ecological research associates

FINAL REPORT

EARLY WINTER FISHERIES SURVEY AND PROVISIONAL LIST OF WATERBODIES ALONG THE ALASKAN GAS PIPELINE ROUTE (PRUDHOE BAY TO THE YUKON TERRITORY) PROPOSED BY NORTHWEST ALASKAN PIPELINE COMPANY

TO:
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FOR:
NORTHWEST ALASKAN PIPELINE COMPANY
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Prepared for and Funded by
Northwest Alaskan Pipeline Company

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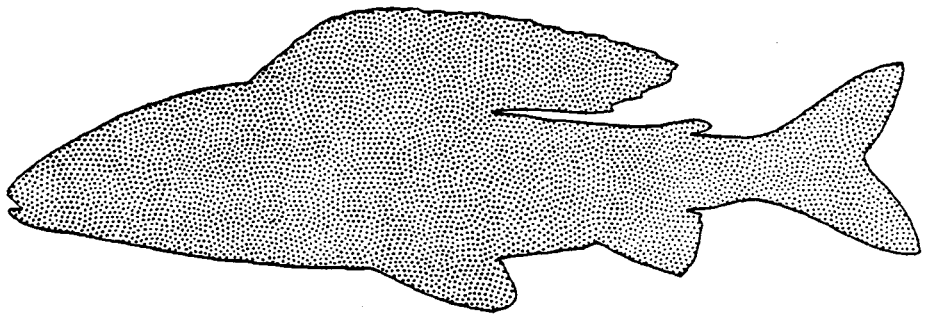
FOREWORD

The importance of overwintering areas to northern fish populations and the land-use conflicts that have arisen between overwintering fish and industrial developments are well known. This report represents a continuation of our winter fisheries program (Chihuly *et al.* 1979) and examines 28 streams that required additional winter information.

An assessment of overwintering areas must recognize that these sites may be dynamic temporally and spatially. The present study, which examines early winter conditions, provides an improved understanding of this dynamic process since many streams may be inhabited by fish in winter only during this portion of the winter period.



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ACKNOWLEDGEMENTS

We would like to acknowledge the field assistance of Mark Chihuly and the logistical, permit and field support by Fluor Northwest, Inc. Financial support for this study was provided by Northwest Alaskan Pipeline Company.

ABSTRACT

The natural gas pipeline proposed by Northwest Alaskan Pipeline Company traverses hundreds of waterbodies in the Beaufort Sea and Yukon River drainages. This report describes the winter fisheries status of these waterbodies based on a review of available information and a field survey of selected streams. Over seventy-five sources of information (including reports, unpublished documents, agency memoranda and personal communications) were examined for winter fisheries data at 492 crossings of waterbodies along the pipeline route. Results of the field surveys and literature review indicate that 52 waterbody crossings or near-crossings of the proposed pipeline are used by fish during winter. An assessment of these data is listed in Appendix II.

This report describes early winter fish use and winter habitat potential of 28 waterbodies at 38 proposed crossings or near-crossings of the Northwest Alaskan Gas Pipeline in Alaska.

Streams were surveyed between 11 November and 20 December 1979. Biological, chemical and physical data gathered are listed in a stream catalogue. Fish species caught were grayling, humpback whitefish, round whitefish, Dolly Varden, slimy sculpin, northern pike and burbot. Fish used 17 of 28 waterbodies surveyed during the early winter period. No fish were caught or observed in the remaining 11; of these 4 were considered to provide good early winter habitat and 5 (at nine locations) were considered marginal. Bear Creek, Confusion Creek, West Fork of North Fork Chandalar River (NPSI 2-28) and Lower Oksrukuyik Creek #2 were considered to be unsuitable due to the absence of free water.

Fish were captured at Moose Creek crossings #1 and #3 despite low dissolved oxygen levels (0.8-1.2 mg/ℓ). The affects of low dissolved oxygen concentrations on overwintering fish in the Arctic waters is unknown.

INTRODUCTION

Northwest Alaskan Pipeline Company proposes to construct the Alaskan segment of a buried pipeline which would transport chilled natural gas from the arctic to southern markets. The proposed routing of the Northwest Alaskan Pipeline (NAPLINE) parallels the Alyeska Oil Pipeline from Prudhoe Bay to Delta Junction with some minor variences, and then follows the Haines-Fairbanks Products pipeline right-of-way east from Delta Junction to the Alaska/Canada border.

On 4 January 1979, LGL Ecological Research Associates (LGL) was awarded a contract by and through Fluor Northwest, Inc., funded by Northwest Alaskan Pipeline Company, to conduct fisheries surveys along the NAPLINE route. The major purposes of this study were to identify the waterbodies crossed or potentially affected by the NAPLINE project and to assess the fish utilization of these waterbodies during winter, spring and fall seasons.

This report presents the results of a second phase in the NAPLINE winter fisheries program and includes: (1) a provisional list of 492 waterbodies crossed or potentially affected by the NAPLINE with an updated evaluation of existing winter fisheries data for each and (2) a winter assessment of waterbodies selected for field examination during the period, 11 November-20 December 1979 (early winter). Appropriate winter fisheries information collected during the initial phase of the winter program, 16 March-26 April 1979 (Ref. 55), is also included.

Early Winter Studies

Objectives and Justification

The purpose of the 1979 early winter field study was to determine the presence or absence of wintering areas in selected locations having both the potential for supporting fish during winter and potentially being affected by construction and/or operation of the Northwest Alaskan Pipeline Project. Wintering areas are defined as any location in a drainage system, placid or flowing, providing fish (any life history stage, egg to adult) with at least minimum survival requirements for some portion of the winter period. Overwintering areas are similarly defined but must provide maximum survival requirements for fish the entire winter period, freeze-up to break-up.

The importance of wintering areas to northern fish populations and the land-use conflicts that have arisen between wintering fish and industrial developments (e.g., pipeline trenching, winter water withdrawal, gravel removal, contaminants) have been described in recent studies and reviews (References 24, 51, 52, 53). It is generally thought that fish are very vulnerable to adverse impacts during the winter period, perhaps more so than at any other stage of their life cycle. Wintering areas are considered critical habitats because fish and/or their eggs may be concentrated in small, sometimes isolated pockets of water which remain

unfrozen during the extended winter period. Many northern streams, particularly the smaller ones, freeze to bottom substrate by late winter when ice thickness commonly reaches 2 m; consequently, the amount of unfrozen water becomes very limited. Fish must either vacate these streams or reside in deep pools or areas supplied by groundwater. As ice thickness increases, fish may become crowded in small areas and stressful conditions may be compounded by a depletion of under-ice dissolved oxygen (References 44, 45, 46, 47). Thus, in winter, habitat conditions for fish can become severe and any additional disturbance from instream construction projects may be most harmful at that time. It is therefore essential to identify which streams support wintering fish populations so that appropriate mitigative measures can be taken.

An assessment of wintering areas must recognize that these sites may be dynamic temporally and spatially. Fish distributions presumably change through the winter as increasing ice thickness reduces the amount and extent of unfrozen water. A concern frequently raised by fisheries biologists involves the possibility of year-to-year variation in the specific locations of wintering areas, but few data are available on this topic. Another unanswered question is the extent to which fish are periodically killed through natural winter processes such as an unusually severe winter which causes a site to freeze solid.

Stream Selection

An evaluation of available winter information for the 492 waterbody crossings or near-crossings of the NAPLINE was based on an extensive ongoing literature review, communications with state and federal agencies, a previous late winter survey and professional judgement. Primary sources for literature were published government and consultant reports and file data from the Joint Fish & Wildlife Advisory Team (JFWAT) in Anchorage. Agencies consulted included: State Pipeline Coordinators Office, Alaska Department of Fish and Game (Habitat and Sport Fish Divisions) and U.S. Fish and Wildlife (Stream Alteration Division). A list of winter criteria has been developed to standardize the manner in which waterbodies are evaluated for winter information (Table 1).

Waterbodies selected for early winter investigations consisted primarily of those streams previously surveyed in March 1979. These streams were identified as potential overwintering areas because conditions appeared favorable but fish data were inconclusive. Waterbodies not previously surveyed and lacking winter fisheries data were identified through continuing literature review and evaluation and agency biologist input.

Report Format

This report combines historical information and data generated during early winter field surveys in order to provide an interim assessment of winter fish use of selected streams affected by the NAPLINE route. A provisional list of 492 waterbodies crossed or potentially affected by

Table 1. Criteria for evaluating available winter fisheries data.

Number*	Winter Criteria
1	Wintering Area--Waterbody investigated and fish wintering areas documented.
2	No Overwintering--Waterbody investigated and found unsuitable for fish overwintering.
3	No Overwintering Inferred--Absence of overwintering habitat inferred and supported by indirect evidence: small drainage, probably freezes solid in winter; intermittent or no winter flow and low dissolved oxygen; no fall spawners in waterbody; or fish blockage present.
4	Additional Data Needed--Waterbody investigations incomplete or lacking for winter season: waterbody has not been surveyed for fish overwintering areas, previous investigations found or suspected overwintering habitat but did not sample for fish, or previous investigations did not find overwintering habitat but effort was considered inadequate.

*Cited in Appendix II

the NAPLINE along its route from Prudhoe Bay to the Canadian Border is presented in Appendix II. For each of these streams, sources of available winter fisheries data and the current status of this information are indicated.

Data gathered during the early winter field survey are presented on a stream-by-stream basis ("Stream Catalogue"). This information is also presented in a tabular summary of results (Table 2).

STUDY AREA

The study area addressed in this report extends along the NAPLINE route from Prudhoe Bay south to Fairbanks and then east to the Alaska/Yukon border (Figs. 1-4). For descriptive purposes, the route has been separated into two distinct regions: the northern segment and the southern segment.

The northern segment is aligned closely with the Trans-Alaska Pipeline System (TAPS) oil line and work pad and extends from Prudhoe Bay to Delta Junction. Between Prudhoe Bay and Atigun Pass, a distance of approximately 275 km, the proposed route crosses the arctic coastal plain, traverses the northern foothills of the Brooks Range and crests Atigun Pass--the highest point in the Alaska routing. Within this area, the NAPLINE alignment parallels most of the Sagavanirktok River and crosses numerous side channels. Larger streams like the Sagavanirktok characteristically are fast-flowing, clear and have wide, extensively braided, gravel floodplains. They support resident and anadromous fish at different times of year and are often used for overwintering. Smaller streams along this section are usually narrow, single channel drainages with stained water and support fewer species of fish than larger streams. These drainages usually freeze to the bottom in winter. Surrounding vegetative types include willow, penny birch and dwarf tundra flora.

South of Atigun Pass, the route continues through the Brooks Range where it crosses the Dietrich and Upper Koyukuk drainages. Most streams within the first 130 km south of Atigun Pass are wide, braided and fast-flowing throughout the summer. Floodplains are gravel and usually without meanders. Vegetative cover in this region changes from white spruce, lichens and dwarf willows in mountainous areas, to black spruce and birch, intermixed with tundra and muskeg in lower elevations.

Approximately 130 km south of Atigun Pass, the NAPLINE route enters the Yukon drainage where most streams exhibit a high degree of meandering. Although some of the larger streams are clear, most are stained brown with tannins and lignins leached from muskeg areas. Many of the larger streams, like the Koyukuk and Jim River, support overwintering fish and provide habitat for fall spawning salmon. Although most small streams do not provide overwintering habitat, they are used by juvenile and young-of-the-year fish during summer. Dwarf spruce and willow are predominant in tundra areas, while large spruce and birch vegetate river bottoms.

From the Yukon River crossing, the NAPLINE parallels the TAPS oil line through the White Mountains and into the Fairbanks area. Here the northern segment routing continues southeast within the Tanana River Valley to Big Delta.

Table 2. Summary of winter (1979) fish use potential of selected waterbodies in the vicinity of the NAPLINE route. Abbreviations used are: X? (fish present but species unknown), BB (burbot), GR (grayling), NP (northern pike), HW (humpback whitefish), RW (round whitefish), DV (Dolly Varden), CN (slimy sculpin), NPSI (Northwest Pipeline Stream Identification Number).

Waterbody	NPSI	Early Winter Fish Use Fish Species Present	No Fish Captured		No Winter Use	Text Page
			Early Winter Habitat	Late Winter Habitat (Reference 55)		
Scottie Creek	6-227	BB,NP,HW		good		17
Yerrick Creek	6-201	GR		marginal		20
Robertson River	5-187		marginal	marginal		23
Bear Creek	5-185				X	26
Berry Creek	5-178	CN		marginal		29
Sears Creek	5-177		good	marginal		32
Johnson River	5-175		marginal	good		35
Tanana River Side Channel	5-165.01	X?		no previous winter survey		38
Shaw Creek	5-165	BB,GR,HW,RW		marginal		41
Redmond Creek	5-159		marginal	marginal		44
Little Salcha River	4-157		good	good		47
French Creek #0	4-155		marginal	non-existent		50
French Creek #1	4-153		marginal	marginal		53
French Creek #3	4-151		marginal	marginal		56
French Creek #5	4-149		marginal	marginal		59
Moose Creek #1	4-148	NP		marginal		62
Moose Creek #3	4-146	BB		marginal		65
Washington Creek	4-137	GR		good		68
North Fork Ray River	3-110	GR		marginal*		71
South Fork Fish Creek	3-100	CN		marginal		74
South Fork Bonanza Creek	3-95	GR,BB,CN		marginal		77
Prospect Creek	3-91	CN		marginal		80
Jim River Side Channel #2	3-90.01	CN		marginal		83
Abba-dabba Creek	3-86	CN		no previous winter survey		86
Rosie Creek	3-74		good	no previous winter survey		89
Confusion Creek	3-61.02				X	92
Dietrich River	2-48	GR		marginal		95
Burgers Bayou	2-36.02	CN		no previous winter survey		98
Dietrich River	2-32.06 - 2-34.06	CN		no previous winter survey		101
Dietrich River	2-32.06	CN		no previous winter survey		104
Dietrich River	2-32.01	DV		no previous winter survey		107
West Fork of North Fork Chandalar River	2-29	GR,CN		no previous winter survey		110
West Fork of North Fork Chandalar River	2-28				X	113
Atigun River (near Mainline Spring)	NA		marginal	no previous winter survey		116
Atigun River	2-22		marginal	no previous winter survey		119
Lower Oksrukuyik Creek #1	1-18.01		good	no previous winter survey		122
Lower Oksrukuyik Creek #2	1-18				X	125
Sagavanirktok River Floodplain	1-4	GR,CN		no previous winter survey		127

*North Fork Ray River was incorrectly given a "no overwintering" status in Reference 55.

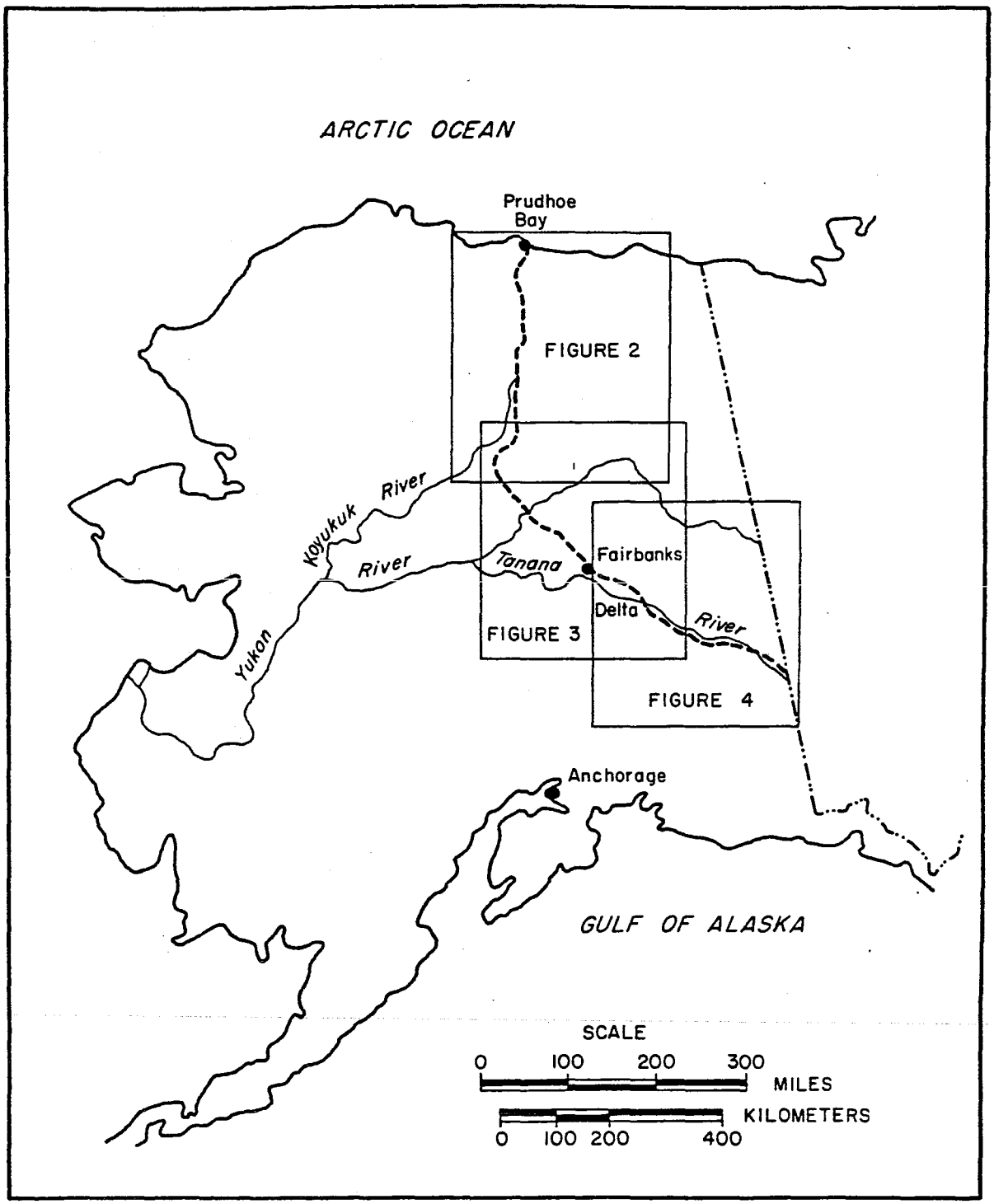

Fig. 1. Route of the proposed NAPLINE from Prudhoe Bay to the Alaska/Yukon border.

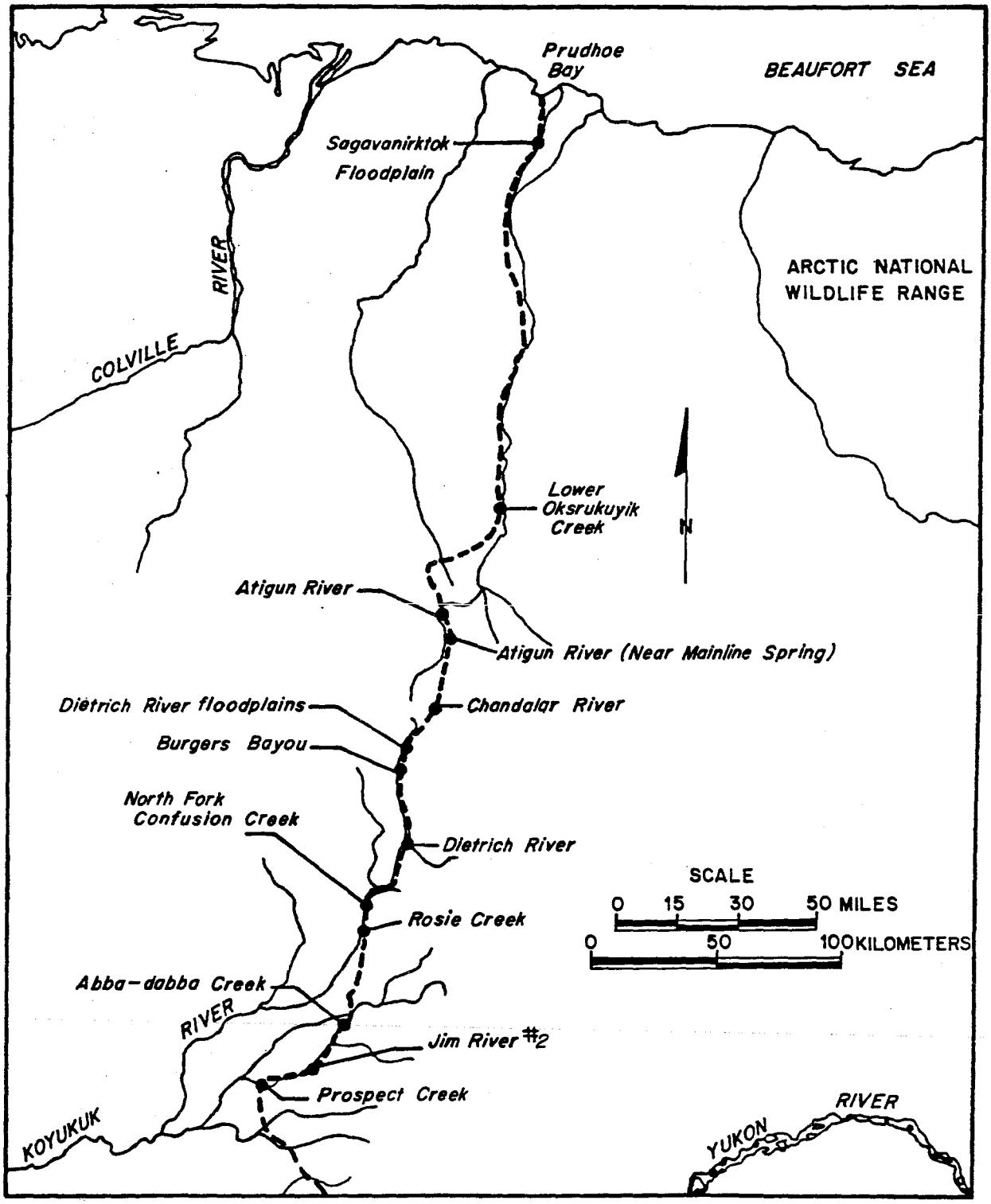

Fig. 2. NAPLINE route and sample sites from Prudhoe Bay to Prospect Creek.

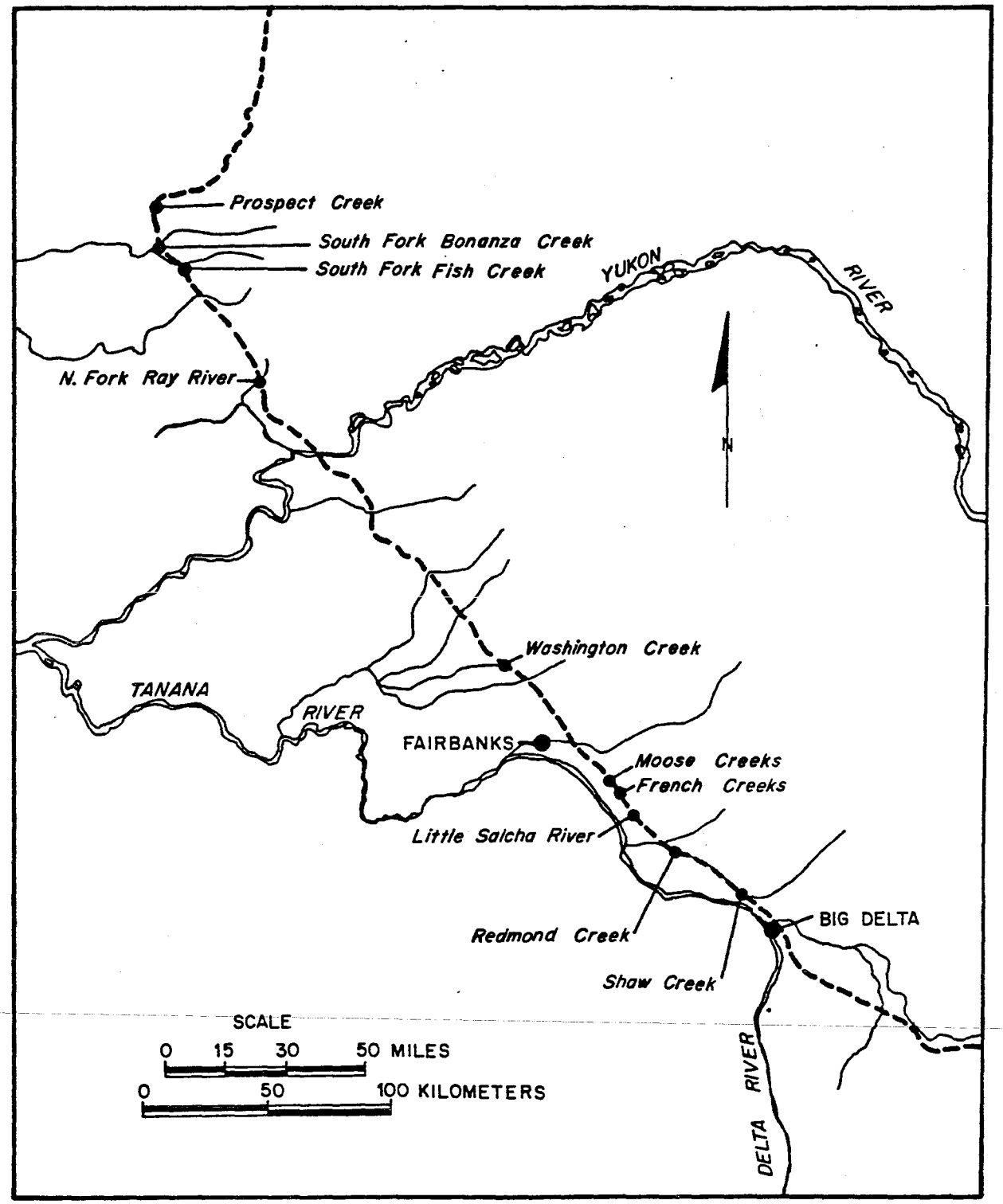

Fig. 3. NAPLINE route and sample sites from Prospect Creek to Big Delta.

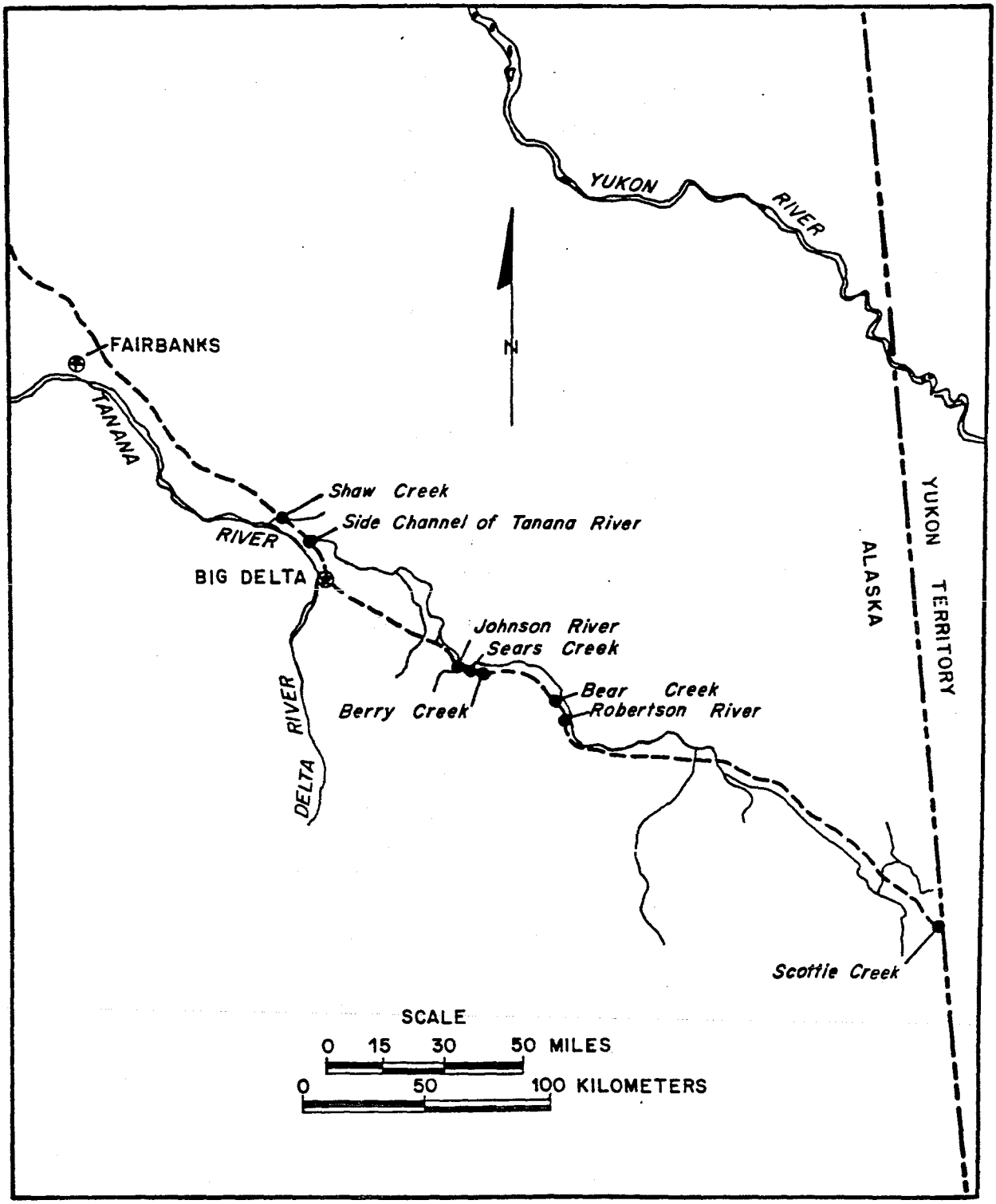

Fig. 4. NAPLINE route and sample sites from Big Delta to the Alaska/ Yukon border.

The southern segment of the study area begins near Delta Junction where the NAPLINE route diverges from the Trans-Alska Oil Pipeline. The proposed gas line continues southeast from Delta Junction, and parallels the Fairbanks-Haines pipeline to the Yukon border. Throughout most of the 313 km between Delta and the Yukon border, the route is within the broad, flat Tanana River Valley or in the northern foothills of the Alaska Range. This routing passes through alternating tundra or muskeg and mature stands of spruce, birch and willow.

Within the first 100 km east of Delta Junction, the NAPLINE crosses four major rivers: Little Gerstle, Gerstle, Johnson and Robertson rivers. These are glacial rivers that are highly turbid and have extensively braided floodplains. Most other drainages crossed in this area are small tundra streams which are used by fish during summer but often freeze solid during winter.

The current alignment leaves the foothills of the northern Alaska Range near Tok, Alaska, and borders the Tetlin Flats. This is a wet muskeg area characterized by an abundance of lakes, ponds and small streams. During ice-free months, many lakes and most small streams are used by waterfowl and fish. During winter, the smaller waterbodies freeze solid and do not provide overwintering habitat. Larger streams on the southern section, like the Tanana and Chisana rivers, become clear in early winter and provide overwintering habitat. From Tetlin Flats, the NAPLINE alignment continues east through the Upper Tanana River drainage basin to the eastern boundary of the study area--the Alaska/Yukon border.

METHODS

Early winter field investigations were conducted between 11 November and 20 December 1979 by two-man field crews. Existing transportation routes (the Richardson and Alaska Highways and the TAPS Haul Road) and a Bell 206B Jet Ranger helicopter provided access to areas surveyed between the Alaska/Canada border and Prudhoe Bay.

The series of Northwest Pipeline route sheets used throughout this report to identify stream locations is indicated in Reference 42.

Field Samples

Streams were examined in the vicinity of each NAPLINE crossing selected for investigation. Field surveys were generally conducted within 100 m upstream and 100 m downstream of the proposed crossing. The habitats sampled were those most likely to be used by fish (i.e., large deep pools, backwater eddies, outside meanders, open water areas, and those areas flagged as potential use areas during the 1979 fall survey). Where appropriate, data describing biological, chemical and physical conditions of streams were collected and are presented within this report.

Fish

A variety of techniques were used to sample for fish. In open water areas, fish were sampled by a Smith-Root Type VIII-A backpack electroshocker. Under ice techniques included the use of gillnets, baited and unbaited minnow traps, baited set lines and angling equipment. A power auger was used to drill through ice and an ice jigger was used to set monofilament (1.2-1.8 cm square mesh) and nylon (1.8-3.2 cm square mesh) gillnets under the ice.

Captured fish were measured to the nearest millimeter and released if possible. Fork lengths were recorded for all species except burbot and slimy sculpin where total lengths were measured.

Since age and growth data are not available for fish in specific waterbodies examined in this study area, life history classifications (fry, juvenile and adult) are professional judgements based on age and growth information for the general region.

Physical and Chemical Measurements

When free water was encountered in open channels or under the ice, current was measured with a Gurley Pygmy current meter. The lower detection limit of this meter is approximately 0.005 m/sec when stream flow is measured for a standard period of 60 sec. Stream discharge was calculated based on stream current and the cross-sectional area of unfrozen water. To define the extent of under-ice unfrozen water, a transect of holes was drilled across the stream. Drill holes were typically spaced at 0.3 to 0.6 m intervals across small streams and 0.6 to 1.5 m across large streams. The depth profiles obtained in this manner were filed with Northwest Alaskan Pipeline Company and Fluor Northwest, Inc.

Dissolved oxygen (Hach Kit Model OX-2P), pH (Hach Kit Model 17-F), conductivity (YSI Model 33 S-C-T) and temperature (Taylor field thermometer) were measured when free water was present. A YSI Dissolved Oxygen meter (Model 57A) and a Hach portable pH meter (Model 16400) were utilized to ensure precision and accuracy and each Hach kit, pH meter, S-C-T meter and hand thermometer were calibrated to ensure quality control. The degree of error in measurement was small and within the limits of precision for methods used and/or manufacturer's specifications (Appendix I).

Conductivity measurements are recorded at field temperatures. Conversion of these values to conductivity at standard temperature (25°C) may be accomplished by using calculations provided in the 14th edition of Standard Methods for the Examination of Water and Wastewater.

Water color, bottom type, channel and floodplain width, percent ice cover, snow depth, and distances of sampling sites from the proposed NAPLINE crossing were estimated in the field and should be considered approximations of conditions at the time of the observation.

Data Limitations

Data on fish and related features of aquatic habitats are difficult to gather during winter. During the present study, sample sites varied from shallow, open-water channels to isolated pools under 1-2 m ice layers. A variety of sampling gear was used to collect fish but factors such as fish catchability under ice, gear effectiveness and sampling intensity all affect the success of sampling efforts. It is recognized that the most useful data gathered in this type of a survey are those which demonstrate that 1) no fish were present because the stream was dry or frozen solid, or 2) fish were present because some were caught. Streams sampled, where no fish were caught, may require additional investigation if indirect evidence (i.e., amount of flowing water and dissolved oxygen levels) suggest that the site is a potential overwintering area for fish.

RESULTS AND DISCUSSION

Provisional List of Waterbodies

In a large-scale project such as pipeline construction, it is essential for reference purposes to maintain an updated list of waterbodies crossed or potentially affected by the pipeline. To date, the provisional list contains 492 entries (Appendix II). References 4, 11, 42, 43 and 48 provided the basis for this list which includes lotic and lentic habitats known to contain fish or having potential for fish utilization. Many waterbodies have multiple NAPLINE crossings--each crossing is treated as a separate entry in the list.

References that contain winter fisheries data are listed for each waterbody and the most recent evaluation of this information, according to the criteria listed in Table 1, is presented. It must be emphasized that this review is an ongoing process. Since our intial examination of available information one year ago, a substantial amount of new data has been gathered. These data, together with site inspections of streams in the study area have allowed a more realistic appraisal of streams and fish populations along the NAPLINE. These updated results indicate that 52 of 492 waterbodies in the vicinity of proposed NAPLINE crossings are used by fish during winter.

General Results of Early Winter Survey

Although early winter investigations were conducted after the expected freeze-up, a wide variety of ice and weather conditions were encountered.

Due to unseasonably warm weather, some waterbodies between the Yukon River and Atigun Pass were partially open when surveyed. Field crews encountered air temperatures ranging from -5°C to -40°C and ice conditions which range from no ice on open water channels to surface ice 1.6 m thick. Aufeis and/or anchor ice were only occasionally present in the streams surveyed.

During early winter surveys 28 streams and side channels of major rivers were investigated at 38 NAPLINE crossings or near-crossings. Water quality varied greatly from stream to stream. Observed ranges for some water quality parameters were as follows:

Dissolved Oxygen 0.2-12.0 mg/ℓ
Temperature 0.0-6.0°C
pH 6.1-7.5
Conductivity 5-460 μmhos/cm

Seven species of fish were seen or captured at 21 crossings of 17 waterbodies sampled:

Arctic grayling (*Thymallus arcticus*)
Northern pike (*Esox lucius*)
Humpback whitefish (*Coregonus clupeaformis*)
Round whitefish (*Prosopium cylindraceum*)
Slimy sculpin (*Cottus cognatus*)
Burbot (*Lota lota*)
Dolly Varden (*Salvelinus malma*)

The species caught and a summary of winter fish use potential of the streams surveyed and side channels of major rivers along the NAPLINE route are summarized in Table 2 and presented in detail in the Stream Catalogue. Grayling and slimy sculpin were the most numerous and frequently occurring species captured during early winter investigations.

No fish were seen or captured at or near 17 waterbody crossings or near-crossings along the NAPLINE route during early winter investigations. Bear Creek, Confusion Creek, West Fork of North Fork Chandalar River (NPSI 2-28) and Lower Oksrukuyik Creek #2 provided no winter habitat for fish in the areas surveyed due to the absence of free water. Using the following guidelines, early winter habitat at the remaining 13 waterbody crossings was judged to be good at four but marginal at nine.

Good early winter habitat--generally has an adequate depth of free water (15-20 cm minimum), measurable flow (at least 0.1-0.3 m^3/sec or 0.5-1 A^3/s), and high dissolved oxygen concentration (5 mg/ℓ minimum). These sites were typically characterized by clear water, gravel substrates and a pH which ranged from 6.1-7.4. Good habitat was judged to have a high potential for early winter fish use and for providing overwintering habitat (freeze-up to break-up).

Marginal early winter habitat--also contained free water but often no measurable flow or low dissolved oxygen concentrations (<5 mg/ℓ). Water temperatures and pH were variable. In general, if any important criterion (water depth, flow, dissolved oxygen concentration) appeared limiting for fish, the habitat was considered marginal. Marginal habitat was considered to have low potential for early winter fish use and for providing overwinter habitat.

It is noteworthy that some waterbodies provided habitat for fish during early winter investigations despite low measured dissolved oxygen levels. A juvenile burbot and a juvenile northern pike were captured in gillnets at Moose Creek crossings #1 and #3, respectively. Dissolved oxygen concentrations at these locations varied from 0.8-1.2 mg/ℓ as measured with a Hach Kit and later verified *in situ* with a YSI dissolved oxygen meter. Fish were also captured in Scottie Creek and Shaw Creek where dissolved oxygen was 2.6 mg/ℓ and 2.4 mg/ℓ, respectively. The dissolved oxygen levels measured in Scottie, Shaw and Moose creeks are well below the generally accepted minimum (5 mg/ℓ) for good fish habitat. It is not known how such low oxygen concentrations affected the fish present in the above streams, how long the fish had tolerated such conditions or how long they would remain. Little is still known about the affects of low dissolved oxygen levels on fish in overwintering areas of arctic waters. The lowest dissolved oxygen concentration observed during early winter surveys was 0.2 mg/ℓ at French Creek crossings #1, #3 and #5. No fish were captured at these crossings despite intensive gillnetting efforts.

