SUSITNA HYDROELECTRIC PROJECT

FEDERAL ENERGY REGULATORY COMMISSION
PROJECT No. 7114

FURBEARER STUDIES
FALL 1985: BEAVER

PREPARED BY

LGL
Alaska Research Associates
Inc.

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SUSITNA JOINT VENTURE

FINAL REPORT

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Alaska Power Authority

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Report by

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and

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Prepared for

Alaska Power Authority

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NOTICE

ANY QUESTIONS OR COMMENTS CONCERNING
THIS REPORT SHOULD BE DIRECTED TO
THE ALASKA POWER AUTHORITY
SUSITNA PROJECT OFFICE

Introduction

Beaver (Castor canadensis) is a visible, easily-studied species tied directly to both aquatic and terrestrial ecosystems. As such, it is the only furbearer species being studied on an ongoing basis as part of the Susitna Hydroelectric Project licensing process. Studies of beaver of the Susitna River between the Deshka (RM 40) and Tyone (RM 147) Rivers have been conducted since 1980, with the majority of work along the floodplain of the middle Susitna River (RM 98 to 150) and, to a lesser extent, Deadman Creek.

Previous studies have examined general abundance patterns, habitat utilization, fall densities, colony composition, and overwinter survival (Gipson et al. 1982, 1984; Woolington et al. 1984, 1985). This report draws liberally from these sources.

The objective of the fall 1985 beaver cache survey was to estimate the number of beaver colonies attempting to overwinter in the Susitna River floodplain between Talkeetna and Portage Creek. Data gathered from the survey are compared with similarly collected data from 1982 to 1984, and may be used in connection with a 1986 pre- and post-breakup survey to estimate overwinter survival.

Study Area

The study area (Figure 1) encompasses the floodplain of the Susitna River between its confluence with the Talkeetna River and its confluence with Portage Creek. Although some areas within the floodplain are likely beyond the hydrologic influence of the Susitna Hydroelectric Project, they were included in the survey because beavers occupying these areas likely forage in portions of the floodplain that will be influenced by the project.

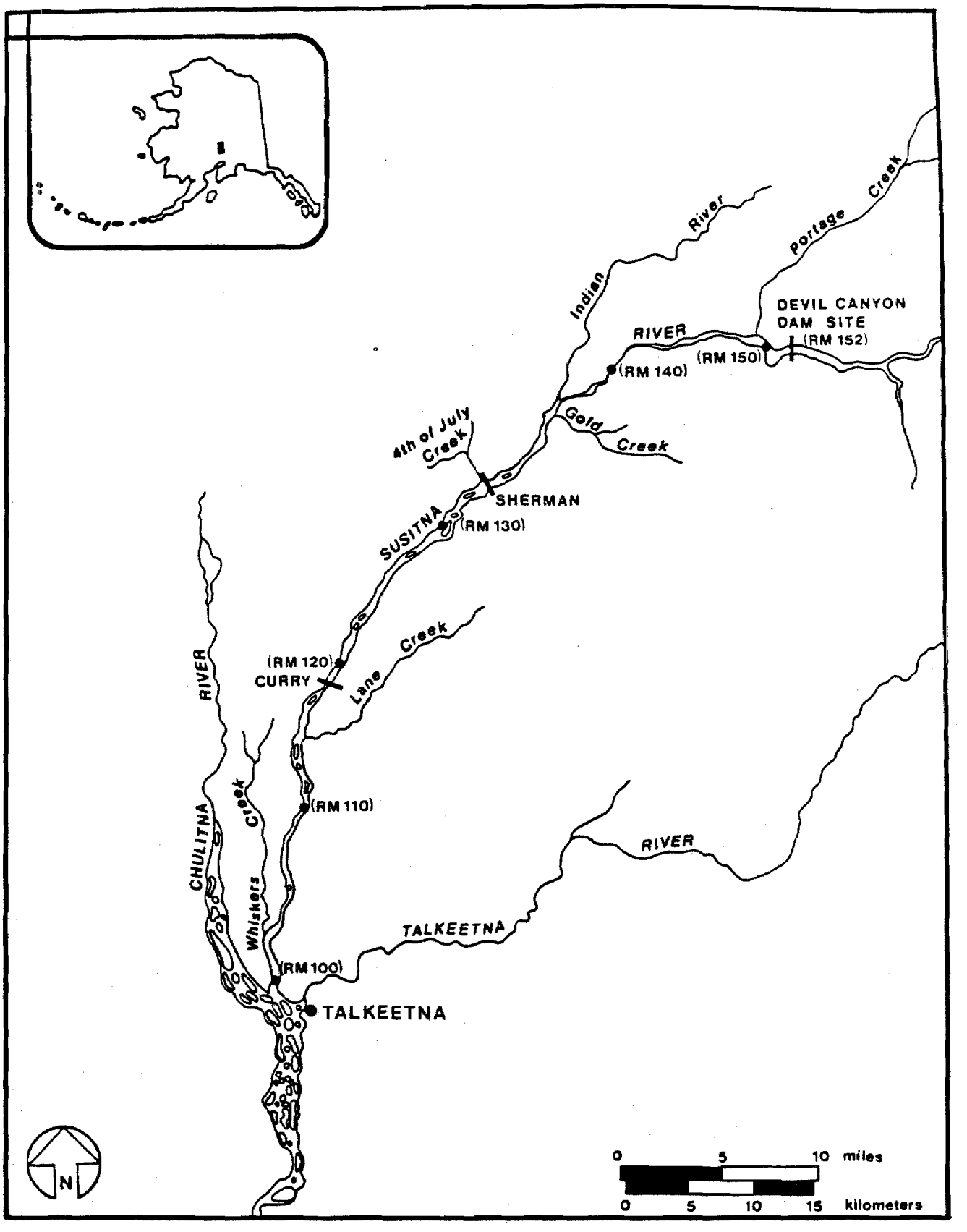

FIGURE 1. Regional map showing features of the middle Susitna River, Alaska. Beaver study area consists of the floodplain of the Susitna River between Talkeetna and Portage Creek.

