

FISHERY DATA SERIES NO. 55

ANNUAL SUMMARY OF STATEWIDE INSTREAM FLOW  
RESERVATION APPLICATIONS<sup>1</sup>

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## ABSTRACT

This report summarizes the activities performed during the second year of the Instream Flow program.

Between 1 July 1987 and 30 June 1988 (FY 88), ten instream flow analyses were completed. Instream flow reservation applications were submitted to and accepted by the Alaska Department of Natural Resources (ADNR) for the Little Susitna River, Chena River (two reaches), Cottonwood Creek, Fish Creek (two reaches), Meadow Creek, Campbell Creek, Sawmill Creek, and Ketchikan Creek by the Alaska Department of Fish and Game (ADF&G). To date, five of the six FY 87 ADF&G instream flow reservation requests submitted to the ADNR have been adjudicated and granted: Terror River, Willow Creek, Rabbit Creek, Little Rabbit Creek, and Little Survival Creek. The remaining FY 87 application for instream flows for a reach within the Little Susitna River and a portion of the applications submitted this fiscal year will probably be adjudicated during FY 89.

Approval of the five FY 87 instream flow water rights applications validates the methods employed by the ADF&G to meet legal requirements for quantifying instream flows under Alaskan law.

KEY WORDS: instream flow, flow reservation, Tennant Method, Montana Method, Willow Creek, Little Susitna River, Rabbit Creek, Little Rabbit Creek, Little Survival Creek, Terror River, Chena River, Cottonwood Creek, Fish Creek, Meadow Creek, Campbell Creek, Sawmill Creek, Ketchikan Creek.

## INTRODUCTION

This report summarizes Fiscal Year (FY) 1988 activities completed during the second year of operation of the Statewide Instream Flow program (1 July 1987 to 30 June 1988).

The State of Alaska has abundant and diversified sport fisheries which are of considerable value to fishermen. In 1986, for example, an estimated 360,000 anglers took 1.7 million household trips, fishing 2.1 million angler days to harvest 3.2 million fish (Mills 1987). These values represent significant increases over those noted in previous years (Mills 1979-1986).

Increases in private and commercial developments such as hydroelectric, recreational, mining, and agricultural projects; and residential and commercial construction, have contributed to changes in both the riparian and instream habitat of important sport fishing areas. These developments will negatively impact the production of fish which use these areas unless sufficient instream flows and other important habitat characteristics are maintained.

An instream flow is defined as the quantity of water that occurs within a stream channel at a specific location during a given time period. In 1980, the Alaska State Legislature enacted the Instream Flow Bill (HB 118) which allows instream flows to be legally reserved (AS 46.15.03, 46.15.145) for the protection of fish and wildlife habitat, migration, and propagation, or other specified uses. Regulations to implement the law were adopted by the Alaska Department of Natural Resources (ADNR) in September 1983 and forms required to file applications for instream flows were made available by the ADNR in November 1983.

To reserve instream flows, an application containing supporting data and analyses that substantiate the flows being requested must be submitted to the ADNR.

Prior to July 1986, the Alaska Department of Fish and Game (ADF&G) had insufficient personnel and financial resources to establish a formal program to collect and/or synthesize and analyze data that are necessary to obtain instream flow reservations for the protection of sport fish or other resources. However, a portion of supplemental funding received by the ADF&G in FY 87 under the recently passed Wallop-Breaux federal legislation allowed for the initiation of an instream flow program in the Statewide Research and Technical Services Unit of the Division of Sport Fish. Six instream flow reservation applications were submitted to and accepted by the ADNR during the first year of the ADF&G instream flow program. To date, five of them have been adjudicated (administrative process to determine whether to approve, modify, or deny an instream flow reservation request) and granted.

The goal of this program is to protect the instream and related habitat of sport fish species by reserving sufficient instream flows.

The objective of the program for FY 88 was to apply for instream flow reservations for the protection of sport fishery resources in a minimum of six rivers of the state.

The streams selected during FY 88 were the Little Susitna River, Chena River (two reaches), Cottonwood Creek, Fish Creek (two reaches), Meadow Creek, Campbell Creek, Sawmill Creek, and Ketchikan Creek (Figures 1-11).

## METHODS

In Alaska, specific methods are not designated or required for supporting an instream flow reservation. The burden of proof for selecting a method and providing hydrological and biological data required to support an application for an instream flow reservation is placed upon the applicant (ADNR 1985; Estes and Harle 1987). A modification of the Tennant Method (Tennant 1972) was employed in FY 88 to apply for instream flows. The selection of this method (also referred to as the Montana Method in earlier literature) was based on the philosophy that any valid instream flow method or combination of methods could be used to generate instream flow recommendations if hydrological data were calibrated to the site or area studied and fish habitat criteria were adjusted to the species/life phases of fish found in the vicinity of the targeted water body (Estes 1984). To date, four FY 87 ADF&G applications to reserve instream flows that were based upon the Tennant analysis have been granted by the ADNR, thus validating its use.

The choice of this method was also based on the availability of data, previous analyses, and financial resources. Accordingly, the Tennant Method was considered the most cost effective approach for recommending a flow regime for the stream reaches selected in FY 88.

The Tennant Method was developed by Tennant (1972, 1976). It has been successfully tested in court, requires minimal expenditures of resources and can be used with limited or extensive hydrological and fishery data bases. The Tennant Method is considered one of the simplest techniques for selecting or qualitatively evaluating instream flows for fish and wildlife. Eight flow classifications were established by Tennant by analyzing a series of field measurements and observations. Each is assigned a percentage or percentage range of the average annual flow (QAA). Seven of the classifications characterize habitat quality for fish and wildlife and the eighth provides for a flushing flow. The percentages of QAA for habitat quality range from <10% (Severe Degradation) to 60%-100% (Optimum Range). The flushing flow classification equals 200% of the QAA. Research by Estes (1984), however, suggests the flushing flow value should be increased to 400% or more of the QAA for a duration of three to seven days.

The Tennant Method requires that the QAA be calculated from an existing or synthesized data base. A flow recommendation is established by selecting the desired classification and multiplying the QAA by the corresponding percentage or percentage range.