Patterns of Fish Movements and Stream Usage

After breakup has occurred, fish are normally found in three general types of streams along the NAPLINE route: (1) small beaded tundra streams, (2) large-size creeks, and (3) large rivers. The small beaded tundra stream (e.g., Shocker Creek and S.F. Minton Creek) is usually frozen solid during winter and breaks up between late March and early June. These streams vary from 0.5-1.5 m in width and seldom exceed 1 m in depth. Substrates are variable but contain gravel, sand, silt and detritus. Although the water is usually clear, it is frequently stained from tannins and lignins leached from surrounding vegetation. Stream banks are often 0.5-1.5 m in height, undercut and vegetated with dwarf willow and birch.

Within the proposed NAPLINE corridor, small beaded tundra streams like Shocker Creek are used primarily by grayling, but round whitefish and/or char may occasionally be present depending on geographical location of the stream. Adult grayling may move into these streams at spring breakup, spawn and then move some distance back downstream. During the egg incubation period (early May to early July) juvenile grayling, juvenile whitefish and/or juvenile char may also move upstream into these areas. After the grayling eggs have hatched in late June to early July, emergent fry remain in the general vicinity until freeze-up. As fall approaches and water temperature drops, all fish begin moving downstream to overwintering areas. Small beaded tundra streams generally do not provide spawning habitat for fall spawning species.

The large creeks or small rivers (e.g., Prospect Creek, Moose Creek or Beaver Creek) are usually 5-10 m in width, with stained or clear water, and a substrate consisting primarily of gravel and sand. Banks, 0-2 m in height, are seldom incised. These drainages typically exhibit alternating stretches of deep, slow-moving water and shallow, rapid riffles. Some pools, especially in lower reaches, may be deep enough to provide overwintering habitat.

Within the proposed NAPLINE corridor, medium-sized streams receive more intense use by fish than small beaded tundra streams. Excluding overwintering, these drainages generally serve as major spring and fall migration routes for many species. Some, especially those with perennial spring sources, may be used for spawning by spring and fall spawning species. Young-of-the-year of fall spawning species (primarily whitefish and char) and eggs of spring spawning species (primarily grayling, northern pike, longnose sucker and slimy sculpin) may be present during spring. By late June or early July fry of spring spawners have emerged and may remain in the vicinity until freeze-up. Many streams are used intensively as nursery areas throughout the open-water season by juvenile grayling, whitefish, sculpin, pike, chub, char and others. Adult fish of several species are commonly present throughout the season. Some of the most northerly medium-sized streams may also support an anadromous fish run during the open water season. As fall approaches, fish generally begin moving downstream to overwintering areas.

Large rivers similar to the Tanana, Yukon, Koyukuk and others vary from 100-1000 m in width and 1-10 m in depth. Floodplains are usually braided and consist of gravel, sand, and silt, depending on river origin. Large rivers usually do not freeze solid and so they provide year-round habitat for fish.

Large rivers are the primary migration pathways for all species of anadromous fish. During spring, many juvenile salmon migrate downstream to enter the ocean; others may remain in freshwater for one or two years, depending on the species. A variety of freshwater fish also use large rivers as migration routes, spawning sites and nursery areas the year-round. Virtually all large rivers provide overwintering habitat for fish.

Stream Catalogue

The purpose of the following stream catalogue is to provide a ready access to fisheries data available for waterbodies examined during the early winter survey (11 November-20 December 1979). For each stream entered in this catalogue, the following information is provided:

Waterbody	- Location of waterbody, section surveyed and applicable identification numbers.
Assessment	- A brief description of the waterbody and assessment of its potential for fish in winter.

Fish	- Description and results of fish sampling efforts.
Physical Conditions	- Description and results of chemical and physical measurements.
Map	- Detailed figure showing sample sites.

Several reference systems have been used to identify the location on each waterbody along the NAPLINE route:

NPSI	- The Northwest Alaskan Pipeline Stream Identification (NPSI) numbering system.
Highway Milepost	- Highway milepost numbers indicate the point of intersection between the waterbody and the indicated highway. When these do not intersect, milepost designations refer to the point on the highway which is closest to the sampling location.
Pipeline Milepost	- Pipeline mileposts for the Northwest Alaskan Pipeline are indicated on the Fluor 1979 alignment sheet series (Ref. 42).
USGS Map	- United States Geological Survey maps are the 1:250,000 scale series. Township, range and section number of specific sampling locations are indicated.

Abbreviations used in the catalogue are listed:

Identification

NPSI	- Northwest Alaskan Pipeline stream identification number.

Milepost

AHMP	- Alaska Highway Milepost
NPMP	- Northwest Alaskan Pipeline Milepost (Ref. 42)

Pipeline

NAPLINE	- Northwest Alaskan Pipeline (Ref. 42)
TAPS	- Trans-Alaskan Pipeline System

Fishing Method

GN	- Gillnet
SL	- Setline
MT	- Minnow Trap
EF	- Electrofished
AN	- Angler
DN	- Dipnet

Units

km	- Kilometer
m	- Meter
h	- Hour

Other

NA	- Not applicable

Abbreviations have been combined to present a simple and concise means of representing sampling gear and fishing effort expended at a specific sampling location. The number or size and type of sampling gear is given first, followed by effort in parentheses. For example, a 15 m gillnet fished for 20 hours would be presented as follows: 15mGN(20h). Effort in parentheses is always given as a cumulative total; effort for electrofishing refers to the distance of stream fished.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Scottie Creek

Main Drainage Tanana River Tributary to Chisana River

Figure 4 Northwest Alignment Sheet 131

Identification Nos: NPSI 6-227 NPMP 737.5

Alaska Highway Milepost 1223.4

USGS Map Reference Nabesna, Ak. T 10N R 23E Sec. 24

Site Access On foot from Alaska Highway

Section Surveyed From Alaska Highway to 10 m upstream of NAPLINE crossing (~260 m)

ASSESSMENT

Scottie Creek is a deep, slow-meandering stream 10-25 m wide. Its banks are steep, grassy and lined with willow, alder and spruce. The channel is relatively uniform in size above and below the NAPLINE with sunken logs and abundant debris. During present investigations ice cover was 100% and 35-40 cm thick. Caddisfly larvae, predacious diving beetles and leeches were numerous under the ice.

Early winter sampling efforts yielded a juvenile and a mature burbot, a juvenile northern pike, and a spawned out humpback whitefish. The latter suggests the possibility of overwintering humpback whitefish eggs in the vicinity. Previous work indicates that burbot may spawn in this area during late winter, probably between February and April (Ref. 54). Present evidence suggests that Scottie Creek in the vicinity of the NAPLINE crossing should be considered an overwintering area, although conditions may deteriorate as winter progresses.

FISH

Site	A	B	C	D	E	F
Date	20-21 Nov. 79	20-21 Nov. 79	20-21 Nov. 79	20-21 Nov. 79	20-21 Nov. 79	20-21 Nov. 79
Location (distance from NAPLINE)	250 m upstream	120 m upstream	100 m upstream	70 m upstream	40 m upstream	10 m downstream
Species	BB	NP	BB,HW			
Quantity	1	1	1 BB;1 HW			
Size Range (mm)	220	210	BB 369 HW 397			
Gear/Effort	7SL(178h)	10mGN(24h) 6SL(153h)	20mGN(24h) 1SL(26h)	10mGN(24h) 1SL(26h)	1MT(24h)	1MT(24h)

PHYSICAL CONDITIONS		REMARKS
Date	20-21 November 1979	
Snow Depth (cm)	5-10	
Percent Ice Cover	100	
Surface Ice Depth (cm)	40	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	10-25	
Floodplain Width (m)	10-25	
Water Depth (cm)	122	
Discharge (m^3/s)	0.64	
D.O. (mg/ℓ)	2.6	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	140	
pH	7.1	
Color	Brown humic-stained	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Mud/detritus	

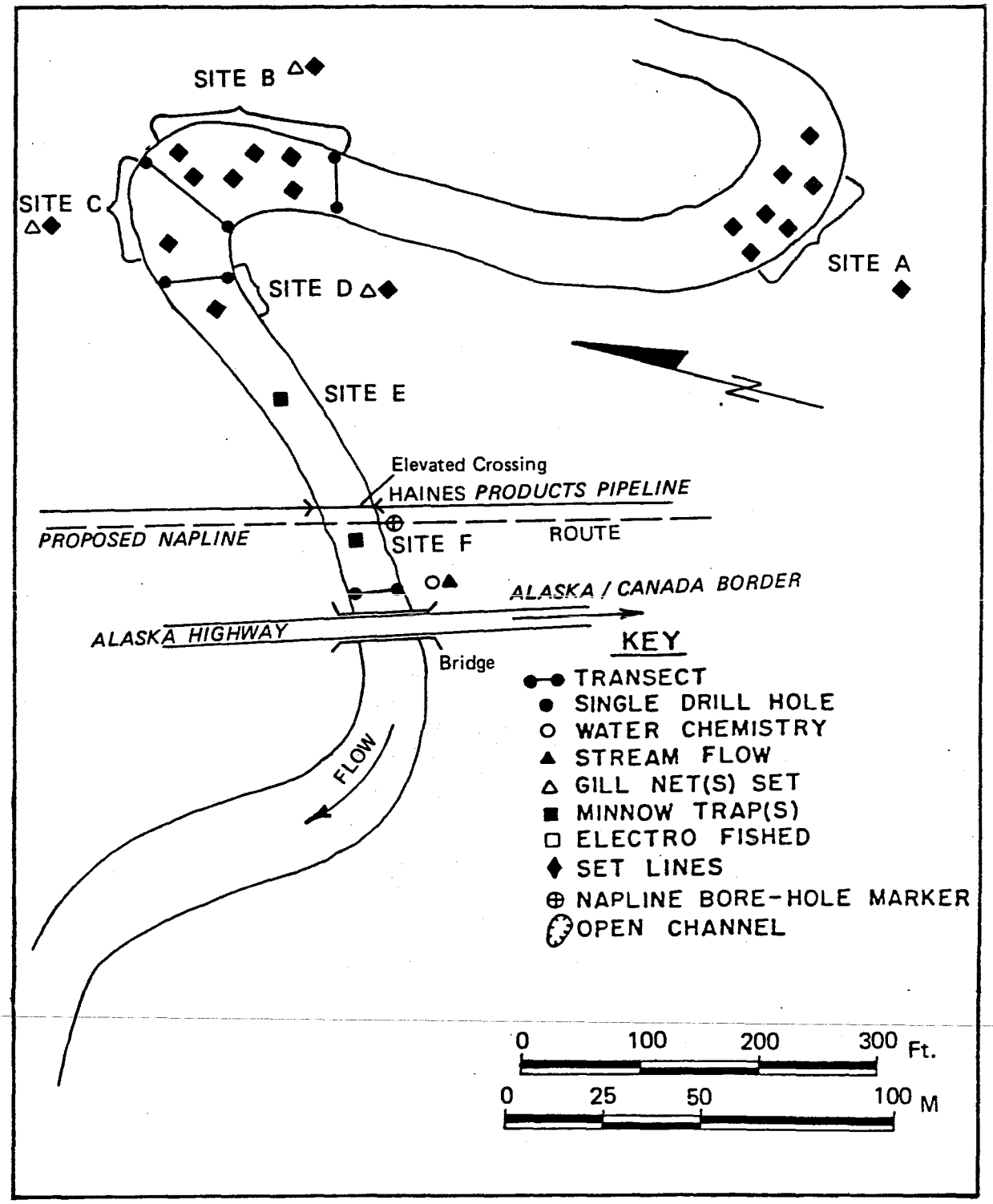

Fig. 5. Early winter survey. Scottie Creek, 20 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Yerrick Creek

Main Drainage Yukon River Tributary to Tanana River

Figure 4 Northwest Alignment Sheet 113

Identification Nos: NPSI 6-201 NPMP 633.0

Alaska Highway Milepost 1333.7

USGS Map Reference Tanacross, Ak. T 19N,18N R 9E,9E Sec. 1,36

Site Access On foot from Alaska Highway

Section Surveyed From Alaska Highway upstream to approximately 600 m above NAPLINE crossing (~1200 m)

ASSESSMENT

Yerrick Creek is a swift, clear water stream flowing northerly from the Alaska Range to its confluence with the Tanana River. The 10-15 m wide and sometimes braided channel has a steep gradient and a floodplain consisting of boulders, cobble and gravel. Gravel, sand and mud banks up to 2.5 m high are vegetated by alder, cottonwood and aspen. A higher discharge of water has been reported approximately 1.5 km upstream of the NAPLINE crossing than at the Alaska Highway, indicating the presence of some subterranean flow (Ref. 6).

Yerrick Creek should be considered a potential overwintering stream in the vicinity of the NAPLINE. Good early winter fish habitat was available throughout the section of stream surveyed and a single grayling was observed in an open water area downstream from the NAPLINE.

FISH

Site	A	B	C	D	E	F
Date	21, 25-26 Nov. 79	21, 25-26 Nov. 79	21, 25-26 Nov. 79	21, 25-26 Nov. 79		
Location (distance from NAPLINE)	500 m upstream	100 m upstream	120 m downstream	600 m downstream		
Species				GR		
Quantity				1		
Size Range (mm)				175-200		
Gear/Effort	Visual Observation	Visual Observation	Visual Observation	Visual Observation		

PHYSICAL CONDITIONS		REMARKS
Date	21, 25-26 November 1979	
Snow Depth (cm)	0-30	
Percent Ice Cover	90	
Surface Ice Depth (cm)	45	
Anchor Ice	Present	
Aufeis	Present	
Channel Width (m)	10-15	
Floodplain Width (m)	50-75	
Water Depth (cm)	55	
Discharge (m^3/s)	0.27-0.72	
D.O. (mg/ℓ)	12	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	85	
pH	Not taken	
Color	Clear to green	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Boulder/cobble; some gravel	

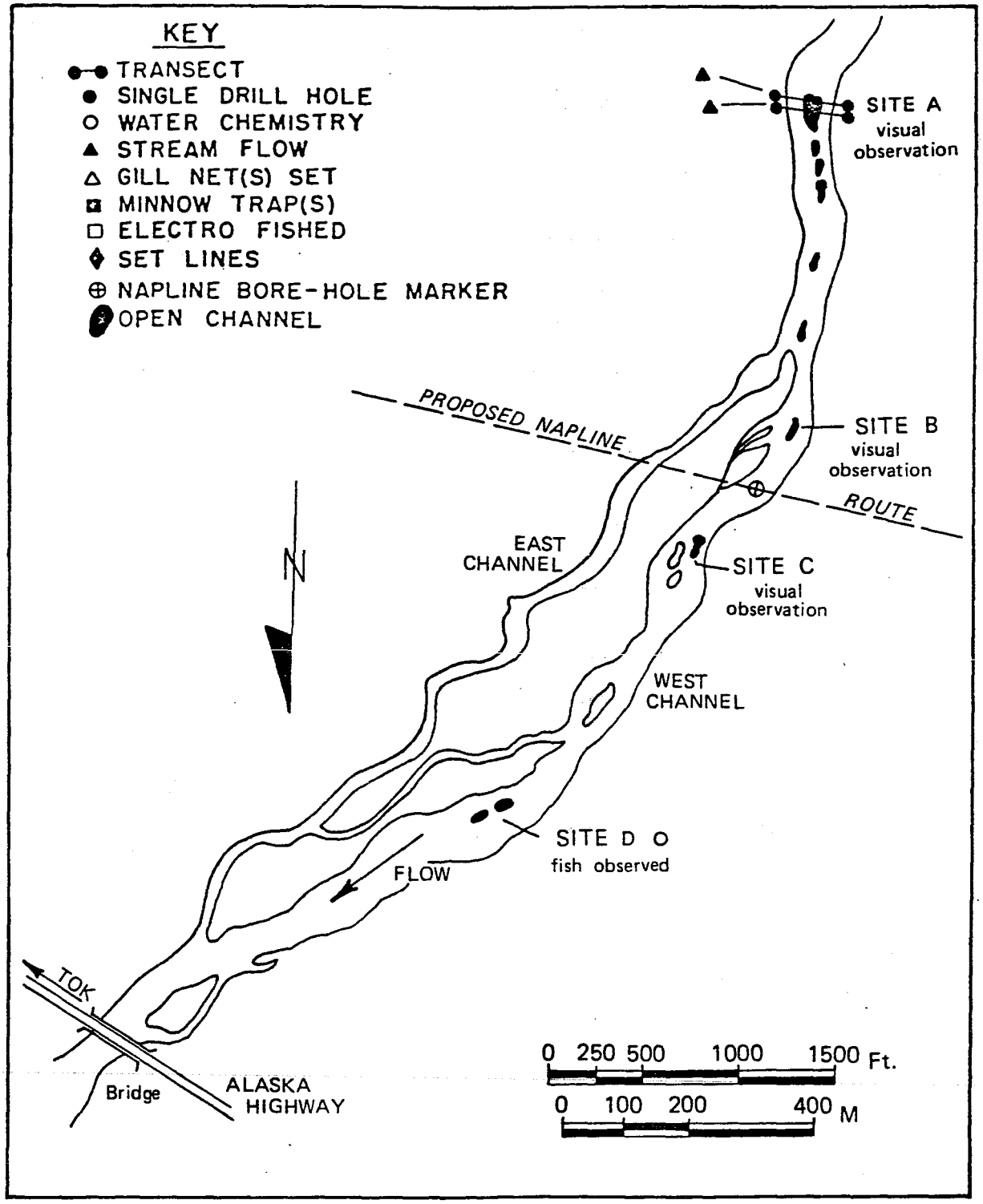

Fig. 6. Early winter survey. Yerrick Creek, 21-26 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Robertson River

Main Drainage Yukon River Tributary to Tanana River

Figure 4 Northwest Alignment Sheet 110

Identification Nos: NPSI 5-187 NPMP 619.6

Alaska Highway Milepost 1347.6

USGS Map Reference Tanacross, Ak. T 20N R 8E Sec. 23

Site Access On foot from Alaska Highway

Section Surveyed From NAPLINE crossing downstream 500 m below Alaska Highway bridge (~800 m)

ASSESSMENT

The Robertson River is a large braided glacial stream which originates in the Alaska Range and flows northeast into the Tanana River. The waters of the Robertson River are highly turbid during spring and summer but are clear by late fall. Flow is sustained year-round. The floodplain is 0.4-0.6 km wide and the substrate is gravel, cobble and silt.

In the vicinity of the NAPLINE crossing, the Robertson River is an unlikely site for fish overwintering. No fish were caught by set lines and ice conditions precluded the use of gillnets or electroshockers. On 19 and 22 November 1979, anchor ice was observed in the stream as freeze-up progressed. By 16 December 1979, the river had frozen over completely and water was confined to thin lenses in the ice or to very narrow, fast flowing channels. The constriction of these channels was due to accumulations of anchor ice. The resulting channels were somewhat unstable as the anchor ice was prone to shifting, which resulted in overflow water. These conditions continue throughout the winter and aufeis covers the entire floodplain to depths in excess of 2.35 m (Ref. 55).

FISH

Site	A	B	C	D	E	F
Date	17-20 Dec. 79	17-20 Dec. 79				
Location (distance from NAPLINE)	900 m downstream	1000 m downstream				
Species						
Quantity						
Size Range (mm)						
Gear/Effort	3SL(134h)	3SL(134h)				

PHYSICAL CONDITIONS		REMARKS
Date	16-20 December 1979	
Snow Depth (cm)	60	
Percent Ice Cover	100	
Surface Ice Depth (cm)	100	
Anchor Ice	Present	
Aufeis	Present	
Channel Width (m)	15-25	
Floodplain Width (m)	300-800	
Water Depth (cm)	70	
Discharge (m^3/s)	1.5	
D.O. (mg/ℓ)	12	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	200	Meter malfunctioned shortly after reading
pH	7.5	
Color	Turquoise	
Turbidity	Not turbid	
Fish Block(s)	Anchor ice	May impede fish movement
Substrate	Gravel/cobble	

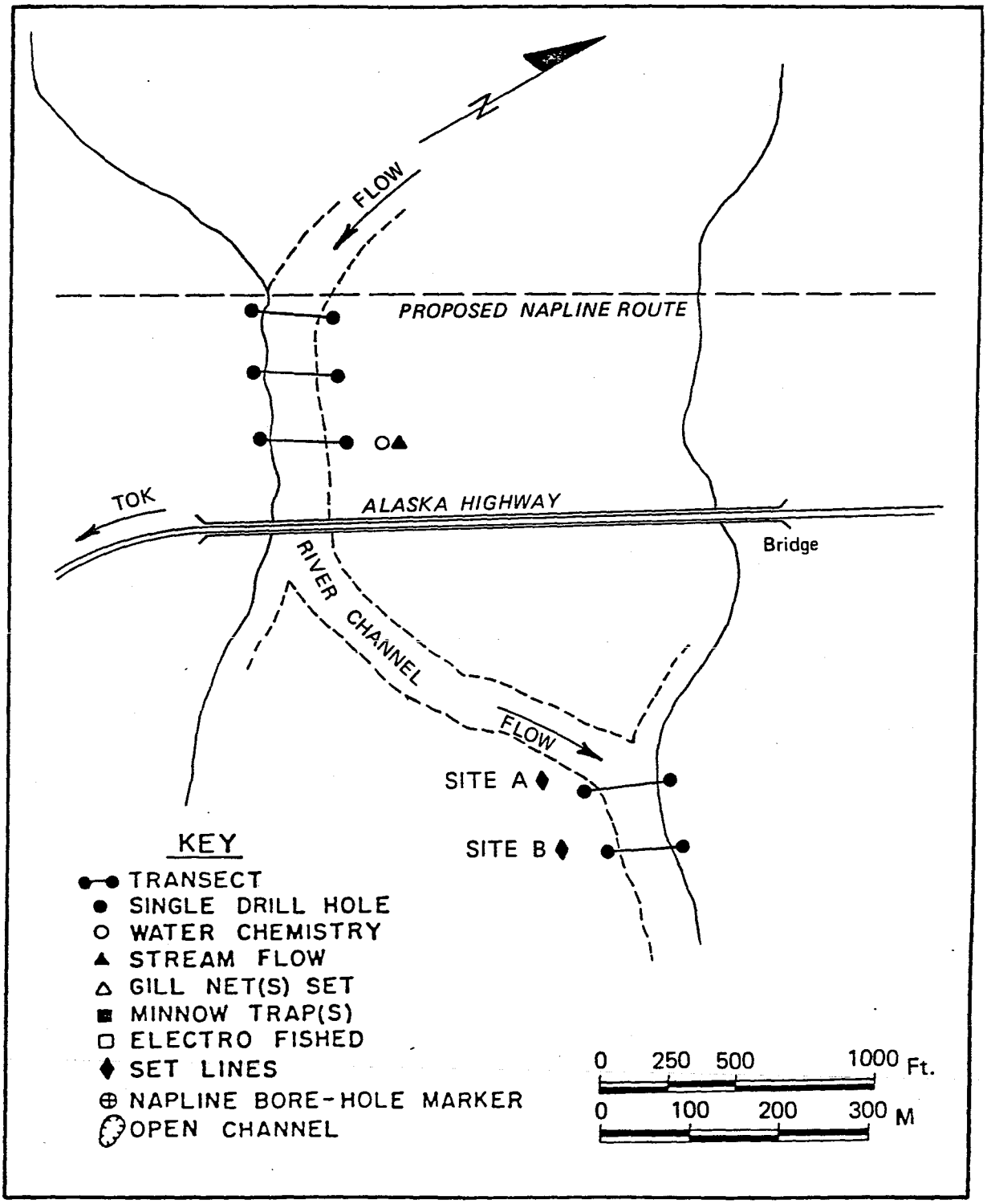

Fig. 7. Early winter survey. Robertson River, 16-20 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Bear Creek

Main Drainage Yukon River Tributary to Tanana River

Figure 4 Northwest Alignment Sheet 109

Identification Nos: NPSI 5-185 NPMP 609.9

Alaska Highway Milepost 1357.3

USGS Map Reference Tanacross, Ak. T 21N R 7E Sec. 12

Site Access On foot from Alaska Highway

Section Surveyed From 170 m upstream of Alaska Highway; downstream 225 m from NAPLINE crossing (~575 m)

ASSESSMENT

Bear Creek is a glacial stream which originates in the Alaska Range. Its major tributary flows from Fish Lake and joins the mainstream 18 km upstream of the NAPLINE crossing. The channel is 5-15 m in width with a gravel and cobble substrate interspersed with scattered boulders.

The upper reaches of Bear Creek are known to support overwintering Dolly Varden and slimy sculpin (Ref. 9). This suggests year-round flow in the area. If this is true, flow must be subterranean in the area of the NAPLINE crossing during the winter. No overwintering habitat was found during present investigations. Free water was absent in areas that had been previously flagged as potential overwintering sites. An ice layer 11.5-18 cm thick had formed and receding water levels left an airspace beneath the ice. Previous studies also found the stream dry during the winters of 1976 and 1977 (Ref. 8 and 9). Investigations in late March 1979 (Ref. 55) found water flowing in the vicinity of the NAPLINE crossing; however, this was probably due to initial break-up conditions.

FISH

Site	A	B	C	D	E	F
Date						
Location (distance from NAPLINE)						
Species						
Quantity						
Size Range (mm)						
Gear/Effort						

PHYSICAL CONDITIONS		REMARKS
Date	22 November 1979	
Snow Depth (cm)	5-10	
Percent Ice Cover	100	
Surface Ice Depth (cm)	12-18	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	5-15	
Floodplain Width (m)	10-20	
Water Depth (cm)	0	
Discharge (m^3/s)	0	
D.O. (mg/ℓ)	NA	
Temperature (°C)	NA	
Conductivity (μmhos/cm)	NA	
pH	NA	
Color	NA	
Turbidity	NA	
Fish Block(s)	None observed	
Substrate	Gravel/cobble underlain with sand	

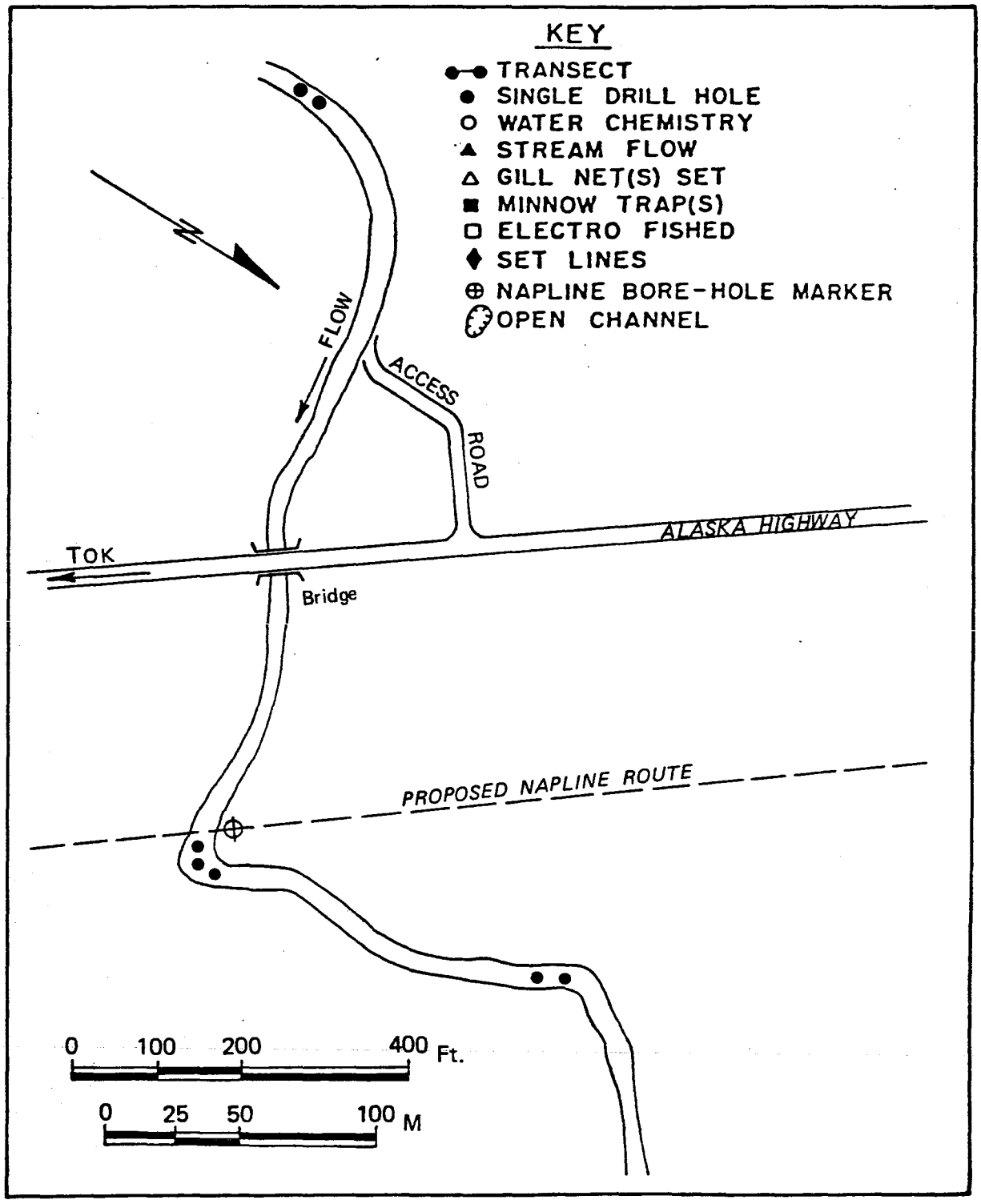

Fig. 8. Early winter survey. Bear Creek, 22 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Berry Creek

Main Drainage Tanana River Tributary to Johnson Slough

Figure 4 Northwest Alignment Sheet 106

Identification Nos: NPSI 5-178 NPMP 596.2

Alaska Highway Milepost 1371.4

USGS Map Reference Mt. Hayes, Ak. T 22N R 5E Sec. 13

Site Access On foot from Alaska Highway

Section Surveyed From 170 m upstream to 245 m downstream of NAPLINE crossing (415 m)

ASSESSMENT

Berry Creek originates from glaciers southeast of the Macomb Plateau and flows northerly across the Alaska Highway into Johnson Slough. This stream is influenced by springs and summer runoff. Discharge fluctuates seasonally, with reduced winter flow (Ref. 10 and 55). Berry Creek flows over a cobble and gravel bottom through a channel bordered by 1-2 m high banks. Primary vegetation includes willow, alder and spruce. Present investigations found small areas of flowing open water near the NAPLINE crossing on 22 November 1979. Approximately 110 m downstream of the crossing, the stream was completely frozen over and icings extended downstream from this point.

Early winter fish habitat was found to be good in the vicinity of the NAPLINE crossing. Slimy sculpin were observed or captured in each of the small open water areas surveyed. However, it is suspected that overwintering habitat in this area is greatly reduced as winter progresses. During February and March of 1978, attempts to locate water at or downstream of the Alaska Highway bridge were unsuccessful (Ref. 9). Other late winter investigations in March 1979 found that the only water present was confined to fast flowing lenses within the ice column (Ref. 55).

FISH

Site	A	B	C	D	E	F
Date	22 Nov. 79	22 Nov. 79	22 Nov. 79	22 Nov. 79		
Location (distance from NAPLINE)	130 m upstream	20 m upstream	25 m downstream	100 m downstream		
Species	CN	CN	CN	CN		
Quantity	3	5	2	1		
Size Range (mm)	41-57	41-57	41-57			
Gear/Effort	EF(5m)	EF(5m)	EF(3m)	EF(1m)		

PHYSICAL CONDITIONS		REMARKS
Date	22 November 1979	
Snow Depth (cm)	2-4	
Percent Ice Cover	100	
Surface Ice Depth (cm)	50	
Anchor Ice	Absent	
Aufeis	Present	
Channel Width (m)	3-10	
Floodplain Width (m)	15-25	
Water Depth (cm)	25	
Discharge (m^3/s)	0.41	
D.O. (mg/ℓ)	10	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	45	
pH	7.3	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/cobble underlain with sand/silt	

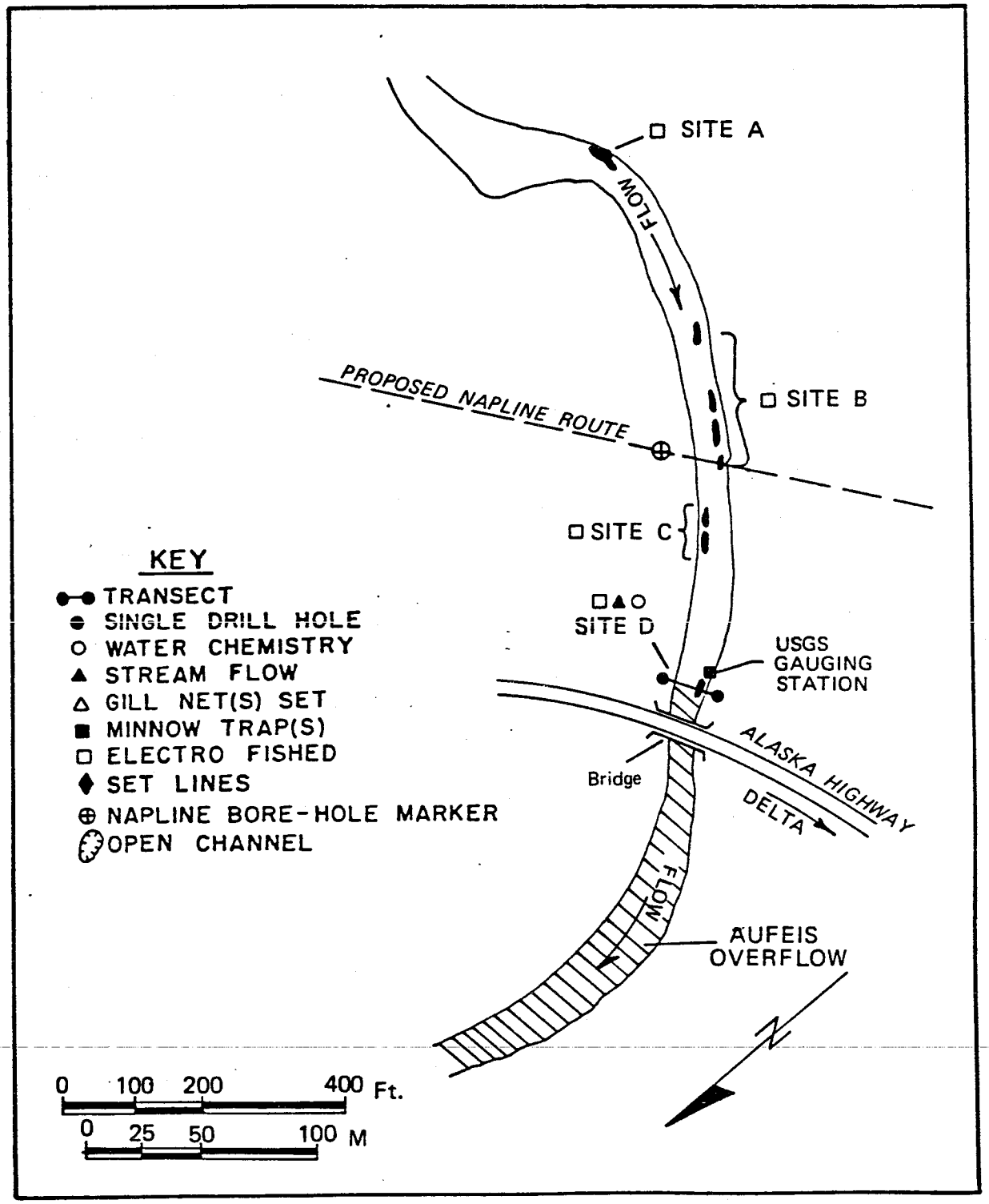

Fig. 9. Early winter survey. Berry Creek, 22 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Sears Creek

Main Drainage Tanana River Tributary to Johnson Slough

Figure 4 Northwest Alignment Sheet 106

Identification Nos: NPSI 5-177 NPMP 593.1

Alaska Highway Milepost 1374.4

USGS Map Reference Mt. Hayes, Ak. T 22N R 5E Sec. 16

Site Access On foot from Alaska Highway

Section Surveyed 40 m upstream to 150 m downstream of NAPLINE crossing (~190 m)

ASSESSMENT

Sears Creek is a small, humic-stained stream fed by springs and summer runoff. It drains the foothills of the Macomb Plateau and flows north into Johnson Slough. The stream bottom consists of gravel, sand and mud while the banks are lined with dense willow and alder. This stream is slow-flowing near the NAPLINE crossing and the channel is 3-5 m wide.

Fish overwintering habitat exists in the vicinity of the NAPLINE. A beaver dam constructed during the previous summer backs up water from just below the Alaska Highway to 10 m upstream of the proposed NAPLINE route. This dam prevents fish movement past this point, but it has resulted in considerable overwintering habitat here. Earlier in the summer (26 June 1979) juvenile grayling and longnose suckers were captured above the NAPLINE. It is suspected that these species were prevented from migrating downstream and were forced to overwinter in the beaver pond. However, no fish were seen or captured during present investigations. Fishing efforts were limited to minnow traps fished upstream from the dam and electrofishing small open sections of water below the dam. Beaver activity and ice conditions prevented the use of gillnets.

FISH

Site	A	B	C	D	E	F
Date	23-26 Nov. 79	23-26 Nov. 79	23-26 Nov. 79			
Location (distance from NAPLINE)	25 m upstream	10 m downstream	100 m downstream			
Species						
Quantity						
Size Range (mm)						
Gear/Effort	1MT(72h)	1MT(72h)	EF(10m)			

PHYSICAL CONDITIONS

		REMARKS
Date	23-26 November 1979	
Snow Depth (cm)	10-15	
Percent Ice Cover	99	
Surface Ice Depth (cm)	37	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	3-5	
Floodplain Width (m)	5-10	
Water Depth (cm)	85	
Discharge (m^3/s)	0.04	
D.O. (mg/ℓ)	11	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	40	
pH	7.1	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	Beaver dam	Just below highway
Substrate	Gravel below beaver dam	

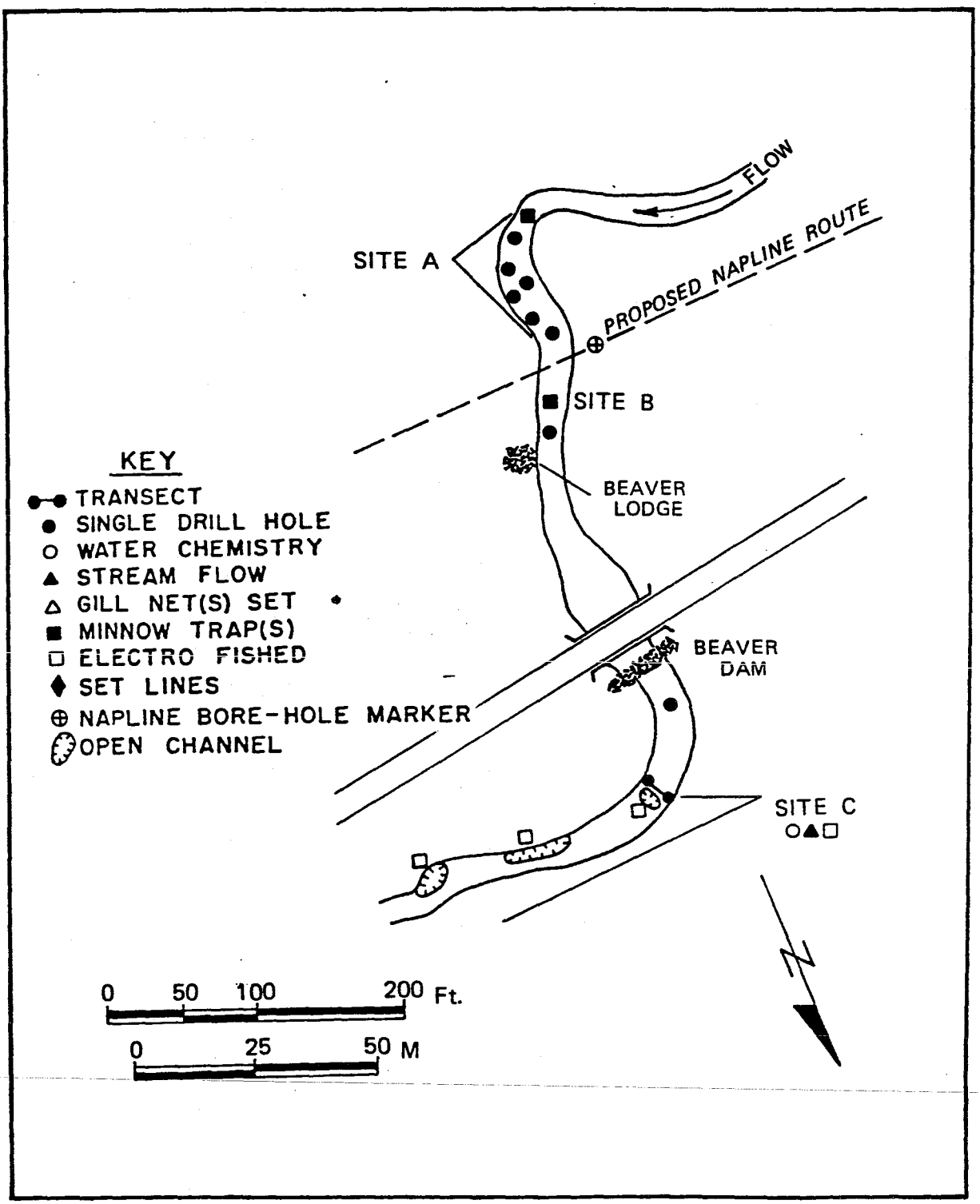

Fig. 10. Early winter survey. Sears Creek, 23-26 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Johnson River

Main Drainage Yukon River Tributary to Tanana River

Figure 4 Northwest Alignment Sheet 104

Identification Nos: NPSI 5-175 NPMP 587.0

Alaska Highway Milepost 1380.5

USGS Map Reference Mt. Hayes, Ak. T 14S R 16E Sec. 15 and 16

Site Access On foot from Alaska Highway

Section Surveyed From NAPLINE downstream to 200 m below the Alaska Highway bridge (~350 m)

ASSESSMENT

The Johnson River is a large, braided, glacial stream originating from the Johnson Glacier in the Alaska Range and flowing northward into the Tanana River. Its waters are turbid during summer, moderately turbid during spring and fall, and clear under winter ice cover. The stream bottom is primarily gravel while the floodplain is composed of sand and silt. The Johnson River is bounded by steep banks 20-30 m high.