Methods

As in previous aerial surveys of this reach of the Susitna River (Gipson et al. 1982, 1984; Woolington et al. 1984), a Bell 206 helicopter was used to look for beaver food caches from the air. Each food cache supports an overwintering lodge and/or bank den colony with food beneath the winter ice. As noted by various authors, cache surveys are probably the most accurate method of establishing numbers of beaver inhabiting an area (Hay 1958, Murray 1961, Koontz 1968, Machida 1982) since each overwintering colony constructs one or more caches in the fall, and the average number of beaver per colony can be determined for a given geographical area. When more than one active cache were found in close proximity, they were deemed to be the winter food reserves of one active colony.

The current survey was conducted on October 4, 1985. Helicopter personnel included a pilot and two experienced observers. One observer kept the flight log and recorded comments at caches; the other served as navigator and recorded cache locations on aerial photos (approximate scale: 1 inch = 3,000 feet).

Each colony location was classified as to the habitat in which it occurred. The classification scheme used follows that set forth by the Alaska Department of Fish and Game (ADF&G) Aquatic Study Team (ADF&G 1983):

- Mainstem habitats are those channels of the river that convey more than approximately 10 percent of the total flow at a given site. During the open water season these channels are characterized by turbidity from glacial meltwater.

- Side channel habitats are those channels of the river that convey less than approximately 10 percent of the total flow. During the open water season these channels are characterized by turbidity from glacial meltwater.

- o Side slough habitats contain clear water. Local surface water runoff and upwelling groundwater are the primary sources that supply these habitats. Side sloughs have nonvegetated upper thalwegs that are overtopped during periods of moderate to high mainstem discharge. Once overtopped, side sloughs are considered side channels.

- o Upland sloughs are clearwater habitats that depend upon upwelling groundwater and/or local runoff for their water sources. Upland sloughs have vegetated upper thalwegs that are seldom overtopped by mainstem discharge.

- o Tributary mouths are clearwater habitats at the confluences of tributaries, where clear water mixes with turbid water. If a backwater occurs as a result of mainstem stage, tributary mouth habitat extends into the tributary channel to the upstream extent of the backwater.

- o Tributary habitats are clearwater reaches of tributary streams upstream of the tributary mouth habitats.

On October 18, 1985, a reconnaissance flight was made from the mouth of the Susitna River to Devil Canyon, including the beaver survey reach. Several caches marked as questionable or abandoned during the October 4 survey were examined, particularly along the mainstem, and observers on the flight were requested to look for caches as a double-check on the October 4 survey.

Results

A total of 42 active colonies were observed on October 4, 1985 (Table 1). The weather was clear and sunny, with excellent visibility. Most deciduous trees were leafless, and a thin layer of ice was present on undisturbed ponds and portions of sloughs. Two additional active colonies were found

during the October 18 flight, bringing the 1985 total to 44 active colonies. One of these additional colonies was in a mainstem location which had signs of activity on October 4, but no cache. The other was at a side slough colony site categorized as abandoned during the October 4 flight.

The Susitna River flow at Gold Creek was declining after a moderately high flow the last half of September (Figure 2). Although the flow the day of the survey was higher than that during the past two surveys (Table 2), it was within normal flows (Figure 2).

Between one and 14 beaver have been reported to occupy each active colony den, with an average of five beaver used for population estimates in Alaska (Koontz 1968, Boyce 1974, Woolington et al. 1984). Therefore, the 44 colonies observed during fall 1984 represent an estimated 220 beaver.

As shown in Table 1, the observed habitat use patterns for caches have varied each of the four years of the surveys. In 1985, the majority of caches were found in upland slough habitat, followed by side channel, side slough, and mainstem habitats. No caches were found in tributary or tributary mouth habitats.

Discussion

Two major types of variability have been seen during the four years of fall beaver studies: numbers of food caches seen during the survey, and the habitats these caches are in.

Table 1. Aerial counts of active beaver colonines within the floodplain of the Susitna River between Devil Canyon and Talkeetna, Alaska. Habitat types are according to ADF&G classifications (ADF&G 1983).

Habitat	1982[1] No.	(%)	1983[2] No.	(%)	1984[3] No.	(%)	1985[4] No.	(%)
Mainstem	2	(14)	11	(41)	13	(29)	6[5]	(14)
Side Channel	2	(14)	2	(7)	4	(9)	8	(18)
Side Slough	7	(50)	11	(41)	14	(31)	6[5]	(14)
Upland Slough	3	(2)	3	(1)	14	(31)	23	(52)
TOTAL	14		27		45		44[6]	

1/ Survey conducted September 15, 1982; from Gipson et al. (1984).

2/ Survey conducted October 18-19, 1983; from Gipson et al. (1984).

3/ Survey conducted October 4, 1984; from Woolington et al. (1984).

4/ Survey conducted October 4, 1985.

5/ Includes colonies seen during October 18, 1985 reconnaissance flight (see text for explanation).

6/ Includes one colony in a pond within the floodplain near Curry.

