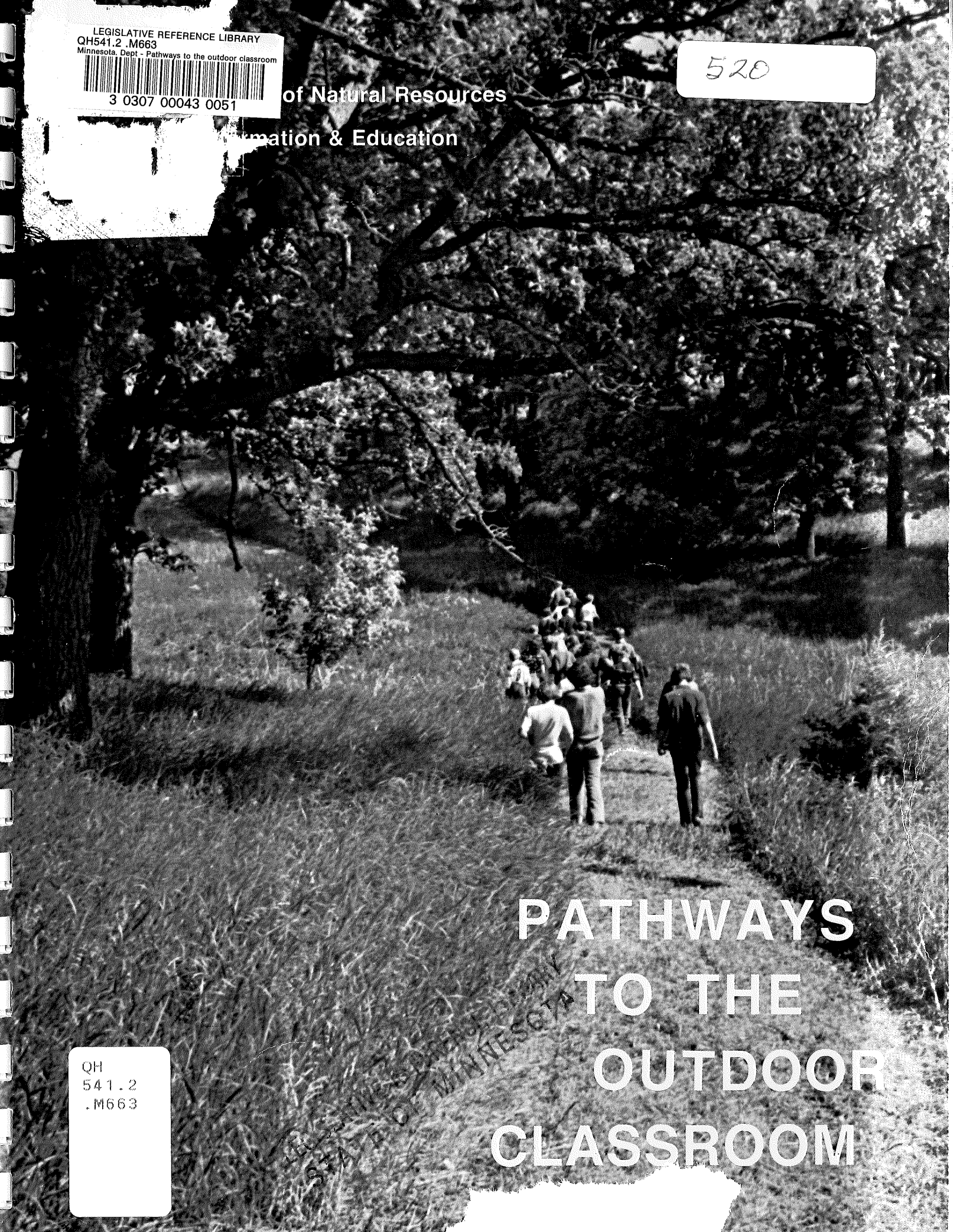


LEGISLATIVE REFERENCE LIBRARY
QH541.2 .M663
Minnesota. Dept. - Pathways to the outdoor classroom
3 0307 00043 0051

520

of Natural Resources

Information & Education



PATHWAYS TO THE OUTDOOR CLASSROOM

QH
541.2
.M663

Index

Page

- 1 — Introduction
- 2 — The Outdoor Classroom
- 3 — Organizing for Action
- 4 — Administrative Support and Budgets
- 5 — DNR Services
- 6 — Field Examination and Mapping
- 8 — Vegetation Types
- 30 — On-Site Field Work
- 33 — Teaching Locations
- 36 — Management and Maintenance
- 38 — Update and Revision of Plans
- 39 — Appendix
- 40 — Teaching Aids
- 41 — Bibliography





*Try Bringing THIS
Into The Classroom!*

Introduction

One of the most important new concepts in education is that the optimum situation for learning is not necessarily in the classroom. Some environmental educators have taken this concept to the opposite extreme. However, to say that all environmental education must take place in the forest is just as restrictive as to say that all other learning must occur within the four walls of the classroom.

The natural environment is constantly changing. This process of change is continually presenting new learning moments to the trained observer. Pathways to the Outdoor Classroom is designed to emphasize the concept of time-place learning — that is, to make optimum use of the place of learning by combining *what* is to be taught with *when* and *where* it can best be taught.

Since, by definition, environmental education is really a way of life, then the classroom for environ-

mental education must be every place where life, and all its manifestations, exists. That “everyplace” includes the sidewalk, the playground, the courtroom, the filling station, the highway and the city dump, as well as the forest, meadow and pond.

The best place to learn about a forest and its inhabitants, is obviously, in the forest. A good place to discover the social and political ramifications of pollution is, just as obviously, in government offices and chambers. In these locations, concepts that are abstract in the classroom become concrete examples of the real world.

One of the most unfamiliar areas for classroom teachers has been the natural environment. Pathways to the Outdoor Classroom is designed to provide educators with assistance in utilizing public or private lands as outdoor classrooms in environmental education.



The Outdoor Classroom

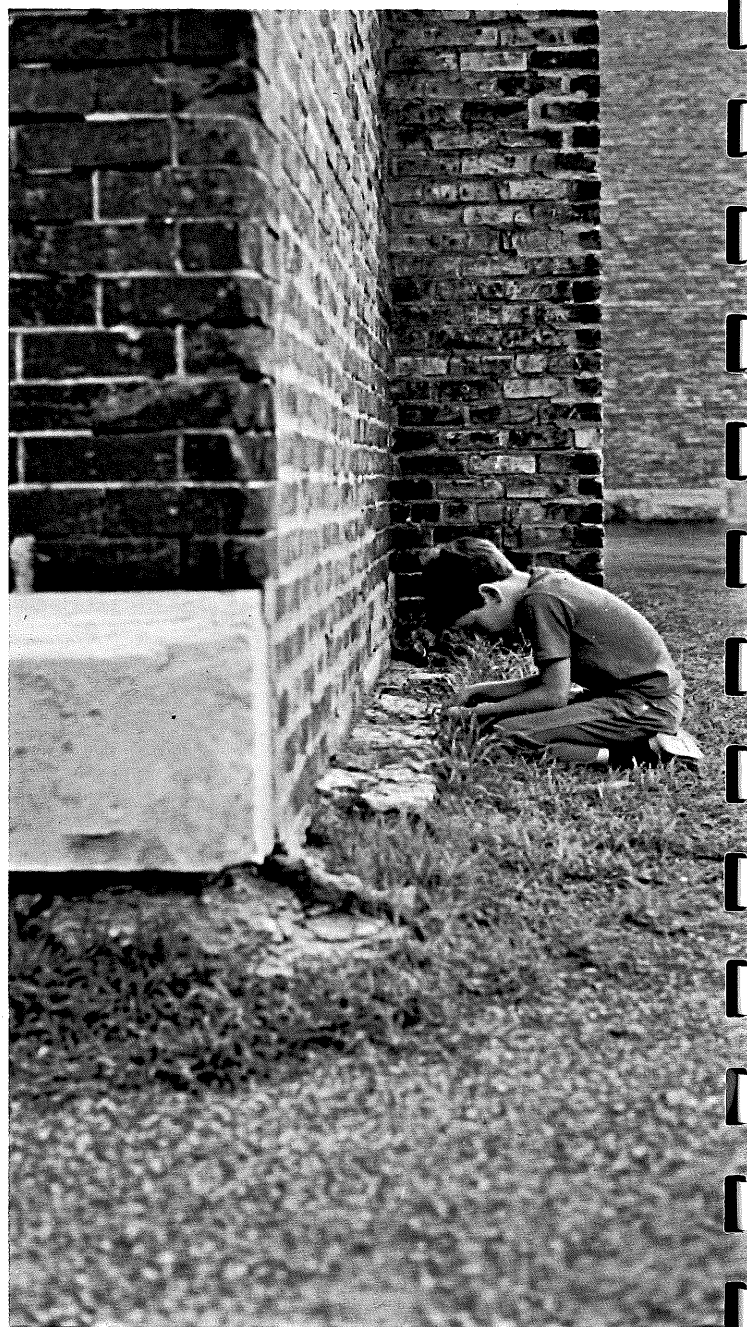
In the *Minnesota State Plan for Environmental Education*, several procedures are suggested for the development of curriculum materials and teaching methods. One suggestion is to "... encourage, promote and/or require instruction in a variety of situations, including both in-school and non-school environments." *

This booklet has been prepared to enable you to better utilize the multitude of diverse, non-school environments found on private or public lands within the state. We call these learning environments Outdoor Classrooms.

The Outdoor Classroom is a place where students have an opportunity to learn and interact within their environment. Outdoor Classrooms are found everywhere — they may be located on the school site or within reasonable proximity to the school.

There is great variation in the type of land area that could be used for an outdoor classroom. Such sites might include: a forested area, marsh, swamp, lake and its shore, open fields, cultivated agricultural land, a town's business district, or your own neighborhood.

The Pathways to the Outdoor Classroom will present a process by which a school district can make the most efficient and effective use of a parcel of land. The process also deals with the application of current curriculum materials to the outdoor classroom.



* P. 20 Minnesota State Plan for Environmental Education

Organizing for Action

Most activities start with someone who has an idea. This person motivates and enlists the support of others to help generate additional ideas and suggestions. Soon, support is derived from a nucleus of people who strive together to attain a common objective or goal.

Proper organization will lead to implementation of ideas and constructive action. The Department of Natural Resources is prepared to help you plan and utilize public lands more efficiently for outdoor classrooms. More about DNR help later. . . .