During present investigations no fish or overwintering habitat were found in the study area. Fishing effort was limited to set lines as ice conditions prevented other means of sampling. Ice cover was 100% and surface ice thickness was typically 60-90 cm. Anchor ice was abundant in the entire area surveyed. Ice frequently occupied the entire water column, constricting flow to a fast, narrow channel. The instability of these channels due to rapid flow and shifting anchor ice indicates that this area does not provide suitable overwintering habitat.

FISH

Site	A	B	C	D	E	F
Date	19-20 Dec. 79	19-20 Dec. 79	19-20 Dec. 79			
Location (distance from NAPLINE)	250 m downstream	300 m downstream	350 m downstream			
Species						
Quantity						
Size Range (mm)						
Gear/Effort	2SL(42h)	1SL(21h)	1SL(21h)			

PHYSICAL CONDITIONS		REMARKS
Date	19-20 December 1979	
Snow Depth (cm)	25-35	
Percent Ice Cover	100	
Surface Ice Depth (cm)	75	
Anchor Ice	Present	
Aufeis	Present	
Channel Width (m)	15-25	
Floodplain Width (m)	200-1000	
Water Depth (cm)	150	
Discharge (m^3/s)	3.0	
D.O. (mg/ℓ)	12	
Temperature (°C)	0.5	
Conductivity (μmhos/cm)	170	
pH	7.5	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Primarily gravel/cobble	

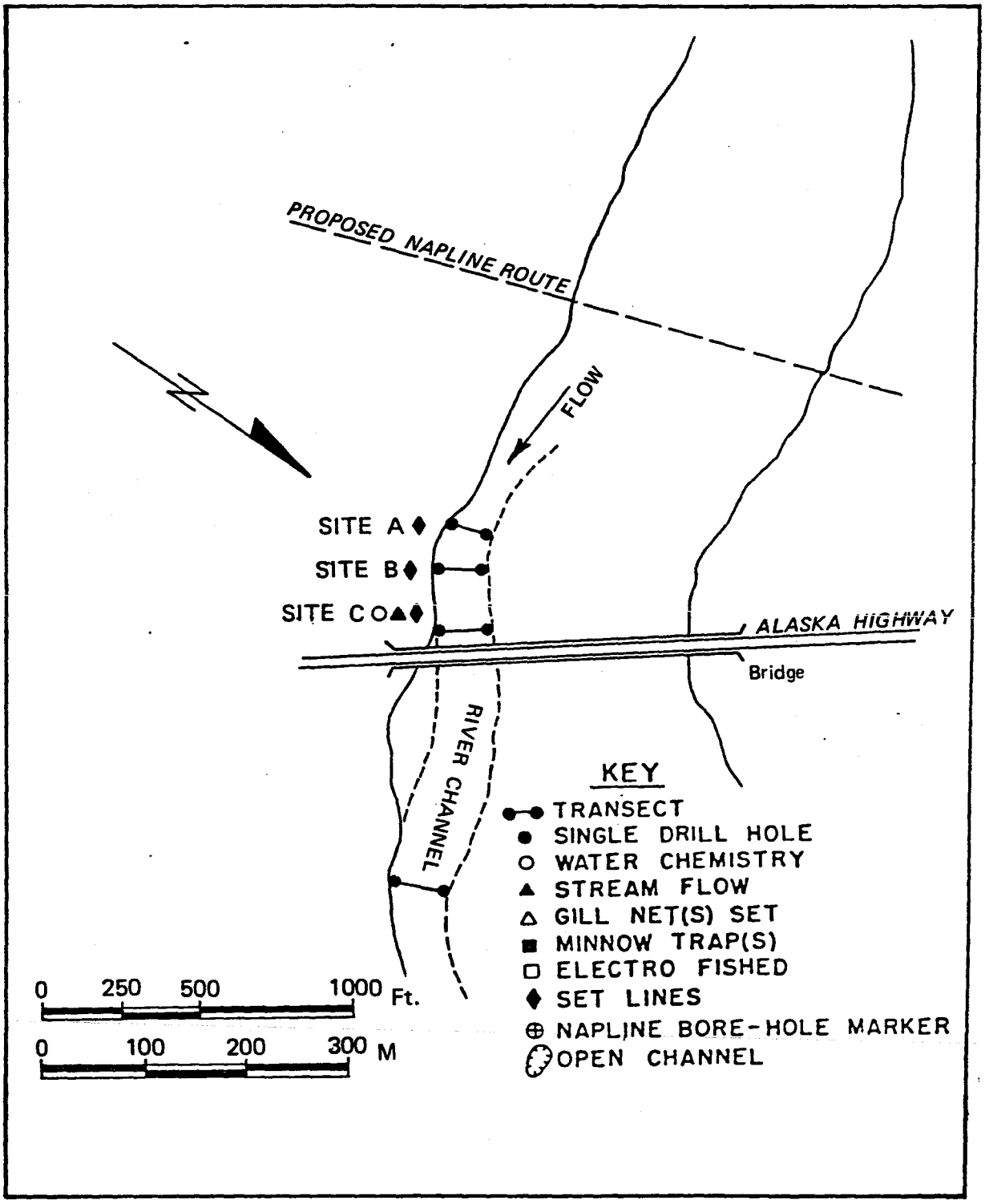

Fig. 11. Early winter survey. Johnson River, 19-20 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Tanana River Side Channel

Main Drainage Yukon River Tributary to Tanana River

Figure 3 Northwest Alignment Sheet 95

Identification Nos: NPSI 5-165.01 NPMP 536.7

Alaska Highway Milepost NA

USGS Map Reference Big Delta, Ak. T 9S R 10E Sec. 5

Site Access Helicopter

Section Surveyed From 700 m downstream to 2000 m upstream of NAPLINE crossing

ASSESSMENT

The Tanana River Side Channel is located on the north side of the Tanana River. It varied from 20 to 50 m in width at the time of present investigations. Banks were gentle slopes of sand and silt on the inside of meanders and 2-3 m high actively eroding silt banks on the outside of the meanders. Ice cover was about 90% with abundant anchor ice in open water areas on 15 December 1979.

Fish utilization of the Tanana River Side Channel was verified during this investigation. Although fishing efforts were hampered by high water velocities along the entire channel, an unidentified fish was observed through a hole in the ice. The south bank of the Tanana River opposite this side channel is a known spawning ground for chum salmon and adults in spawning condition were found in the side channel during the fall survey (Ref. 57). It is conceivable that the side channel is also an overwintering area for chum salmon eggs.

FISH

Site	A	B	C	D	E	F
Date	15 Dec. 79	15 Dec. 79				
Location (distance from NAPLINE)	1300 m upstream	650 m upstream				
Species		unident.				
Quantity		1				
Size Range (mm)		150-200				
Gear/Effort	2SL(45h)	7mGN(46h) 4SL(180h) Visual obs.				

PHYSICAL CONDITIONS		REMARKS
Date	15 December 1979	
Snow Depth (cm)	25	
Percent Ice Cover	90	
Surface Ice Depth (cm)	19	
Anchor Ice	Present	
Aufeis	Present	
Channel Width (m)	20-50	
Floodplain Width (m)	80-120	
Water Depth (cm)	122	
Discharge (m^3/s)	15.8	
D.O. (mg/ℓ)	10	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	150	
pH	7.4	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Sand/gravel	

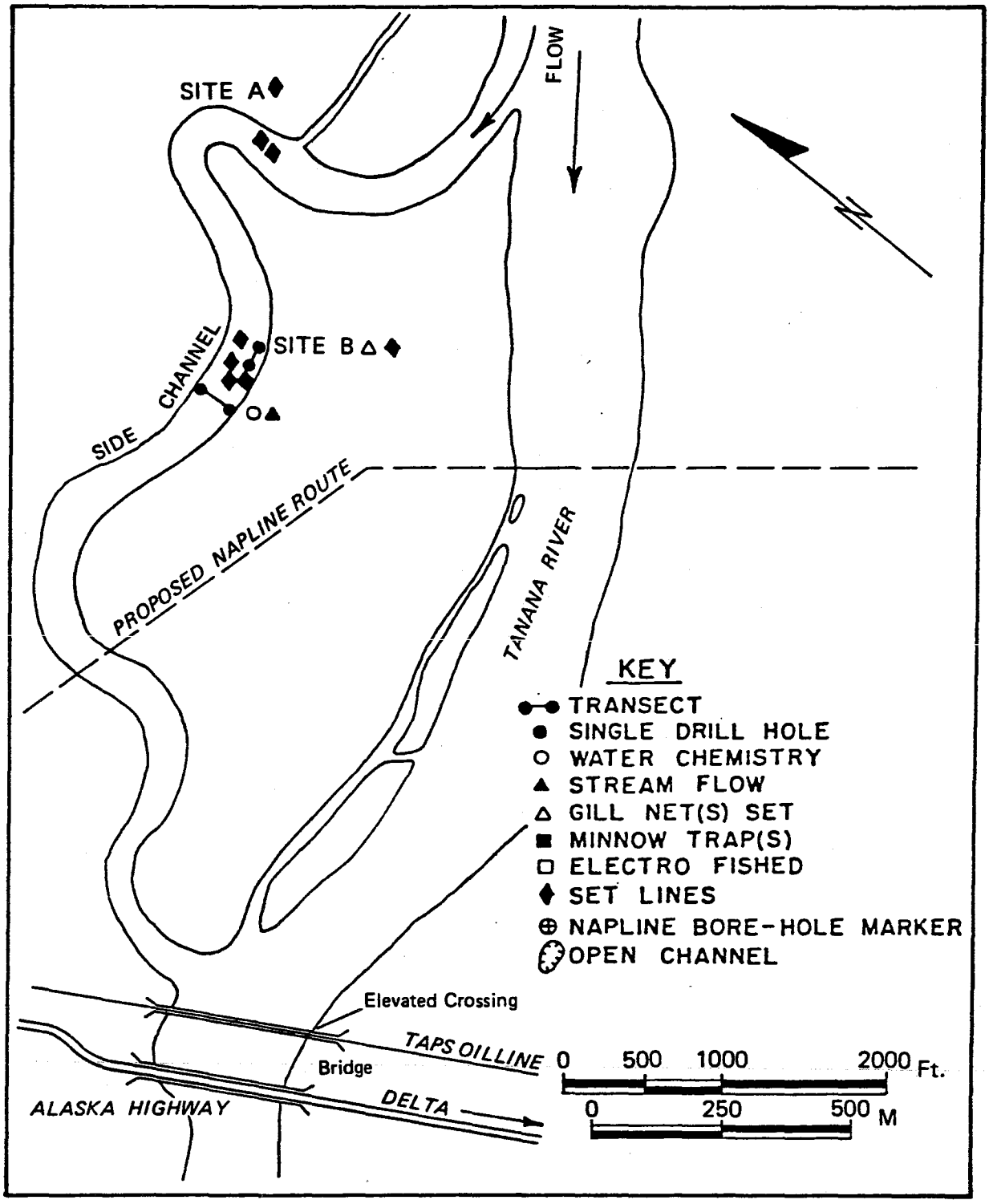

Fig. 12. Early winter survey. Tanana River Side Channel, 15 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Shaw Creek

Main Drainage Yukon River Tributary to Tanana River

Figure 3 Northwest Alignment Sheet 93

Identification Nos: NPSI 5-165 NPMP 526.0

Alaska Highway Milepost NA

USGS Map Reference Big Delta, Ak. T 7S R 8E Sec. 35 and 36

Site Access On foot from Richardson Highway

Section Surveyed From NAPLINE crossing downstream 900 m below the Richardson Highway bridge (2.7 k)

ASSESSMENT

Shaw Creek is a deep (over 2 m), slow flowing stream. The substrate is primarily mud with numerous sunken logs and the steep, often incised banks are 2-3 m in height. The stream is bordered by a mature spruce stand with some birch and willow. Ice cover was 100% and the water was under pressure resulting in considerable discharge from holes drilled through the 35-50 cm of surface ice.

During present investigations good overwintering habitat existed near the NAPLINE crossing. Several species of fish were caught: grayling, burbot, humpback whitefish and round whitefish. Fish habitat probably degrades, however, as winter progresses and discharge is reduced. Previous winter studies reported that there was no measurable flow or that the stream tends to freeze solid in winter (Refs. 11 and 55).

FISH

Site	A	B	C	D	E	F
Date	27-28 Nov. 79	27-28 Nov. 79	27-28 Nov. 79	27-28 Nov. 79	27-28 Nov. 79	27-28 Nov. 79
Location (distance from NAPLINE)	200 m downstream	1200 m downstream	1300 m downstream	2200 m downstream	2400 m downstream	2700 m downstream
Species	GR,HW,RW, BB	BB	BB	BB	BB	BB
Quantity	7 GR; 23 HW 2 RW; 3 BB	2	2	1	1	3
Size Range (mm)	GR 168-295 HW 151-275 RW 215-222 BB 216-360	343-678	343-678			343-678
Gear/Effort	10mGN(28h) 10mGN(25h) 20mGN(26h)	6SL(122h)	3SL(62h)	1SL(20h)	2SL(40h)	3SL(62h)

PHYSICAL CONDITIONS — REMARKS

Date	27-28 November 1979
Snow Depth (cm)	10-15
Percent Ice Cover	99
Surface Ice Depth (cm)	30-50
Anchor Ice	Absent
Aufeis	Absent
Channel Width (m)	15-25
Floodplain Width (m)	15-25
Water Depth (cm)	25-230
Discharge (m^3/s)	0.98
D.O. (mg/ℓ)	2.4
Temperature (°C)	0.0
Conductivity (μmhos/cm)	95
pH	6.8
Color	Brown humic-stained
Turbidity	Not turbid
Fish Block(s)	None observed
Substrate	Mud

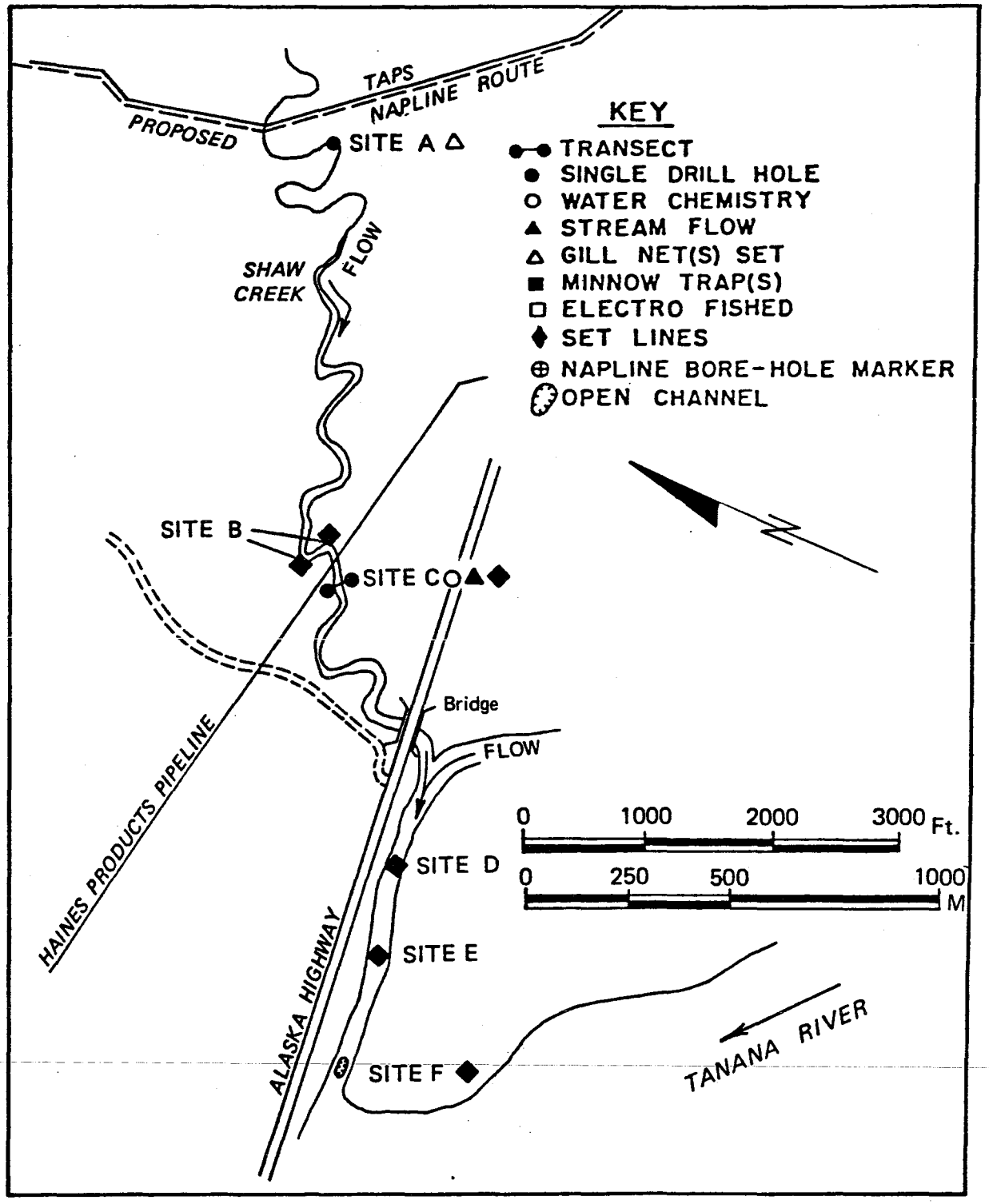

Fig. 13. Early winter survey. Shaw Creek, 27-28 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Redmond Creek

Main Drainage Tanana River Tributary to Salcha River

Figure 3 Northwest Alignment Sheet 90

Identification Nos: NPSI 5-159 NPMP 505.7

Alaska Highway Milepost NA

USGS Map Reference Big Delta, Ak. T 5S R 6E Sec. 22

Site Access Helicopter

Section Surveyed From 30 m upstream of NAPLINE crossing to 200 m downstream

ASSESSMENT

Redmond Creek is a small, meandering stream which flows into the Salcha River. The banks are 1.5-2.5 m high and well vegetated with grasses, alder, dense willow stands and spruce. Gravel and sand are the most prevalent substrate materials. Ice cover was 100% during this investigation, varying 5-25 cm in thickness over riffles and up to 45 cm thick over pools. The channel was 2-8 m across and appeared to have frozen when water levels were higher, causing the ice to slump and cave in. Visual observations suggested that discharge varied substantially within the area surveyed. This suggests that flow was at least partially subterranean in certain areas.

Overwintering habitat probably does not occur in the vicinity of the NAPLINE crossing. Only one pool suitable for overwintering was found within 200 m of the crossing and no fish were caught or observed here. Previous studies have also failed to find overwintering fish in this portion of the stream. On 20 March 1979, the stream was found to be intermittently frozen to the bottom near the NAPLINE (Ref. 55). In December 1974, no fish were captured in four baited minnow traps fished for a total of 432 hours in Redmond Creek from its confluence with the Salcha River to the TAPS crossing (Ref. 25).

FISH

Site	A	B	C	D	E	F
Date	14 Dec. 79					
Location (distance from NAPLINE)	200 m downstream					
Species						
Quantity						
Size Range (mm)						
Gear/Effort	8mGN(48h)					

PHYSICAL CONDITIONS		REMARKS
Date	14 December 1979	
Snow Depth (cm)	30-40	
Percent Ice Cover	100	
Surface Ice Depth (cm)	5-45	5-25 over fast flowing water;45 over pools
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	~3	
Floodplain Width (m)	~3	
Water Depth (cm)	12	
Discharge (m^3/s)	0.02	
D.O. (mg/ℓ)	5.6	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	105	
pH	6.5	
Color	Clear	
Turbidity	Slightly turbid	
Fish Block(s)	Beaver dam	Near mouth of creek
Substrate	Mud/detritus	

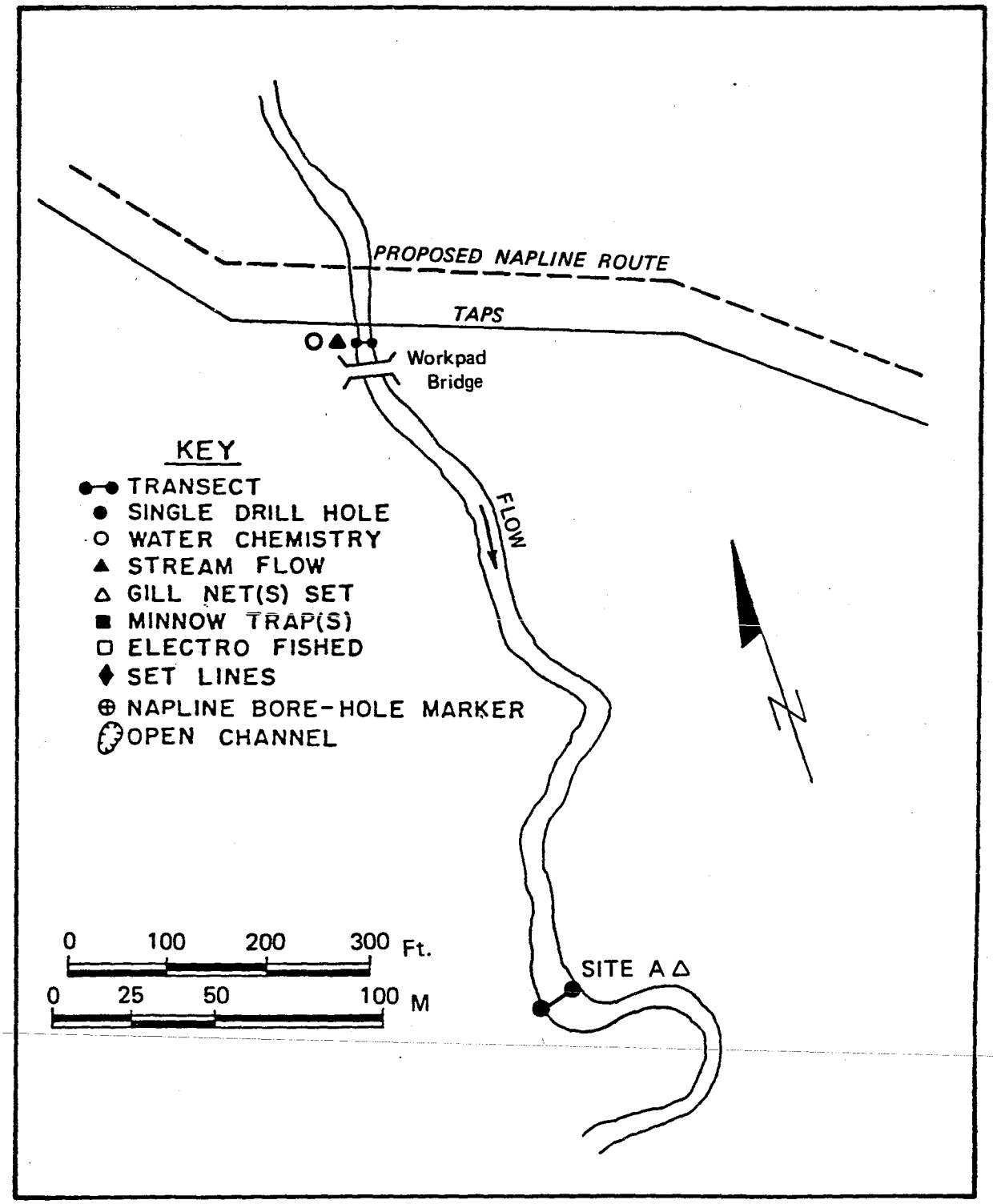

Fig. 14. Early winter survey. Redmond Creek, 14 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Little Salcha River

Main Drainage Yukon River Tributary to Tanana River

Figure 3 Northwest Alignment Sheet 88

Identification Nos: NPSI 4-157 NPMP 496.5

Alaska Highway Milepost NA

USGS Map Reference Big Delta, Ak. T 4E R 5S Sec. 32

Site Access Helicopter

Section Surveyed From 100 m upstream to 200 m downstream of the NAPLINE crossing

ASSESSMENT

Little Salcha River is a small, bog-fed stream of variable width (4-10 m) and depth (0.1-2 m). During the summer its waters are stained red/brown from leachates of surrounding tundra and muskeg, however, the water appeared colorless at this time. Viewed from the air the stream is a series of alternating circular pools and narrower straight riffles. Substrate is gravel and sand in fast water and mud in pool or slow water areas. Banks are moderately steep (1.8-2.4 m) and heavily wooded with alder and spruce in the area of the NAPLINE crossing.

Overwintering habitat appeared good at the two areas previously flagged for winter study. However, no fish were caught or seen at either site although a gillnet spanned the entire channel in both cases. Previous investigations suspect upwelling to occur in the vicinity of the NAPLINE crossing where high dissolved oxygen levels and the live caddisfly larvae were observed in late winter (Ref. 55). All of these are indications that suitable overwintering habitat exists throughout the winter.

FISH

Site	A	B	C	D	E	F
Date	14 Dec. 79	14 Dec. 79				
Location (distance from NAPLINE)	60 m upstream	200 m downstream				
Species						
Quantity						
Size Range (mm)						
Gear/Effort	5mGN(24h)	8mGN(50h)				

PHYSICAL CONDITIONS		REMARKS
Date	14 December 1979	
Snow Depth (cm)	45	
Percent Ice Cover	100	
Surface Ice Depth (cm)	20-40	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	4-10	
Floodplain Width (m)	4-10	
Water Depth (cm)	80-100	
Discharge (m^3/s)	<0.01	Estimated
D.O. (mg/ℓ)	6.8	
Temperature (°C)	0.0	
Conductivity (µmhos/cm)	50	
pH	6.1	
Color	Clear	Some reddish-brown floating material
Turbidity	Slightly turbid	
Fish Block(s)	None observed	
Substrate	Mud/sand with abundant detrital material	

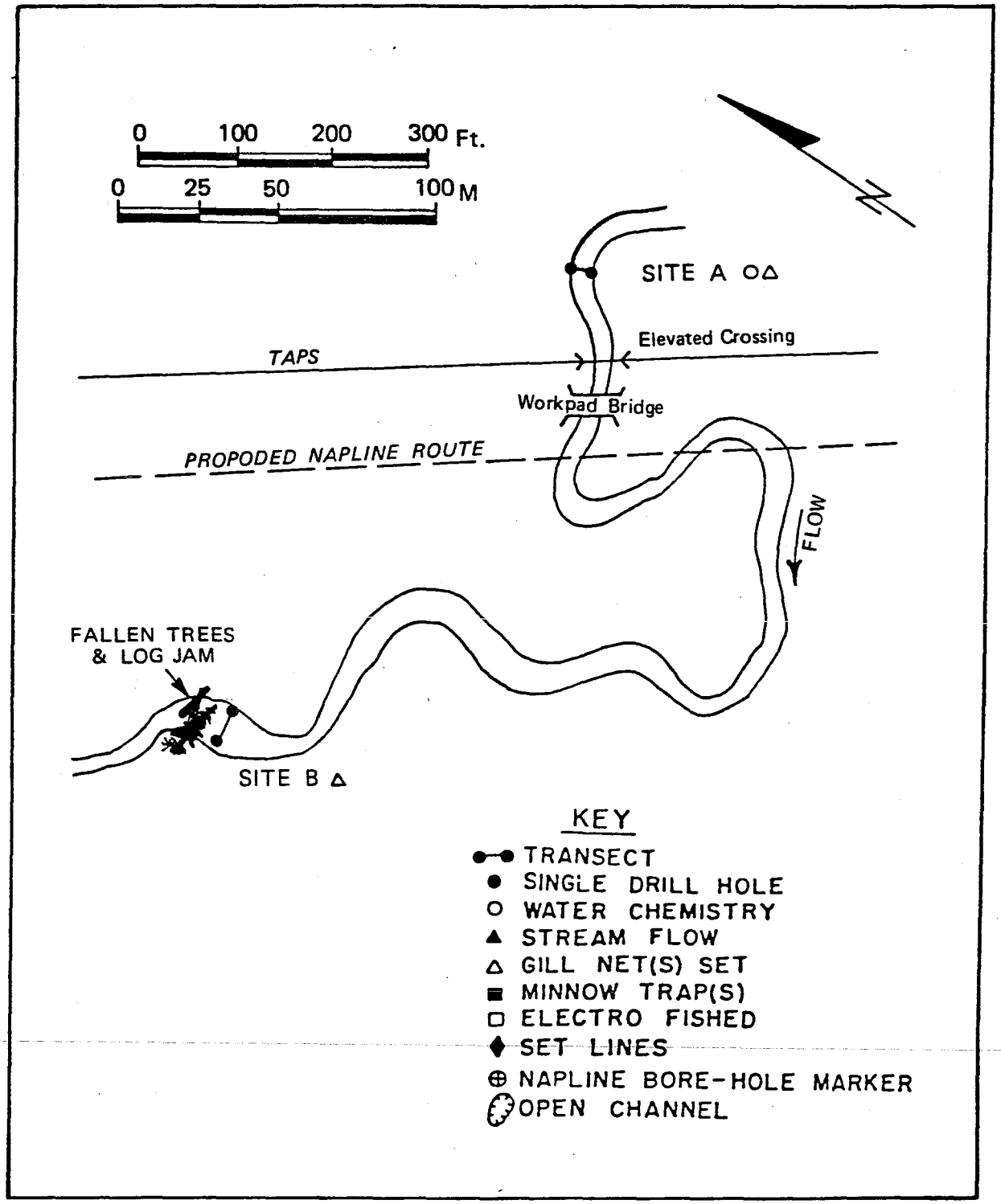

Fig. 15. Early winter survey. Little Salcha River, 14 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody French Creek #0

Main Drainage Tanana River Tributary to Moose Creek

Figure 3 Northwest Alignment Sheet 87

Identification Nos: NPSI 4-155 NPMP 489.6

Alaska Highway Milepost NA

USGS Map Reference Big Delta, Ak. T 3S R 4E Sec. 34

Site Access Helicopter

Section Surveyed From 200 m upstream to 50 m downstream of NAPLINE crossing

ASSESSMENT

French Creek #0 is the farthest upstream of six proposed crossings of this stream. In this area the channel varied 3-6 m in width and flowed through a region of partially open tundra/bog. The banks were 0.1-3 m high and bordered by willow, dwarf birch and scattered stands of spruce. Ice cover was 100% during the present investigations. Since the ice had frozen when water levels were much higher, the result was a series of ice layers and air spaces or occasionally solid ice to the level of flowing water.

Overwintering habitat appeared poor in the vicinity of the NAPLINE. No fish were seen or captured in the area previously marked for early winter studies. Low discharge combined with a steep gradient and narrow channel provided marginal habitat for fish during this investigation. As winter progresses, extensive icing is known to occur at this crossing (Ref. 11), and no free-flowing water was located here during late winter investigations on 24 March 1979 (Ref. 55).

FISH

Site	A	B	C	D	E	F
Date	5 Dec. 79					
Location (distance from NAPLINE)	150 m upstream					
Species						
Quantity						
Size Range (mm)						
Gear/Effort	5mGN(72h)					

PHYSICAL CONDITIONS		REMARKS
Date	5 December 1979	
Snow Depth (cm)	60	
Percent Ice Cover	100	
Surface Ice Depth (cm)	50	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	3-6	
Floodplain Width (m)	3-6	
Water Depth (cm)	75	
Discharge (m^3/s)	0.07	Estimate
D.O. (mg/ℓ)	10	
Temperature (°C)	0.0	
Conductivity (µmhos/cm)	65	
pH	6.6	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Mud/detritus	

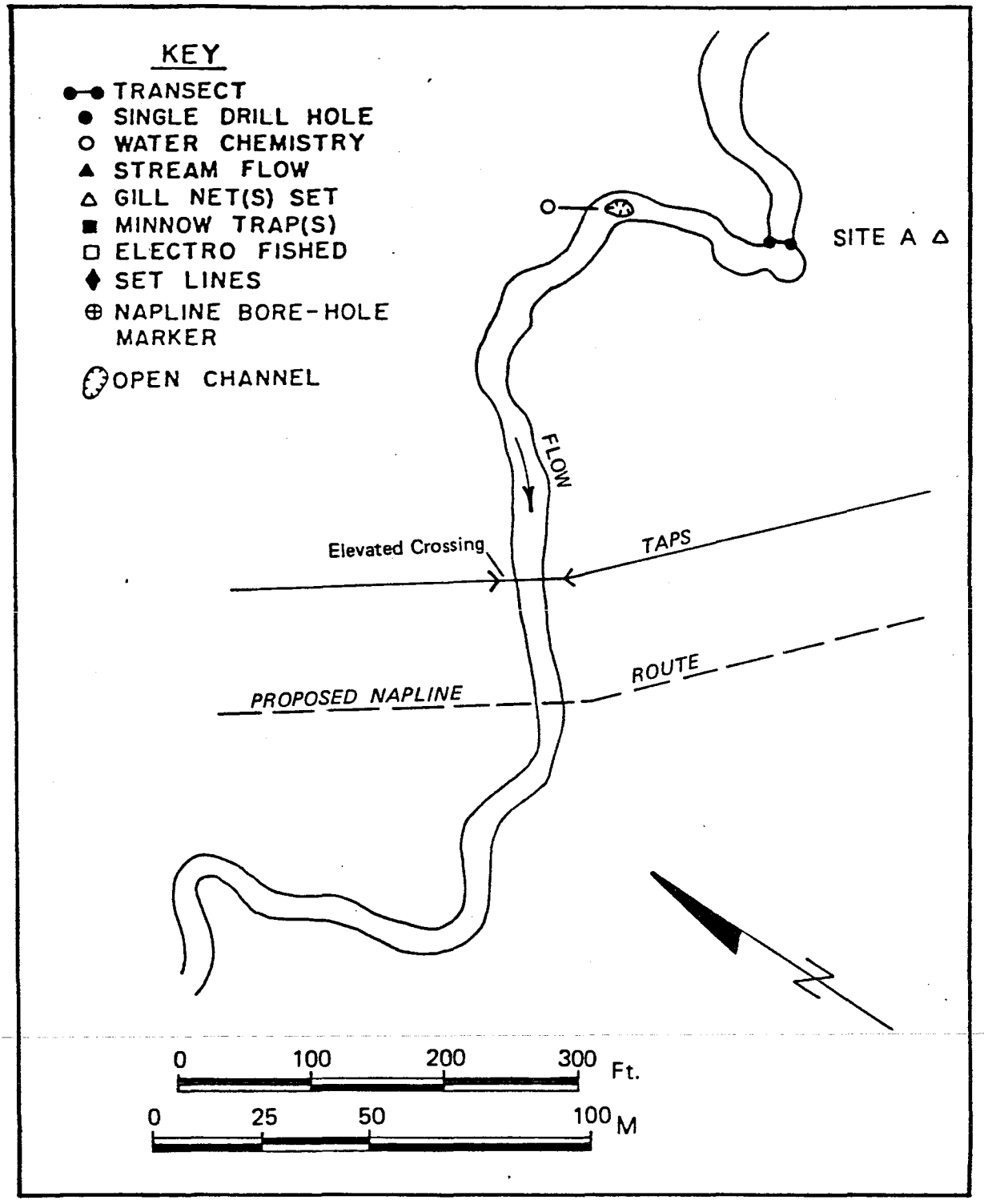

Fig. 16. Early winter survey. French Creek #0, 5 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody French Creek #1

Main Drainage Tanana River Tributary to Moose Creek

Figure 3 Northwest Alignment Sheet 86

Identification Nos: NPSI 4-153 NPMP 483.7

Alaska Highway Milepost NA

USGS Map Reference Fairbanks, Ak. T 3S R 4E Sec. 7

Site Access Helicopter

Section Surveyed From 100 m upstream to 200 m downstream of NAPLINE crossing

ASSESSMENT

French Creek at crossing #1 is a meandering stream about 7 m wide with steep banks 1.5-2.5 m in height. The channel is shaded by overhanging willows and alder in a stand of spruce. The substrate is sand and gravel with some detrital material. During present investigations ice cover was 100% and 25-30 cm thick.

This section of French Creek provides poor overwintering habitat due to extremely low dissolved oxygen levels. In slightly over 9 km that the stream flows from French Creek #0 to #1, the dissolved oxygen level decreased from 10.2 mg/ℓ to 0.2 mg/ℓ. This rapid decline suggests the introduction of a very strong reducing agent into the stream.

