Montana Fish, Wildlife & Parks

May 14, 1999

Bill Michael
NPS-Glacier Nat'l Park
West Glacier, MT 59936

Dear Bill,

I did receive your message on the phone yesterday concerning information you need from us to acquire a collection permit. We are using the same sampling protocol this year as we did last. A backpack shocking unit will be used to collect fish samples. We plan to collect 25 fin clips from Oncorhynchus species in three different locations of each stream to determine if any genetic hybridization exists. If brook trout are present , we will take up to 60 for whirling disease testing. We have already installed our temperature recorders near the mouth of each stream. We accomplished this last fall and plan to retrieve them this coming fall. Following is the list of streams we would like to sample:

Akakola; Muir; Harrison; Nyack; Rubideau.

Well Bill, I believe that is it for now. Ladd Knotek is no longer our supervisor. He successfully applied for a permanent fish biologist position in Missoula. At present we have no biologist but will soon. You can use my name if you need one for the permit.

Sincerely, Jon Cavigli

Fish Technician

Jon Cavigli

MFWP-REGION ONE
490 N. MERIDIAN RD.
KALISPELL, MT 59901

L76
Date: 5/19/99
Memorandum

To: Project Initiator, BILL MICHELS

From: Compliance Coordinator

Subject: Compliance Screening Form, GLAC- RES-1999-005
TROUT STUDY

Your Compliance Screening Form has been reviewed. See items marked below.

X Your project meets the following categorical exclusion (CX), 516 DM 2, 1, 1.6
Please complete a Categorical Exclusion Form (CXF), (see H:\USERS\COMMON\COMPLY\COMPLCXF.DOC), and submit it to the Superintendent for signature. Attach this Screening Form to the CXF. After the CXF is signed, please forward the original CSF and original CXF to the Compliance Coordinator (who will file them in central files). If you would like to retain copies for your records, please make them first.

_____ Your project does meet CX, 516 DM_____. However, it also meets exception 516 DM2, App. 1, _____. Additional NEPA documentation will be required. Please complete Compliance Checklist.

_____ Though your project meets a CX, it will require some additional permits. See attached Project Compliance Form to see which permits are needed.

_____ Your project does not meet a CX and has not been previously documented. Additional NEPA documentation will be required. Please complete Compliance Checklist.

_____ Your project has been adequately analyzed in an existing NEPA document.

X Your project involves no cultural resources. Therefore, Section 106 compliance is not necessary.

_____ Your project requires an Assessment of Effect Form (AEF). Please submit an AEF to the Superintendent for signature. Please send the original signed AEF to the Compliance Coordinator to file in central files. You may retain a copy for your own records if you wish.

_____ Your project is covered by AEF #_____.

Tara Williams

Tara Williams

H:\USERS\COMMON\COMPLY\COMPLCSF.DOC (3/99)

Project Number: GLAC- -
(To be assigned by Compliance Office)

COMPLIANCE SCREENING FORM
GLACIER NATIONAL PARK

To be completed by Project Initiator or as assigned by Supervisor. Please fill out and attach this form to any funding request, or any time you propose to complete a project with existing funds that has the potential to alter or disturb natural or cultural resources. See H:\USERS\COMMON\COMPLY\COMPLSOP.DOC for instructions.

Project Title: Thermal Regime and the Distribution of Native and introduced Trout Species in the Flathead River System

Proposed Start Date: 06/01/99 **Initiating Division: Resource Management**

Proposed by: Montana DFWP **Date:** 05/14/99

Time Frame: *Are there any known important scheduling needs, such as tribal consultation, biological, legal, or funding deadlines, planning staff should be aware of? Please specify* ***funding year****. No known scheduling needs. FY-99 No park funds involved*

Project Description: *Please attach description of project. This may be a funding proposal, project agreement, or any other document that describes the project, including justification, location, area to be affected, and size of project.*

Note: this is a continuation of the 1998 project. A project report is on file.

1. Has this project already been analyzed in site-specific, accurate, and current detail in a previous NEPA document? (Y/N) N
   If Yes, specify document and skip to question #4.

2. Is this project included in the categorical exclusion list? (Y/N) Y
   If No, ADDITIONAL NEPA COMPLIANCE WILL BE NEEDED. Skip to #4.
   If Yes, specify categorical exclusion:
   5/6 DM2, 1, 1.6 Non Destructive Data Collection

3. Do any of the exceptions to the categorical exclusions apply to this project? (Y/N) N
   If Yes, specify exception. ADDITIONAL NEPA COMPLIANCE WILL BE NEEDED.
   If No, document on *Categorical Exclusion Form* (CXF).

4. Could project affect cultural, historic, or archeological resources? (Y/N) N
   If yes, is this project covered in a current programmatic exclusion, Programmatic Agreement (PA), Assessment of Effect Form (AEF), or other Sect. 106 compliance document signed by the Superintendent? (Y/N)
   If No, ADDITIONAL SECT. 106 COMPLIANCE WILL BE NEEDED.
   If Yes, specify AEF Project Number (Note: AEF will reference appropriate PA or other document.):

William R Michels — Project Initiator — 5/18/99 — Date

CONCLUSION *(To be completed by Compliance Office)*

_____Compliance for the proposed project is covered by one or more of the following: an existing NEPA document, a NEPA categorical exclusion, a Section 106 programmatic exclusion, an existing AEF, or other Section 106 compliance document. *(File AEF and CXF as record of compliance.)*

_____Additional NEPA compliance will be needed for this project.

_____Additional Sect. 106 compliance will be needed for this project.

Results 1998

Montana Fish, Wildlife & Parks

December 21, 1998

Bill Michael
Glacier National Park
West Glacier, MT 59936

Dear Bill:

Here is a summary of data collected this summer on several of the North and Middle Fork Flathead River tributaries in Glacier National Park. These data include fish species distribution, genetic and whirling disease testing, and thermal data related to our study examining interactions of native and non-native trout (primarily westslope cutthroat and rainbow trout).

