tracks all along our main survey route until we lost them in section 33, T 2 N, R 1 E, where they left a main seep and headed off through a wet sedge meadow.

Approximately .5 miles upstream from the start of the survey is the first salmon spawning stream. We walked approximately .75 miles of this stream without observing any evidence of use by either brown or black bears. Both Bevins et al (1985) and Risdaal et al (1986) observed use of this stream in previous field seasons.

One mile further upstream is the second salmon spawning stream. Approximately 1 mile of this stream was surveyed. A scat was observed along an old blazed trail but we were unable to discern whether it was from a black or brown bear.

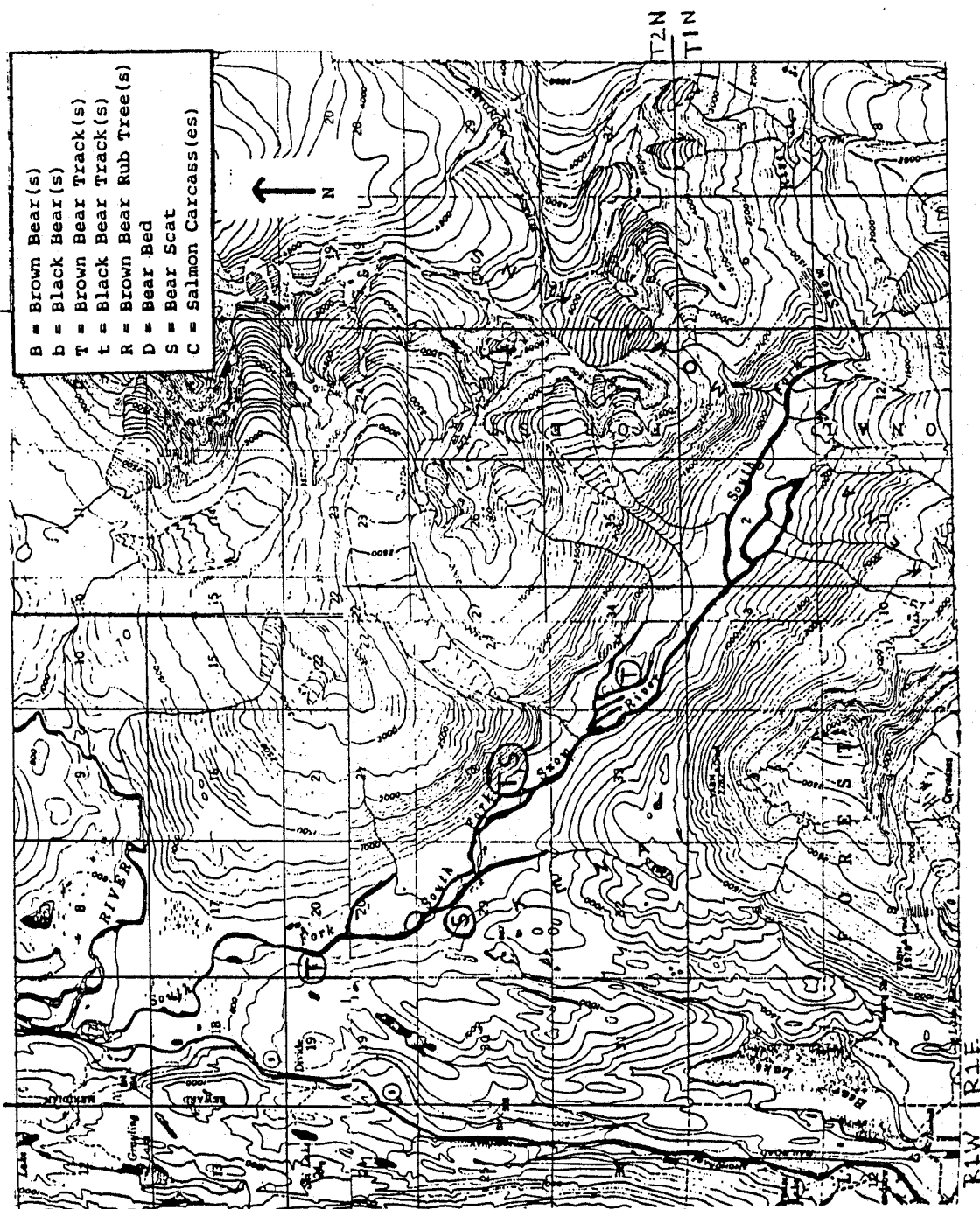
One mile further upstream we followed an old channel of the river bed. It had water flowing in it due to the spring thaw, but it is dry later in the season. Along the river bed we found a partial carcass of a bear. It is believed to be a black bear because of the size, and numerous black hairs found stuck to what little meat remained on it. The brown bear sow and cub appeared to have fed on this carcass, however we were unable to determine the cause of death. Since neither the hide nor head were found it is probable that a black bear hunter shot it and left the meat and bones behind, taking only the hide and head with them. On our return trip back out, we observed a fresh scat close to this carcass along with evidence that the carcass had been fed on some more. Fresh tracks from the sow and cub were also evident. The scat was briefly analyzed and appeared to be composed mostly of bluejoint and horsetail while also containing both feet of a spruce grouse.