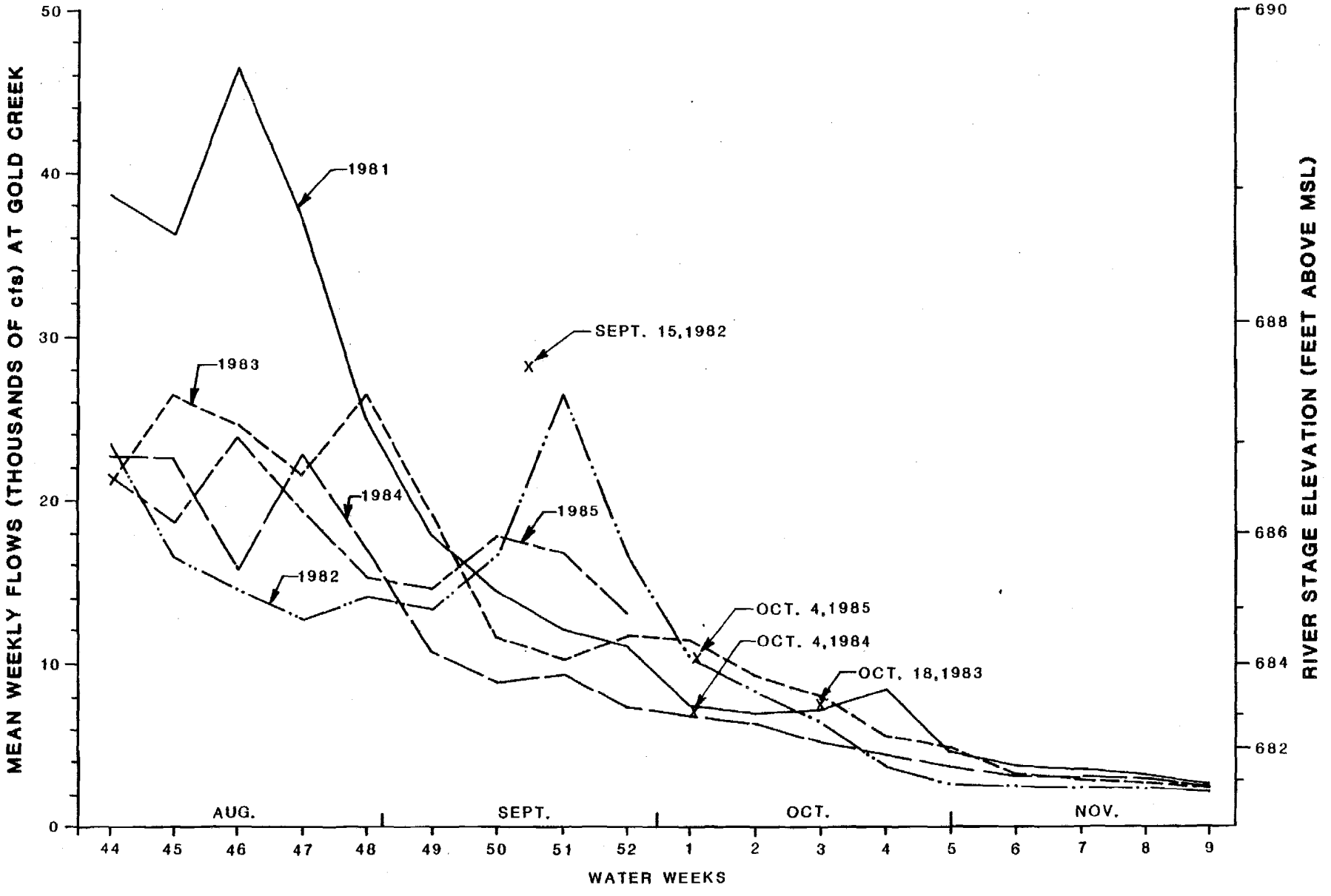

FIGURE 2. MEAN WEEKLY FLOWS AND STAGES OF SUSITNA RIVER, ALASKA, AT THE GOLD CREEK GAGING STATION DURING THE FALLS OF 1981 TO 1985. "X"s REPRESENT FLOW ON CACHE SURVEY DATES

Table 2. Characteristics of beaver cache aerial survey periods along the Susitna River, Alaska, from 1982 to 1985.

Year	Date	Susitna River flow at Gold Creek (cfs)	Comments
1982	15 September	28,200	high, turbid flows due to rains
1983	18-19 September	7,560-7,830	sloughs icing over
1984	4 October	7,380	weather clear; no ice
1985	4 October	10,400	clear; light ice on ponds and along shores

The year-to-year differences in numbers of caches seen (Table 1) could be from several sources:

- Learning may help observers to be more accurate, bias their observations because of "known" locations of previous years' caches, or help locate caches where beavers are using bank dens rather than traditional lodges.

- The beaver population may be increasing rapidly.

- The hydrologic regime at the time of or prior to the survey may have a large effect upon survey results.

- The timing of the survey relative to initiation and completion of cache-building may affect cache sightability.

Hydrologic regime, survey timing, and observer experience are likely the factors having the greatest effects upon the middle Susitna River surveys. Observers become more proficient at noticing caches from the air with experience, as well as learning "typical" and traditional locations of colony lodges, dens, and caches. This is particularly important where beavers are using bank dens since such dens often have little or no stick mass at the entrance during the first few years of use. With time, some bank dens develop the look of "regular" lodges as a stick mass accumulates.

Hydrologic regimes likely affect both the beaver and the observers. High water is often turbid, obscuring caches and lodges as it rises, and can break caches apart as was seen in 1982 (Gipson et al. 1982). Beaver likely build their caches at a time when water levels are falling and stabilizing at winter flow rates (Figure 2), and surveying too early in the fall may result in cache construction not being far enough along for accurate counting.