On the electrofishing results table, I also included species distribution data from the most recent surveys prior to this one for comparison (Read et al. 1982; Weaver et al 1983). Although our sampling was not intended to be quantitative, species are listed in descending order of abundance in our samples on each date. Genetic samples of *Oncorhynchus* spp. were collected from all streams. Whirling disease samples were only taken where we could get enough brook trout. Attached thermographs represent daily max, min and avg.

Beginning in fall 1999, we plan to sponsor a graduate student who will work with us on this project under Dr. Chris Frissell at the U. of Montana. We look forward to continued collaboration with you and Glacier National Park as the project progresses.

Please contact me if you have any questions about the data or thoughts on the project.

Best Regards,

Ladd

Ladd Knotek
Special Projects Fisheries Biologist

Study Description

THERMAL REGIME AND THE DISTRIBUTION OF NATIVE AND INTRODUCED TROUT SPECIES IN THE FLATHEAD RIVER SYSTEM

BACKGROUND

Over the past decade, protection and management of native trout species has become a high priority in Montana. This is especially true in the Flathead River system, which includes some of the best remaining strongholds for westslope cutthroat trout (WCT) and bull trout (DV). Recent attention has focussed on DV recovery in the Flathead Drainage and western Montana, but WCT populations have experienced similar declines (Deleray et al. 1997). Both are fish Species of Special Concern in Montana and are proposed for federal listing under the Endangered Species Act of 1973.

Although many factors jeopardize the persistence of native trout, the introduction of non-native fish species is one of the greatest threats. Introduced brook trout (BT) and rainbow trout (RBT) are known to compete and hybridize with DV and WCT. In the Flathead River system, fluvial RBT and resident BT have been established for more than three decades. These species inhabit the main stem Flathead River and its tributaries and selected portions of the lower Middle Fork Flathead River drainage (Deleray et al. 1997; Weaver et al. 1983; Read et al. 1982). Despite uninhibited access and depressed adfluvial runs of WCT and DV, we have not observed RBT or BT in the North Fork or the upper Middle Fork. In addition, adjacent tributaries of the lower Middle Fork vary in species composition. Suspected environmental factors that may influence fish community composition include stream temperature regime, productivity, level of stream degradation, and gradient. Since non-native trout species inhabit a range of stream gradients and levels of habitat quality, examination of thermal regimes is a logical step first step in evaluating trout distribution. By updating species composition surveys, we can also detect changes in the distribution of species since original surveys were conducted.

THERMAL REGIME PILOT STUDY

In the initial field study, we intend to quantify any obvious differences in thermal regime among streams and determine if these differences are correlated with fish species distribution. This study focusses on resident and fluvial WCT, EBT, and RBT populations for several reasons: 1) we have a poor understanding of limiting factors, competitive interactions, and hybridization rates (RBTxWCT) for these populations, 2) we lack basic fish population and distribution data for many of these streams, and 3) we seek some explanation and tool for predicting areas that are most susceptible to invasion by non-native species and further declines of natives. Although we are targeting tributaries capable of supporting WCT, many of these streams also contain adfluvial DV populations. Information on the distribution and habitat requirements for DV is much more comprehensive.

The hypothesis that thermal regime plays a key role in trout distribution in the Flathead System stems from known differences in preferred temperatures and observed patterns of distribution.

The timing of spawning, growth rates, etc. are temperature-mediated processes that vary among trout species. Streams in the Flathead Drainage vary greatly in temperature regimes and extremes. Streams range from moderate spring creeks with nearly constant temperatures to extremely cold North Fork tributaries with great thermal variance among seasons.

Methods

In December 1997, thermographs were placed in 20 tributary streams of the North Fork, Middle Fork, and main stem Flathead River. Selection of streams and stream sections was based on current fish distribution maps, stream gradient, and land use history. Gradient is < 2.5% in all stream reaches containing thermographs. A matrix was established so that our sample included streams with only WCT, WCT and established introduced species, and those with predominately introduced species. Streams were also divided into "managed" and "pristine" land use categories. Pristine streams all lie within Glacier National Park: Anaconda, Camas, McDonald, Lincoln, Coal (Middle Fork), Ole (2 sites), and Park Creeks. Other streams in the study include: Cyclone Cr., Coal Cr. (North Fork), Hay Cr., Red Meadow Cr., Big Cr., Langford Cr., Deerlick Cr., Essex Cr., East Spring Cr., Goodrich Bayou, Taylor's Outflow, Elliott Spring Creek, and Abbott Creek (2 sites). Thermographs were not placed in Taylor's Outflow, Elliott Spring Creek, McDonald Creek, and Coal Creek (North Fork) because we had already collected thermal data for these streams.