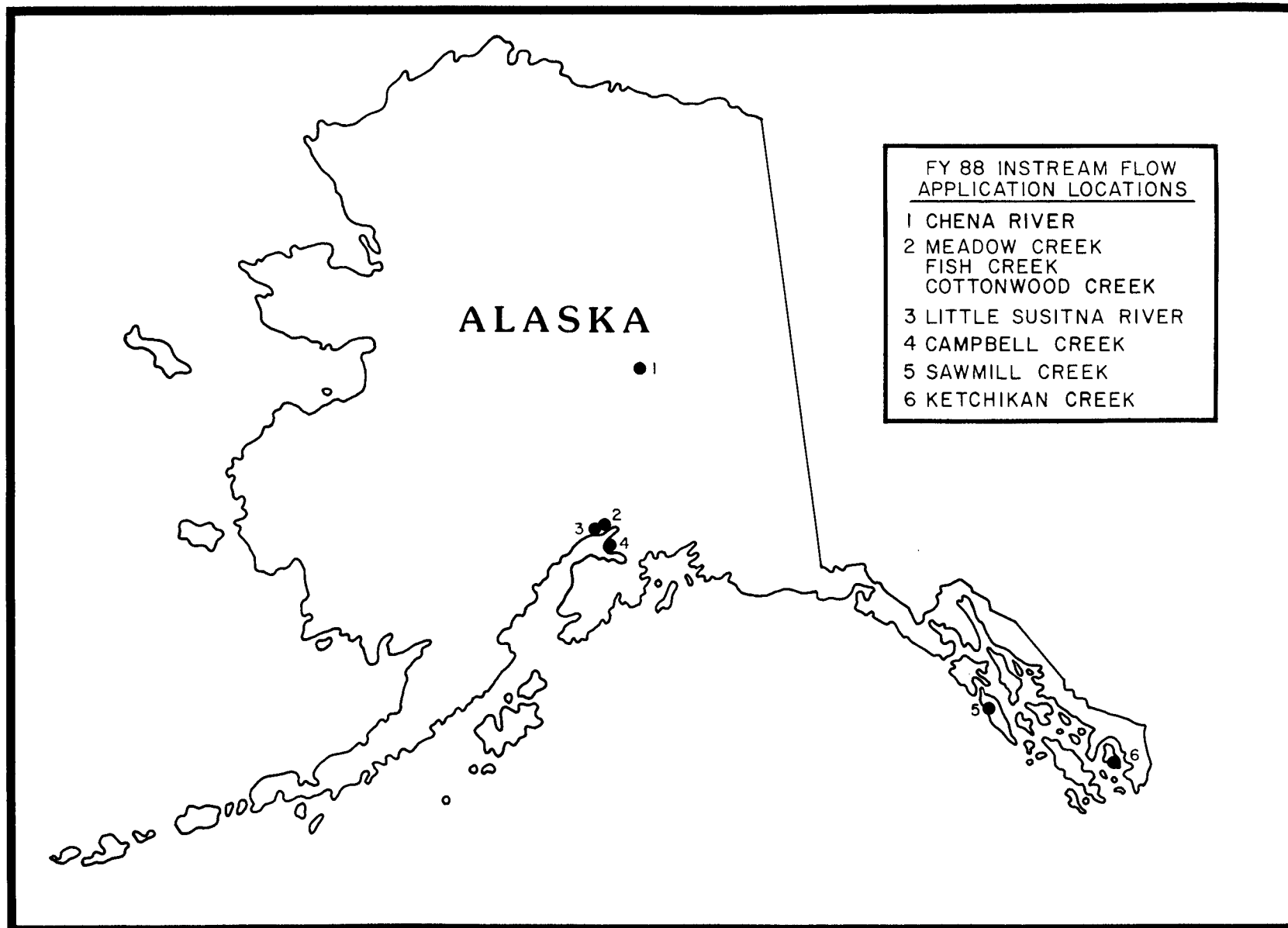


Figure 1. FY 88 instream flow reservation application locations.