Who's Involved?

The Outdoor Classroom is a place for everyone. Therefore, a diverse group of individuals should be encouraged to plan and implement programs. The planning group should include:

parents	resource specialists
students	industry and business leaders
elementary and secondary	service organizations
teachers	professional planners
administrators	DNR personnel
curriculum coordinators	government representatives

Some or all of these individuals may be part of a planning team, depending of course on the size of the school district, physical size of the proposed outdoor classroom, and the type of assistance available locally.

Committees function best if they have a common goal, are interested in what they are doing, and can see the results of their labor come to fruition.

A functional outdoor classroom should be de-

veloped by individuals from within the school system, who in turn, are supported by citizens working in the community. Outdoor classrooms should be planned for more than just science activities. Social studies, language arts, music, history, vocational education and other disciplines are a part of outdoor and environmental education.

Support Materials

Many curriculum materials can be used in conjunction with outdoor classroom programs. Teaching units, guides, and resource materials are available from state and other agencies that complement existing school district materials. (See appendix for additional listings.) Selection of viable learning materials should be done with the help of many cooperating individuals.

The outdoor classroom planning teams should enlist the support of elementary and secondary teachers, administrators, resource managers, and the community. Enlist the support of those who have an interest in our most valuable resource — people.

Developing A Plan

The outdoor setting provides an opportunity for youngsters to learn about real-world problems. A stimulating and exciting learning environment encourages students to learn enthusiastically and efficiently. Having the proper tools and resources further enhances learning. The Pathways to the Outdoor Classroom will help you plan and develop an outdoor environmental education program.

Administrative Support and Budgets

Two key ingredients in the operation of most education programs is administrative support and a sound financial base. One of the quickest ways of destroying a project is to forge ahead with an idea, and forget to involve those who have ultimate responsibility for long-term management. Accountability and overall educational objectives are important to long-term survival.

Support by local administrators can help you solve many problems. School district officials can help coordinate cooperative arrangements with other agencies and can perform more effective and widespread public relations tasks.

On many sites some modest improvements or developments may be needed. In most cases, however, physical development should be minimal to preserve the educational value of the site.

Administrative support is essential to allocate available funds and to help with support services, e.g. developing a sound financial base. The school administration can provide a climate for effective, in-

service training programs. Overall responsibility for accomplishing educational goals is based on a district-wide system of evaluation and involvement. The school administration can also help teachers locate and acquire additional help and/or service from the Department of Natural Resources and other governmental or private entities.

Contacting the DNR

After a decision has been made to use a portion of your school site or other land area for an outdoor classroom, contact a local representative of the Department of Natural Resources. This person may be a local conservation officer, forester, wildlife manager, fisheries manager, park ranger, parks naturalist, or information and education specialist. If you do not know any local Department of Natural Resources representatives, write or call the Bureau of Information and Education, Department of Natural Resources, 350 Centennial Building, St. Paul, Minn. 55155 — (612) 296-3336.

Students on a "timber cruise" at their school forest laboratory.



DNR Services

Your Department of Natural Resources can furnish limited numbers of informational brochures, outdoor teaching units, slide sets, and educational films for use in conjunction with the outdoor classroom. Complete lists of environmental education materials and films are available. In addition, environmental education specialists in each DNR region can help you with specific problems.

DNR personnel can assist in initial planning of your outdoor classroom. They can help you develop preliminary site surveys, including inventories of wildlife, habitat, soils, forest cover, etc.

Suggestions for extensive land management of your outdoor classroom and its eventual establishment as a designated school forest can be arranged through DNR. For more detailed information, contact your local District Forester or the Division of Lands and Forestry, Centennial Building, St. Paul, Minn. 55155. More detailed plans and recommendations are available and can be developed in cooperation with *specialized groups*, such as the Minnesota Environmental Sciences Foundation.

Assistance from the Department of Natural Resources is based on a first-come, first-serve basis. All requests will be answered as soon as possible, keeping in mind that during certain seasons, some re-

source personnel are extremely busy with field assignments. We ask for you to be patient!

Considerations in Site Use

Size of the outdoor classroom may vary from a few acres to sites that are quite large. The parcel should be large enough to handle the expected number of students without creating scheduling problems, and be close enough to minimize travel time and cost.

In urban and suburban areas a site may be relatively small, 1-10 acres in size. In more rural areas, a suitable tract might be 40, 100, or for that matter, 400 to 500 acres in size. As many as 200 students can easily use a 10-acre site. However, if usage becomes heavy (four to five classes per day), it would be advisable to acquire or use a site of 40-60 acres in size.

Vegetation and other natural features will adapt and recover from periodic heavy usage. Over extended periods of time, however, it is necessary to allow the area to recover for at least one or two months.

Remember — visitors to an outdoor classroom come to see and learn about natural resources. If the natural resources are depleted or damaged, the value of the field experience is limited.

Field Examination and Mapping Committee

Once a suitable parcel has been located and a committee has been assigned to develop plans for the site, it is necessary to develop a generalized plan or map of the area so that educational potentials can be pinpointed. This project can be accomplished by students, teachers, and resource personnel working in cooperation with each other. Assistance from DNR personnel is available as outlined in preceding chapters.

Step 1

A group of at least 10-12 teachers should be established to help with assessing and mapping the site. The first step would be to acquire maps of the area. Topographic maps, for example, can be obtained from the United States Geologic Survey. These maps are available for most areas of Minnesota. Your local county agent, DNR resource manager, or Soil Conservation Service representative can help you in securing topographic maps or they may, in some cases, be acquired at local libraries.

In addition to topographic maps, soils information

is available from the local Soil Conservation Service office. Consult the telephone directory under United States government listings for the location and phone number of your Soil Conservation Service office. Most DNR resource managers have aerial photographs of that portion of the state under their supervision. It may be possible to acquire copies of these photographs or to use the photographs with the help of the resource manager. In some areas, especially in rural townships, fire plan maps, lake maps, and county maps reveal much of the terrain and site factors.

After you have had an opportunity to gather maps and aerial photographs of the site, go on to Step 2.

Step 2 — Organizing for Field Work

Generally, topographic maps are small in scale and have to be enlarged for easier interpretation. We would recommend a scale of eight inches to one mile. An opaque projector or tracings can be used to enlarge maps. The contour topographic map on page 7 was enlarged from a large-scale map with a projector.

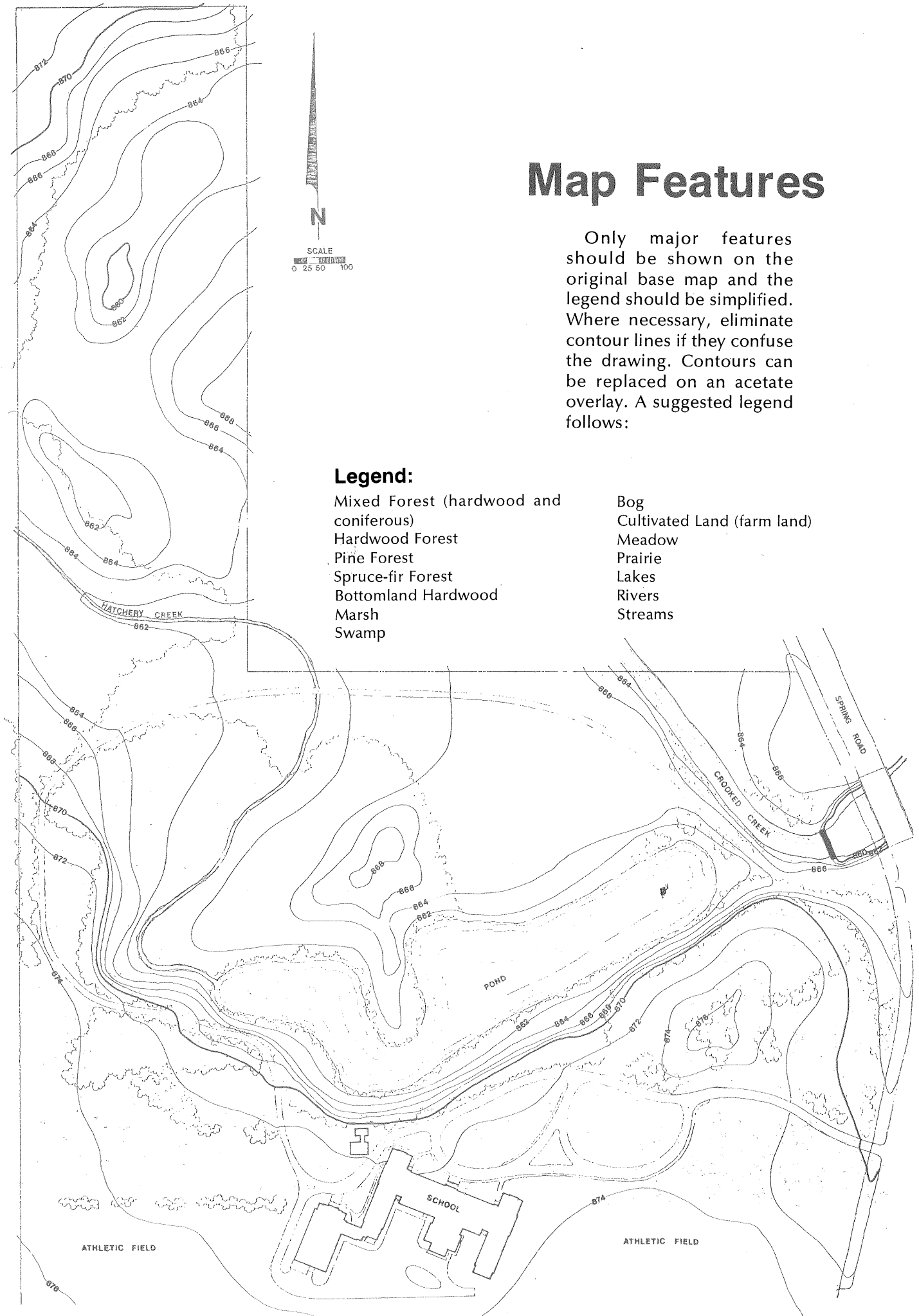
Map Features

Only major features should be shown on the original base map and the legend should be simplified. Where necessary, eliminate contour lines if they confuse the drawing. Contours can be replaced on an acetate overlay. A suggested legend follows:

Legend:

Mixed Forest (hardwood and coniferous)
Hardwood Forest
Pine Forest
Spruce-fir Forest
Bottomland Hardwood
Marsh
Swamp

Bog
Cultivated Land (farm land)
Meadow
Prairie
Lakes
Rivers
Streams



Mixed Forest

(Hardwood and Coniferous)

A forest area that has hardwood trees (deciduous species) and evergreen trees (coniferous trees) within the same general area.

