Minnesota Natural Resources Department: Environmental Assessment Files Regarding State Parks

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Version 3
August 20, 2018

Rough Draft Copy - August 30, 1973

IRMINA PLEASE RETURN AND SEND FINAL ASSESSMENT

ENVIRONMENTAL ASSESSMENT

ST. CROIX STATE PARK

1. Description of the Proposed Action - Lands to be acquired or developed are within the statutory boundaries of St. Croix State Park. The park is located in the east central part of the state, in Pine County, midway between Minneapolis-St. Paul and Duluth. The park is twenty miles east of Interstate 35 and the city of Hickley, off State Highway #48. The St. Croix and Kettle rivers border on the park. Established acreage is 34,037 acres, and it is the second largest park in the state park system.

The inception of the Civilian Conservation Program under the National Park Service resulted in a survey for an outlet for relief work which would benefit the state. The St. Croix area was selected because it was equal distance between the three largest metropolitan centers in Minnesota. The development work was undertaken in 1935 and the major portion of work was completed about 1941. In 1943 the St. Croix Recreation Demonstration Area became St. Croix State Park and was made a part of the Minnesota Park System.

The park's recreational facilities include campgrounds, a swimming beach and picnic area, a trail center area for horseback riding and snowmobiling, nature trails and over 174 miles of snowmobile trails, three large group camp facilities for under priviledged and intercity children and four boat and canoe launches. Winter camping at the trail center has become popular since electrical outlets were provided for snowmobilers. The park has an active naturalist program and provides guided and self guided trails.

The main management goal of the park is to provide many recreational facilities for the entire state. The size of the park and many recreational opportunities available have made this park a destination area. Visitations are of one or two weeks duration. A secondary goal is to protect and preserve the resources of the area including those portions of the St. Croix and Kettle rivers.

2. Description of the Environment - The St. Croix park area was once part of a shallow sea. Earth movements succeeded in raising this portion of the state above sea level, then the great lava flows followed along the north shore. These followed down what is now the valley of the St. Croix River and outcropped near Interstate State Park near Taylors Falls. The glaciers scoured the St. Croix

Valley and in the region of the park left a gravel plain of some extent with morainal ridges in the northeast part of the park. A tremendous amount of water flowed southward through the St. Croix Valley with the smaller tributaries of the Kettle, Sand and Bear creeks eroding channels through the plains and hills. In later geologic time, vegetation took over, so that in the beginnings of recent history this portion of the St. Croix Valley was covered with a magnificant white pine forest. The great lumbering industry ultimately removed the white pine forest. Today a beautiful second growth forest of pine, spruce, and hardwoods is interspersed with open meadows which form ideal conditions for the many whitetailed deer, and other wildlife.

The years following the logging operations found settlers coming in and attempting to farm the lands which were opened up in the timber harvest. By the early thirties it was determined that the soils were not sufficiently productive to warrant agricultural production.

Just as the streams are primitive in character so are the fish species. In the upper reaches, the rivers harbor one of the early remaining populations of Lake Sturgeon. Only in the St. Croix and Rainy River watersheds can many of these fish be found in Minnesota today. The other principle species are the smallmouth bass, muskellings, walleye, redhorse, northern pike and channel catfish.

Because of the wild character of the land good populations of big game such as whitetail deer and black bear are found. Ruffed grouse and woodcock are common and provide good hunting outside of the park. Wood ducks and other waterfowl find the river attractive. Shore birds and other water birds are commonly seen throughout the river. Bald eagles are spotted frequently in the ~~surrounding area.~~ park.

3. The Environmental Impact of the Proposed Action - Enhancement of the environment will result through improved management practices such as timber stand improvement, tree planting, sodding, seeding and erosion control. Park development will be minimized to preserve the natural, biological and geological resources of the area. An effort will be made to control and limit visitor use capacity and to conserve natural values.

Current management policies on acquisition and development of state parks provides for an area, approximately one-fifth which is developed for concentrated recreational

use with the remaining four-fifths providing a natural environmental area and buffer zone designed for limited use such as trails. The natural area of St. Croix State Park perhaps is closer to ninety percent.

Public ownership of lands along the St. Croix River and Kettle rivers will offer protection to those parts of the river. The animal and bird populations will be protected in the park since the park must be managed as a game preserve under state law.

Currently there is 1,700 acres of private ownership remaining to be acquired within the park boundaries. This is an small percentage compared to the ~~total~~ present public ownership. Acquisition of the remaining private land will be at the convenience of the owner. These lands will be acquired if and when the owner wishes to sell to the State of Minnesota.

Tax loss experienced by the county will be insignificant. Most of the land has been in public ownership since the early forties. The acquisition remaining will be spread over a period of years.

Pine County has benefited from the establishment and development of the park. The county has, however, probably experienced the leveling off of these economic benefits. Park attendance is expected to increase to over one million by 1980 and this will increase the economic activity in the area ~~a small amount~~ but ~~at~~ to a lesser degree than the increase in attendance.

There is expected to be only one or two relocations, if any, when the remaining land is acquired. Those persons relocated will be eligible for relocation assistance, compensation and moving expenses.

4. Mitigating Measures Included in the Proposed Action - All existing overhead power and telephone lines will be buried and when burial is not physically possible or economically feasible, the lines will be screened. Present development policy include provisions for burial of all overhead lines when new development takes place. Lines which serve no demonstrated needs will be removed.

Any buildings which are acquired with the parcel will be removed, if they are not to be used for park purposes.

When buildings are removed the area is returned to a natural condition.

To acquire the remaining private land within the park a land transfer transaction will be discussed before acquisition. This would allow the state to fill out the boundaries and the present owner to remain in the immediate area with a minimum of disturbance on a comparable plat of land. IF A LAND TRANSFER IS NOT POSSIBLE THEN AN OPTION WILL BE TAKEN FOR FEE SIMPLE ACQUISITION.

5. Any Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented - There will be an adverse effect by withdrawing private land from the tax roles of the local taxing districts. This will be minor however. Acreage remaining to be acquired within the boundaries is approximately 1,700 acres or four percent of the total land area. Since most of the land area within the park was in public ownership before acquisition the CCC and WPA program, very little tax loss has been experienced. The local communities have benefited economically by the utilization of the area as a park.

6. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long Term Productivity - The immediate area of the St. Croix and Kettle rivers would have eventually been developed with summer cabins and homes. Since the area is ~~removed~~ distant from any sizeable city it is doubtful that the area would have provided for year around residential dwellings. The remaining area back from the rivers could have ~~had the~~ been timber harvested ~~from it~~. Some of this land could also have been used for marginal agricultural production however this is also most doubtful. Most of the land in Pine County is a gravel plain. During the ~~Great~~ Great Depression much of the land became tax forfieted, which was the reason for the establishment of such a huge land area as a recreational demonstration area.

It is doubtful that much use could have been made of this area. The considered best use is for recreation. Secondary use, which would ~~also~~ not necessarily be economical, would be for agriculture and timber harvesting.

By establishing the area as a recreational area, many persons can use the resources continually over a long period of time and during all seasons of the year. The many resources: water, land, timber and wildlife, will be protected from development and explortation.

Any Irreversible and Irretrievable Commitments of Resources Which Would be Involved in the Proposed Action Should it be Implemented - State ownership and development of this area, as park and open space will enhance the range of resource uses. Acquisition and development of land with assistance of the Land and Water Conservation Fund will preclude any uses other than for park and open space.

Alternatives to the Proposed Action - Once the park has been established by the legislature there remains two alternatives: (1). No action (2). Acquisition of lands within the boundaries.

No Action - If no action is taken to acquire and fill out the boundaries of a park, then the goal of developing the area for recreation is denied the public. The goals of protection and preservation are lost.

Acquisition - Since the Division of Parks and Recreation does not have the general authority of eminent domain acquisition must be accomplished over a period of years. This is done with the owner's consent by optioning a parcel of land or by land transfer. Eventually most land is acquired, development is accomplished and the area provides recreational opportunities for the public.

ENVIRONMENTAL ASSESSMENT

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5. Any Adverse Environmental Effects Which Cannot be Avoided Should the Proposal be Implemented- There will be an adverse effect by withdrawing private land from the tax roles of the local taxing districts. This will be minor however. Acreage remaining to be acquired within the boundaries is approximately 1,700 acres or four percent of the total land area. Since most of the land area within the park was in public ownership before acquisition the CCC and WPA program, very little tax loss has been experienced. The local communities have benefited economically by the utilization of the area as a park.

6. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity - The immediate area of the St. Croix and Kettle rivers would have eventually been developed with summer cabinsand homes. Since the area is distant from any sizable city it is doubtful that the area would have provided for year around residential dwellings. The remaining area back from the rivers could have been timber harvested. Some of this land could also have been used for marginal agricultural production however this is also most doubtful. Most of the land in Pine County is a gravel plain. During the Great Depression much of the land became tax forfieted, which was the reason for the establishment of such a huge land area as a recreational demonstration area.

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   By establishing the area as a recreational area, many persons can use the resources continually over a long period of time and during all seasons of the year. The many resources: water, land, timber and wildlife, will be protected from development and exploration.

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SF-00006-05 (4/86)

DEPARTMENT : DNR - Fisheries

STATE OF MINNESOTA

Office Memorandum

DATE : July 12, 1988

TO : Dick Hassinger, Chief, Section of Fisheries

FROM : Ed Feiler, Regional Fisheries Manager, Region 3 EZF

PHONE : 218-828-2624

SUBJECT : Request to Control Nuisance Otters

Attached is a request, through you, to Larry Shannon, to control nuisance otters in one of Hinckley's muskie ponds. Henry Wulf informs me that this type of request must be made of the Director. Will you review the request, and, if approved, request approval from the Director.

ELF/lkm
cc: Dick Trombley, Area Fisheries Supervisor
✔David Novitski, Regional Parks Supervisor

607 90
JOHN DAILY

612 384 6147

← Mo. ago fish tech asked to shoot otter + Morgan

RECEIVED
JUL 12 1988
REGIONAL HEADQUARTERS
DIVISION OF PARKS

8/8/88
Talked to Trombley
doesn't seem to be a prob. at
this point. will follow and provide
data if a prob.

SF-00006-05 (4/86)

DEPARTMENT : DNR - Fisheries

STATE OF MINNESOTA

Office Memorandum

DATE : July 12, 1988

TO : Larry R. Shannon, Director, Division of Fish and Wildlife

THRU: Richard L. Hassinger, Chief, Section of Fisheries

FROM : Edward L. Feiler, Regional Fisheries Manager, Region 3 ELF

PHONE : 218/828-2624

SUBJECT : Request to Control Nuisance Otters

The Hinckley Area Fisheries Headquarters operates a drainable (intensive culture) muskellunge rearing pond in St. Croix State Park, a statutory game refuge. Beginning last year, and continuing this year, otters have become numerous (four) in the vicinity of this pond. The opinion of Dick Trombley, Area Fisheries Supervisor, is that these otters are making significant inroads into the muskellunge yearlings we are attempting to rear. Dick has been involved in the operation of this pond, in various capacities, for 20 or so years. This is the first time in which otters have created a problem, to his knowledge.

I would like to request permission for the Hinckley Area Fisheries Headquarters personnel to control the otters by trapping, or, if needs be and permissible, by shooting them. Henry Wulf, Regional Wildlife Mnager, informs me that live trapping would probably not be successful. This matter was discussed with David Novitski, Regional Parks Supervisor, so that he is also aware of this request. It has also been discussed at a Regional staff meeting. Should the request be approved, all otters taken will be turned over to the local Conservation Officer for disposition.

ELF:RLH/lkm
cc: Dick Trombley, Area Fisheries Supervisor
David Novitski, Regional Parks Supervisor


JUL 1988
RECEIVED
DNR & PARKS & REC

3632

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
DIVISION OF FISH AND WILDLIFE

SPECIAL PERMIT NO. 3632
(General and Miscellaneous)

DATE: April 15, 1982

TO WHOM IT MAY CONCERN:
Permission is hereby granted to: Dr. John C. Schlotthauer and B.E. Stromberg
Department of Veterinary Pathobiology
College of Veterinary Medicine
University of Minnesota
205 Veterinary Science
1971 Commonwealth Avenue
St. Paul, Minnesota 55108

to take, transport, and possess two (2) white-tailed deer in St. Croix State Park for studies of the liver fluke.

Parts of said deer not used for research studies shall be disposed of at the direction of the local Conservation Officer.

This permit is valid from date of issuance through April 24, 1982, but may be revoked at any time.

JEROME H. KUEHN, ACTING DIRECTOR
DIVISION OF FISH AND WILDLIFE

with Jerome H. Kuehn

Copies to: Division of Enforcement
Roger Holmes, Chief, Section of Wildlife
Lee Hemness, Area Wildlife Manager
Robert Kangas, Conservation Officer

STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

St. Croix State Park, Rt. 3, Hinckley, MN 55037 612-384-6591

10/27/80

October 23, 1980

Parks & Recreation
Don D. Davison, Director
Box 39 Centennial Office Building
St. Paul, MN 55155

Dear Don:

If you have not already heard, I just received the information from the License Center on the successful applicants for our November special deer season coming up this fall at St. Croix State Park and thought I would pass it along to you.

We received 681 permit applications from Minnesota residents for the 600 permits to be given out. The computer made random selections from the applications and as you can see by the number of applications versus the number of permits, the chances of being selected were close to 100%. There were 53 Pine County residents (23 from the Hinckley area, 26 from the Pine City area, and 4 from other areas in the county) that received permits. All of the local land owners around the park that I talked with were successful in receiving permits.

Pat Karns from the Big Game Research Center at Grand Rapids and a crew from the Division of Wildlife will also be present taking liver and teeth samples, along with weights and measurements of the deer for analysis to assist in future management of the deer herd in the park and surrounding area.

Sincerely,

James A Willford

James A. Willford, Manager
ST. CROIX STATE PARK

JAW:jkc

Minnesota
Environmental Quality Board
100 Capitol Square Building
550 Cedar Street
St. Paul, Minnesota 55101
Phone (612) 296-8542

September 11, 1980

Craig Cox, Office of Planning
Department of Natural Resources
658 Cedar Street
St. Paul, Minnesota 55155

RE: St. Croix State Park

Dear Mr. Cox:

The 30-day review period for the environmental assessment worksheet (EAW) on the above project ended on September 10, 1980. No objections to the EAW's determination that no environmental impact statement (EIS) is needed on the project were received. Therefore, the decision stands.

Final actions to approve or commence the project can now be undertaken.

Sincerely,

Steve Brandt

Steve Brandt, Staff
Environmental Quality Board

SB/dh

cc: Tom Balcom, Department of Natural Resources
Department of Natural Resources (Warner Road - St. Paul)

DNR-8

Yellow

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES

PHONE: 296-2270

Centennial Office Building
658 Cedar Street
St. Paul, Minnesota 55155

File No. _____

SUBJECT: St. Croix State Park Special 1980 Deer Hunting Permit

Dear Successful Permit Holder:

Congratulations! Your name has been drawn to receive a permit to hunt deer in St. Croix State Park. Your permit and a map with special regulations is enclosed.

You will be hunting in an area not normally open to deer hunting and the discharging of firearms. A deer season is being held to reduce the size of the deer herd in the park.

The park will be closed to all other uses during the time of this hunt.

Please read and become thoroughly familiar with the special regulations for this permit area.

When you have completed your hunt, surrender your permit at the park office. The information regarding deer taken is to be completed at that time.

Be careful and courteous. Good Luck!

Sincerely,

Don D. Davison, Director
Division of Parks and Recreation

DDD/FHK/hab
Enclosures

ST. CROIX STATE PARK FIREARMS HUNTING REGULATIONS
AS PRESCRIBED BY THE COMMISSIONER OF THE
MINNESOTA DEPARTMENT OF NATURAL RESOURCES

November 8 through November 10, 1980

ALL PERSONNEL ENTERING AND UTILIZING ST. CROIX STATE PARK FACILITIES MUST BECOME THOROUGHLY FAMILIAR WITH AND ABIDE BY THE FOLLOWING REGULATIONS IN ADDITION TO ALL OTHER DEER HUNTING REGULATIONS. ANYONE FOUND IN VIOLATION OF THESE REGULATIONS MAY BE RESTRICTED FROM THE PARK AND SUBJECT TO ARREST.

1. Hunters will be allowed in the open hunting area in the park one hour before sunrise, to one hour after sunset. No shooting before sunrise or after sunset.

2. Only hunters having a valid antlerless permit in posession for area 75 are allowed to hunt in the park.

3. Hunting is only permitted on public lands within St. Croix State Park. No hunting is allowed in the restricted area. Weapons must be cased and unloaded when in or crossing through the restricted area.

4. Wounded deer cannot be pursued in the closed areas unless the hunter is accompanied by a park ranger or a Conservation Officer.

5. Private lands - entry to the park through private lands bordering the park is dependent upon consent of the landowner.

6. Hunting of any wildlife other than deer is prohibited.

7. Deer wearing collars and/or tags may be taken. Collars and tags must be turned in at the main headquarters.

8. Only portable deer stands are permitted.

9. All deer taken must be registered at the park office on the day taken.

10. REMEMBER it is unlawful to discharge any firearm upon, along, or across any public roadway.

11. All vehicles must stay on main roads. Vehicles MAY NOT ENTER roped or chained areas. Vehicles blocking roads or trails will be towed away at the owners expense.

12. Off-road vehicles, including motor bikes, mini bikes and mo-peds are not permitted in the park during the November season.

13. Do not remove anything from the park except your game.

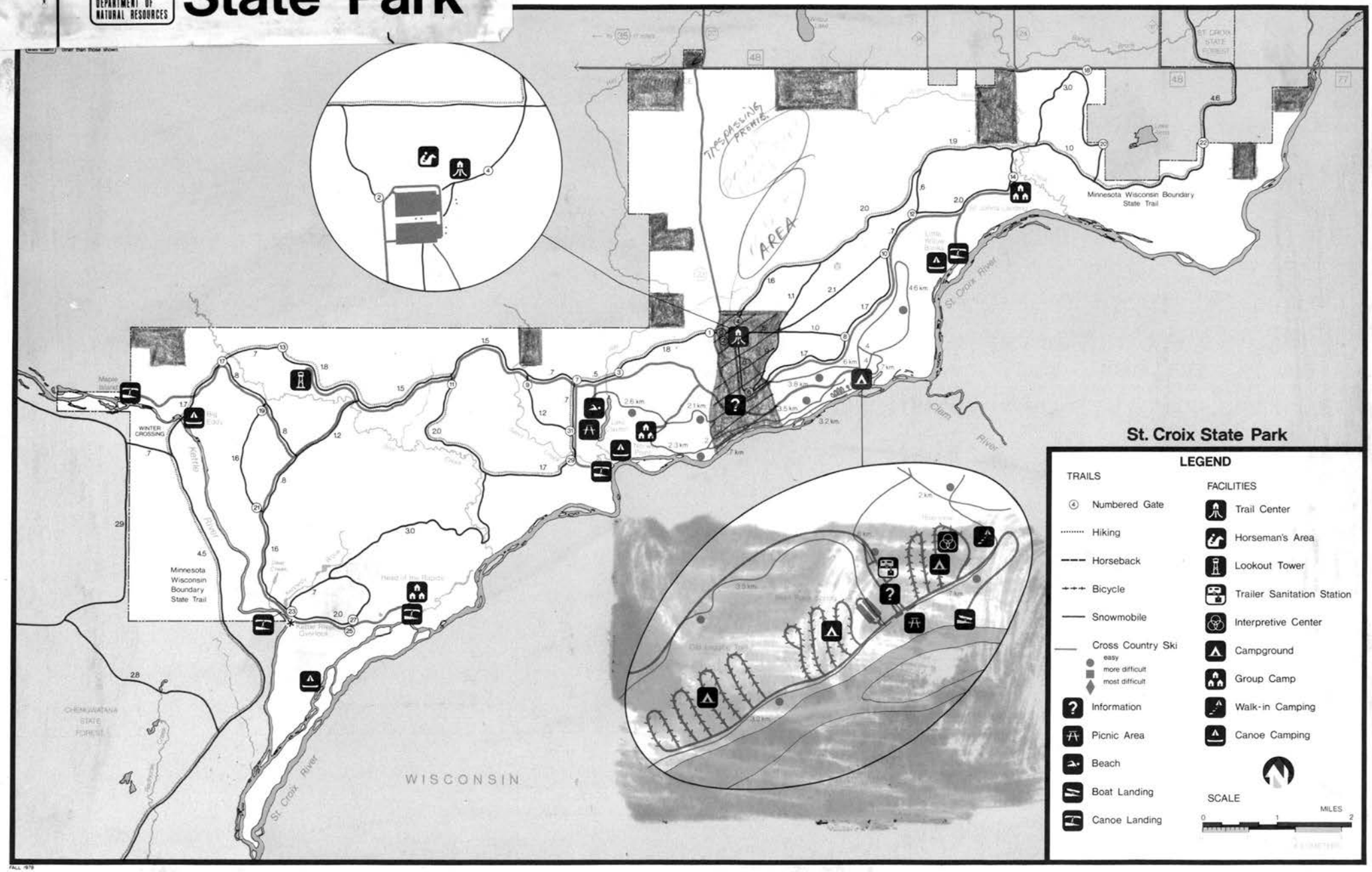
STAY ALIVE -- USE COMMON SENSE AND COURTESY

Hunting in St. Croix State Park is a privilege, not a right - preserve that privilege by respecting all property, keeping the area clean and observing all rules and regulations.

St. Croix State Park

Minnesota Department of Natural Resources

1980 FIREARM SEASON



FALL '79

Frank Knoche by Sept. 15 — text to come 800 COPIES

5

MINNESOTA ENVIRONMENTAL QUALITY COUNCIL
ENVIRONMENTAL ASSESSMENT WORKSHEET (EAW)
AND NOTICE OF FINDINGS

DO NOT WRITE IN THIS SPACE
E.R. # _____

NOTE: The purpose of the Environmental Assessment Worksheet (EAW) is to provide information on a project so that one can assess rapidly whether or not the project requires an Environmental Impact Statement. Attach additional pages, charts, maps, etc, as needed to answer these questions. Your answers should be as specific as possible. Indicate which answers are estimated.

I. SUMMARY

A. ACTIVITY FINDING BY RESPONSIBLE AGENCY (PERSON)

[X] Negative Declaration (No EIS) [ ] EIS Preparation Notice (EIS Required)

B. ACTIVITY IDENTIFICATION

1. Project name or title St. Croix State Park - Vegetative Management

2. Project proposer(s) Department of Natural Resources - Parks & Recreation

Address 1200 Warner Road St. Paul, Minnesota 55106

Telephone Number and Area Code (612) 296-8949

3. Responsible Agency or Person Office of Planning

Address Box 10 658 Cedar Street, St. Paul, Minnesota 55155

Person in Responsible Agency (Person) to contact for further information on this EAW: Craig Cox Telephone 612-296-8949

4. This EAW and other supporting documentation are available for public inspection and/or copying at: Location 1200 Warner Road St. Paul

Telephone 612-296-8949 Hours 8-4:30

5. Reason for EAW Preparation

[X] Mandatory Category -cite MEQC Rule number(s) 6MCAR 3.024.B.1.Z [ ] Petition [ ] Other

C. ACTIVITY DESCRIPTION SUMMARY

1. Project location

County Pine City/Township name Crosby

Township number 40 (North), Range Number 18 East or West (circle one),

Section number(s) 9, 10, 16 Street address (if in city) or legal description:

2. Type and scope of proposed project:

3. Estimated starting date (month/year) Fall 1980

4. Estimated completion date (month/year) Fall 1981

5. Estimated construction cost _____

6. List any federal funding involved and known permits or approvals needed from each unit of government and status of each:

Unit of Government (federal, state, regional, local)	Name or Type of Permit/Approval or Federal Funding	Status
Minn DNR	Timber Sale Permit	To be applied for as needed
Minn DNR	Burning Permit	To be applied for as needed

7. If federal permits, funding or approvals are involved, will a federal EIS be prepared under the National Environmental Policy Act? X NO ___ YES ___ UNKNOWN

II. ACTIVITY DESCRIPTION

A. Include the following maps or drawings:

1. A map showing the regional location of the project.
2. An original 8½ x 11 section of a U.S.G.S. 7½ minute, 1:24,000 scale map with the activity or project area boundaries and site layout delineated. Indicate quadrangle sheet name. (Original U.S.G.S. sheet must be maintained by Responsible Agency; legible copies may be supplied to other EAW distribution points.)
3. A sketch map of the site showing location of structures and including significant natural features (water bodies, roads, etc).
4. Current photos of the site must be maintained by the Responsible Agency. Photos need not be sent to other distribution points.