FISH

Site	A	B	C	D	E	F
Date	5 Dec. 79	5 Dec. 79				
Location (distance from NAPLINE)	35 m downstream	75 m downstream				
Species						
Quantity						
Size Range (mm)						
Gear/Effort	8mGN(72h)	6mGN(73h)				

PHYSICAL CONDITIONS		REMARKS
Date	5 December 1979	
Snow Depth (cm)	30	
Percent Ice Cover	100	
Surface Ice Depth (cm)	25-30	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	7	
Floodplain Width (m)	7	
Water Depth (cm)	75	
Discharge (m^3/s)	0.27	
D.O. (mg/ℓ)	0.2	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	Not taken	Meter malfunction
pH	6.9	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Sand/gravel with some detritus	

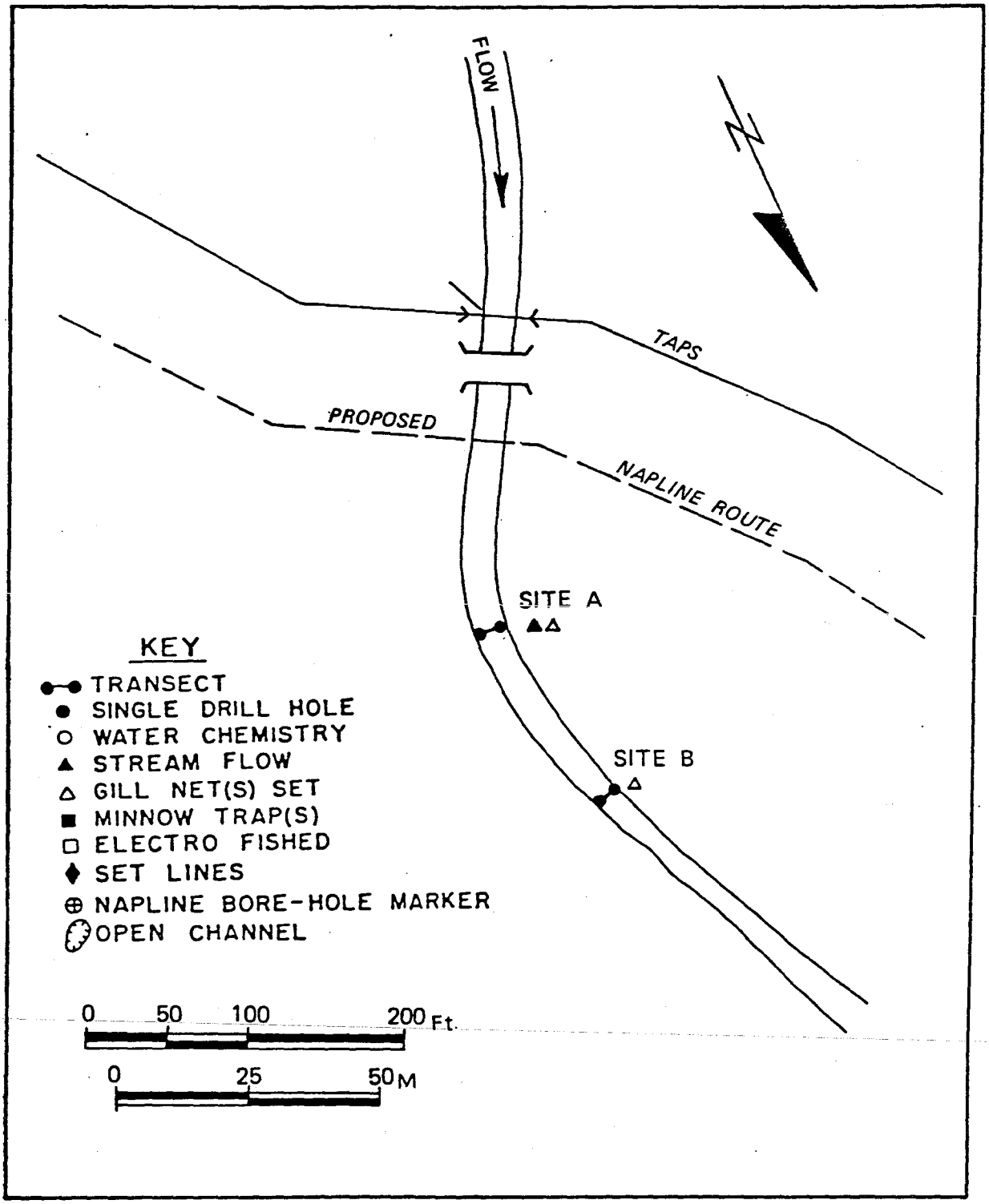

Fig. 17. Early winter survey. French Creek #1, 5 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody French Creek #3

Main Drainage Tanana River Tributary to Moose Creek

Figure 3 Northwest Alignment Sheet 86

Identification Nos: NPSI 4-151 NPMP 482.5

Alaska Highway Milepost NA

USGS Map Reference Fairbanks, Ak. T 3S R 3E Sec. 1

Site Access Helicopter

Section Surveyed From 150 m upstream to 100 m downstream of NAPLINE crossing

ASSESSMENT

French Creek at crossing #3 is 6-9 m wide with banks 1.5-2.5 m high which are heavily overgrown with willows and alders. The substrate was mud and detrital material. Ice cover at the time of this study was 100% with icing conditions resulting in the accumulation of aufeis to 65 cm. The water was under pressure causing water to flood over the section surveyed to a depth of 15 cm when holes were drilled through the ice.

Overwintering habitat at French Creek #3 is poor. No fish were caught or observed at this crossing during present investigations. Very slow water exchange and low dissolved oxygen levels are suspected to be inadequate for overwintering requirements. As water flow decreases through the winter, these conditions probably deteriorate and preclude any overwintering potential in this area.

FISH

Site	A	B	C	D	E	F
Date	4 Dec. 79	3 Dec. 79	3 Dec. 79			
Location (distance from NAPLINE)	100 m upstream	20 m upstream	40 m downstream			
Species						
Quantity						
Size Range (mm)						
Gear/Effort	8mGN(92h)	6mGH(116h)	5SL(528h)			

PHYSICAL CONDITIONS		REMARKS
Date	3-4 December 1979	
Snow Depth (cm)	50	
Percent Ice Cover	100	
Surface Ice Depth (cm)	66	
Anchor Ice	Absent	
Aufeis	Present	
Channel Width (m)	6-9	
Floodplain Width (m)	6-9	
Water Depth (cm)	155	
Discharge (m^3/s)	<0.01	
D.O. (mg/ℓ)	0.2	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	Not taken	Meter malfunction
pH	6.8	
Color	Slightly humic-stained	
Turbidity	Slightly turbid	
Fish Block(s)	None observed	
Substrate	Mud	

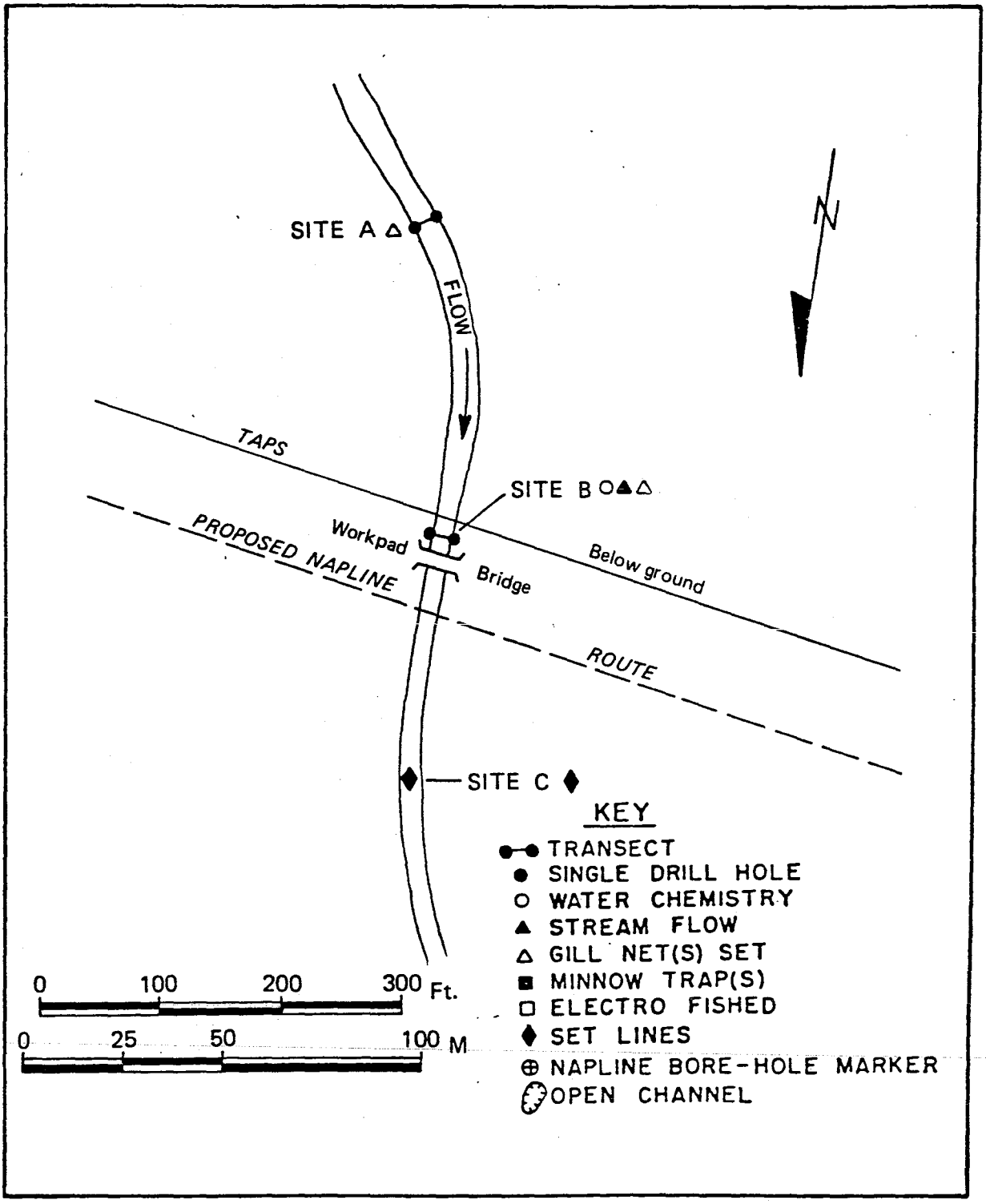

Fig. 18. Early winter survey. French Creek #3, 3-4 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody French Creek #5

Main Drainage Tanana River Tributary to Moose Creek

Figure 3 Northwest Alignment Sheet 85

Identification Nos: NPSI 4-149 NPMP 480.4

Alaska Highway Milepost NA

USGS Map Reference Fairbanks, Ak. T 2S R 3E Sec. 27

Site Access Helicopter

Section Surveyed From 50 m upstream to 200 m downstream of NAPLINE crossing

ASSESSMENT

French Creek #5 is the most downstream of 6 proposed NAPLINE crossings of the stream. French Creek is a small meandering stream which drains a low-lying area to the southeast of Eielson Air Force Base and empties into Moose Creek. The stream follows a well defined channel (5-8 m wide) confined by banks to 2.5 m high. Stream side vegetation consists of willow, alder and grasses. The substrate in the vicinity of crossing #5 consists of gravel and mud with occasional sunken logs. Although ice cover was 98% on 3 December 1979, all open water had frozen over by 7 December 1979.

Overwintering habitat at French Creek #5 was assessed to be poor. Considerable fishing effort yielded no fish during present investigations. Low levels of dissolved oxygen may be a limiting factor for fish overwintering in this area.

FISH

Site	A	B	C	D	E	F
Date	3 Dec. 79	3 Dec. 79	4 Dec. 79			
Location (distance from NAPLINE)	55 m downstream	70 m downstream	200 m downstream			
Species						
Quantity						
Size Range (mm)						
Gear/Effort	8mGN(98h)	1MT(98h)	10mGN(76h)			

PHYSICAL CONDITIONS		REMARKS
Date	3 December 1979	
Snow Depth (cm)	50	
Percent Ice Cover	99	
Surface Ice Depth (cm)	15	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	5-8	
Floodplain Width (m)	5-8	
Water Depth (cm)	75	
Discharge (m^3/s)	0.32	
D.O. (mg/ℓ)	0.2-0.4	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	30	
pH	6.8	
Color	Slightly humic-stained	
Turbidity	Slightly turbid	
Fish Block(s)	None observed	
Substrate	Gravel/mud	

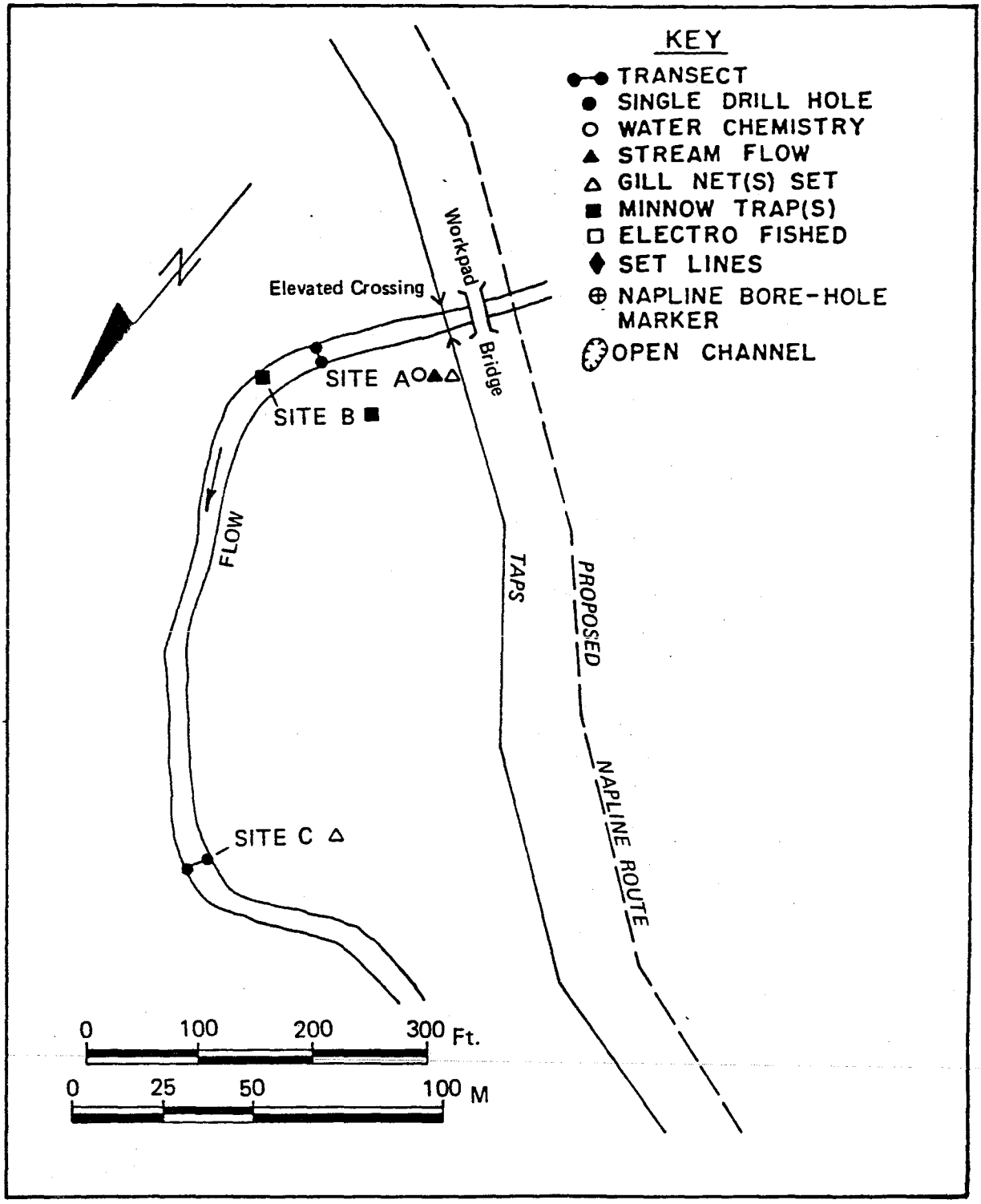

Fig. 19. Early winter survey. French Creek #5, 3 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Moose Creek #1

Main Drainage Yukon River Tributary to Tanana River

Figure 3 Northwest Alignment Sheet 85

Identification Nos: NPSI 4-148 NPMP 479.3

Alaska Highway Milepost NA

USGS Map Reference Fairbanks, Ak. T 2S R 3E Sec. 28

Site Access Helicopter

Section Surveyed From 50 m upstream to 300 m downstream of NAPLINE crossing

ASSESSMENT

Moose Creek is a moderate sized, deep, meandering stream that drains a low-lying tundra/muskeg area to the east of Eielson Air Force Base and flows into the Tanana River. Channel width is 10-15 m and depths exceed 2 m. Banks are 1.5-3.0 m high and heavily vegetated with willow, birch and grasses. At the time of this survey reddish-brown detritus covered mud substrate and was suspended in the water column. Ice cover was 98% and thickness approximately 2-10 cm.

Moose Creek provides overwintering habitat in the vicinity of the NAPLINE crossing #1. One juvenile northern pike was captured during present investigations. Stomach analysis of the pike produced a partially digested whitefish (possibly a humpback whitefish) suggesting winter use of this area by several fish species.

FISH

Site	A	B	C	D	E	F
Date	3 Dec. 79					
Location (distance from NAPLINE)	60 m downstream					
Species	NP					
Quantity	1					
Size Range (mm)	285					
Gear/Effort	10mGN(100h)					

PHYSICAL CONDITIONS		REMARKS
Date	3 December 1979	
Snow Depth (cm)	30	
Percent Ice Cover	98	
Surface Ice Depth (cm)	1-3	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	10-15	
Floodplain Width (m)	10-15	
Water Depth (cm)	200	
Discharge (m^3/s)	Not taken	Ice too thin to support biologist
D.O. (mg/ℓ)	0.8	
Temperature (°C)	0.5	
Conductivity (μmhos/cm)	110	
pH	6.8	
Color	Brownish red	
Turbidity	Moderately turbid	
Fish Block(s)	None observed	
Substrate	Mud; abundant red-brown filamentous material	

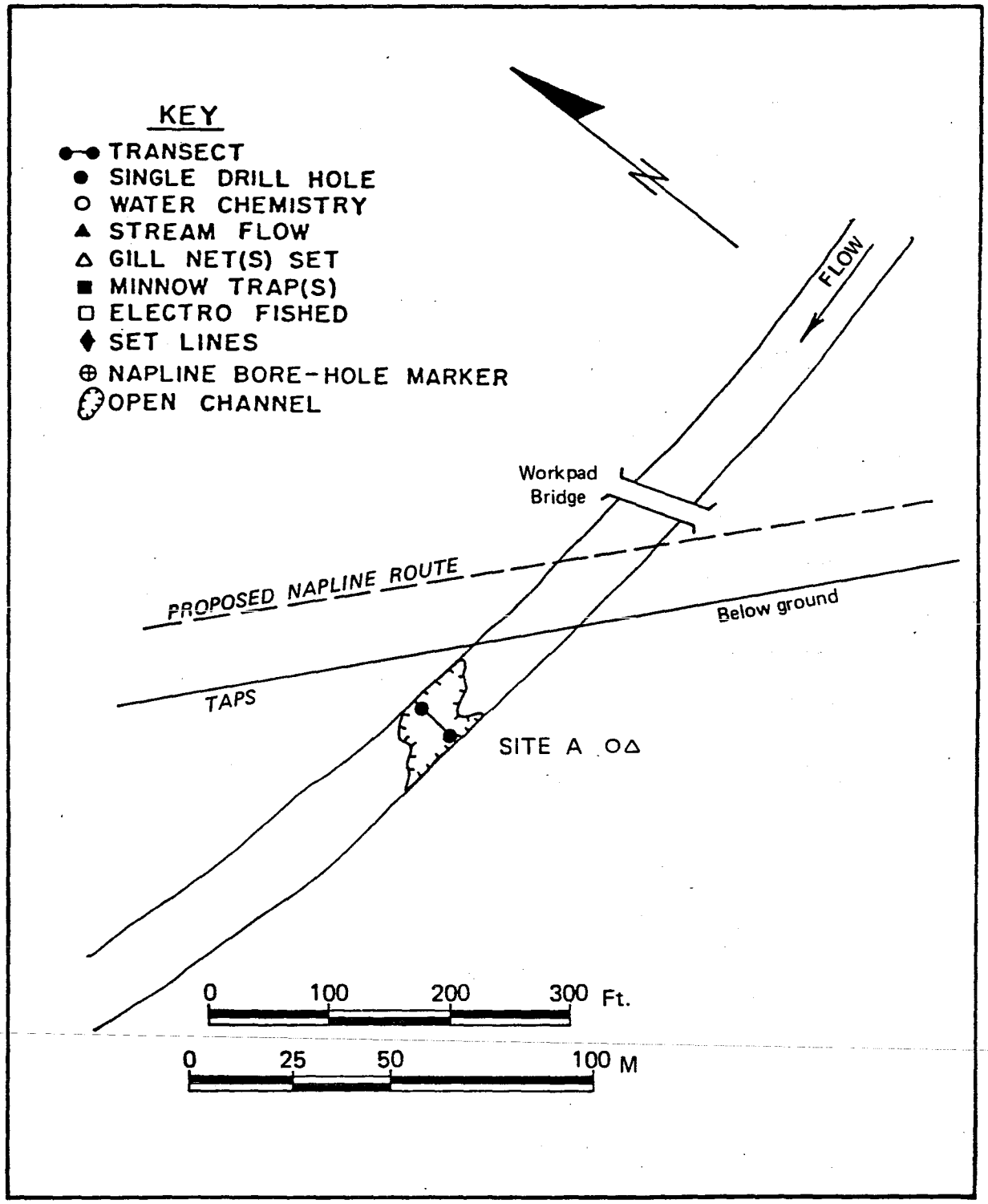

Fig. 20. Early winter survey. Moose Creek #1, 3 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Moose Creek #3

Main Drainage Yukon River Tributary to Tanana River

Figure 3 Northwest Alignment Sheet 85

Identification Nos: NPSI 4-146 NPMP 477.3

Alaska Highway Milepost NA

USGS Map Reference Fairbanks, Ak. T 2S R 3E Sec. 20

Site Access Helicopter

Section Surveyed From 150 m upstream to 150 m downstream of NAPLINE crossing

ASSESSMENT

Moose Creek #3 is a medium sized, meandering stream that drains a low-lying tundra/muskeg area to the east of Eielson Air Force Base. The stream is uniformly deep and slow flowing, following a well defined steep banked channel 10-15 m wide. Water color is brownish-red with an abundance of red, filamentous material carried and deposited within the stream. The channel substrate is mud with occasional sunken logs scattered within it. Ice cover was 100% with a thickness of 25-45 cm on 3 December 1979.

During present investigations Moose Creek at crossing #3 provided overwintering habitat for juvenile burbot. Stream flow characteristics of Moose Creek #3 were good although low dissolved oxygen levels measured could be a limiting factor as winter progresses.

FISH

Site	A	B	C	D	E	F
Date	3 Dec. 79	4 Dec. 79	4 Dec. 79	3 Dec. 79		
Location (distance from NAPLINE)	120 m upstream	50 m upstream	25 m downstream	150 m downstream		
Species	BB					
Quantity	1					
Size Range (mm)	218					
Gear/Effort	8mGN(95h)	10mGN(72h)	12mGN(74h)	6SL(576h)		

PHYSICAL CONDITIONS		REMARKS
Date	3-4 December 1979	
Snow Depth (cm)		
Percent Ice Cover	100	
Surface Ice Depth (cm)	25-45	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	10-15	
Floodplain Width (m)	10-15	
Water Depth (cm)	155	
Discharge (m^3/s)	0.82	
D.O. (mg/ℓ)	1.2	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	135	
pH	6.9	
Color	Brownish-red	
Turbidity	Moderately turbid	
Fish Block(s)	None observed	
Substrate	Mud; abundant reddish-brown filamentous material	

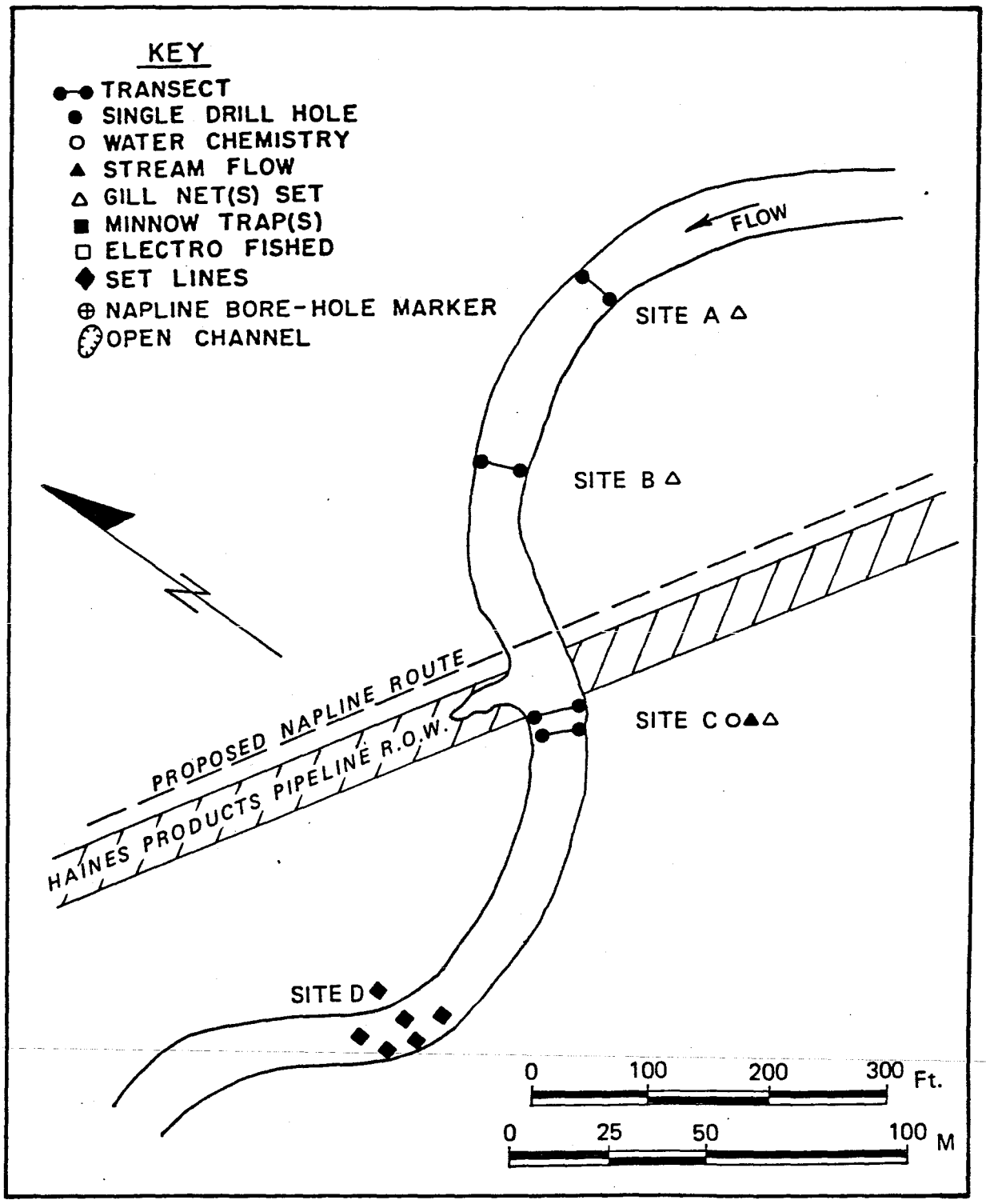

Fig. 21. Early winter survey. Moose Creek #3, 3 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Washington Creek

Main Drainage Tanana River Tributary to Tolovana River

Figure 3 Northwest Alignment Sheet 78

Identification Nos: NPSI 4-137 NPMP 438.2

Alaska Highway Milepost NA

USGS Map Reference Livengood, Ak. T. 3N R 2W Sec. 4

Site Access Helicopter

Section Surveyed From 200 m upstream to 200 m downstream of NAPLINE crossing

ASSESSMENT

Washington Creek is a medium-sized (6-15 m wide) stream that drains a tundra/muskeg area. Well defined banks (2-3 m high) are vegetated with willow, tundra and occasionally spruce. At the time of this survey ice cover was 100% and thickness was 50-60 cm.

Washington Creek provides overwintering habitat in the vicinity of the NAPLINE crossing. Fishing efforts in a pool previously flagged for early winter studies produced one grayling. Other evidence indicates this area is capable of supporting fish throughout the winter; although no fish were captured, late winter studies found suitable overwintering habitat in early April 1979, (Ref. 55).

FISH

Site	A	B	C	D	E	F
Date	11 Dec. 79					
Location (distance from NAPLINE)	200 m upstream					
Species	GR					
Quantity	1					
Size Range (mm)	183					
Gear/Effort	7mGN(48h)					

PHYSICAL CONDITIONS		REMARKS
Date	11 December 1979	
Snow Depth (cm)	25	
Percent Ice Cover	100	
Surface Ice Depth (cm)	30	
Anchor Ice	Absent	
Aufeis	Present	
Channel Width (m)	6-15	
Floodplain Width (m)	6-15	
Water Depth (cm)	140	
Discharge (m^3/s)	0.14	
D.O. (mg/ℓ)	7.8	
Temperature (°C)	1.0	
Conductivity (μmhos/cm)	140	
pH	7.0	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Mud with some detrital matter	

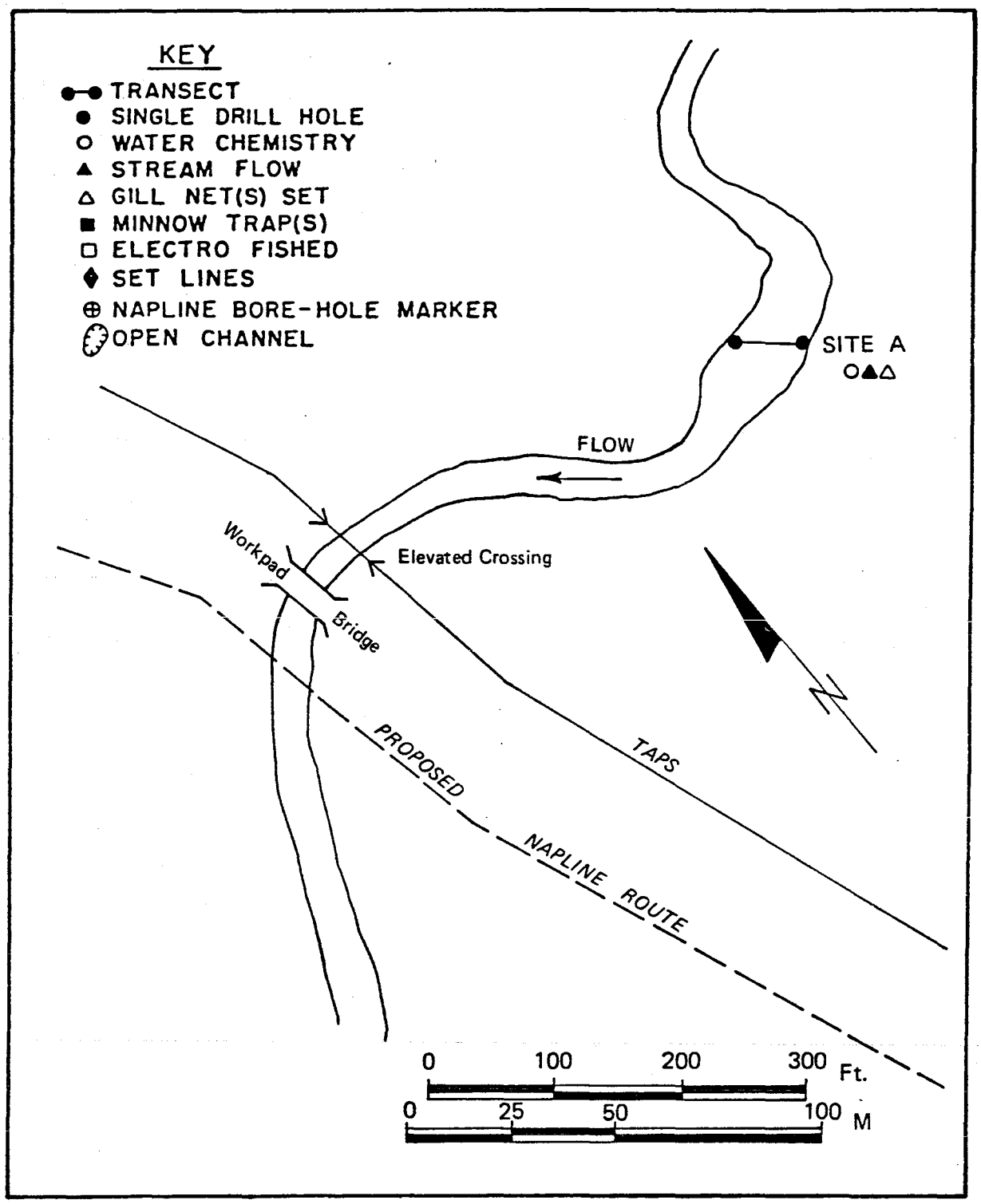

Fig. 22. Early winter survey. Washington Creek, 11 December 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody North Fork Ray River

Main Drainage Yukon River Tributary to Ray River

Figure 3 Northwest Alignment Sheet 59

Identification Nos: NPSI 3-110 NPMP 336.0

Alaska Highway Milepost NA

USGS Map Reference Bettles, Ak. T 15N R 12W Sec. 17

Site Access Helicopter

Section Surveyed From 200 m upstream to 1 km downstream of NAPLINE crossing

ASSESSMENT

The North Fork Ray River is a slow-moving stream that meanders through dense stands of willow, birch and large spruce trees. Near the NAPLINE the stream channel varies in width from 9-15 m and averages 2-3 m in depth. Incised banks range in height from 3-8 m and substrate consists of mud and silt. Numerous dead trees fallen into the stream channel provide good cover for fish. Ice cover was 100% and 15-25 cm thick.

Early winter fishing efforts captured grayling both upstream and downstream of the proposed NAPLINE crossing. At the time of this investigation conditions appeared favorable to support overwintering fish, although discharge was extremely low. Previous studies suggest unlikely overwintering in this area during late winter due to low dissolved oxygen levels or the absence of free water (Ref. 11 and 55).

FISH

Site	A	B	C	D	E	F
Date	17 Nov. 79	17 Nov. 79				
Location (distance from NAPLINE)	175 m upstream	400 m downstream				
Species	GR	GR				
Quantity	1	1				
Size Range (mm)	200	180				
Gear/Effort	10mGN(22h)	8mGN(22h)				

PHYSICAL CONDITIONS		REMARKS
Date	17 November 1979	
Snow Depth (cm)	15-20	
Percent Ice Cover	100	
Surface Ice Depth (cm)	15-25	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	9-15	
Floodplain Width (m)	9-15	
Water Depth (cm)	150	
Discharge (m^3/s)	Negligible	
D.O. (mg/ℓ)	9.8	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	5	
pH	7.0	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Mud/silt in pools	

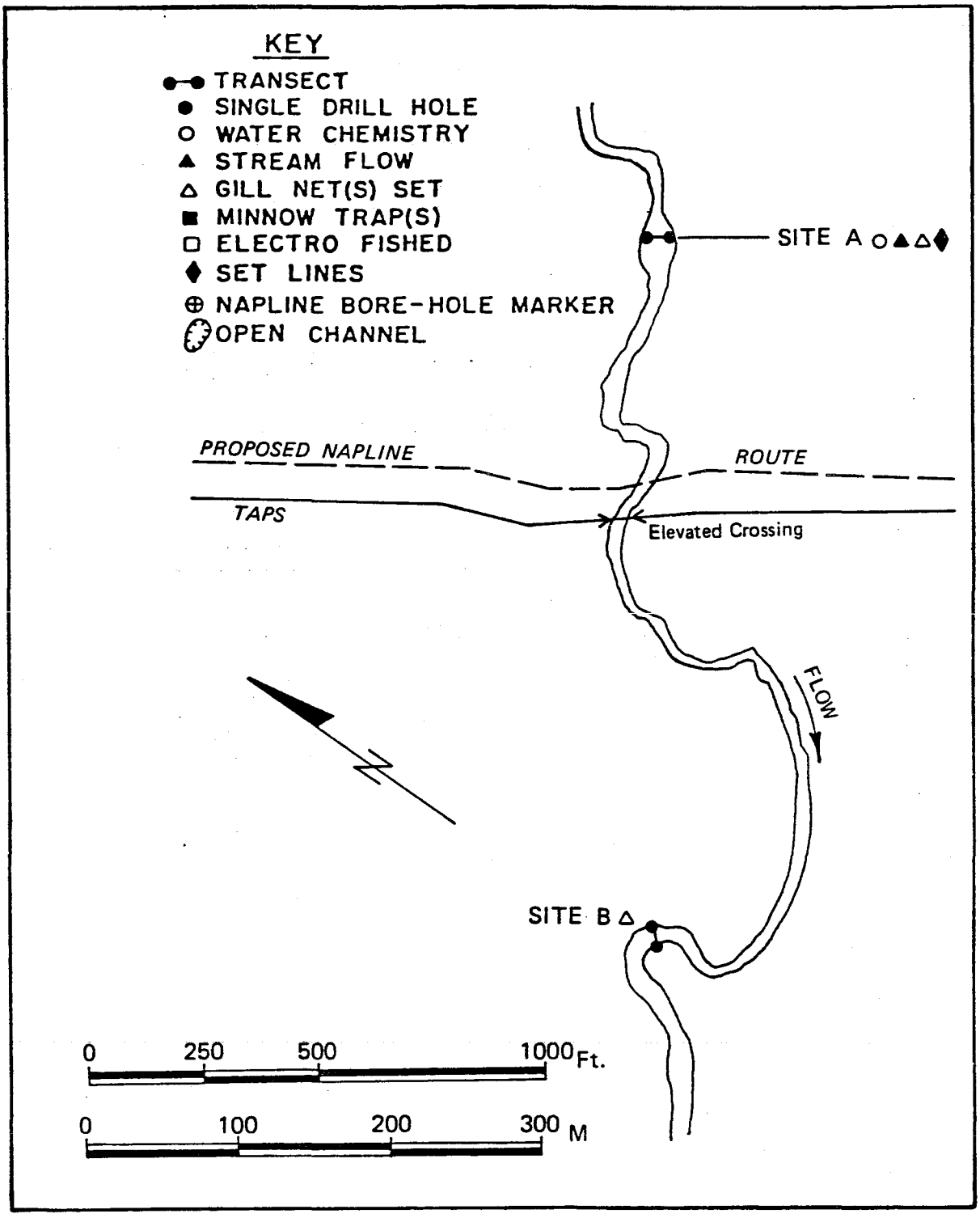

Fig. 23. Early winter survey. North Fork Ray River, 17 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody South Fork Fish Creek

Main Drainage Yukon River Tributary to Fish Creek

Figure 3 Northwest Alignment Sheet 53

Identification Nos: NPSI 3-98 NPMP 304.1

Alaska Highway Milepost NA

USGS Map Reference Bettles, Ak. T 20N R 15W Sec. 35

Site Access Helicopter

Section Surveyed From 2 km upstream to 1.5 km downstream of NAPLINE crossing

ASSESSMENT

South Fork Fish Creek is a shallow, moderately fast-flowing stream approximately 2 m wide. Willow and grass vegetate occasionally incised banks (1-3 m high). Stream bottom consists primarily of cobble and gravel. At the time of this investigation ice cover was approximately 95%.

Electrofishing one small (8-10 m) open water section yielded four slimy sculpin, indicating that South Fork Fish Creek offers good habitat through early winter. Previous investigations found free water to be absent in the area of the NAPLINE crossing during late winter suggesting that fish habitat in this area may degenerate (Ref. 11 and 55).

