

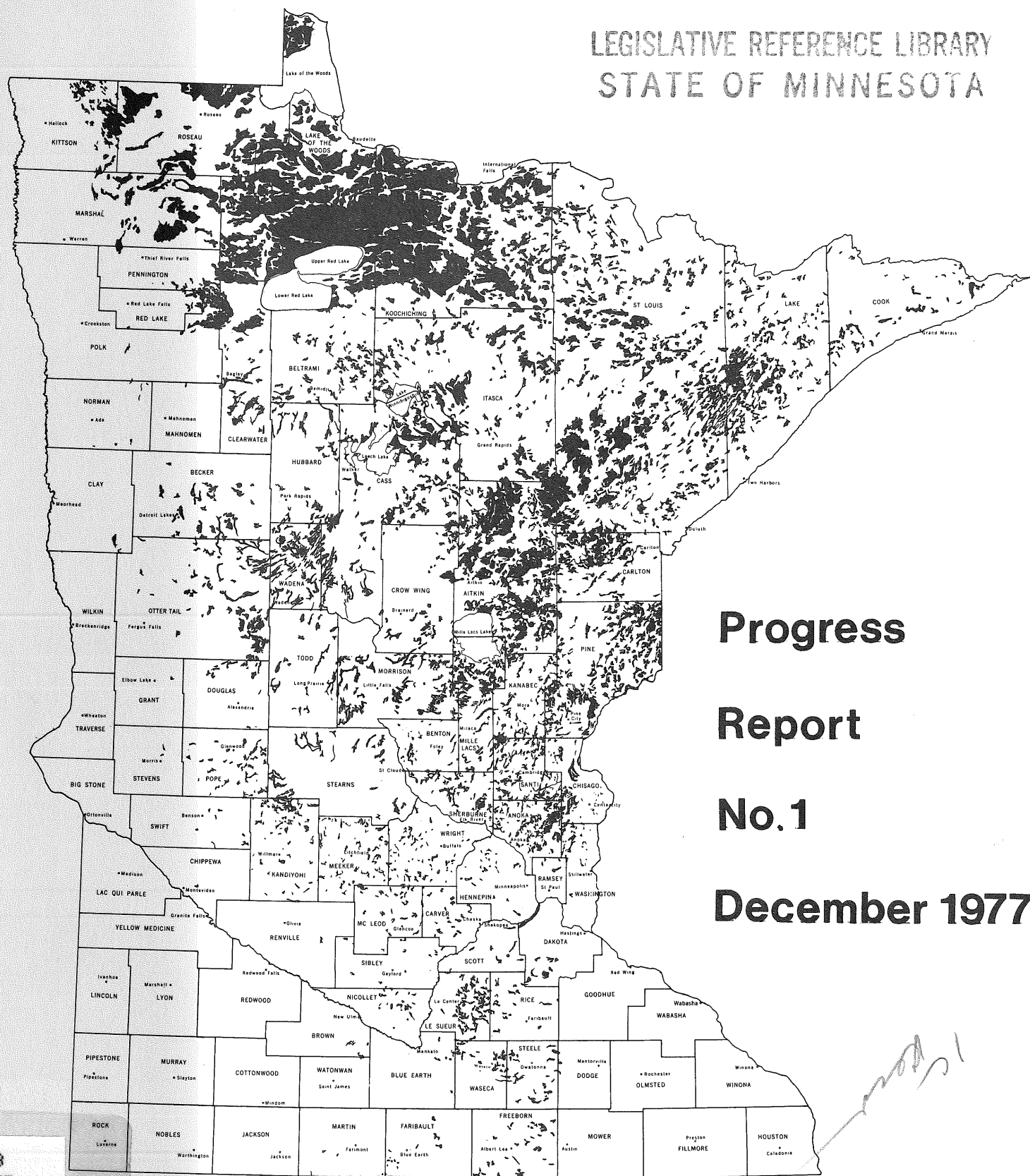


781367
2 copies

PEAT PROGRAM

1978-1979 BIENNIUM LEGISLATIVE APPROPRIATION

LEGISLATIVE REFERENCE LIBRARY
STATE OF MINNESOTA



**Progress
Report
No. 1
December 1977**

GB
625
.M6
M65x
no. 1

4430208

LEGISLATIVE REFERENCE LIBRARY
STATE OF MINNESOTA

290 MINNESOTA PEAT PROGRAM PROGRESS REPORT

December 1977

Submitted by the

Minnesota Department of Natural Resources

Funded by the

Minnesota State Legislature

(1978 - 1979 Biennium)