B. Present land use.

1. Briefly describe the present use of the site and lands adjacent to the site.

The site is within St. Croix State Park. The lands are used for park and recreation open space.

2. Indicate the approximate acreages of the site that are:

a. Urban developed	___ acres	f. Wetlands (Type III, IV, V)	___ acres
b. Urban vacant	___ acres	g. Shoreland	___ acres
c. Rural developed	___ acres	h. Floodplain	___ acres
d. Rural vacant	___ acres	i. Cropland/Pasture land	___ acres
e. Designated Recreation/Open Space	36 acres	j. Forested	36 acres

3. List names and sizes of lakes, rivers and streams on or near the site, particularly lakes within 1,000 feet and rivers and streams within 300 feet.

None

C. Activity Description

1. Describe the proposed activity, including staging of development (if any), operational characteristics, and major types of equipment and/or processes to be used. Include data that would indicate the magnitude of the proposed activity (e.g. rate of production, number of customers, tons of raw materials, etc).

4 five acre tracts of aspen and 2 five acre and 1 six acre tracts of jackpine will be logged. The stands are over matured and the logging will stimulate regeneration of these stands.

2. Fill in the following where applicable:

a. Total project area 36 acres
or
Length ____ miles

b. Number of housing or recreational units ____

c. Height of structures ____ ft.

d. Number of parking spaces ____

e. Amount of dredging ____ cu. yd.

f. Liquid wastes requiring treatment ____ gal/da

g. Size of marina and access channel (water area) ____ sq. ft.

h. Vehicular traffic trips generated per day 36 ADT

i. Number of employees 18

j. Water supply needed ____ gal/da
Source: ____

k. Solid waste requiring disposal ____ tons/yr

l. Commercial, retail or industrial floor space ____ sq. ft.

III. ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACT

A. SOILS AND TOPOGRAPHY

1. Will the project be built in an area with slopes currently exceeding 12%? X No ___ Yes

2. Are there other geologically unstable areas involved in the project, such as fault zones, shrink-swell soils, peatlands, or sinkholes? X NO ___ YES

3. If yes on 1 or 2, describe slope conditions or unstable area and any measures to be used to reduce potential adverse impacts.

4. Indicate suitability of site soils for foundations, individual septic systems, and ditching, if these are included in the project.

NA

5. Estimate the total amount of grading and filling which will be done:
_____cu. yd. grading _____ cu. yd. filling
What percent of the site will be so altered? 3 %
Minor grading and clearing for skidding trails.

6. What will be the maximum finished slopes? _____ %
NA

7. What steps will be taken to minimize soil erosion during and after construction?

B. VEGETATION

1. Approximately what percent of the site is in each of the following vegetative types:

Woodland	100 %	Cropland/ Pasture	____ %
Brush or shrubs	____ %	Marsh	____ %
Grass or herbaceous	____ %	Other (Specify)	____ %

2. How many acres of forest or woodland will be cleared, if any? None acres

3. Are there any rare or endangered plant species or areas of unique botanical or biological significance on the site? (See DNR publication The Uncommon Ones.) ___X___ NO _____ YES
If yes, list the species or area and indicate any measures to be used to reduce potential adverse impact.

C. FISH AND WILDLIFE

1. Are there any designated federal, state or local wildlife or fish management areas or sanctuaries near or adjacent to the site? ___ NO ___X___ YES

2. Are there any known rare or endangered species of fish and wildlife on or near the site? (See DNR publication The Uncommon Ones.) ___X___ NO _____ YES

3. Will the project alter or eliminate wildlife or fish habitat? _____ NO ___X___ YES

4. If yes on any of questions 1-3, list the area, species or habitat, and indicate any measures to be used to reduce potential adverse impact on them.

The project is located within St. Croix State Park. The project will improve deer and grouse habitat by providing younger stands of timber. There will be temporary displacement of small birds and mammals during the harvesting operation.

D. HYDROLOGY

1. Will the project include any of the following:
   If yes, describe type of work and mitigative measures to reduce adverse impacts.

		NO	YES
a.	Drainage or alteration of any lake, pond, marsh, lowland or groundwater supply	X	
b.	Shore protection works, dams, or dikes	X	
c.	Dredging or filling operations	X	
d.	Channel modifications or diversions	X	
e.	Appropriation of ground and/or surface water	X	
f.	Other changes in the course, current or cross-section of water bodies on or near the site	X	

2. What percent of the area will be converted to new impervious surface? None %

3. What measures will be taken to reduce the volume of surface water run-off and/or treat it to reduce pollutants (sediment, oil, gas, etc.)?

4. Will there be encroachment into the regional (100 year) floodplain by new fill or structures? X NO ____YES

   If yes, does it conform to the local floodplain ordinance? ____NO ____YES

5. What is the approximate minimum depth to groundwater on the site? UNKNOWN ____ feet

E. WATER QUALITY

1. Will there be a discharge of process or cooling water, sanitary sewage or other waste waters to any water body or to groundwater? X NO ____YES
   If yes, specify the volume, the concentration of pollutants and the water body receiving the effluent.

2. If discharge of waste water to the municipal treatment system is planned, identify any toxic, corrosive or unusual pollutants in the wastewater.

3. Will any sludges be generated by the proposed project? X NO ____YES
   If yes, specify the expected volume, chemical composition and method of disposal.

4. What measures will be used to minimize the volumes or impacts identified in questions 1-3?

NA

5. If the project is or includes a landfill, attach information on soil profile, depth to water table, and proposed depth of disposal.

F. AIR QUALITY AND NOISE

1. Will the activity cause the emission of any gases and/or particulates into the atmosphere? ____NO __X__ YES
If yes, specify the type and origin of these emissions, indicate any emission control devices or measures to be used, and specify the approximate amounts for each emission (at the source) both with and without the emission control measures or devices.

There will be emission of exhaust gases from chain saws and logging equipment. The amount of exhaust gas will not require special control. Gases and particulates will be released during controlled burns. The burns will be small and no significant effect on air quality is expected.

2. Will noise or vibration be generated by construction and/or operation of the project? ____NO __X__ YES
If yes, describe the noise source(s); specify decibel levels [dB(A)], and duration (hrs/da) for each and any mitigative measures to reduce the noise/vibration. Chain saws, logging equipment and trucks during daylight hours, Monday-Friday. Work will occur after the major park use season so no mitigation will be required.

3. If yes on 1 or 2, specify whether any areas sensitive to noise or reduced air quality-(hospitals, elderly housing, wilderness, wildlife areas, residential developments, etc.) are in the affected area and give distance from source. The project is within St. Croix State Park. The project will be done during low use periods to minimize any impacts on park visitors.

G. LAND RESOURCE CONSERVATION, ENERGY

1. Is any of the site suitable for agricultural or forestry production or currently in such use? ____NO __X__ YES
If yes, specify the acreage involved, type and volume of marketable crop or wood produced and the quality of the land for such use.

2. Are there any known mineral or peat deposits on the site? ____NO ____YES
If yes, specify the type of deposit and the acreage.

3. Will the project result in an increased energy demand? X NO ____ YES
Complete the following as applicable:

a. Energy requirements (oil, electricity, gas, coal, solar, etc.)

NA

Type	Estimated Annual Requirement	Peak Demand (Hourly or Daily) Summer	Peak Demand (Hourly or Daily) Winter	Anticipated Supplier	Firm Contract or Interruptible Basis?

b. Estimate the capacity of all proposed on-site fuel storage.

NA

c. Estimate annual energy distribution for:

space heating NA % lighting NA %

air conditioning NA % processing NA %

ventilation NA %

d. Specify any major energy conservation systems and/or equipment incorporated into this project.

NA

e. What secondary energy use effects may result from this project (e.g. more or longer car trips, induced housing or businesses, etc)?

NA

H. OPEN SPACE/RECREATION

1. Are there any designated federal, state, county or local recreation or open space areas near the site (including wild and scenic rivers, trails, lake accesses)? ____ NO X YES
If yes, list areas by name and explain how each may be affected by the project. Indicate any measures to be used to reduce adverse impacts.

see appendix

H. TRANSPORTATION

1. Will the project affect any existing or proposed transportation systems (highway, railroad, water, airport, etc)? ___X___ NO _____ YES
If yes, specify which part(s) of the system(s) will be affected. For these, specify existing use and capacities, average traffic speed and percentage of truck traffic (if highway); and indicate how they will be affected by the project (e.g. congestion, percentage of truck traffic, safety, increased traffic (ADT), access requirements).

2. Is mass transit available to the site? ___X___ NO _____ YES

3. What measures, including transit and paratransit services, are planned to reduce adverse impacts?

NONE

J. PLANNING, LAND USE, COMMUNITY SERVICES

1. Is the project consistent with local and/or regional comprehensive plans? _____ NO ___X___ YES
If not, explain:

If a zoning change or special use permit is necessary, indicate existing zoning and change requested.

2. Will the type or height of the project conflict with the character of the existing neighborhood? ___X___ NO _____ YES
If yes, explain and describe any measures to be used to reduce conflicts.

3. How many employees will move into the area to be near the project? None
How much new housing will be needed? None

4. Will the project induce development nearby--either support services or similar developments? No
If yes, explain type of development and specify any other counties and municipalities affected.

5. Is there sufficient capacity in the following public services to handle the project and any associated growth? NA

Public Service	Amount required for project	Sufficient capacity?
water	gal/da	
wastewater treatment	gal/da	
sewer	feet	
schools	pupils	
solid waste disposal	ton/mo	
streets	miles	
other (police, fire, etc)		

If current major public facilities are not adequate, do existing local plans call for expansion, or is expansion necessary strictly for this one project and its associated impacts?
NA

6. Is the project within a proposed or designated Critical Area or part of a Related Actions EIS or other environmentally sensitive plan or program reviewed by the EQC? X NO ___ YES
If yes, specify which area or plan.

7. Will the project involve the use, transportation, storage, release or disposal of potentially hazardous or toxic liquids, solids on gaseous substances such as pesticides, radioactive wastes, poisions, etc? X NO ___ YES
If yes, please specify the substance and rate of usage and any measures to be taken to minimize adverse environmental impacts from accidents.

8. When the project has served its useful life, will retirement of the facility require special measures or plans? __X__ NO _____ YES
If yes, specify:

K. HISTORIC RESOURCES

1. Are there any structures on the site older than 50 years or on federal or state historical registers? __X__ NO _____ YES

2. Have any arrowheads, pottery or other evidence of prehistoric or early settlement been found on the site? __X__ NO _____ YES
Might any known archaeologic or paleontological sites be affected by the activity? _____ NO __X__ YES

3. List any site or structure identified in 1 and 2 and explain any impact on them.

The area will be surveyed prior to the project by an archeologist.

L. OTHER ENVIRONMENTAL CONCERNS
Describe any other major environmental effects which may not have been identified in the previous sections.

III. OTHER MITIGATIVE MEASURES
Briefly describe mitigative measures proposed to reduce or eliminate potential adverse impacts that have not been described before.

V. FINDINGS

The project is a private ( ) governmental (X) action. The Responsible Agency (Person), after consideration of the information in this EAW, and the factors in Minn. Reg. MEQC 25, makes the following findings.

1. The project is ( ) is not (X) a major action.
   State reasons: The area affected by the project is less than 1% of the Park. There is no change in land use. The project is timed to minimize impact on park users.

2. The project does ( ) does not (X) have the potential for significant environmental effects.
   State reasons: The project will replace natural occurrences such as fire and wind which will result in young stands of the same trees.

3. (For private actions only.) The project is ( ) is not ( ) of more than local significance.
   State Reasons:

IV. CONCLUSIONS AND CERTIFICATION

NOTE: A Negative Declaration or EIS Preparation Notice is not officially filed until the date of publication of the notice in the EQC Monitor section of the Minnesota State Register. Submittal of the EAW to the EQC constitutes a request for publication of notice in the EQC Monitor.

A. I, the undersigned, am either the authorized representative of the Responsible Agency or the Responsible Person identified below. Based on the above findings, the Responsible Agency (Person) makes the following conclusions. (Complete either 1 or 2).

1. X NEGATIVE DECLARATION NOTICE
   No EIS is needed on this project, because the project is not a major action and/or does not have the potential for significant environmental effects and/or, for private actions only, the project is not of more than local significance.

2. ____ EIS PREPARATION NOTICE
An EIS will be prepared on this project because the project is a major action and has the potential for significant environmental effects. For private actions, the project is also of more than local significance.

a. The MEQC Rules provide that physical construction or operation of the project must stop when an EIS is required. In special circumstances, the MEQC can specifically authorize limited construction to begin or continue. If you feel there are special circumstances in this project, specify the extent of progress recommended and the reasons.

b. Date Draft EIS will be submitted: _____
(month) (day) (year)

(MEQC Rules require that the Draft EIS be submitted within 120 days of publication of the EIS Preparation Notice in the EQC Monitor. If special circumstances prevent compliance with this time limit, a written request for extension explaining the reasons for the request must be submitted to the EQC Chairman.)

c. The Draft EIS will be prepared by (list Responsible Agency(s) or Person(s)):

_____

[signature] Signature

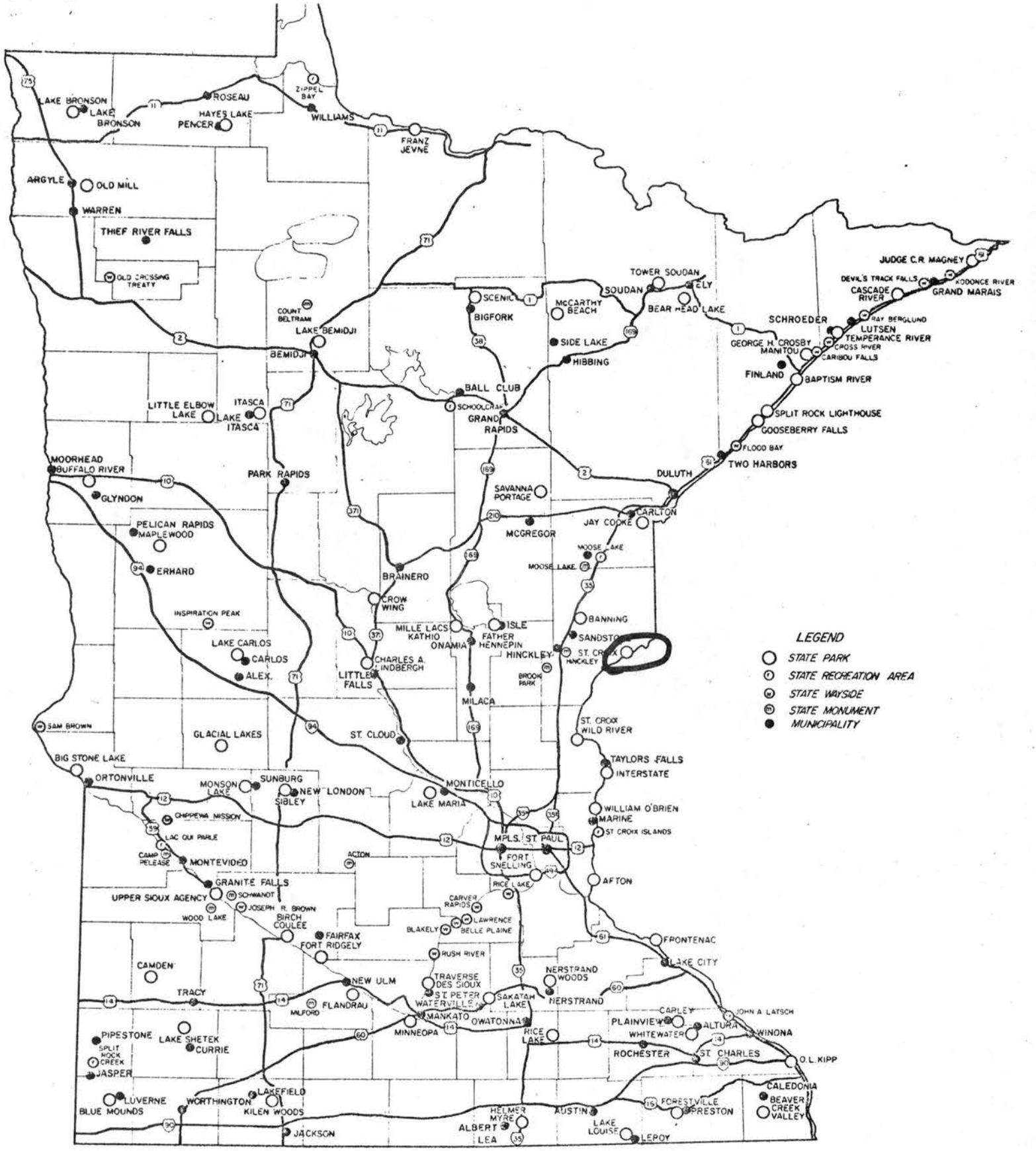
Director Title

7/28/80 Date

B. Attach an affidavit certifying the date that copies of this EAW were mailed to all points on the official EQC distribution list, to the city and county directly impacted, and to adjacent counties or municipalities likely to be directly impacted by the proposed action (refer to question III.J.4 on page 9 of the EAW). The affidavit need be attached only to the copy of the EAW which is sent to the EQC.

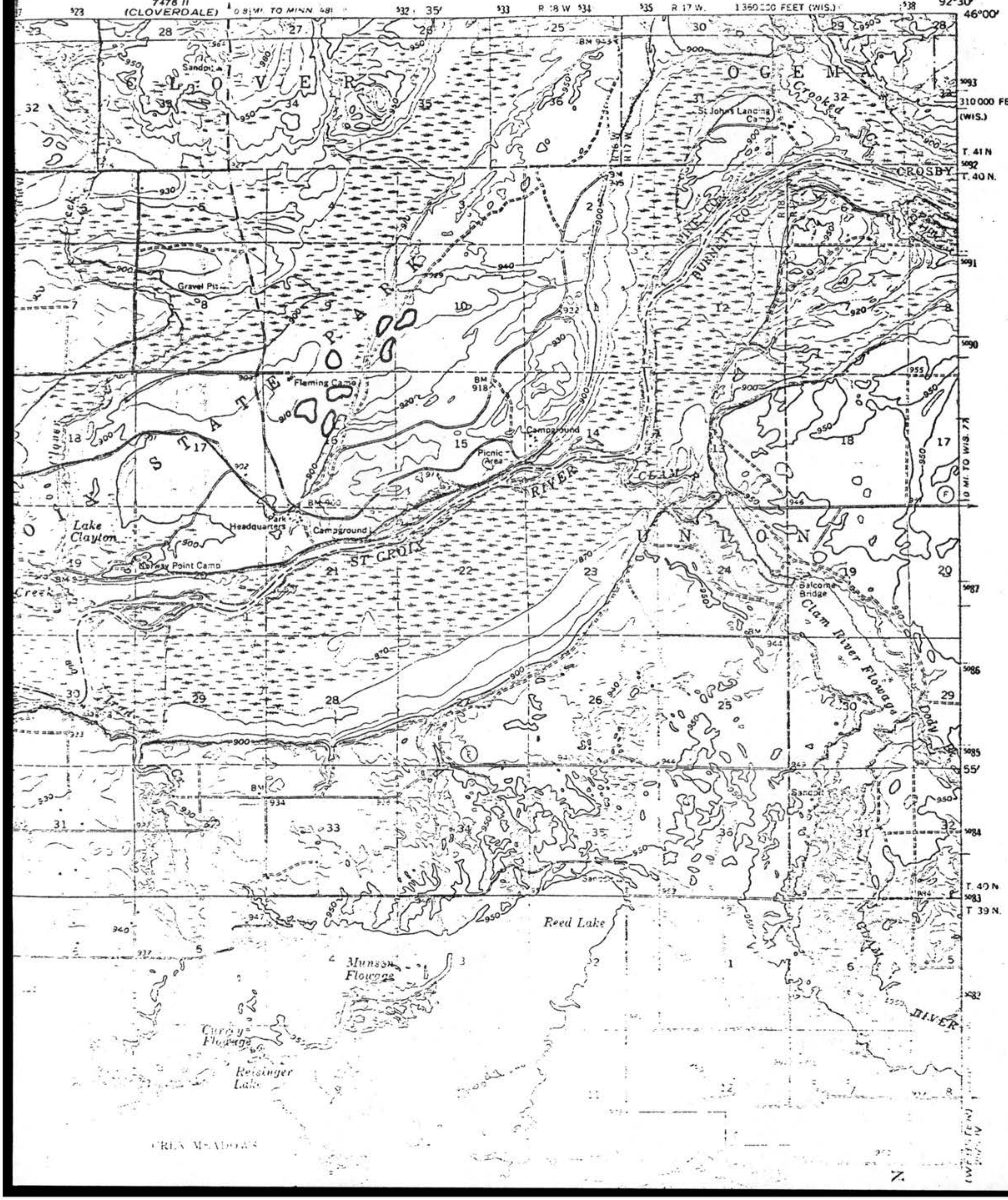
C. Billing procedures for EQC Monitor Publication

State agency ONLY: Attach to the EAW sent to the EQC a completed OSR 100 form (State Register General Order Form--available at Central Stores). For instructions, please contact your Agency's Liaison Officer to the State Register or the Office of the State Register--(612) 296-8239.


LAKE BRONSON
LAKE BRONSON
ROSEAU
HAYES LAKE
PENCER
ZIPPEL BAY
WILLIAMS
FRANZ JEVNE
ARGYLE
OLD MILL
WARREN
THIEF RIVER FALLS
OLD CROSSING TREATY
COUNT BELTRAMI
LAKE BEMIDJI
BEMIDJI
LITTLE ELBOW LAKE
LAKE ITASCA
ITASCA
MOORHEAD
BUFFALO RIVER
GLYNDON
PARK RAPIDS
PELICAN RAPIDS
MAPLEWOOD
ERHARD
INSPIRATION PEAK
LAKE CARLOS
CARLOS
ALEX.
SAM BROWN
GLACIAL LAKES
BIG STONE LAKE
ORTONVILLE
MONSON LAKE
SUNBURG
SIBLEY
NEW LONDON
CHIPPEWA MISSION
LAC QUI PARLE
CAMP RELEASE
MONTEVIDEO
GRANITE FALLS
UPPER SIOUX AGENCY
SCHWANDT
JOSEPH R. BROWN
WOOD LAKE
BIRCH COULEE
FAIRFAX
FORT RIDGELY
CAMDEN
TRACY
NEW ULM
MILFORD
FLANDRAU
PIPESTONE
SPLIT ROCK CREEK
JASPER
LAKE SHETEK
CURRIE
LUVERNE
BLUE MOUNDS
WORTHINGTON
LAKEFIELD
KILEN WOODS
JACKSON
SCENIC
BIGFORK
COUNTY BELTRAMI
MCCARTHY BEACH
TOWER SOUDAN
SOUDAN
ELY
BEAR HEAD LAKE
SIDE LAKE
HIBBING
BALL CLUB
SCHOOLCRAFT
GRAND RAPIDS
SAVANNA PORTAGE
MCGREGOR
JAY COOKE
CARLTON
DULUTH
JUDGE C.R. MAGNEY
DEVIL'S TRACK FALLS
KODONCE RIVER
CASCADE RIVER
GRAND MARAIS
SCHROEDER
RAY BERGLUND
LUTSEN
TEMPERANCE RIVER
CROSS RIVER
GEORGE H. CROSBY MANITOU
CARIBOU FALLS
FINLAND
BAPTISM RIVER
SPLIT ROCK LIGHTHOUSE
GOOSEBERRY FALLS
FLOOD BAY
TWO HARBORS
MOOSE LAKE
BRAINERD
CROW WING
MILLE LACS KATHIO
ONAMIA
ISLE
FATHER HENNEPIN
HINCKLEY
ST. CROIX
BROOK PARK
BANNING
SANDSTONE
CHARLES A. LINDBERGH
LITTLE FALLS
MILACA
ST. CLOUD
ST. CROIX WILD RIVER
TAYLORS FALLS
INTERSTATE
MONTICELLO
LAKE MARIA
WILLIAM O'BRIEN
MARINE
ST. CROIX ISLANDS
MPLS.
ST. PAUL
FORT SNELLING
ACTON
RICE LAKE
AFTON
CARVER RAPIDS
LAWRENCE
BLAKELY
BELLE PLAINE
RUSH RIVER
FRONTENAC
LAKE CITY
NERSTRAND WOODS
NERSTRAND
TRAVERSE DES SIOUX
ST. PETER
WATERVILLE
SAKATAH LAKE
MANKATO
OWATONNA
MINNEOPA
RICE LAKE
CAPLEY
JOHN A. LATSCH
PLAINVIEW
ALTURA
WHITEWATER
WINONA
ROCHESTER
ST. CHARLES
O.L. KIPP
CALEDONIA
BEAVER CREEK VALLEY
FORESTVILLE
PRESTON
HELMER MYRE
ALBERT LEA
AUSTIN
LAKE LOUISE
LEROY
LEGEND
STATE PARK
STATE RECREATION AREA
STATE WAYSIDE
STATE MONUMENT
MUNICIPALITY

GRANTSBURG QUADRANGLE
WISCONSIN–MINNESOTA
15 MINUTE SERIES (TOPOGRAPHIC)

7576 III
(DANBURY)



7476 II
(CLOVERDALE)
R 18 W
R 17 W
92°30'
46°00'
310 000 FEET (WIS.)
T. 41 N
T. 40 N.
T. 39 N.
55'
CLOVER
OGEMA
CROSBY
St Johns Landing Camp
Crooked
PINE CO
BURNETT CO
STATE PARK
Gravel Pit
Fleming Camp
Campground
Picnic Area
Park Headquarters
Lake Clayton
Norway Point Camp
Creek
ST CROIX
RIVER
CLAM
UNION
Balcome Bridge
Clam River Flowage
Reed Lake
Munson Flowage
Reisinger Lake
CLAM
RIVER
10 MI. TO WIS. 77

APPENDIX

H. 1. The project is within St. Croix State Park.

The project will result in young stands of jackpine and aspen. It will lessen the chance of disease and fire which could damage the park. The resulting young stands will also increase the amount of food available for the park's wintering deer herd.