FISH

Site	A	B	C	D	E	F
Date	16 Nov. 79					
Location (distance from NAPLINE)	75 m upstream					
Species	CN					
Quantity	4					
Size Range (mm)	45-65					
Gear/Effort	EF(10 m)					

PHYSICAL CONDITIONS		REMARKS
Date	16 November 1979	
Snow Depth (cm)	60	
Percent Ice Cover	95	
Surface Ice Depth (cm)	10-20	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	~2	
Floodplain Width (m)	~2	
Water Depth (cm)	30	
Discharge (m^3/s)	0.13	
D.O. (mg/ℓ)	10	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	28	
pH	6.5	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Cobble/gravel with some sand	

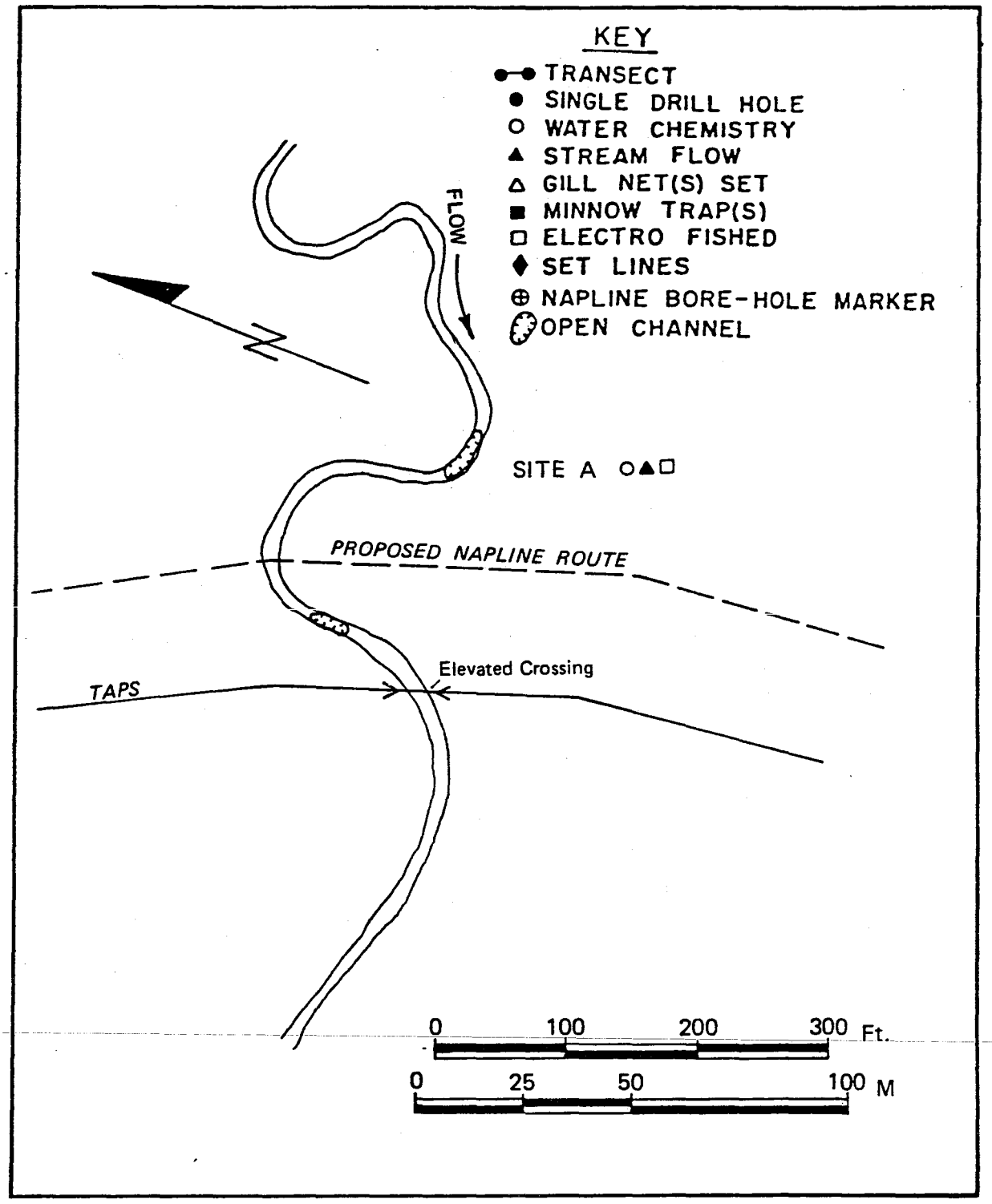

Fig. 24. Early winter survey. South Fork Fish Creek, 16 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody South Fork Bonanza Creek

Main Drainage Yukon River Tributary to Bonanza Creek

Figure 3 Northwest Alignment Sheet 52

Identification Nos: NPSI 3-95 NPMP 292.8

Alaska Highway Milepost NA

USGS Map Reference Bettles, Ak. T 21N R 14W Sec. 7 and 8

Site Access Helicopter

Section Surveyed From ~700 m upstream to ~900 m downstream of NAPLINE crossing

ASSESSMENT

South Fork Bonanza Creek is a clear, mountain stream with alternating pools and riffles throughout the proposed construction area. Channel width varies from 5-7 m and the 1.5-2 m high mud banks are incised and bordered with willow, birch and spruce. At the TAPS workpad stream bottom consists primarily of gravel and the banks are boulder/cobble rip rap. Surface ice covered about 20% of the stream at the time of the early winter survey.

Burbot, grayling and sculpin were present in the NAPLINE area and habitat appeared favorable for fish overwintering at the time of the survey. Previous studies found intermittent flow near the NAPLINE crossing during late winter and overwintering habitat is marginal at that time (Ref. 55).

FISH

Site	A	B	C	D	E	F
Date	15 Nov. 79					
Location (distance from NAPLINE)	60 m upstream 50 m downstream					
Species	BB,GR,CN					
Quantity	8 CN, 1 BB, 1 GR					
Size Range (mm)	CN 56-92 BB 235 GR 75					
Gear/Effort	EF(110 m)					

PHYSICAL CONDITIONS		REMARKS
Date	15 November 1979	
Snow Depth (cm)	30	
Percent Ice Cover	20	
Surface Ice Depth (cm)	15	
Anchor Ice	Present	
Aufeis	Absent	
Channel Width (m)	5-7	
Floodplain Width (m)	7-15	
Water Depth (cm)	30	
Discharge (m^3/s)	0.44	
D.O. (mg/ℓ)	8.6	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	20	
pH	6.3	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/sand	

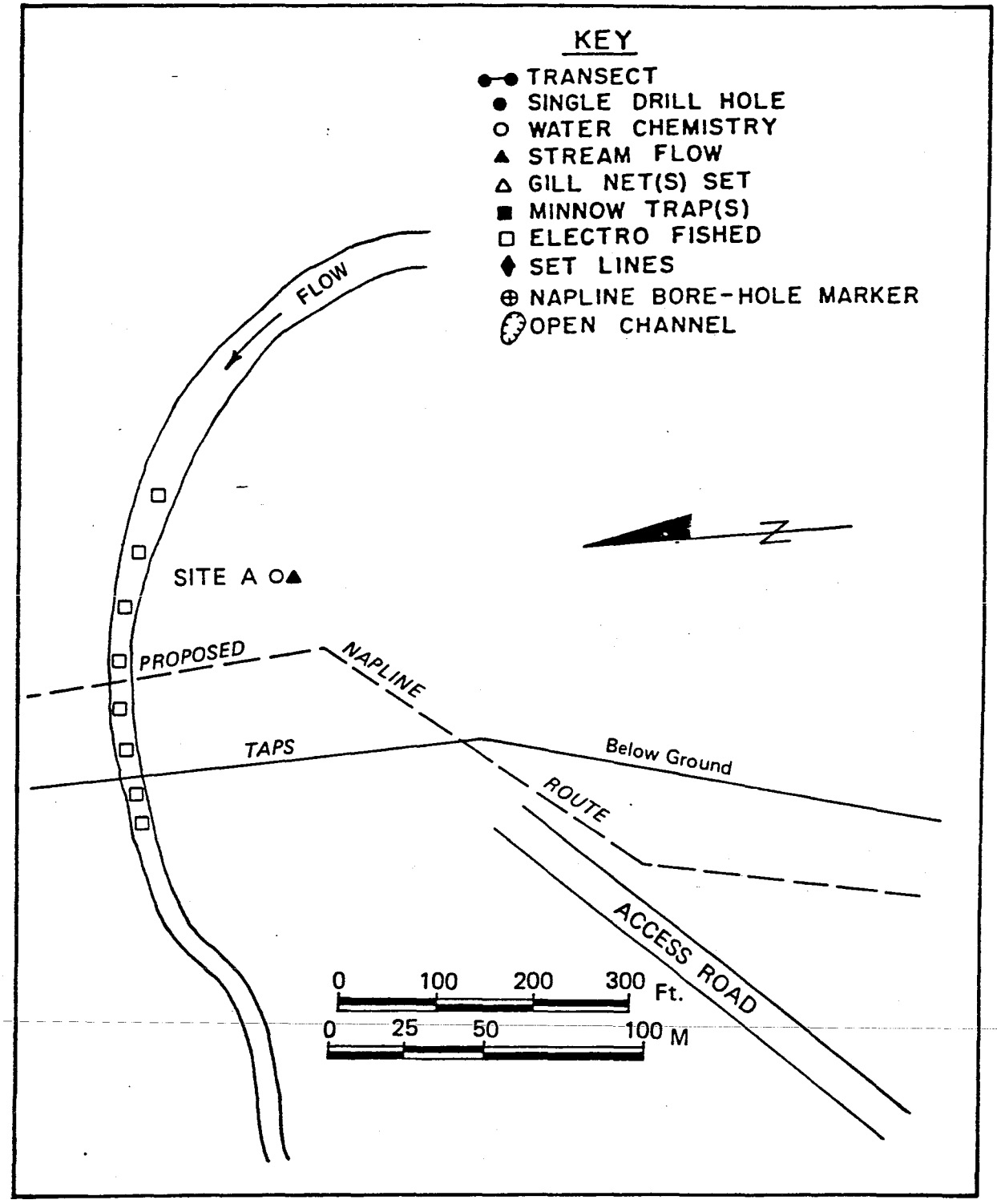

Fig. 25. Early winter survey. South Fork Bonanza Creek, 15 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Prospect Creek

Main Drainage Yukon River Tributary to Jim River

Figure 3 Northwest Alignment Sheet 50

Identification Nos: NPSI 3-91 NPMP 284

Alaska Highway Milepost NA

USGS Map Reference Bettles, Ak. T 23N R 14W Sec. 31

Site Access Helicopter

Section Surveyed 80 m upstream from NAPLINE crossing

ASSESSMENT

At the NAPLINE crossing Prospect Creek is a clear, shallow, fast-flowing stream of alternating pools and riffles varying in width from 6-15 m. The 2-3 m high banks of boulders and cobbles are bordered by willow and small spruce. Bottom substrate consists of cobble and gravel. Below the NAPLINE crossing Prospect Creek grades into a slower flowing stream that meanders through a dense stand of spruce.

Early winter sampling efforts yielded sculpin at the NAPLINE crossing. Ice cover was 50-60% and anchor ice had formed. A previous study (Ref. 55) cited a lack of available free water and extensive areas of aufeis during late winter which suggests that as winter progresses this area offers only marginal overwintering habitat.

FISH

Site	A	B	C	D	E	F
Date	14 Nov. 79					
Location (distance from NAPLINE)	80 m upstream					
Species	CN					
Quantity	1					
Size Range (mm)	78					
Gear/Effort	EF(80 m)					

PHYSICAL CONDITIONS		REMARKS
Date	14 November 1979	
Snow Depth (cm)	35	
Percent Ice Cover	50-60	
Surface Ice Depth (cm)	5-10	
Anchor Ice	Present	
Aufeis	Absent	
Channel Width (m)	6-15	
Floodplain Width (m)	6-20	
Water Depth (cm)	60	
Discharge (m^3/s)	0.55	
D.O. (mg/ℓ)	9.6	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	11	
pH	6.7	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Cobble/gravel	

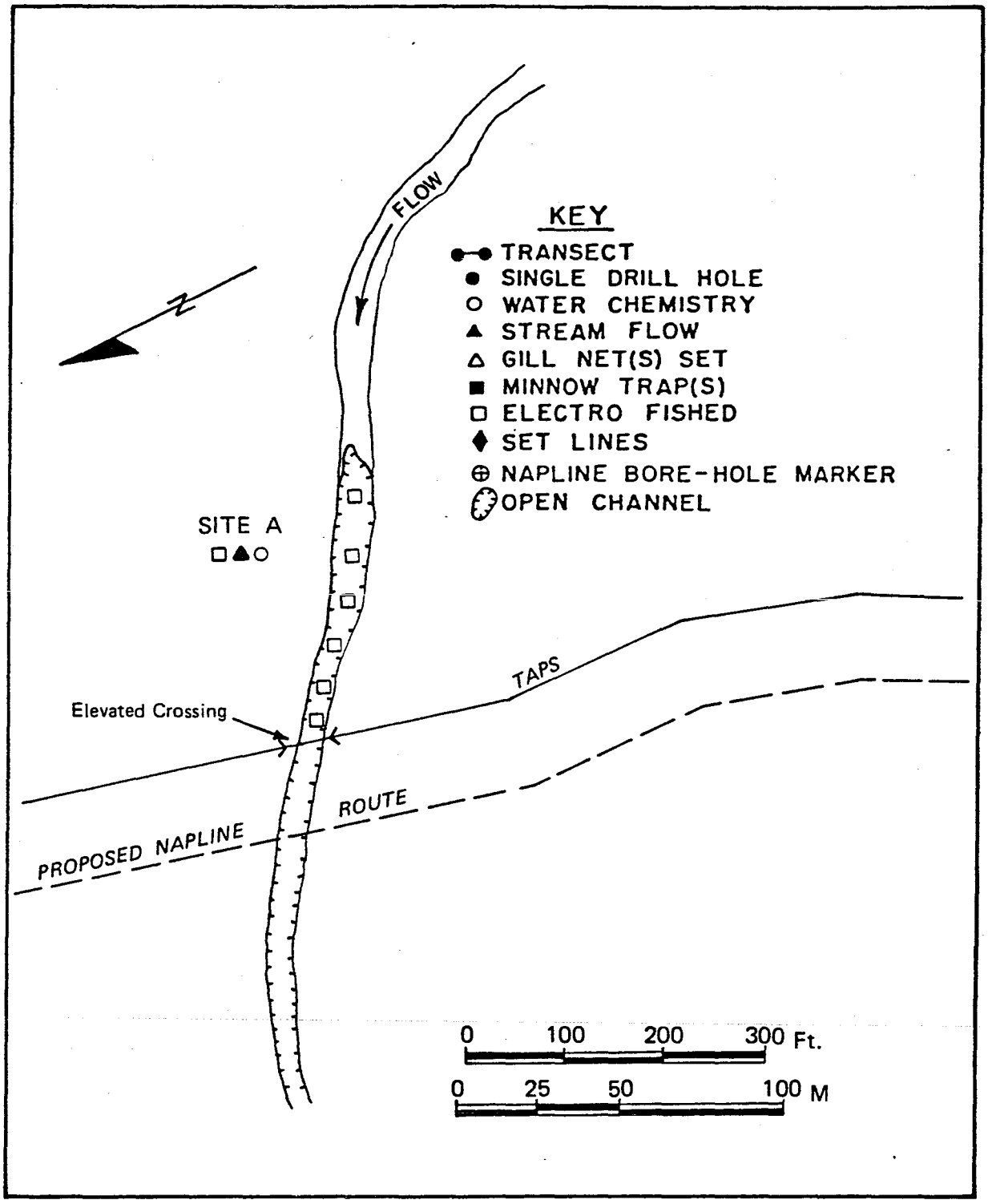

Fig. 26. Early winter survey. Prospect Creek, 14 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Jim River Side Channel #2

Main Drainage Yukon River Tributary to Jim River

Figure 2 Northwest Alignment Sheet 49

Identification Nos: NPSI 3-90.01 NPMP 278.0

Alaska Highway Milepost NA

USGS Map Reference Bettles, Ak. T 23N R 14W Sec. 3

Site Access Helicopter

Section Surveyed From 125 m downstream of NAPLINE crossing to 175 m upstream

ASSESSMENT

Jim River Side Channel #2 is a shallow, meandering stream near the proposed NAPLINE crossing. The stream was 5-8 m wide within a 15-20 m wide floodplain. Gravel banks are bordered by thick willow and spruce and the bottom consists primarily of gravel and sand.

Sculpin were the only fish captured in the 75 m of open water present upstream of the proposed NAPLINE crossing during early winter investigations. Other species (e.g., grayling and round whitefish) found in the mainstream of the Jim River (Ref. 34) also are likely to frequent the side channel during early winter. Although Jim River Side Channel #2 becomes extensively aufeised and frozen to the bottom in many places as winter advances, it does have potential for good overwintering habitat (Ref. 55).

FISH

Site	A	B	C	D	E	F
Date	14 Nov. 79					
Location (distance from NAPLINE)	75 m upstream 25 m downstream					
Species	CN					
Quantity	17					
Size Range (mm)	30-74					
Gear/Effort	EF(60 m)					

PHYSICAL CONDITIONS		REMARKS
Date	14 November 1979	
Snow Depth (cm)	~30	
Percent Ice Cover	50-70	
Surface Ice Depth (cm)	15	
Anchor Ice	Present	
Aufeis	Present	
Channel Width (m)	5-8	
Floodplain Width (m)	15-20	
Water Depth (cm)	24	
Discharge (m^3/s)	1.01	
D.O. (mg/ℓ)	9.8	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	12	
pH	6.9	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Cobble/sand and gravel	

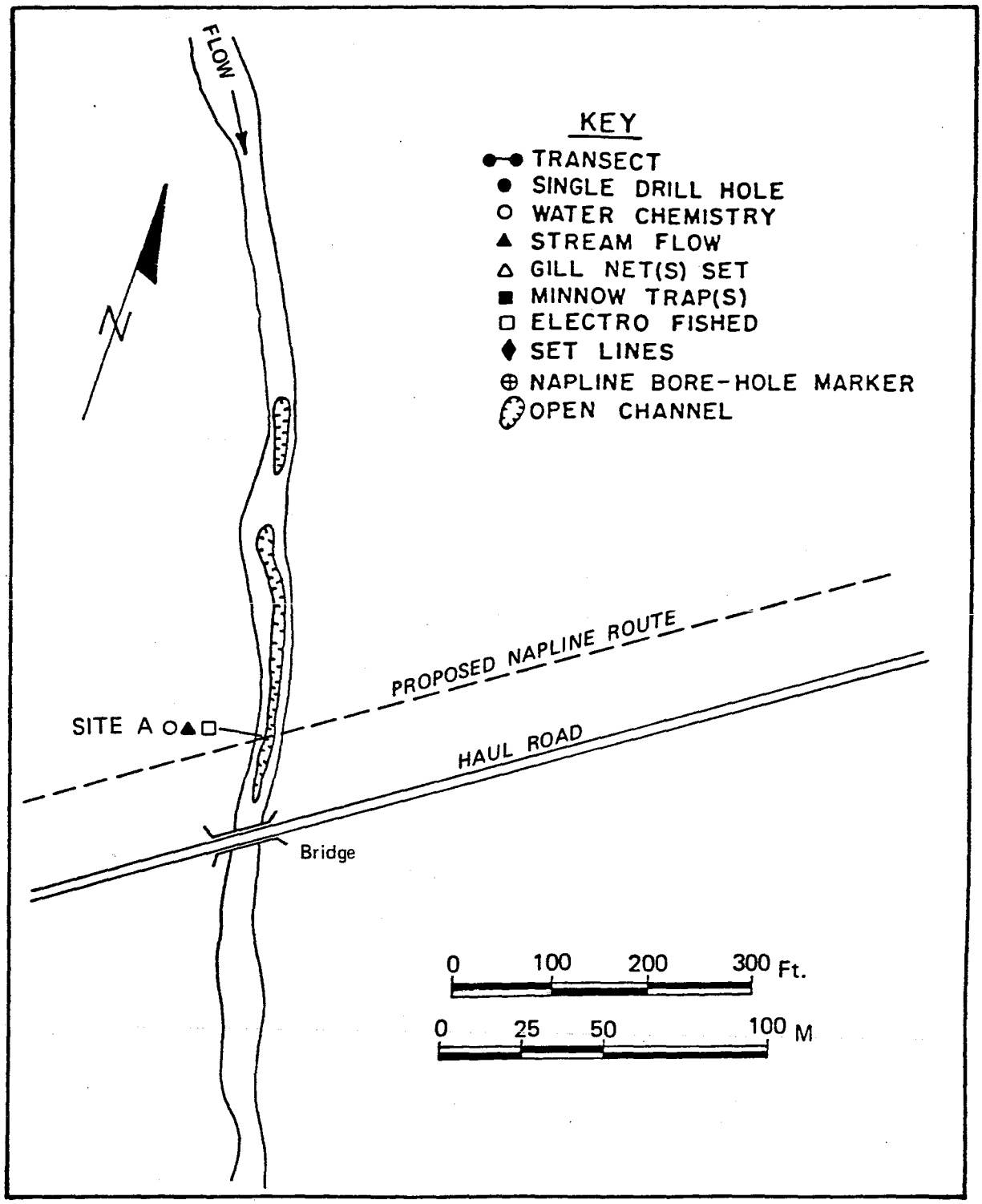

Fig. 27. Early winter survey. Jim River Side Channel #2, 14 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Abba-dabba Creek

Main Drainage Yukon River Tributary to South Fork Koyukuk River

Figure 2 Northwest Alignment Sheet 47

Identification Nos: NPSI 3-86 NPMP 265.2

Alaska Highway Milepost NA

USGS Map Reference Bettles, Ak. T 25N R 13W Sec. 13

Site Access Helicopter

Section Surveyed From ~400 m upstream to NAPLINE crossing

ASSESSMENT

Abba-dabba Creek is a shallow, spring-fed stream 2-5 m wide. It has a relatively steep gradient at the Haul Road that moderates slightly at the NAPLINE crossing 150 m downstream. The 1-2 m high banks are heavily vegetated with willow and spruce and the stream bottom consists of gravel and cobble. Below the NAPLINE crossing stream flow continues to decrease as the channel width increases to 8-10 m meandering north 3.7 km to the South Fork of the Koyukuk River.

Early winter fishing efforts yielded two slimy sculpin in 120 m of stream immediately above the NAPLINE crossing. Although fish densities appeared low at the time of this investigation, high dissolved oxygen levels and close proximity of spring sources upstream of the Haul Road suggest that Abba-dabba Creek in the vicinity of the NAPLINE crossing may offer fish overwintering habitat throughout the winter season.

FISH

Site	A	B	C	D	E	F
Date	14 Nov. 79					
Location (distance from NAPLINE)	120 m upstream					
Species	CN					
Quantity	2					
Size Range (mm)	83-95					
Gear/Effort	EF(120 m)					

PHYSICAL CONDITIONS		REMARKS
Date	14 November 1979	
Snow Depth (cm)	60	
Percent Ice Cover	50	Ice free above NAPLINE and 50-80 below
Surface Ice Depth (cm)	0	Above NAPLINE in area surveyed
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	2-5	
Floodplain Width (m)	2-5	
Water Depth (cm)	~25	
Discharge (m^3/s)	0.06	
D.O. (mg/ℓ)	9.4	
Temperature (°C)	0.0	
Conductivity (µmhos/cm)	31	
pH	7.1	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Cobble/gravel with sand	

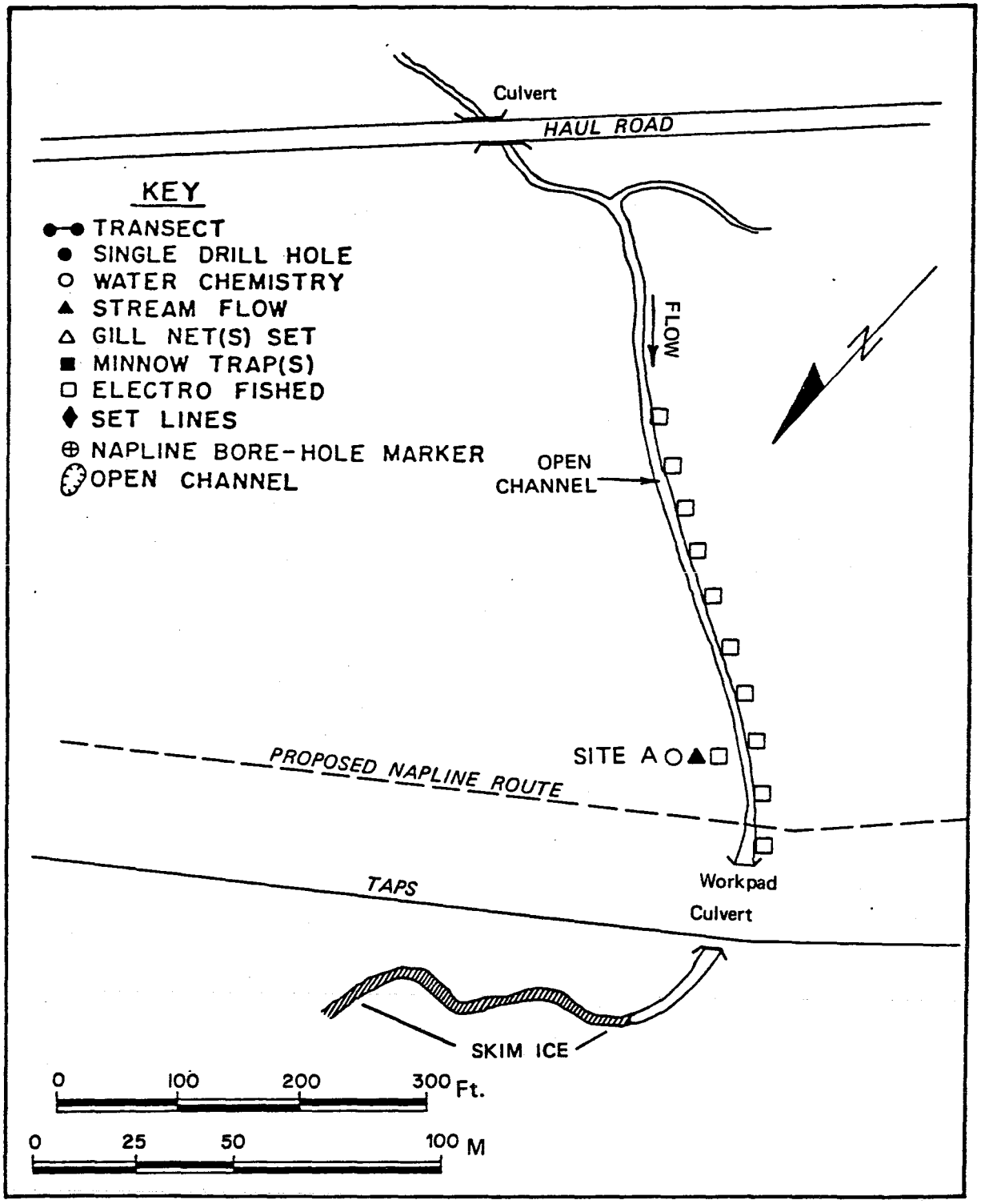

Fig. 28. Early winter survey. Abba-dabba Creek, 14 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Rosie Creek

Main Drainage Yukon River Tributary to Koyukuk River

Figure 2 Northwest Alignment Sheet 44

Identification Nos: NPSI 3-74 NPMP 249.4

Alaska Highway Milepost NA

USGS Map Reference Wiseman, Ak. T 27N R 12W Sec. 6

Site Access Helicopter

Section Surveyed From ~100 m upstream to ~100 m downstream of NAPLINE crossing

ASSESSMENT

Upstream of the Haul Road Rosie Creek is a moderately swift clear-water stream confined to a 4 m wide channel within a floodplain approximately 10 m wide. Substrates are sand and gravel and gravel banks (0.3 m high) are bordered by dense willow and spruce. Downstream of the Haul Road, the flow of Rosie Creek meanders sluggishly through a dense stand of spruce. At the time of this investigation ice cover was approximately 80%. One small side channel upstream of the Haul Road and a deep (1.5 m) pool at the highway culvert outfall were the only observed areas of open water.

Although sampling efforts did not yield fish during this study, favorable water chemistry, substantial free water and adequate fish cover suggest Rosie Creek provides suitable overwintering habitat for fish.

FISH

Site	A	B	C	D	E	F
Date	12 Nov. 79	12 Nov. 79	12 Nov. 79			
Location (distance from NAPLINE)	25 m upstream	20 m downstream	65 m downstream			
Species						
Quantity						
Size Range (mm)						
Gear/Effort	Total electrofishing effort 150 m					

PHYSICAL CONDITIONS

		REMARKS
Date	12 November 1979	
Snow Depth (cm)	50	
Percent Ice Cover	80	
Surface Ice Depth (cm)	5-10	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	4	
Floodplain Width (m)	10	
Water Depth (cm)	15	
Discharge (m^3/s)	0.10	
D.O. (mg/ℓ)	10	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	60	
pH	7.1	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/sand at highway; gravel in riffles, mud in pools	

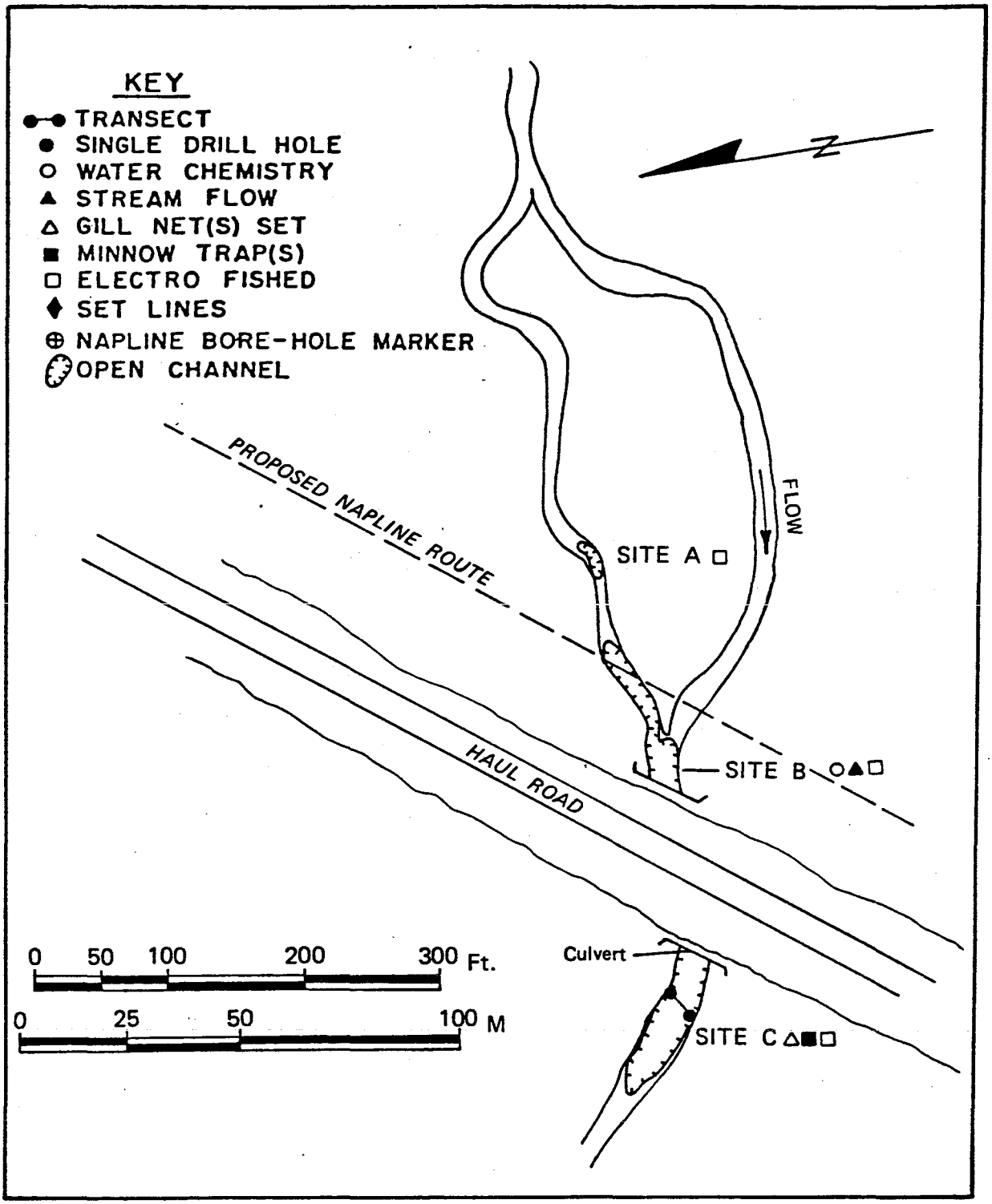

Fig. 29. Early winter survey. Rosie Creek, 12 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Confusion Creek

Main Drainage Yukon River Tributary to Middle Fork Koyukuk River

Figure 2 Northwest Alignment Sheet 41

Identification Nos: NPSI 3-61.02 NPMP 233.5

Alaska Highway Milepost NA

USGS Map Reference Wiseman, Ak. T 30N R 11W Sec. 30,25

Site Access Helicopter

Section Surveyed From NAPLINE crossing downstream 1.5 km to confluence with main channel of Middle Fork Koyukuk River

ASSESSMENT

Confusion Creek is a narrow (2 m) stream with a gravel bottom bordered by 0.5 m high gravel banks heavily vegetated with willow, dwarf birch and spruce.

At the time of the early winter survey, Confusion Creek was completely dry in the vicinity of the NAPLINE. Transects at several locations in the creek yielded only dry gravel. Fish habitat in the area surveyed was assessed as non-existent due to the absence of water.

FISH

Site	A	B	C	D	E	F
Date						
Location (distance from NAPLINE)						
Species						
Quantity						
Size Range (mm)						
Gear/Effort						

PHYSICAL CONDITIONS		REMARKS
Date	12 November 1979	
Snow Depth (cm)	50	
Percent Ice Cover	0	Stream bed dry
Surface Ice Depth (cm)	NA	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	2	
Floodplain Width (m)	2	
Water Depth (cm)	NA	
Discharge (m^3/s)	NA	
D.O. (mg/ℓ)	NA	
Temperature (°C)	NA	
Conductivity (µmhos/cm)	NA	
pH	NA	
Color	NA	
Turbidity	NA	
Fish Block(s)	Stream bed dry	
Substrate	Gravel/sand	

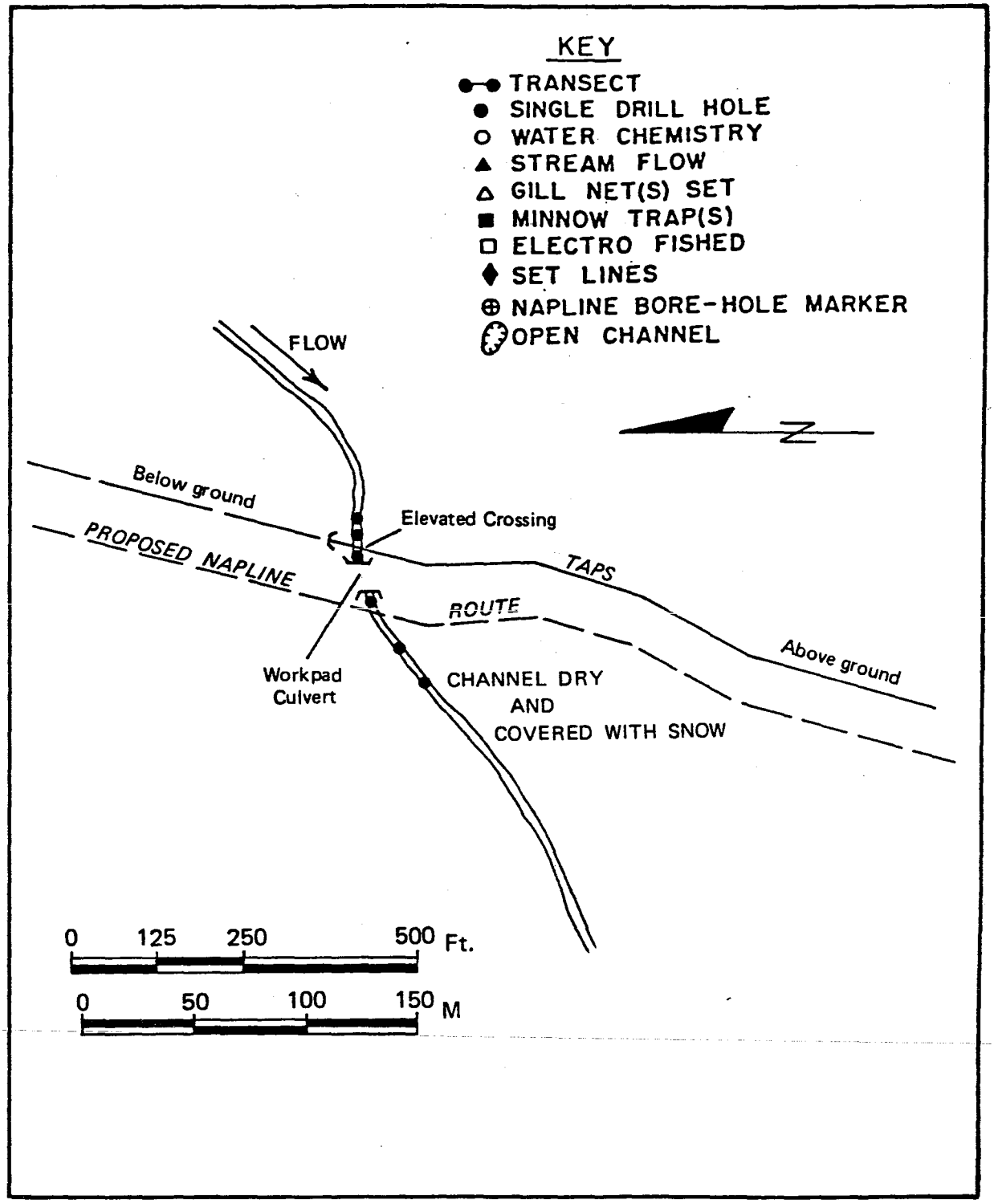

Fig. 30. Early winter survey. Confusion Creek, 12 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Dietrich River

Main Drainage Yukon River Tributary to Middle Fork Koyukuk River

Figure 2 Northwest Alignment Sheet 38

Identification Nos: NPSI 2-48 NPMP 211.0

Alaska Highway Milepost NA

USGS Map Reference Chandalar, Ak. T 33N R 10W Sec. 35

Site Access Helicopter

Section Surveyed From ~1000 m upstream to ~1000 m downstream of NAPLINE crossing

ASSESSMENT

Dietrich River NPSI 2-48, near its confluence with the Bettles River, is a large, swift, clear-water stream with 1-1.5 m high gravel banks and a cobble/gravel bottom. This portion of the Dietrich is crossed by TAPS and the Haul Road. The river has been channelized with rip rap abutments at two bridge crossings, confining the 40 m wide stream channel to a 180 m floodplain.

At the time of the early winter survey, the river was 90% ice-covered. A juvenile grayling was caught in a small (20 m) section of open water upstream of the Haul Road bridge. Favorable water quality and flow characteristics indicate good habitat in this area through early winter. Late winter surveys have found the area to be poor fish overwintering habitat (Ref. 55).