TABLE OF CONTENTS

	PAGE
Program Foreword	1
Water Resources of Peatlands	2
The Importance of Peatland Habitats to Small Mammals in Minnesota	3
Bird Population Structure and Seasonal Habitat Use as Indicators of Environmental Quality of Peatlands	9
Utilization of Minnesota Peatland Habitats by Large Mammals and Birds	11
The Relationship of Amphibians and Reptiles to Peatland Habitats in Minnesota	11
Agricultural Reclamation of Peatlands	12
Forestry Reclamation of Peatlands	12
Reclamation Demonstration Project	13
Peat Utilization and the Red Lake Indian Reservation	13

PEAT PROGRAM PROGRESS REPORT

1978 - 1979 Biennium Legislative Appropriation

FOREWORD

The studies in this part of the Peat Program are complementary, as well as supplementary, to those funded by the Upper Great Lakes Regional Commission in the Phase II -- Peat Program.

These studies cover such areas as water resources of peatlands, the importance of peatland habitat to wildlife, forest and agriculture reclamation of peatlands, and the potential impact of peat development or non-development on, or adjacent to, the Red Lake Indian Reservation. The results of these studies will provide information necessary for the formulation of a policy governing the management of state peatlands.

Water Resources of Peatlands (Dr. Ken Brooks, University of Minnesota)

TASK 1: SELECT STUDY AREAS

Three study areas have been selected for field instrumentation. The "wild bog" area is located in an 11 square mile portion of the Toivola Bog draining into Joula Creek. This area coincides with a portion of the proposed Bay-Houston lease application. The Corona bog near Cromwell has been selected as the existing peat harvesting operation. Reclamation studies are to be conducted at the Fens Bog at Wilderness Valley Farms. near Zim, Minnesota.

TASKS 2 and 3: FIELD INSTRUMENTATION

All field equipment has been ordered but not all equipment has been received. Instrumentation that either has been or is being installed for each area include:

Toivola Bog

20 - water table wells	outlet gauging station
60 - piezometers	1 - recording well

Corona Bog

weather shelter
precipitation gauge with wind shields
10 - water table wells
1 - recording well
2 - ditch outlet gauging stations

Fens Bog

1 - ditch outlet gauging station
2 - lysimeters

TASK 4: REVIEW LITERATURE

A portion of the literature pertaining to peatlands in Minnesota has been obtained especially as it relates to specific items in the study.

TASKS 5 - 9

These tasks have not been initiated at this time. The project team did investigate the U. S. Bureau of Mines Vari-Nip press peat dewatering experiment in the Red Lake bog and obtained water quality samples to determine the effect on water quality. All results have not been received from the supporting laboratory but at the site a 100% increase in specific conductance was observed in the water discharged from the press as compared to the water entering the press.

The Importance of Peatland Habitats to Small Mammals in Minnesota (Dr. Elmer Birney, University of Minnesota)

Peatlands recently have received much attention from industry, biologists, and environmentalists with respect to their utilization. Management decisions must consider what plants and animals live in peatlands and how they will be affected by major disturbances to these areas. The distributional status of most small mammals in Minnesota is reasonably well understood, however, essentially nothing is known on small mammal presence in peatlands, nor on the importance of peatlands to mammals.

The objectives of the small mammal study are: 1) to determine what species of small mammals live in peatland habitats in Minnesota; 2) to determine the relative reliance of these species on peatlands; and 3) to assess the extent to which small mammals interact with the unique environmental conditions of peatlands, especially species utilizing peatlands as a primary

or exclusive habitat. Field research has been organized into two units:

1) a state-wide survey of small mammals using peatland habitats; and 2) an intensive, year-long study of small mammals utilizing a particular peatland site.

PROGRESS OF STUDY

At this time, fieldwork for the state-wide survey has been completed.

This involved a preliminary reconnaissance of the state peatlands, followed by extensive trapping of selected areas. For purposes of the survey, the state was divided into 6 regions as follows: Northeast (Lake County), North-central (Koochiching County), Northwest (Roseau County), East-central (Carlton County), West-central (Wadena County), and South-central (Anoka/Chisago Counties). Peatland habitats representative of the area, as well as an adjacent non-peat habitat, were sampled for each region. A maximum of 8 sites was trapped per region because of equipment and time constraints (7 peat, 1 non-peat).

Several trap types were employed due to the hypothesized diversity of small mammals in peatlands. These were: Museum Special kill traps, rat kill traps, Sherman live traps, cone pit-fall traps, and tube live traps. All traps captured small mammals except the tube trap. Its use was discontinued after the first trapping session. At each trap site, a 2 by 20 or 4 by 10 station grid was constructed and each trap station spaced 10m apart. One Sherman and one Museum Special were set at each station. Cone and rat traps were placed between trap rows at alternate stations. Each trapping site was checked twice a day for 4 days. Table 1 gives a summary of trapping efforts.