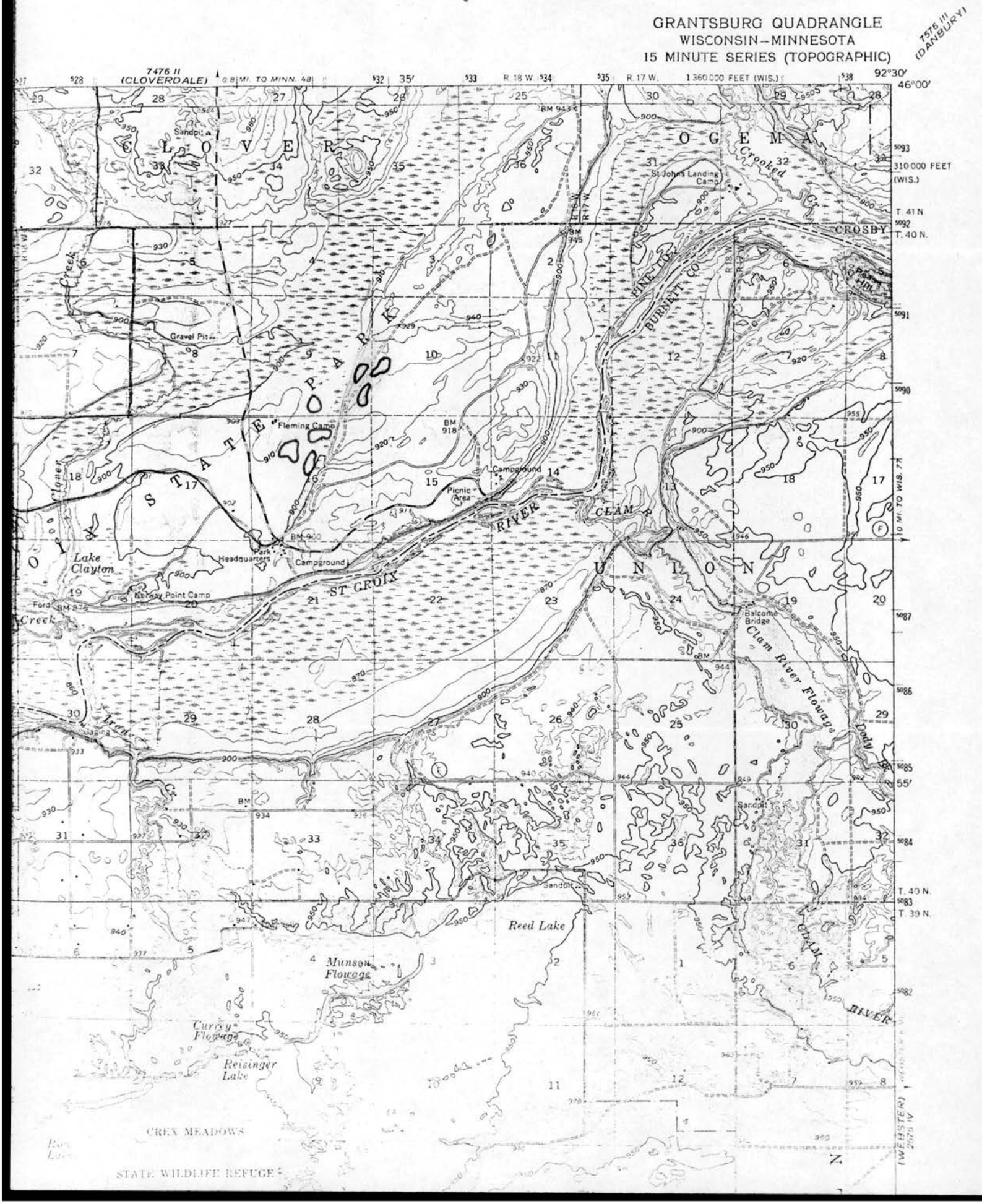
Mitigation Measures

Logging contract regulations and restrictions

1. Fell trees away from wetlands.
2. Utilize all trees to 4" top diameter or less.
3. Certain areas shall be reserved from treatment and so indicated in the appraisal report.
4. Cutting of non-commercial timber may be required.
5. Lumbering can be done where the tree is felled, all brush to be piled.
6. Stumps shall not be higher than six inches from the ground.
7. Roads: all shall be to minimum specifications
   a. haul roads to be designated by the Division of Parks, no deviation will be allowed without permission.
   b. road construction debris shall be flattened out. No debris shall be shoved into wetlands or drainageways.
8. Timber landings will be located as directed by the Park Manager and Forester's direction to meet the minimum forestry specifications.
9. All solid waste and equipment residue must be picked up and a garbage can must be provided for this purpose.
10. Oil from equipment oil changes must be drained into a receptacle for removal from the park.
11. All equipment must be removed from the permit area within the specified 90 day period.
12. Time of day or day of week or season for cutting may be restricted.
13. If there is some doubt or question on any environmental problem, the operator is to contact the Park Manager.

Aspen clearcuts

Jack pine cuts



NATURAL RESOURCES REGION VI

FRANK KNOKE May 30, 1980

CRAIG COX 296-8949

TIMBER SALES; ST. CROIX STATE PARK

I am sending you the locations and descriptions of timber sales for use in completing EAW's. Seven cuts in all are planned, 3 inch Jack Pine, 4 inch Aspen. The purpose of the cuts is to rejuvenate over-mature stands. No type conversion is planned. The sales will be put on auction this summer and the cutting will be done this fall or next year. Summer cuts are planned to minimize interference with the winter trail system. The locations of the cuts are as follows:

JACK PINE

1.	SE¼, Sec. 9, T.40N., R18W, Pine County	5 acres
2.	SE¼, Sec. 9, T.40N., R18W, Pine County	5 acres
3.	SW¼, Sec. 10, T.40N., R18W, Pine County	6 acres

ASPEN

changed to NW¼-16

1.	SE¼, Sec. 9, T.40N., R18W, Pine County	5 acres
2.	SE¼, Sec. 9, T40N., R18W, Pine County	5 acres
3.	NE¼, Sec. 16, T.40N., R18W., Pine County	5 acres
4.	NE¼, Sec. 16, T.40N., R18W., Pine County	5 acres

These cuts are consistent with the St. Croix Resource Management Plan.

If you need further information just let me know.

Enclosure.
CC:dr

18 people
8 ± trucks per day

ADMIN 1000 (Rev. 1/78)
SF-00006-01

STATE OF MINNESOTA

DEPARTMENT NATURAL RESOURCES REGION VI

Office Memorandum

TO : FRANK KNOKE

DATE: May 30, 1980

FROM : CRAIG COX Craig Cox

PHONE: 296-8949

SUBJECT: TIMBER SALES; ST. CROIX STATE PARK

I am sending you the locations and descriptions of timber sales for use in completing EAW's. Seven cuts in all are planned, 3 in Jack Pine, 4 in Aspen. The purpose of the cuts is to rejuvenate over-mature stands. No type conversion is planned. The sales will be put on auction this summer and the cutting will be done this fall or next year. Summer cuts are planned to minimize interference with the winter trail system. The locations of the cuts are as follows:

JACK PINE

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2.	SE¼, Sec. 9, T.40N., R18W, Pine County	5 acres
3.	SW¼, Sec. 10, T.40N., R18W, Pine County	6 acres

ASPEN

1.	SE¼, Sec. 9, T.40N., R18W, Pine County	5 acres
2.	SE¼, Sec. 9, T40N., R18W, Pine County	5 acres
3.	NE¼,Sec. 16, T.40N., R18W., Pine County	5 acres
4.	NE¼, Sec. 16, T.40N., R18W., Pine County	5 acres

These cuts are consistent with the St. Croix Resource Management Plan.

If you need further information just let me know.

Enclosure.
CC:dr

timber mang. study

ADMIN 1000

STATE OF MINNESOTA -3430 D. Davison

DEPARTMENT NATURAL RESOURCES - Region II

Office Memorandum

TO : Don Davison, Director, Div. of Parks
Earl Adams, Director, Div. of Forestry
Joe Fabish, Regional Forest Manager

DATE: August 11, 1976

FROM : Milt Stenlund Mil
Regional Administrator

PHONE: (218) 326-8307

Copy to Frank Kruchek & Craig Cox

SUBJECT: Attached Reprint by Cliff Ahlgren

Perhaps you have seen the results of Cliff's study, but I think it is one of the most important silvicultural studies in many years which affects the future of both Forestry and Parks in northern Minnesota. The results are especially important to St. Croix, Itasca and Scenic Parks. It is the author's conclusion that we cannot reestablish red and white pine stands by simply using prescribed or wild fire. As I understand, it has been the contention of Dr. Heinselman and the U. S. Forest Service that pine stands can be generated by the use of fire and this was going to be one of the main programs in the BWCA. It appears from Ahlgren's study that conditions must be very specific in order to regenerate pine after a fire.

MS:jaw

Attachment

Reprinted from the JOURNAL OF FORESTRY
Vol. 74, No. 3 March 1976

Regeneration of red pine and white pine following wildfire and logging in northeastern Minnesota

Clifford E. Ahlgren

*ABSTRACT—The exacting silvical requirements for regenerating red pine and white pine in northeastern Minnesota are rarely met by natural disturbance including wildfire. Buildup of aspen to the point of takeover, incidence of white pine blister rust (*Cronartium ribicola*), and lack of abundant seed trees make impossible the re-creation of natural conditions which favored the establishment of these pines in the past. Data from seven areas—two burned, two logged, and three undisturbed—illustrate the point.*

Current environmental concern has stimulated interest in the reestablishment of natural forests by prescribed burning of standing timber or by permitting wildfires to burn (Kilgore, 1975). Although such procedures may prove feasible in some forest types, generalizations from one region or tree species to another may be misleading. Public enthusiasm for burning in the North Central States is, in part, based on the idea that the extensive and stately stands of red and white pine, which were a major portion of the northwoods virgin forest, can be re-created with fire, since the original stands were of fire origin. This opinion needs reexamination, for the silviculture of these stands is not that simple.

It is generally recognized that most of the forests of the North Central States had fire histories, and that the development of presettlement stands of red pine (*Pinus resinosa* Ait.), white pine (*P. strobus* L.), and jack pine (*P. banksiana* Lamb.) followed fire. Adaptations of certain tree species to postfire development are also well known. Aspen (*Populus tremuloides* Michx.) and paper birch (*Betula papyrifera* Marsh.), for example, reproduce vegetatively over a wide range of postfire conditions; on moist sites, birch may also reseed. Aspen seedling establishment is less frequent. Jack pine and spruce (*Picea mariana* BSP and *P. glauca* Voss) readily reseed in burned areas, but the requirements for the natural reestablishment of red and white pine are more specific, making their natural reproduction more limited. In the present forests of northeastern Minnesota, fire rarely creates all of the conditions necessary for the reestablishment of successful red and white pine stands.

This paper reviews the requirements of red and white pine and reports a study of the extent to which optimum conditions for regeneration occurred naturally in undisturbed natural stands as well as in those recently logged or burned by wildfire. A comparison is made with the occurrence of optimum conditions for other common tree species of the area: jack pine, aspen, paper birch, and spruce.

The study, part of a long-range investigation of ecological changes, was made within the interior zone of the Boundary Waters Canoe Area and the Quetico Provincial Park, on the border between northeastern Minnesota and southwestern Ontario.

Silvical Requirements

Seedbed—Red pine has more exacting seedbed requirements than the other postfire tree species of the region. Germination is best on exposed, mineral soil and associated thin moss; it is inhibited by high ash concentrations, thick litter, or sod. High temperatures that occur on fire-blackened soil surfaces for the first few years after fire are lethal to small seedlings. On severe burns, optimum germination is achieved several years after fire when ash minerals have been reduced by leaching.

Seedbed requirements for white pine are less demanding. Seeds can germinate on recently burned seedbeds, on heavy litter in a mature forest, and on mineral soil or light litter (Horton and Bedell, 1960; Kozlowski and Ahlgren, 1974).

Seed Production—Although there is some local variation, good red pine seed crops are produced only at 5- to 7-year intervals in northeastern Minnesota; bumper crops occur about every 10 to 12 years. For white pine, good seed crops are 3 to 10 years apart (U.S. Forest Service, 1974). Because of these intervals, the probability of good seed years coinciding with desirable postfire seedbeds is low, making adequate postfire seedling establishment doubtful (Van Wagner, 1971). Cones of these species are easily destroyed by crown fire. In contrast, cones of jack pine—a frequent associate of red pine—are produced annually, are fire resistant and, in northeastern Minnesota, are commonly serotinous remaining on the tree for many years. Here, most jack pine cones open and disperse seed only following fire.

Bark of red pine is more fire resistant than that of jack pine and white pine (Van Wagner, 1971). Therefore, mature red pine trees may occasionally survive fire, but seed yield is rarely sufficient to restock an area. If seed trees are more than 100 to 200 feet apart, pollination and seed set are inadequate (Horton and Bedell, 1960). Cones open best on warm, calm autumn days, and seeds are usually dispersed within a radius comparable to the height of the seed tree.

Jack pine has the further postfire advantage of producing seed at a very early age, frequently by 7 years.

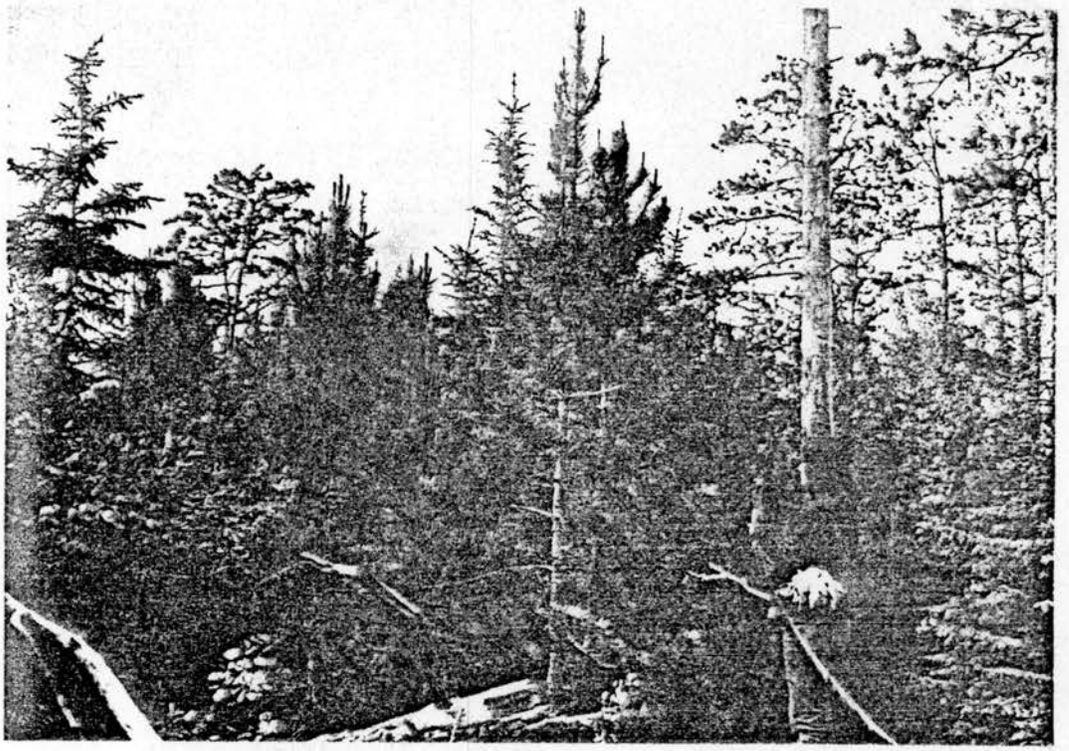

Figure 1. Site A. Red pine reproduction where seed was abundant and the site remained open for several years after fire (McAcree Lake, Quetico Provincial Park).

For red pine, normal seed production begins at about 20 to 25 years, and for white pine at 15 to 20 years (Horton and Bedell, 1960, U.S. Forest Service, 1974).

Competition—Both red pine and jack pine are shade-intolerant and do not thrive in competition with other vegetation. On postfire lands, ashes often stimulate a lush, early herb and shrub growth (Ahlgren, 1960). Even in open shade, competition for moisture by dense postfire herbs may inhibit early stages of red pine growth (Lambert *et al.*, 1972). Jack pine grows rapidly, however, and can often rise above the competitive herb and shrub layers. White pine is more tolerant and, although often suppressed in heavy shade, can survive better than the other two pine species.

Regeneration on the Study Tracts

Observations from seven red and white pine sites are reported here. These were selected as typical of (1) old pine stands in relatively undisturbed condition and (2) after disturbance by logging or fire. Two observations taken 5 to 6 years apart are included to indicate current vegetational trends, except for the most recently burned site where only the first and third postfire year observations are available. On each study site, 30 permanent stations were established 30 m apart. At each station, data were gathered from concentric 10 m^2 and 100 m^2 circular plots. From the 10 m^2 plots, percent of space occupied and height of all species of mosses, herbs, shrubs, and trees were obtained. Tree reproduction was recorded by age. Records of frequency, age, and size of the overstory were made from the 100 m^2 plots. Depth of organic mantle was recorded.

Burned Areas

Two burned areas were available for study, one with an adequate seed source and one without.

Site A, Burned with Seed Source—In late summer of 1946, a severe wildfire burned 440 acres in the Quetico Park, Ontario, including a 40-acre plateau overlooking McAree Lake. Before the fire, most of the plateau was covered with jack pine and black spruce, but about 5 acres of mature red pine were growing near the center. The study site is in this red pine stand, about half of which escaped crown fire and provided seed for eventual stand reestablishment. Soils are shallow, sandy loam over white granite.

The majority of the red pine seedlings and saplings present 13 and 19 years after fire became established about 7 years apart, coinciding with the usual interval between good seed years (*Table 1*). Abundant seedlings were established 6 years after fire. Of these, an appreciable number reached sapling size by the nineteenth postfire year (*fig. 1*). The ash seedbed and heavy competition of postfire herbs and low shrubs in the first few postfire years may be responsible for light red pine reestablishment (Ahlgren, 1959, 1960; Kozlowski and Ahlgren, 1974). Six or more years after fire, when the ash layer had been reduced, seed germinated and seedlings became established on a *Polytrichum* seedbed typical of postfire development in this area (Kozlowski and Ahlgren, 1974). The moss keeps the ground compact, moist, and relatively free from other competition.

Thirteen years after fire, major plants included the herbs big-leafed aster (*Aster macrophyllus* L.), false lily-of-the-valley (*Maianthemum canadense* Desf.), wild sarsaparilla (*Aralia nudicaulis* L.), and brake fern (*Pteridium aquilinum* Kuhn). The low shrubs consisted principally of blueberry (*Vaccinium angustifolium* Ait.), bush honeysuckle (*Diervilla lonicera* Mill.), and sweet fern (*Comptonia peregrina* Coult.). There was a minor growth of high shrubs, chiefly hazel (*Corylus cornuta* Marsh.) and willow (*Salix* spp.). This vegetation was not seriously competitive during the ~~first few~~ later postfire years. The 1- to 2-foot pine seedlings were above the herb-low shrub competition, and the high shrubs were not numerous. Birch and aspen were sparse on the study sites, but were abundant on the outer edges of the plateau. With only one white pine

seed tree, very few seedlings appeared and sapling survival was poor. Nineteen years after fire, the area had medium stocking with 437 trees per acre, mostly red pine.

Site B, Burned with Inadequate Seed Source—In early spring of 1971, the Little Sioux Fire in the La Croix District, Superior National Forest, burned 15,000 acres, including a mature red pine-white pine stand. The study site is in a portion of the burned area containing only red pine. The land is hilly with rocky outcrops. Soils are rocky, sandy loam over white granite with silty loam in depressions.

All of the parent red and white pine stand on the study site was killed by intense fire. A portion of the nearby old pine survived within seeding distance. The years immediately after fire were poor seed years, however, and no seedlings became established (*Table 1*).

Even if seed had been available, the ash seedbed and dense growth of herbs and low shrubs would have hampered red pine establishment during these early postfire years. Evidence supporting this was found in our nearby prescribed burning studies, where a limited trial of broadcast red pine seeding gave sparse seedling establishment only where mineral soil with low ash concentrations was exposed and remained free from competitive vegetation for the first 3 postfire years. No red pine seedlings appeared where there was heavy ash and a vigorous growth of big-leafed aster and raspberry (*Rubus idaeus* L.).

During the first 3 postfire growing seasons on site B, there was a vigorous growth of herbs and shrubs, particularly aster and raspberry. Aspen, about 2,400 stems per acre, appeared the first 2 years after fire. Dense recovery of aspen is typical of either postfire or postlogging vegetation in this area. The competing herbs and shrubs of the early postfire years will gradually decline, but aspen will increase in cover and height before the next good red pine seed year, thus providing continuous serious competition for any later reproduc-

Table 1. Red and white pine reproduction per acre in burned, logged and undisturbed stands in the BWCA and Quetico Provincial Park, Ontario, Canada.

	First examination							*Second Examination*						
Site and species	Years since fire or cutting	Seedlings dbh <1	Avg. age yrs.	Avg. ht. ft.	Saplings dbh >1	Seed trees per acre	Total reproduction	Years since fire or cutting	Seedlings dbh <1	Avg. age yrs.	Avg. ht. ft.	Saplings dbh >1	Seed trees per acre	Total reproduction
BURNED AREAS														
Site A														
Red pine	13	526*	7	2.0	6*	35	532*		284*	8	2.0	130*	24	414*
White pine		20	7	2.0	0	1	20	19	20	4	1.0	3	1	23
Total							552							437
Site B														
Red pine		0	0	0	0	0	0		0	0	0	0	0	0
White pine	1	0	0	0	0	0	0	3	0	0	0	0	0	0
Total							0							0
LOGGED AREAS														
Site C														
Red pine		486	6	2.0	226	74	712		162	10	3.2	217	54	379
White pine	22	405	5	1.5	137	16	542	27	162	2	0.3	124	16	286
Total							1,254							665
Site D														
Red pine		0	0	0	13	1	13		0	0	0	11	1	11
White pine	22	324	5	0.5	81	3	405	27	162	5	0.9	63	3	225
Total							418							236
UNDISTURBED AREAS														
Site E														
Red pine		891	8	2.0	344	74	1,235		608	9	2.0	362	54	970
White pine	200	1,458	8	1.0	321	16	1,779	205	1,377	6	1.0	293	16	1,670
Total							3,014							2,640
Site F														
Red pine		0	0	0	0	19	0		0	0	0	0	19	0
White pine	271	283	1	0.2	0	11	283	273	108	2	0.2	0	11	108
Total							283							108
Site G														
Red pine		0	0	0	0	0	0		0	0	0	0	0	0
White pine	200	3,686	3	0.2	0	31	3,686	205	810	4	0.4	0	28	810
Total							3,686							810

*Represents the average number of seedlings and saplings per acre.