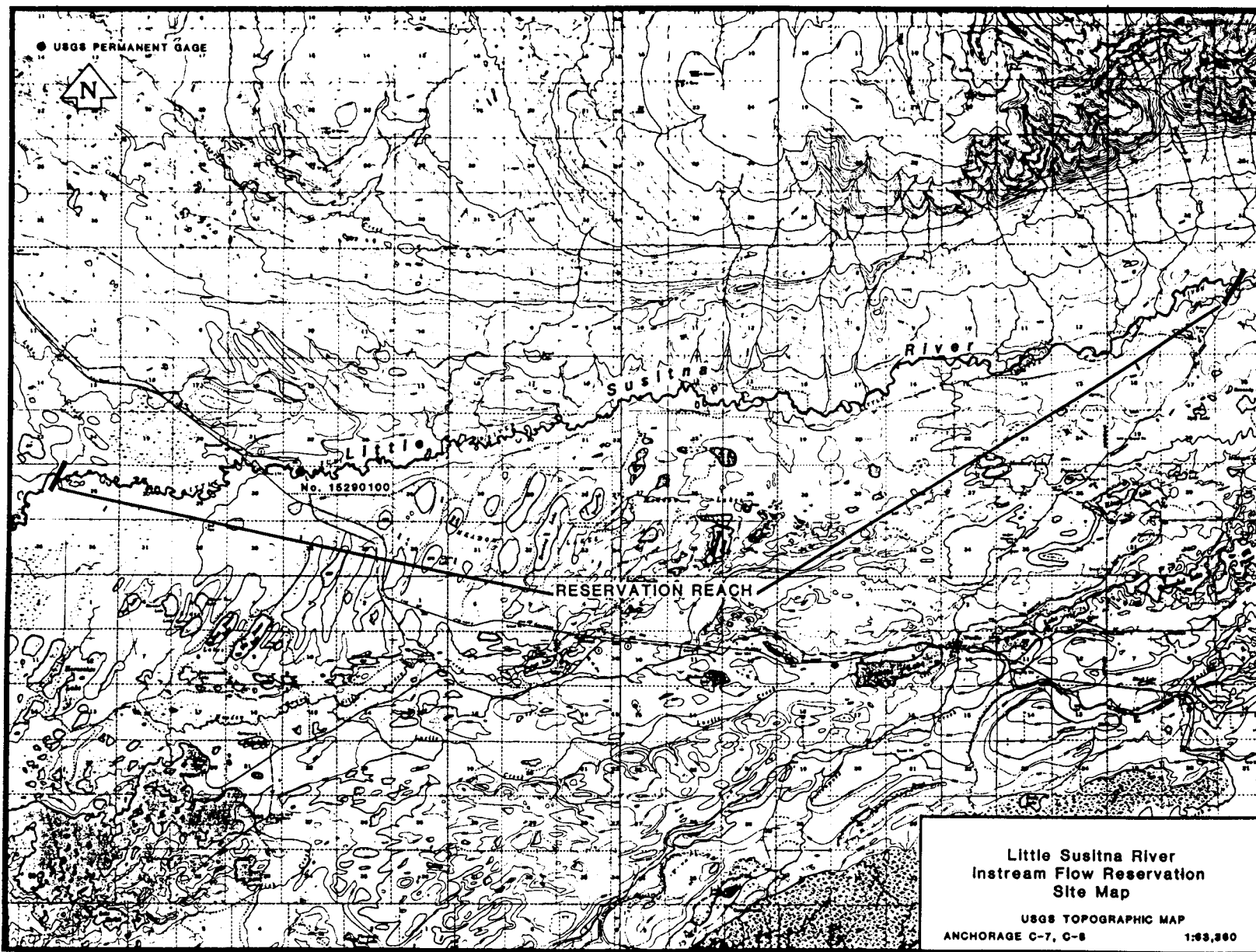


Figure 2. Little Susitna River reservation reach.

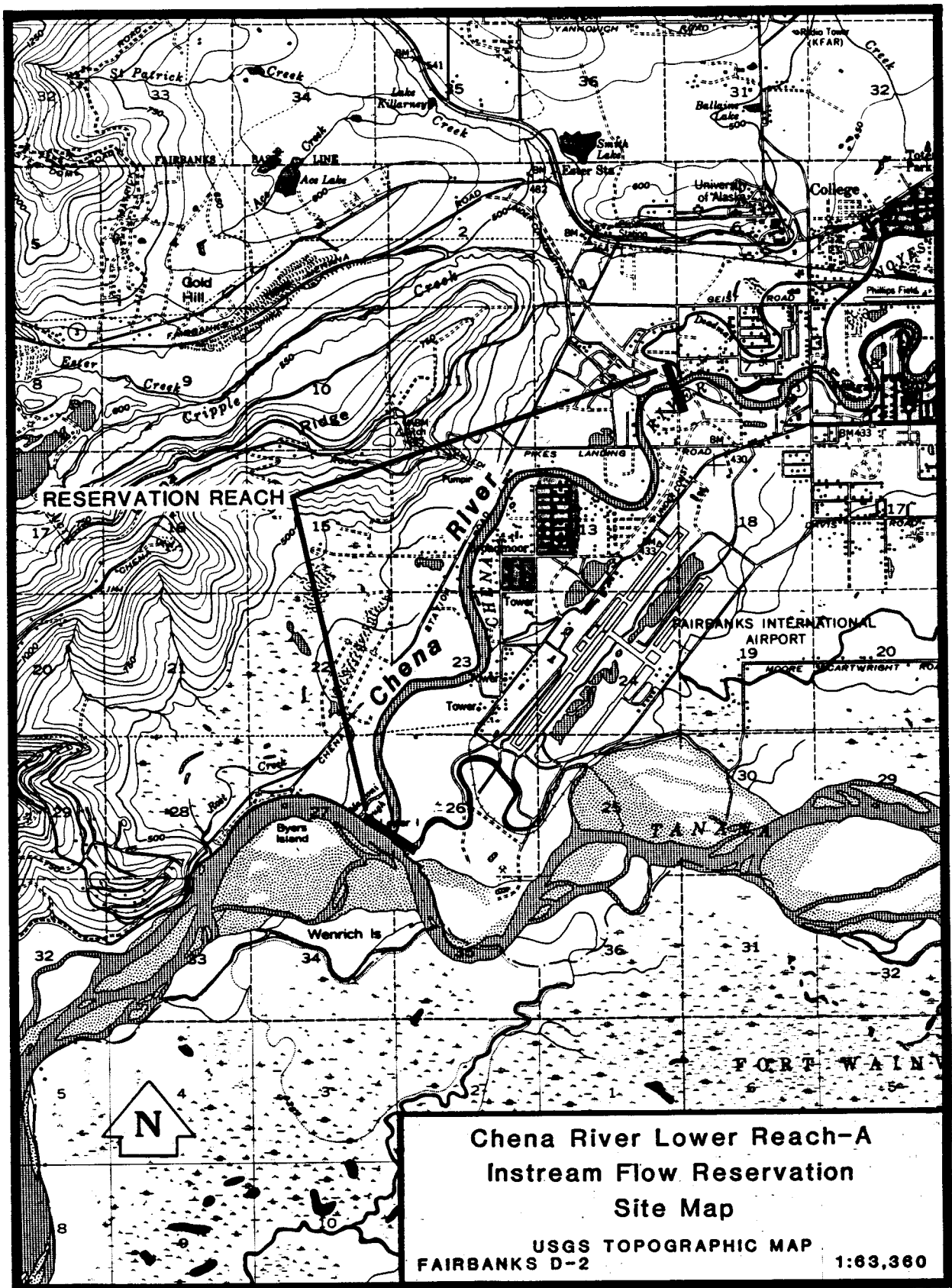


Figure 3. Chena River lower reach-A reservation.