The large differences in habitat use in different years (Table 1) may be at least partially attributable to August and September flow regimes. High flows during September seem to decrease the proportion of caches built along the mainstem (1982, 1985). In 1984, flows declined markedly in late August (about when cache construction begins in earnest) and stayed fairly stable throughout September. That year, beaver used mainstem, side slough, and upland slough habitats in about equal proportions. Many side channels were likely dewatered at this time. In 1985, flows were similar to those of 1984 through the first of September, then increased markedly for most of September. Beaver showed a major shift in habitat use this year, making increased use of side channel and upland slough habitats. Perhaps 1985 flow in mainstem habitats were too fast for cache construction, and beaver moved to available upland slough habitats and the lower velocity, watered side channels. The lack of caches in side sloughs during 1985 is puzzling. Perhaps fluctuating water levels in these sloughs discouraged building by beaver, since such changes cause rather large wetted surface area changes in this habitat.

It is likely that the 1982 and 1983 surveys under-estimated the actual number of overwintering colonies due to high water and timing, and ice cover, respectively (Woolington et al. 1984). The 1984 survey is believed to be accurate and complete, and the total number of active colonies seen, and hence overwintering beaver, is nearly the same as that for 1985. For this reason, we do not believe that the middle Susitna River beaver population is undergoing a major increase, but rather that we now have a reasonably accurate estimate of the beaver population.

The possibility that beavers build caches at different times in different habitats (Woolington et al. 1984) was explored during the 1985 survey. Three mainstem lodges which had no caches on October 4, 1985, nonetheless had fresh signs of lodge maintenance and had caches during the winter of 1984. These lodges were re-examined during the October 18, 1985, flight, and one was found to have a newly constructed food cache. Since water levels stabilize and ice forms earlier in low velocity habitats (upland slough, side slough) than in higher velocity habitats (side channel,

mainstem), it seems plausible that beaver might time cache construction differently in these different habitats. At present, however, this scenario has little substantive data to refute or support it.

Questions have been raised as to the likelihood of long-term trends in beaver populations and habitat availability in the middle Susitna River basin. Although no quantification of habitat is possible at present, comparisons of aerial photos of the middle Susitna River since 1949 show no clear patterns of change in river morphology or distribution of vegetated areas (Labelle et al. 1985). Shifts in distribution of plant species may have had a larger, more definite role in beaver population trends than has geomorphology. Suitable food species must be present to support an active colony. Areas along the middle Susitna River can be seen where old, abandoned beaver dam systems are surrounded by herbaceous vegetation and spruce, both of which are unsuitable food for overwintering beavers (Gipson et al. 1982). These areas generally had numerous stumps from balsam popular, alder, and willow removed by beaver. In this manner, increasing beaver populations would accelerate floodplain succession to spruce forest, reducing available beaver habitat and beaver populations.

Any long-term population trend which might be found would be a combination of historical trapping pressures, beaver production levels in tributaries entering the Susitna River, and in availability of suitable food plants on a continuing basis.

Summary

A total of 44 active beaver colonies were observed within the floodplain of the Susitna River between Talkeetna and Portage Creek during survey flights on October 4 and 18, 1985. These colonies represent an overwintering population of about 220 beaver. Upland slough habitats were most frequently the site of caches observed (52%), followed by side channel (18%), side slough (14%), and mainstem (14%) habitats.

The 1984 and 1985 cache surveys produced nearly equal numbers of active beaver colonies in the middle Susitna River floodplain, although shifts in habitat use were observed. These two surveys are believed to be much more accurate than the 1982 and 1983 surveys. Experienced observers and low, stable water levels are believed most responsible for accurate beaver cache surveys.

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APPENDICES

Appendix A

Notes and habitat utilization observations made during 1985 beaver cache survey along the middle Susitna River, Alaska.

1985 BEAVER CACHE SURVEY

Colony No.	Habitat[1/]	Comments
85- 1	US	beaver seen
85- 2	US	double cache; beaver seen
85- 3	US	small cache
85- 4	SS	
85- 5	SC	beaver seen
85- 6	MS	
85- 7	MS	
85- 8	US	
85- 9	US	new lodge; large cache; beaver seen
85-10	US	large cache; large lodge
85-11	US	new lodge; lodge at base of birch
85-12	US	cache mostly alder; beaver seen?
85-13	US	3 lodges; 1 large cache
85-14	US	cache mostly alder
85-15	MS	bank lodge in eddy of balsam poplar
85-16	US	2 beaver seen
85-17	US	large lodge
85-18	US	
85-19	SC	
85-20	SC	
85-21	SS	bank den
85-22	MS	cache packed under downed logs in river
85-23	pond	
85-24	US	
85-25	US	
85-26	MS	2 lodges; cache (& lodges?) under fallen birch
85-27	SS	cache under fallen balsam poplar
85-28	US	beaver seen
85-29	SS	large cache
85-30	SC	

85-31	US	no activity recently (ice still on surface)
85-32	SC	cache anchored in root mass of fallen spruce
85-33	SC	
85-34	SC	
85-35	SS	large cache
85-36	US	very large cache; pond iced over
85-37	US	
85-38	US	
85-39	US	
85-40	US	large cache; large lodge
85-41	US	large cache
85-42	SC	
85-43	MS	sighted 18 Oct.; same location as 84-41
85-44	SS	sighted 18 Oct.; visible portion of cache alder

NOTES: (4 October survey)