One mile further upstream from this, section 33 and 34, T 2 N, R 1 E, we surveyed 3 main seeps all of which were flowing at the time. The only evidence of use that we observed was the set of tracks made by the sow and cub, up the middle of the second seep. They traveled about .25 miles up it then left the seep and headed upstream through the sedge/willow meadow. We did not observe their sign again until heading back out.

The last portion of the survey was from the 3 seeps, up to section 12, T 1 N, R 1 E. There was no black or brown bear sign evident on any portion of the stream or banks that we surveyed. However, because of the nature of the substrate (wet meadows, large rocks) sign would be minimal if not nil should a bear happen to travel along this portion.

Surveying the alpine and alder shrubfields with 8 and 10 power binoculars also revealed no sign of either brown or black bears.

In conclusion it appears that use by both brown and black bears was low along the South Fork of the Snow River at this time. However, evidence from previous surveys (Bevins et al 1985, Risdahl et al 1986) has lead us to believe that the river bottom is used as a travel corridor and maybe as a source of spring foods until the salmon come up to spawn, at which time use increases considerably.



South Fork Snow River

Brown Bear Use Survey

Area: Russian River Trail
Personnel: Schloeder/Jacobs

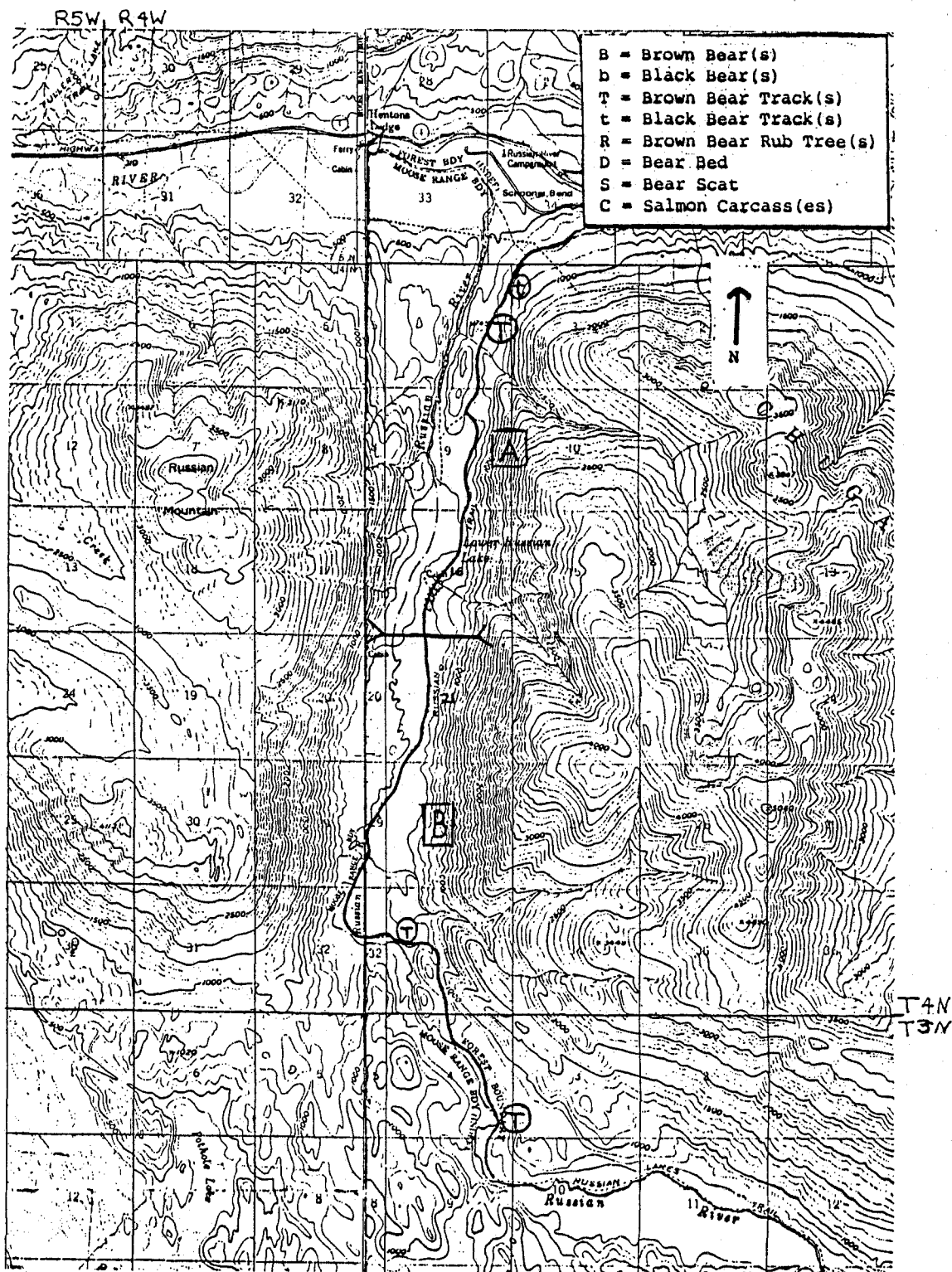
Date: 5/22/86

The purpose for this trip was to make a reconnaissance of the Russian River Trail for spring use by brown bear. The survey began at the Russian River Trailhead and extended 9 miles to Aspen Flats cabin. For a habitat evaluation description of the area refer to Bevins et. al (1985).