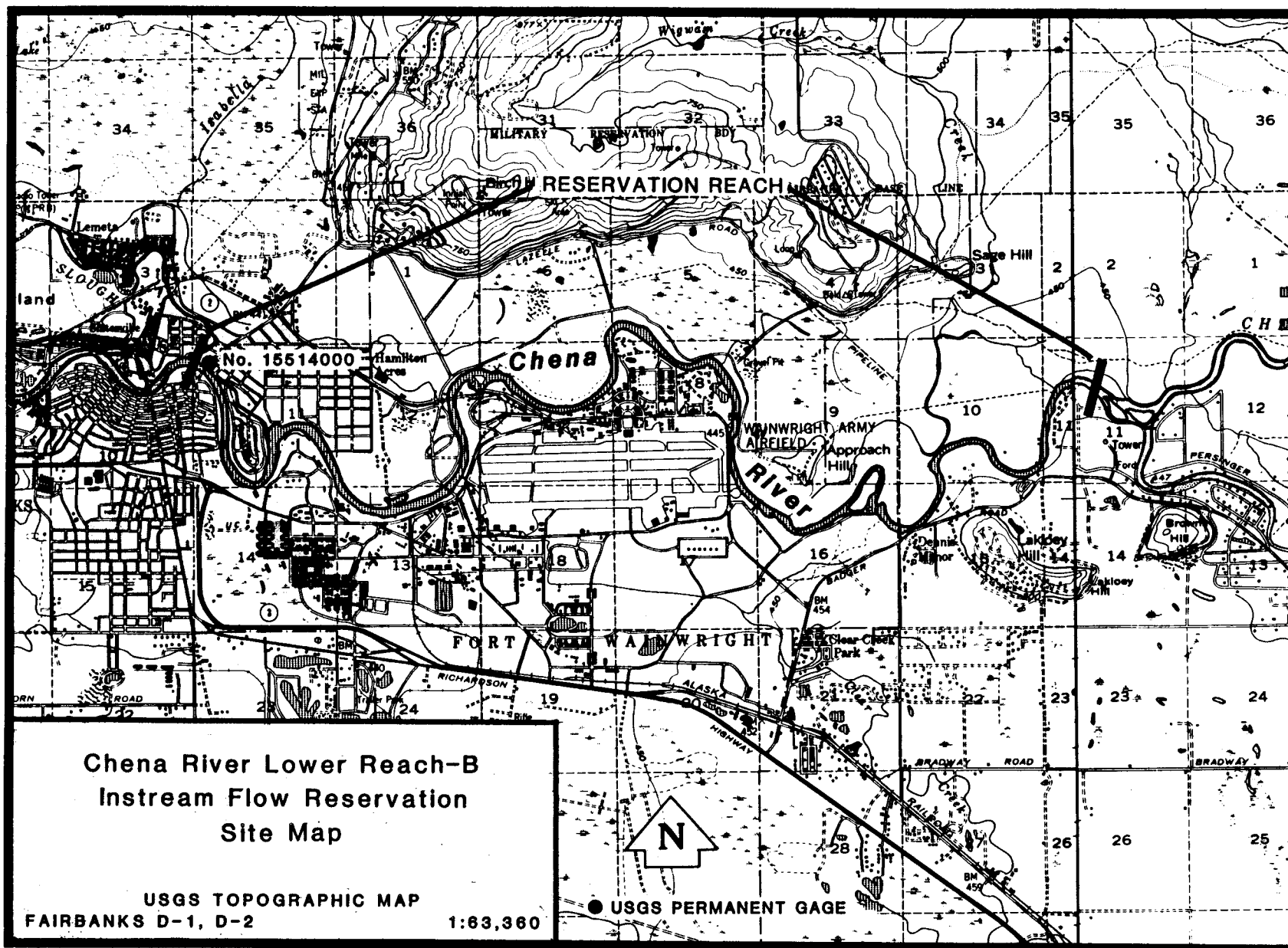


Figure 4. Chena River lower reach-B reservation.