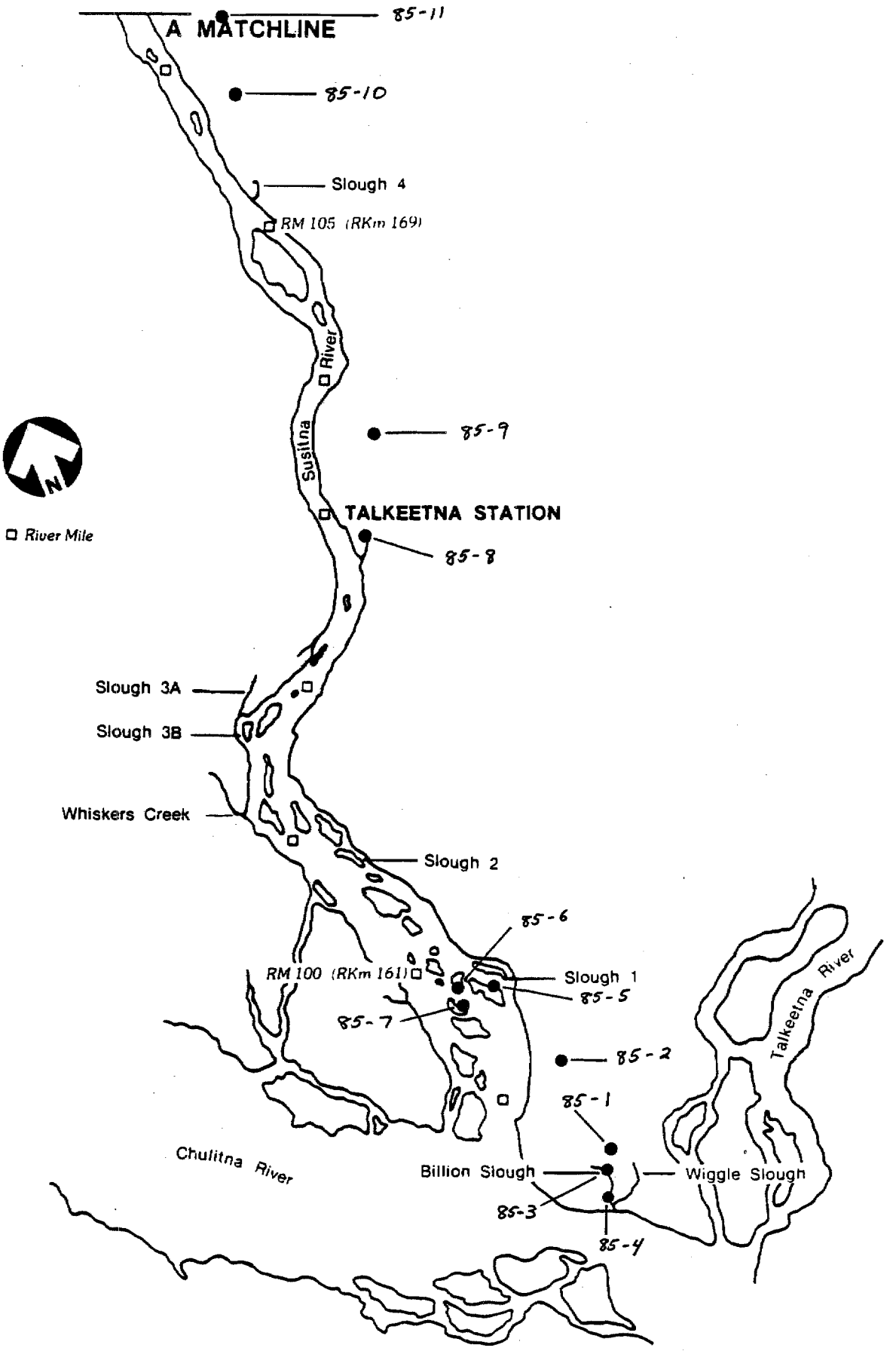
84- 8	looks abandoned
84- 9	lodge/bank den just downstream from this location; no cache
84-17	lots of trails, cuttings, etc., but no cache
84-41	a few cuttings of small sticks; no cache?

1/ MS = Mainstem
SC = Side Channel
SS = Side Slough
US = Upland Slough

pond = one small pond near Curry; within floodplain of Susitna River

Appendix B

Locations of active beaver colonies seen along the middle Susitna River, Alaska, during fall 1985 surveys.



SLOUGH AND TRIBUTARY INDEX

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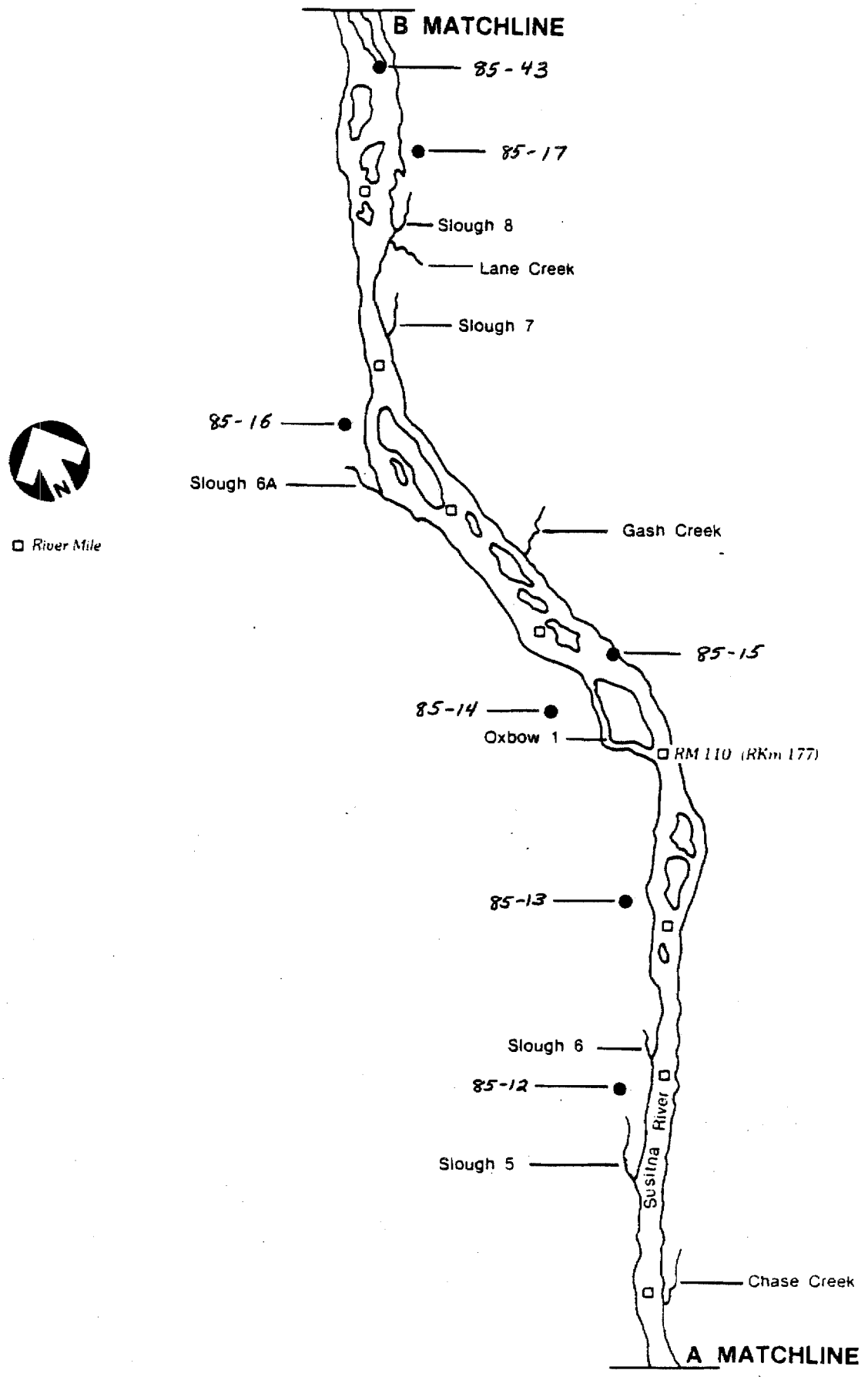