Segment A which is the first 4.5 miles of the trail had mostly black bear tracks on it. However, there was one set of brown bear tracks in T4N R4W Sec4 that were made by a single adult

Segment B starts at the section division between sec16 and sec21 along the trail. We found brown bear tracks of a sow with a cub in T4N R4W Sec33. The tracks were found on a quarter mile portion of the trail. Further along the the trail in section 4 of T3N R4W tracks of a fairly large adult brown bear were seen for a one mile stretch. The tracks went in both directions all along this portion of trail.

In conclusion, it is obvious that both brown and black bears use the Russian River trail in the spring because of food availability and ease of travel. The brown bears are more likely to occur closer to Upper Russian Lake as summer progresses however probably because of heavy human use around Lower Russian Lake and north towards the campground.



Russian River Trail

Brown Bear use Survey

Area: Cooper Trail
Personnel: Schloeder/Jacobs

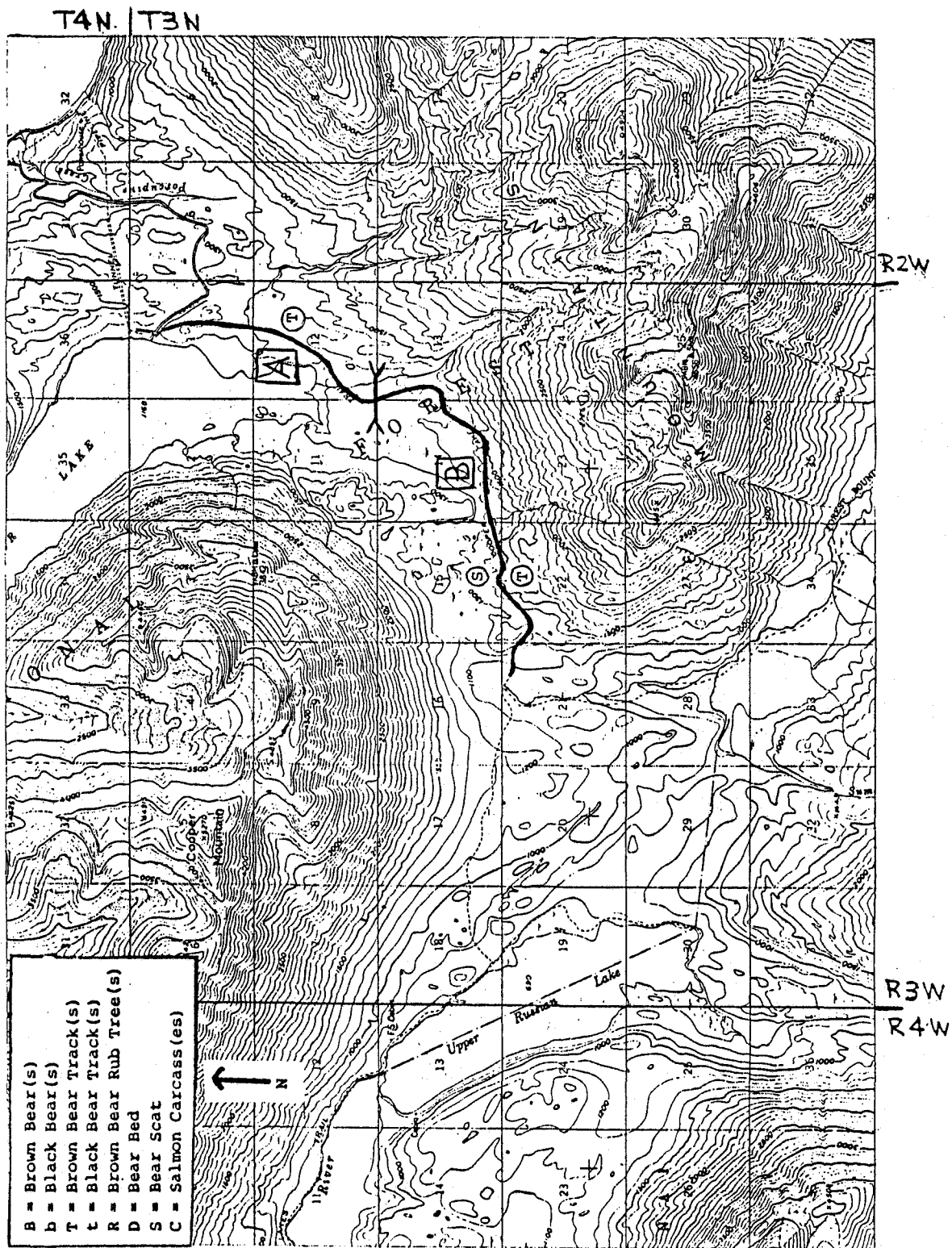
Date: 6/12/86

Cooper Trail was surveyed for brown bear use from the Cooper Lake trailhead to the junction with the Russian/Resurrection trail. Refer to Bevins et al (1985) for habitat evaluation information for this area.