A total of 1593 individuals, representing 18 species, were taken from the 6 regions. Table 2 summarizes the trapping results.

Site descriptions were associated with the small mammals trapped. Habitat information was gathered at two locations within each site. Vegetational analysis was modeled after the releve' method of Braun-Blanquet. The habitat was divided according to vegetation type, height class, and species present. Values for coverage, abundance, and sociability were assigned to the plant species. Physical parameters were also recorded. These included depth of peat, temperature of peat at several depths, depth of water table, and pH of ground water. Peat samples were taken for later analysis by Dr. R. S. Farnham, Soil Science, University of Minnesota.

FUTURE WORK

The small mammals collected are being held at the Bell Museum of Natural History, University of Minnesota, Minneapolis, Minnesota. These will be analyzed later this winter. Standard external measurements will be taken for each specimen. They will be autopsied for reproductive information, stomachs will be preserved for later analysis, and ectoparasites will be collected from selected specimens. Many will be prepared for storage in the permanent collection at the Bell Museum.

Information gathered from the trapping, habitat analysis and autopsies will be compiled and examined, and later be transcribed onto computer cards for statistical analysis.

Preparation for the intensive study includes final site choice, refinement of field techniques, and procurement of equipment. Fieldwork on this aspect

of the study is expected to begin late spring, 1978.

Table 1. Summary of trapping effort

Total number of regions: 6

Total number of sites: 40

Length of field season: August 4 - November 18

Total number of traps set: 1020

Total number of trapnights: 4080

region	trap period	# sites	# traps
NE	August 31 - September 10	8	880*
NW	September 17 - 27	7	700
NC	October 1 - 11	8	800
EC	October 18 - 27	8	800
WC	November 2 - 7	5	500
SC	November 12 - 18	4	400

* after the NE trapping session, a fifth type of trap was discontinued due to lack of trapping success

Table 2. Summary of trapping results for all regions.

Species	Total Capture	Regional Occurrence					
		NE	NC	NW	EC	WC	SC
Masked shrew (<u>Sorex cinereus</u>)	482	X	X	X	X	X	X
Arctic shrew (<u>Sorex arcticus</u>)	80	X	X	X	X	X	X
Pigmy shrew (<u>Microsorex hoyi</u>)	40	X	X	X	X	X	X
Short-tailed shrew (<u>Blarina brevicauda</u>)	66	X	X	X	X	X	X
Star-nosed mole (<u>Condylura cristata</u>)	1			X			
Snoeshoe hare (<u>Lepus americanus</u>)*	9	X	X	X	X	X	X
Franklin's ground squirrel (<u>Spermophilus franklini</u>)	1			X			
Eastern chipmunk (<u>Tamias striatus</u>)**	3	X		X			
Least chipmunk (<u>Eutamias minimus</u>)**	1			X			
Red squirrel (<u>Tamiasciurus hudsonicus</u>)*	7	X	X	X	X	X	
Northern flying squirrel (<u>Glaucomys sabrinus</u>)	4		X	X			
Deer mouse (<u>Peromyscus maniculatus</u>)	67		X	X	X	X	X
White-footed mouse (<u>Peromyscus leucopus</u>)	12					X	X
Bog lemming (<u>Synaptomys</u> spp)***	8	X	X	X			
Red-backed vole (<u>Clethrionomys gapperi</u>)	402	X	X	X	X	X	X
Meadow vole (<u>Microtus pennsylvanicus</u>)	398	X		X	X	X	X
Meadow jumping mouse (<u>Zapus hudsonius</u>)**	2	X		X			

* regional occurrence includes actual capture and sightings

** capture affected by hibernating habits

*** identification to species requires further examination

Bird Population Structure and Seasonal Habitat Use as Indicators of
Environmental Quality of Peatlands (Dr. Dwain Warner, University of
Minnesota)

PROJECT NATURE AND OBJECTIVES:

This study is designed to obtain quantitative data on the population structure of bird species that utilize resources of the several vegetation types growing on major peat deposits in Minnesota. All types of populations are included: migrating birds, non-breeding season (migrant) residents, permanent residents and breeding season (migrant) residents.

Both plot transects and line transect census techniques are in planning stage and equipment for them is being inventoried and ordered, including banding and color marking supplies and radios. Methods for determining resource use applicable to birds in bog habitats are under review for the intensive, large scale study periods from April 1 through October, 1978 and 1979.