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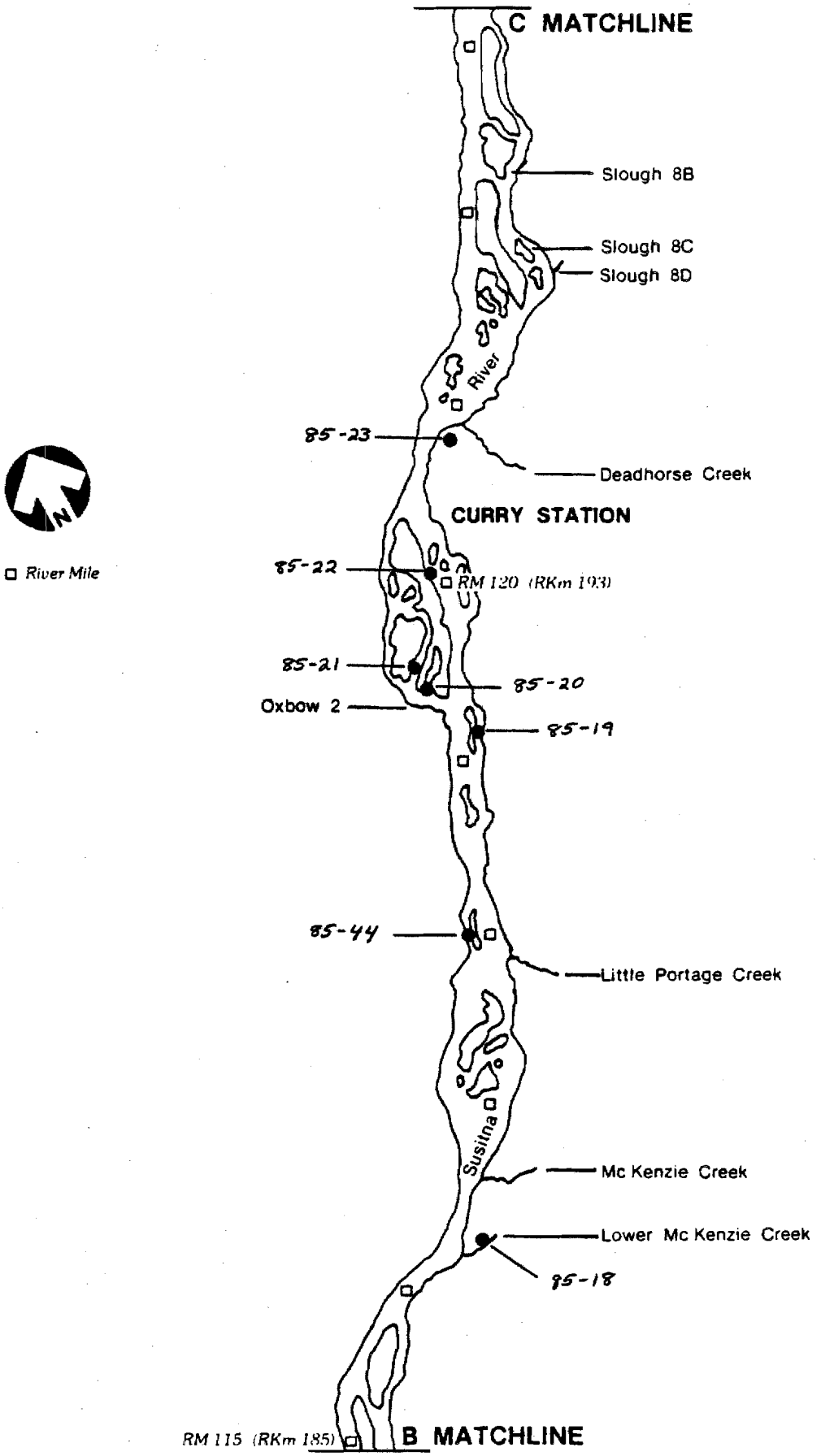