Segment A of the Cooper trail is the portion between the Cooper Lake trailhead and where the four corners of sections 11,12,13,and 14 meet in T3N R3W. Brown bear tracks of a sow and a yearling cub were sighted approximately one-half mile from the trailhead. This was the area a bear encounter occurred just one week earlier. A Forest Service trail crew were working on the trail when a cow moose and a calf ran across the trail. Very soon after the moose a yearling brown bear came running down the trail. When the bear saw the crew it stopped, looked at them and then ran off. The crew could hear the sow calling for the cub but never saw her.

Segment B of the trail had brown bear tracks in section 22 of T3N R3W. We found tracks going in both directions of 3 individual bears. One set of tracks was an adult brown bear and the others were a sow with a cub of the year. The tracks of all three bears were found on a one-half mile section of the trail. Numerous scats were also present which reflected the availability of spring foods in the area.

In conclusion, the spring use of Cooper trail by brown bear seems to be concentrated towards the intersection of the Russian/Resurrection trail with Cooper trail. This is probably due to the wet steam bottoms in the area which provide early spring food.



Cooper Trail

Surveys for potential snare sites

Areas: Benjamin, Goat Creek

Personnel: Schloeder/Jacobs

The purpose of these surveys were to select potential snaring sites along Benjamin and Goat Creek. For a review of habitat types refer to Bevins et al (1985).

Benjamin Creek

The survey began in section 17, T 2 N, R 6 W. Snare sites selected were only in those areas where it was known that brown bears fish for salmon. Sites were selected on the basis of tree diameter (to anchor the snare to), visibility from all sides, and distance from stream bank. Sites selected were flagged with orange survey flagging. 10 sites were selected in all. Since the area that the traps are to be put in does not cover much distance (less than 1/2 mile) it was difficult to select for more. Trap sites were selected on both sides of Benjamin Creek, depending on amount of use each portion of the stream received.

Potential camp sites were also investigated. Two camp sites were recommended. One site is located at the base of the falls, upstream from the trap sites. Fresh water is available near by and the bears do not appear to spend much time in that area. Another potential camp site is along the Killey River, section 20, T 2 N, R 6 W, upstream from the junction of the Killey River and Benjamin Creek.

It was recommended that all equipment be transported by helicopter and unloaded at the creek. This would save time and energy by allowing more time for snaring and less time for transportation of equipment.

At the time of the survey, June 23, we observed that the king salmon had started to run up into Benjamin Creek. We observed 4 in one stretch of the river. We also observed tracks of an adult brown bear that appeared to be at least a week old. While it did not appear that the brown bears were starting to fish it yet, it did seem evident that it would not be long before the bears started to fish in this area.

During our trip we observed a solitary adult black bear feeding along the hillsides in section 11, T 2 N, R 6 W. On our hike back up to Twin Lakes we observed a sow black bear with 3 yearling cubs feeding in the alpine. Only the solitary adult bear was aware of our presence and it avoided us.

Goat Creek

The Goat Creek survey for snare sites began in T3N R3W Sec30 on July 22. The salmon were into the creek at this time and brown bear use was already evident. Along the banks of the creek the bear trails were tracked down through the grass and there were numerous fresh, bear-killed sockeye salmon. Ten trees were flagged as potential snare sites. Flags were placed within a quarter-mile stretch of the creek beginning near the mouth of Goat Creek.

Brown bear tracks seen on the creek were made by a sow with two subadults and a sow with a yearling cub.

It was discussed that base camp should be the Alaska Fish and Game cabin located just south of Bear Creek along the East shore of Upper Russian Lake. Personnel and equipment for snaring could be brought in by float plane and travel to and from the creek would be by boat.

On the same day we surveyed the creek, we observed a brown bear sow with 2 subadults along the south shore of Upper Russian Lake just East of the mouth of Goat Creek. The sow spotted us at approximately 100 yards and they quickly ran away.

BROWN BEAR SNARING

Area: Benjamin Creek
Personnel: Bangs/Schloeder/Jacobs

Date: 8/30-9/3/86

We flew into Benjamin Creek by helicopter. Because of weight and gear we had to make two trips. The flight route was Kenai to Benjamin Creek, to Lower Skilak Lake, to Benjamin Creek. We arrived at noon on the 30th of July and we set 10 snares that afternoon before returning to our camp which was 1 to 1.25 miles upstream along the Killey River.

There were 26 traps tripped during the 4 full days of snaring. We believe all were tripped by black bears. Black bear hair, tracks, and scats indicated black bears readily tripped the traps. Because of the stopper placement and size of loops, no black bear were held. Only one black bear appeared to have been in the snare for more than a few seconds. Snares were checked and if needed reset every morning & afternoon. Only one bear made aggressive actions. After checking the set which had briefly held a bear we hiked along a trail to our other sets. A fairly large black bear huffed and ran at us from above. It only approached within 50 m then stopped and just watched us despite some talking and shouting. We walked away from it and the bear did not follow. There only appeared to be minimal brown bear use of the area. Fresh tracks (1-3 days old) of a female/1 cub, 1 medium and 1 large brown bear were seen. One medium sized brown bear walked (along a sand bar) past camp the second night. There were no fresh tracks by brown bear after the second day. Black bear sign was plentiful and trails were well used. Salmon were in the streams and were being fed upon. We collected several fish tags and saw 5-6 marked kings in the creeks. Fish were common (probably 100 in the area we trapped). There appeared to be plenty enough for bears to eat.