At each site, we wired 6" (8-32 K) ONSET recording thermographs to railroad tie plates and used rebar to anchor the plates on the streambed in pool or run reaches. Thermograph locations were marked using Global Positioning Systems (GPS) or distance and direction measurements from natural landmarks. Thermographs were set to record hourly temperatures through fall 1998. In key bull trout spawning streams (core areas), we deployed 32K thermographs to extend memory through the rest of the year.

FISH SURVEYS

In 1998-99, we hope to collect fisheries information from tributaries of the North Fork, Middle Fork, and main stem Flathead River. The main goal of sampling will be to determine species composition and distribution, particularly in streams where thermographs were deployed. We have long-term fish sampling sites on many of these streams (e.g., Big Cr., Langford Cr., Cyclone Cr., Taylor's Outflow). In other streams, such as tributaries located in Glacier National Park, we lack current information. In addition to fish species composition and species distribution, we will test for whirling disease and conduct genetic surveys.

Methods

We will conduct sampling during low periods from late June-September. Sampling methods will depend, in part, on logistic constraints. The preferred protocol is to establish 150 m electrofishing

sections. This is our standard multi-pass method (Zippen 1956) for sampling species composition, population structure, and conducting population estimates. However, it often requires bank electrofishing equipment (including a large generator). In addition to the 150 section, we would use a backpack electrofisher to assess species composition in all reaches with gradient < 3%. Because of problems with accessibility, stream discharge (too high), and conductivity, we will likely have to modify our methods in some tributaries. Snorkeling may be used if electrofishing is not feasible.

Fish collected will be identified, measured, and weighed, and a fin clip will be taken for genetic analysis. We will also take a sample of introduced species (if present) for whirling disease testing. All native species will be released at the sampling location.

FUTURE STUDIES

If there is a significant relationship between thermal conditions and fish community composition, we will expand our survey in the Flathead Drainage. Eventually, we hope to complete and update watershed assessments for the drainages mentioned in this study. These assessments will integrate thermal, water chemistry, physical habitat, riparian condition, and fish community data to aid in our native species restoration and preservation efforts.

REFERENCES

Deleray, M., T. Weaver, and W.L. Knotek 1997. Statewide Fisheries Investigations: Survey and inventory of coldwater and warmwater ecosystems. Flathead Lake- River System study, F-78-R-3, Job No.V-a. July 1, 1995 through June 30, 1996. Montana Fish, Wildlife, and Parks, Kalispell, Montana. 84 pp.

Knotek, W.L., M. Deleray, and B. Marotz. 1997. Fish passage and habitat improvement in the upper Flathead River basin. Montana Fish, Wildlife, and Parks, Kalispell, Montana. Prepared for Bonneville Power Administration. 60 pp.

Read, D., B.B. Shepard, and P.J. Graham. 1982. Fish and habitat inventory of streams in the North Fork Drainage of the Flathead River. Flathead River Basin Environmental Impact Study. Prepared by Montana Department of Fish, Wildlife, and Parks, Kalispell, Montana for the Environmental Protection Agency. 181 pp.

Weaver, T.M., J.J. Fraley and P.J. Graham. 1983. Fish and habitat inventory of streams in the Middle Fork of the Flathead River. Flathead River Basin Environmental Impact Study. Prepared by Montana Department of Fish, Wildlife, and Parks, Kalispell, Montana for the Environmental Protection Agency. 229 pp.

Zippen, C. 1956. An evaluation of the removal method of estimating animal populations. Biometrics 12:163-169.

For more information, contact:

Ladd Knotek
Special Projects Fisheries Biologist
Montana Fish, Wildlife and Parks
Kalispell, MT 59901
Phone: (406) 751-4542
Email: ladd@digisys.net

Form 10-141
(Rev. 3/57)

United States Department of the Interior
National Park Service

Collector's Permit

APPLICATION FOR PERMISSION TO COLLECT SPECIMENS OF PLANTS, ROCKS, MINERALS, AND ANIMALS

Name of Area	Date
Glacier National Park	June 9, 1998

Name of Applicant	Home Address
Ladd Knotek	Montana Fish, Wildlife & Parks, 490 N. Meridian. Kali

Representing *(Name of Institution)*
Montana Fish, Wildlife and Parks

Type of Specimens to be Collected
None to be collected. Thermographs were installed near mouths of streams

Class of Collecting*	Check for Class B Permit	Period of Collecting
[X] Class A [ ] Class B	[ ] Paid Employee [ ] WCC Collaborator	From 6/9/98 To 12/31/98

Reason for Collecting
Quantify any obvious differences in thermal regime among streams and determine if these differences are correlated with fish species distribution.

Place Where Specimens are to be Deposited
GNP Streams: Anaconda, Camas, Coal, McDonald, Lincoln, Ole and Park Creek

I, the applicant, having read the conditions on the reverse of the permit relating to collections in areas administered by the National Park Service, agree that, if the permit is granted, I will comply with all the conditions stated therein.