Things to Look For:

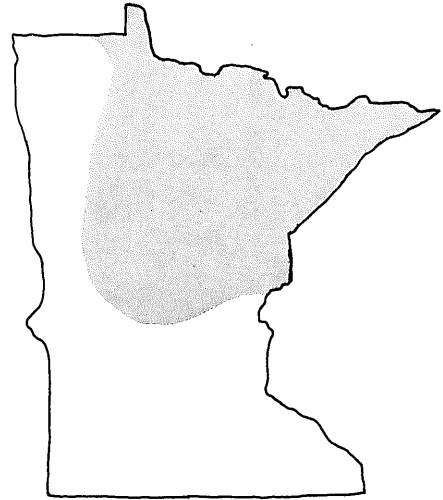
Generally the evergreen trees are growing directly adjacent to hardwood trees. Sometimes the evergreen species or coniferous trees are found in the same understory.

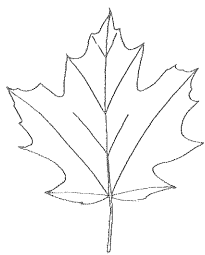
General Location:

Mixed forest stands are generally found in the northern and east-central part of Minnesota with some scattered stands in the southeastern part of the state.

Indicators:

Oaks, maples, Balsam fir, White Spruce, and a variety of shrubs and low growing trees.

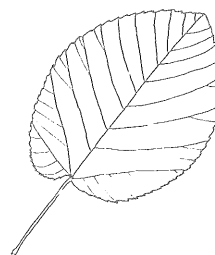




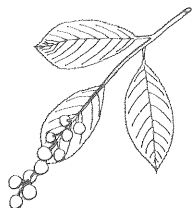
Sugar Maple



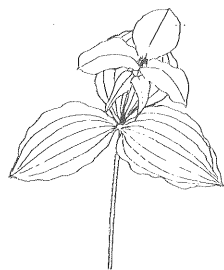
Quaking Aspen



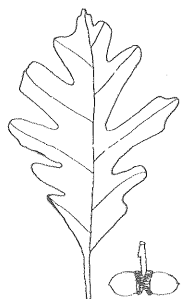
Basswood



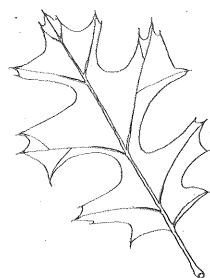
Choke Cherry



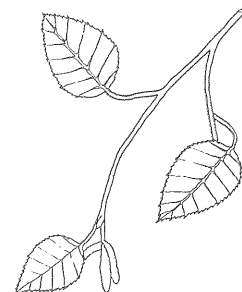
Common Trillium



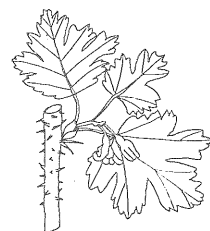
White Oak



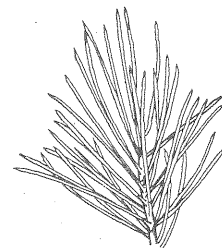
Red Oak



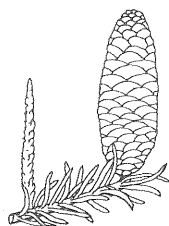
Paper Birch



Northern
Gooseberry



Red Pine



Balsam Fir



Jack Pine

Hardwood Forest

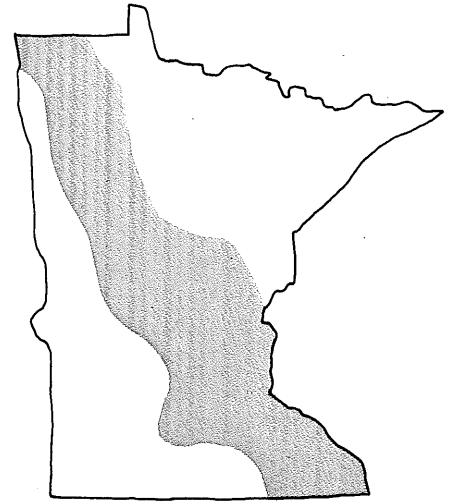
Hardwood forest areas are almost entirely made up of deciduous trees. Ground cover and the under-story or shrub layer is made up entirely of hardwood species.

Things to Look For:

Hardwood forest areas generally have both mature and young trees growing side by side. There is usually substantial evidence of old rotting logs and stumps. Many species of wildflowers are present. In some cases, almost pure stands of oaks, maples, basswood, or birch may be found.

General Location:

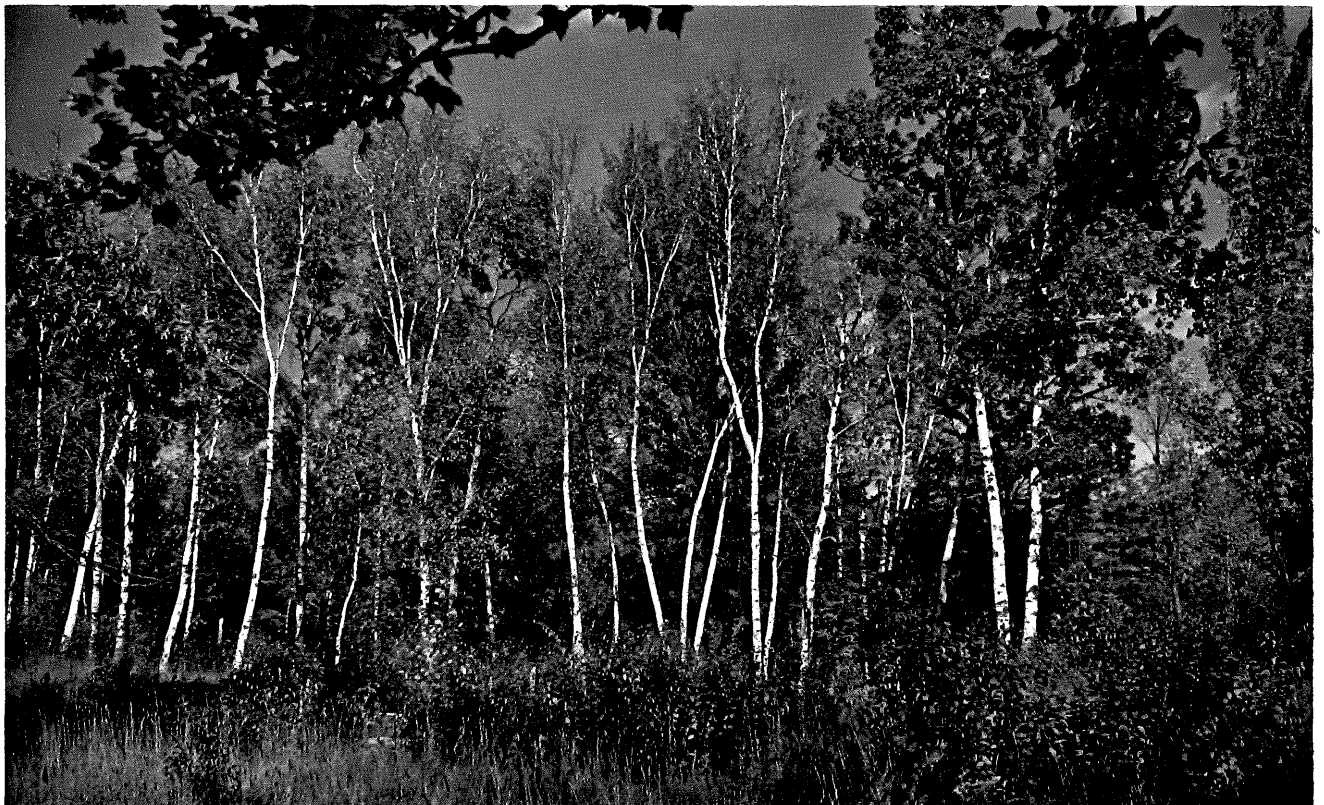
The original hardwood forest area extended from the northwest part of the state to the southeast in a band about 100 miles wide. True hardwood forest areas can be found in other scattered locations, primarily due to past agricultural practices. Hard-

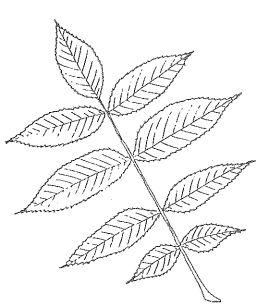


woods are generally more aggressive than coniferous trees and will re-invade lands formerly cleared for farming.

Indicators:

Most hardwood species, including oaks, maples, basswood, elm and ash. Many species of wildflowers. Generally abundant fern and low-growing shrub growth.