Trap nights are tabulated below.

DATE	# SNARES SET (PM)	#SNARES TRIPPED	DESCRIPTION OF TRIPPED SNARE
		NEXT MORNING	
7/30	10	5	all empty
7/31	12	6	all empty
8/1	12	1	all empty
8/2	12	4	all empty
Totals 4 nights	46	16	No bears caught

We feel the high amount of human activity recently may have driven off the few brown bears that were using the area. An ADF&G helicopter surveyed the area the 29th and 30th; FWS collected fish eggs the 21st, and set up the water temperature meter in the creek; Plus we dropped off traps on the 30th. Snaring appears relatively simple (at least for black bears) and we feel our lack of success was due to the absence of brown bear. Perhaps earlier in the run and at a time of less human activity snaring would have been more successful.

The operation was relatively safe, especially when snares could be monitored through radio telemetry (trap radios) and could be checked from a relatively open position (gravel bars or the creek). We had no trouble locating good trees and trails to make sets. We pulled the snares and flew out at 1300 hours Sunday August 3rd.

Weather was sunny and warm with only light showers AM the 30th.

BROWN BEAR SNARING

Area: Goat Creek

Date 8/6-8/11/86

Personnel: Bangs/Schloeder/Jacobs/Portner/Schumacher

We arrived at the ADF&G cabin on Upper Russian Lake by float plane from Cooper Lake. Bangs and Portner came from Refuge headquarter in Soldotna by the same plane. We used a boat to access Goat Creek from the cabin. Six snares were set along the creek on the afternoon of 8/6. The sockeye salmon numbers were peaking at this time and bear activity appeared to be moderate. We observed tracks of a sow and yearling cub and tracks of a medium sized brown bear. Bear-killed fish were common along the banks and in the grass just away from the creek.

On 8/8 we checked a tripped snare and had caught our first brown bear. It was a female approximately 1.5 years old and 150 lbs. As we approached we could hear the sow in the woods growling. We kept a careful watch as we processed the bear and never saw the sow. The snare held the yearling because it closed above the elbow. This bear would have escaped if the snare had been around the wrist. The bear needed some assistance in breathing to help it come out of the drug. The bear was tattooed number 011.

In the morning of 8/9 we caught another brown bear. This one was a large (500 lb) male. It was very old and had extremely short hair on its legs and sides. He had one ear missing. His neck was scared with puncture holes and scratches. We processed the bear in about one hour, and fitted him with a radio-collar. He was tattooed 012. The front pad width was 22cm and wrist circumference was 35cm at the smallest spot.

By 8/9 the sockeye were spawning heavily. Walking up the creek over the reds, was like walking through chuck-holes in a road. By 8/11 many fish were dead and floating downstream. After 8/9 we had no more success snaring brown bear, and on the 11th of August collected the snares after scanning the trap radios that morning. Our trap rate for the five nights of trapping was 4.16 captures per 100 snares set. Snaring data is tabulated below.

DATE	# SNARES SET (PM)	#SNARES TRIPPED	DESCRIPTION OF TRIPPED SNARE
		NEXT MORNING	
8/6	6	1	Empty
8/7	11	2	Yearling, empty
8/8	9	2	Old boar, empty
8/9	10	0	Nothing
8/10	12	1	Empty
Totals 5 nights	48	6	2 bears caught

The weather throughout the snaring effort was rainy or heavily overcast. We saw one black bear the entire time we stayed at Upper Russian Lake.

BROWN BEAR SNARING

Area: Bear Creek

Date 9/8-9/11/86

Personnel: Bangs/Jacobs/Bailey

Ed Bangs and Ted Bailey arrived at the ADF&G cabin on Upper Russian Lake by USFWS float plane on 9/8. The plane then brought me to the cabin from Cooper Lake. We put out 7 snares along the lake and portions of Bear Creek in the afternoon. There were a large number of sockeye at the mouth of Bear Creek and a good number of the salmon already to the furthest point up Bear Creek they could go. It appeared to be before peak spawning. Several wide spots in the creek looked to be fairly heavily used. However, we didn't find very many promising tracks. We saw some tracks of a sow with a cub and several black bear tracks. Several scats were present consisting of mostly highbush cranberry (Viburnum edule).

We examined the south end of Russian Lake and Goat Creek for potential snaring sites but found none. Salmon were gone from Goat Creek and brown bear use of these areas was low.

Two sets were tripped the following morning; 9/9. When we checked them one had held a black bear for a few seconds. We found black hairs on the cable. The other set was empty. This particular set was baited with a moose hide we found. Something obviously drug the hide about 25 feet away. We reset these snares and set 5 new snares along Bear Creek.

On 9/10 two of three tripped snares had brown bears in them. The first bear we processed was a young female. The bear climbed 3 m up a tree right after we darted her. She held on to a branch with her mouth and we couldn't get her out of the tree. Fortunately, it let go after a few minutes and fell out of the tree and landed on her haunches. She appeared to be lactating. I caught a glimpse of what could have been her cub about 75 yards from the snared sow. It saw me first and was gone before I had a good look. She weighed approximately 300-350 pounds. She was tattooed number 013 and was fitted with a radio collar.