Signed W. L. Knotek

TO BE FILLED IN BY ISSUING OFFICE ONLY--DO NOT WRITE BELOW THIS LINE

Approved for Collecting Following Specimens	Class
None to be collected. Thermographs were installed near mouth of streams and Park Creek	A
Locality of Collecting Limited to GNP Streams: Anaconda, Camas, Coal, McDonald, Lincoln, Ole	**Expiration Date** 12/31/98

Special Conditions or Restrictions
None

Recommended by (Signature and Title)	Approved By (Signature and Title)	Date Approved
Ladd Knotek Fisheries Biologist	L. W. Smith Sr. Scientist	6/10/98

United States Department of the Interior
National Park Service

COLLECTING PERMIT CLASS [ ]

In Accordance with the Conditions and Restrictions Appearing on the Back Permission is Granted

Name of Collector	Area	Date Issued
Ladd Knotek	Glacier National Park	6/9/98

To Collect the Following Specimens
None. Thermographs were installed near mouth of streams

Locality of Collecting Limited to	Expiration Date
GNP Streams: Anaconda, Camas, Coal, McDonald, Lincoln, Ole Park	12/31/98

Special Conditions or Restrictions
None

Approved (Signature)	Title
L. W. Smith	Senior Scientist

* *Two classes of collecting may be conducted under this permit:*

Class A - That required for public exhibits and for research undertaken by persons who can establish their connection with public museums or other scientific or educational institutions. Specimens collected may be insects (Hexapoda), spiders (Araneida), plants, rocks, or minerals, as designated in the permit.

Class B - That undertaken by Federal employees only for scientific or educational purposes. Specimens collected may be plants, rocks, minerals or animal life as designated in the permit.

The collecting of endangered or vanishing species of animals, if permitted at all, will be allowed only where the required approval has been obtained from the Director of the National Park Service

THIS PERMIT MUST BE CARRIED AT ALL TIMES WHILE COLLECTING. SEE REVERSE FOR CONDITIONS AND RESTRICTIONS.

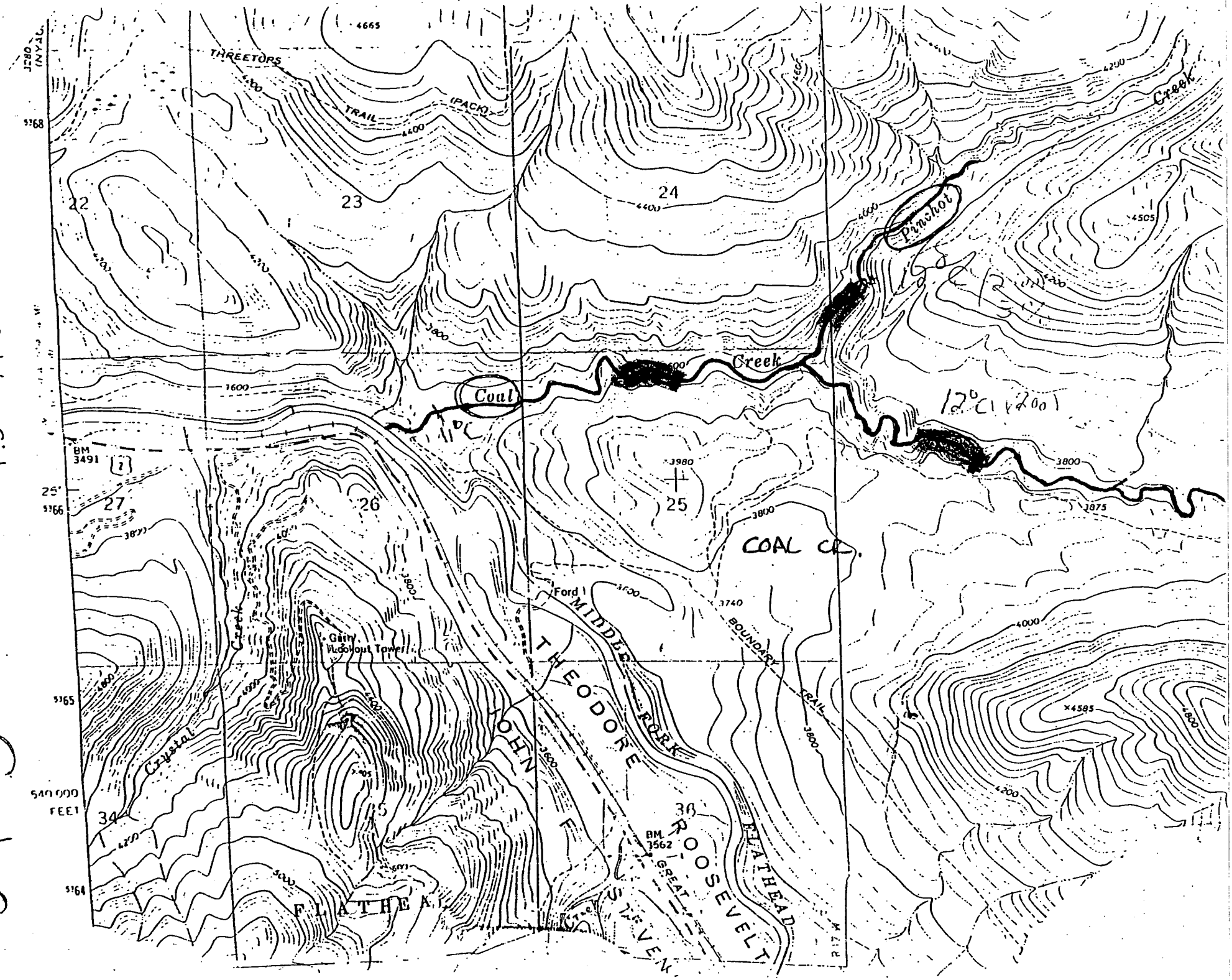
Species composition samples taken from Middle Fork Flathead River tributaries in Glacier National Park.