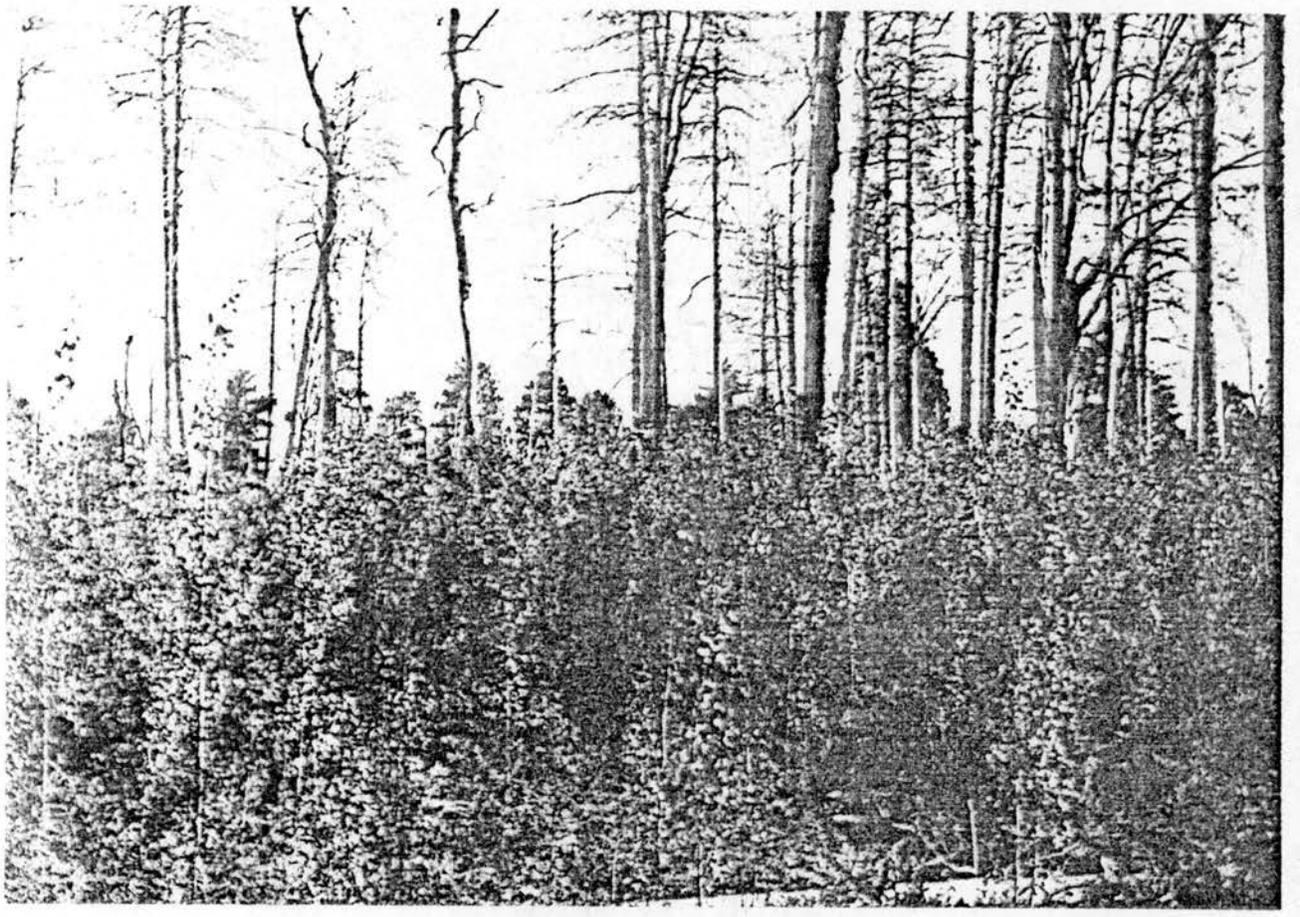

Figure 2. Site B. Vigorous aspen sprouting following wildfire in a 270-year-old red pine stand (Superior National Forest).

tion (*fig. 2*). Although white pine is tolerant of a wider range of seedbed conditions, its survival here is doubtful because of heavy aspen and herb competition. Jack pine seedlings which become established on ash and grow rapidly, could have competed successfully.

Logged Areas

Two logged tracts, one with a seed source and one without, were available for study.

Site C, Logged with Seed Source—During the war in 1943, a mature stand of red and white pine was clearcut on the Canadian shore of Basswood Lake. Small crawler tractors were used. A strip about 400 ft. wide was left uncut along the shore (Loucks, 1957). This study site is within the cutover area, adjacent to the reservation strip. The land is sloping; soil is sandy loam over Ely greenstone.

The 400-foot reservation strip of uncut pine provided ample seed. Age of advanced red and white pine growth indicated establishment 2 years after logging; some younger reproduction from later seed years was also present (*Table 1*). Good seed years apparently coincided with the logging operation. The mineral soil seedbed exposed during logging favored pine germination.

Lacking ash stimulus, early herbaceous growth was not sufficient to impede seedling establishment. The major shrubs—hazel and mountain maple (*Acer spicatum* Lam.)—present 22 years after logging developed after the trees had grown above them. The low pine seedling count at the latest observation, however, reflects the influence of this high shrub layer on subsequent reproduction (*Table 1*). Aspen and birch were scattered and infrequent. White pine seeds more abundantly than red pine, as reflected in the larger number of seedlings per seed tree. White pine survival was low, however, because of blister rust. Twenty-seven years after logging, the area contained a 25-year-old mixed red pine and white pine stand with 665 trees per acre, well above the accepted minimum stocking of 300-350 trees per acre (*fig. 3*).

Site D, Logged with Inadequate Seed Source—This site, otherwise similar to Site C, is one-half mile distant from the reservation strip containing seed trees. It lacked a nearby red pine seed source, except for one cull tree, from which a few saplings became established (*Table 1*). There were 3 white pine seed trees per acre. White pine seedlings were common, and a few saplings developed, but most reproduction was killed by blister rust. Stocking of both red and white pine was poor 22 years after logging. This site also resembled Site C in ground cover and associated vegetation, except for a greater density of hazel and mountain maple. Although other conditions would have favored red pine reproduction immediately after logging, an adequate seed source was lacking and the area has converted to brushland.

Undisturbed Areas

Three undisturbed areas were included in the study for comparative purposes.

Site E, Mature Uncut Red Pine Stand with Reproduction—This stand, on the Canadian side of Basswood Lake, is in the lakeshore strip restricted

Figure 3. Site C. Area well stocked with red pine reproduction, 32 years after logging (Merriam Bay, Basswood Lake, Quetico Provincial Park). Note stump, lower right.

from cutting in 1943 and mentioned in the descriptions of sites C and D. A few white pine are mixed with the red.

Very abundant red pine seed from the overstory started even more seedlings here than in the adjacent Site C, which was supplied by side seeding (*Table 1*). The seedbed was a 1-inch layer of litter mixed with patches of moss typical of the older forest (*Calliergonella schreberi* Grout, *Dicranum* spp., *Polytrichum commune* Hedw.). Herbs and shrubs were sparse.

Development of a red pine understory such as this is possible only in open stands with little brush or other competitive vegetation. Generally, such stands are found on lake shores where soil is shallow and rocky. They seldom occur inland where soils are deeper and brush predominates.

Mortality of white pine seedlings (84 percent) was higher than that of red pine (71 percent) as shown in a comparison of seedling and sapling counts (*Table 1*). The difference can be attributed to blister rust. Reproduction of both red and white pine was well distributed with 2,640 trees per acre.

Site F, Mature Red Pine-White Pine Stand with No Reproduction—A portion of the mature pine stand in the Little Sioux area escaped the 1971 fire and lies in a depression between 2 hills, adjacent to Site B. This site, F, is within the unburned stand, in a moist valley with a fine sandy loam soil and an organic mantle 2 or 3 inches deep.

Good red pine or white pine reproduction was impeded by the understory of balsam-fir (*Abies balsamea* Mill.) and spruce and dense high shrubs, especially hazel and mountain maple (*Table 1*). Birch, red maple (*Acer rubrum* L.) and aspen dominated the openings in the old stand.

Site G, Mature White Pine Stand—This 210-year-old white pine stand on the Minnesota shore of Basswood Lake is on level, deep sandy loam with an organic mantle 2 to 4 inches deep. It contained a dense understory of hazel and mountain maple, as did Site F. Low shrubs were sparse; herbs were mostly big-leaved aster and false lily-of-the-valley. Many white pine seedlings were found in the first examination, but subsequently most seedlings succumbed to competition and blister rust. Development of shade-tolerant balsam-fir and spruce was similar to that in Site F.

In brief, then, seed source was critical on all seven sites. When abundant seed fell on a good seedbed, and when seedlings were free from serious competition, adequately stocked stands developed following either burning or logging. Lacking seed, the areas were taken over by fire-tolerant aspen, birch, or brush. In the undisturbed, older stands, second-growth pine developed where the stand remained open, free of brush, and the seedbed consisted of thin litter. This condition existed only on shallow, rocky soils along a shoreline. Understory growth in all other mature stands was balsam-fir, spruce, or brush.

Discussion and Conclusions

In northeastern Minnesota, the success of red pine and white pine reproduction following logging or fire depends on the silvical limitations of these species and

on the impact of modern civilization on the environmental conditions which set these limitations. Comparison of limitations on seed production, dispersal, seedbed requirements, and competition for these species with those of other common tree species of the area—jack pine, spruce, aspen, and birch—gives a good indication of the fate of the forests.

The range of conditions for successful red pine reproduction is narrow and restricting; that of white pine is broader. Seed supplies for red pine and white pine are limited to good seed years. In addition, the extensive areas of mature pine which served as seed reservoirs in the past have been markedly reduced by cutting, fire, and disease. Jack pine and black spruce are well adapted to a wide range of postfire conditions. Much of their annually produced seed is retained on the tree until the cones are opened by fire. This serotinous cone habit limits their reproduction following logging. Vegetative reproduction of aspen over a wide range of conditions and the subsequent proliferation of the rhizomes has permitted the gradual increase of this species.

Red pine reproduces best on mineral soil or thin moss and litter; its germination is inhibited by a layer of ash—a condition tolerated by jack pine and white pine. Blowdown exposes soil in places and has undoubtedly been responsible for some of the small patches of red pine found in the area, but the size of patch has been limited by brush invasion. Spruce can germinate on thicker moss seedbeds, thin litter, and mineral soil and is more tolerant of ash seedbeds than is red pine.

Red pine cannot survive in association with the quick flush of herb growth following fire whereas jack pine seedlings are not impeded by the herbs and rapidly grow above them. Throughout the Boundary Waters Canoe Area, the aspen rhizome network has built up gradually over centuries of fire history. Although aspen played a minor role in the forests of the distant past (Swain, 1973), it is now very important (Ohman and Ream, 1971). In many places, it has reached a reproductive threshold sufficient to provide fatal competition, especially to red pine. When the mature pine stands now present in the area developed, this aspen threshold had not been reached. Spruce and white pine grow more slowly but are shade-tolerant and can survive these conditions.

Because of its silvical requirements, red pine often depends on fire for renewal, but its seeding habits put the species at a disadvantage with jack pine and black spruce, with their fire-adapted seed dispersal mechanisms. Some authors believe that, from an evolutionary sense, red pine is slowly declining in stand acreage in the natural forests of northeastern Minnesota (Fowler and Lester, 1970; Van Wagner, 1971). The adaptability of white pine to a wider range of conditions than red pine is negated in modern times by blister rust, which now eliminates much reproduction in the area.

An obvious conclusion is that the ecological succession of the forest of northeastern Minnesota is disturbance-oriented. Whether the disturbances are created by man, accidentally or in management, or whether they are natural, caused by fire, wind, insects, and disease, a hypothetical climax forest would rarely be achieved. Nevertheless, in wilderness or natural areas, the ideal management is seemingly to let nature take its course. If the reproductive capacity of the species were not influenced by the impact of civilization, nature could be effective. Permitting wildfires to burn, or using prescribed fire in standing timber in northeastern Minnesota can aid in the perpetuation of the aspen-spruce-fir complex or the restoration of jack pine and black spruce.

Modern influences on succession, even in remote areas, tend to eliminate rather than perpetuate the longer lived red pine and white pine following natural disturbances. These species cannot be restored by natural means to the position they represented in the forests of the past. If their perpetuation is desired, knowledge of their silvical requirements must be applied to current conditions. Because of the interest the public and conservation groups have taken in management policy, the ultimate quality of the naturally produced forest should be made clear to those participating in management decisions. A choice must be made between (1) establishing, through man's efforts, forests resembling the primeval stand or (2) by natural means, permitting the development of a forest in which other species predominate. It is possible to opt for each of these choices in different parts of the area. ■

THE AUTHOR—Clifford E. Ahlgren is director of research, Wilderness Research Foundation, Duluth, Minnesota.

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ADMIN 1000
-3

STATE OF MINNESOTA

DEPARTMENT Natural Resources - Wildlife

Office Memorandum

TO : Roger Holmes, Section Chief

DATE: 8-10-76

FROM : Henry Wulf, Regional Wildlife Supervisor

SUBJECT: St. Croix Park Forest Wildlife Management

On Tuesday, August 10, a meeting was held at Brainerd to review a proposed timber management plan for St. Croix Park. I met with Area Forester John Anderson, Regional Staff Forester Bruce Humrickhouse, and Regional Parks Supervisor Clint Besonen to discuss the proposed plan.

The major emphasis of this meeting was to stress the need for timber harvest (for timber management and improvement of wildlife habitat) in the park - where past policy has been one of no timber harvest in state parks. The Division of Forestry has a complete inventory of timber types available in the park and has worked out a proposed cutting rotation with the State Park Manager. A copy of this cutting plan is attached for your review.

I was impressed with the foundation work that has been laid out and was pleased to note that the compartments that have received top priority in the proposed cutting rotation have been coordinated with Area Wildlife Manager Lee Hemness and are located within a deer wintering area.

I feel that a good forest wildlife management plan which incorporates wildlife needs in our state parks will serve as an asset in assisting the Section of Wildlife in the management of forest wildlife species; and I am hopeful that this type of cooperation between disciplines will carry over into other parks.

HFW:jd

cc: M. Casey
E. Adams
D. Davison
R. Lorenz
L. Hemness

Attachment

ADMIN. 1000

STATE OF MINNESOTA

Milt

DEPARTMENT PARKS AND RECREATION

Office Memorandum

TO : Don Davison, Director,

DATE: Aug. 10, 1976

FROM : Clinton Besonen, Regional Supervisor.

SUBJECT: Forest Management, - St. Croix Park.

The Area Forester, Game Manager and Park Manager have spent considerable time working up a forest management plan based on the Upper St. Croix Management Plan.

I have reviewed the preliminary plans with the Regional Game Manager and Regional Forester. We are all in agreement that we must do some management of our forest if we are to have deer in St. Croix.

Enclosed are the basic guidelines for future management. If you, Milt or Wayland would like to review the plan, I will arrange a meeting at St. Croix . We also will be presenting this plan to the Pine County DNR Advisory Committee.

CB:KA

cc: John Rodewald,
Henry Wulf,
Don Jueneman.

Copies to Don Zimmerman
7-30-76 Lee Hemmes

ST. CROIX STATE PARK - CUTTING PLAN

The Moose Lake Area, using field survey data obtained in the Upper St. Croix Scenic Riverway Project, is setting up a timber management program for the St. Croix State Park.

The need for some kind of vegetative management within the Park is necessary if timber types such as pine and aspen are desired. While the changes in vegetation are relatively slow, they are occurring and they are noticeable. The pine areas are being replaced by aspen and low quality hardwoods, and the aspen areas are changing to hardwood and brush. A good timber harvesting and reforestation program can maintain these aspen and pine areas where they are most desireable.

The Park area has been type-mapped entirely, and is presently being zoned into cut and no-cut areas. The determination to cut or not is being based on recreation uses, wildlife needs and aesthetic considerations. The total acres, by type, left in the cut zone is being used to establish allowable harvest figures. One problem stems from the fact that no cutting during past years has resulted in a high percentage of mature and over-mature stands of timber.

The Division of Forestry and the Division of Parks are working closely on this project so that all cuttings are planned wisely and to achieve a specific purpose. If all goes well, we should be able to harvest 220 acres or 2,685 cords each year over the next 15 years. This will include 25 acres or 375 cords of jack pine, 180 acres or 2,160 cords of aspen and birch and 15 acres or 150 cords of hardwoods and spruce.

Approximately 44 acres of mature aspen is expected to be harvested during the winter of 1976-77. Of this acreage, 22 acres is located within a deer yard, and two small sales of 10 acres and 12 acres will be set up outside of established deer yards. Details of sale requirements and slash disposal have not been worked out yet.

Aspen - birch areas will be clear cut in a manner most beneficial to wildlife. Medium and better aspen sites will be encouraged to regenerate naturally to aspen. Poor aspen sites may be converted to conifers in areas where this is deemed desireable. Aspen cuttings will follow terrain features and type lines. Straight lines and square corners will be avoided whenever possible.

Jack pine areas will be clear cut in patterns which blend in with terrain features and type lines. Pine cutover areas will be re-established with pine by seeding or planting. Plantings should be designed to appear natural and should not be in blocks or straight rows. Hand planting may provide more natural appearing stands.

Who will bear to costs of site preparation, planting, and timber stand improvement remains unanswered. Some volunteer labor may be available for many projects, but funding must be made available for development work.

Logging access roads should be temporary unless Park managers desire to leave the roads for other access. Strategically located logging roads can provide fire breaks and fire access in emergencies. Roads must sit lightly on the land and should blend in as much as possible. In the case of roads that will be abandoned after logging terminates, plans should be made as to how this will be accomplished. The Division of Game may desire to fund some road work when game habitat improvement will be accomplished.

The large resident population of white tail deer should benefit greatly from aspen harvests, and the present over browsing of some areas should be lessened. At the same time, this high deer population may impede the re-establishment of pine areas. Pine plantings will undoubtedly receive browsing.

The St. Croix Park manager has been very cooperative in this venture. With the various disciplines working together, the project should be a benefit to the Department, to St. Croix Park and to the public.

Harvest Areas:

1.) Between Sand River and Lost Creek excluding land marked as NSP land — 864 Acres

2.) Area between Lost Creek, north of road and area north of Bear Creek. — 272 Acres

3.) East of Park road and south of Bear Creek excluding all NSP land. — 1232 Acres

2268 Acres

2268 ÷ 45 = 50.4 Acres/year A.C. in Aspen Type

1.) E½ Section 28 & 29-40-19 (Deer Yard) SWSW 28 & SESE 29 = 22 Acres

2.) NE¼ Section 15-40-19 = 10 Acres

3.) SE¼ Section 16-40-19 = 12 Acres

Total = 44 Acres

44 Acres of allowable cut is proposed to be cut in Fiscal Year 1977

UNIVERSITY OF Minnesota

COLLEGE OF FORESTRY · 110 GREEN HALL · ST. PAUL, MINNESOTA 55101

May 6, 1971

Mr. U. W. Hella, Director
Department of Parks and Recreation
Minnesota Department of Natural Resources
St. Paul, Minnesota 55101

Dear Mr. Hella:

Enclosed is a copy of a proposed Minnesota Forestry Note entitled "Winter Cover Type Use by White-tailed Deer in St. Croix State Park, Minnesota". This note is based on some aspects of our ecological research in the park especially as it relates the patterns of deer use to the problem of reestablishing pine in that park to restore something of its pre-white man condition. We feel the management implications are well documented and significant. They suggest a way of reestablishing pine stands consistent with maintaining a deer herd at reasonable stocking levels.

This note has been reviewed and approved by our committee which screens such publications. It is in final form as far as we are concerned. However, if you see anything in it to which you have objection, please contact us soon so that we can give consideration to any need for revision before it is too late.

Copies are being sent to Mr. Reitan at St. Croix State Park and to Mr. Casey of the Division of Game and Fish. We hope they too feel free to communicate any reactions they may have.

Sincerely,

Henry L. Hansen
Professor

HLH:ee
cc: Mr. M. Casey
Mr. N. Reitan

B3-1

No.
May 3, 1971

WINTER COVER TYPE USE BY WHITE-TAILED DEER (*Odocoileus virginianus*) IN ST. CROIX STATE PARK, MINNESOTA[1/]

A. W. Fedkenheuer and Henry L. Hansen[2/]

Over-use by deer of parts of St. Croix State Park has seriously depleted the browse supply and reduced the regeneration of trees and shrubs. Because availability of adequate food and cover in severe winter conditions is critical to northern deer populations, it was felt that the patterns of winter use of various cover types by deer should be studied. This report focuses on the results of such a study.

Methods

This study took place in the winter and spring of 1970. Four survey methods including aerial, ground surveys by car and snowmobile, and spring pellet-group counts were used. The first phase consisted of aerial flights over the entire park on February 15 and March 14, using a Cessna 172 Skyhawk. The park was covered by systematically flying east-west transects. Each deer sighted was mapped by location and surrounding cover type (Fig. 1).

On March 14 and 21-24, a car and snowmobiles were used to make additional surveys of deer occurrence. Routes were chosen to give coverage of all major cover types and all areas of the park (Fig. 1). Several snow-plowed roads were surveyed by car at a maximum speed of 5 mph. When an animal was spotted, its map location and associated cover type, the car mileage from the initial starting point, and time of day were recorded. The snowmobiles were used on a trail network to record similar data. General deer activity in the different cover types was also noted by presence or absence of deer trails.

The last phase of the field work was a spring pellet-group count in four areas of the park. The areas were located so as to sample the cover types as surveyed by the previous studies. Only fresh, winter dropped pellets were counted. Circular 1/100 acre pellet-group plots were located randomly along north-south transects. The number of pellet-groups and the cover type were recorded for each plot.

The cover types were grouped as follows: pine , pine-aspen, aspen, upland hardwood, open, and lowland. Pine types were about 95 percent jack pine (*Pinus banksiana* Lamb.) with a few areas of red pine (*Pinus resinosa* Ait.) or mixed red

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1/ This project was supported by grants from the Minnesota Natural Resources Fund and McIntire-Stennis funds administered by the Cooperative State Research Service of the U.S. Department of Agriculture.

2/ Research Assistant and Professor, respectively, College of Forestry, University of Minnesota.

and jack pine. Pine-aspen types included those with equal representation of jack pine and aspen (Populus tremuloides Michx.) as well as types where aspen predominated, but where jack pine had good representation. Stands typed as aspen were essentially pure aspen, while upland hardwood included various mixtures of bur oak (Quercus macrocarpa Michx.) northern red oak (Quercus borealis Michx.), red maple (Acer rubrum L.), sugar maple (Acer saccharum Marsh.), American elm (Ulmus americana L.), birch (Betula papyrifera Marsh.), aspen and other minor species. Areas classed as open lacked trees or had a few small trees. Lowland included areas of sedges (Carex spp.), willows (Salix spp.), alder (Alnus rugosa (DuRoi) Spreng.), black ash (Fraxinus nigra Marsh.), tamarack (Larix laricina (DuRoi) K. Koch.), and any other low lying areas.

Results

The numbers of deer sighted per section or per mile, the average number of pellet-groups per plot, and the coverage by each survey method are recorded in Table 1. It is evident that all four survey methods show deer were confined, with a few exceptions, to the types having a strong component of pine. Data obtained by car and snowmobile were similar to that obtained by airplane, even though the former entailed looking horizontally into the cover type and the latter provided a vertical view. A difficulty in using deer surveys which depend on sighting deer either from above or from the ground is the variation in visibility between the various cover types. This is a major problem in the coniferous types, especially when using the airplane. In spite of this drawback, the aerial survey revealed a substantially higher number of deer per section in the coniferous types than in any of the other types. It is also important to note that the results of the pellet-group counts, where variations in visibility of deer are not involved, are essentially similar to those obtained by sighting survey methods. The number of pellet-groups would probably be even lower in the non-coniferous types if only those dropped while there was snow on the ground could be counted. Since this was impossible, some of the pellet groups counted were dropped before deer became concentrated in the pine types. The results of the separate survey methods follow.

Aerial Surveys. Each "x" on the map in Fig. 1 represents the location of a deer sighted from the air. Shaded areas are the pine and pine-aspen cover types. Of the total of 75 deer seen, 56 were in these two types and only 19 were in all non-coniferous cover types. When these data are converted to an equal-area basis, the differences are even more striking, 4.9 deer per section in the pine and pine-aspen types and only 0.5 deer per section in the non-coniferous types.

Surveys by Car. Car surveys covered a lineal total of 49.5 miles of raodsides with an average of 7.2 deer sighted per mile in pine types, 2.7 in pine-aspen types, and none in non-coniferous types.