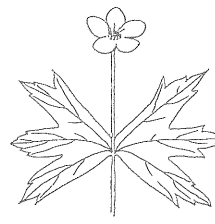




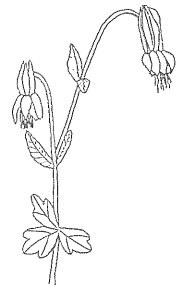
Black Ash



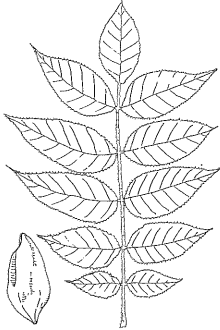
Sugar Maple



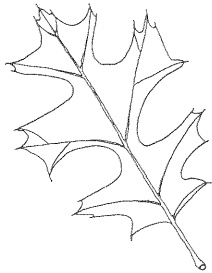
Canada Anemone



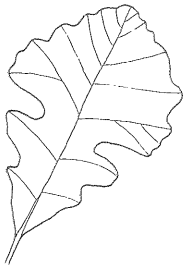
Eastern Columbine



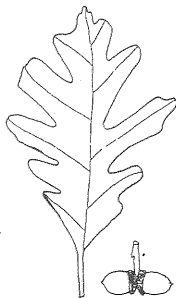
Butternut



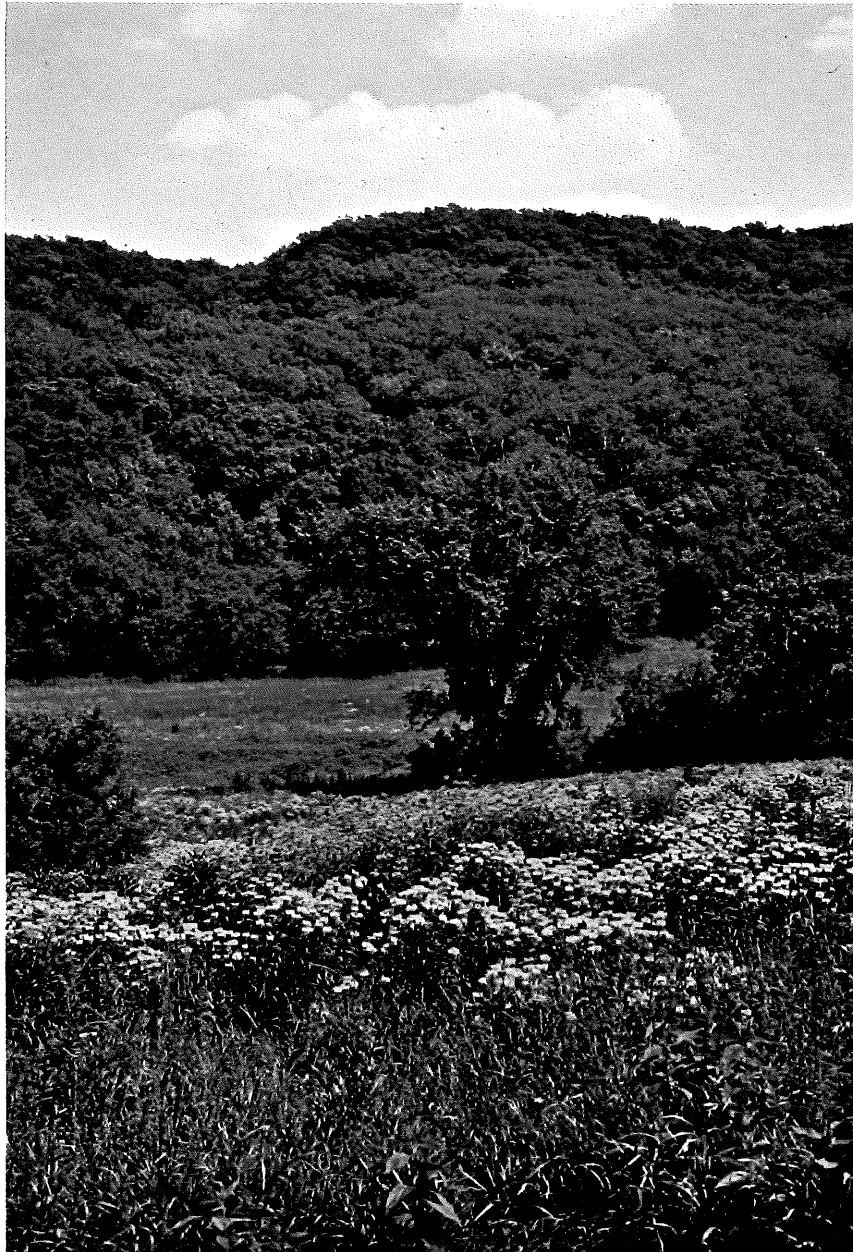
Red Oak



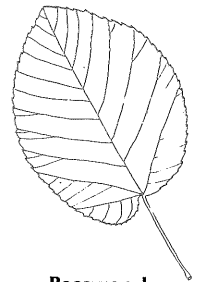
Bur Oak



White Oak



Woodbine



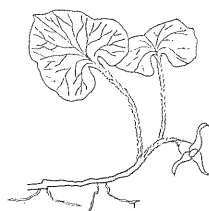
Basswood



American Elm



Poison Ivy



Wild Ginger



Bloodroot



Jack-in-the-Pulpit

Pine Forest

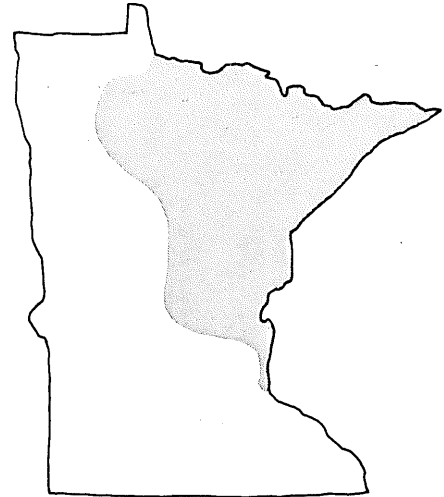
Pine forests are made up of almost completely pure stands of white or Norway (Red) Pine. They are found growing on sandy soils, with very little undergrowth.

Things to Look For:

Almost pure stands of pine forests exist in various parts of Minnesota. Generally pine forests can be recognized by their uniformity in size or in the types of species present. Young trees are usually found in open areas where they receive abundant sunlight.

General Location:

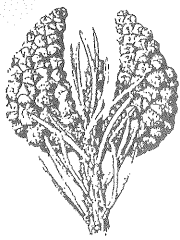
Pine forests are found predominantly in the central part of Minnesota and in scattered locations in the northeast. In addition, there are occasional pure stands of White Pine located in the southeast. Many pine plantations exist in the state.



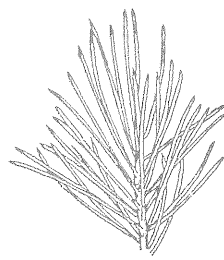
Indicators:

Primary species are the White Pine and Norway (Red) Pine. In the central part of the state, pine forests are usually found on very sandy or sandy-loam soils. Understories are made up of scattered ferns and small herbaceous plants. Some hazel brush and other shrub species may be found in a pine forest. In some areas, lichens grow quite abundantly.

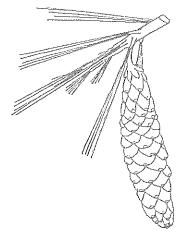




Jack Pine



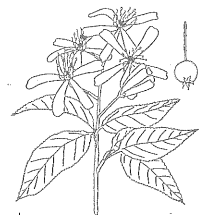
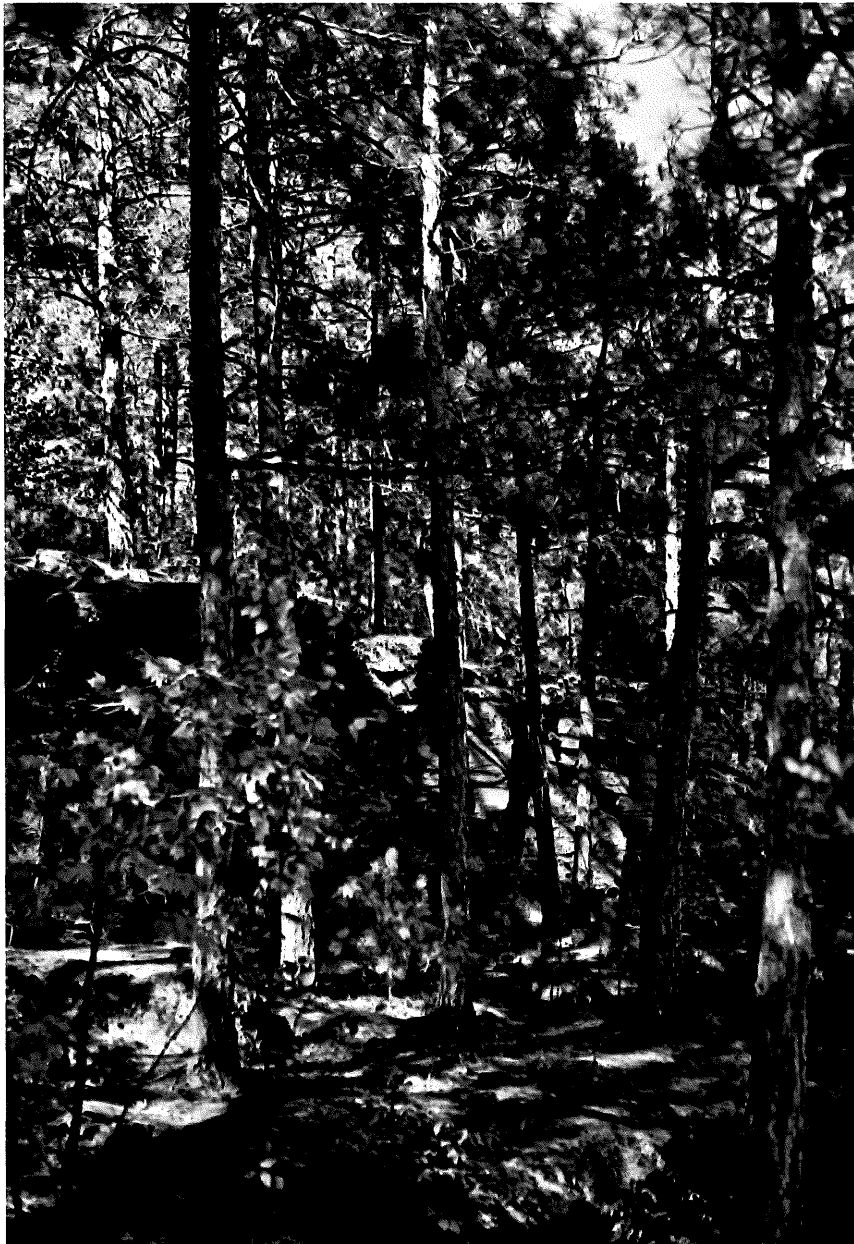
Red Pine



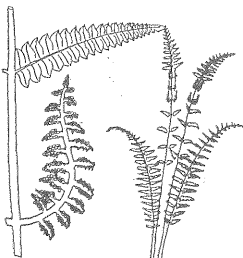
White Pine



Clintonia



Juneberry



Interrupted Fern



Wild Strawberry



Lady Fern



Wild Rose



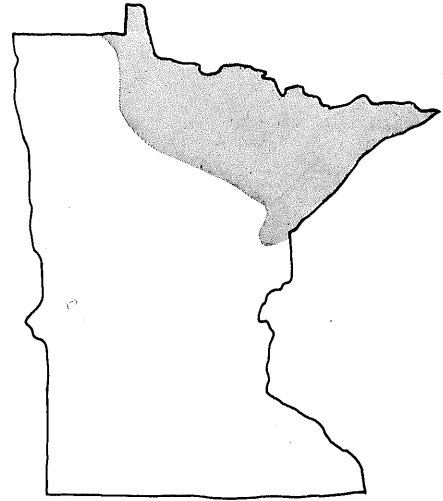
Beaked Hazelnut

Spruce-Fir Forest

Spruce fir forests generally contain mixtures of Black and White Spruce and Balsam Fir. They are generally found in moist to wet sites and the understory in many instances contains a variety of bog type plants. Sphagnum Moss is also associated with these forests.