Middle Fork	Stream	Reach	Date	Method	Spp. present	Size Range(mm)	Sites sampled	Samples taken: Genetics	Samples taken: Whirling Dis.
1	Lincoln	1	8/7/81	Snorkel	WCT	N/A	1	N	N
					EBT	N/A			
					DV	N/A			
					MWF	N/A			
	Lincoln	**1**	**9/23/98**	**Electro**	**WCT**	**57-156**	**3**	**Y**	**Y**
					EBT	**74-247**			
					COTT	**23-125**			
					MWF	**89**			
2	Coal	1	8/13/81	Snorkel	WCT	N/A	1	N	N
					DV	N/A			
					EBT	N/A			
					MWF	N/A			
	Coal	**1**	**8/18/98**	**Electro**	**WCT**	**61-175**	**2**	**Y**	**Y**
					EBT	**127-234**			
					DV	**153**			
					COTT	**52-121**			
					MWF	**80-338**			
3	Pinchot	1	8/14/82	Snorkel	WCT	N/A	1	N	N
					DV	N/A			
					EBT	N/A			
					MWF	N/A			
	Pinchot	**1**	**8/18/98**	**Electro**	**WCT**	**37-166**	**1**	**Y**	**Y**
					MWF	**156-157**			
					DV	**143**			
					EBT	**127**			
4	Park	2	8/4/81	Snorkel	WCT	N/A	1	N	N
					DV	N/A			
					MWF	N/A			
	Park	**2**	**8/20/98**	**Electro**	**WCT**	**72-262**	**3**	**Y**	**N**
					DV	**73-380**			
					COTT	**36-108**			
5	Ole	1	8/14/81	Snorkel	WCT	N/A	1	N	N
					DV	N/A			
					EBT	N/A			
					MWF	N/A			
	Ole	2	8/11/81	Snorkel	WCT	N/A	1	N	N
					DV	N/A			
					MWF	N/A			
	Ole	**1**	**8/24/98**	**Electro**	**WCT**	**82-238**	**2**	**Y**	**N**
					DV	**144-205**			
					COTT	**89**			
	Ole	**2**	**8/17/98**	**Electro**	**WCT**	**37-278**	**1**	**N**	**N**
					DV	**78-228**			
					MWF	**297-410**			

Species composition samples taken from North Fork Flathead River tributaries in Glacier National Park.

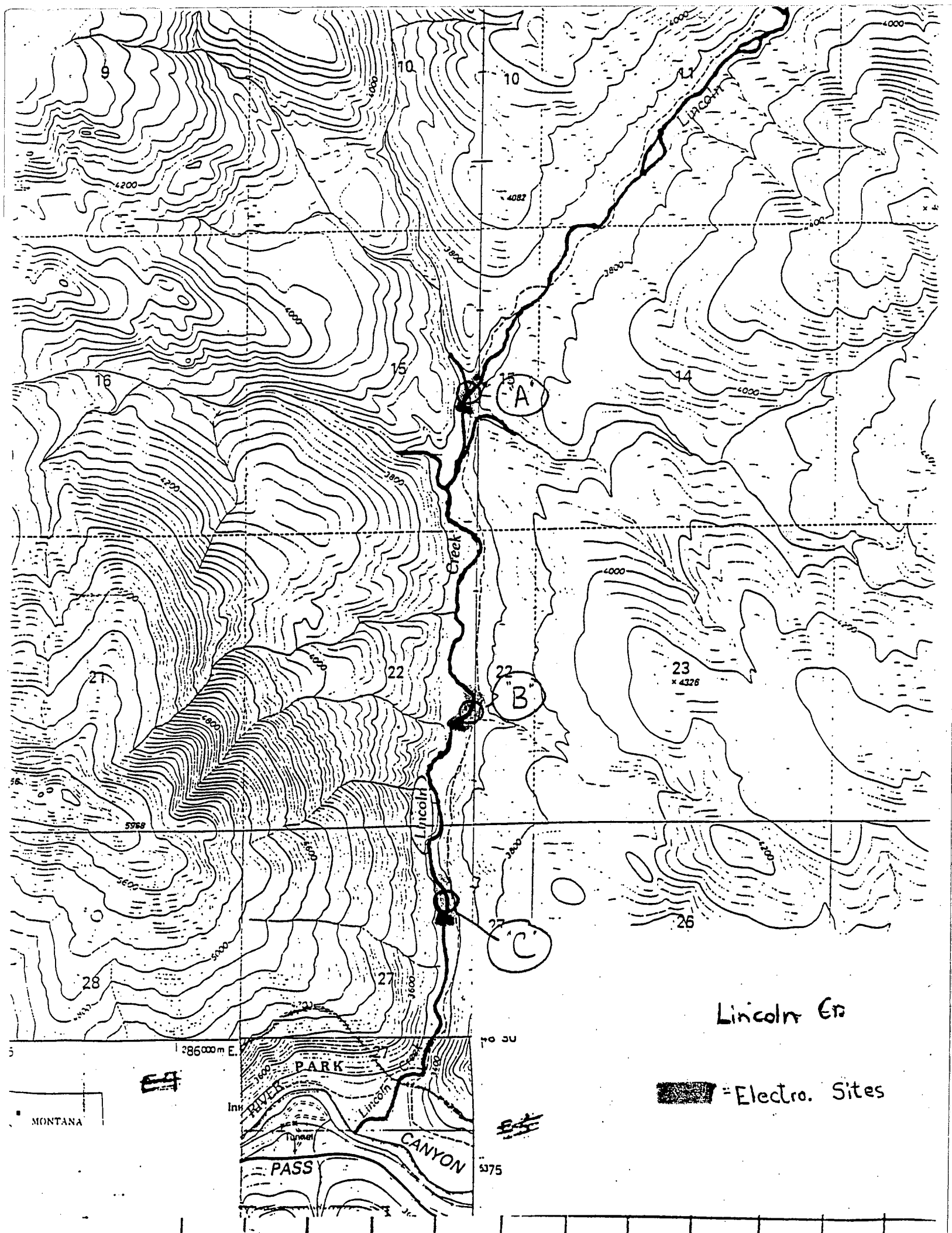
North Fork	Stream	Reach	Date	Method	Spp. present	Size Range(mm)	Sites sampled	Samples taken: Genetics	Samples taken: Whirling Dis.
1	Camas	1	8/6/80	Snorkel	WCT	N/A	1	N	N
					MWF	N/A			
					COTT	N/A			
					NSQ	N/A			
					SU	N/A			
	Camas	2	8/6/80	Snorkel	WCT	N/A	1	N	N
					MWF	N/A			
					COTT	N/A			
					RSS	N/A			
					SU	N/A			
	Camas	**1**	**9/21/98**	**Electro**	**WCT**	**121-218**	**1**	**N**	**N**
					COTT	**49-83**			
	Camas	**2**	**8/11/98**	**Electro**	**COTT**	**N/A**	**1**	**Y**	**N**
					LNSU	**N/A**			
					NSQ	**N/A**			
					RSS	**N/A**			
2	Dutch	1	8/26/80	Snorkel	WCT	N/A	1	N	N
					MWF	N/A			
					COTT	N/A			
	Dutch	**1**	**8/11/98**	**Electro**	**WCT**	**40-178**	**1**	**Y**	**N**
					MWF	**110**			
					COTT	**N/A**			
3	Anaconda	1	8/8/80	Snorkel	WCT	N/A	2	N	N
					MWF	N/A			
					LNSU	N/A			
					COTT	N/A			
	Anaconda	**1**	**9/21/98**	**Electro**	**WCT**	**36-194**	**3**	**Y**	**N**
					COTT	**56-110**			
					LNSU	**30-110**			
					MWF	**80**			
					RB?	**106-162**			