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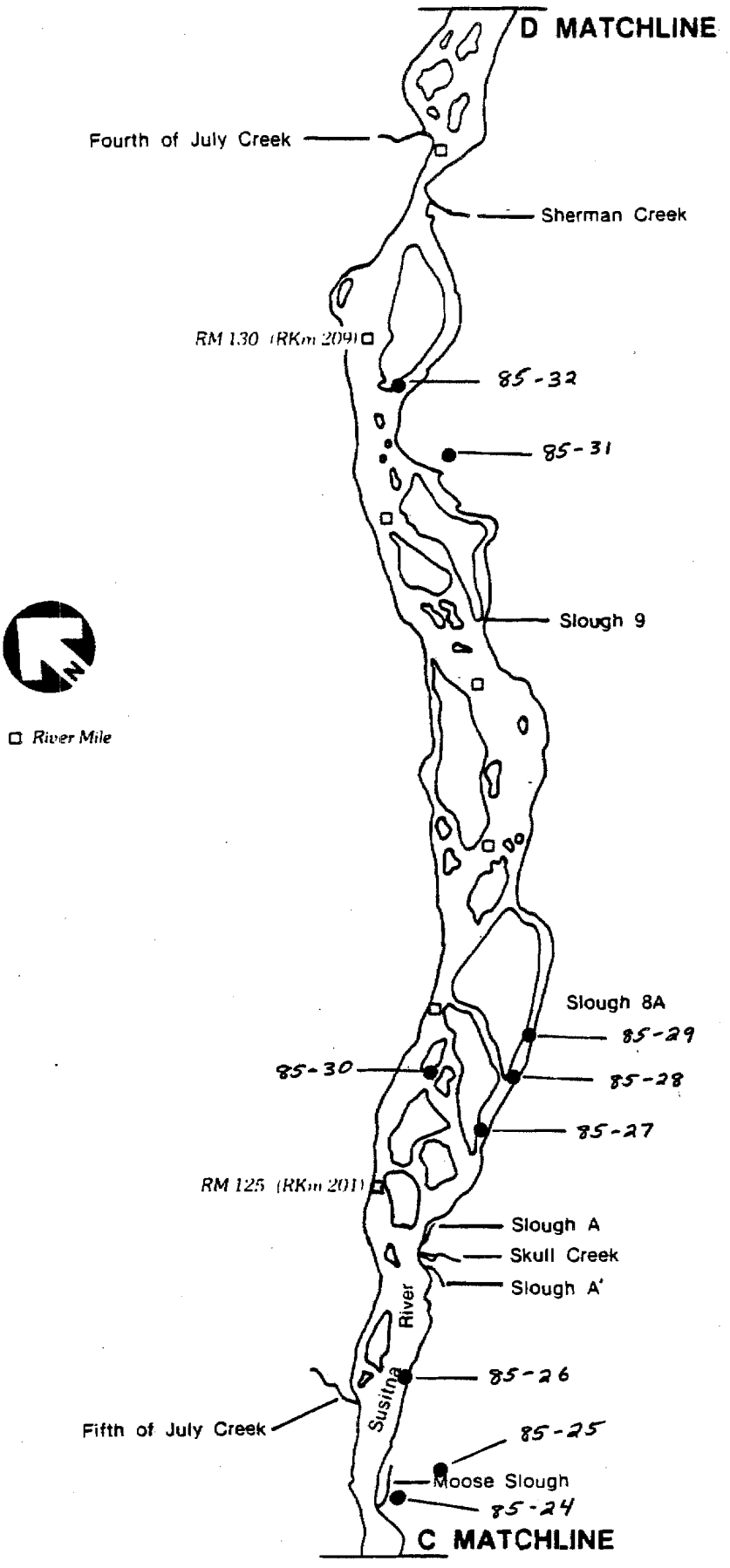

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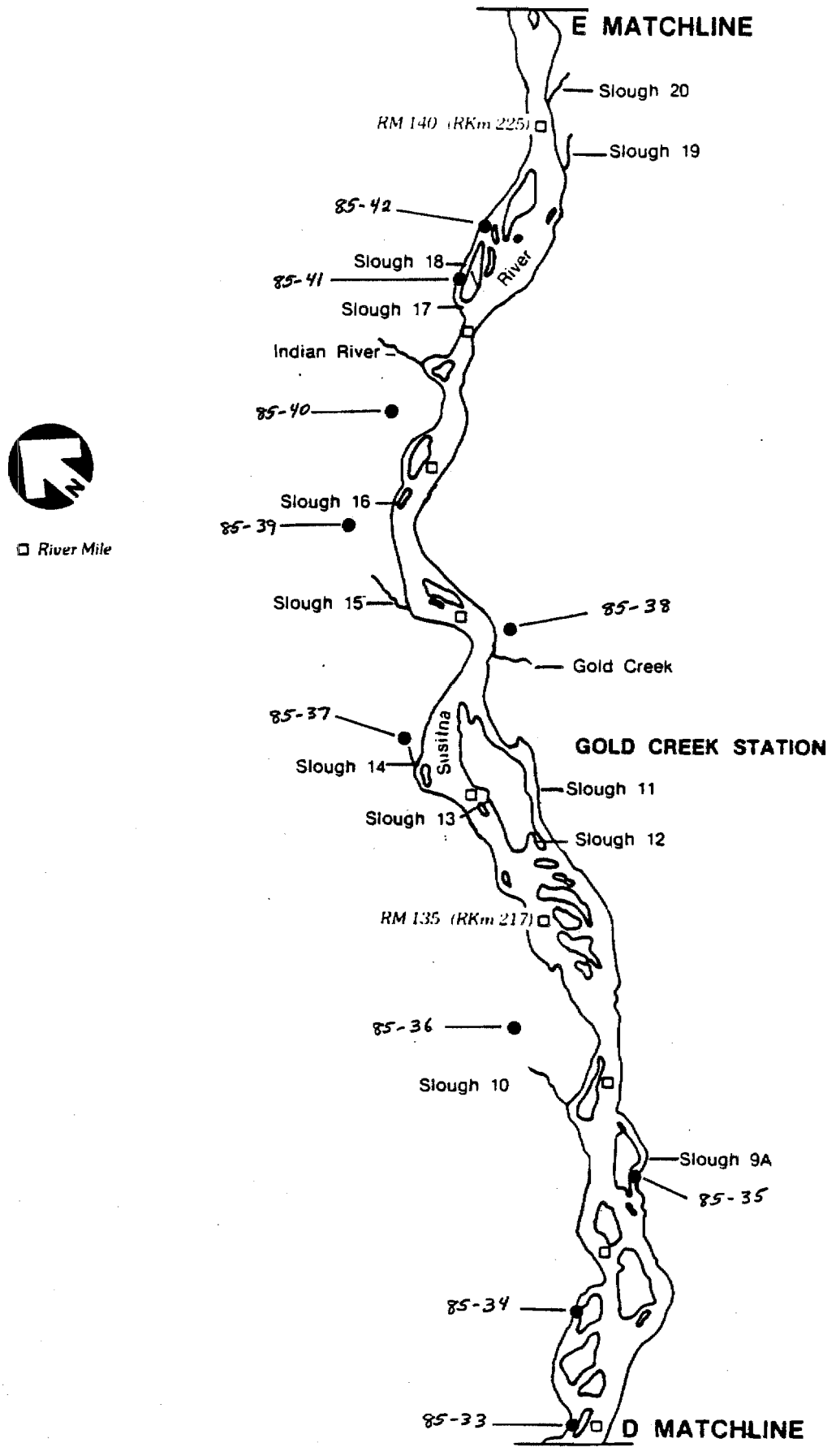