Things to Look For:

Spruce-fir forests are generally found in the northern half of the state. Old lake beds and bogs form the foundation for these tree types. Sometimes the spruce appear in a pure stand. However, due to past logging practices, pure stands of spruce are somewhat rare, except for managed parcels on state and federal lands. Soil base for most spruce-fir forests is a peat or loamy-sand soil. There is usually abundant Sphagnum Moss underneath most of the trees.



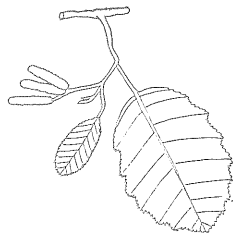
General Location:

Spruce-fir forests are located in the northern half of the state. There are also scattered patches found in central Minnesota.

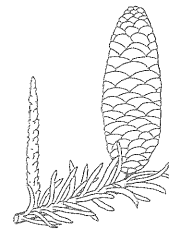
Indicators:

Black and White Spruce, Balsam Fir, Labrador Tea, Sphagnum Moss, and alder.

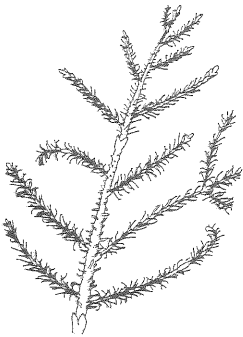




Speckled Alder



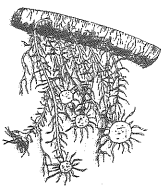
Balsam Fir



Dwarf
Mistletoe



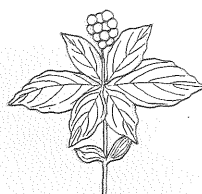
White Spruce



Old-Man's-Beard
Lichen



Blueberry



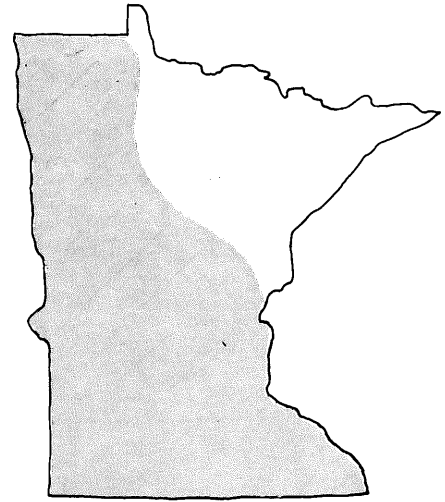
Bunchberry

Bottomland Hardwood Forest

Bottomland hardwood forests are found in river bottom valleys and flood plain areas. They are distinguished by having many large trees growing in scattered areas or almost pure stands of cottonwood or willow.

Things to Look For:

Bottomland hardwoods include Cottonwood, willow, Box Elder, ash, and elm. These trees are usually quite large, sometimes exceeding 40 inches in diameter. Trees are usually scattered and in many instances are damaged by ice but generally are long-lived with large extensive crowns. Bottomland hardwood forests generally show evidence of flooding from periodic high water and ice damage.



General Location:

River bottoms and flood plains throughout Minnesota. Exception would be the northeast where rivers generally flow too rapidly and deep bottomland soils are rare.

Indicators:

Large Cottonwood, elm, willow, ash, and Box Elder. Understory usually consists of willows and Cottonwood sprouts.

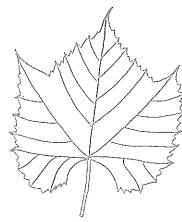




Solomon's Seal



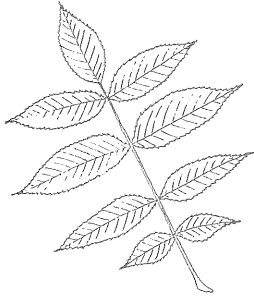
Silver Maple



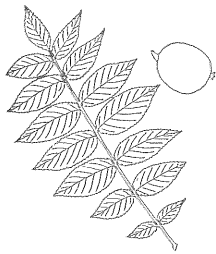
Wild Grape



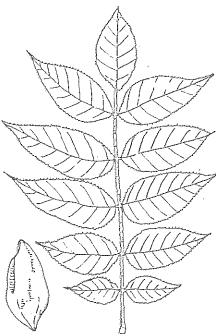
Box Elder



Black Ash



Black Walnut



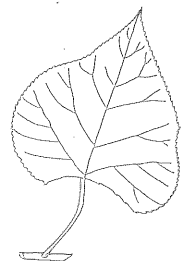
Butternut



Hackberry



American Elm



Cottonwood



Sharp-lobed Hepatica



Jewelweed



Woodland Horsetail

Marsh

A marsh is an area of soft, spongy wetland where the dominant vegetation is grass, cattails, or reeds.

Things to Look For:

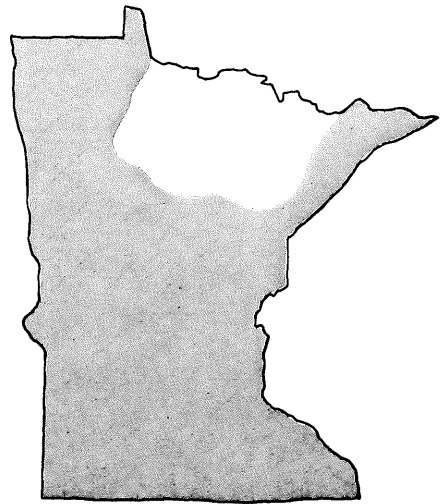
Extensive growth of cattails, sedge, and some open water. Marshes are also classified as to types of vegetation. However, without extensive background information, areas that have growth of cattail and sedge will be considered marsh areas.

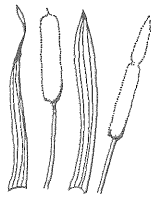
General Location:

Marsh areas are found throughout Minnesota. Some may be quite extensive in area while others may be smaller than one acre in size.

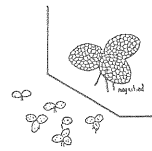
Indicators:

Cattails, sedge and numerous water plants such as Duckweed, water lilies, Marsh Marigold, etc.

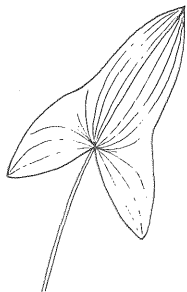




Cattail



Duckweed



Arrowhead



Red-Osier
Dogwood



Watercress

Swamp

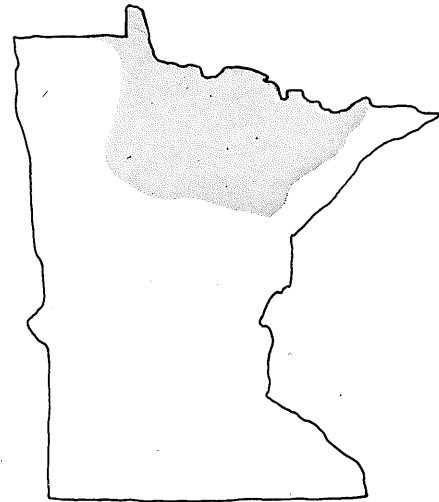
A swamp is a wet, spongy area of land that may or may not have open water. Dominant vegetation is woody plants including willow, alder, and hazel brush. Some swamps contain mixtures of spruce and fir trees. Minnesota's swamps are fresh water areas and they may contain a mat of Sphagnum Moss.

Things to Look For:

Scattered clumps of willow and other hardwood brush species. Some open water, and occasionally larger spruce or fir trees.

General Location:

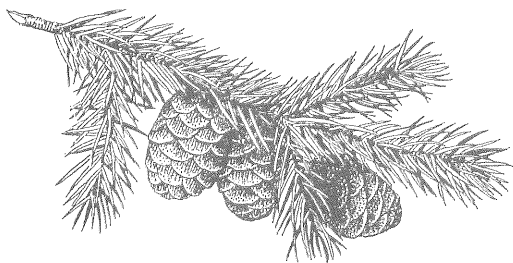
Predominant in northern Minnesota. True swamps once made up large portions of north-central Minnesota. Many of these areas are now vegetated with extensive stands of Black Spruce.



Indicators:

Woody vegetation, including willows, hazel brush, alder, and some spruce and fir trees. Many low growing shrubs and herbaceous plants are also found, such as Bearberry, Joe-Pye Weed and Swamp Buttercup.





Black Spruce



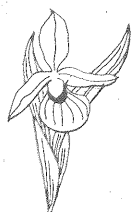
White Cedar



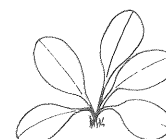
Joe-Pye
Weed



Swamp
Buttercup



Showy
Lady's-Slipper



Wintergreen



Bearberry



Sedge



Tamarack

Bog

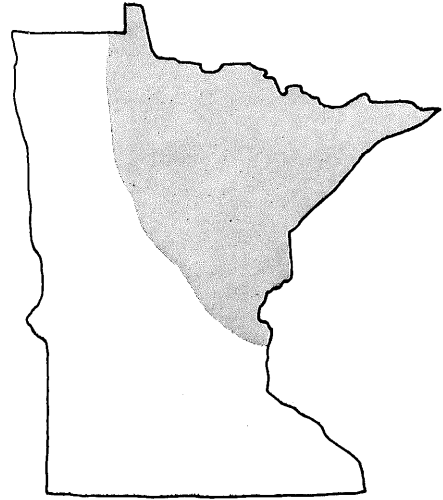
All bogs have several features in common: A cushion-like vegetation and an accumulation of peat.