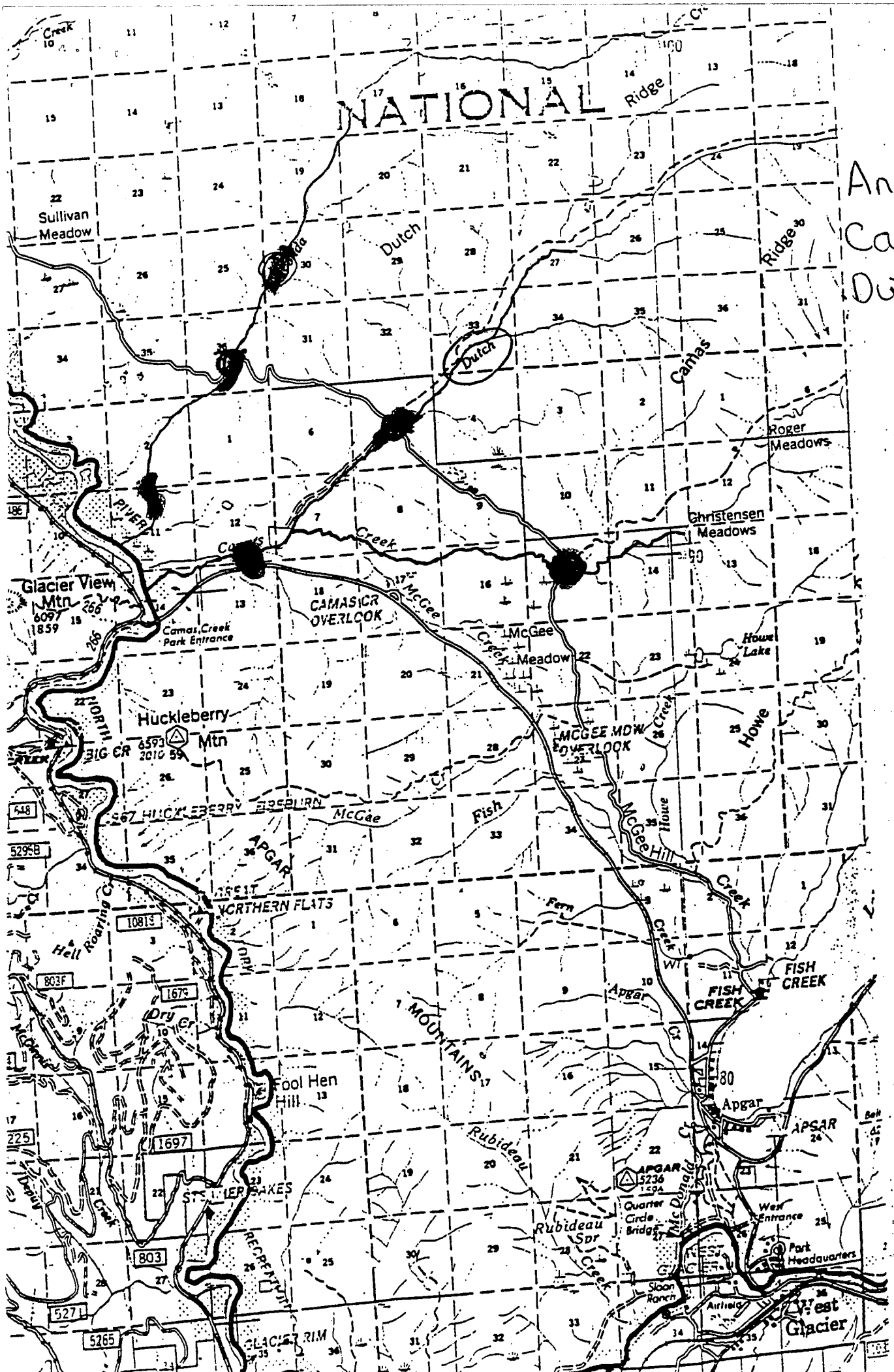

PARK
& OLE Cr.
Church Butte
Salvage Mountain
Riverview Mtn
Rampage Mtn.
Sheep Mountain
PARK CR.
Electro. Sites
OLE CR.
Elk Mtn.
Calplock Mountain
Essex
CR.
Blacktail
2174.
2132
2339
Running Rabbit Mountain
THEODORE
CANYON
Snowslip
STEVENS
JOHN F
TRAIL
Mount Furlong 2253
2337
Creek