Surveys by Snowmobile. A total of 43.8 miles of trails were covered by the snowmobile surveys. On these, an average of 3.7 deer were seen per mile in the pine types, 4.0 in the pine-aspen types, 0.5 in the aspen, 0.7 in the upland mixed hardwood types, and none in the open or lowland types.

Pellet-group Counts. As indicated by winter deposited pellet-groups, deer had been using the pine (4.3 pellet groups per plot) and pine-aspen (3.9 per plot) types far more than the other types (aspen, 1.4; upland mixed hardwoods, 1.0; open, 0.6; lowland, 0.4 pellet groups per plot).

(28 deer/sq mi)?

Discussion

The deer use pattern of forest cover types is remarkably consistent as determined by four separate survey methods. However, because of some variability in the timing of surveys and in the relative visibility in the various cover types, no attempt was made to use the data as a basis for a total census of the deer herd.

The concentration of deer within or near conifer types is shown in the comparative data in Table 1 and on the map (Fig. 1). It is also strikingly illustrated by the fact that where deer were sighted in an area of predominantly aspen and other hardwoods they were within a short distance of a pine plantation to which they had access for cover.

Management Implications

The winter distribution pattern of the deer herd can be used in planning reforestation in the park. The deer are an important asset of interest to park visitors. However, they have badly overbrowsed portions of the park, totally eliminating any young pine that may have started through either natural regeneration or planting. It is common knowledge that deer seldom browse red pine except in winter and only when more desirable species are not available. The findings of these surveys suggest that pine could be planted in clearings made in large stands of aspen and other hardwood types seldom used by deer in winter. Since they do not browse the pine in summer, these planted trees could have a good chance to become established. Further, as such planted trees get large enough they would provide winter cover that might attract the deer to portions of the park presently given little winter use by the herd.

The present study was limited to one winter period when a blanket of 17-20 inches of snow covered the area for about 4 months. It would be desirable to continue the surveillance of winter use patterns in connection with efforts to maintain a substantial deer herd and at the same time to restore some of the red pine to the park vegetation.

* * * * * * * * * * * *

Table 1. Deer Observations in Different Cover Types and the Amount of Coverage by Various Sampling Methods.

Cover Type Group	Number of Deer Observed and Coverage per Type						Ave. No. Pellet Groups Per Plot	No. Plots
	Airplane		Car		Snowmobile			
	No./Sect.	Sect.	No./Mi.	Mi.	No./Mi.	Mi.		
Pine	7.7	3.0	7.2	2.8	3.7	5.0	4.3	68
Pine-Aspen	5.0	6.6	2.7	23.2	4.0	17.6	3.9	31
Aspen	0.7	13.0	0.0	7.4	0.5	7.6	1.4	43
Upland Hardwood	0.5	11.5	0.0	13.5	0.7	12.6	1.0	28
Open	0.0	2.9	0.0	1.0	0.0	0.2	0.6	20
Lowland	0.3	12.4	0.0	1.6	0.0	0.8	0.4	8

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ADMIN. 1009

STATE OF MINNESOTA

Office Memorandum

DEPARTMENT Natural Resources - Wildlife

TO : Roger Holmes, Section Chief

DATE: 8-10-76

FROM : Henry Wulf, Regional Wildlife Supervisor

SUBJECT: St. Croix Park Forest Wildlife Management

On Tuesday, August 10, a meeting was held at Brainerd to review a proposed timber management plan for St. Croix Park. I met with Area Forester John Anderson, Regional Staff Forester Bruce Humrickhouse, and Regional Parks Supervisor Clint Besonen to discuss the proposed plan.

The major emphasis of this meeting was to stress the need for timber harvest (for timber management and improvement of wildlife habitat) in the park - where past policy has been one of no timber harvest in state parks. The Division of Forestry has a complete inventory of timber types available in the park and has worked out a proposed cutting rotation with the State Park Manager. A copy of this cutting plan is attached for your review.

I was impressed with the foundation work that has been laid out and was pleased to note that the compartments that have received top priority in the proposed cutting rotation have been coordinated with Area Wildlife Manager Lee Hemness and are located within a deer wintering area.

I feel that a good forest wildlife management plan which incorporates wildlife needs in our state parks will serve as an asset in assisting the Section of Wildlife in the management of forest wildlife species; and I am hopeful that this type of cooperation between disciplines will carry over into other parks.

HFW:jd

cc: M. Casey
E. Adams
D. Davison
R. Lorenz
L. Hemness

Attachment

3320.120-10

Lee Hennessy

ST. CROIX STATE PARK - CUTTING PLAN

The Moose Lake Area, using field survey data obtained in the Upper St. Croix Scenic Riverway Project, is setting up a timber management program for the St. Croix State Park.

The need for some kind of vegetative management within the Park is necessary if timber types such as pine and aspen are desired. While the changes in vegetation are relatively slow, they are occurring and they are noticeable. The pine areas are being replaced by aspen and low quality hardwoods, and the aspen areas are changing to hardwood and brush. A good timber harvesting and reforestation program can maintain these aspen and pine areas where they are most desireable.

The Park area has been type-mapped entirely, and is presently being zoned into cut and no-cut areas. The determination to cut or not is being based on recreation uses, wildlife needs and aesthetic considerations. The total acres, by type, left in the cut zone is being used to establish allowable harvest figures. One problem stems from the fact that no cutting during past years has resulted in a high percentage of mature and over-mature stands of timber.

The Division of Forestry and the Division of Parks are working closely on this project so that all cuttings are planned wisely and to achieve a specific purpose. If all goes well, we should be able to harvest 220 acres or 2,685 cords each year over the next 15 years. This will include 25 acres or 375 cords of jack pine, 180 acres or 2,160 cords of aspen and birch and 15 acres or 150 cords of hardwoods and spruce.

Approximately 44 acres of mature aspen is expected to be harvested during the winter of 1976-77. Of this acreage, 22 acres is located within a deer yard, and two small sales of 10 acres and 12 acres will be set up outside of established deer yards. Details of sale requirements and slash disposal have not been worked out yet.

Aspen - birch areas will be clear cut in a manner most beneficial to wildlife. Medium and better aspen sites will be encouraged to regenerate naturally to aspen. Poor aspen sites may be converted to conifers in areas where this is deemed desireable. Aspen cuttings will follow terrain features and type lines. Straight lines and square corners will be avoided whenever possible.

Jack pine areas will be clear cut in patterns which blend in with terrain features and type lines. Pine cutover areas will be re-established with pine by seeding or planting. Plantings should be designed to appear natural and should not be in blocks or straight rows. Hand planting may provide more natural appearing stands.

Who will bear to costs of site preparation, planting, and timber stand improvement remains unanswered. Some volunteer labor may be available for many projects, but funding must be made available for development work.

Logging access roads should be temporary unless Park managers desire to leave the roads for other access. Strategically located logging roads can provide fire breaks and fire access in emergencies. Roads must sit lightly on the land and should blend in as much as possible. In the case of roads that will be abandoned after logging terminates, plans should be made as to how this will be accomplished. The Division of Game may desire to fund some road work when game habitat improvement will be accomplished.

The large resident population of white tail deer should benefit greatly from aspen harvests, and the present over browsing of some areas should be lessened. At the same time, this high deer population may impede the re-establishment of pine areas. Pine plantings will undoubtedly receive browsing.

The St. Croix Park manager has been very cooperative in this venture. With the various disciplines working together, the project should be a benefit to the Department, to St. Croix Park and to the public.

Harvest Areas:

1.) Between Sand River and Lost Creek excluding land marked as NSP land — 864 Acres

2.) Area between Lost Creek, north of road and area north of Bear Creek. — 272 Acres

3.) East of Park road and south of Bear Creek excluding all NSP land. — 1232 Acres

2268 Acres

2268 ÷ 45 = 50.4 Acres/year A.C. in Aspen Type

1.) E½ Section 28 & 29-40-19 (Deer Yard) SWSW 28 & SESE 29 = 22 Acres

2.) NE¼ Section 15-40-19 = 10 Acres

3.) SE¼ Section 16-40-19 = 12 Acres

Total = 44 Acres

44 Acres of allowable cut is proposed to be cut in Fiscal Year 1977

FRANK K
12/9/80

DEER CHECK STATION DATA FOR 1980

Deer management check stations were run at Blackduck, Garrison, Cotton and Hinckley during the first few days of the firearms deer season. A check was also made of deer harvested in the St. Croix State Park firearms season from 8 to 11 November. The purpose of the stations is to gather data regarding weights and age structure of the deer populations for management purposes. As in previous years, deer were aged as to fawn, yearling and adult, and yearling bucks were weighed. Attemps were made to measure hooves and collect liver specimens as an aid in determining the sufficiency of mineral nutrition, particularly copper.

NUMBER OF DEER CHECKED

	STATION			
Year	Blackduck	Cotton	Garrison	Hinckley
1976	84	NR	248	NR
1977	117	257	NR	102
1978	107	177	283	106
1979	67	144	182	90
1980	143	222	361	204

This increase may be due in part to the button given in 1979 and the patch in 1980 as an incentive for hunters to stop, and in part due to an increased deer harvest.

PERCENT YEARLING BUCKS

The percent of yearling males (as the proportion of the total antlered males) remained relatively unchanged at Blackduck and Cotton, but increased at Hinckley and Garrison.

	STATION			
Year	Blackduck	Cotton	Garrison	Hinckley
1976	27	--	31	--
1977	46	38	62	59
1978	58	49	60	79
1979	48	44	37	51
1980	48	41	52	63

YEARLING BUCK WEIGHTS

	STATION			
Year	Blackduck	Cotton	Garrison	Hinckley
1976	117	99	114	110
1977	122	102	125	121
1978	118	115	119	128
1979	111	110	115	121
1980	117	114	114	122

The average weights of yearling bucks increased in 1980 at the two northern stations, and remained relatively unchanged at the two southern stations. The number of yearling bucks in the harvest is probably dependent on hunting pressure, vulnerability and population levels.

Weights of yearlings are the sum of many factors that make deer grow. Among these are the two growing seasons and one winter they have survived. The lightest average yearling bucks are weighed at the check station in the northeast at Cotton. In ascending order Garrison is next, followed by Blackduck and Hinckley. We can only speculate as to why these differences occur, among which could be genetics, nutrition and winter severity.

Hinckley also has the highest percentage of yearling males in the buck harvest - and some of the heaviest hunting pressure in the northern forested area of the state.

CORONET

Check station personnel were advised to look for the coronet (burr at the base of the antler) on yearling bucks. This can be another indicator of range adequacy. Essentially all yearling bucks with legal antlers in the St. Croix State Park had coronets. Those yearlings with spikes less than 3 inches did not develop coronets.

ST. CROIX STATE PARK

Hunting by firearms with a special permit for any deer was allowed in St. Croix State Park from 8-11 November. For the 600 permits there were 681 useable applications. Approximately 550 hunters used the park, and registered 336 deer at the Park headquarters.

Overall hunter success was about 60 percent. The check station manned at the Park checked 294 of these deer.

Average St. Croix State Park Deer Weights for 1980 were:

Age	Bucks	Does
1/2	72	63
1 1/2	109	93
over 2 1/2	158	115

Yearling bucks were about 10 pounds lighter in the park than outside, as weighed at the Hinckley check station. Deer have been weighed at St. Croix State Park since 1947 and the results are rather interesting.

Deer Weights from St. Croix State Park, 1947 to 1980.

Year	FAWNS Bucks	FAWNS Does	1 1/2 years Bucks	1 1/2 years Does	2 1/2 and older Bucks	2 1/2 and older Does
1947	71	66			143	113
1948	68	64			141	114
1949	74	70		a	153	119
1951	71	64	108		147	118
1952	73	62	111	107	157	119
1960	61	71	110	99	161	111
1963			110			
1975	57	47	106	101	142	107
1978	57	57	94	91	126	102
1980	72	63	110	93	158	115

[a] Yearlings included with adults until 1951

Weights for St. Croix deer have returned to the pre-1960 level, which probably reflects the relatively mild winter of 1979-80, and a good growing season in summer of 1980.

Age and sex cohorts for the St. Croix harvest were as follows:

	Sex			
	Bucks		Does	
Age	%	n	%	n
Fawn	15	48	11	35
1 1/2	15	47	8	24
over 2 1/2	24	75	25	80

The yearling bucks made up 38 percent of the antlered buck harvest.

Data from hooves is still being tabulated. Liver samples have to be chemically analyzed before any statement can be made regarding potential mineral problems.

SUMMARY

1. A record number of deer were checked during the 1980 check station operations. This may reflect an increased harvest, but also is attributable in part to the reward patch used as an incentive for hunters to stop at the stations.

2. Yearling bucks made up the largest proportion of the buck harvest, and were the heaviest at the Hinckley check station.

3. Cotton had the lowest proportion and lightest yearling bucks.

4. Information on coronets suggest the smaller yearling bucks had little or no development.

5. Deer from St. Croix State Park were lighter than from the surrounding areas of Pine County, but heavier than in the past few seasons.

A special thanks to all the personnel who participated in the 1980 check station effort. It was the total of your individual contributions that made it a success!

PK/js

12/1/80

FOREST WILDLIFE POPULATION AND RESEARCH GROUP
Minnesota Department of Natural Resources
201 S. W. Golf Course Road
Grand Rapids, MN 55744

ADMIN 1000 (Rev. 1/78)
SF-00006-01

STATE OF MINNESOTA

Office Memorandum

DEPARTMENT Natural Resources

TO : Lee Hemness

DATE: November 26, 1980

FROM : Jack Mooty

PHONE:

SUBJECT: Trail Counts - St. Croix State Park 1980

The results of these counts indicate a deer population of 31±9 deer per square mile. Including questionable trails yielded results of 36±9 deer per square mile. All these calculations are based on the regression equation given by McCaffery (1976) ($y=2.16X - 2.83$) where y=deer/km^2 and X=the average number of trails/course.

CC: P. Karns
H. Wulf
J. Wilford
F. Knoke

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PK/js

12/1/80

FOREST WILDLIFE POPULATION AND RESEARCH GROUP
Minnesota Department of Natural Resources
201 S. W. Golf Course Road
Grand Rapids, MN 55744

1974

RH RC WL BJ

file

Bow and Arrow Hunting

at St. Croix Park

Friday - November 1

950 hunters took 33 deer

Saturday - November 2

1450 hunters took 42 deer

Sunday - November 3

640 hunters took 22 deer

Saturday - November 9

1000 hunters took 8 deer

Sunday - November 10

300 hunters took 3 deer

Saturday - November 16

790 hunters took 3 deer

Sunday - November 17

218 hunters took 2 deer

Henry didn't have the breakdown after the 17th but total number of hunters during the November season was 11,939 and total kill was 167.

3320-120-10

ADMIN 1000 (Rev. 1/78)

STATE OF MINNESOTA

DEPARTMENT Natural Resources-Parks and Recreation **Office Memorandum**

TO : Don D. Davison, Director

DATE: June 13, 1979

FROM : Frank H. Knoke FHK
Environmental Specialist

PHONE: 296-6226

SUBJECT: State Park Deer Herds

In the course of this year's deer season setting, Milt and I met with the wildlife people. We discussed a season at Nerstrand and agreed a season was needed. The details of how many hunters and the way to handle the park and refuge is being worked out at the regional level.

We also looked at the St. Croix State Park data. The pellet counts showed 47 deer per square mile ± 46% with a loss of 13 deer per square mile. This data leaves a lot to be desired as far as exactness. Everyone agrees that we have a lot of deer in the park. The big question is, how many do we want?

I discussed the deer population estimates from the pellet count with Jim Willford, Park Manager and Lee Hemness, Area Wildlife Manager. They both felt the deer numbers were around 25-30 per square mile which is within the range of the pellet count data. Jim also felt the losses were higher than the pellet count showed. Both felt that no season was necessary this fall.

I also talked with Pat Karns, Forest Wildlife Research Group Leader. Pat's feeling is that we have a large population of deer in the park and that a hunt would not hurt the population. His data shows that the parks adult does average 90 pounds dressed. A weight of 120-130 pounds is expected for adult does. He did not have data available for adult does around the park. The deer population around the park is about 15 deer per square mile. The deer in the park have a slightly lower reproductive rate. He expects a 25% increase in deer this year.

Using the lower figure from the pellet count (47 square/mile - 46%) we have 25 deer square/mile in the park now. This figure is about what our field people feel is valid. This gives us about 1,325 deer in the park now. A 25% increase would bring it up to 31 deer square/mile or 1,643 deer.

We must decide which way to go on our deer herd in the park. As I see it, we have two choices:

1) We have a large number of deer which are small in size with a potential for large winter losses. With this option, we could have primitive weapon hunts for recreational purposes or no hunts at all. The primitive weapon hunts have not shown the ability to reduce the herd significantly.

2) We have a smaller deer herd of larger animals and a smaller winter loss potential. With this option, we most likely would need an annual rifle hunt to hold the herd size down. We could also hold recreational primitive weapon hunts if the rifle quota were reduced.

This is not the only park with deer problems but it offers a good example of our problem. The decision must be made between roller-coaster type of population with bad press on winter losses or a stable population with anti-hunting type of press.

We must make the decision. Wildlife will assist our management but they must know what we want.

FHK/hab
cc: Wayland Porter, Park Systems Supervisor
Milt Krona, Recreation Systems Coordinator

ADMIN 1000 (Rev. 1/78)

STATE OF MINNESOTA

DEPARTMENT Natural Resources-Parks & Recreation **Office Memorandum**

TO : Don D. Davison, Director

DATE: June 19, 1979

FROM : Frank H. Knoke
Environmental Specialist

PHONE: 296-6226

SUBJECT: Recommendation: Deer Hunt at St. Croix State Park

The pellet count data for this park is not very reliable. A ± 46% error demonstrates that we must make several assumptions, on both herd size and fawn recruitment into the population.

I feel that a conservative use of the data is in order. This would be 25 deer square/mile or 1,325 deer. A 25% increase due to fawn recruitment would add 331 deer to the population.

If we are to use the pellet count data without considering error and the 50% recruitment expected for this area of the state, we have 47 deer square/mile or 2,491 deer. A 50% increase would add 1,245 deer to the population.

The available data on the parks deer herd shows that we have an over population of deer. The parks adult does average 90 pounds dressed. A weight of 120-130 pounds dressed is expected. This year's fawns were the smallest on record. In 1948, the male fawns averaged 90 pounds dressed. In 1978, they averaged 58 pounds dressed.

I feel our goal should be to eliminate this year's recruitment and get better data next spring. To do this, we should permit 600 hunters into the park during the three day doe season. Pat Karns feels a 60-70% hunter success is a reasonable estimate. We can safely assume that not all the hunters will show up and that the number of hunters will decrease over the three days as the permits are filled since doe permits are issued to an individual not a party. We should be able to take around 400 deer which is somewhat over our conservative recruitment estimate of 331 deer but far below what the face value pellet count data shows.

Next spring, we should give wildlife assistance to ensure that the money and manpower is available to get better data.

FHK/hab
cc: Milt Krona, Recreation Systems Coordinator
Wayland Porter, Park Systems Supervisor

STATE OF MINNESOTA

DEPARTMENT NATURAL RESOURCES - Game

Office Memorandum

TO : Maynard Nelson

DATE: March 10, 1972

FROM : Pat Karns Pat

Circulate this copy + figures to St Paul staff - Send copies of memo to Regionals 3-15-72

NOTE & INITIAL
DV
RC
MN
BL
RH
MW
SJ

SUBJECT: Metabolic profiling of deer at St. Croix State Park

As you are aware, we collected blood from eight deer in St. Croix State Park in February of 1972. With most of the blood chemistry completed, I have drawn up a composite profile of all deer and profiles for several individuals. The metabolic profiles indicate the amount of deviation in terms of standard deviation from an expected mean. As you know, approximately 68% of the observations will fall within ± 1 standard deviation, and 95% within ± 2 standard deviations. For our purposes when we go beyond two standard deviations in these parameters it is a strong indication that things have gone wrong.

The composite profile indicates that blood urea nitrogen and magnesium are extremely low and glucose is somewhat high. The low value for the blood urea nitrogen indicates that these animals are on an extremely poor protein diet. The same is true of magnesium, magnesium being important particularly to pregnant does for proper fetal development and in warding off the effects of cold winter. The high glucose is mainly attributed to one animal, an adult female #1018.

In reviewing the metabolic profiles of individual deer, this same pattern is apparent, only differing largely in degree. One animal #1014, an adult female, appears to be extremely physiologically distressed, and her total blood proteins, blood urea nitrogen, calcium and magnesium are all low. In addition to this, she is exhibiting ketone bodies in her blood which is an indication of a restriction in her carbohydrate intake. Ketone bodies were also exhibited by #1015, a male fawn, and #1018, an adult female.

A fair amount of progress is being made on the write-up of our baseline data on the hematological values. Predictive values of these measurements will increase as we accumulate knowledge relative to their changes with the nutritional status of the deer. Some of this data is available in our files and awaits analysis, and this winter's work will make a large contribution to our understanding.

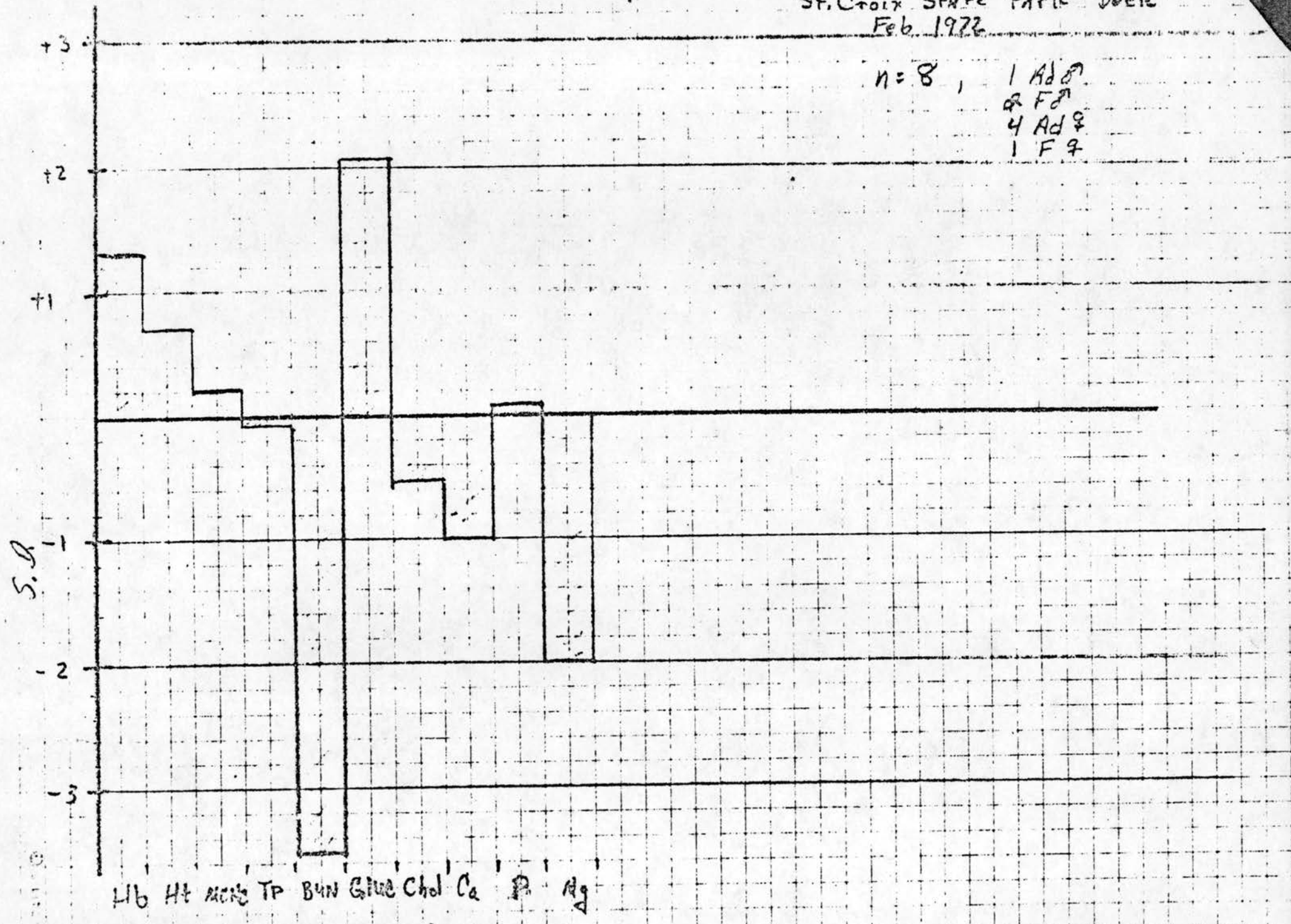
Based on BUN measurements in our experimental deer from last winter and the St. Croix deer this winter, we can expect to have abnormally high fawn losses in the Park.