FISH

Site	A	B	C	D	E	F
Date	14 Nov. 79					
Location (distance from NAPLINE)	275 m downstream					
Species	GR					
Quantity	1					
Size Range (mm)	100					
Gear/Effort	EF(20 m)					

PHYSICAL CONDITIONS		REMARKS
Date	14 November 1979	
Snow Depth (cm)	30	
Percent Ice Cover	99	
Surface Ice Depth (cm)	5-10	Estimate
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	40	
Floodplain Width (m)	180	
Water Depth (cm)	60	
Discharge (m^3/s)	Not taken	Flow meter malfunction
D.O. (mg/ℓ)	9.2	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	80	
pH	7.4	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Cobble/gravel	

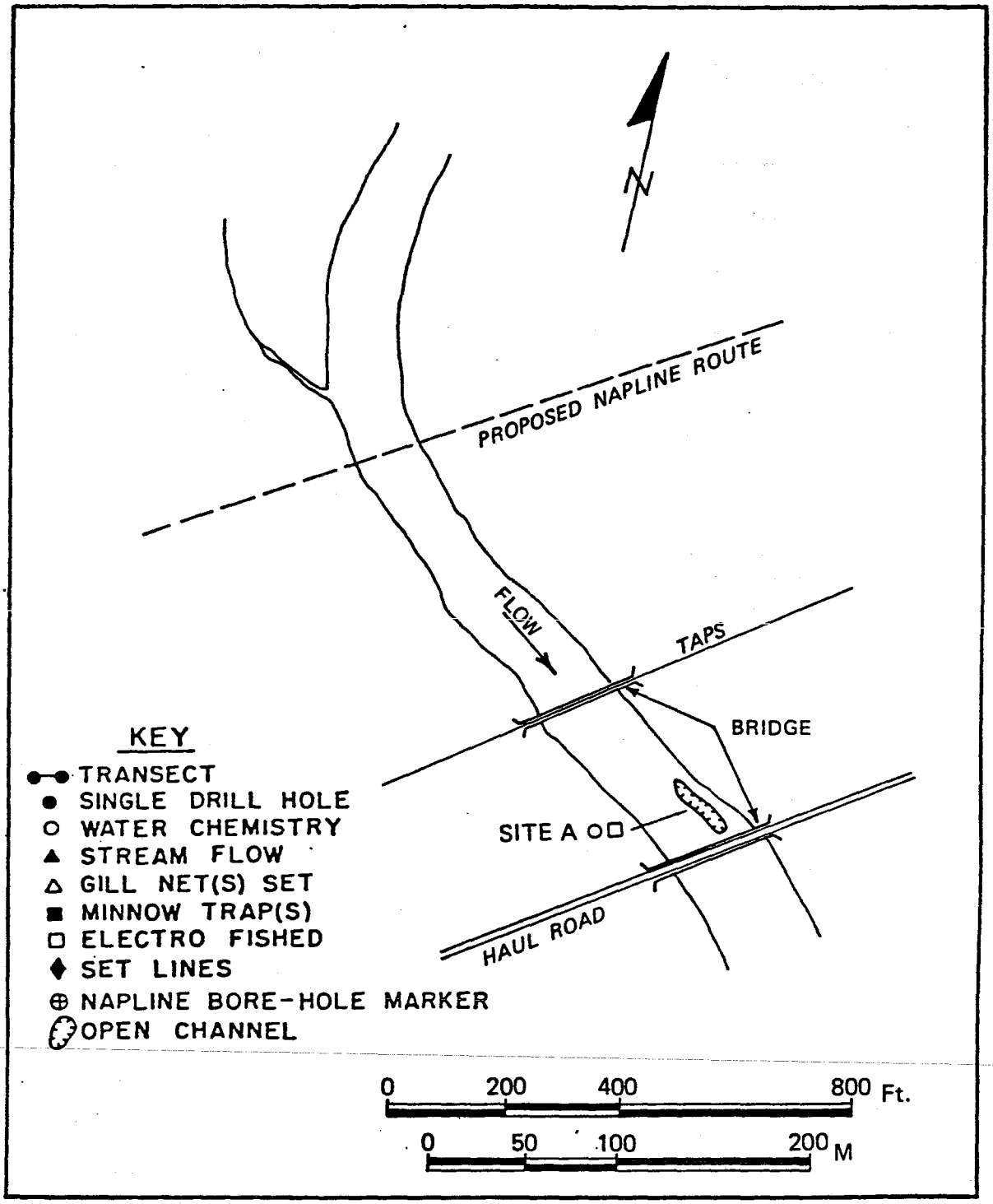

Fig. 31. Early winter survey. Dietrich River (NPSI 2-48), 14 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Burger's Bayou

Main Drainage Yukon River Tributary to Drainage Material Site 106

Figure 2 Northwest Alignment Sheet 35

Identification Nos: NPSI 2-36.02 NPMP 195.5

Alaska Highway Milepost NA

USGS Map Reference Chandalar, Ak. T 35N R 10W Sec. 16

Site Access Helicopter

Section Surveyed From 10 m downstream to 50 m upstream of TAPS Haul Road crossing

ASSESSMENT

Burger's Bayou is a shallow, slow-flowing, spring-fed stream originating approximately 50 m upstream of the Haul Road crossing. The bottom substrate is composed of gravel covered with filamentous green algae. Bordered on the east side by a steep spruce-covered slope and on the west side by dense willow and spruce, this clear-water stream flows southwest 600 m to the Dietrich River.

Burger's Bayou was ice free and slimy sculpin were captured during present investigations. High dissolved oxygen levels and warmer water temperatures (6°C probably due to spring influence) observed provide excellent overwintering fish habitat in this area.

FISH

Site	A	B	C	D	E	F
Date	14 Nov. 79					
Location (distance from NAPLINE)	100 m upstream					
Species	CN					
Quantity	8					
Size Range (mm)	21-60					
Gear/Effort	EF(100 m)					

PHYSICAL CONDITIONS		REMARKS
Date	14 November 1979	
Snow Depth (cm)	30	
Percent Ice Cover	0	
Surface Ice Depth (cm)	3-5	Fringe ice at stream bank
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	4	
Floodplain Width (m)	4	
Water Depth (cm)	2-10	
Discharge (m^3/s)	<0.01	Estimate; flow meter malfunction
D.O. (mg/ℓ)	9.0	
Temperature (°C)	6.0	
Conductivity (µmhos/cm)	460	
pH	7.3	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Mud; gravel at work pad	

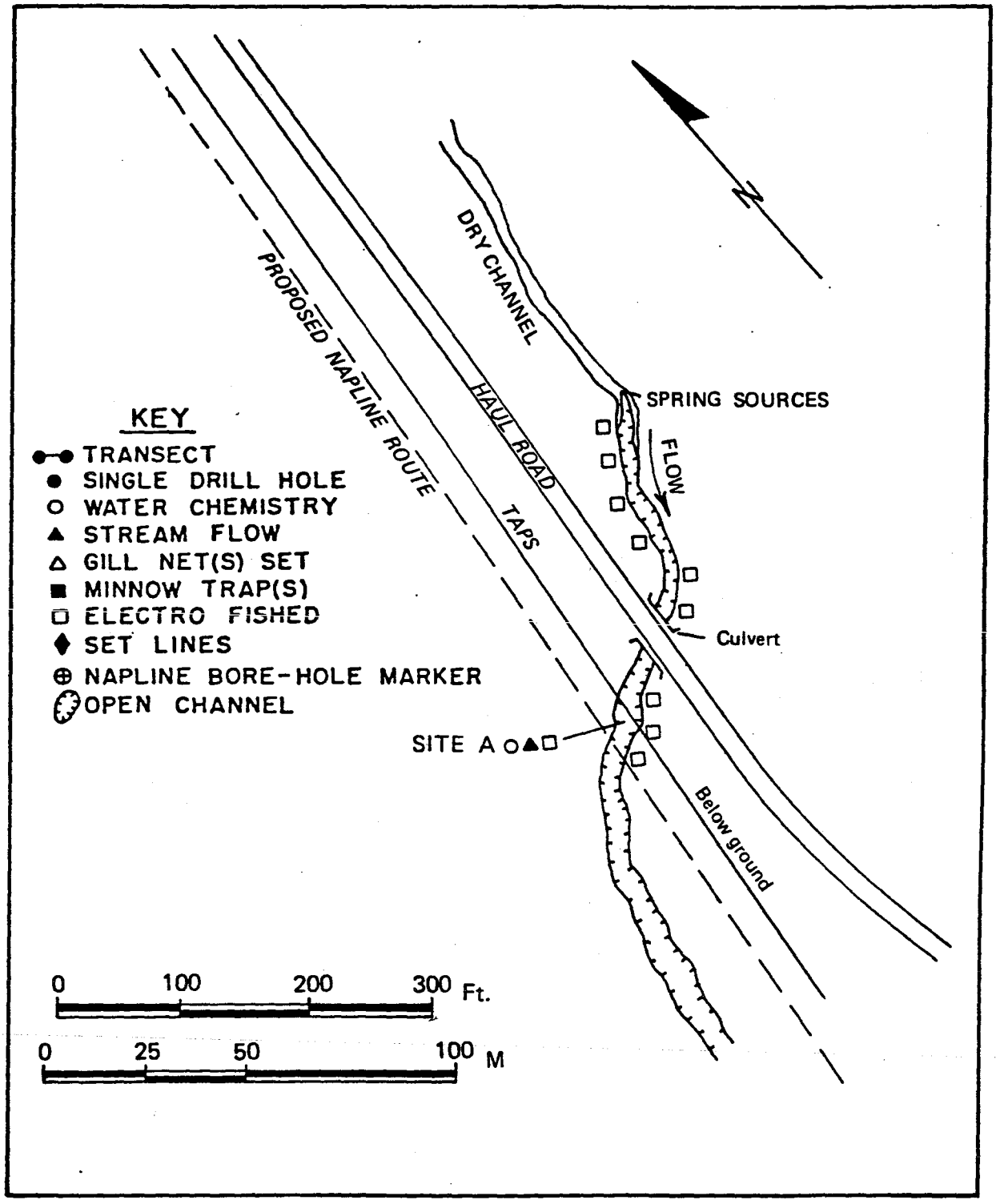

Fig. 32. Early winter survey. Burger's Bayou, 14 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Dietrich River (between NPSI 2-32.06 and 2-34.06)

Main Drainage Yukon River Tributary to Main Fork Koyukuk River

Figure 2 Northwest Alignment Sheet 34

Identification Nos: NPSI Between 2-32.06 and 2-34.06 NPMP 190.6

Alaska Highway Milepost NA

USGS Map Reference Chandalar, Ak. T 35N R 10W Sec. 21

Site Access Helicopter

Section Surveyed From the confluence of Kuyuktuvuk Creek and Dietrich River
50 m up Kuyuktuvuk Creek to 100 m down the Dietrich River

ASSESSMENT

The Dietrich River where it is joined by Kuyuktuvuk Creek (between NPSI 2-32.06 and 2-34.06) is narrower than areas sampled upstream. The majority of the water at the confluence flows from Kuyuktuvuk Creek. The channel at the confluence is approximately 6 m wide and the bottom consists primarily of cobble and gravel. Cobble and gravel banks 0.5-1.0 m high border a 300 m wide floodplain.

Sampling efforts during present investigations captured sculpin in the Dietrich River below the confluence as well as in Kuyuktuvuk Creek. Extensive ice cover (90%) limited the sample area to approximately 40 m up Kuyuktuvuk Creek and 40 m down the Dietrich River below the confluence. Although the shallow channelized portions of the river may offer habitat only during early winter, a large deep (1.5 m) pool near the downstream portion of the study area appears to have potential to provide good habitat throughout the winter season.

FISH

Site	A	B	C	D	E	F
Date	13 Nov. 79					
Location (distance from NAPLINE)	450 m west					
Species	CN					
Quantity	3					
Size Range (mm)	40					
Gear/Effort	EF(150 m)					

PHYSICAL CONDITIONS		REMARKS
Date	13 November 1979	
Snow Depth (cm)	40	
Percent Ice Cover	40	100 on Dietrich, ~20 on Kuyuktuvuk Creek
Surface Ice Depth (cm)	5	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	2-6	
Floodplain Width (m)	300	
Water Depth (cm)	15-30	
Discharge (m^3/s)	0.12	
D.O. (mg/ℓ)	7.4	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	79	
pH	7.5	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/cobble	

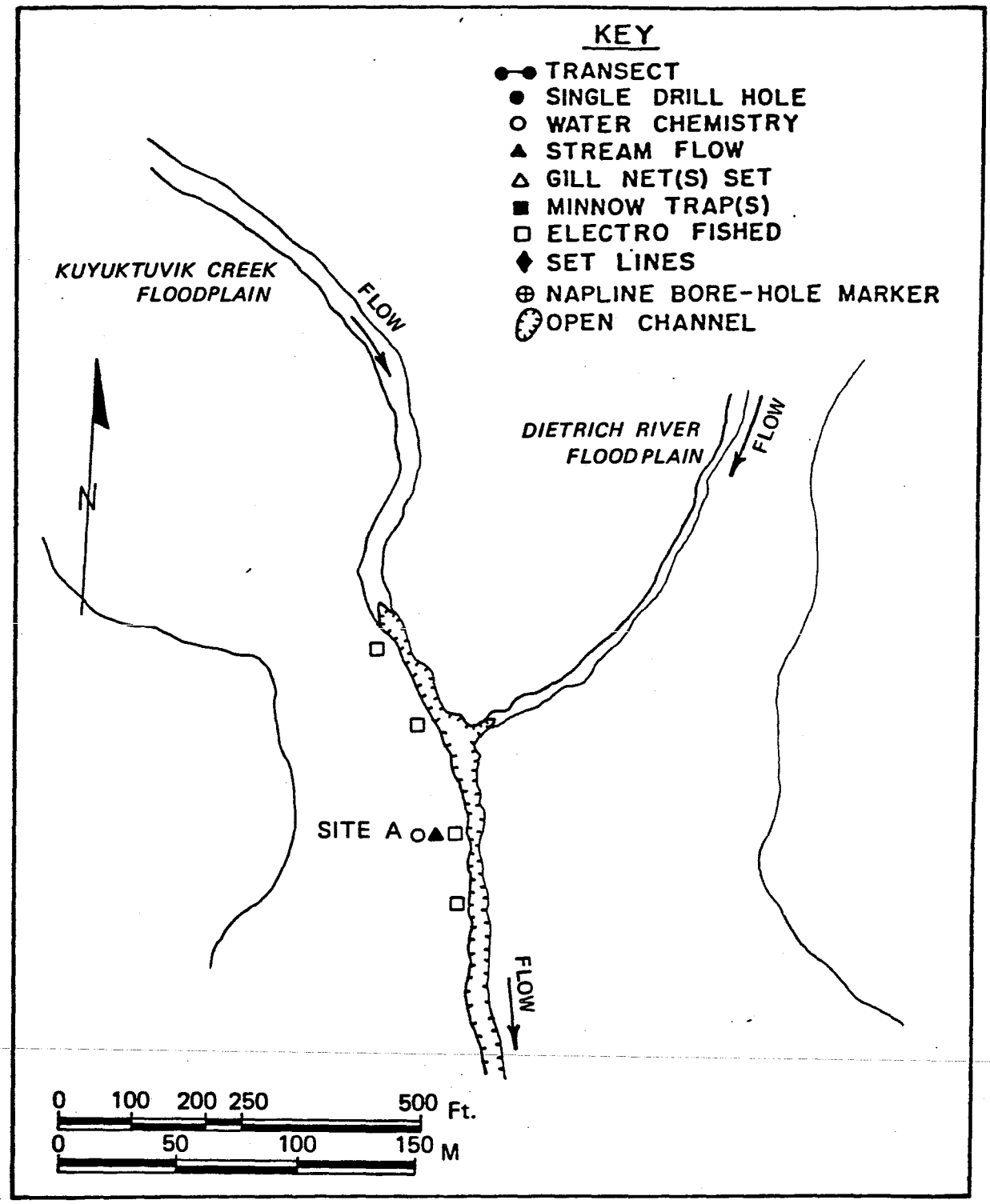

Fig. 33. Early winter survey. Dietrich River (Between NPSI 2-32.06 and 2-34.06), 13 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Dietrich River Floodplain (NPSI 2-32.06)

Main Drainage Yukon River Tributary to Main Fork Koyukuk River

Figure 2 Northwest Alignment Sheet 34

Identification Nos: NPSI 2-32.06 NPMP 189.3

Alaska Highway Milepost NA

USGS Map Reference Chandalar, Ak. T 36N R 10W Sec. 15

Site Access Helicopter

Section Surveyed From 100 m upstream to 20 m downstream of overwintering site #13

ASSESSMENT

The Dietrich River is a narrow (3 m wide), clear-water stream that parallels the Haul Road in the vicinity of the sample area (NPSI 2-32.06). Gravel banks 1 m high, heavily vegetated with willow, alder and spruce, border the 190 m wide floodplain. The bottom consists of gravel and cobble in the channelized areas and sand in the pools.

Early winter fishing efforts in open water areas yielded one slimy sculpin in the 120 m section of river sampled. Favorable water chemistry, relatively deep pools (~1 m), and adequate flow suggest that this area offers excellent fish habitat during early winter and may provide habitat for fish year-round.

FISH

Site	A	B	C	D	E	F
Date	13 Nov. 79					
Location (distance from NAPLINE)	150 m east					
Species	CN					
Quantity	1					
Size Range (mm)	28					
Gear/Effort	EF(120 m)					

PHYSICAL CONDITIONS		REMARKS
Date	13 November 1979	
Snow Depth (cm)	40	
Percent Ice Cover	30	
Surface Ice Depth (cm)	3	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	3-6	
Floodplain Width (m)	190	
Water Depth (cm)	15	
Discharge (m^3/s)	0.08	
D.O. (mg/ℓ)	10	
Temperature (°C)	0.0	
Conductivity (µmhos/cm)	260	
pH	7.5	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/cobble in channel; sand in pool	

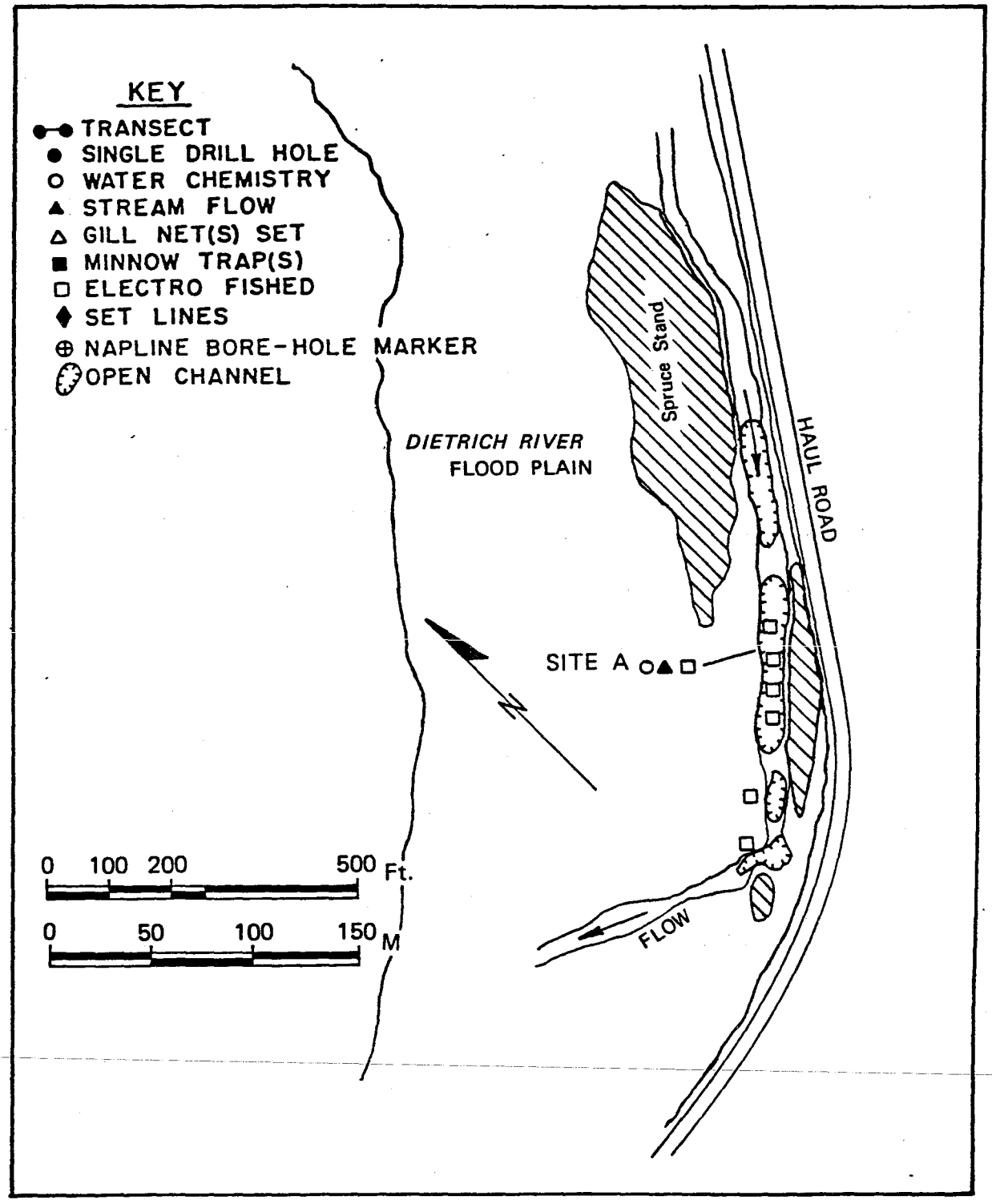

Fig. 34. Early winter survey. Dietrich River (NPSI 2-32.06), 13 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Dietrich River (NPSI 2-32.01)

Main Drainage Yukon River Tributary to Main Fork Koyukuk River

Figure 2 Northwest Alignment Sheet 33

Identification Nos: NPSI 2-32.01 NPMP 185.6

Alaska Highway Milepost NA

USGS Map Reference Philip Smith Mountain, Ak. T 37N R 10E Sec. 35

Site Access Helicopter

Section Surveyed From NAPLINE to crossing 125 m downstream

ASSESSMENT

Dietrich River NPSI 2-32.01, the farthest upriver location investigated during this survey, is characterized by a narrow (2.5-5 m) channel contained in a gravel floodplain approximately 180 m wide. Actively eroding banks (~1 m) were heavily vegetated with alder, willow and spruce.

Although early winter fishing efforts yielded one Dolly Varden in the shallow ~60 m^2 pool sampled, overwintering conditions appeared to be deteriorating rapidly. The shallow nature of the stream at the sample site and a negligible discharge at the time of present investigations suggest this area may offer habitat only during early winter.

DIETRICH RIVER (NPSI 2-32.01)

FISH

Site	A	B	C	D	E	F
Date	13 Nov. 79					
Location (distance from NAPLINE)	125 m downstream					
Species	DV					
Quantity	1					
Size Range (mm)	23					
Gear/Effort	3mGN(46h)					

PHYSICAL CONDITIONS

		REMARKS
Date	13 November 1979	
Snow Depth (cm)	40	
Percent Ice Cover	90	
Surface Ice Depth (cm)	10-15	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	2-5	
Floodplain Width (m)	180	
Water Depth (cm)	18	
Discharge (m^3/s)	Negligible	
D.O. (mg/ℓ)	10	
Temperature (°C)	0.0	
Conductivity (µmhos/cm)	235	
pH	7.4	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel	

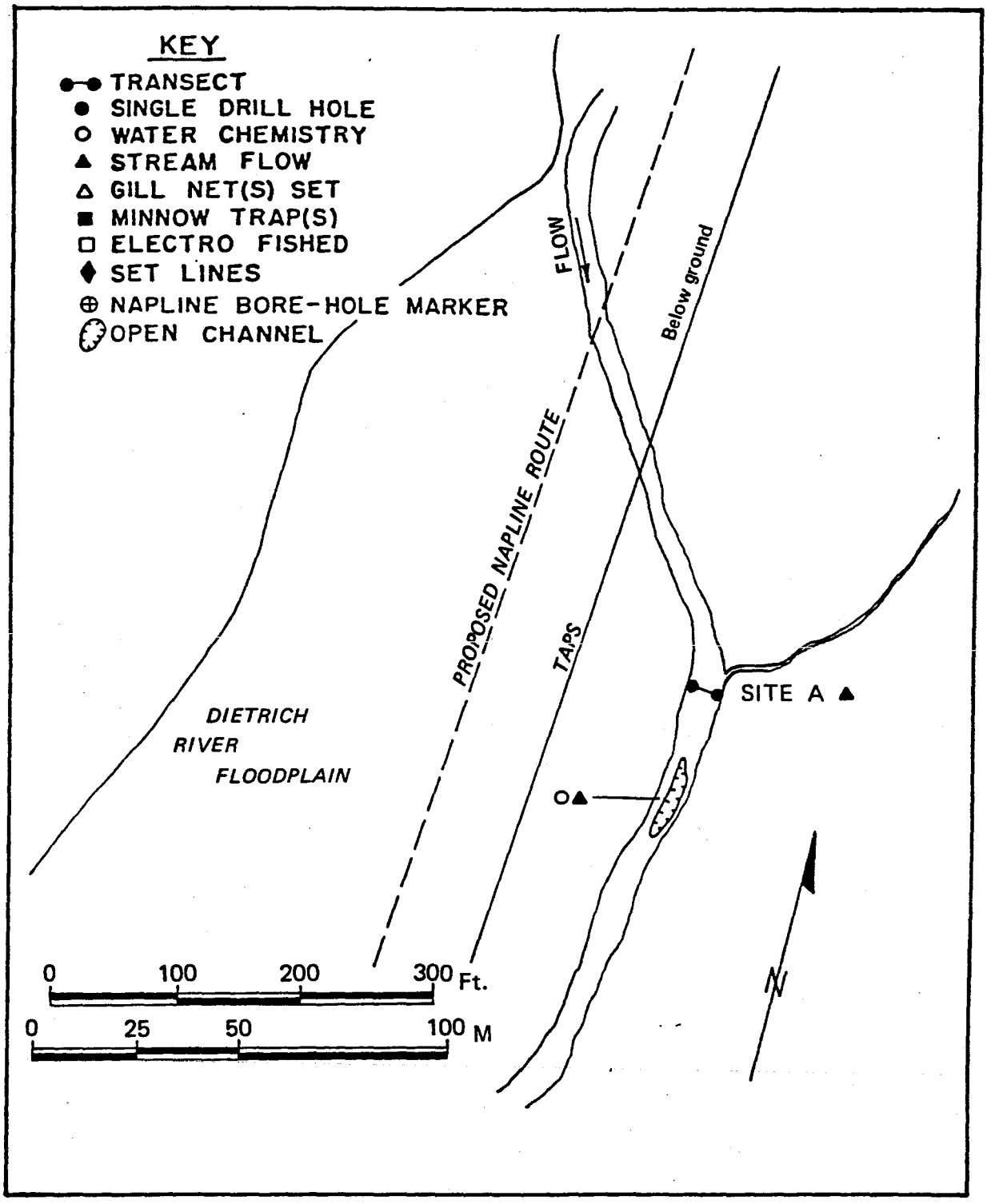

Fig. 35. Early winter survey. Dietrich River (NPSI 2-32.01), 13 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody West Fork of North Fork of Chandalar River

Main Drainage Yukon River Tributary to Yukon River

Figure 2 Northwest Alignment Sheet 32

Identification Nos: NPSI 2-29 NPMP 179.0-178.7

Alaska Highway Milepost NA

USGS Map Reference Philip Smith Mountains, Ak. T 16S R 11E Sec. 16

Site Access Helicopter

Section Surveyed From 800 m upstream to NAPLINE crossing

ASSESSMENT

Where the West Fork of the North Fork Chandalar River (NPSI 2-29) is crossed by the NAPLINE, the river braids into two distinct channels. The west channel varies to 6 m in width and the east to 4 m in width. Both channels meander in a broad (300 m) floodplain bordered by willow and alder and have gravel/sand substrate. These channels originate at separate spring sources 40 m apart located 900 m upstream of the NAPLINE crossing. Although the two sources are in close proximity to each other, water quality characteristics of each differ somewhat.

No fish were captured or observed in the east channel of the river during the early winter survey. A large (~500 fish) population of grayling and sculpin was observed in the west channel. Approximately 30 grayling and 20 sculpin were captured and measured. These fish may be part of a group of fish found trapped upstream during fall 1979 and transplanted to this site by state agency biologists. Although fish were observed only in the west channel of the West Fork of the North Fork of the Chandalar River, both channels appeared to provide good habitat for fish during early winter. If the spring sources continue to flow, this area may provide good habitat throughout the winter season.

FISH

Site	A	B	C	D	E	F
Date	11 Nov. 79	11 Nov. 79				
Location (distance from NAPLINE)	800 m upstream (West Channel)	800 m upstream (East Channel)				
Species	GR, CN					
Quantity	28 GR; 19 CN					
Size Range (mm)	GR 54-205 CN 67-125					
Gear/Effort	EF(800 m)	EF(600 m)				

PHYSICAL CONDITIONS		REMARKS
Date	11 November 1979	
Snow Depth (cm)	70	
Percent Ice Cover	20	
Surface Ice Depth (cm)	30-40	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	1-4, 1-6	East/west channel, respectively
Floodplain Width (m)	150	
Water Depth (cm)	10-15/40	Channels/pools, respectively
Discharge (m^3/s)	0.02/0.06	East/west channel, respectively
D.O. (mg/ℓ)	9.4/10	East/west channel, respectively
Temperature (°C)	1.0/0.5	East/west channel, respectively
Conductivity (μmhos/cm)	135/150	East/west channel, respectively
pH	7.3/7.25	East/west channel, respectively
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/sand; some silt in pools	

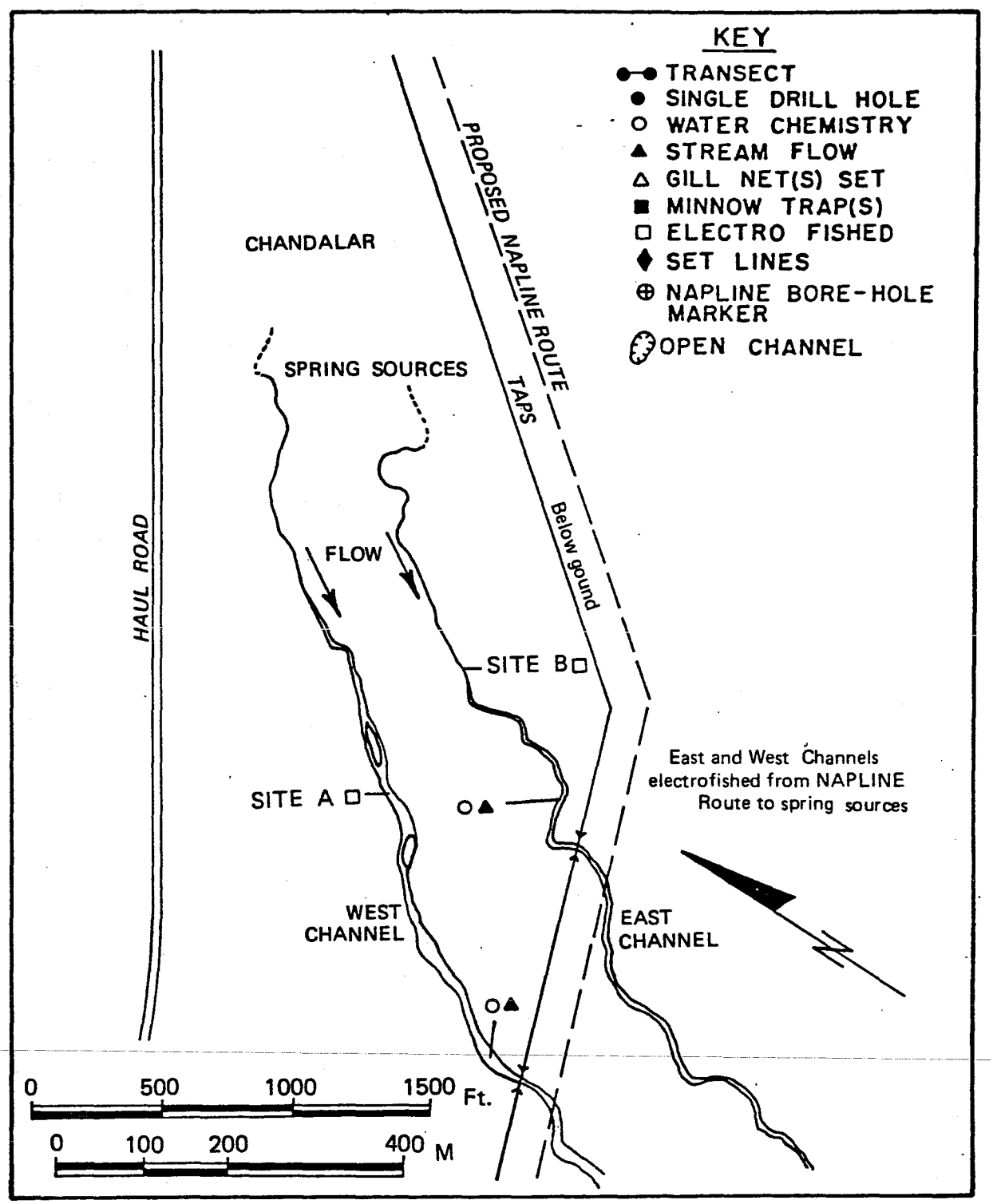

Fig. 36. Early winter survey. West Fork of North Fork Chandalar River (NPSI 2-29), 11 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody West Fork of North Fork of Chandalar River

Main Drainage Yukon River Tributary to Yukon River

Figure 2 Northwest Alignment Sheet 32

Identification Nos: NPSI 2-28 NPMP 177.3-176.1

Alaska Highway Milepost NA

USGS Map Reference Philip Smith Mountains, Ak. T 16S R 11E Sec. 9 and 10

Site Access Helicopter

Section Surveyed Transect 20 m upstream of access road 109 APL AMS 3 to north end of Chandalar airstrip (4.6 km)

ASSESSMENT

The West Fork of North Fork Chandalar River was found dry during the early winter survey and offers no winter fish habitat.

FISH

Site	A	B	C	D	E	F
Date						
Location (distance from NAPLINE)						
Species						
Quantity						
Size Range (mm)						
Gear/Effort						

PHYSICAL CONDITIONS		REMARKS
Date	11 November 1979	
Snow Depth (cm)	70	
Percent Ice Cover	100	
Surface Ice Depth (cm)	0	Stream bed dry
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	1-6	
Floodplain Width (m)	150	
Water Depth (cm)	0	
Discharge (m^3/s)	NA	
D.O. (mg/ℓ)	NA	
Temperature (°C)	NA	
Conductivity (μmhos/cm)	NA	
pH	NA	
Color	NA	
Turbidity	NA	
Fish Block(s)	Stream bed dry	
Substrate	Cobble/gravel	

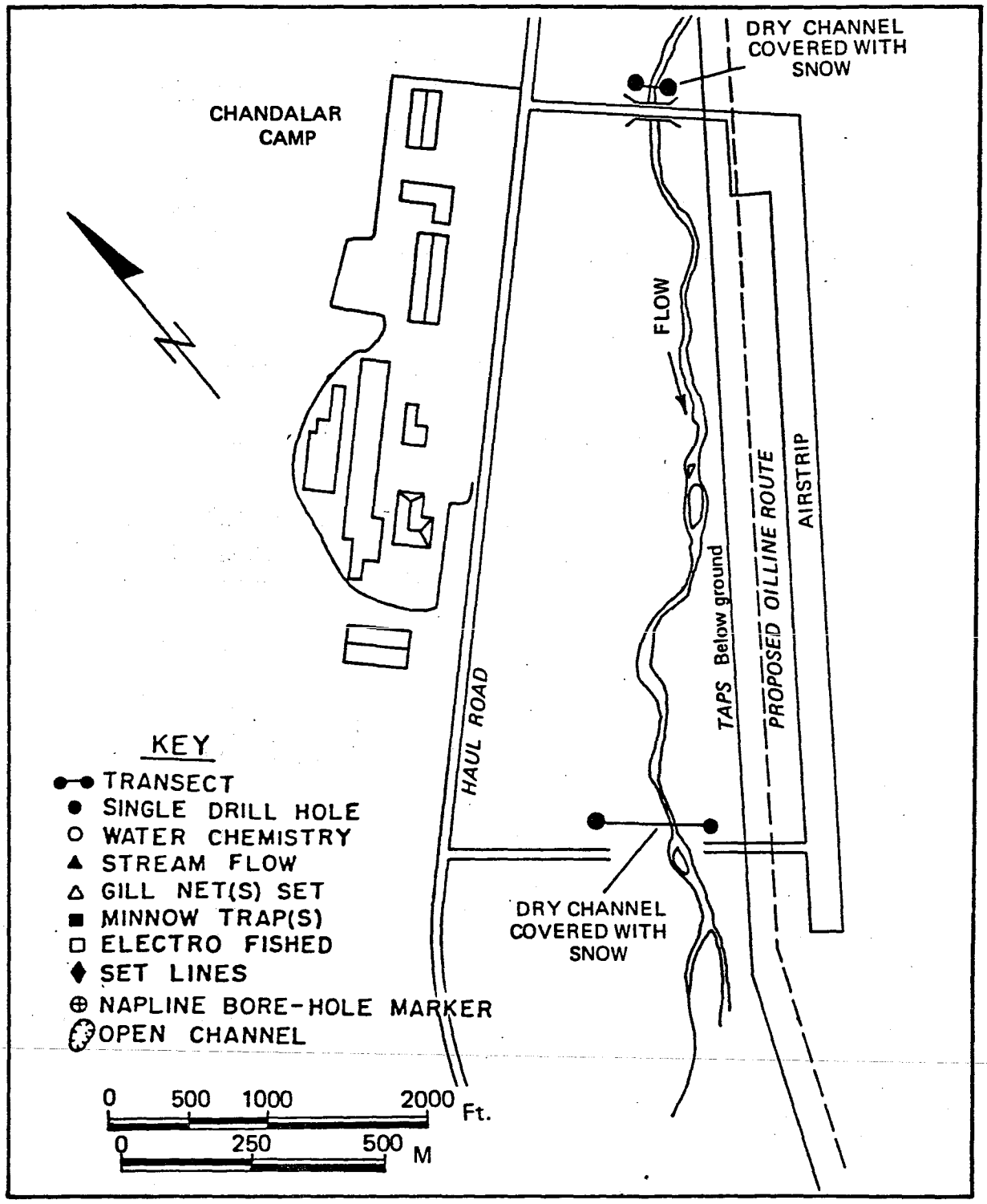

Fig. 37. Early winter survey. West Fork of North Fork Chandalar River (NPSI 2-28), 11 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Atigun River (near Mainline Spring)

Main Drainage Sagavanirktok River Tributary to Sagavanirktok River

Figure 2 Northwest Alignment Sheet 27

Identification Nos: NPSI None assigned NPMP 152.2

Alaska Highway Milepost NA

USGS Map Reference Philip Smith Mountains, Ak. T 12S R 12E Sec. 20 and 21

Site Access On foot from TAPS Haul Road

Section Surveyed From 500 m upstream to 800 m downstream of confluence of Mainline Spring and Atigun River

ASSESSMENT

The Atigun River near Mainline Spring is a 25 m wide braided channel which flows through a floodplain approximately 150 m wide. Sand and gravel banks vary in height from 2-5 m and are tundra vegetated. Bottom substrate consists of gravel with intermittent accumulations of sand.

During the 1979 early winter survey, the Atigun River was completely frozen over. Ice thickness ranged from 25-100 cm. Surface ice was sufficiently clear in most areas to allow visual inspection for fish. Only one pool was located in the study area that would accommodate a net but no fish were caught. Fish habitat in the area surveyed was assessed to be poor due to limited pool area and the absence of adequate cover.