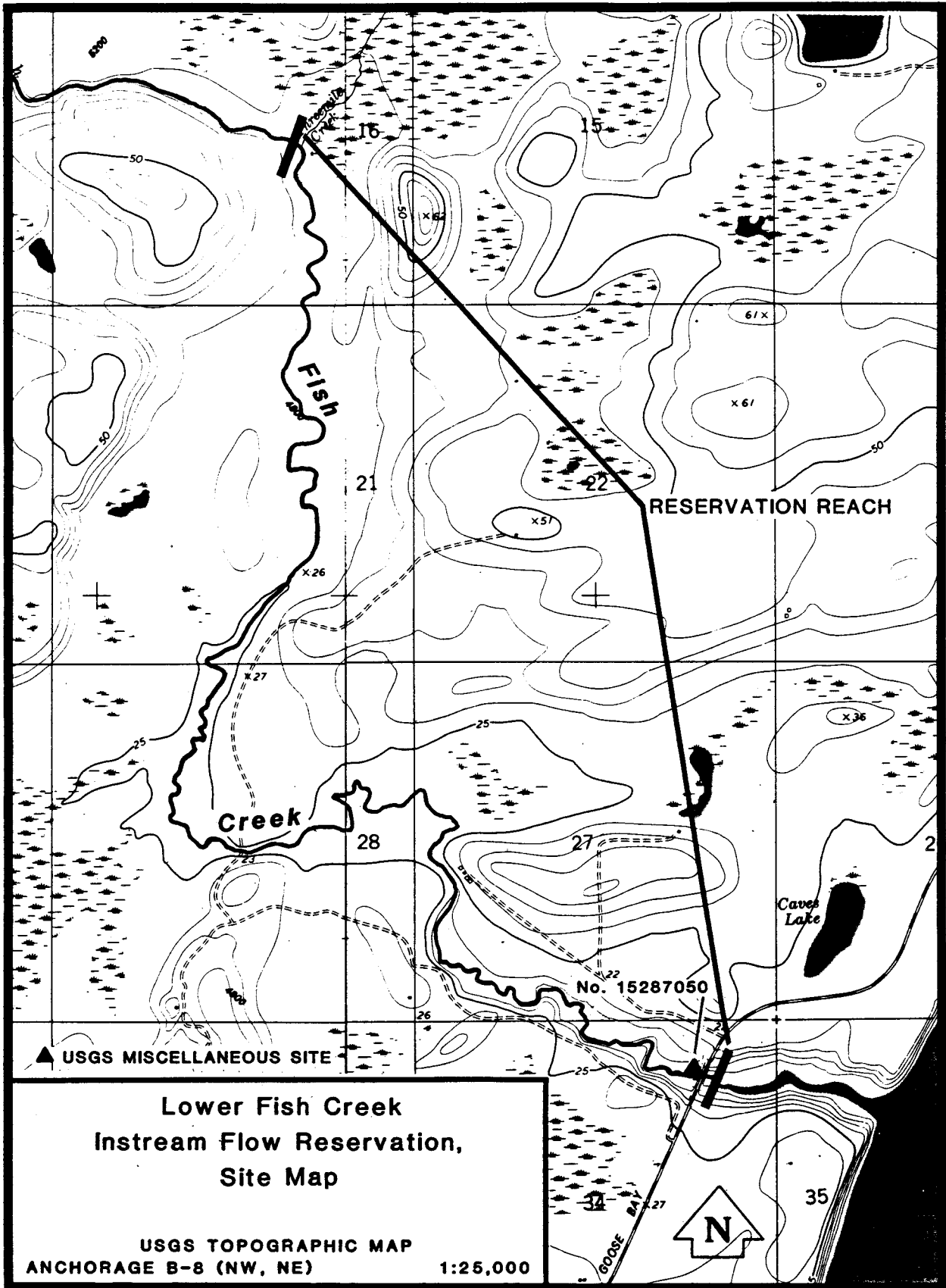


Figure 6. Lower Fish Creek reservation reach.

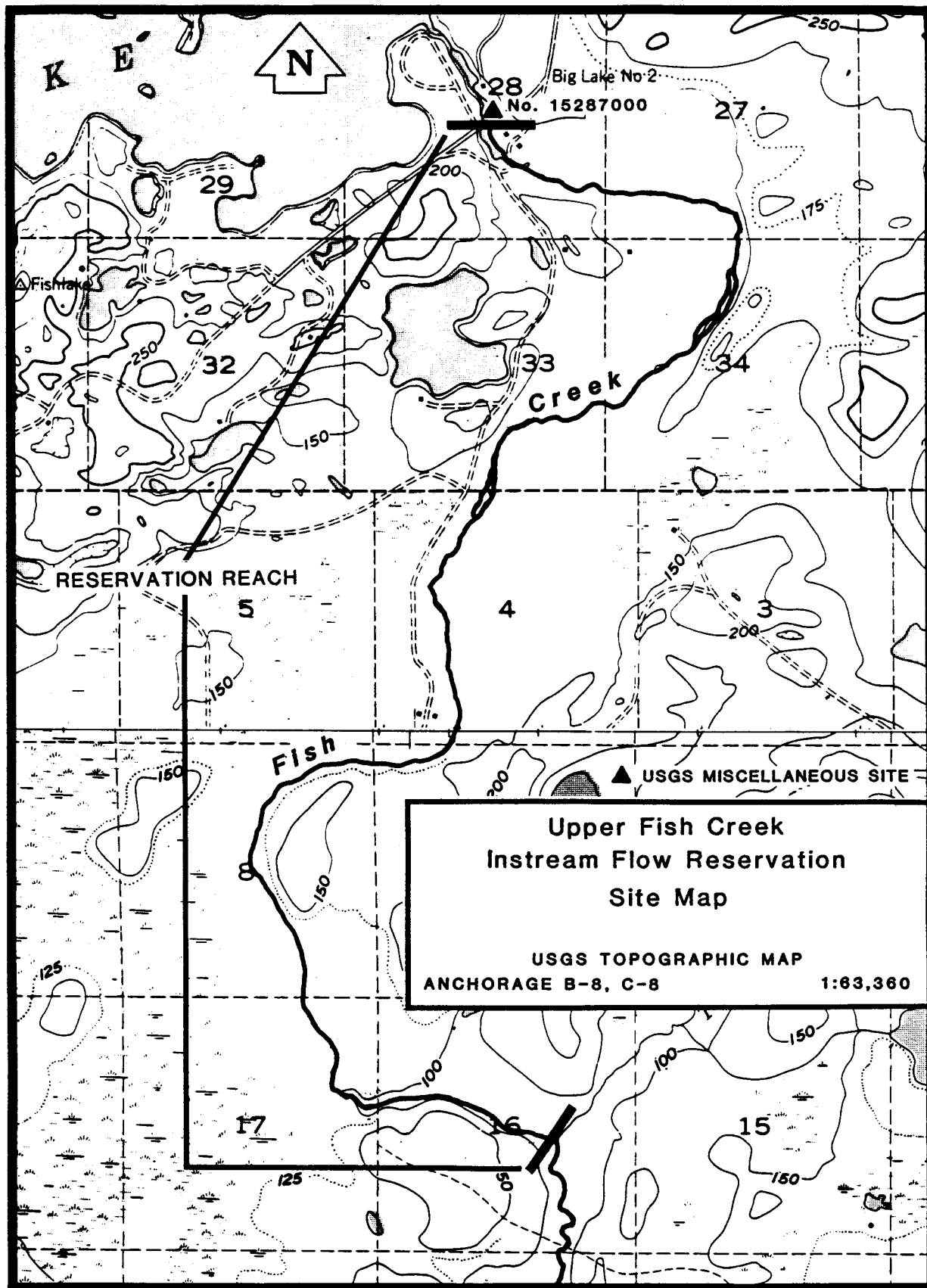


Figure 7. Upper Fish Creek reservation reach.