The other brown bear snared on 9/10, a young male, was caught at the set with the moose hide next to it. When we arrived at the set, the bear had a bloody mouth. We darted him and found that he had wrapped the cable around a small diameter tree 3 feet from the tree that the snare was attached to. He pulled against the snare until he dislocated the radius and ulna from his wrist. We took body measurements and examined the injury. Ed and Ted contacted ADF&G to get approval to destroy the bear. We salvaged the hide and skull.

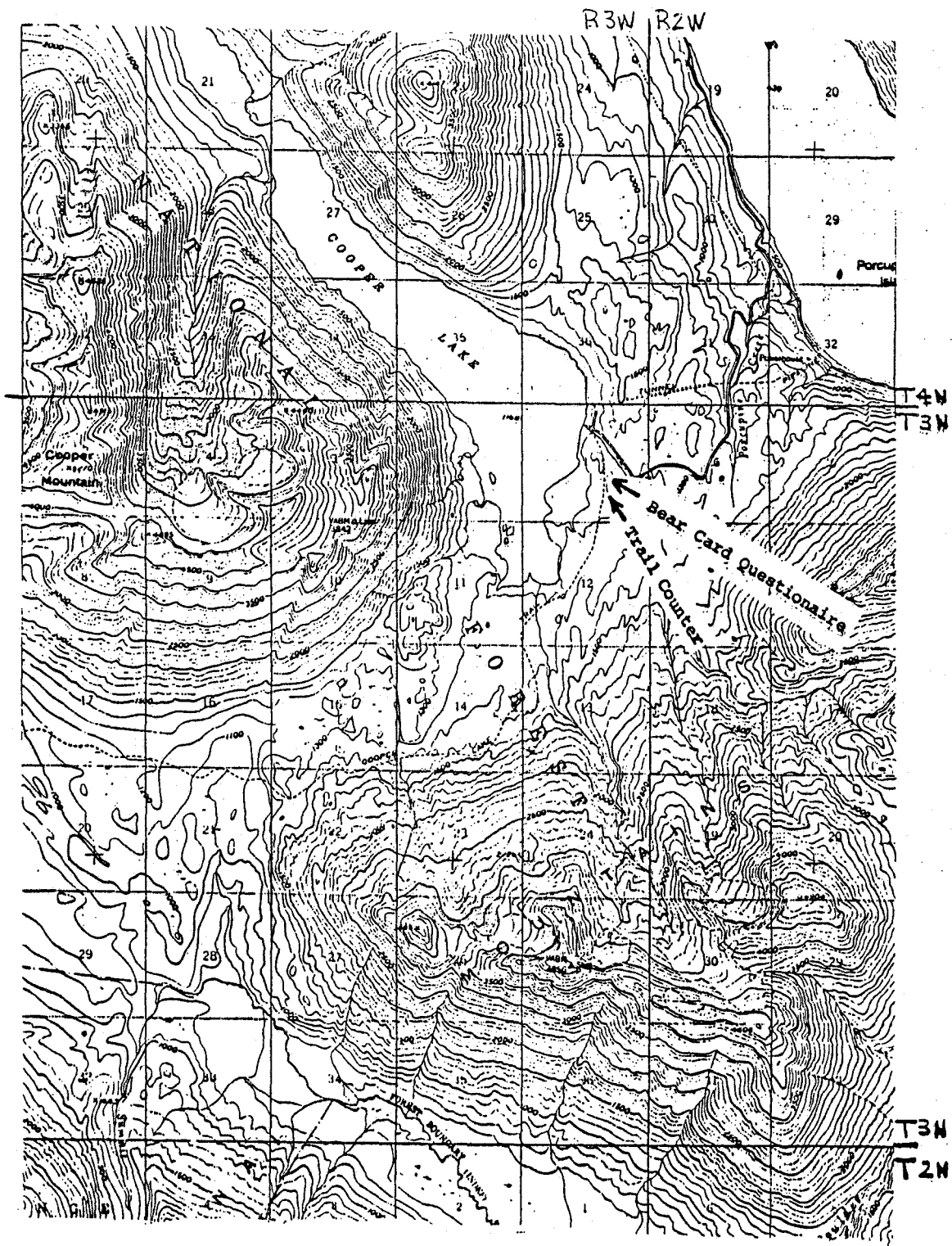
There were no tripped sets on 9/11 and we decided to pull the snares and fly out. The trap rate was 6.9 captures per 100 snares set. The snaring data is tabulated below.