I am forwarding this information to you to provide an idea of the value of metabolic profiling in evaluating the condition of white-tail deer.

PK:sp
Enc. (6)
cc: C. Kinsey
H. Shepperd

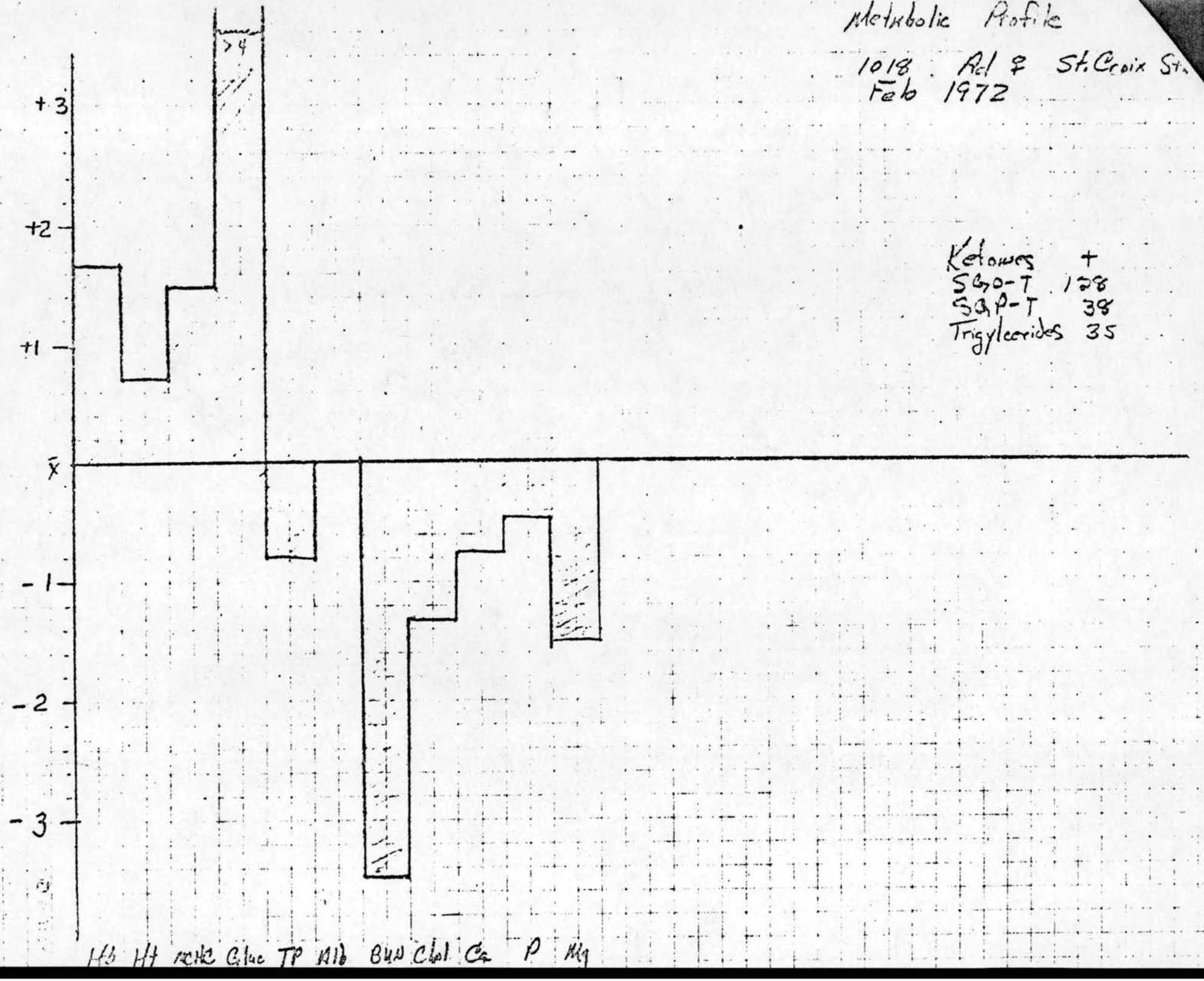
Composite Metabolic Profile
St. Croix State Park Deer
Feb. 1972

n = 8, 1 Ad ♂
& F ♂
4 Ad ♀
1 F ♀



Metabolic Profile

1018 Rd & St. Croix St.
Feb 1972

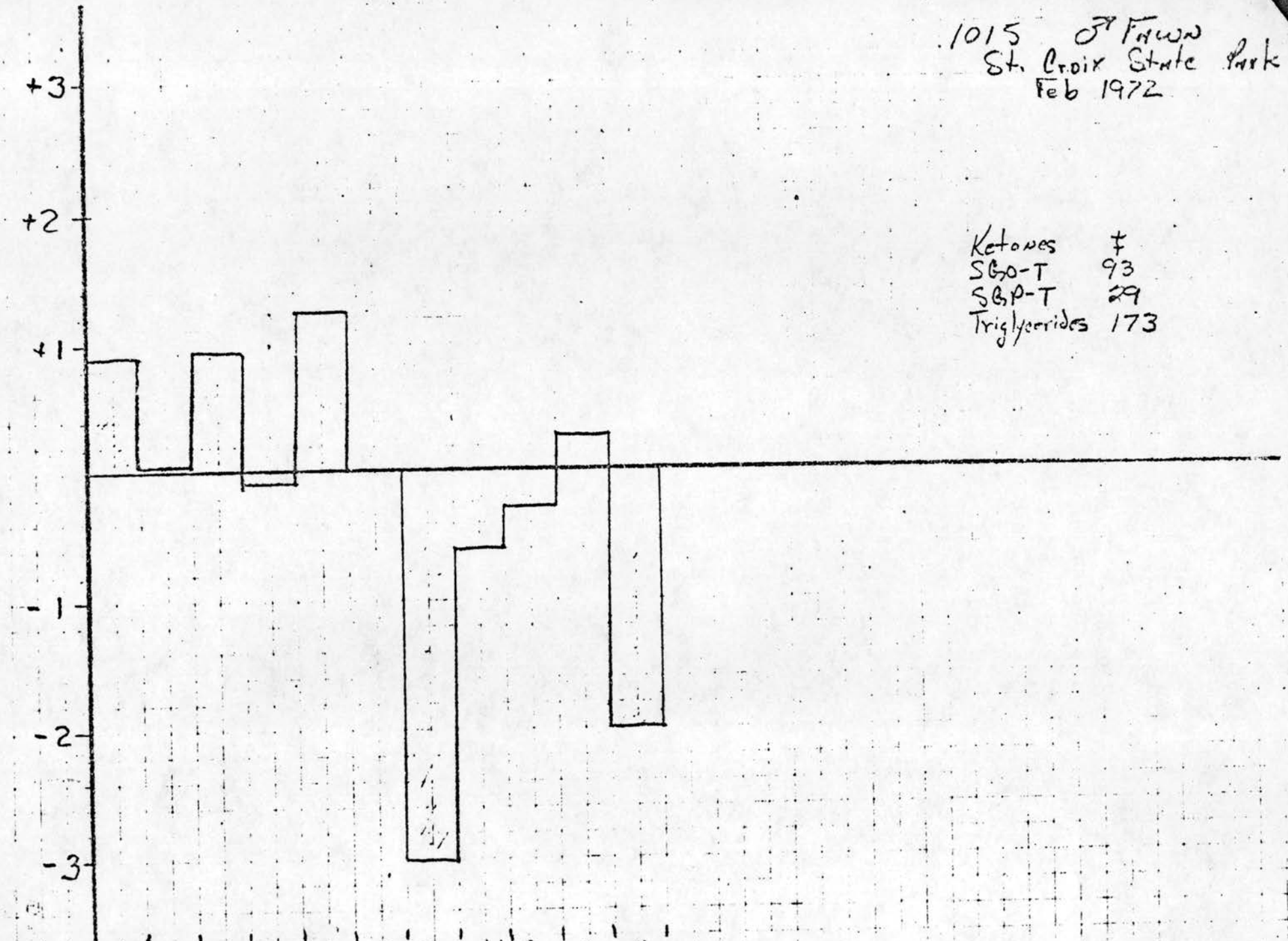


Ketones	+
SGO-T	128
SGP-T	38
Triglycerides	35

Metabolic Profile

1015 3rd Farm
St. Croix State Park
Feb 1972

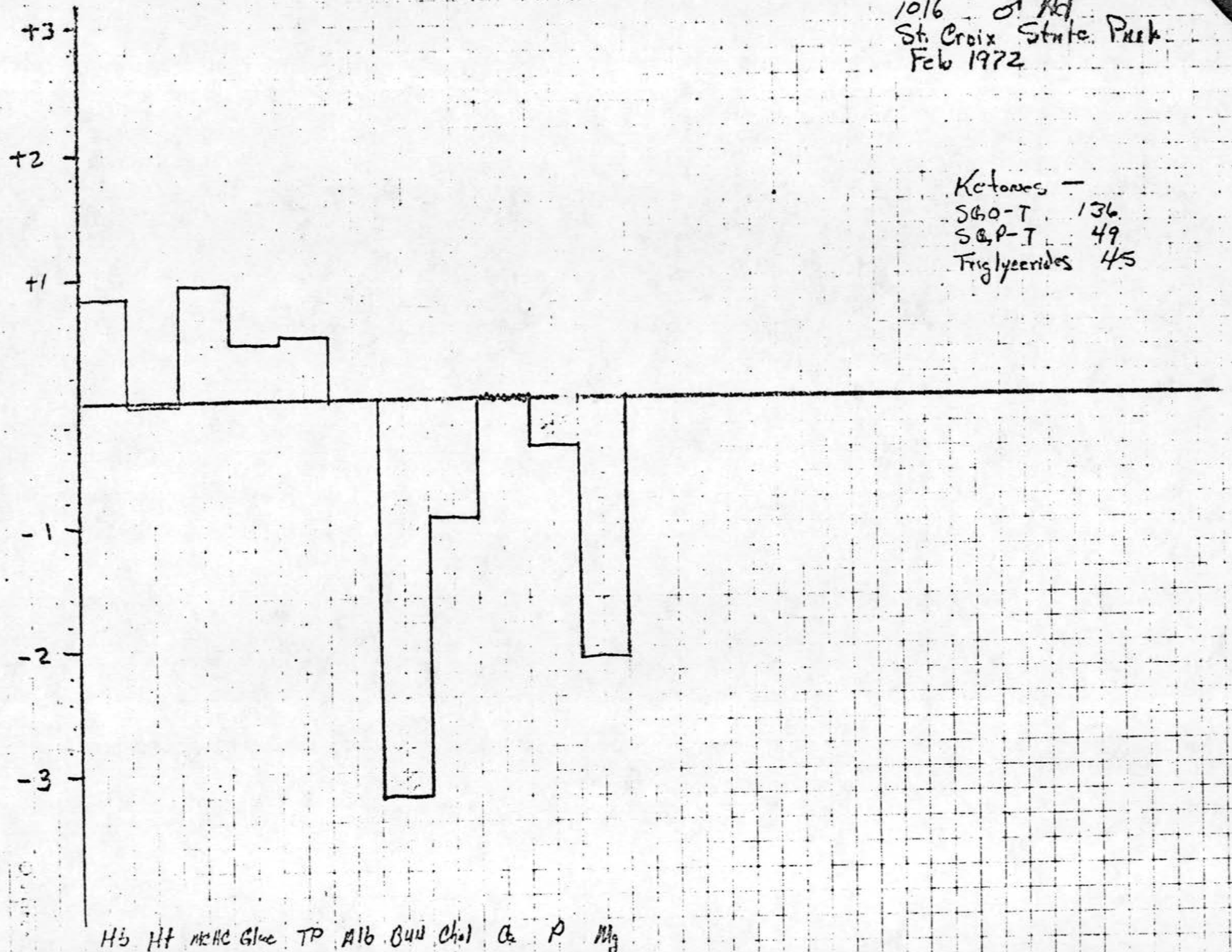
Ketones	∓
SGO-T	93
SGP-T	29
Triglycerides	173



Metabolic Profile

1016 ♂ Ad
St. Croix State Park
Feb 1972

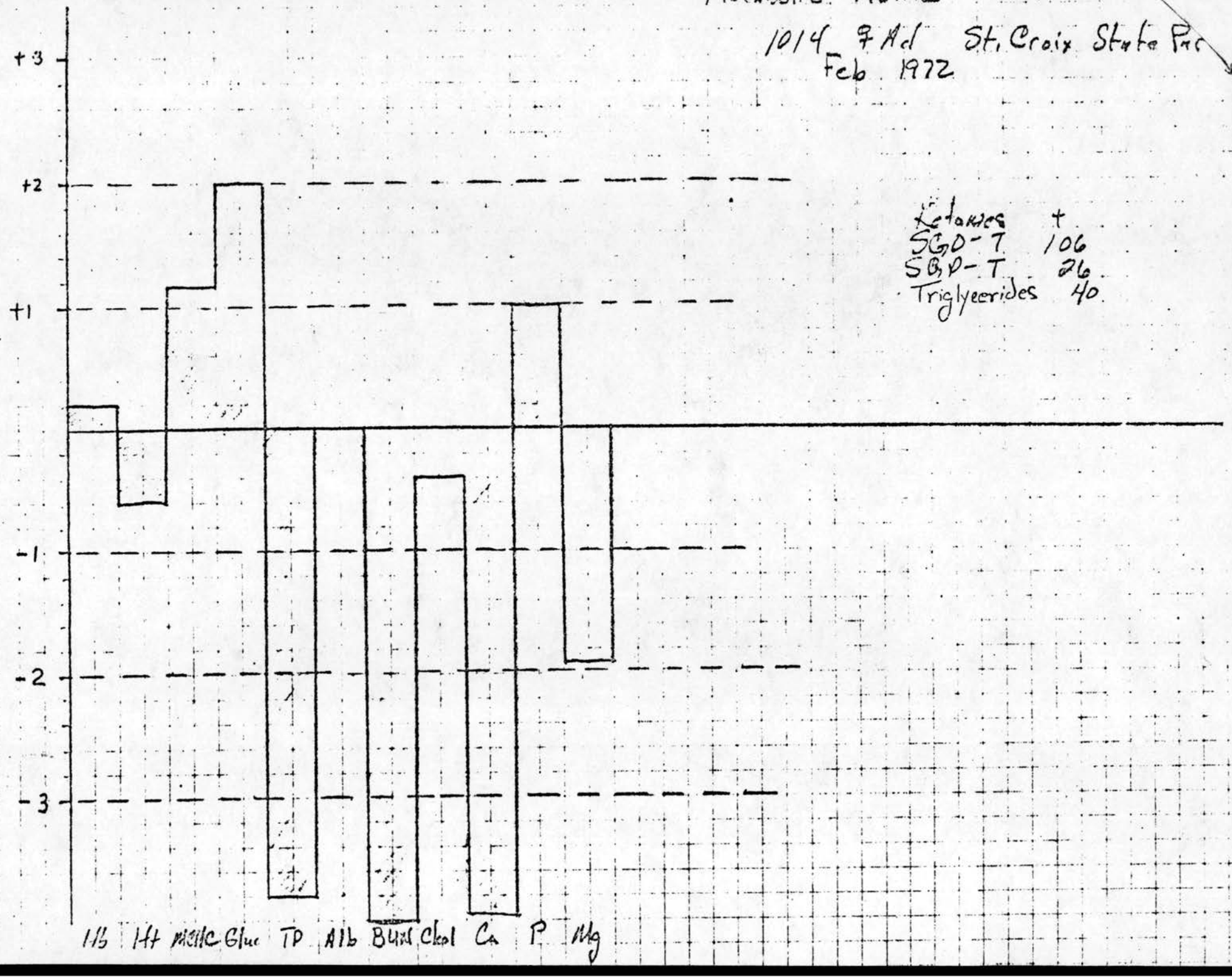
Ketones —
SGO-T 136
SGP-T 49
Triglycerides 45



Metabolic Profile

1014 7 Ad St. Croix State Pri

Feb 1972



Ketones +

SGO-T 106

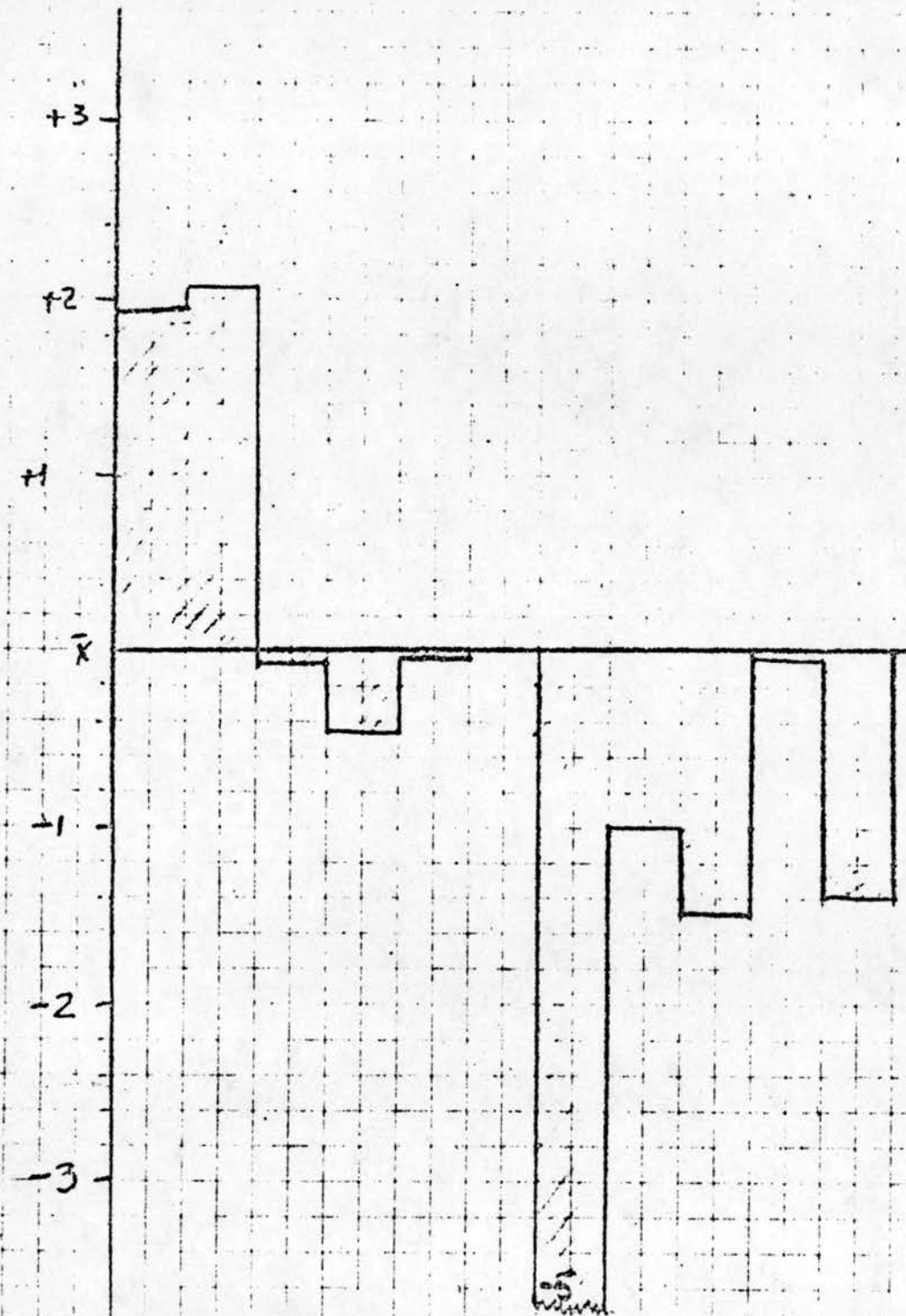
SGP-T 26

Triglycerides 40

Metabolic Profile

Adult F St. Croix State Park
February 1972

Ketones –
SGO-T 80
SGP-T 16
Triglycerides 30



Hb is hemoglobin
Ht is hematocrit
MCHC is mean corpuscular volume
TP: total protein
BUN - Blood urea nitrogen
Alb - albumin
Chol - cholesterol
Ca - calcium
P - phosphorous
Mg - magnesium

) Values for which no normals have been established.

ADMIN 1000 (REV. 4/77)

STATE OF MINNESOTA

DEPARTMENT Natural Resources

Office Memorandum

TO : Frank Knoke

DATE: June 21, 1979

FROM : Pat Karns PK

PHONE:

SUBJECT: St. Croix State Park Deer Population Management

Most of the data, i.e. seasons harvests, and the like is available from Lee Hemness. Biological and census data is coordinated from this office. Copies of pellet counts for the last 2 years are enclosed.

Weight data for female fawns (the class affected by habitat conditions, but least by timing of season) shows an interesting decline.

Year	Average weight of female fawns
1948	84
1949	81
1950	90
1958	62
1978	58

This decline is related to a general reduction in range quality with increasing age of the forest stands.

Population estimates, from pellet counts, are probably not that far from reality. The high variability comes from the high population, but the mean estimate of 40-50 deer per square mile, based on my personal experience in St. Croix and elsewhere, is probably a good estimate. Note also that mean pellet groups per course in the high 3 strata are not in line with expected populations, i.e. Blue being the lowest and Brown the highest population, indicating problems in how the strata were established. This problem effects the variance more than the mean, according to sampling theory, thus again the high variance.

Summary of available pellet count data is as follows:

Year	Deer/sq. mi $\pm$ 2 standard errors
1975	62.5 ± 17.0
1978	40.6 ± 15.2
1979	52.2 ± 24.1

We can assume a net productivity of 25 percent in this population, so by fall this would be 65 deer/square mile. With 50 square miles of park area this is 3250 deer, and to maintain a stable population removal of this 25 percent would amount to 800 deer. Assuming park hunters are no better (or worse) than those outside there is a 40 percent wounding loss, thus permits to take 575 deer would in actuality take the 800. Assuming no severe winter losses in 79-80, we would be back at this population level in the fall of 1980. This is where park objectives enter into the deer population management scheme.

With some objectives in mind a deer population management program can be carried out to meet the goals of such a plan.