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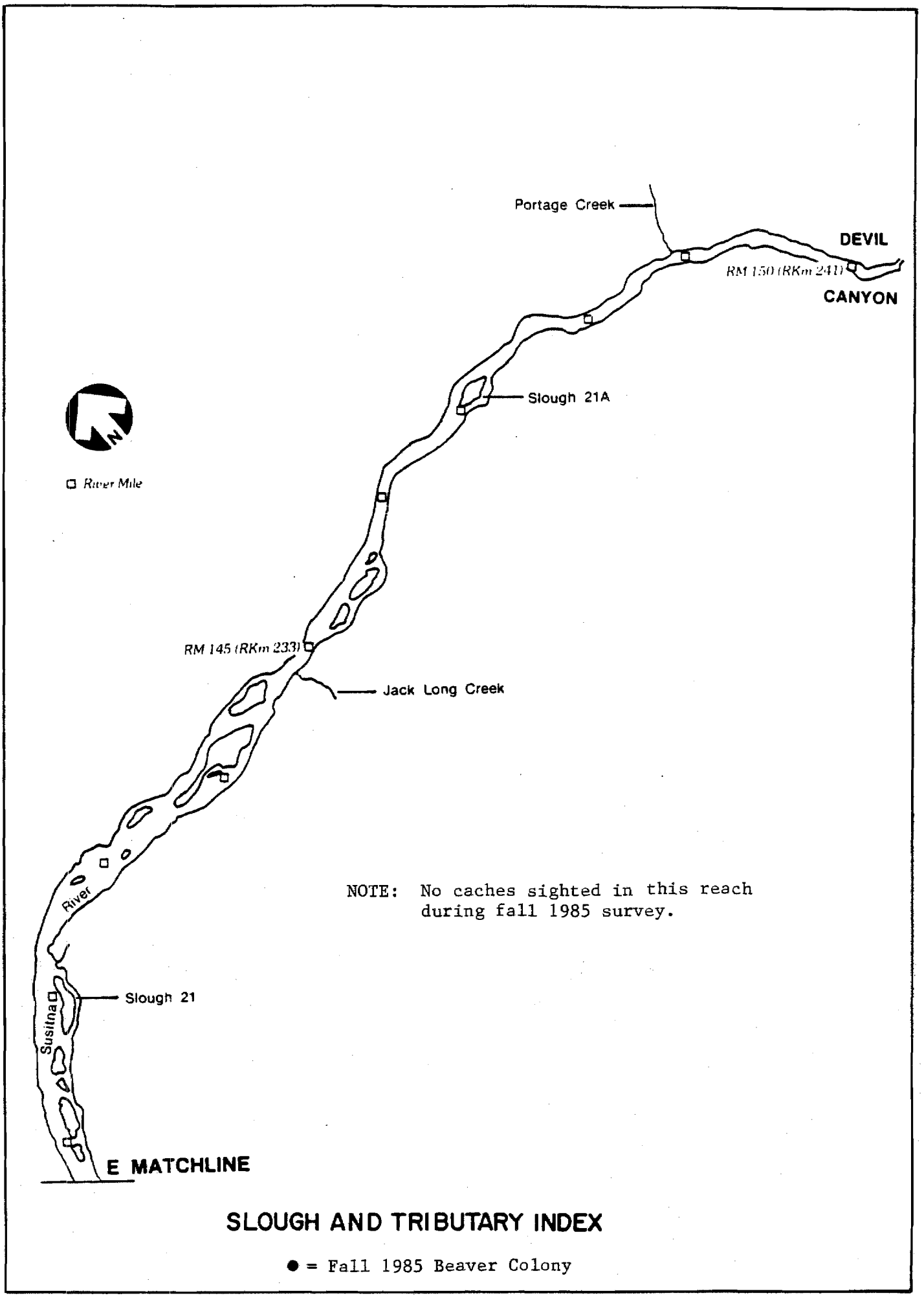

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