General Location:

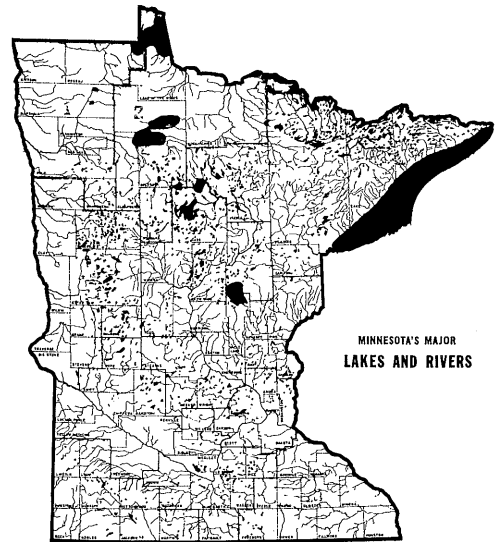
Bogs usually develop where drainage has been blocked. Bog succession may occur on lakes as the deposition of organic material advances.

Indicators:

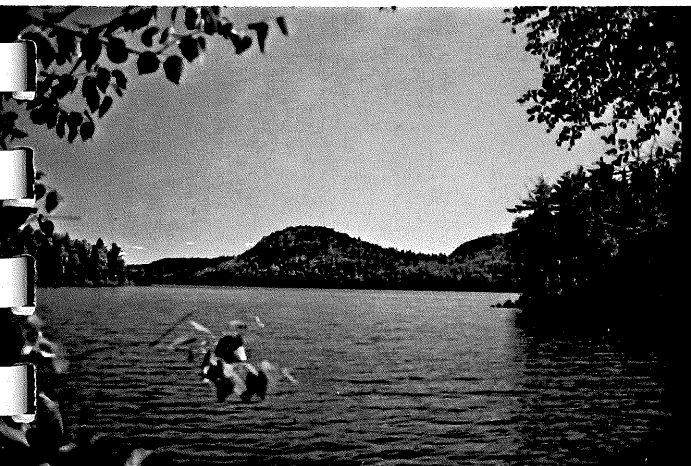
Sphagnum Moss, heath, Bog Rosemary, Leather-leaf, Labrador Tea, and Pitcher Plant.



Water Areas



WATER — whether it be roaring cascades or tranquil northern lakes — enhances any outdoor classroom and thus the learning experience. Fortunately, Minnesota's liquid assets are great — 25,000 miles of rivers and streams, over 12,000 lakes, and myriad bogs, marshes and prairie potholes. Together these waters lap over 4.3 million acres or 6,700 square miles.



Meadow

Description of a meadow generally includes goldenrod, clover, ragweed, thistle and Burdock.

Things to Look For:

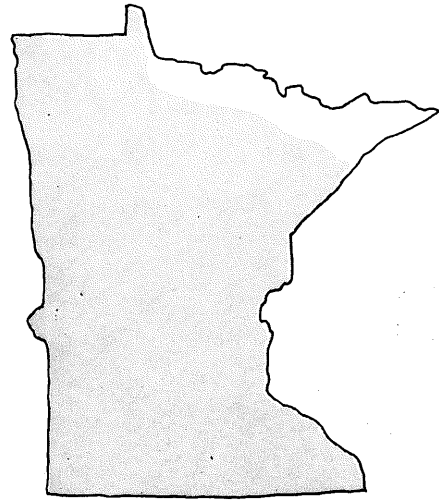
Many meadow areas contain both natural and introduced species of plants. A meadow may be relatively dry or wet. Often, they are areas that at one time were cultivated or used for pasture.

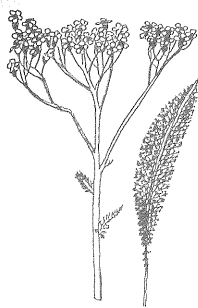
General Location:

Found throughout Minnesota, with the exception of heavily forested areas.

Indicators:

Dandelion, daisies, goldenrod, White Clover, sweet clover, Staghorn Sumac, Common Burdock and ragweed.





**Common
Yarrow**



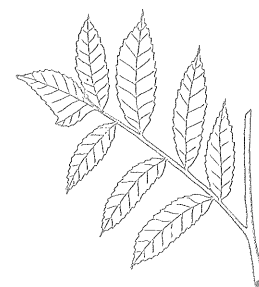
Wild Bergamot



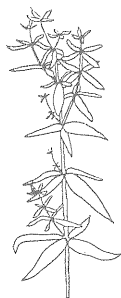
Catnip



Ragweed



Smooth Sumac



**Northern
Bedstraw**



Goldenrod



**New England
Aster**



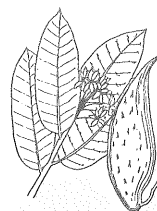
**Hedge
Bindweed**



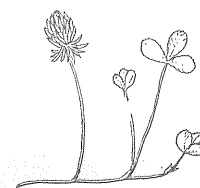
**Common
Burdock**



**Common
Mullein**



Milkweed



White Clover



**Sweet
Clover**



**Canada
Thistle**



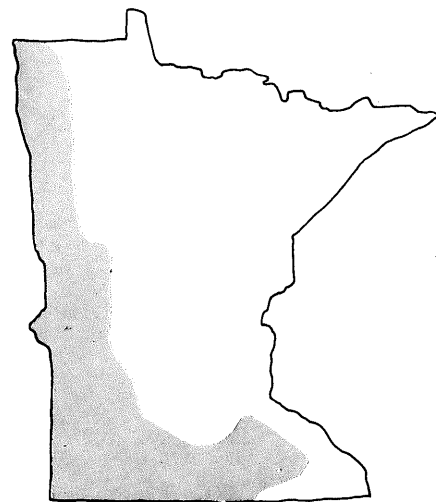
Bluebell

Prairie

The prairies are generally made up of sod forming and bunch grasses. The sod forming grasses may include Kentucky Blue Grass and Western Wheat Grass. Bunch grasses include: Little Bluestem, Crested Wheat Grass, Broomsedge, Orchard Grass, and other herbs. Legumes are generally scarce.

Things to Look For:

Very few native prairies exist in Minnesota. There are scattered patches of native prairie under protection by The Minnesota Nature Conservancy. Some areas contain many species of grasses growing in one area, where others are made up primarily of one or two dominant species. Some prairie areas have been re-established as experimental plots and do require various means of management to maintain themselves. Fire is sometimes used as a management tool.



General Locations:

Native prairie areas are found in the western half of Minnesota.

Indicators:

Prairies contain Orchard Grass, Broomsedge, Big Bluestem, Blue Grama, Buffalo Grass, Little Bluestem, Indian Grass, Reed Canary Grass, Sideoats Grama, Switch Grass, Western Wheat Grass, Prairie Cordgrass, Virginia Bluebell, Harebell, Cardinal Flower, Blazing Star, Prairie False Dandelion and Ground Plum.

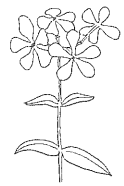




**Black-eyed
Susan**



Harebell



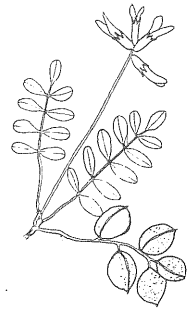
Wild Phlox



**Tall
Goldenrod**



**Cardinal
Flower**



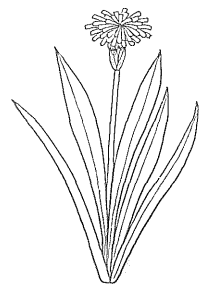
**Ground
Plum**



Blazing Star



Starflower



**Prairie False
Dandelion**

Cultivated Land

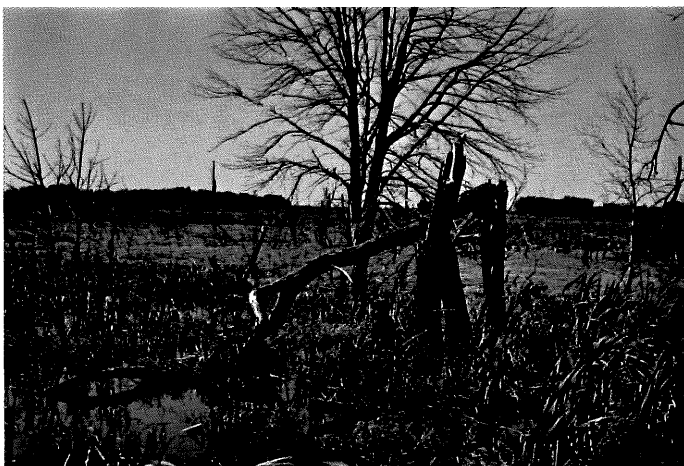
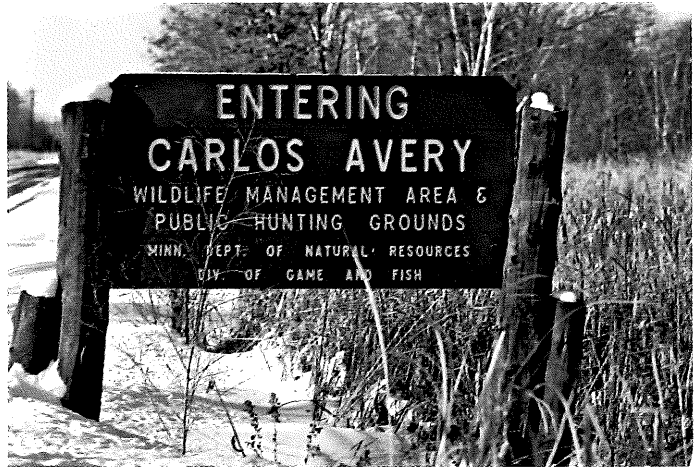
Any farm land that is currently under production for either row or grain crops. Included in this type would be orchards and sod farms.



State Owned Lands



Nearly all lands managed by the Minnesota Department of Natural Resources are available for environmental education. They are: 98 state park units (some 204,000 acres); over 900 wildlife management areas encompassing some 1 million acres; and 55 state forests with another 3 million acres. MDNR lands are managed for fish and wildlife, timber production and to provide quality recreation experiences. Educators are encouraged to utilize these diverse lands and waters, but should contact area game and fish managers, foresters and park managers before planning a field trip.



On-Site Field Work

After the initial base map has been drawn (see page 31), it is of paramount importance that an on-site field survey be made to locate and delineate major physical, cultural and natural features. This experience can and should be replicated by all future classes of students. It is valuable not only for the mapping experience, but it also enables students to gain a thorough, first-hand knowledge of the area. The field survey can take place any time of the year. It may be more desirable, however, to wait until the area is clear of snow cover.

The planning committee should study the photographs and sketches of vegetation and other features found in this booklet, especially those types expected to be encountered on their site. Everyone must understand what is meant by a marsh area, meadow, prairie, pine forest, etc.