FISH

Site	A	B	C	D	E	F
Date	28 Nov. 79					
Location (distance from NAPLINE)	250 m upstream of confluence with Mainline Spring					
Species						
Quantity						
Size Range (mm)						
Gear/Effort	10mGN(72h)					

PHYSICAL CONDITIONS		REMARKS
Date	28 November 1979	
Snow Depth (cm)	15	
Percent Ice Cover	100	
Surface Ice Depth (cm)	25-100	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	~25	
Floodplain Width (m)	150	
Water Depth (cm)	65	In pool
Discharge (m^3/s)	Negligible	
D.O. (mg/ℓ)	7.4	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	320	
pH	6.7	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	Stream frozen solid between pools	
Substrate	Gravel/sand	

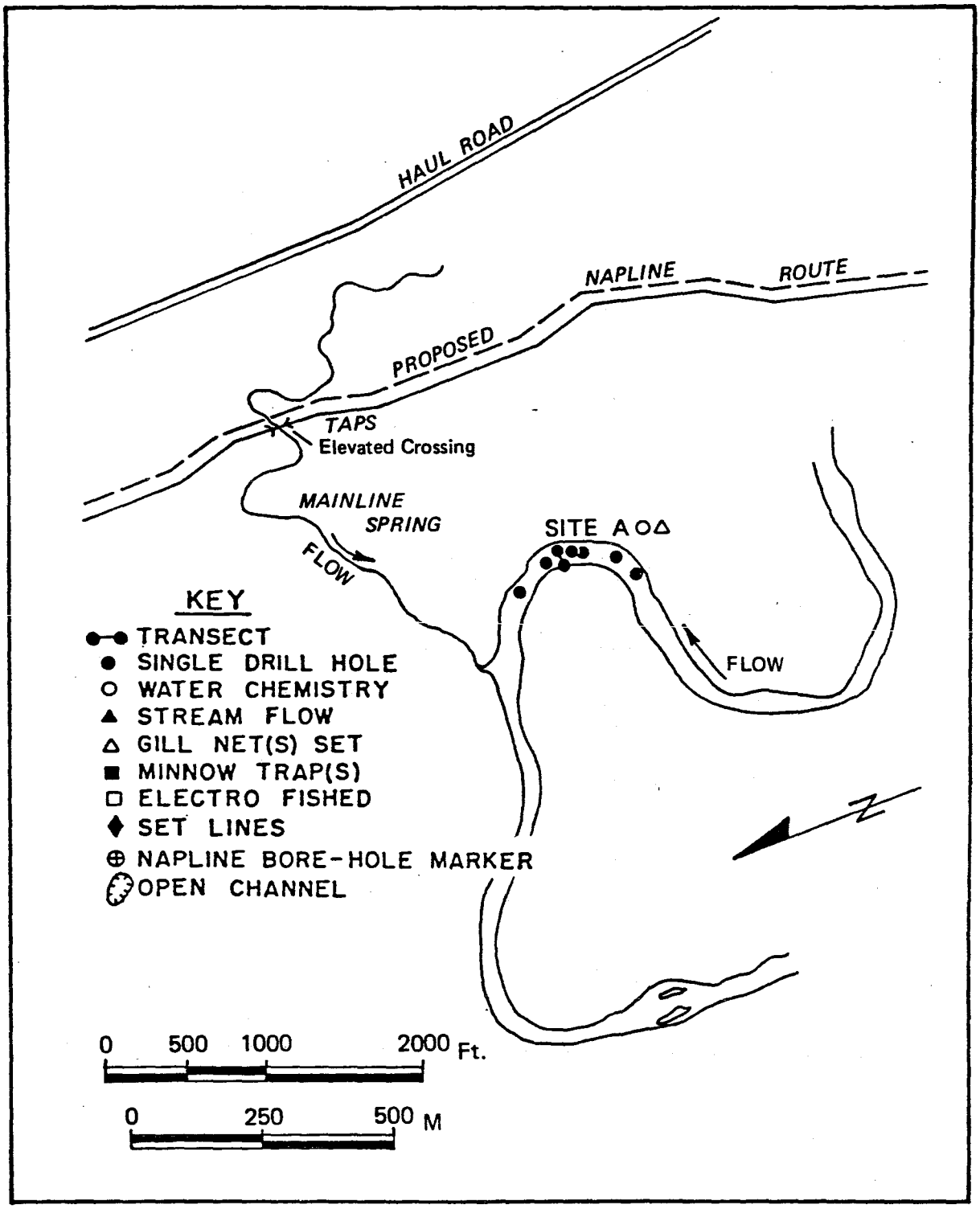

Fig. 38. Early winter survey. Atigun River (Near Mainline Spring), 28 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Atigun River

Main Drainage Sagavanirktok River Tributary to Sagavanirktok River

Figure 2 Northwest Alignment Sheet 27

Identification Nos: NPSI 2-22 NPMP 147.6

Alaska Highway Milepost NA

USGS Map Reference Philip Smith Mountains, Ak. T 11S R 12E Sec. 32

Site Access On foot from Haul Road

Section Surveyed From 800 m upstream to 500 m downstream of TAPS Haul Road crossing

ASSESSMENT

Atigun River #2 is a braided channel 25 m wide that meanders in a 120 m wide floodplain. Steep 5-7 m high sand and gravel banks are lined with tundra; the channel bottom is gravel.

At the time of the 1979 early winter survey the entire river was frozen over with clear ice 25-100 cm thick. Visual observations were possible through clear ice but few areas of water were located and no fish were observed. Fish habitat in the area surveyed was assessed to be poor to non-existent due to the minimal amount of free water present.

FISH

Site	A	B	C	D	E	F
Date						
Location (distance from NAPLINE)						
Species						
Quantity						
Size Range (mm)						
Gear/Effort						

PHYSICAL CONDITIONS		REMARKS
Date	26 November 1979	
Snow Depth (cm)	15	
Percent Ice Cover	100	
Surface Ice Depth (cm)	50	
Anchor Ice	Absent	
Aufeis	Absent	Present 700 m upstream of NAPLINE
Channel Width (m)	25	
Floodplain Width (m)	120	
Water Depth (cm)	5-30	
Discharge (m^3/s)	Negligible	
D.O. (mg/ℓ)	5.4	
Temperature (°C)	1.0	
Conductivity (μmhos/cm)	270	
pH	6.3	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	Stream frozen solid between pools	
Substrate	Sand/gravel	

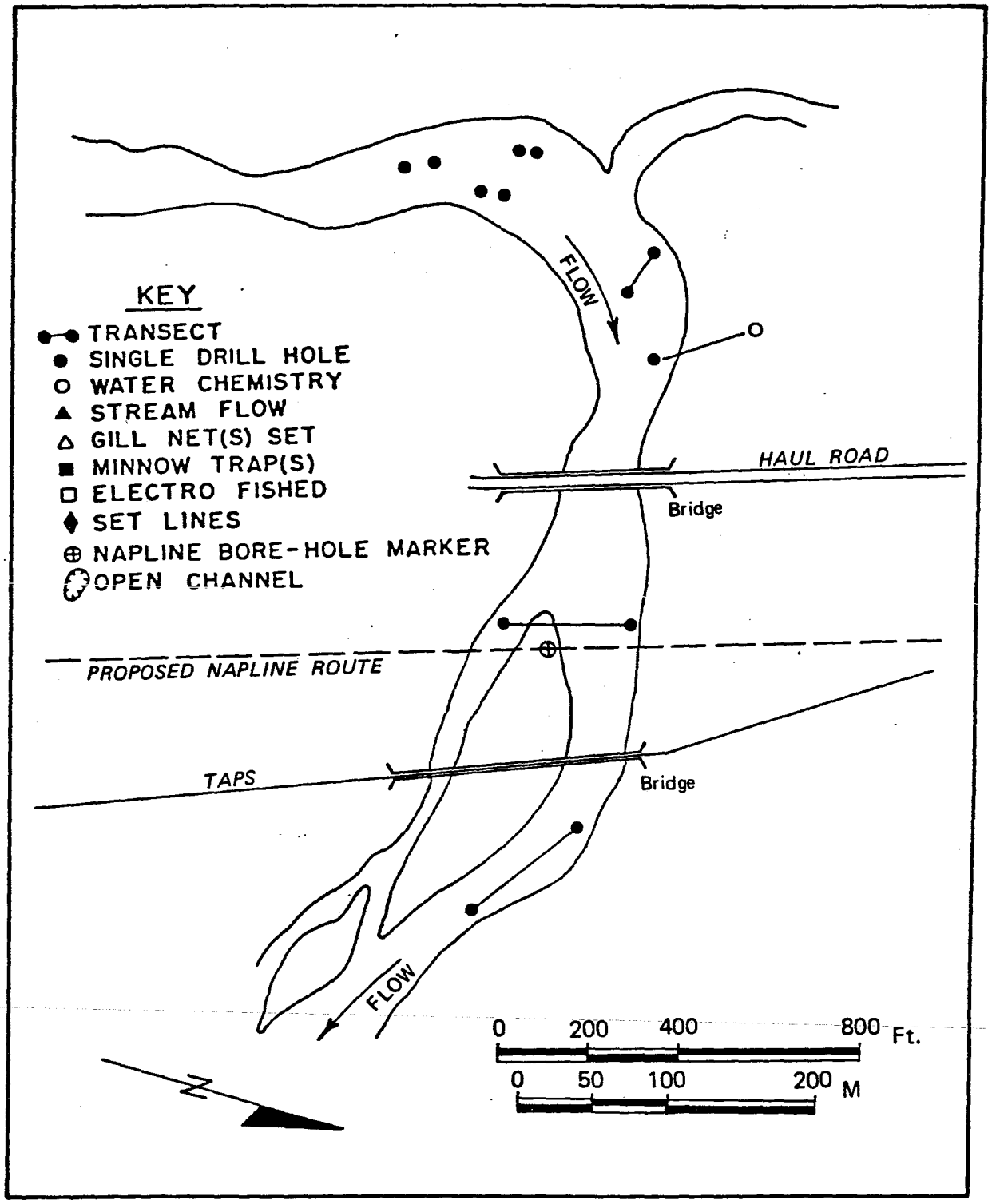

Fig. 39. Early winter survey. Atigun River, 26 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Lower Oksrukuyik Creek #1

Main Drainage Sagavanirktok River Tributary to Sagavanirktok River

Figure 2 Northwest Alignment Sheet 20

Identification Nos: NPSI 1-18.01 NPMP 109.5

Alaska Highway Milepost NA

USGS Map Reference Philip Smith Mountains, Ak. T 7S R 14E Sec. 8 and 5

Site Access On foot from Haul Road

Section Surveyed From NAPLINE crossing to confluence with Sagavanirktok River (~2 km)

ASSESSMENT

Lower Oksrukuyik Creek #1 is a large (6-16 m wide), clear-water stream characterized by large, deep pools (2.0 m) and shallow riffles and gravel/cobble substrate. The 1.5-3.0 m high banks, lined with willow, are actively eroding. At the time of this study, ice cover was 100% and 30-95 cm thick.

Although early winter investigations did not verify the presence of fish in Lower Oksrukuyik Creek #1, high dissolved oxygen levels and an abundance of free water at all sample locations indicates suitable overwintering habitat. Previous studies in late fall documented the presence of arctic char, grayling and sculpin in Lower Oksrukuyik Creek which also indicates the likelihood of fish use during early winter (Ref. 57 and 64).

FISH

Site	A	B	C	D	E	F
Date	24 Nov. 79	24 Nov. 79	24 Nov. 79			
Location (distance from NAPLINE)	75 m downstream	1800 m downstream	2000 m downstream			
Species						
Quantity						
Size Range (mm)						
Gear/Effort	20mGN(46h)	MT(46h)	4mGN(69h)			

PHYSICAL CONDITIONS		REMARKS
Date	24 November 1979	
Snow Depth (cm)	50	
Percent Ice Cover	100	
Surface Ice Depth (cm)	45	
Anchor Ice	Present	At confluence with Sagavanirktok River
Aufeis	Absent	
Channel Width (m)	20	
Floodplain Width (m)	20	
Water Depth (cm)	70	
Discharge (m^3/s)	Negligible	
D.O. (mg/ℓ)	8.0	
Temperature (°C)	0.5	
Conductivity (μmhos/cm)	95	
pH	7.5	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/sand	

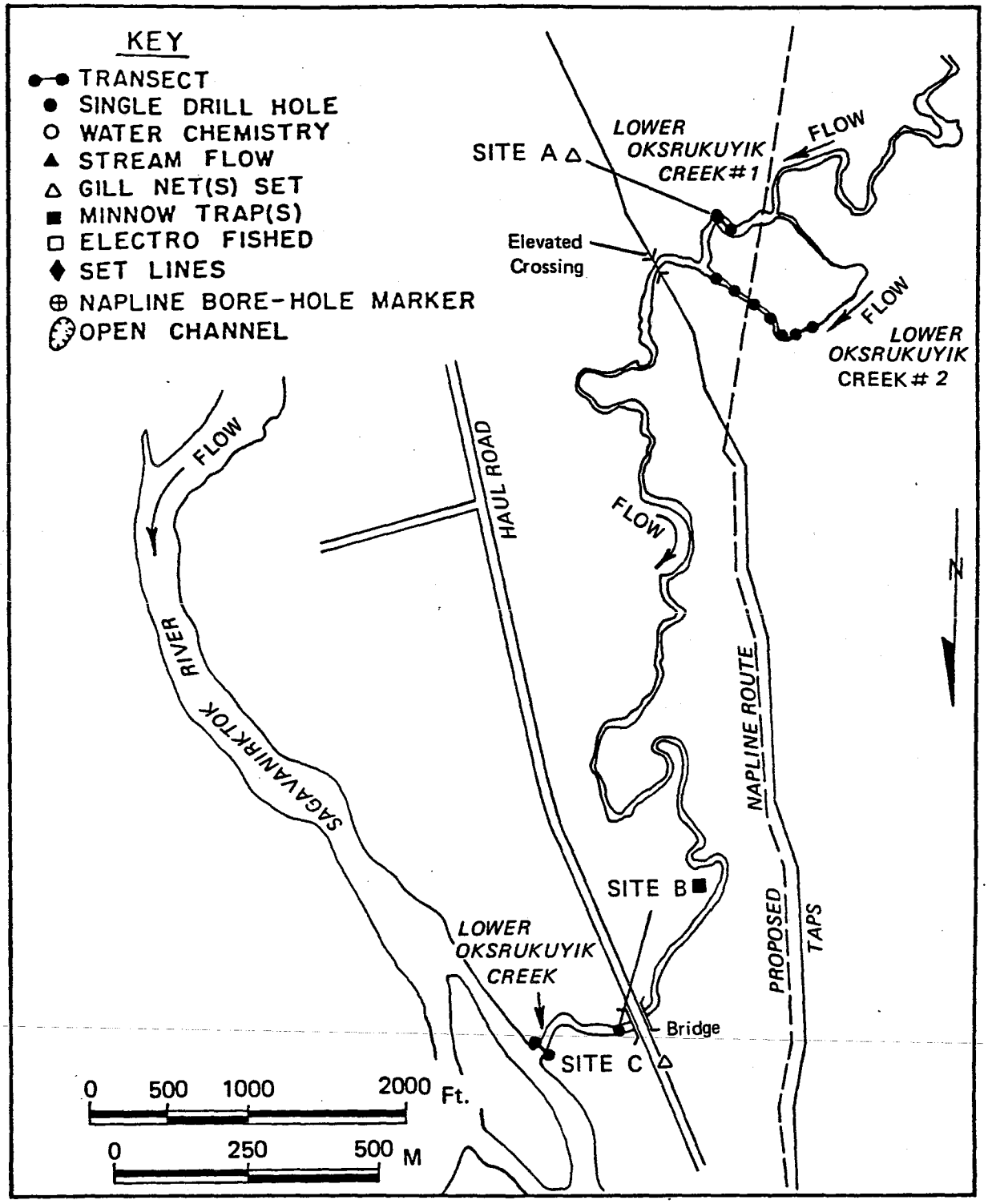

Fig. 40. Early winter survey. Lower Oksrukuyik Creek #1, 24 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Lower Oksrukuyik Creek #2

Main Drainage Sagavanirktok River Tributary to Sagavanirktok River

Figure 2 Northwest Alignment Sheet 20

Identification Nos: NPSI 1-18 NPMP 109.4

Alaska Highway Milepost NA

USGS Map Reference Philip Smith Mountains, Ak. T 7S R 14E Sec. 8

Site Access On foot from Haul Road

Section Surveyed From 200 m upstream to 200 m downstream of NAPLINE

ASSESSMENT

Lower Oksrukuyik Creek #2 was dry during early winter investigations. This small (3-5 m wide) stream bed appears to be a runoff channel where flow occurs only during periods of heavy precipitation. Terrestrial grasses and other vegetation growing in the stream bed indicate intermittent flow. This stream offers no overwintering fish habitat.

FISH

Site	A	B	C	D	E	F
Date						
Location (distance from NAPLINE)						
Species						
Quantity						
Size Range (mm)						
Gear/Effort						

PHYSICAL CONDITIONS		REMARKS
Date	24 November 1979	
Snow Depth (cm)	50	
Percent Ice Cover	0	
Surface Ice Depth (cm)	NA	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	5	
Floodplain Width (m)	5	
Water Depth (cm)	Stream bed dry	
Discharge (m^3/s)	NA	
D.O. (mg/ℓ)	NA	
Temperature (°C)	NA	
Conductivity (μmhos/cm)	NA	
pH	NA	
Color	NA	
Turbidity	NA	
Fish Block(s)	Stream bed dry	
Substrate	Gravel; terrestrial vegetation	

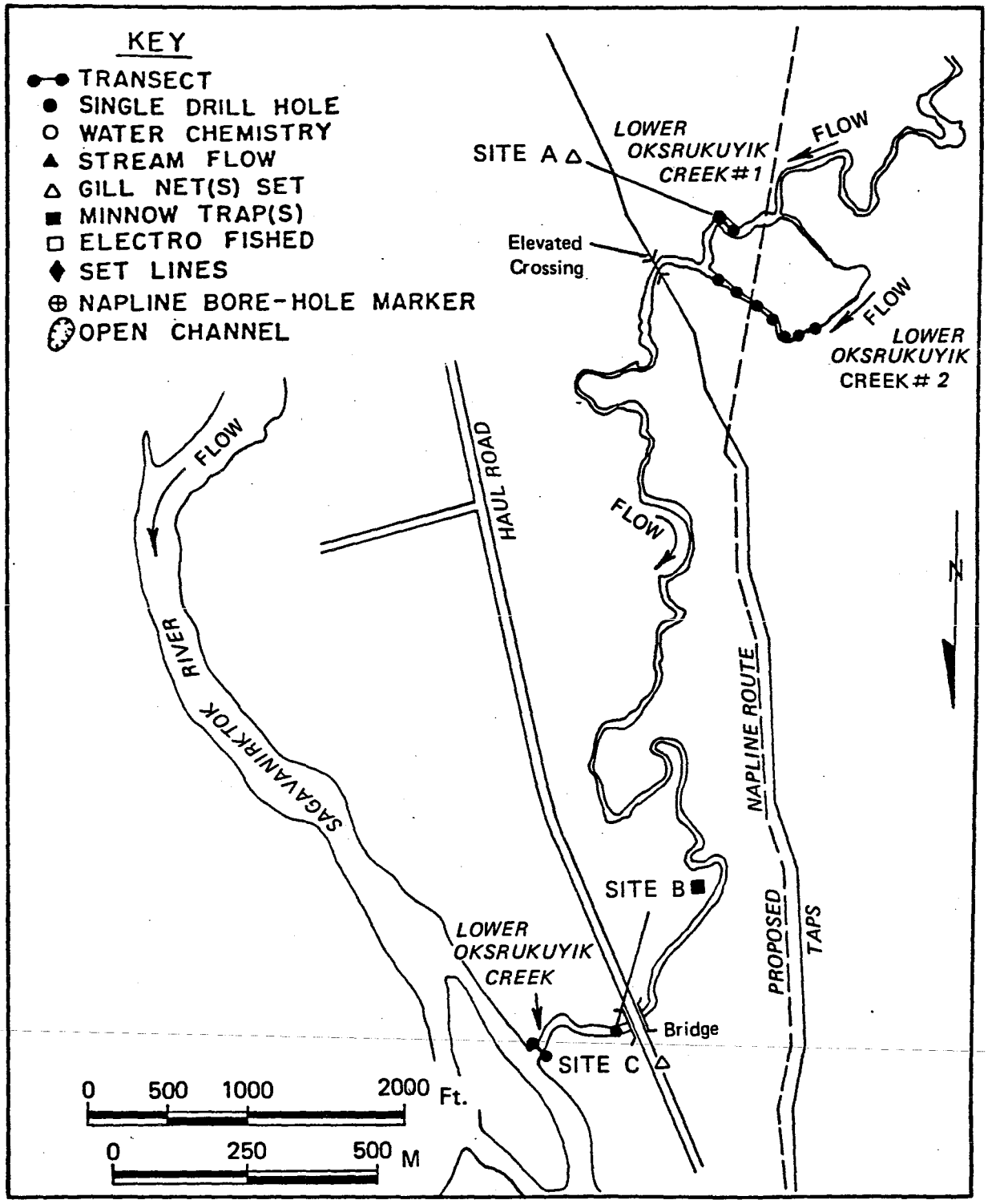

Fig. 41. Early winter survey. Lower Oksrukuyik Creek #2, 24 November 1979.

EARLY WINTER SURVEY FORM

WATERBODY

Waterbody Sagavanirktok River Floodplain

Main Drainage Sagavanirktok River Tributary to Sagavanirktok River

Figure 2 Northwest Alignment Sheet 5

Identification Nos: NPSI 1-4 NPMP 26.4-27.2

Alaska Highway Milepost NA

USGS Map Reference Sagavanirktok, Ak. T 7N R 14E Sec. 18 and 17

Site Access Truck from TAPS Haul Road to spur dikes

Section Surveyed Three spur dike/access roads crossed by the NAPLINE (from NPMP 26.4 to 27.2)

ASSESSMENT

The Sagavanirktok River near NPSI 1-4 is a braided stream confined by low gravel banks within the Sagavanirktok River floodplain south (~24 km) of Deadhorse. The westernmost branch of the river is crossed (below ground) by the TAPS and lined by a series of spur dikes, constructed to control erosion. Three spur dikes have caused significant pools in deep channels to form. These areas were flagged during the fall 1979 survey for the early winter investigations. At the time of the early winter investigation, ice cover was nearly 100% and ice depth averaged 0.8 m. The spur dike channels were approximately 30 m wide with water depths to 3 m.

Grayling and sculpin were captured during the early winter survey. This area was assessed to offer good overwintering habitat due to the presence of fish and an abundance of free water with adequate dissolved oxygen.

FISH

Site	A	B	C	D	E	F
Date	23 Nov. 79	23 Nov. 79	23 Nov. 79			
Location (distance from NAPLINE)	250 m East	250 m East	250 m East			
Species	GR		CN			
Quantity	1		5			
Size Range (mm)	185		32-66			
Gear/Effort	10mGN(42h)	2SL(46h)	4SL(46h) EF(75 m)			

PHYSICAL CONDITIONS		REMARKS
Date	23 November 1979	
Snow Depth (cm)	25-30	
Percent Ice Cover	100	
Surface Ice Depth (cm)	80	
Anchor Ice	Absent	
Aufeis	Absent	
Channel Width (m)	30	
Floodplain Width (m)	3000	
Water Depth (cm)	180-275	
Discharge (m^3/s)	Negligible	
D.O. (mg/ℓ)	5.8	
Temperature (°C)	0.0	
Conductivity (μmhos/cm)	15	
pH	7.4	
Color	Clear	
Turbidity	Not turbid	
Fish Block(s)	None observed	
Substrate	Gravel/sand	

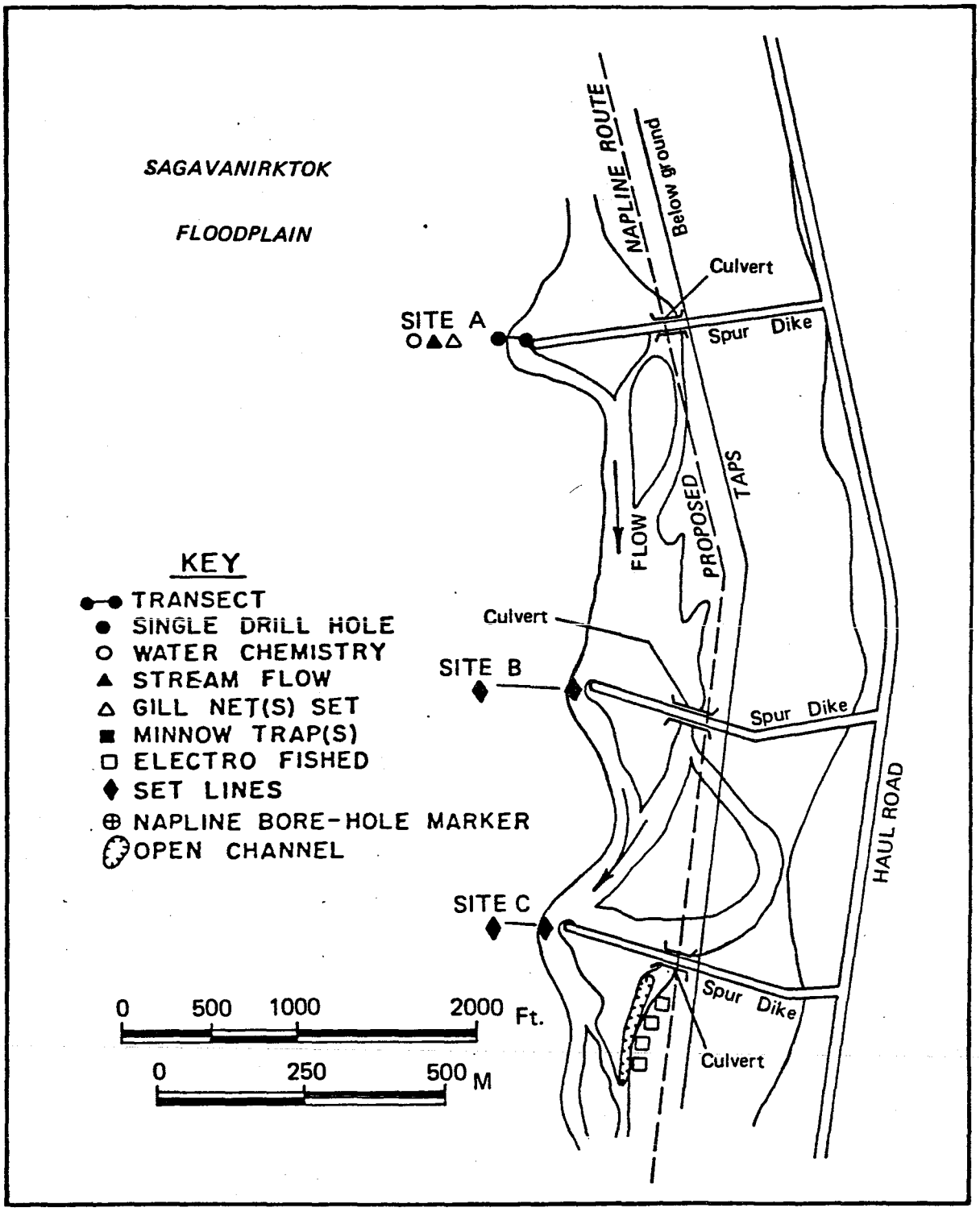

Fig. 42. Early winter survey. Sagavanirktok River Floodplain, 23 November 1979.

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APPENDIX I

Calibration of Field Equipment

and

Accuracy of Measurements

ENVIRONMENTAL SERVICES Ltd

February 4, 1980

LGL Alaska
P. O. Box 80607
Fairbanks, Alaska 99708

Attention: Mr. Mike Chihuly

Dear Sir:

For the purpose of quality control, six Taylor hand thermometers, two Hach pH kits (model 17-F), two YSI conductivity/salinity meters and two Hach portable water analysis pH meters were brought to our laboratory for calibration. The thermometers and the YSI conductivity/salinity meters were calibrated according to Standard Methods.* The pH kits and pH meters were calibrated using our Orion digital ionalyzer model 801A which had previously been standardized using the procedures described in Standard Methods.

The two Hach pH kits were calibrated before and after LGL's project. Both times they were found to be within the plus or minus 5% accurary range as specified by Hach Chemical Co.

The six themometers were found to be accurate within the limits of the 1.0 degree increments except for one which was subsequently discarded.

The Hach portable water analysis pH meter (No. 16049T "A") was found to be accurate to plus or minus 0.1 pH units which is acceptable accuracy for this instrument. During calibration the second pH probe was broken. As a result of this delay, we were unable to calibrate the pH meter. The replacement was delivered to LGL after two weeks.

In the YSI conductivity/salinity meters, the temperature probes were found to be accurate within the specifications for the instruments. The calculated cell constants were between 1 and 2 as requred by standard methods.

If you have any questions, please call at 479-3115.

Very truly yours,

ENVIRONMENTAL SERVICES, LIMITED

Carol J Brown

Carol J. Brown,
Laboratory Supervisor
CJB/cno
* 14th Edition, Standard Methods.

APPENDIX II

Provisional List of Waterbodies Crossed or Potentially Affected by the NAPLINE

APPENDIX II. Provisional list of 492 waterbodies crossed or potentially affected by the Northwest Alaskan Pipeline including an evaluation of existing winter fisheries data for each. Data sources (see Literature Reviewed) and winter criteria (see Table 1) are listed by number. Primary data sources are underlined. Abbreviations: NPSI (Northwest Alaskan Pipeline Stream Identification Number), NPAS (Northwest Pipeline Alignment Sheet), NPMP (Northwest Pipeline Milepost), AHMP (Alaska Highway Milepost), Alyeska AS (Alyeska Assignment Sheet), Sta. (Station). Reference 42 identified the alignment sheet series used.

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Unnamed Creek	6-227.03	131	738.7	1222.2				3	2,54
Unnamed Creek	6-227.02	131	738.3	1222.6				3	54,57
Unnamed Pond	6-227.01	131	737.5	1223.4				3	2,54
Scottie Creek	6-227	131	737.5	1223.4				1	5,6,7,8,9,10,17,22,26,29,54,55,57,59,60,72,73,77
Desper Creek	6-226	130	735.6	1225.6				2	5,6,7,9,10,17,26,29,54,55,57,59,60,72,73
Unnamed Creek	6-225.01	129	730.6	1232.1				3	2,54
Sweetwater Creek	6-225	129	728.4	1234.2				2	2,9,29,54,57,59,60,68,72,73
Unnamed Creek	6-224	129	728.0	1234.7				3	2,29,54,59,60,73
Unnamed Creek	6-223	129	726.8	1235.9				3	2,29,54
Unnamed Creek	6-223	129	726.8	1235.9				3	2,29,54
Unnamed Creek	6-222	129	726.5	1236.3				2	2,29,54,57,59,60
Gardiner Creek	6-219	127	716.8	1246.7				2	5,6,7,8,9,10,17,22,26,29,54,57,59,60,68,72,73
Tenmile Creek	6-218	126	710.7	1252.8				2	2,5,6,9,10,17,26,29,54,57,59,60,73
Silver Creek	6-217	125	704.8	1258.7				3	2,5,6,9,10,26,29,54,59,60,73
Unnamed Creek	6-216.01	124	701.9	1262.3				3	2,54
Unnamed Creek	6-216.01	124	701.9	1262.3				3	2,54
Unnamed Creek	6-216	124	699.2	1266.5				2	2,29,54,59,60
Beaver Creek	6-215	124	697.4	1268.0				2	5,6,7,8,9,10,17,22,26,29,54,57,59,60,72
Unnamed Creek	6-214.01	123	695.2	1270.4				3	2,54
Unnamed Creek	6-213.01	123	692.8	1273.0				3	2,59,60
Unnamed Creek	6-213	122	688.3	1278.3				3	2,9,29,59,60
Bitters Creek	6-212	122	686.5	1280.2				2,3	5,6,9,10,26,29,54,57,59,60,69,72,73
Unnamed Creek	6-210.02	121	683.9	1283.2				3	2
Unnamed Creek	6-210.01	121	681.8	1285.4				3	2
Unnamed Creek	6-210	119	671.0	1296.7				3	2,29
Unnamed Creek	6-209	119	669.9	1297.9				3	2,29,59,60
Tanana River	6-207 A/B	118	664.3	1303.3				1	3,5,6,7,9,10,13,17,22,26,29,54,57,60,69,72
Tanana River Alt #1	6-207C	118	664.3	1303.3				1	3,5,6,7,9,10,17,22,26,29,54,57,60
Tanana River Alt #2	6-208	118	664.3	1303.3				1	3,5,6,7,9,10,17,22,26,29,54,57,60
Tok River	6-205	117	658.2	1309.4				2	3,5,6,7,9,10,17,22,26,29,54,57,59,60,72,73
Crystal Springs	6-203.03	114	639.0	1328.2				1	2,9,26,54,55,57,60,73
Unnamed Creek	6-203.02	114	638.8	1328.2				3	54,60
Unnamed Creek	6-203.01	113	637.6	1329.5				3	2,60
Unnamed Creek	6-203	113	636.5	1330.5				3	2,54,59,60
Moon Lake Tributary	6-202	113	635.2	1331.9				3	2,6,29,59,69

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Yerrick Creek	6-201	113	633.0	1333.7				1	3,5,6,7,8,9,10,17,22,26,29, 54,55,57,64,68,69,72,73,77
Unnamed Creek	6-200.01	112	630.8	1336.9				3	2,29,54,59,60
Unnamed Creek	6-200	112	630.7	1336.9				3	2,29,54,59,60,69
Cathedral Rapids Creek #1	6-199	112	629.2	1338.1				3	2,4,7,22,29,60,68,69
Cathedral Rapids Creek #2	6-198	112	628.6	1338.7				3	2,4,7,22,29,59,60,68,69
Cathedral Rapids Creek #3	6-197B	112	628.6	1338.7				3	2,4,7,22,29,59,60,68,69
Cathedral Rapids Creek #4	6-197A	112	628.5	1338.8				3	2,4,7,22,29,59,60,68,69
Cathedral Rapids Creek #5	6-197	112	628.4	1338.9				3	2,4,7,22,29,60,68,69
Cathedral Rapids Creek #6	6-196	112	628.2	1339.0				3	2,4,7,22,29,59,60,68,69
Cathedral Rapids Creek #7	6-195	112	628.0	1339.2				3	2,4,7,22,29,60,68,69
Unnamed Creek	6-193.01	112	627.5	1339.8				2	2,5,6,10,26,29,54,57, 69,72
Unnamed Creek	6-192.01	111	626.2	1340.5				3	2,54
Sheep Creek	6-191	111	625.1	1342.2				3	3,5,6,7,8,10,22,29,54, 68,69,72
Unnamed Creek	5-190	111	623.5	1343.7				3	2,29,54
Robertson River	5-187	110	619.6	1347.6				3	3,5,6,7,8,9,10,17,22,26, 29,54,55,57,73,77
Unnamed Creek	5-185.03	110	617.2	1350.1				3	2,54
Unnamed Creek	5-185.02	110	617.0	1350.2				3	2,54
Unnamed Creek	5-185.01	109	615.1	1352.3				3	2,54
Bear Creek	5-185	109	609.9	1357.3				2	3,5,6,7,8,9,10,17,22,26,29, 54,55,59,60,69,72,73,77
Chief Creek	5-184	108	608.6	1358.6				2	3,5,6,7,8,9,10,17,22,26,29, 54,55,57,59,60,72
Unnamed Creek	5-183	108	605.4	1361.7				3	2,5,26,29,54
Unnamed Creek	5-182	108	605.2	1362.0				3	2,5,54
Unnamed Creek	5-181	107	603.1	1364.4				3	2,29,54,59,60,73
Sam Creek	5-180	107	601.6	1365.9				2	3,5,6,7,8,9,10,26,29,54
Unnamed Creek	5-179	106	598.4	1369.1				2	3,5,6,9,10,26,29,54,57 59,60,73
Berry Creek	5-178	106	596.2	1371.4				1	3,5,6,7,8,9,10,22,29,54,57, 59,60,69,72,73,77
Sears Creek	5-177	106	593.1	1374.4				1	3,5,6,7,8,9,10,17,22,29,54, 57,59,60,64,69,72,73,77
Unnamed Creek	5-176.01	105	590.6	1377.0				3	2
Dry Creek	5-176	105	589.5	1378.1				3	3,5,6,7,8,9,10,22,29,54,57, 59,60,68,69,72,73

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Johnson River	5-175	104	587.0	1380.5				3	3,5,6,7,8,9,10,17,22,26,29, 54,57,60,69,72,73,77
Little Gerstle River	5-174	103	579.3	1388.4				2	3,5,6,7,8,9,10,17,22,26,29, 54,72,73,77
Gerstle River	5-172	102	575.0	1393.0				2	3,5,6,7,8,9,10,17,22,26,29, 54,57,72,73
Sawmill Creek	5-171	100	563.8	1403.9				3	3,5,6,7,8,9,10,29,54
Rhoads Creek	5-170	100	560.1	1407.6				3	3,5,6,9,10,29,54
Granite Creek	5-169	99	558.4	1409.2				3	3,5,6,7,9,10,22,29,54
Tanana River	5-166	96	537.3		47	9215+00		1	3,5,11,13,15,16,27,29,32
Side Channel of Tanana River	5-165.01	95	536.7					1	3,11,13,42,43, 57,77
Shaw Creek	5-165	93	526.0		49	9789+15		1	3,5,11,29,30,57,65,77
Rosa Creek #1	5-164	93	525.8		49	9800+40		3	5,11,29,30
West Branch Keystone Creek	5-163	93	525.2		49	9830+70		3	5,11,29,30
Rosa Creek #2	5-162	92	519.8		50	10110+50		2	5,11,29,57
Rosa Creek #3	5-162	92	519.2		50	10142+74		2	5,11,29
Rosa Creek #4	5-162	92	518.9		50	10165+25		2	5,11,29
South Fork Minton Creek #1	5-161	92	518.0		51	10214+80		2	5,11,29,32,54,60,66
South Fork Minton Creek #2	5-161	92	517.4		51	10244+06		2	5,11,29,32,54,66
South Fork Minton Creek #3	5-161	92	517.0		51	10258+12		2	5,11,29,32,54,66
South Fork Minton Creek #4	5-161	92	516.3		51	10298+63		2	5,11,29,32,54,66
South Fork Minton Creek #5	5-161	92	516.0		51	10305+90		2	5,11,29,32,54,66
South Fork Tributary Minton Creek	5-161	92	515.8		51	10316+00		3	5,11,29,32,54,66
South Fork Minton Creek #6	5-161	92	515.8		51	10316+98		2	5,11,29,32,54,66
South Fork Minton Creek #7	5-161	91	515.5		51	10343+09		2	5,11,29,30,32,54,66
North Fork Minton Creek #1	5-161	91	515.4		51	10346+68		2	5,11,32,54
North Fork Minton Creek #2	5-161	91	514.8		51	10374+14		2	5,11,32,54
North Fork Minton Creek #3	5-161	91	514.5		51	10393+01		2	5,11,32,54
North Fork Minton Creek #4	5-161	91	514.4		51	10394+88		2	5,11,32,54
Gold Run Creek	5-160	91	512.7		51	10467+62		2	3,5,11,29,54
Small Creek	5-159.02	91	511.3		52	10561+41		3	11,54,57
Tributary to Small Creek	5-159.01	91	510.7		52	10589+47		3	11
Redmond Creek	5-159	90	505.7		53	10855+33		3	3,5,11,14,29,30,32,35,38, 54,57,77
Unnamed Tributary to Salcha River	4-158.03	89	502.8		53	11037+79		3	11,54
TAPS Slough	4-158.02	89	501.9		53A	2+00		2	11,54,55,57
Unnamed Slough	4-158.01	89	501.8		53A	7+50		1	11,55,57
Salcha River	4-158	89	501.5		53A	19+00		1	3,5,11,13,14,25,29,32,35,38

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Oxbow Slough	4-157.02	89	501.3		53A	33+00		3	11,54,57
Two-Nineteen Creek	4-157.01	88	497.6		54	223+50		2	11,54
Little Salcha River	4-157	88	496.5		54	281+71		3	3,5,11,13,29,31,38,57,77
Tributary to Little Salcha River	4-156.05	88	495.3		54	345+50		3	11,54
Tributary to Million Dollar Creek	4-156.04	88	493.9		54	417+00		3	11,29,31,54
Million Dollar Creek #1	4-156.03	87	491.5		55	545+00		2	5,11,29,31,64
Million Dollar Creek #2	4-156.02	87	491.2		55	558+60		2	5,11,29,57
Million Dollar Creek #3	4-156.01	87	491.0		55	568+00		2	5,11,29,57
Million Dollar Creek #4	4-156	87	490.6		55	592+00		2	5,11,29,31,57
French Creek #0	4-155	87	489.6		55	643+55		3	3,5,11,19,29,31,38,55,57,77
Knokanpeover Creek	4-154	86	486.4		56	809+40		2	3,5,11,19,29,31,57
French Creek #1	4-153	86	483.7		56	942+85		3	3,5,11,19,29,38,77
French Creek #2	4-152	86	483.0		56	993+69		3	3,5,11,19,29,38
French Creek #3	4-151	86	482.5		56	1018+95		3	3,5,11,19,29,38,77
French Creek #4	4-150	85	482.2		56	1035+43		3	3,5,11,19,29,38
French Creek #5	4-149	85	480.4		57	1125+18		3	3,5,11,19,29,38,57,77
Bear Lake Outlet	4-148.01	85	480.2		57	1134+40		3	11,31,54,57
Moose Creek #1	4-148	85	479.3		57	1188+02		1	5,11,29,31,38,54,57,77
Moose Creek #2	4-147	85	478.0		57	1250+70		1	5,11,29,31,38,54,57
Moose Creek #3	4-146	85	477.3		57	NA		1	5,11,29,31,38,54,57,77
Unnamed Creek	4-145.04	84	473.7		58	1495+15		2	11,54
Unnamed Creek	4-145.03	84	473.5		58	1505+00		2	11,54
Ess Shaped Slough	4-145.02	84	471.9		58	1570+00		2	11,31
Seventeen-twenty Slough	4-145.01	83	468.2		59	1720+20		3	11,31,54
Seventeen-thirty Slough	4-145	83	468.0		59	1730+50		3	11,29,31,54
Isolated Slough	4-144.01	83	465.9		59	1845+55		3	11,31,54
Chena River	4-144	83	465.8		59	1849+50		1	3,5,11,13,17,27,29,31,38,39
Steele Creek	4-143	82	463.6		60	1962+80		2	11,29,54,57
Engineer Creek	4-142	81	457.5		61	210+00		2	11,17,29,31,54,57
Goldstream Creek	4-141	81	454.7		61	336+01		2	3,5,11,17,29,54,57
Treasure Creek	4-140	80	448.6		62	659+43		3	3,5,11,17,29,54,57
Chatanika River	4-139	79	444.5		63	873+63		1	3,5,11,17,29,31,38