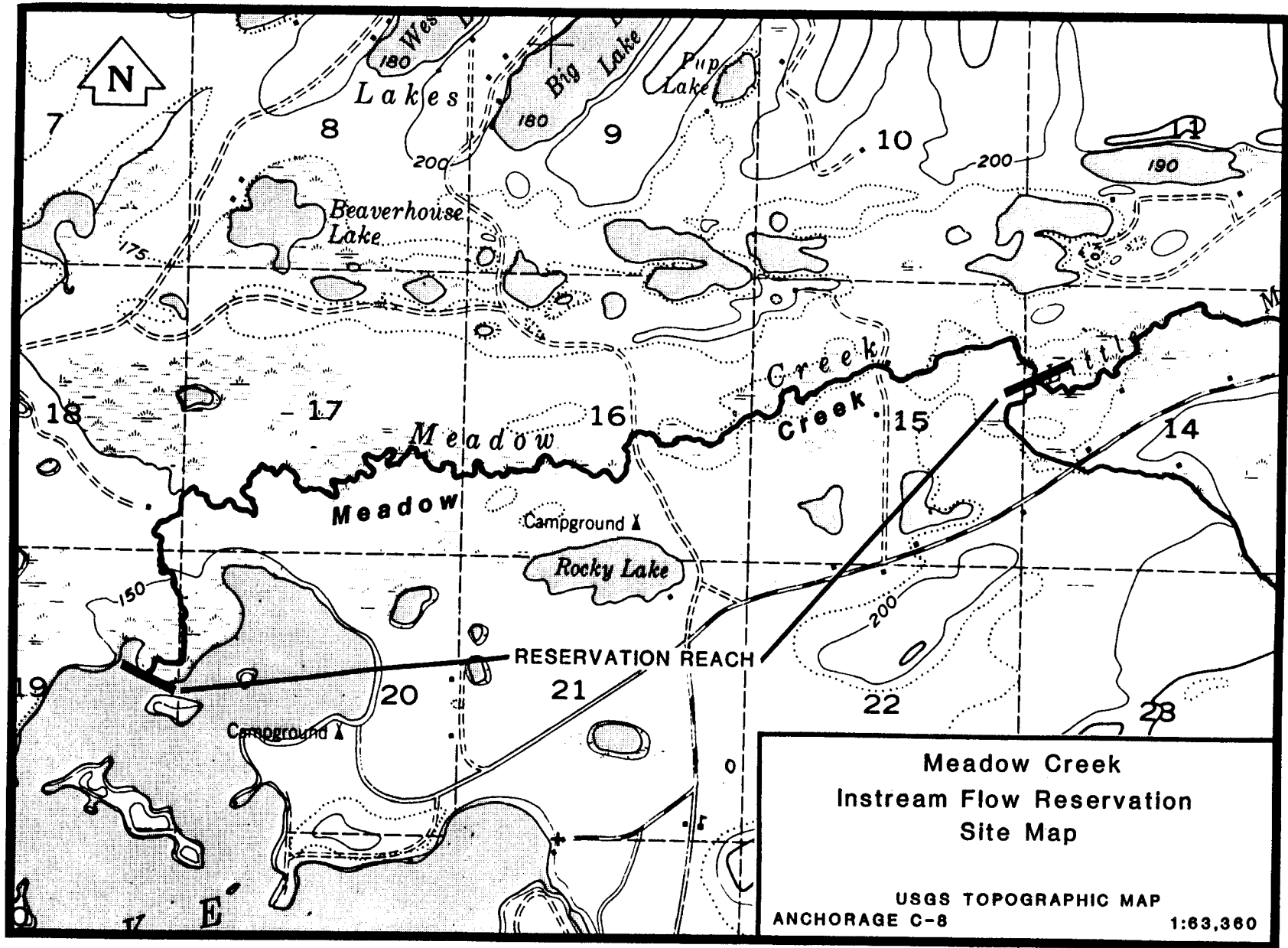


Figure 8. Meadow Creek reservation reach.



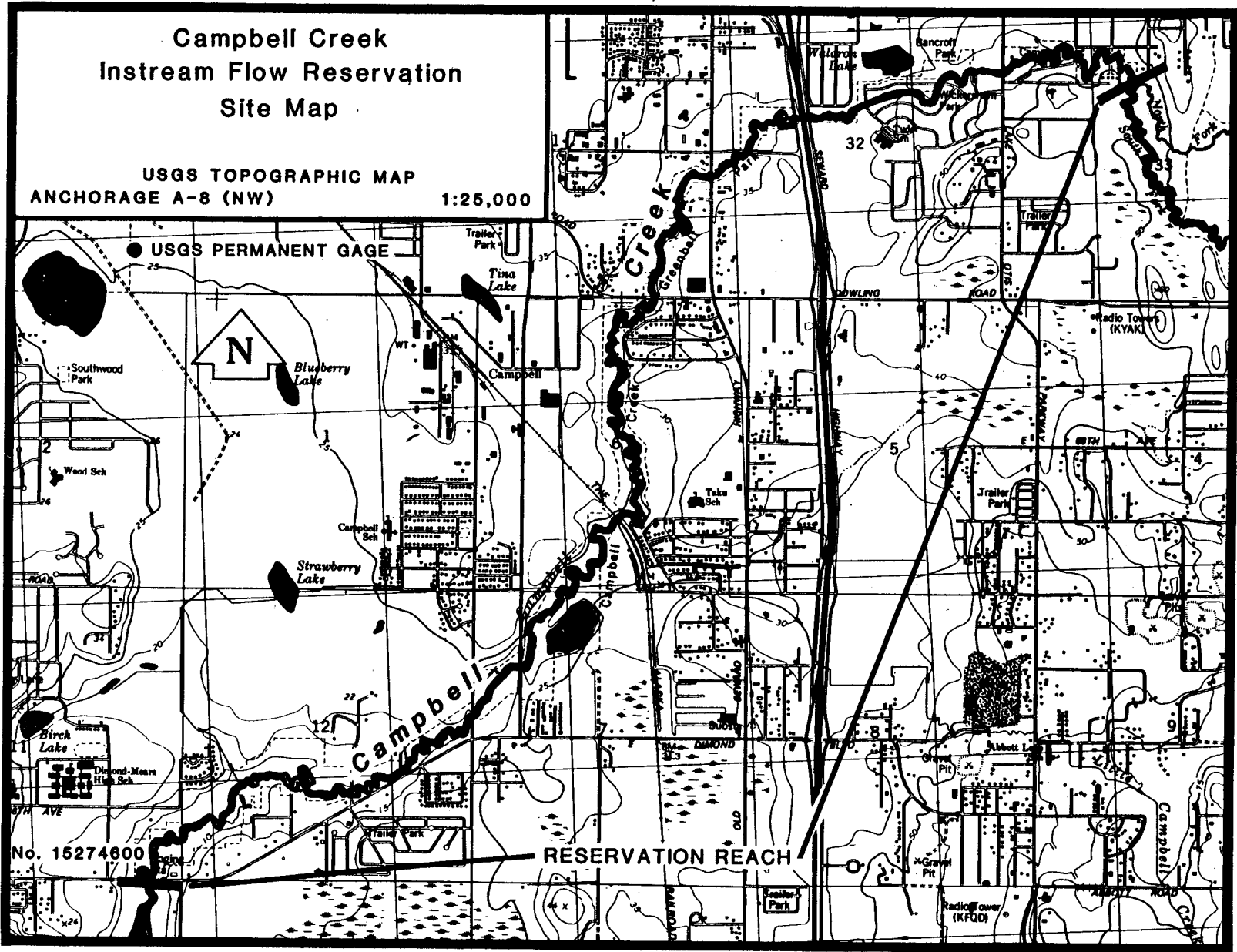


Figure 9. Campbell Creek reservation reach.