<u>DATE</u>	<u># SNARES SET (PM)</u>	<u>#SNARES TRIPPED NEXT MORNING</u>	<u>DESCRIPTION OF TRIPPED SNARE</u>
9/8	7	2	Empty, Empty
9/9	12	3	Brown Bear sow, Brown bear boar, Empty
9/10	10	0	Nothing
Totals 3 nights	29	5	2 bears caught

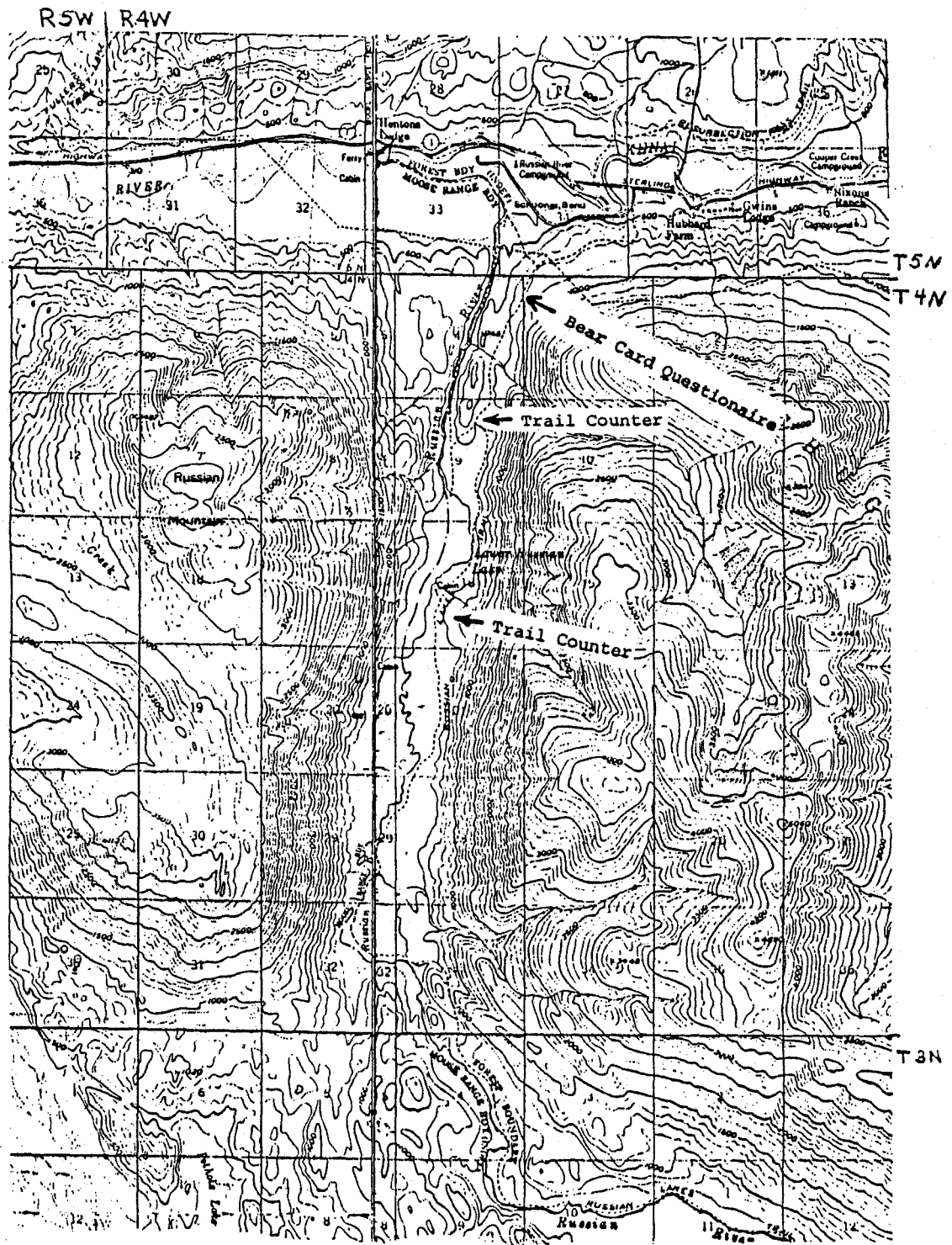
The weather was cool and sunny for the entire time we were snaring.