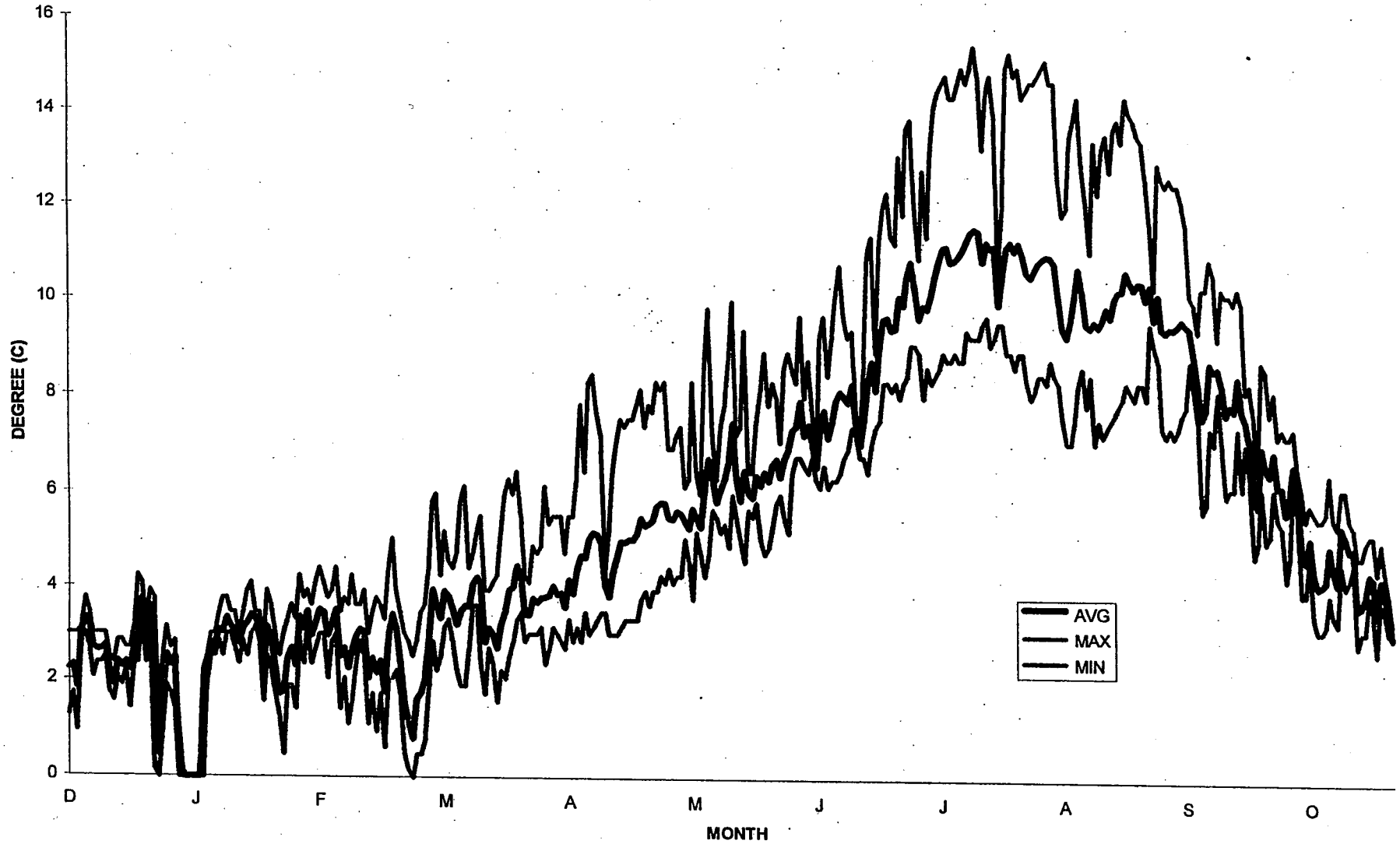
= Electrofishing Sites

1. Coal Cr.
2. Pinchot

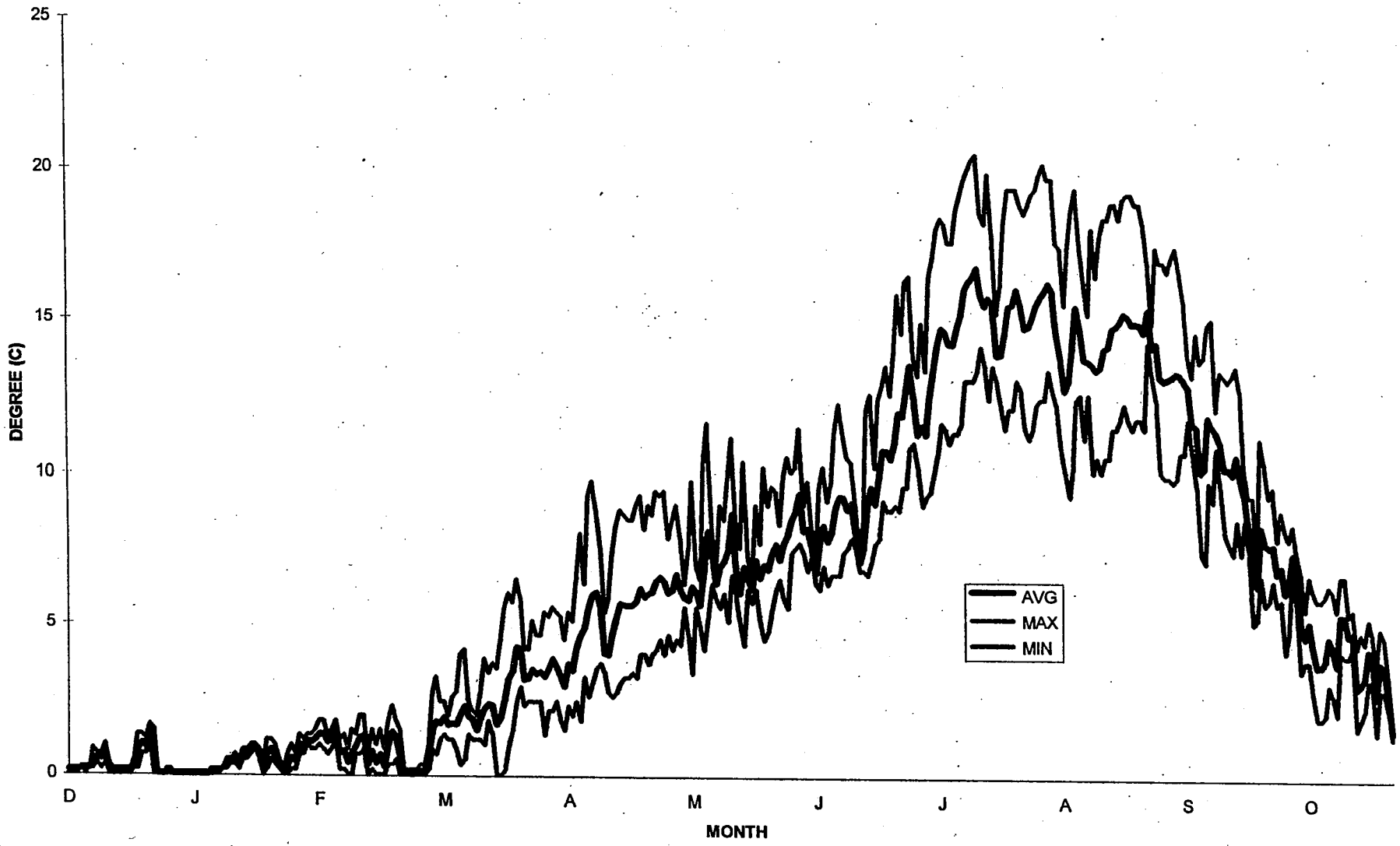

A
B
C
Lincoln Creek
Lincoln
PARK
RIVER
CANYON
PASS
Tunnel
MONTANA
Lincoln En
= Electro. Sites


NATIONAL
Ridge
Sullivan Meadow
Dutch
Anaconda
Camas
Dutch
Ridge
Roger Meadows
Christensen Meadows
Glacier View Mtn
6097
1859
CAMAS OR OVERLOOK
Camas Creek Park Entrance
McGee
Creek
McGee Meadow
Howe Lake
Howe
Huckleberry Mtn
6593
2010
BIG CR
NORTH
HUCKLEBERRY FIREBURN
MCGEE MDW OVERLOOK
McGee
Fish
Howe
McGee Hill
APGAR
NORTHERN FLATS
Hell Roaring Cr
Fern
Creek
FISH CREEK
Apgar
Dry Cr
MOUNTAINS
Fool Hen Hill
Rubideau
APGAR
5236
Quarter Circle Bridge
West Entrance
Park Headquarters
Rubideau Spr
Creek
Sloan Ranch
Airfield
West Glacier
GLACIER RIM
RECREATION
1679
1697
803
803F
527
5265
225
548
529SB
1081S
186
266
265
80

PARK CREEK TEMPERATURE PROFILES -1998



COAL CREEK TEMPERATURE PROFILES -1998



OLE CREEK TEMPERATURE PROFILES - 1998