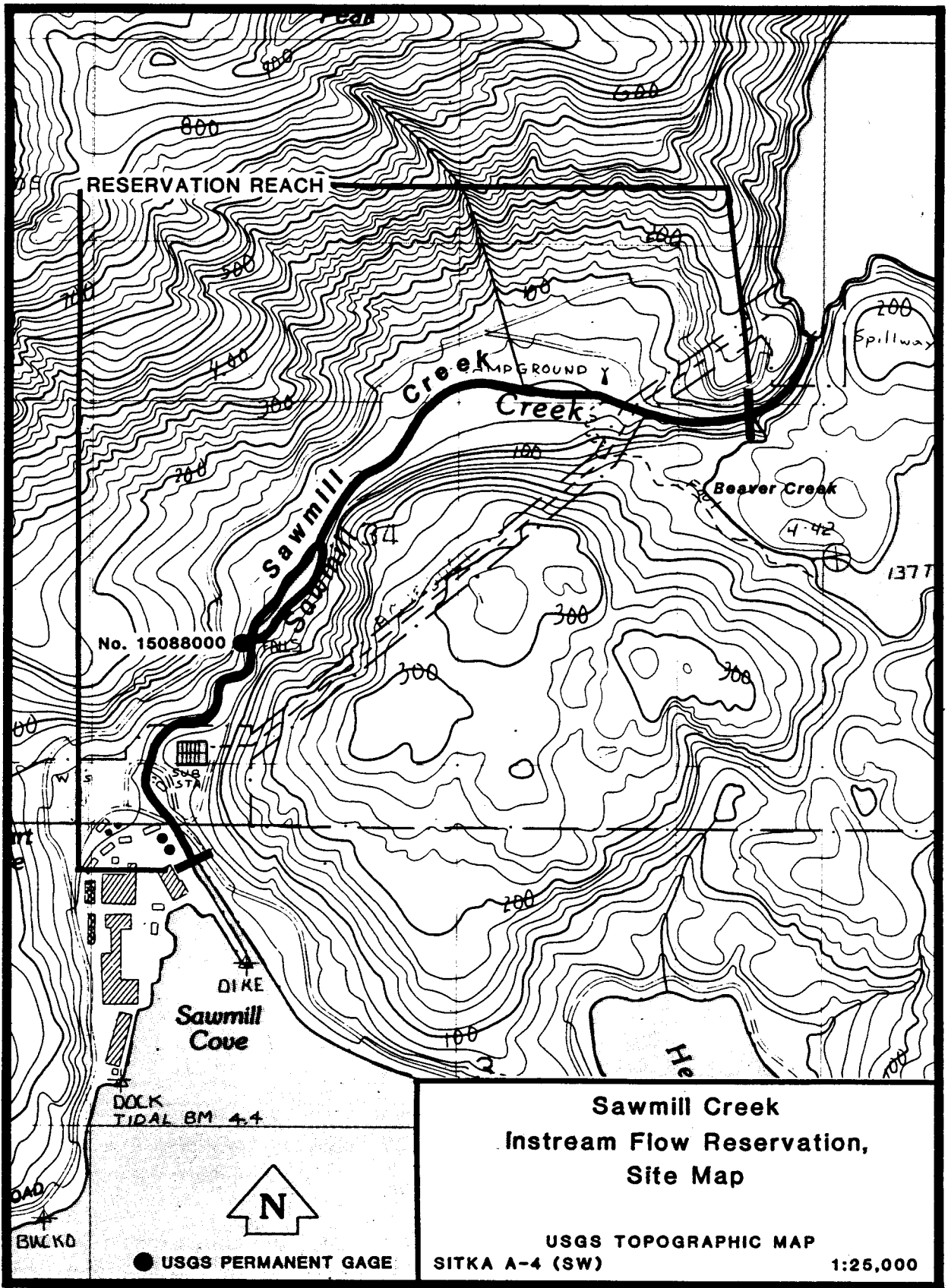


Figure 10. Sawmill Creek reservation reach.



Rivers and streams were nominated for analysis as described in the 1984 Instream Flow Work Plan (ADF&G 1984; Estes 1985), and as modified in 1986 (Instream Flow Committee 1986). The final selection of the streams was made by the Division of Sport Fish by evaluating the importance of the nominated streams to the sport fishery, the likelihood of competition for out of stream appropriation, and reviewing the quantity and quality of existing data that are necessary for the submission of an application.

Data analyses were performed following procedures recommended by Estes (1984) and Estes and Orsborn (1986). The Tennant Method in combination with an evaluation of hydrological patterns and fish periodicity was used to derive instream flow recommendations for the Little Susitna River, Chena River (two reaches), Cottonwood Creek, Fish Creek (two reaches), Meadow Creek, Campbell Creek, Sawmill Creek, and Ketchikan Creek as described in ADF&G (1988a, b, c, d, e, f, g, h, i, j).

The results of these analyses were used to complete instream flow applications following procedures described in ADNR (1985). The completed applications were submitted to the ADNR for adjudication.

## RESULTS

Ten analyses were completed and used to submit applications to the ADNR to reserve instream flows in the Little Susitna River, Chena River (two reaches), Cottonwood Creek, Fish Creek (two reaches), Meadow Creek, Campbell Creek, Sawmill Creek, and Ketchikan Creek (ADF&G 1988a, b, c, d, e, f, g, h, i, j). A summary of the reservation flows requested for each stream is presented in Table 1.