APPENDIX 2

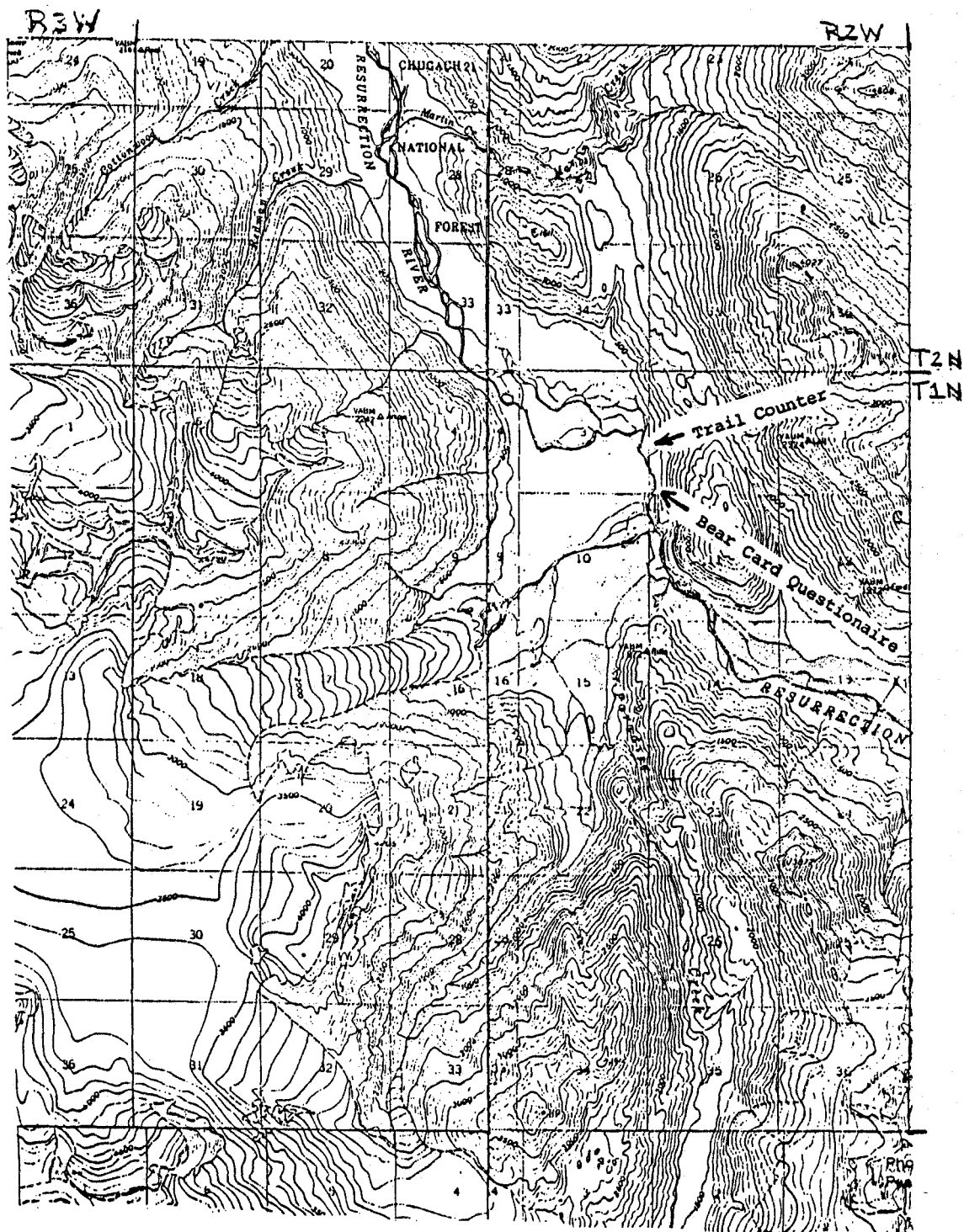
Maps of Trail Counter Placement



Cooper Trail Counter Placement



Russian River Trail Counter Placement



Resurrection River Trail Counter Placement

APPENDIX 3

Calculations of Trail Use

Appendix 3

Russian River Trailhead

- 1) $73.63 = 7069/96$
- 2) $94.9\% = 641/675$
- 3) $5.1\% = 100\% - 94.9\%$
- 4) $37.75 = 73.63 / (.95(2) + .05)$
- 5) $35.87 = 73.63 * .95 / (.95(2) + .05)$
- 6) $1.88 = 37.75 - 35.87$
- 7) $3624 = 96 * 37.75$

Russian to Cooper Trailhead

- 1) $2.6\% = 18/675$
- 2) $.529 = 18/34$
- 3) $.994 = .529 * 1.88$
- 4) $95.42 = 96 * .994$

Russian to Resurrection Trailhead

- 1) $2.3\% = 16/675$
- 2) $.47 = 16/34$
- 3) $.883 = .47/1.88$
- 4) $84.8 = 96 * .883$

Cooper Lake Trailhead

- 1) $17.03 = 1703/100$
- 2) $50\% = 72/144$
- 3) $50\% = 100\% - 50\%$
- 4) $11.35 = 17.03 * (.5(2) + .5)$
- 5) $5.67 = 17.03 * .5 / (.5(2) + .5)$
- 6) $5.68 = 11.35 - 5.67$
- 7) $1135 = 100 * 11.35$

Cooper to Russian Trailhead

- 1) $33\% = 48/144$
- 2) $.66 = 48/72$
- 3) $3.78 = .66 * .68$
- 4) $378 = 100 * 3.78$

Cooper to Resurrection

- 1) $16.6\% = 24/144$
- 2) $.33 = 24/72$
- 3) $1.89 = .33 * 5.68$
- 4) $189 = 100 * 1.89$

Resurrection River Trailhead

- 1) $4.37 = 420/96$
- 2) $70.2\% = 59/84$
- 3) $29.8\% = 100\% - 70.2\%$
- 4) $2.57 = 4.37 / (.702(2) + .298)$
- 5) $1.804 = 4.37 * .702 / (.702(2) + .298)$
- 6) $.766 = 2.57 - 1.8$
- 7) $246.72 = 96 * 2.57$

Resurrection to Russian Trailhead

- 1) $25\% = 21/84$
- 2) $.84 = 21/25$
- 3) $.643 = .84 * .766$
- 4) $61.7 = 96 * .643$

Resurrection to Cooper Trailhead

- 1) $4.7\% = 4/84$
- 2) $.16 = 4/25$
- 3) $.122 = .16 * .766$
- 4) $11.7 = 96 * .122$