PK/js

CC: Henry Wulf
Lee Hemness
Blair Joselyn
LeRoy Rutske

1975

University of Minnesota
Bus. Form 205
S-91660

TABULATION SHEET

TOPIC: St. Croix State Park Deer Pellet Counts

DATE OF TABULATION: June 1975

TABULATED BY: [illegible]

Strata	Total Area mi² (A_j)	No. of Pellet Groups	Allocated Sample (N_j) Courses	Prop. of Area (W_j)	Pellet Groups /course ($\bar{x}_j$)	Number of courses completed (r_j)	Prop. of courses completed	Variance (s_j^2)	$\tilde{P}_j$	$\frac{\tilde{P}_j^2 s_j^2}{n_j}$	Stand Error $\sqrt{\frac{\tilde{P}_j^2 s_j^2}{n_j}}$	Two Stand Errors as % of $\bar{x}_j$	Deer/mi² uncorrected	Pell. Gps. /course by dead deer in 100 days	Pell Gps /course correc. Deer/mi² correc.	Pell Gps. /course by deer removed by hunt in 30 days	Pell. Gps /course correc. Deer /mi² correc.	Two stand Errors as deer /mi²	Number of courses with grouse roosts	Grouse roosts %	Number of courses with hare sign	Hare Sign %	Grouse Flushes No.	Total Chains	Dead Deer	Mean completion Days	Minutes of Course
Red	39		26	.722	12.9	12		136.1	.721	5.89	2.43	4.85 37.6	39.7						6		9		0	963	1		
Blue	7		9	.129	51.5	4		625.0	.124	2.42	1.56	3.11 6.04	158.5						2		2		0	378	1		
Green	5		8	.093	17.5	4		209.7	.100	.5252	.725	1.45 8.28	53.8						2		4		2	289	3		
Brown	3		11	.056	67.6	5		161.3	.054	.0958	.309	.619 .91	208						1		0		1	441	4		
TOTAL	54		54	1.00	21.2	25			1.00	8.931	2.99	5.98 28.2	65.1	0.68		0.16			11		15		3	2,071	9	200	

$$\bar{\bar{x}}_j = \sum_{j=1}^{3} \bar{x}_j \tilde{P}_j$$

62.5 ± 17.0

54
31

DEER PELLET GROUP COUNT RESULTS FOR ST. CROIX STATE PARK (1978)

J	A	W	N	X	X'	X''	E	SE	R1	R2	R3
RED	39	0.722	12	111.0	9.25		3.82771				
BLUE	7	0.129	4	89.3	22.34		1.36216				
GREEN	5	0.092	4	79.3	19.84		.17541				
BROWN	3	0.055	5	93.9	18.78		.08067				
ST. CROIX	54	1.000	25	373.7		12.46	5.4459	2.3336	12.46 ± 37.4%	40.57 ±15.19	2191 ± 820

LEGEND

J = STRATUM
A = AREA (SQ.MILES)
W = PROPORTION OF AREA IN STRATUM
N = NUMBER OF COURSES COMPLETED
X = NUMBER OF PELLET GROUPS FOUND (ADJUSTED FOR KNOWN MORTALITY)
X' = PELLET GROUPS / COURSE
X'' = WEIGHTED PELLET GROUPS / COURSE
E = WEIGHTED VARIANCE OF THE MEAN
SE = STANDARD ERROR OF THE MEAN
R1 = MEAN NUMBER OF PELLET GROUPS PER COURSE ± 2-STANDARD ERRORS OF THE MEAN AS (%)
R2 = MEAN NUMBER OF DEER PER SQ. MILE ± 2-STANDARD ERRORS
R3 = TOTAL DEER ± 2-STANDARD ERRORS

RED	=	0 - 5	DEER / SQ.MILE	
BLUE	=	6 - 15	DEER / SQ.MILE	
GREEN	=	16 - 25	DEER / SQ.MILE	
BROWN	=	25	DEER / SQ.MILE	

ST.CROIX S.P. 5/17/79

Stratum	Area (sqmi)	Weight	Courses completed	X	X'	E	SE	R1 PG/Course	R2 Deer/sq.mi.	R3 Total Deer
RED	36.0	0.720	13	137.4	10.57	6.0536				
BLUE	7.0	0.140	4	159.8	39.97	7.6942				
GREEN	4.0	0.080	4	79.8	19.97	0.3598				
BROWN	3.0	0.060	5	127.6	25.52	0.1502				
Total	50.0	1.000	26	504.8		14.2579	3.7759	16.3 ± 46%	52.2 ±24.1	2600 ± 1200

	Dead Deer	KEYS
RED	0	14791
BLUE	1	14792
GREEN	1	14793
BROWN	2	14794

LEAF FALL = OCT. 23

TOTAL CHAINS= 1937 HARVEST= 128 ADJ.FACTOR=0.27550

Dead Deer / sq.mi. = 13.22 Total Dead Deer = 660

LEGEND
X = No. of pellet groups found (adjusted for known mortality)
X' = Pellet groups / course
E = Weighted variance of the mean
SE = Standard error of the mean
R1 = Mean no. of pellet groups / course ± 2-standard errors of the mean
R2 = Mean no. of deer / sq.mi. ± 2-standard errors
R3 = Total deer ± 2-standard errors

ADMIN 1000 (Rev. 1/78)
SF-00006-01

STATE OF MINNESOTA

DEPARTMENT Natural Resources-Parks & Recreation **Office Memorandum**
File No. 3516

TO : Don D. Davison, Director

DATE: November 27, 1979

FROM : Frank Knoke, Environmental Specialist

PHONE: 6226

FK

SUBJECT: St. Croix Deer Management

Since our discussion on a deer hunting season in St. Croix State Park, I have been doing some research in the files on our deer management history for this park. A brief summary of our management would be, inconsistent.

The Department first recognized the deer population problem in 1945. Our reaction was a wide open deer season for eight years. The first two seasons were basically a slaughter and we more than likely over-harvested the population. The next five years the harvest ranged from 113-312 deer per year. A one-day hunt by permit every other year ran from 1960-1966. The harvest of deer ranged from 88-340 animals.

A bow season every year was held from 1946-1968 with every other year seasons from 1974 to 1978. The harvest of deer ranged from 70-167 animals.

Since 1960, the harvest has exceeded three per square mile only twice. With this light harvest for so many years one would expect the deer numbers to reach a high level. From the scant population data available it appears that this has happened.

The 1975 population was estimated at 62.5 ($\pm$ 17.0) per square mile, in 1978 40.6 ($\pm$ 15.2) per square mile, and in 1979 52.2 ($\pm$ 24.1) per square mile.

The impact of this increase in deer numbers can be seen in the browse surveys in 1966 which showed only four species of browse made up 65% of the food available. None are considered good deer foods.

The weight of deer in the parks herd has also showed a marked decline from 84 pounds to 58 pounds for female fawns from 1948 to 1978.

Blood samples taken from deer in 1972 showed that the deer were on an extremely poor protein diet and generally in poor condition. Since no appreciable numbers of deer have been removed one could reasonably expect conditions to be the same or worse.

The "Upper St. Croix Resource Management Plan" recognized the problem and set the goal of a deer herd at between 20-30 deer per square mile. The plan also recognized that the park's vegetation needed management and it set goals. From what I have been able to determine we have done little or nothing to meet the goals of the plan.

The legislature charged the Division with the responsibility to conserve and perpetuate the natural resources for future generations in state parks. On our present course of resource management in St. Croix State Park we will leave an over-browsed and over-aged stand of vegetation with many of the endemic species missing. This park may stand as a monument to our generations mismanagement through non-management

To meet the goals set out in the plan and our responsibilities set by the legislature I make the following recommendations:

1. Delegate total deer management responsibility to the Division of Fish and Wildlife with the specific charge to meet the goals set in the plan.

2. Ask the Division of Forestry to draw up and implement the vegetative management proposals called for in the plan.

FK:hf

cc: Milt Krona, Recreation System Supervisor
Wayland Porter, Park System Supervisor

ADMIN 1000 (Rev. 1/78)

STATE OF MINNESOTA

DEPARTMENT Natural Resources-Parks & Recreation **Office Memorandum**

TO : Don D. Davison, Director

DATE: June 19, 1979

FROM : Frank H. Knoke
Environmental Specialist

PHONE: 296-6226

SUBJECT: Recommendation: Deer Hunt at St. Croix State Park

The pellet count data for this park is not very reliable. A ± 46% error demonstrates that we must make several assumptions, on both herd size and fawn recruitment into the population.

I feel that a conservative use of the data is in order. This would be 25 deer square/mile or 1,325 deer. A 25% increase due to fawn recruitment would add 331 deer to the population.

If we are to use the pellet count data without considering error and the 50% recruitment expected for this area of the state, we have 47 deer square/mile or 2,491 deer. A 50% increase would add 1,245 deer to the population.

The available data on the parks deer herd shows that we have an over population of deer. The parks adult does average 90 pounds dressed. A weight of 120-130 pounds dressed is expected. This year's fawns were the smallest on record. In 1948, the male fawns averaged 90 pounds dressed. In 1978, they averaged 58 pounds dressed.

I feel our goal should be to eliminate this year's recruitment and get better data next spring. To do this, we should permit 600 hunters into the park during the three day doe season. Pat Karns feels a 60-70% hunter success is a reasonable estimate. We can safely assume that not all the hunters will show up and that the number of hunters will decrease over the three days as the permits are filled since doe permits are issued to an individual not a party. We should be able to take around 400 deer which is somewhat over our conservative recruitment estimate of 331 deer but far below what the face value pellet count data shows.

Next spring, we should give wildlife assistance to ensure that the money and manpower is available to get better data.

FHK/hab
cc: Milt Krona, Recreation Systems Coordinator
Wayland Porter, Park Systems Supervisor

STATE OF MINNESOTA

DEPARTMENT Conservation

Office Memorandum

TO : Dave Vesall

DATE: 20 April, 1966

FROM : Milt Stenlund

SUBJECT: Browse Survey, St.Croix State Park , Pine County.

We are planning a browse survey in the Park on May 4 and 5. This will give us data on the present condition and variety of deer foods in the area and will give training to personnel who are not familiar with a formal browse survey. All personnel from Region V will take part. Casey plans to include H. Shepperd, R. Erickson, and possibly personnel from Mille Lacs WMA. Ledin should include Wulf. Vern has stated that Lehmann will take part. If Regional Game Managers have any personnel they believe would benefit, they may send them.

We will plan to meet at the Park office on the main highway entrance at 1:00PM on Wednesday, May 4. We will then have a training session for part of the afternoon and will run some plots on the survey. All of Thursday will be used for taking plots. We will stay at the new motel right next to the new freeway in Hinckley. We can sleep and eat there. Plan to provide a sack lunch for Thursday.

Equipment needed will be suitable clothing, a compass, rubber boots, rain gear, a lightweight measuring stick 11.7 feet long (bamboo is very good)., and a clip board.

All needed forms for recording will be provided.

If so inclined we can meet for lunch at noon on May 4 at the motel. It is right on Hiway 48 on the way to the Park on the edge of Hinckley. You can make reservations for the nite at that time.

It will be up to the Regional Managers to inform personnel as to details in this memo.

cc
Casey
Vern
Rutske
Angell
Ledin
Wulf

B3-1

Game

GAME SURVEY

State of Minnesota

Name: Wildlife Census and Survey

Period Covered: May 5,6, 1966

Title: Deer Browse Survey
St. Croix State Park

Introduction

On May 5 and 6, 1966, a deer browse survey was completed in St. Croix State Park on four selected areas by a crew of eleven men. Those taking part were Jay Janecek, Howard Shepperd, Milt Stenlund, Gerald Maertens, Ron Erickson, Orville Nordsletten, Gary Johnson, Henry Wulf, LeRoy Rutske, Roger Lehmann, LeRoy Angell, and Don Ledin. The Aldous system using 1/100 acre plots was used.

On the basis of an aerial survey made during the winter (January 29, 1966) by Don Ledin and Jerry Kuehn, two areas were selected which had relatively higher winter concentrations of deer than other areas of the Park. These two were the Headquarters -- Paint Rock Spring area lying just northeast of Headquarters and the Kennedy Brook Spring area lying east of the road and north of Kennedy Brook in Section 28 Township 40N Range 19W.

The two areas of low density winter population were the Sand Creek - Hay Creek area lying mainly south of the road in Section 13, Township 40N Range 19West and the Main Entrance Road area lying east and west of the main entrance road in Sections 27,28, 33 and 34 Township 41 North Range 18 West.

Headquarters -- Paint Rock Spring Area

A total of 360 plots were taken in this area. Hazel and willow were the only two important species of browse available making up 40% and 22% of the food. They were also browsed most heavily, making up 36% and 25% of the food eaten. Neither is rated as a good food on this type of range. It is also of interest to note that when all plots on which hazel was found are considered, it made up only 10% of the optimum yield of 100%. Willow made up only 5% of the optimum yield in availability. All other species were below 2% in possible yield. It is evident that food is extremely poor in quality

and quantity on this area.

Tree reproduction of both conifers and hardwoods was almost non-existent. What few small jack pines were present were dead, dying, or heavily browsed. A heavy grass sod is also developing which will make natural reproduction difficult even with a reduced deer herd.

Two broad age groups of jack pine were evident. One, the mature and overmature pine which is 40 to 50 feet high. The other, the 15 to 25 year old age group which was released after the drastic reduction in deer numbers in 1946. There are practically no pines between these age classes and none younger. This area is a classic example of how a big game herd has determined the kind of forest present merely through browsing pressure over a period of three decades.

Kennedy Brook Spring Area 165 plots

This area is a mixture of upland and lowland with heavier soils and more moisture than the Headquarters area where sands were dominant.

Three species made up 59% of the available browse. They were alder 18%, hazel 22%, and panicled dogwood 19%. Alder is a starvation food and hazel and panicled dogwood are considered only fair. Mt. maple made up only 5% of the available browse and red maple 4%. There is an extreme shortage of quality browse in this area, despite better soil and water conditions.

Sand Creek - Hay Creek Area 74 plots

Again three species made up the bulk of the available food, willow 15%, hazel, 25%, and panicled dogwood 15%. Not a single good browse species was of any importance. Red-ozier dogwood, red oak, red maple, and white oak together made up only 4.2% of the available browse. The shortage of good quality deer browse is extreme.

Main Entrance Road Area 75 Plots

On this area, the only species of any importance in availability were hazel, aspen, and alder -- alder being a starvation food and hazel and aspen rated only as second rate. Mountain maple and red maple, two good foods made up only 5% and 7% of the available food. There is an extreme shortage of good browse species in this area when quantity available is considered.

All Areas Total 674 Plots

When all areas are totaled we find four species making up 65% of the available browse. They are willow, a fair food, hazel - fair, alder - starvation, and panicled dogwood - fair. Not a single good deer browse species is found among the most abundant species. Even these foods, although they make up 65% of the available food, are not plentiful. For example, hazel has the best distribution of all the species. It is found on 428 of the 674 plots or on 64% of the plots. Although found on 64% of the plots, it makes up only 8.8% of the density, a very low rating for a browse species when 5 is considered light, 30 - moderate, and 70 high.

Furthermore mountain maple makes up 0.6% of the density on all plots, red-ozier dogwood 0.2%, white birch 0.2%, jack pine 0.8%, red maple 0.5%, and white oak 0.2%. These good browse species together make up only 2.5% of the density on all plots.

It is evident from these data that there is an extreme shortage of deer browse in St. Croix Park. Good browse species, even where present, afford little food because of overbrowsing in the past or growth beyond the available stage.

Hazel, a second rate food, is the most common shrub available and even this makes up only 8.8% of the density on the plots. A 5% rating is considered low density.

It is of interest to note that the % of food eaten and the % browse

available are reasonably close for most species. Ordinarily on overbrowsed range the % eaten will be much larger than the % available. However, here we have a case where no good foods are common enough to be an important source of browse. Even the second rate foods are not common, therefore browsing pressure is spread over a large area and on all species through necessity.

The last intensive survey in the Park was made in April, 1949. At that time ten species were important food sources and they included oak, juneberry, mountain maple, black ash, and red-ozier dogwood. These are no longer important. These ten species made up 62% of the available browse. Now only three species, one a starvation food, make up 65% of the available food.

In 1949, willow was considered the most important food. It formed 15% of the available browse and made up 33% of the food eaten. In 1966 it made up 14% of the browse available and 18% of the browse eaten. In 1949 hazel made up 18% of the available browse, in 1966, 31%. In 1949 oaks made up 14% of the available browse, in 1966 only 5%. It is evident that the browse situation has deteriorated further since 1949, some of the better species then are no longer available as good sources of food.

In 1949 jack pine was heavily overbrowsed. The only branches available were lower boughs of small trees that were covered by snow in the winter. These are now absent. The only jack pine available consists of scattered branch tips up near the seven foot level or an occasional badly browsed three to four foot tree.

In 1949 it was noted that intermediate sized jack pines were lacking and the two age classes present were small trees (reproduction) that had been held down by heavy browsing pressure and mature trees that offer no food.

In 1966, the reproduction mentioned in 1949 that had survived, made up one age class of trees that were 10 to 20 feet tall. The other age class was mature and overmature trees that offered no food. Small reproduction is practically non-existent.

Summary and Conclusions

1. A browse survey was made in St. Croix Park on May 5 and 6, 1966, using the Aldous system of 1/100 acre plots spaced four and five chains apart on compass lines.

2. Four areas were selected to represent habitat in the Park. Two were in wintering areas of heavier deer use as determined by an aerial survey made in January, 1966. The other two areas were on lighter deer use sections of the Park.

3. A total of 674 plots were taken on the survey.

4. Four species made up 65% of the available browse and none were good deer foods. One, alder, is a starvation food. Furthermore, even these four species were not abundant when only available food is considered.

5. One species, hazel, a second rate food, had the best distribution in the Park but even then made up only 8.8% the density on the plots, a very low density when 5% is rated as "light".

6. Better deer browse species such as mountain maple, red-ozier dogwood, white birch, jack pine, red maple, and oaks, together made up only 2.5% the density on the plots.

7. There is an extreme shortage in availability of good deer browse species.

8. In 1949, ten species including several good goods made up 62% of the available browse. In 1966, four species, none good deer food and one a starvation food made up 65% of the available browse.

9. In 1949, willow was considered the most important food available. By 1966 conditions had deteriorated so that hazel was most important.

10. Reproduction of both conifers and hardwoods was practically non-existent on the plots.

11. Jack pines were represented by two age classes, one mature and overmature, and the other trees 10 to 20 feet tall which grew quickly following the deer herd reduction of 1946-7.

12. St. Croix Park remains a classic example of how a big game animal can determine forest composition through browsing pressure.

13. Under present conditions it is doubtful that any plantations made in the Park will survive browsing pressure.

14. Any future management plans for reforestation of the Park should include consideration of the effect of browsing pressure by deer. Since the esthetic value of deer in the Park is high it will take considerable work to determine the level at which the population should be held to permit tree reproduction and yet allow enough deer for esthetic observations.

Submitted by: Milt Stenlund
MILT STENLUND
REGIONAL GAME MANAGER

Approved by: D. Vesall
DAVE VESALL
SUPERVISOR, SECTION OF GAME

HEADQUARTERS - PAINT ROCK SPRING

Total Plots 360

SPECIES	Total Plots Found	% Plots Present	Total Density	Average Density	Total Browsing	Average Browsing	Utilization Factor	% of Feed Eaten	% of Browse Available
Mt. Maple	1	.3	5	.01	0	0	0	0	.04
Mt. Ash	2	1	10	.03	140	70	2.10	.4	.1
Red-osier Dogwood	7	2	35	.10	450	64.3	6.43	1	.4
Y. Birch	4	1	20	.06	65	16.2	.97	.2	.2
Willow Species	232	64	1945	5.40	6435	27.7	149.58	25	22
Hazel Species	245	68	3500	9.72	5465	22.3	216.76	36	40
Aspen	116	32	605	1.68	2545	21.9	36.79	6	7
Black Ash	2	1	75	.21	5	2.5	.53	.1	1
Alder	19	5	170	.47	225	11.8	5.55	1	2
Jack Pine	70	19	400	1.11	1815	25.9	28.75	5	5
Red Oak	98	27	565	1.57	3060	31.2	48.98	8	6
White Oak	10	3	50	.14	325	32.5	4.55	1	1
Juneberry	30	8	150	.42	860	28.7	12.05	2	2
Raspberry	49	14	385	1.07	945	19.3	20.65	3	4
Sweet Fern	72	20	360	1	1135	15.8	15.80	3	4
Panicled Dogwood	33	9	390	1.08	1355	41.1	44.39	7	4
Blueberry	20	6	100	.28	120	6	1.68	.3	1
Blackberry	1	.3	5	.01	0	0	0	0	.04
Rose	9	3	45	.13	35	3.9	.51	.1	1
Cherry	1	.3	5	.01	5	5	.05	0	.04
Blue Beech	1	.3	5	.01	5	5	.05	0	.04
Thornapple	1	.3	5	.01	5	5	.05	0	.04

MAIN ENTRANCE AREA

Total Plots 75

SPECIES	Total Plots Found	% Plots Present	Total Density	Average Density	Total Browsing	Average Browsing	Utilization Factor	% of Food Eaten	% of Browse Available
Mt. Maple	6	8	80	1.08	165	27.5	29.70	25	5
Red-osier Dogwood	1	1	5	.07	0	0	0	0	.3
Ironwood	1	1	5	.07	0	0	0	0	.3
W. Birch	17	23	85	1.15	55	3.2	3.68	3	5
Willow Species	13	18	115	1.55	20	1.5	2.33	2	7
Hazel Species	31	42	305	4.12	70	2.3	9.48	8	19
Aspen	25	34	150	2.03	290	11.6	23.55	19	10
Black Ash	2	3	10	.14	35	17.5	2.45	2	1
Alder	22	30	235	3.18	65	2.9	9.22	8	15
Red Oak	2	3	10	.14	10	5	.70	1	1
White Oak	2	3	10	.14	5	2.5	.35	.3	1
Juneberry	1	1	5	.07	5	5	.35	.3	.3
Raspberry	19	26	95	1.28	95	5	6.40	5	6
Panicled Dogwood	16	22	80	1.08	90	5.6	6.05	5	5
Bog Birch	13	18	105	1.42	65	5	7.10	6	7
Cherry Species	8	11	40	.54	40	5	2.70	2	3
Bog Birch	4	5	45	.61	0	0	0	0	3
Prunus Species	7	9	35	.47	0	0	0	0	2
Red Maple	22	29	110	1.47	250	11.36	16.70	14	7
Blue Spruce	3	4	15	.20	0	0	0	0	1
Lab. Tea	3	4	15	.20	0	0	0	0	1
Blackberry	4	5	20	.27	5	125	.34	.3	1

SAND CREEK - HAY CREEK

Total Plots 74

SPECIES	Total Plots Found	% Plots Present	Total Density	Average Density	Total Browsing	Average Browsing	Utilization Factor	% of Food Eaten	% of Browse Available
American Elm	1	1	5	.07	5	5	.35	.06	.2
Blue Beech	1	1	5	.07	5	5	.35	.06	.2
Basswood	1	1	5	.07	5	5	.35	.06	.2
Red-osier Dogwood	6	8	30	.41	250	41.7	17.10	3	1
Willow	42	57	400	5.41	745	17.7	95.76	17	15
Hazel	52	70	675	9.12	855	16.4	149.57	27	25
Aspen	35	47	200	2.70	470	13.4	36.18	6	7
Black Ash	1	1	5	.07	5	5	.35	.06	.2
Alder	14	19	250	3.38	55	3.9	13.18	2	9
Jack Pine	6	8	95	1.28	95	15.8	20.22	4	3
Sweet Fern	22	30	110	1.49	715	32.5	48.43	9	4
Raspberry	38	51	240	3.24	530	13.9	45.03	8	9
Blueberry	2	3	10	.14	10	5	.70	.1	.4
Rose	6	8	30	.41	30	5	2.05	.4	1
Red Oak	11	15	55	.74	380	34.5	25.53	5	2
Panicled Dogwood	26	35	400	5.41	265	10.2	55.18	10	15
Cherry	10	14	100	1.35	270	27	36.45	6	4
Honeysuckle	2	3	10	.14	10	5	.70	.1	.4
Red Maple	4	5	20	.27	20	5	1.35	.2	1
Thornapple	1	1	5	.07	5	5	.35	.06	.2
Holly	1	1	5	.07	5	5	.35	.06	.2
White Oak	1	1	5	.07	70	70	4.90	.9	.2
Juneberry	7	9	35	.47	135	19	8.93	2	1
Red Pine	1	1	5	.07	0	0	0	0	.2
Viburmun	2	3	35	.47	5	5	.35	.06	1

KENNEDY BROOK SPRING

Total Plots 165

SPECIES	Total Plots Found	% Plots Present	Total Density	Average Density	Total Browsing	Average Browsing	Utilization Factor	% of Food Eaten	% of Browse Available
Sft. Maple	28	17	290	1.76	750	26.8	47.17	7	5
American Elm	5	3	25	.15	25	5	.75	.1	.4
Ribes	12	7	60	.36	50	4.17	150.12	24	1
Ironwood	1	1	5	.03	5	5	.15	.02	.1
Balsam	3	2	15	.09	140	46.67	4.20	1	.2
Red-osier Dogwood	7	4	60	.36	385	55	19.80	3	1
W. Birch	9	5	45	.27	155	17.2	4.64	1	1
Willow Species	33	20	190	1.15	390	11.8	13.57	2	3
Hazel Species	100	61	1415	8.58	775	7.75	66.50	10	22
Aspen	46	28	300	1.82	1140	24.8	45.14	7	5
Black Ash	30	18	175	1.06	715	23.8	25.23	4	3
Alder	68	41	1150	6.97	430	6.3	43.91	7	18
Jack Pine	3	2	15	.09	65	21.7	1.95	.3	.2
Red Oak	15	9	60	.36	605	40.3	14.51	2	1
White Oak	13	8	65	.39	780	60	23.40	4	1
Juneberry	22	13	135	.82	230	10.5	8.61	1	2
Raspberry	77	47	460	2.79	355	4.6	12.83	2	7
Sweet Fern	7	4	35	.21	35	5	1.05	.2	1
Panicled Dogwood	86	52	1195	7.24	1355	15.8	114.39	18	19
Blueberry	6	4	30	.18	55	9.2	1.66	.3	.5
Rose	5	3	25	.15	25	5	.75	.1	.4
Red Maple	41	25	230	1.39	660	16.10	22.38	4	4
Am. Holly	4	2	20	.12	20	5	.60	.1	.3
Yellow Birch	4	2	20	.12	15	3.75	.45	.1	.3
Honeysuckel	7	4	60	.36	55	7.9	2.84	.4	1
Cherry	4	2	20	.12	15	3.75	.45	.1	.3
Viburnum	2	1	10	.06	10	5	.30	.04	.2
Prickly Ash	2	1	10	.06	5	.25	.15	.02	.2
Bog Birch	13	8	195	1.18	90	6.9	8.14	1	3
W. Spruce	3	2	15	.09	65	21.7	1.95	.3	.2