## DISCUSSION

Since adoption of the instream flow legislation and regulations, the ADNR has received 23 instream flow water rights applications. Sixteen were submitted by the ADF&G (six in FY 87 and ten in FY 88), one by the Bureau of Land Management (BLM), four by the Anchorage Audubon Society, and two by private individuals (Estes 1987; Harle 1988). Only the applications submitted by the ADF&G and the BLM have been accepted as meeting all technical requirements. The others were rejected for one of three reasons: two were filed before the regulations were adopted; documentation was insufficient to support the reservation request in three of the applications; and the instream flow reservation quantity request was not specified in one of them (Harle 1988).

Five of the six applications for instream flow water rights that were submitted to the ADNR by the ADF&G in FY 87 have been adjudicated and granted: Willow Creek, Rabbit Creek, Little Rabbit Creek, Little Survival Creek, and Terror River. The remaining FY 87 application for a reach within the Little Susitna River will be adjudicated during FY 89. The FY 88 applications will probably be adjudicated during FY 89 and 90.

Table 1. Summary of FY88 ADF&G instream flow reservation requests.

FLOW (cfs)					
MONTH	Campbell Creek	Chena River Lower Reach-A	Chena River Lower Reach-B	Cottonwood Creek	Lower Fish Creek
Jan	22	310	310	14	21
Feb	17	250	250	13	21
Mar	15	230	230	13	21
Apr	26	317	317	16	21
May	50	1403	1403	16	31
Jun	65	1403	1403	13	52
Jul	65	1403	1403	15	52
Aug	65	1403	1403	14	52
Sep	65	1403	1403	16	52
Oct	65	981	981	16	52
Nov	44	540	540	16	31
Dec	30	420	420	16	21

MONTH	Upper Fish Creek	Ketchikan Creek	Little Susitna River	Meadow Creek	Sawmill Creek
Jan	15	74	73	10	121
Feb	15	70	61	10	98
Mar	15	67	53	10	95
Apr	15	122	87	10	147
May	23	200	395	14	477
Jun	38	200	395	24	477
Jul	38	170	395	24	477
Aug	38	134	395	24	477
Sep	38	134	395	24	477
Oct	38	219	303	24	477
Nov	23	200	156	14	331
Dec	15	105	93	10	152

The ADNR also adjudicates water rights applications for out of stream appropriations. Therefore, due to limited personnel resources, the ADNR has a backlog and usually cannot adjudicate applications immediately after an applicant files. However, a priority date is assigned to all water rights applications by the ADNR on the day an application for instream flows is accepted. This date protects the applicant by establishing the order of priority for the allocation of water, regardless of when the adjudication occurs.

Approval of the five FY 87 ADF&G applications for instream flow water rights validates the methods employed by the ADF&G to meet legal requirements for instream flows under Alaskan law. Accordingly, the methods used in the ADF&G applications (Estes 1987) can now serve as examples for other parties who wish to reserve instream flows.

Alaskan law is unique because private individuals, in addition to state, federal, and local government agencies, can apply to the ADNR for instream flow reservations. Applications for instream flows can be filed for four types of uses:

- 1) to protect fish and wildlife habitat, migration, and propagation;
- 2) recreation and park purposes;
- 3) navigation and transportation purposes; and
- 4) sanitary and water quality purposes.

The experience we gain through the analysis and preparation of each application improves our ability to complete the next application. Though we are becoming more efficient, other data limitations or processes may limit the number of reservations submitted in the future to the present level unless additional resources are obtained to collect and analyze the required biological and hydrological data.

For example, the dearth of hydrological data for most streams in Alaska will govern the ability to evaluate naturally occurring hydrological patterns with confidence. It is also more time consuming to estimate flow characteristics for streams having a limited or non-existent data base as opposed to summarizing data for a stream having an adequate historical record. There are only 310 stream gaging sites in Alaska. Of them, only 160 have a continuous flow record of ten or more years, 55 have a record of five to nine years, and 95 have a record shorter than four years (Emery 1987). The U.S. Geological Survey (USGS) considers a ten year record as the minimum data base required to support a statistically reliable regional flow analysis. Alaska has an average of one stream gage per 7,000 square miles, whereas there is an average of one gage per 400 square miles in the lower forty-eight states. Flows must be estimated for the numerous unged stream reaches in Alaska using regional hydrological models. Reliability of the flow estimates calculated by using the equations in these models is usually best for models developed for regions having a greater concentration of

gaging stations. Therefore it is obvious that additional gaging stations are required to improve the accuracy of the data base used to develop instream flow recommendations.

Competition for water in some systems and the associated adjudication process, if lengthy (see Estes 1987), could conceivably hamper the ability of the ADF&G to apply for reservations. Another constraint to reserving water is the lack of equality afforded an applicant for an instream flow reservation as opposed to applicants for out-of-stream appropriations with respect to obtaining a priority date (Estes 1987). Presently, an instream flow applicant must quantify and substantiate the flow regime requested in order to file an application and receive a priority date. An out-of-stream applicant, however, is only required to estimate the amount of water needed in order to receive a priority date. This shortcoming may be corrected by proposed changes to the ADNR water management regulations which are undergoing interagency review. The proposed changes would allow instream flow applicants to receive a priority date by estimating the quantity of water they want to reserve. Additional time would then be granted to collect and analyze data to substantiate instream flow quantities requested.

There are over 12,000 streams in Alaska presently classified as anadromous fish streams (ADF&G 1987). This does not include the thousands of unclassified or resident fish streams. At the current rate of reserving ten streams a year, it would take at least 1,200 years to protect these streams.

In summary, although the existing instream flow reservation process and its proposed improvements are among the most progressive in the country, they are too resource intensive and lengthy to provide for the base level of instream flow protection which is implied in the Alaska Constitution. These and other concerns should be addressed in order to provide adequate protection for instream flow requirements of sport fish. Based on these concerns, the following four recommendations to improve the instream flow program are provided:

- 1) additional staff and financial resources should be allocated to the instream flow program to allow for a greater number of applications to be processed;
- 2) additional USGS gaging stations should be funded to improve flow projection estimates;
- 3) the proposed ADNR water use regulation modifications should be approved if they provide treatment regarding priority dates for instream flow applications that is equivalent to treatment presently granted applications for out-of-stream water appropriations; and
- 4) legislation should be enacted that will automatically provide a base level of instream flow protection for stream reaches that are classified as supporting anadromous fishes.

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