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Shocker Creek	4-138	79	443.7		63	914+00		3	5,11,29,54,57
Unnamed Tributary to Shocker Creek #1	4-137.06	79	443.5		63			3	54
Unnamed Tributary to Shocker Creek #2	4-137.05	79	443.4		63			3	54
Unnamed Tributary to Shocker Creek #3	4-137.04	79	443.3		63			3	54
Unnamed Tributary to Chatanika River #1	4-137.03	78	441.7		63	1025+70		3	11
Unnamed Tributary to Chatanika River #2	4-137.02	78	441.7		63	1027+70		3	11
Unnamed Tributary to Chatanika River #3	4-137.01	78	441.7		63	1032+20		3	11
Washington Creek	4-137	78	438.2		64	1209+62		1	1,3,5,11,17,29, 31,38,54,57,77
Unnamed Tributary to Washington Creek	4-136.01	78	438.0		64	1220+00		3	11
South Fork Aggie Creek	4-136	76	430.9		65	1595+00		3	1,3,5,11,17,29, 31,38,54,57
North Fork Aggie Creek	4-135	76	430.1		65	1635+00		3	1,3,5,11,17,29, 31,38,48,54,57
Tributary to Little Globe Creek	4-134.01	76	428.3		66	1740+00		3	11
Little Globe Creek	4-134	76	427.2		66	1759+00		3	11,17,29,67
Unnamed Tributary to Little Globe Creek	4-133.01	76	427.0		66	1796+00		3	11
Globe Creek	4-133	75	423.8		66	1966+75		3	1,3,5,11,17,29, 38,48,66
Unnamed Tributary to Globe Creek	4-132.02	75	423.4		67	1988+88		3	11,66
Unnamed Tributary to Tatalina River	4-132.01	74	420.0		67	2167+00		3	11,30,48
Tatalina River	4-132	74	419.0		67	2241+80		2	1,3,5,11,17,29, 48
Tributary of Slate Creek	4-131.01	73	415.0		68	2456+31		3	11
Slate Creek	4-131	73	414.9		68	2459+35		3	3,5,11,17,29, 30,38,48
Ski Jump Ramp Creek	4-130	73	413.1		68	2550+00		3	11,29
Wilber Creek	4-129	73	412.1		68-69	2608+00		3	3,5,11,17,29,48
Tributary of Wilber Creek	4-128.04	73	410.6		69	2666+35		3	11
Shorty Creek	4-128.03	72	407.0		69	2855+73		3	11
Tributary of Shorty Creek	4-128.02	72	406.8		69	2865+11		3	11
Tributary to Tolovana River	4-128.01	72	405.7		70	2924+55		3	11
Tolovana River	4-128	72	405.1		70	2957+90		2	1,3,5,11,13,17, 29,48,57,74
Unnamed Tributary to West Fork Tolovana River	4-127.01	71	402.0		70	3122+16		3	11
Lost Creek	4-127	71	398.6		71	104+33			3,5,11,17,29,30, 31,48

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Erickson Creek Tributary	4-126	70	394.3		72	337+66		3	3,11,29
Erickson Creek #1	4-125	69	390.9		72	513+62		3	3,5,11,17,29,30,31
Unnamed Lake Outlet	4-124.01	69	390.0		73	562+98		3	11
Erickson Creek #2	4-124	69	389.1		73	611+95		3	3,5,11,17,29,30,31, 48
Hess Creek Tributary	4-123.05	68	385.5		73	800+02		3	11,17
Hess Creek	4-123A.04	68	385.2		73,74W	820+00		2	1,3,5,11,17,29,31,48 70,74
Fish Creek	4-123.03	68	385.0		73	829+65		3	3,5,11,29,31,48
Unnamed Creek	4-123.02	68	381.0		74	1040+40		3	11
Unnamed Creek	4-123.01	68	380.4		74	1071+47		3	11
Unnamed Creek	4-123	67	379.9		74	1096+85		3	11,29
Unnamed Creek	3-122.05	67	378.8		75	1150+15		3	11,17
Unnamed Creek	3-122.04	67	378.3		75	1181+44		3	11
Hot Cat Creek	3-122.03	67	377.1		75	1242+94		3	5,11,17,31,48,61
Unnamed Creek	3-122.02	67	374.7		75	1367+33		3	11,17
Unnamed Creek	3-122.01	66	373.2		75	1447+20		3	11,17
Isom Creek #1	3-122	66	369.5		76	1642+50		3	3,5,11,29,30,31,48
Isom Creek #2	3-121.02	66	368.4		76	1549+50		3	3,5,11,17,29,30,31, 48
Isom Creek #3	3-121.01	66	369.4		76	1651+34		3	3,5,11,30,31,48
Tributary to Isom Creek	3-121	66	368.8		76	1682+08		3	11
Yukon River	3-120	64	360.0		77-78	58+00		1	1,3,5,11,13,17,20, 21,29,38,48
Burbot Creek	3-119	64	358.3		78	158+21	1HR168+10	3	5,11,20,21,29,48
Wood Chopper Creek	3-118	63	357.2		78	215+30	1HR215+20	3	5,11,20,21,29,48
Phelps Creek	3-117	62	351.7		79	508+70	1HR501+00	3	5,11,20,21,29,48,64
Unnamed Creek	3-112	61	344.3		80	899+15	1HR892+15	3	11,17,20,21,29
Fort Hamlin Hills Creek	3-111	61	342.9		81	971+50	1HR1011+08	3	5,11,20,21,29,20,48 61,70
Unnamed Creek	3-110.01	60	340.0		81	1123+25	1HR1158+45	3	11,20,21
North Fork Ray River	3-110	59	336.0		82	58+49	1HR1337+34	1	1,5,11,17,20,21,29 38,48,55,64,74,77
Fed Creek	3-109	59	332.0		82	270+25	1HR1600+24	3	11,29,30,48
South Branch West Fork Dall River	3-108	57	324.3		84	673+00	1HR2001+50	2	1,5,11,20,21,29,38, 48
Middle Branch West Fork Dall River	3-107	57	321.9		84	798+00	1HR2125+39	3	1,5,11,20,21,29,30 38,48
Smoky Creek	3-106.02	57	321.4		84	818+75	1HR2163+02	3	11,20,21
Unnamed Creek	3-106.01	56	319.7		85	915+75	1HR2245+45	3	11,20,21
Finger Mountain Creek	3-106	56	318.8		85	961+66	1HR2291+88	3	5,11,20,29,30,48
Olson's Lake Creek	3-105	55	315.3		85	1149+38	1HR2469+77	3	5,11,29,30,48,70
Caribou Mountain Lake	3-104	55	312.9		86	56+03	1HR2609+50	3	5,11,29,31,48
Kanuti River	3-103	54	309.7		86	231+00	1HR2777+75	2	1,3,5,11,13,17,20, 21,29,30,31,37,38, 67,74

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Netsch's Creek Tributary #1	3-102	54	307.7		87	331+60	1HR2875+90	3	11,29
Netsch's Creek Tributary #2	3-101	54	307.4		87	349+00	1HR2894+96	3	11,29
Netsch's Creek Tributary #3	3-100.01	54	307.0		87	370+80	1HR2944+05	3	11
South Fork Fish Creek	3-100	53	304.1		87	520+50	1HR3255	1	1,3,5,11,20,21,29,30 48,55,77
Middle Fork Fish Creek	3-99	53	303.1		87	577+90	1HR3255	2	1,3,5,11,20,21,29,30 48
Fish Creek	3-98	53	301.7		88W	653+50	1HR3255+12	2	1,3,5,11,17,20,21,29 30,34,37,38,48,64,67
Alder Mountain Creek	3-97	53	300.0		88W	742+50	2HR115+00	3	5,11,20,21,29,30,48
Pung's Crossing Creek #1	3-96.01	52	296.5		89	932+40	2HR363+36	3	5,11,20,21
Pung's Crossing Creek #2	3-96	52	296.5		89	931+40	2HR363+36	3	5,11,20,21,29
South Fork Bonanza Creek	3-95	52	292.8		89	1123+60	2HR550+59	1	1,3,5,11,17,20,21,29 30,31,34,37,38,55,77
Unnamed Bonanza Creek Channel	3-94.02	52	292.8		89	1128+50	2HR547	3	11,20,21
Oxbow Lake System	3-94.01	51	292.3		89	1148+00	2HR561+64	3	11,20,48
North Fork Bonanza Creek	3-94	51	291.2		89	1208+32	2HR606+69	2	1,3,5,11,17,20,21,29 30,31,34,38,48,67
South Fork of the Little Nasty	3-93	51	289.0		90	1327+15	2HR759+84	3	5,11,20,21,29,30,48 67
The Little Nasty	3-92	51	288.8		90	1340+25	2HR767+82	3	1,5,11,20,21,29,30, 48,61,64
Prospect Creek	3-91	50	284		91	1590+00	2HR1099+52	1	1,3,5,11,17,20,21,29 30,31,34,37,38,48,55 70,74,77
Little Piddler Creek	3-90.03	49	279		91	241+60	2HR1376+57	3	11,30
Jim River Side Channel #1	3-90.02	49	278.9		91	257+00	2HR1379+45	1	1,5,11,17,29,31,34, 48,55,62,64,74
Jim River Side Channel #2	3-90.01	49	278.0		92	272+49	2HR1425+40	1	1,5,11,17,29,31,34 48,55,62,74,77
Douglas Creek	3-89	49	277.2		92	330+00	2HR1470+34	3	1,3,5,11,17,20,21 29,34,48,62,74
Dee Creek	3-88	49	275.8		92	407+00	2HR1544+97	3	5,11,20,21,29,48, 62,74
Beaver Springs #1	3-87.02	49	275.5		92	435+84	2HR1557+06	1	11,20,21,55,62
Beaver Springs #2	3-87.01	49	275.5		92	436+73	2HR1565+32	1	11,20,21,55,62
Jim River Side Channel #3	3-87	49	274.9		92	453+50	2HR1579+80	1	1,3,5,11,13,17,20, 21,29,34,38,48,62,
Inlet to Grayling Lake	3-86.04	47	268.3		93	798+30	2HR1926+00	3	11,20,48
Avoided Lake Inlet	3-86.03	47	267.7		93	832+75	2HR1960	3	11,20
Grayling Lake Creek	3-86.02	47	267.3		93	849+00	2HR1949+14	3	11,20,21,48,70
Unnamed Creek	3-86.01	47	266.7		94	884+80	2HR2017	3	11,20
Abba-dabba Creek	3-86	47	265.2		94	963+28	2HR2098+18	1	1,5,11,20,21,29,48, 61,64,70,74,77
South Fork Koyukuk River	3-85	46	263.0		94-95	1073+00	2HR2206+88	1	1,3,5,11,13,17,20, 21,29,48
Cross Roads Creek #1	3-82.03	46	258.6		95	222+50	3HR129+23	3	11,20,21,29

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Cross Roads Creek #2	3-82.02	46	258.4		95	228+75	3HR129+58	3	11,20,21,29
Cross Roads Creek #3	3-82.01	46	258.4		95	232+25	3HR129+58	3	11,20,21,29
Cross Roads Creek #4	3-82	46	258.4		95	233+60	3HR129+58	3	11,20,21,29
Chapman Creek	3-81	46	257.2		96	295+17	3HR205+23	3	1,5,11,20,21,29,30,48
South Fork Windy Arm Creek	3-80	45	256.3		96	343+75	3HR255+64	3	1,11,20,21,29,20,48
North Fork Windy Arm Creek	3-79	45	254.9		96	417+25	3HR326+94	3	1,5,11,20,21,29,48,64,74
Unnamed Creek	3-78.01	45	254.1		96	458+70	3HR369+59	3	11,20,21
Trent's Trickle	3-78	45	253.0		96	518+39	3HR413+47	3	5,11,20,21,29,30,48 61,62,70
Jackson Slough East Channel #1	3-77.02	45	252.2		97	555+85	3HR452+15	3	5,11,34,48,61,62,64
Jackson Slough Cross Channel	3-77.01	44	252.0		97	570+70	3HR464+00	3	5,11,29,34,48,61,62 64,74
Jackson Slough East Channel #2	3-77	44	251.9		97	593+00	3HR483+00	3	5,11,34,48,61,62,64
Rosie Creek	3-74	44	249.4		97		3HR599+00	3	3,5,11,17,20,21,29, 31,48,74,77
First Creek #1	3-72.06	44	247.3		97		3HR727+14	3	11,20,21
First Creek #2	3-72.05	44	247.1		97		3HR727+14	3	11,20,21
East Fork Spring Slough	3-72.04	44	245.8		97-98		3HR776+84	3	5,11
Spring Slough #1	3-72.03	44	245.5		98		3HR783+98	3	5,11
Spring Slough #2	3-72.02	44	245.4		98		3HR790+14	3	5,11
Spring Slough #3	3-72.01	43	245.3		98		3HR797+60	3	5,11,48
Slate Creek	3-72	43	243.7		98	976+83	3HR876+86	2	1,3,5,11,17,20,21,29 31,34,38
Calf Creek	3-71	43	243.2		98	1004+75	3HR910+70	3	5,11,29,31,48
South Fork Clara Creek Overflow	3-70.01	43	243.0		98	1015+80	3HR925+49	3	5,11,29,31,48
Clara Creek Overflow	3-70	43	242.9		98	1019+50	3HR933+34	3	5,11,29,31,48.64
Clara Creek #1	3-69.01	43	242.6		98	1033+70	3HR941+85	3	5,11,17,29,31,34,48
Clara Creek #2	3-69	43	242.6		98	1036+20	3HR941+85	3	5,11,17,29,31,34,48
Equisetum Creek	3-68	43	242.3		98		3HR944	3	5,11,29,48,64
Organo Creek	3-67	43	242.2		98		3HR946	3	5,11,29,31,34,48,62 64,70
Unnamed Creek	3-65.01	43	240.8		98		3HR1037+00	3	11
South Fork Mary Angel Creek	3-65	43	240.4		98-99	4+30	3HR1052+04	3	5,11,29,31,48,64
Mary Angel Creek	3-63.04	43	240.3		99	8+40	3HR1055+57	3	5,11,34,48,61,64,70, 74
South Fork Sharon Creek	3-63.03	43	239.8		99	38+70	3HR1076+29	3	5,11
Sharon Creek #1	3-63.02	43	239.7		99	45+00	3HR1097	3	5,11,31,48,61
Sharon Creek #2	3-63.01	42	239.4		99	55+00	3HR1097	3	5,11,31,48,61
Marion Creek	3-63	42	239.3		99	59+85	3HR1114+14	3	1,3,5,11,20,21,29 31,34,38,48,74,

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
North Marion Creek Overflow #1	3-62.04	42	239.2		99	68+60	3HR1115	3	11
North Marion Creek Overflow #2	3-62.03	42	239.2		99	70+75	3HR1120+33	3	11
North Marion Creek Overflow #3	3-62.02	42	239.0		99	78+00	3HR1122+90	3	11
Pence's Pond Creek	3-62.01	42	238.9		99	85+50	3HR1143+81	3	5,11,20,21,31,48
Confusion Creek	3-61.02	41	233.5		100	369+00	3HR1439+92	2	5,11,20,31,48,77
North Fork Confusion Creek	3-61.01	41	233.0		100	91+70	3HR1443	3	5,11,20,31,48
Minnie Creek	3-61	41	231.8		100	454+46	3HR1519+34	3	1,3,5,11,17,20,21, 29,34,38,48
North Fork Koyukuk River	2-60.19	41	231.0		100	495+50	3HR1588+80	1	1,3,5,11,13,17,20,21
Union Gulch Creek #1	2-60.18	41	230.7		100	516+65	3HR1600	3	5,11,20,21,31
Union Gulch Creek #2	2-60.17	41	230.2		100	536+00	3HR1600	3	5,11,20,21,31,48,
Confederate Gulch Creek	2-60.16	41	229.3		100	590+75	3HR1655+00	3	11
North Fork Confederate Gulch Creek	2-60.15	41	228.8		100	607+90	3HR1675	3	11,48
Hammond River	2-55	40	228.1		101	635+60	3HR1711+42	2	1,3,5,11,17,20,21, 29,37,48,67
Middle Fork Koyukuk River Anabranch	2-60.14	40	227.5		101		3HR1823	3	1
Middle Fork Koyukuk River	2-60.13	40	227.1		101			1	1,5,11,13,20,21,29, 38,48
Richardson's Slough #1	2-60.12	40	225.2		101	778+30	3HR1861+03	3	5,11,48
Richardson's Slough #2	2-60.11	40	225.2		101	781+90	3HR1865+68	3	5,11,48
Over Creek #1	2-60.10	40	224.8		101	796+70		3	1,11,48
Over Creek #2	2-60.09	40	224.8		101	800+50		3	1,11,48
Over Creek #3	2-60.08	40	224.7		101	803+10	3HR1891+44	3	1,11,48
Over Creek #4	2-60.07	40	224.7		101	805+39	3HR1896+30	3	1,11,48
Alignment Slough #1	2-60.06	40	222.1		101	836+40	3HR1945+13	3	5,11,48,61,62
Alignment Slough #2	2-60.05	40	222.0		101	841+20	3HR1945+13	3	5,11,48,61,62
Alignment Slough #3	2-60.04	40	221.9		101	845+28	3HR1945+13	3	5,11,48,61,62
Alignment Slough #4	2-60.03	40	221.8		101	849+30	3HR1945+13	3	5,11,48,61,62
Alignment Slough #5	2-60.02	40	221.7		101	855+70	3HR1945+13	3	5,11,48,61,62
Alignment Slough #6	2-60.01	40	221.6		101	860+00	3HR1945+13	3	5,11,48,61,62
Nugget Creek	2-60	40	221.1		101	886+60	3HR1969+70	3	5,11,20,21,34,38
Wolf Pup Creek	2-59	39	220.7		102	906+50	3HR1990+56	3	5,11,20,34,48
Sheep Creek	2-53	39	220.2		102	933+00	3HR2018+85	3	5,11,20,21,29,34, 48
Cushing Creek	2-52.01	39	219.9		102	948+60	3HR2033+06	3	5,11,20,48
Gold Creek	2-52	39	219.4		102	976+00	3HR2059+11	3	3,5,11,17,20,21,29 31,34,48,64
Linda Creek	2-51	39	218.8		102	1001+18	3HR2087+21	3	5,11,17,20,21,29,31 34,48
Valve Site Creek	2-49.07	39	216.6		102	1121+05	3HR2203+04	3	11,20
Rocky Creek #1	2-49.06	38	214.4		103	1250+60	3HR2326	3	11,64
Rocky Creek #2	2-49.05	38	214.0		103	1258+30	3HR2326	3	11,64
Rocky Creek #3	2-49.04	38	213.8		103	1269+10	3HR2326	3	11,64
Sukakpak Creek	2-49.03	38	213.1		103	1305+00	3HR2373+80	3	5,11,20,21,31,61,62

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
North Fork Sukakpak Creek	2-49.02	38	212.7		103	1332+20	3HR2447+70	3	11,20,21
Unnamed Creek	2-49.01	38	212.3		103	1353+23	3HR2440	3	11
Middle Fork Koyukuk River	2-49	38	212.2		103	1361+45	3HR2460+47	1	1,3,5,11,13,17,20,21 29,31,38,48,74
Way Back Creek	2-48.04	38	211.3		103	1408+00	3HR2485	3	11,48
Millie's Meander	2-48.03	38	211.0		103	1418+76	3HR2489+68	3	11,31,48,64,70
Unnamed Creek	2-48.02	38	210.6		103	1444+19	3HR2528+00	3	11,20
Eva's Alv	2-48.01	38	209.4		103	1507+08	3HR2583+84	3	11,20,48
Dietrich River	2-48	38	209.0		104	1526+55	3HR2604+66	1	1,3,5,11,17,20,21,29 31,37,38,48,61,62,77
1415 Lake Inlet	2-46.01	37	208.4		104	1556+18	3HR2631+80	3	11
Brockman Creek	2-46	37	207.7		104	1581+87	3HR2662+07	2	11,20,21,29,48,64
Steitz Lake Outlet	2-45.04	37	206.2		104	1607+52	3HR2703	3	11,20,21,48,64,70
South Branch Airport Creek	2-45.03	37	206.7		104	1637+70	3HR2728+26	3	11,20
Middle Tributary Airport Creek	2-45.02	37	206.5		104	1644+93	3HR27+36+41	3	11,20
Airport Creek	2-45.01	37	205.8		104	1681+92	3HR2775+58	3	11,20,48
Disaster Creek	2-45	37	205.1		104	1719+41	3HR2809+90	3	3,5,11,20,29,48,64
Unnamed Creek	2-43.07	37	204.7		104	1736+51	3HR2826+88	3	11
Trap Slough	2-43.06	37	204.6		104	1747+44	3HR2847+57	3	11
Dietrich River	2-43.05	37	204.2		104	1756+00		1	1,3,5,11,17,20,21,29 31,37,38,48
Dietrich River	2-43.04	37	205.7		104			1	1,3,5,11,17,20,21,29 31,37,38,48,61,62
Sahr's Slough	2-43.03	37	205.6		104	1795+99	3HR2889+08	3	5,11
Meadow Slough	2-43.02	37	205.4		104	1801+00	3HR2892+78	3	11
Unnamed Creek	2-43.01	37	204.8		104	1831+09	3HR2925+28	3	11
Snowden Creek	2-43	36	204.1		105	1870+20	3HR2959+42	3	3,5,11,17,20,21,29, 34,48,64
Unnamed Creek	2-41.05	36	203.6		105	1897+49	3HR2978+20	3	11
Snowden Pond Outlet	2-41.04	36	203.4		105	1906+65	4HR1984	3	5,11,20,
Numbers Lake Creek	2-41.03	36	202.7		105	1941+95	4HR3026+13	3	1,5,11,20,48
Dunder's Dribble	2-41.02	36	202.6		105	1947+73	4HR3036	3	5,11,31,48
Stanzla Creek	2-41.01	36	202.5		105	1952+70	4HR3060	3	11,20,31,48
Ugh Creek	2-41	36	201.6		106	2123+20	4HR2333+30	3	11,20,48
Unnamed Creek	2-39.01	36	199.2		106	2123+20	4HR2333+30	3	11
Steep Creek	2-39	35	197.2		106	2235+00	4HR3309+86	3	11,29,30
Buff Creek	2-38	35	195.8		106	52+10	4HR3375+85	3	11,29,30
Burger's Bayou	3-36.02	35	195.5		106	72+50	4HR3414+01	1	1,5,11,20,30,48,77
Drainage Material Site #106	2-36.01	35	195.3		106		4HR3447	1	1,11,30,48,64
Unnamed Creek	2-36	35	193.0		107	212+40	4HR3543+02	3	11

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Dietrich River Floodplain	2-34.06	34	192.4-191.3		107	248+79 - 302+00	4HR3579 - 257+00	1	1,3,5,11,30,31,62 77
Beaver Dam Brook #1	2-34.05	34	191.7		107	295+10	4HR255+58	3	TT,20,21,30,64
Beaver Dam Brook #2	2-34.04	34	191.1		107	321+32	4HR280+97	3	11,30
Beaver Dam Brook #3	2-34.03	34	190.9		107	329+88	4HR290+66	3	TT,30
Beaver Dam Brook #4	2-34.02	34	190.8		107	334+05	4HR293+50	3	TT,30
Beaver Dam Brook #5	2-34.01	34	190.7		107	336+75	4HR296+15	3	TT,30
Nutirwik Creek	2-34	34	189.8		107	375+54	4HR343+00	3	3,5,11,17,20,21,30 38,48,64,67
Dietrich River Floodplain	2-32.06	34	189.8-188.1		107	379+39 - 457+37	4HR349+31 - 481+82	1	1,3,5,11,20,21,48, 62,77
Unnamed Spring	2-32.05	34	187.4			496+00		1	41
Dietrich River	2-32.04	33	187.4-187.2		107	500+36 - 513+36		1	1,3,5,11,21,31
Dietrich River Floodplain	2-32.03	33	187.0-186.4		108	525+75 - 556+00	4HR503+72 - 547+00	1	1,3,5,TT,21,62
Unnamed Spring	2-32.02	33	185.9		108		4HR553+73	1	30,40,41,64
Dietrich River Floodplain	2-32.01	33	186.0-184.9		108	578+00 - 621+69		1	1,3,5,11,21,62,77
Oskar's Eddy	2-31	33	184.3		108	662+80	4HR632+98	3	5,11,30
Unnamed Creek	2-30.02	33	184.1		108	675+00	4HR649+00	3	11,20,30
Bear Track Creek	2-30.01	33	183.6		108	705+50	4HR678+00	3	TT,20,30
Dietrich River Floodplain	2-29.03	33	183.3-182.9		108			1	1,3,5,11,20,30,62
Dietrich River Floodplain	2-29.02	33	182.4-181.1		109			1	1,3,5,11,20,30,62
Andy's Creek	2-29.01	32	180.9		109	840+52	4HR817+50	3	11,20,21,30,48
West Fork of North Fork Chandalar River	2-29	32	179.0-178.7		109	945+23 - 957+00		1	1,3,5,11,20,21,30 48,64,77
West Fork of North Fork Chandalar River Floodplain	2-28	32	177.3-176.1		109	1030+00 - 1093+00		2	1,3,5,11,20,21,30, 42,64,77
West Fork of North Fork Chandalar River Floodplain	2-28	31	174.6-174.2		109	55+00 - 78+72		2	1,3,5,11,20,21,30 42,64,77
Atigun River Floodplain	2-27	30-31	171.0-165.1		110-112	247+32	4HR1360-5HR431+54	3	1,3,5,TT,30,31,48 67
Unnamed Creek	2-26	29	162-161		111		5HR520+00	3	11
Unnamed Creek	2-25.03	29	162-161		111-112		5HR541+66	3	11
Unnamed Creek	2-25.02	29	162-161		112		5HR550+80	3	11
Unnamed Creek	2-25.01	29	162-161		112		5HR552+37	3	11
Trevor Creek	2-25	29	159.8		112	837+00	5HR709+72	3	11,48,30,64,70
Tyler Creek #1	2-24.03	29	159.3		112	871+00	5HR717+90	3	11,48,30
Tyler Creek #2	2-24.02	29	159.0		112	878+65	5HR717+90	3	TT,48,30
Tyler Creek #3	2-24.01	29	159.0		112	881+00	5HR717+90	3	TT,48,30
Roche Moutonee	2-24	28	153.3		113	1170+91	5HR1053+28	3	3,11,30,48,57,62 64
One-one-three Creek	2-23.03	28	153.2		113	1176+95		3	11,62
Mainline Spring	2-23.02	27	152.2		113	1226+50	5HR1097	3	11,30,48,57,62,64 77
Holdon Creek	2-23.01	27	151.5		114	30+44	5HR1176+47	3	TT,30,48,62,64
Vanish Creek	2-23	27	151.4		114	35+24	5HR1161	3	TT,30,48,62,70
Unnamed Creek	2-22.05	27	151.3		114	38+70	5HR1164	3	TT
Tad Creek	2-22.04	27	151.1		114	44+00	5HR1169	3	11
Tee Lake Outlet #1	2-22.03	27	148.9		114	153+63	5HR1280+85	3	1,5,11,30,31,48,62 64,70
Tee Lake Outlet #2	2-22.02	27	148.9		114	155+29	5HR1280+85	3	1,5,11,30,31,48,62 64,70

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Mosquito Lake	2-22.01	27	148.9		114		5HR1334	1	11,30,48,57
Atigun River	2-22	27	147.6		114	20+94	5HR1364+44	3	1,3,5,11,31,48,77
Jill Creek	1-21.11	25	140.7		115	380+60	6HR229+00	2	11,48,64
Jill Creek Tributary	1-21.10	25	140.4		115	395+24	6HR234+75	2	11,48
Ed Creek	1-21.09	25	140.0		115	421+74	6HR436+25	3	11,30,48
Mack Creek	1-21.08	25	139.6		115	438+29	6HR452+00	3	11,30,48
Terry Creek	1-21.07	25	139.1		115	466+12	6HR490+00	3	11,30,48,64
Moss Creek	1-21.06	25	138.6		115	494+00	6HR500+41	3	11,30,48
Hallock Creek	1-21.05	25	138.4		115	504+27	6HR512+00	3	11,30,48
Yan Creek	1-21.04	25	136.0			629+06	6HR641+00	3	11,30,48
Becky Creek #1	1-21.03	24	134.2		116	721+63	6HR684	3	1,11,30,48,64
Becky Creek #2	1-21.02	24	132.8		116	797+80	6HR984	3	1,11,30,48,64
Holt Creek	1-21.01	24	132.6		116	804+36	6HR985	3	11,30,48
Kuparuk River	1-21	24	131.9		117	842+00	6HR986+50	2	1,3,5,11,29,30,36,48,64,67
East Fork Kuparuk River	1-20.01	23	130.4		117	921+55	6HR911+80	3	5,11,30,48,64
Toolik River	1-20	23	129.5		117	968+30	6HR948+50	3	3,5,11,29,30,48,64
East Fork Toolik River	1-19.01	23	129.4		117	973+30	6HR970+25	3	11,48
Oksrukuyik Creek	1-19	22	122.7		118	1325+64	6HR1285+32	3	1,3,5,11,29,30,48,57,64
Shifish Creek #1	1-18.04	22	121.3		118	1395+51		3	11,30,48
Shifish Creek #2	1-18.03	22	120.5		119	1441+26		3	11,30,48,57
Thiele's Trickle	1-18.02	21	119.1		119	1512+60	6HR1518	3	1,11,30,48
Lower Oksrukuyik Creek #1	1-18.01	20	109.5					3	1,11,30,48,57,64,70,77
Lower Oksrukuyik Creek #2	1-18	20	109.4					2	1,11,30,48,64,70,77
Unnamed Creek	1-17.02	20	109.2		120	911+80		3	11
Unnamed Creek	1-17.01	20	108.9		120	924+50		3	11
Rudy Creek	1-17	19	108.5		120	947+99	6HR2153	3	3,11,29,30,48
Bassett Creek	1-16.03	19	106.9		121	1029+20	6HR2228+14	3	11,30,48
Dennis Creek	1-16.02	19	106.8		121	1033+60	6HR2234+80	3	11,30,48
Climb Creek	1-16.01	19	106.3		121	1060+34	6HR2262+60	3	11,30,48,64
Poison Pipe Creek	1-16	19	106.0		121	1077+10	6HR2318+92	3	11,29,30,48
Polygon Creek	1-15	19	105.1		121	1125+00	6HR2351+97	3	11,30,48,64
Gustafson Gulch	1-14	18	102.2		122	1280+00	6HR2517+85	3	11,30,48,63
Arthur Creek	1-13	18	101.8		122	1297+50	6HR2536+20	3	11,29,30,48,63,64
Sagavanirktok River Side Channel	1-12.05	18	99.4		122	1424+79	6HR2657+20	3	11,48,64
Sagavanirktok River Side Channel	1-12.04	18	99.0		122	1445+85	6HR2684+43	3	11,48
Clark's Lake	1-12.03	17	98.4-98.2		122	1481+00-1489+28	6HR2770+86	1	11,30,48,57
Stump Creek	1-12.02	17	98.0		122	1499+00	6HR2770+86	3	11,30,48,57,63
Lori Creek	1-12.01	17	93.0		123	1719+50	6HR2974+15	3	11,30,48,63,70
Charlotte Creek	1-12	16	91.0		123		6HR3083+19	3	11,29,64
Happy Valley Camp Creek	1-11	16	87.3		124		6HR3259+77	3	3,5,11,29,48,63,64
Milke Creek	1-10	16	86.6		124		6HR3296+20	3	3,11,29,48,63,64
Stout Creek	1-9	15	83.1		124		6HR3471+69	3	11,48,64,70
Sagavanirktok River Side Channel	1-8.03	15	81.9-81.5		125	469+75		3	11,30,48
Sagavanirktok River Side Channel	1-8.02	15	81.9-81.5		125	489+35		3	11,30,48
Sagavanirktok River Side Channel	1-8.01	15	81.9-81.5		125	492+70		3	11,30,48
Spoiled Mary Creek	1-8	15	81.5		125	493+95	6HR3535+62	3	11,30,48

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Sagavanirktok River Side Channel	1-7.11	14	79.2		125	616+70		3	11,48
Sagavanirktok River Side Channel	1-7.10	14	78.8		125	632+50		3	11,48
Sagavanirktok River Side Channel	1-7.09	14	78.7		125	637+00		3	11,48
Sagavanirktok River Side Channel	1-7.08	14	78.6		125	643+50		3	11,48
Sagavanirktok River Side Channel	1-7.07	14	78.2		125	666+00		3	11,48
Sagavanirktok River Side Channel	1-7.06	14	77.7		125	696+00		3	11,48
Sagavanirktok River Side Channel	1-7.05	14	77.7		125	697+50		3	11,48
Sagavanirktok River Side Channel	1-7.04	14	77.3		125	714+00		3	11,48,57
Sagavanirktok River Side Channel	1-7.03	14	77.0		125	734+30		3	11,48,57
Sagavanirktok River Side Channel	1-7.02	14	76.7		125	747+12		3	11,48,57
Sagavanirktok River Side Channel	1-7.01	14	75.9		126	790+40		3	11,48
Mark Creek	1-7	14	75.8		126	791+40	6HR3840+41	3	3,11,29,30,48,63
Unnamed Creek	1-5.49	13	69.2		126W		6HR4195+99	3	11,42,43
Unnamed Creek	1-5.48	12	63.9		126W		6HR4481+00	3	11,42,43
Wood Creek #1	1-5.47	11	59.0		128	210+92	7HR486+16	3	11,30,64
Wood Creek #2	1-5.46	11	58.9		128	215+96		3	11,30,48,64
Wood Creek #3	1-5.45	11	58.5		129	233+50		3	11,30,48
Wood Creek #4	1-5.44	11	58.4		129	242+80		3	11,30
Wood Creek #5	1-5.43	11	58.3		129	246+20		3	11,30
Wood Creek #6	1.5.42	11	58.1		129	258+60		3	11,30
Wood Creek #7	1-5.41	11	58.0		129	265+76		3	11,30
Wood Creek #8	1-5.40	11	57.7		129	281+50		3	11,30,48
Wood Creek #9	1-5.39	11	57.1		129	322+66		3	11,30,48,64
Wood Creek #10	1-5.38	10	56.5		129	355+07		3	11,30
Wood Creek #11	1-5.37	10	56.4		129	360+60		3	11,30
Wood Creek #12	1-5.36	10	55.8		129	395+41		3	11,30,48
Extension Creek #1	1-5.35	10	55.4		129	410+52		3	11,30,48
Extension Creek #2	1-5.34	10	55.4		129	412+57		3	11,30,48
Extension Creek #3	1-5.33	10	55.1		129	430+57		3	11,30
Extension Creek #4	1-5.32	10	55.1		129	432+00		3	11,30,48
Extension Creek #5	1-5.31	10	53.9		129	492+35		3	11,30,48
Extension Creek #6	1-5.30	10	53.8		129	499+16		3	11,30,48
Extension Creek #7	1-5.29	10	53.2		129	531+00		3	11,30,48
Extension Creek #8	1-5.28	10	53.0		129	539+10		3	11,30
Unnamed Pond	1-5.27	9	50.0		130	702+00		3	11
Ghost Creek #1	1-5.26	9	49.5		130	728+68		3	11,30,48
Ghost Creek #2	1-5.25	9	49.3		130	736+81		3	11,30,48
Ghost Creek #3	1-5.24	9	48.9		130	756+49		3	11
Ghost Creek #4	1-5.23	9	48.7		130	768+86		3	11
Ghost Creek #5	1-5.22	9	48.0		130	804+68		3	11,30,48
Ghost Creek #6	1-5.21	9	47.6		130	826+22		3	11,30,48
Ghost Creek #7	1-5.20	9	47.5		130	831+23		3	11,30,48
Ghost Creek #8	1-5.19	9	47.3		130	843+08		3	11
Ghost Creek #9	1-5.18	9	47.2		130	846+16		3	11
Ghost Creek #10	1-5.17	9	47.1		130	853+25		3	11

APPENDIX II. (cont'd)

Waterbody	NPSI	NPAS	NPMP	AHMP	Alyeska AS	Alyeska Pipe Sta.	Haul Road Sta.	Winter Criteria	Data Source
Ghost Creek #11	1-5.16	9	46.7		131	871+81		3	11,30,48
Ghost Creek #12	1-5.15	9	46.3		131	892+55		3	11,30,48,64
Ghost Creek #13	1-5.14	9	46.1		131	905+20		3	11,30,48
Ghost Creek #14	1-5.13	8	45.7		131	924+58		3	11
Ghost Creek #15	1-5.12	8	45.6		131	937+85		3	11,30,48
Ghost Creek #16	1-5.11	8	45.3		131	957+04		3	11,30,48
Ghost Creek #17	1-5.10	8	45.1		131	958+00		3	11
Sagavanirktok River Side Channel	1-5.09	8	43.5		131	1042+70		3	11,43,48
Sagavanirktok River Side Channel	1-5.08	8	42.9		131	1076+42		3	11,43,48
Sagavanirktok River	1-5.07	8	42.6		131	1095+00		3	11,43,48
Sagavanirktok River	1-5.06	8	42.4		131	1106+70		3	11,43,48
Silvia Creek	1-5.05	7	38.4		132	1316+45	7HR1624+77	3	11,30,48
Unnamed Pond	1-5.04	7	38.1		132			3	11,43
Sagavanirktok River Side Channel	1-5.03	7	37.9		132	4822+81	7HR1655+59	3	11,30,48
Sagavanirktok River Side Channel	1-5.02	7	37.9		132	4827+89		3	11,30,43,48
Unnamed Creek	1-5.01	7	35.4		132	4951+44		3	11,30,48
Sagavanirktok River Floodplain	1-5	6-7	35.4-32.7		132-133	4951+44-5103+20		3	11,30,48
Sagavanirktok River Side Channel	1-4.05	6	30.6		133	5211+48		3	11,43,48
Sagavanirktok River Side Channel	1-4.04	6	30.5		133	5215+30		3	11,43,48
Sagavanirktok River Side Channel	1-4.03	6	30.1		133	5238+76		3	11,43,48
Sagavanirktok River Side Channel	1-4.02	6	30.0		133	5243+53		3	11,43,48
Sagavanirktok River Side Channel	1-4.01	6	29.9		133	5251+05		3	11,30,42,48
Sagavanirktok River Floodplain	1-4	5	27.3-25.5		134	5396+10-5459+93		1	11,30,43,48,77
Unnamed Creek	1-3.02	5	23.0		135	806	7HR2482+36	3	11
Unnamed Lake	1-3.01	4	17.2		137			3	11
Little Putuligayuk River	1-3	2	10.2			1478+52		3	11,48,57
Pump Station #1 Drainage Ditch	1-2	1	4.8					3	42,43,48
Putuligayuk River	1-1	1	3.2					3	27,42,43,48,57

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