Extensive survey of literature pertaining to birds in peat lands reveals that almost nothing is known about the subject. The literature review on all aspects of peat land structure and ecology is continuing.

Four graduate students and four other trained biologists have been selected to begin field work April 1.

Two persons began the winter survey in Red Lake Bog on 15 November. This will continue through 31 March at which time the study will become expanded to eight more people.

All of these people are participating in continuing discussions and literature review as the project develops this fall and winter.

LITERATURE SEARCH:

Information on all aspects of peat and peatland ecology on a world wide basis is being reviewed. Reports relevant to this particular project are made available to the field personnel and to the laboratory for persons not yet in the field.

STUDY SITE SELECTION

The objectives of this study require that the field study sites be within the major peatlands in Minnesota. Two site surveys were made this fall as follows:

August 23, 24, 25 - Itasca, Koochiching, Lake of the Woods and Beltrami Counties.

September 24, 25, 26 - Cass, Aitkin, St. Louis, Koochiching and Itasca Counties.

These surveys centered on vegetation types growing on and adjacent to peat lands and their accessibility to roads and living facilities. Prior to the field surveys we examined in detail descriptive information, aerial photos, and orthophoto and topographic maps of these counties.

Through interviews with personnel in several branches of the Minnesota Department of Natural Resources, especially Les Blakesley, Big Falls, Merlyn Wesloh and others at Bemidji and Philip Watt at Norris Camp, Red Lake Wildlife Management Headquarters, much was learned about the "big bog" and the severe limitations to working in it.

Since the DNR living facilities at Norris Camp would be available to the group

the entire year and tentatively for nearly the entire year at Waskish (except for the walleye spawning period), those two areas were selected as field bases. The winter study is currently operating out of Norris Camp.

FIELD RESEARCH IN PROGRESS:

Field research began 15 November at which time the methods to be followed for the winter studies were established. This work centers on determining species and numbers of birds by habitat type by the line transect system of Emlen (Auk, 94:395-408. 1977 (July)). Food resources utilized by these birds are noted and mapped by habitat type but are not at this time quantified. This phase of the research will continue through 31 March.

Beginning on 17 December a search will be made by a group of seven persons for specific study sites in the Red Lake Bog that will be utilized in the April-October intensive studies.

Utilization of Minnesota Peatland Habitats by Large Mammals and Birds (Dr. John Tester, University of Minnesota)

Several trips to different parts of northern Minnesota's peatlands were needed to find a study site with necessary vegetation types and enough roads to follow large mammals such as white-tailed deer marked with radio transmitters. The site selected was the Lake Alice Bog, Hubbard County. The study will focus on species such as deer, snowshoe hare, striped skunk, porcupine, and ruffed grouse. The field work was begun late in November.

The Relationship of Amphibians and Reptiles to Peatland Habitats in Minnesota (Dr. Philip Regal, University of Minnesota)

The objectives of this study are: 1) to determine what reptiles and amphibians are found in major Minnesota peatlands; 2) to determine which species rely

on peatlands in comparison to adjacent non-peatland areas; and 3) to identify some of the ecological factors responsible for differences. Fieldwork on this project will begin in the coming spring. The necessary background literature search and evaluation was done at the principal investigator's expense.

Agricultural Reclamation of Peatlands (Dr. Rouse Farnham, University of Minnesota)

Peat samples to be used for greenhouse studies have been obtained from the following areas:

- Wilderness Valley Farms - surface peat
- Wilderness Valley Farms - subsurface peat
- Wilderness Valley Farms - first 1 foot substratum
- Meadowlands White Cedar Bog - surface highly decomposed
sapric peat
- Roseau non-acid reed sedge - surface peat
- Anoka County - surface peat

These peat samples are to be used in the greenhouse to compare agricultural plant growth potential using tomatoes. Various fertilizations will also be used.

Forestry Reclamation of Peatlands (Dr. Edwin White, University of Minnesota)

Forest species to be tested have been determined in cooperation with foresters from the Iron Range Resources and Rehabilitation Board. A source for planting stock has been obtained and plot designs have been laid out using standard statistical methods. Materials will be ready for spring planting and fertilization.

Reclamation Demonstration Project (Don Grubich, IRRRB)

Approximately 16 acres of peatland at Wilderness Valley Farms have been prepared for agricultural, forestry, and sewage treatment reclamation studies. Many of the ditches draining these plots have been cleaned. Experimental areas to be mined have been marked off in the field and are ready for excavation.