ALL AREAS

Total Plots 674

SPECIES	1 Total Plots Found	2 % Plots Present	3 Total Density	4 Average Density	5 Total Browsing	6 Average Browsing	7 Utilization Factor	8 % of Food Eaten	9 % of Browse Available
t. Maple	35	5	375	.56	915	26.14	14.64	3	2
d-osier Dogwood	21	3	130	.19	1085	51.67	9.82	2	1
. Birch	30	4	150	.22	275	9.17	2.02	.4	1
illow	320	47	2650	3.93	7590	23.22	93.22	18	14
azel	428	64	5895	8.75	7165	16.74	146.48	29	31
spen	222	33	1255	1.86	4445	20.02	37.24	7	7
lack Ash	35	5	265	.39	760	21.71	8.47	2	1
lder	123	18	1805	2.68	775	6.30	16.88	3	9
ack Pine	79	12	510	.76	1975	25	19	4	3
ed Oak	126	19	690	1.02	4055	32.18	32.82	6	4
hite Oak	26	4	130	.19	1180	45.38	8.62	2	1
uneberry	60	9	325	.48	1230	20.50	9.84	2	2
aspberry	183	27	1180	1.75	1925	10.52	18.41	4	6
weet Fern	101	15	505	.75	1885	18.66	14	3	3
anicled Dogwood	161	24	2065	3.06	3065	19.04	58.26	11	11
lueberry	28	4	140	.21	185	6.61	1.39	.3	1
ose	20	3	100	.15	90	4.50	.68	.1	1
herry	30	4	200	.30	330	11	3.30	1	1
og Birch	30	4	345	.53	155	5.17	2.74	1	2
ed Maple	67	10	360	.53	930	13.88	7.36	1	2
Honey suckle	9	1	70	.10	65	7.22	.72	.1	.3
Am. Holly	5	1	25	.04	25	5	.20	.03	.1
Yellow Birch	4	1	20	.03	15	3.75	.11	.02	.1
Ribes Species	17	3	85	.13	55	3.24	.42	.1	.5
				28.61			506.64		

3. Total density is found by adding all density figures on all plots for each species.

4. Average density is found by dividing the total density for each species by the total number of plots taken (674).

5. Total browsing is found by adding all browsing figures on all plots for each species

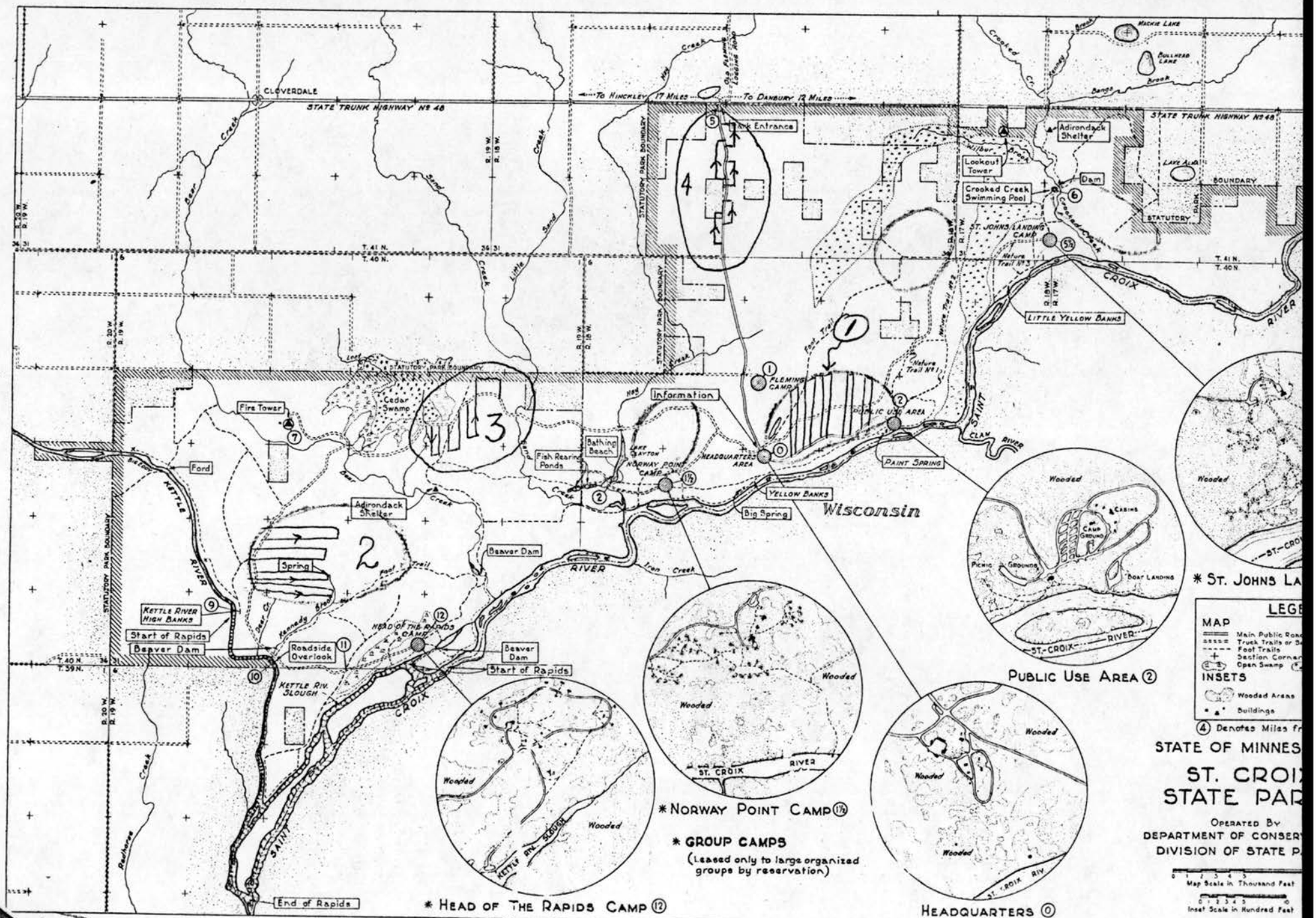
6. Average browsing is found by dividing each figure in column 5 by the number of plots on which the species was found (column 1)

7. Utilization factor is found by multiplying average density by average degree of browsing (column 4 times column 6).

8. % of food eaten is found by dividing each figure in column 7 by the total of column

9. % of browse available is found by dividing the average density (column 4) by the total of column 4.

DEER BROWSE SURVEY May 5,6, 1966



Winter deer concentrations, Jan. 1966

Survey line routes

1. Headquarters - Paint Rock Spring Area
2. Kennedy Brook Spring Area
3. Sand Creek - Hay Creek Area

St. Croix State Park - Archery

Year	Archery Season	Permits Issued	Deer Taken
1946	Oct. 16-Nov. 1	192	24
1947	Oct. 16-Nov. 1	293	3
1948	Oct. 16-Oct. 31	122	1
1949	Nov. 12-Nov. 16		
1951	Oct. 1 -Oct. 31		
1956	Oct. 1 -Oct. 31		
1958	Oct. 1 -Oct. 31		
1959	Oct. 1 -Oct. 31		
1961	Oct. 14-Oct. 31		
1962	Oct. 13-Oct. 31		
1963	Oct. 12-Oct. 31		
1964	Dec. 1 -Dec. 15		
1965	Oct. 23-Oct. 31		
1966	Oct. 22-Oct. 31		
1966	Dec. 3 -Dec. 18	800	
1967	Oct. 21-Oct. 31		
1967	Dec. 2 -Dec. 17		
1968	Oct. 19-Oct. 31		
1968	Nov. 30-Dec. 21		
1974	Nov. 1 - 30		167
1975	" "		70

St. Croix State Park - Firearms

Year	Season Dates	Permits Issued	Hunter Days	Percent Success	Area Open (Sq. mi.)	Deer Taken Total	Deer Taken Per Sq. Mile
1945	Nov. 17-Nov. 25	No limit	3,611	36	17	1,292	76.0
1946	Nov. 16-Nov. 24	No limit	4,444	30	23	1,392	60.0
1947	Nov. 15-Nov. 19	400	731	52	46	207	4.5
1948	Nov. 20-Nov. 28	400	700+	34	46	137	3.0
1949	Nov. 12-Nov. 16	No limit	2,009	-	46	255	5.5
1950	Closed statewide						
1951	Nov. 17-Nov. 25	No limit	--	-	46	312	7.0
1952	Nov. 15-Nov. 23	No limit	2,487	-	46	113	2.4
1960	Nov. 19 only	300	300	29	46	88	1.9
1962	Nov. 18 only	456	456	34	46	152	3.3
1964	Nov. 14 only	650	650	52	46	340	7.4
1966	Nov. 19 only	475	475	24	46	113	2.4

1978 — 15 day bow season — 178 deer

deer pop in '78 48.6 per Sq.

" " " '79 50 " "

ST. CROIX

	TYPE	DAYS	DEER TAKEN	# HUNTERS	AREA OPEN	Park DEER POP.
1945	rifle	9	1292	3,611 hunter/days	10,910 (32%)	2,228
1946	rifle					
*1947	rifle	5	207 ~~(214)~~	731 hunter/days		
1948		9	137			
X 1949		5	255 (333)			
1950						
1951		9	312 (321)			
52		9	98 (113)			
53						
54						
55						
56						
57						
58						
59						
60	rifle	1	88	300 permits 300 H/D		
61						
62	rifle	1	152	456 HD (600) permits		
63						
64	rifle	1	340	650/800 permits		
CB-65						
66	rifle	1	~~##~~ 113	475 /800 permit		
67						
68	Bow					
69						
70						
71						
72						
73						
74	Bow		(167) ~~97~~	12,000 (11,000) ~~5,000~~ /hunter days		

	TYPE	DAYS	DEER TAKEN	HUNTER/DAY	AREA OPEN	PARK DEER POP
75	Bow	30	70	~~7015~~ 7,500	ALL	3100 ~~21~~ (62.5)
76						
77	Bow					~~3100 (62.5)~~
78	Bow	15	128	3507	TOTAL/EST USEARCH	2191 (40.6)

DNR-7

STATE OF MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55155

Parks Trails

2/4/81

DNR INFORMATION
(612) 296-6157

January 21, 1981

File No. _____

Mr. Robert Arnold
7214 Upton Ave. S.
Minneapolis, Minn. 55423

Dear Bob:

We are considering a modification of the bow season opener and will also review the location of the December bow and arrow line. However, following the 1969 season we found it necessary to eliminate the December bow hunting in the farming areas of Minnesota and will be reluctant to open those areas up again. We found that the quality of bow hunting being done in December in farm areas was considerably below what we wanted to promote. Many hunters were hunting in large parties and using vehicles to drive deer and we have no reason to expect that that would not develop again.

You commented that "metro bow hunters were extremely displeased with the failure to include St. Croix Park in the special season category". There were special considerations in St. Croix Park and one of them was to reduce the deer herd as much as possible this fall. You may be aware of the fact that the bow season we had in St. Croix Park in 1978 did not accomplish the objective of reducing the herd. State parks are refuges by law and are opened to hunting only if it is necessary to regulate wildlife populations. An additional factor was holding down costs of administering the hunt and the three day hunt was relatively low cost to administer. You will recall that some parks had to actually be closed to all use last year because of a shortage of funds.

You mention the "gun slaughter" that took place in St. Croix Park, but we do not feel it was a slaughter. The hunt was very well controlled and there were no problems or incidents. Sure there was high hunting success, but the hunt was designed to produce that. Further, I feel that the term "gun slaughter" is a disparaging one that any hunter should eliminate from his vocabulary. You are aware of the anti-hunting sentiment and using that type of term does not help any of us.

Thank you for your letter.

Yours truly,

JOSEPH N. ALEXANDER
Commissioner

JNA:rmh
cc: Don Davison, Div. of Parks
Chuck Burrows, Div. of Fish & Wildlife

AN EQUAL OPPORTUNITY EMPLOYER

7214 Upton Ave. So.
Minneapolis, MN 55423

January 12, 1981

Mr. Joe Alexander, Commissioner
Department of Natural Resources
Centennial Building
658 Cedar Street
St. Paul, MN 55155

Dear Joe:

Once again, I am asking that you give consideration to extending the December bow season area to include that portion of the State - West of the present line.

In contacting numerous bow clubs in the Park Rapids, Detroit Lakes, Thief River Falls area, there is unanimous interest in having this area included.

Also, Joe, metro bow hunters were extremely displeased with the failure to include St. Croix Park in special season category. There seems to be little justification to open that Park for the type of gun slaughter that took place this year. The special bow season could be set in advance of the gun season at St. Croix and still accomplish additional "deer thinning" if necessary.

Have a good year.

Sincerely,

Robert F. Arnold

RFA:mb

STATE OF
MINNESOTA
DEPARTMENT OF NATURAL RESOURCES
BOX 39 , CENTENNIAL OFFICE BUILDING • ST. PAUL, MINNESOTA • 55155
ST. CROIX STATE PARK, RT. 3, HINCKLEY MN 55037
DNR INFORMATION
(612) 296-6157

FILE NO._____

September 23, 1981

SUBJECT: St. Croix State Park Special 1981 Firearms Deer Hunting Permit

Dear Successful Permit Holder:

Congratulations! Your name has been drawn to receive a permit to hunt deer in St. Croix State Park. Enclosed is a map of the park with special regulations on the reverse side. Please read and become thoroughly familiar with the special regulations for this permit area.

The postcard that you will be receiving will be your permit to hunt in St. Croix State Park. Please retain it and have it on your person at all times while at St. Croix State Park during the hunting season.

You will be hunting in an area not normally open to deer hunting and discharging of firearms. The deer season is being held to reduce the size of the herd in the park.

Camping for deer hunters will be allowed at the All Seasons Trail Center. The remainder of the park will be closed for other uses during the hunt. Only those in possession of valid permits will be allowed entry into the park.

Be careful and courteous. Good luck!

Yours very truly,

Don D. Davison, Director
DIVISION OF PARKS & RECREATION

DDD:JW/gyb
Enclosure

ADMIN. 1000

STATE OF MINNESOTA

Office Memorandum

DEPARTMENT DNR - Parks

TO : Frank Knoke
St. Paul

DATE: 8-24-81

FROM : Jim Willford
St. Croix State Park

SUBJECT: FIREARMS DEER SEASON - NOVEMBER 7 & 8, 1981

Enclosed is the letter and map for mailing out to the sucessful permit holders for our upcoming deer season. As you remember, we did the same thing last year and it worked very well. It not only saves alot of questions, but eliminates alot of hassels during the hunt.

The front of the map needs only to have the dates changed. We have retyped the special regulations on the backside including any changes that were needed.

I would appreciate it if you would take it from here, getting the maps printed, the letter approved and copies back to us as soon as possible. We will need 650 copies of the letter and 1,500 copies of the map. I would like to get these as early as possible as we are already getting requests for maps of the open areas of the park.

Thank you.

JAW:jah
Encs. 2

ST. CROIX STATE PARK FIREARMS HUNTING REGULATIONS
AS PRESCRIBED BY THE COMMISSIONER OF THE
MINNESOTA DEPARTMENT OF NATURAL RESOURCES

November 7 & 8, 1981

ALL PERSONNEL ENTERING AND UTILIZING ST. CROIX STATE PARK FACILITIES MUST BECOME THOROUGHLY FAMILIAR WITH AND ABIDE BY THE FOLLOWING REGULATIONS IN ADDITION TO ALL OTHER DEER HUNTING REGULATIONS. ANYONE FOUND IN VIOLATION OF THESE REGULATIONS MAY BE RESTRICTED FROM THE PARK AND SUBJECT TO ARREST.

1. Hunters will be allowed in the open hunting area in the park one hour before sunrise, to one hour after sunset. No shooting before sunrise or after sunset.

2. Only hunters having a valid Special Area Permit in possession for St. Croix State Park are allowed to hunt in the park.

3. Hunting is only permitted on public lands within St. Croix State Park. No hunting is allowed in the restricted area.

4. WEAPONS MUST BE CASED AND UNLOADED WHEN IN OR CROSSING THROUGH THE RESTRICTED AREA.

5. Wounded deer cannot be pursued in the closed areas unless the hunter is accompanied by a park ranger or a conservation officer.

6. Private lands - entry to the park through private lands bordering the park is dependent upon consent of the landowner.

7. Hunting of any wildlife other than deer is prohibited.

8. Deer wearing collars and/or tags may be taken. Collars and tags must be turned in at the main headquarters.

9. Only portable deer stands are permitted.

10. All deer taken must be registered at the park office on the day taken.

11. REMEMBER IT IS UNLAWFUL TO DISCHARGE ANY FIREARM UPON, ALONG OR ACROSS ANY PUBLIC ROADWAY.

12. All vehicles must stay on main roads. Vehicles MAY NOT ENTER roped or chained areas. Vehicles blocking roads or trails will be towed away at the owners expense.

13. Off-road vehicles, including motor bikes, mini bikes and mo-peds are not permitted in the park during the November season.

14. Do not remove anything from the park except your game.

USE COMMON SENSE AND COURTESY

ST. CROIX STATE PARK FIRARMS HUNTING REGULATIONS
AS PRESCRIBED BY THE COMMISSIONER OF THE
MINNESOTA DEPARTMENT OF NATURAL RESOURCES

November 8 through November 10, 1980

ALL PERSONNEL ENTERING AND UTILIZING ST. CROIX STATE PARK FACILITIES MUST BECOME THOROUGHLY FAMILIAR WITH AND ABIDE BY THE FOLLOWING REGULATIONS IN ADDITION TO ALL OTHER DEER HUNTING REGULATIONS. ANYONE FOUND IN VIOLATION OF THESE REGULATIONS MAY BE RESTRICTED FROM THE PARK AND SUBJECT TO ARREST.

1. Hunters will be allowed in the open hunting area in the park one hour before sunrise, to one hour after sunset. No shooting before sunrise or after sunset.

2. Only hunters having a valid antlerless permit in possession for area 75 are allowed to hunt in the park.

3. Hunting is only permitted on public lands within St. Croix State Park. No hunting is allowed in the restricted area. Weapons must be cased and unloaded when in or crossing through the restricted area.

4. Wounded deer cannot be pursued in the closed areas unless the hunter is accompanied by a park ranger or a conservation officer.

5. Private lands - entry to the park through private lands bordering the park is dependent upon consent of the landowner.

6. Hunting of any wildlife other than deer is prohibited.

7. Deer wearing collars and/or tags may be taken. Collars and tags must be turned in at the main headquarters.

8. Only portable deer stands are permitted.

9. All deer taken must be registered at the park office on the day taken.

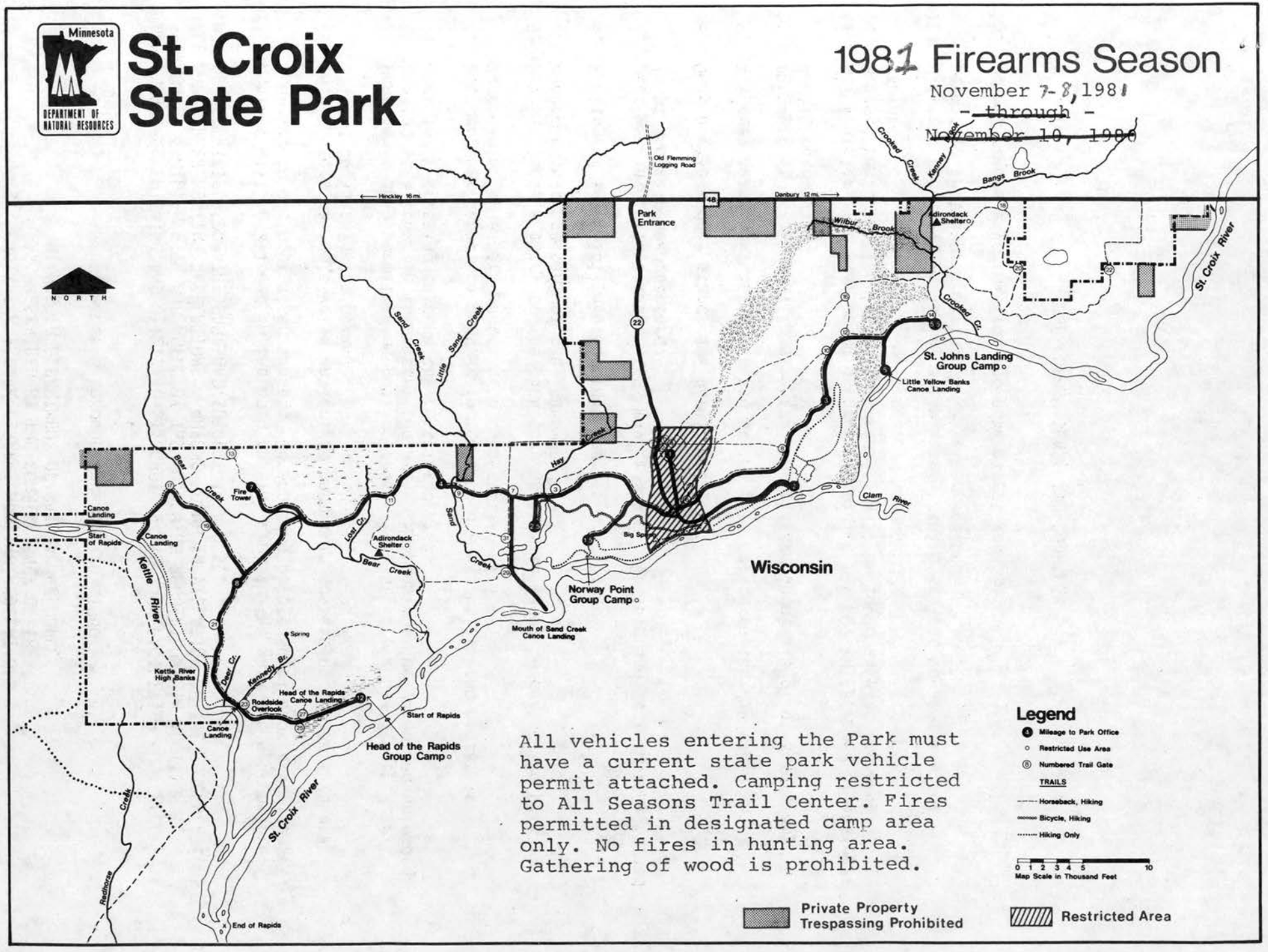
10. REMEMBER it is unlawful to discharge any firearm upon, along or across any public roadway.

11. All vehicles must stay on main roads. Vehicles MAY NOT ENTER roped or chained areas. Vehicles blocking roads or trails will be towed away at the owners expense.

12. Off-road vehicles, including motor bikes, mini bikes and mo-peds are not permitted in the park during the November season.

13. Do not remove anything from the park except your game.

-- USE COMMON SENSE AND COURTESY


Minnesota
DEPARTMENT OF NATURAL RESOURCES
St. Croix State Park
1981 Firearms Season
November 7-8, 1981
- through -
November 10, 1986
NORTH
Old Flemming Logging Road
Hinckley 16 mi.
Danbury 12 mi.
48
22
Park Entrance
Crooked Creek
Kenney Brook
Bangs Brook
Wilbur Brook
Adirondack Shelter
St. Croix River
Sand Creek
Little Sand Creek
Crooked Cr.
St. Johns Landing Group Camp
Little Yellow Banks Canoe Landing
Hay Creek
Bear Creek
Fire Tower
Canoe Landing
Start of Rapids
Canoe Landing
Kettle River
Lost Cr.
Adirondack Shelter
Sand Creek
Clam River
Big Sand
Wisconsin
Norway Point Group Camp
Mouth of Sand Creek Canoe Landing
Spring
Kettle River High Banks
Deer Cr.
Kennedy Br.
Head of the Rapids Canoe Landing
Roadside Overlook
Canoe Landing
Start of Rapids
Head of the Rapids Group Camp
Creek
Redhorse
St. Croix River
End of Rapids
All vehicles entering the Park must have a current state park vehicle permit attached. Camping restricted to All Seasons Trail Center. Fires permitted in designated camp area only. No fires in hunting area. Gathering of wood is prohibited.
Legend
Mileage to Park Office
Restricted Use Area
Numbered Trail Gate
TRAILS
Horseback, Hiking
Bicycle, Hiking
Hiking Only
0 1 2 3 4 5 10
Map Scale in Thousand Feet
Private Property Trespassing Prohibited
Restricted Area