Once in the field, divide the group into three or four members per team. Locate each team along a predetermined base line such as a road, trail, utility line, or fence. Teams should be located at least 100 feet apart. This will allow a greater area to be mapped and teams will not interfere with each other's work.

Teams should then walk in a designated compass direction to the opposite boundary, noting vegetative types and points of interest. Each team must know where they are going and the purpose of their activity. Adequate map preparation and preplanning are absolutely necessary.

If areas larger than 40 acres are involved, a DNR manager should be on hand to assist with initial mapping and field work. DNR personnel have had extensive experience in surveying techniques and can offer many helpful suggestions.

Team Field Notes

Team #1

Orientation WEST
Starting Point N.E. CORNER OF PROPERTY
Date _____

Stop No.	Total Distance	Distance	Description
1	15'	15'	CENTER OF OLD ROAD
2	25'	10'	HARDWOOD FOREST
3	65'	40'	HUGE OAK
4	195'	130'	HOLE IN FENCE
5	350'	155'	A DEN HOLE

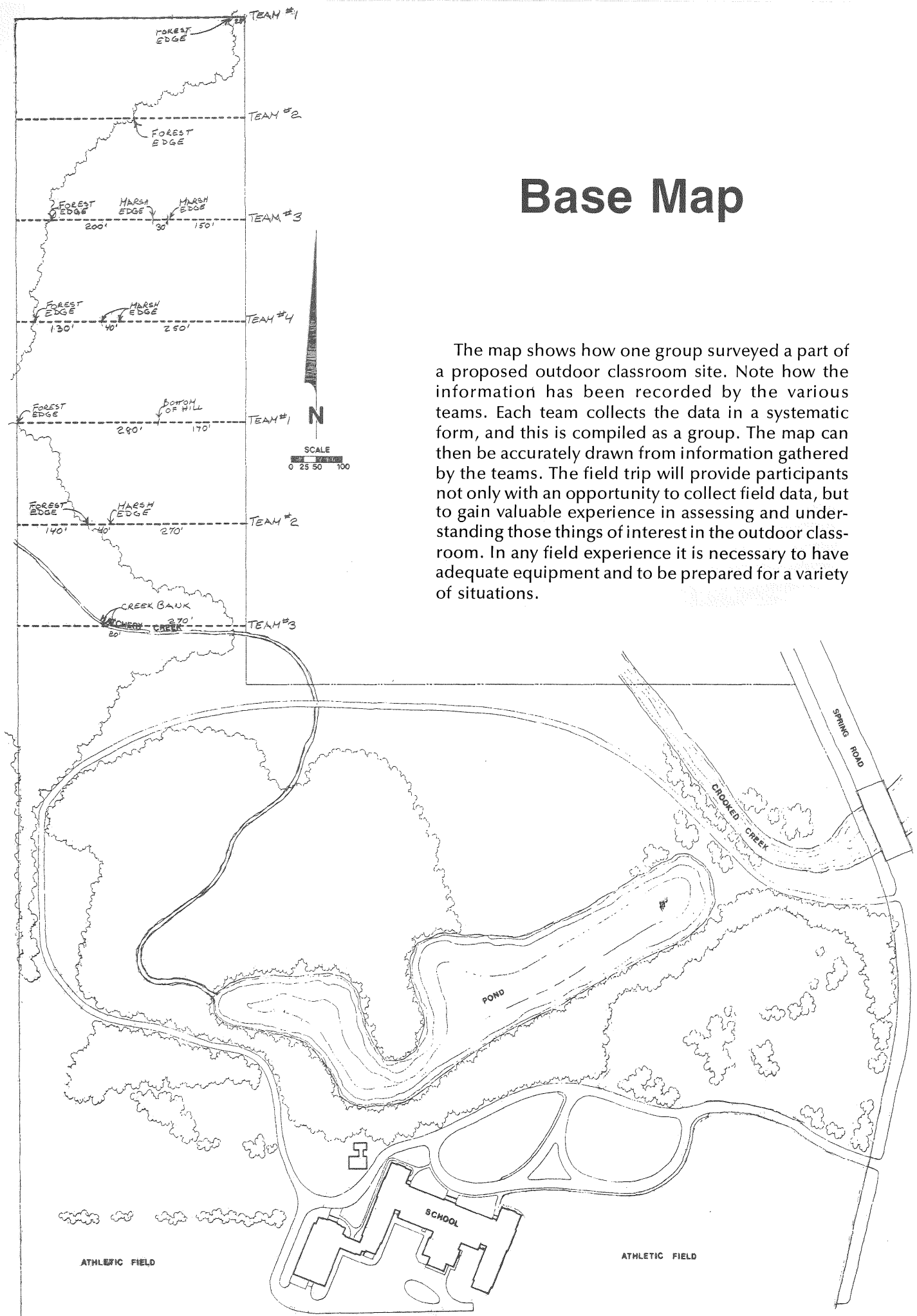
Team #2

Orientation WEST
Starting Point 200' S. OF N.E. PROPERTY LINE
Date _____

Stop No.	Total Distance	Distance	Description
1	20'	20'	GOPHER MOUNDS
2	50'	30'	CENTER OF OLD ROAD
3	113'	63'	HAWTHORN TREE
4	153'	40'	WHITE & NORWAY PINES
5	183'	30'	WEST PROPERTY LINE

Base Map

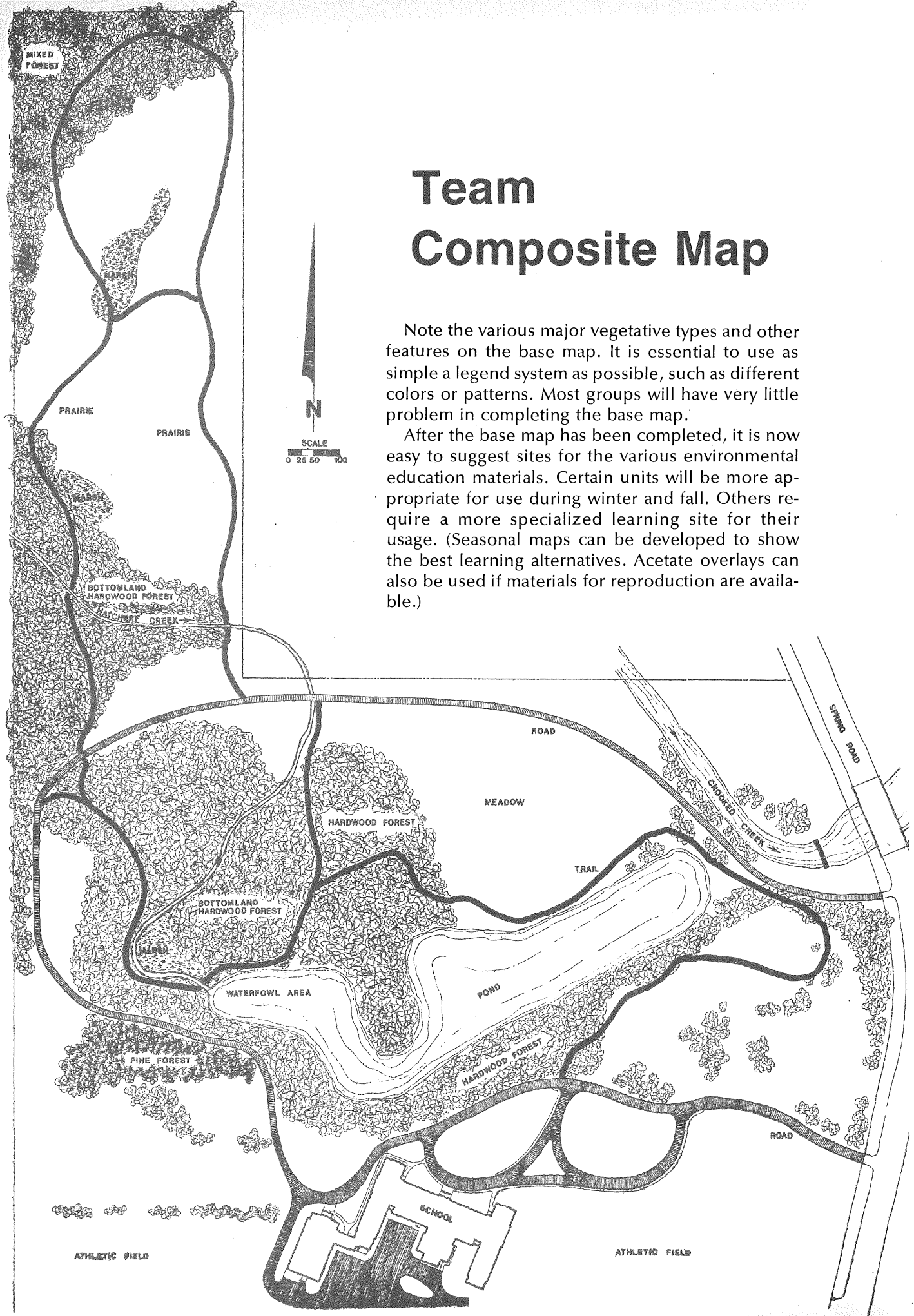
The map shows how one group surveyed a part of a proposed outdoor classroom site. Note how the information has been recorded by the various teams. Each team collects the data in a systematic form, and this is compiled as a group. The map can then be accurately drawn from information gathered by the teams. The field trip will provide participants not only with an opportunity to collect field data, but to gain valuable experience in assessing and understanding those things of interest in the outdoor classroom. In any field experience it is necessary to have adequate equipment and to be prepared for a variety of situations.



Team Composite Map

Note the various major vegetative types and other features on the base map. It is essential to use as simple a legend system as possible, such as different colors or patterns. Most groups will have very little problem in completing the base map.

After the base map has been completed, it is now easy to suggest sites for the various environmental education materials. Certain units will be more appropriate for use during winter and fall. Others require a more specialized learning site for their usage. (Seasonal maps can be developed to show the best learning alternatives. Acetate overlays can also be used if materials for reproduction are available.)



Teaching Locations

This section is designed to help the teacher locate the most suitable and practical sites for teaching outdoor environmental education materials. It is not necessary, however, to have an extensive outdoor classroom for teaching most materials; but it is essential to provide the most appropriate and suitable site for the units to enhance the learning environment.