Peat Utilization and the Red Lake Indian Reservation (Walter Butler Company)

The study is now approximately 84% complete. The baseline information and impact analysis is essentially complete as of the end of this period. What remains is to complete the information transfer to the residents and record their attitudes toward peat utilization.

The focus of the study during this period has been disseminating the information generated by this study. A second meeting of interested individuals, representatives from various Red Lake agencies, and Tribal Leaders was held on December 1, 1977. The meeting was held in the Tribal Council Chambers and was attended by key Tribal members. Again, the hydrological concerns, such as the potential impact on the Red Lake, was of paramount concern. Also, considerable discussion centered around the wildlife in the bog areas. Very little interest was expressed in potential economic benefits to the Tribe. However, this topic will be elaborated upon in later meetings. The following individuals were attendant at the meeting:

Roger Jourdain	Chairman, Red Lake Tribal Council
Robert Butler	Walter Butler Company
Richard Murphy	Walter Butler Company
Daniel Russell	Walter Butler Company
Floyd W. Jorgenson	U of M Agricultural Extension Service Director, County Extension, Red Lake
Sheldon Anderson	Red Lake Forestry
Richard E. Rolling	Red Lake Soil Survey
James Strong	Red Lake Tribal Planning
Stewart W. Irwin	Mill Manager, Red Lake
Rod Jourdain	Red Lake Tribal Council

During this meeting plans for a public meeting were discussed. It was the recommendation of the Tribal representatives to postpone any major meeting until after the Holidays. A better attendance would be likely after the first of the year. Consequently, the Walter Butler Company has asked for a 30 day extension of the completion date of the contract. It remains our intention to complete the study as near to the original January 15, 1977 completion date as the meeting date allows.

PROGRESS SINCE LAST REPORT

Since the last report, background research and impact analysis has been primarily completed. Final research continues in the Forestry and Economic Analysis section. Completion of the editing and narrative for the report has been given attention in this period. Input was received from Peat Advisory Committee members in response to our third progress report. This input has been reviewed

for incorporation into our report.

The additional progress of this period will be specified under the topics listed in the study proposal.

TRIBAL RELATIONS - PROJECT MANAGEMENT

Approximate portion of study represented by this topic - 15%

Approximate portion of this topic complete - 85%

During this last period, this section concentrated upon transferring information to Tribal Leaders and Agency representatives. Several private discussions with Reservation residents complemented a general meeting of interested individuals.

GEOLOGY - TOPOGRAPHY - PEAT TECHNOLOGY

Approximate portion of study represented by this topic - 16%

Approximate portion of this topic complete - 98%

This portion of the study is essentially complete. Minor corrections and revisions were undertaken to improve the section.

ECONOMIC ANALYSIS

Approximate portion of study represented by this topic - 13%

Approximate portion of this topic complete - 80%

During this period, the focus of this section has shifted to the assessment of the possible economic benefits of Peat Utilization to the Reservation. Consideration was given to additional area employment, revenues from leasing of Tribal lands and small scale Tribally owned peat utilization industries.

FORESTRY - ECOLOGY

Approximate portion of study represented by this topic - 10%

Approximate portion of this topic complete - 75%

The wildlife and general ecological impact analysis has been essentially completed during this period. Assessment of the forestry impacts continues with the development of forest utilization profiles of the area.

HYDROLOGY - WATER QUALITY

Approximate portion of study represented by this topic - 15%

Approximate portion of this topic complete - 98%

The hydrological analysis is essentially complete. Minor corrections and revisions were undertaken to improve this section.

SOCIAL - ISSUES IDENTIFICATION - OPINION SURVEY

Approximate portion of study represented by this topic - 27%

Approximate portion of this topic complete - 70%

The process of disseminating information to Reservation residents was the focus of the period. A second meeting was held involving several of the area residents with an active interest in the Peat Program. Emphasis was placed on involving the opinion leaders of the Tribe. Also, private meetings were held with several members of the Tribe.

RECAP OF PROGRESS

The following table indicates the estimated progress, by topic, completed as of the end of this period.

TOPIC	Portion of Study of Each Topic	Portion of Topic Completed	Portion of Study Completed By Topic
Tribal Relations-Project Management	15%	85%	13%
Geology-Topography-Peat Technology	16%	98%	16%
Economic Analysis	13%	80%	10%
Forestry-Ecology	10%	75%	8%
Hydrology-Water Quality	15%	98%	15%
Social-Issues Identification	27%	70%	19%
Miscellaneous	<u>4%</u>	84%	<u>3%</u>
	100%		84%

TO BE COMPLETED BY THE END OF THE NEXT PERIOD

The study will be completed by the end of the next period. This represents the final progress report. The completed study will be submitted with the Final Report.