A suggested process is: First, assemble the cur-

riculum materials that are to be incorporated in the school's environmental education program. Next, by reviewing this material, a committee or working group should be able to determine the specific site and seasonal requirements of each unit or activity that would facilitate its teaching. Next, make a chart of these requirements, similar to the one illustrated on this page. This chart will serve as a continual reference.

Chart of Suggested Study Locations

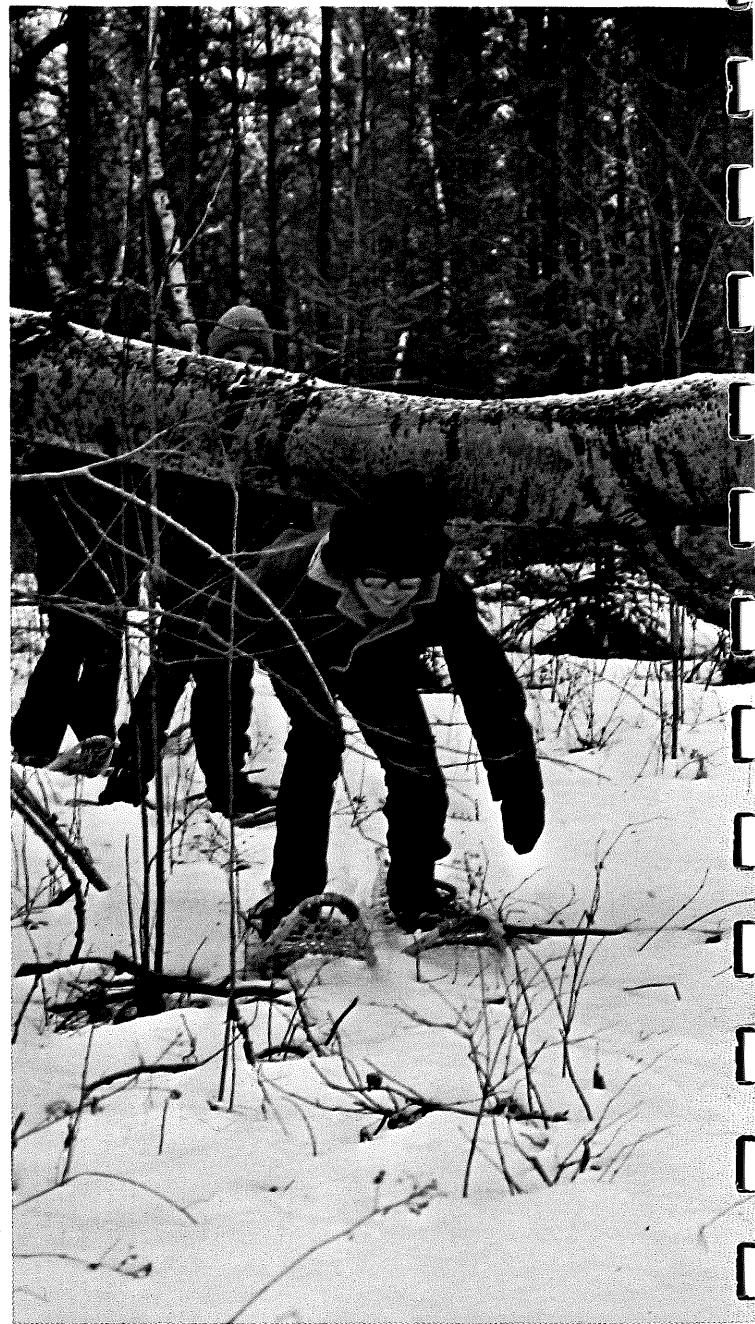
UNIT TITLE	(Study Locations)																		Recommended group size	Recommended grade level
	Mixed Forest	Hardwood Forest	Pine Forest	Spruce fir Forest	Bottomland Hardwoods	Marsh	Swamp	Open water (Lakes, rivers, streams)	Waterfowl area (open)	Cultivated Land	Meadow	Prairie	Indoor	Outdoor	Spring	Summer	Fall	Winter		
Duplicating Nature's Colors	X	X	X	X	X						X	X		X	X	X	X		20	K-3
Fingerprinting Trees and Bushes	X	X	X	X	X										X	X	X		20	K-3
Needs and Requirements for keeping people alive	X	X	X		X						X				X		X		25	K-3
An animal to Experiment with		X									X	X		X			X	X	25	4-6
Fire Building	X	X	X	X	X										X	X	X	X	25	4-6
Fire & Values	X	X	X	X	X										X	X	X	X	25	4-6
Rotting Log	X	X	X	X	X										X	X	X		20	4-6
Natural Communities	X	X	X	X	X	X	X	X	X	X	X	X			X	X	X		25	6-9
Snow and Survival	X	X	X	X	X	X	X				X	X						X	20	6-9
Animal Territories						X			X						X				20	6-9
It's only Me													X						25	4-6

Assigning Locations

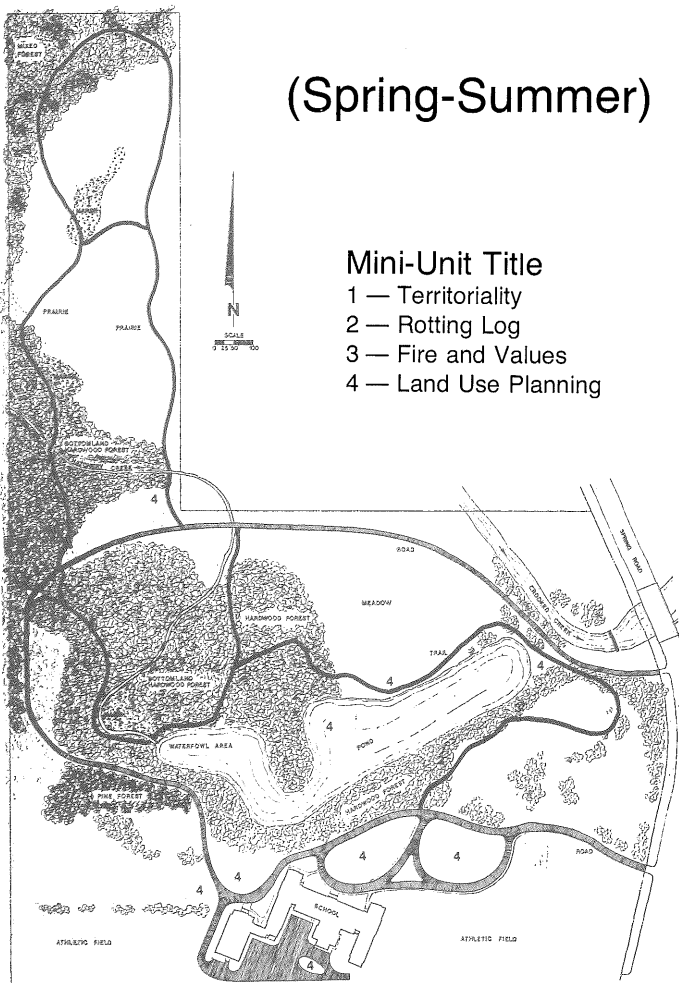
Following the charting procedure, assignment of teaching locations can be made. As an example, suppose a particular teaching unit would be enhanced by access to a mixed forest type in spring or fall. Return to the field and carefully examine the area for suitable teaching locations. Keep in mind the varying conditions imposed by the respective seasons and also probable size of classes using the area.

The designated area should be physically delineated in the field. This can be done in any number of ways: plastic flagging, wooden laths with numbers, 4" x 4" posts with numbers, etc. The approximate locations and numerical (or other coding) assignment of each teaching station should be plotted on the base map. Some units will appear on more than one seasonal map. These base maps will then serve as a guide to locating learning areas which correspond to specific pieces of curriculum for use by all teachers within the school.

In some instances, it may be necessary to develop additional trails or access points to the learning areas. Trail systems should be planned with the aid of DNR personnel and other resource specialists. Because of the varied terrain and requirements of different groups, it is impossible in this booklet to outline any detailed techniques for trail construction and development. Consult the bibliography for further information regarding trail development and other activity suggestions for outdoor classrooms.



(Spring-Summer)

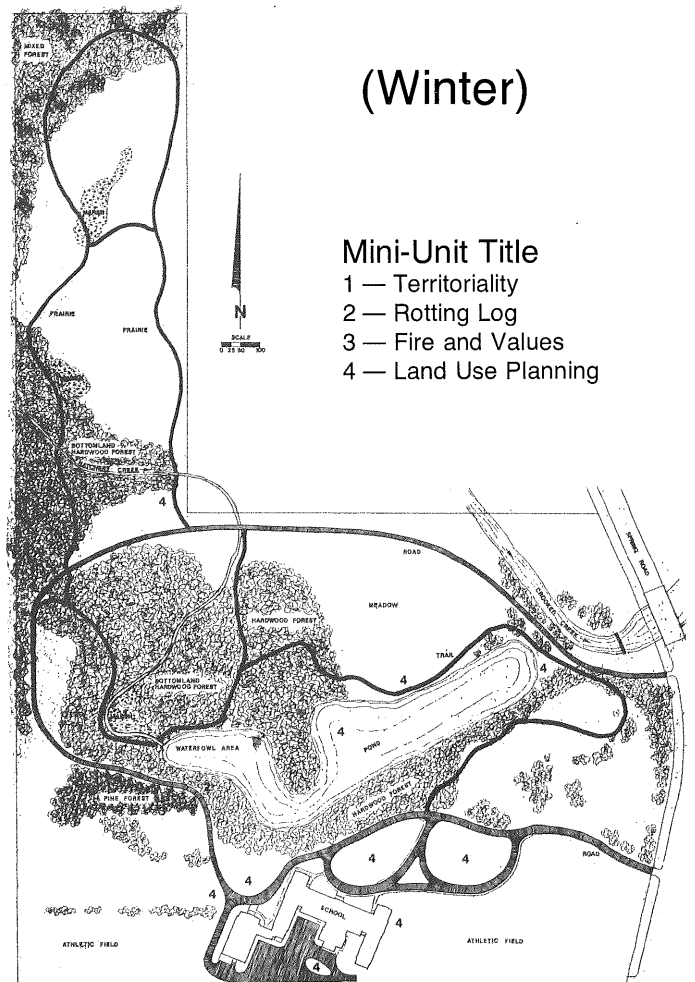


Mini-Unit Title

- 1 — Territoriality
- 2 — Rotting Log
- 3 — Fire and Values
- 4 — Land Use Planning

Mini-Unit Study Site Locations

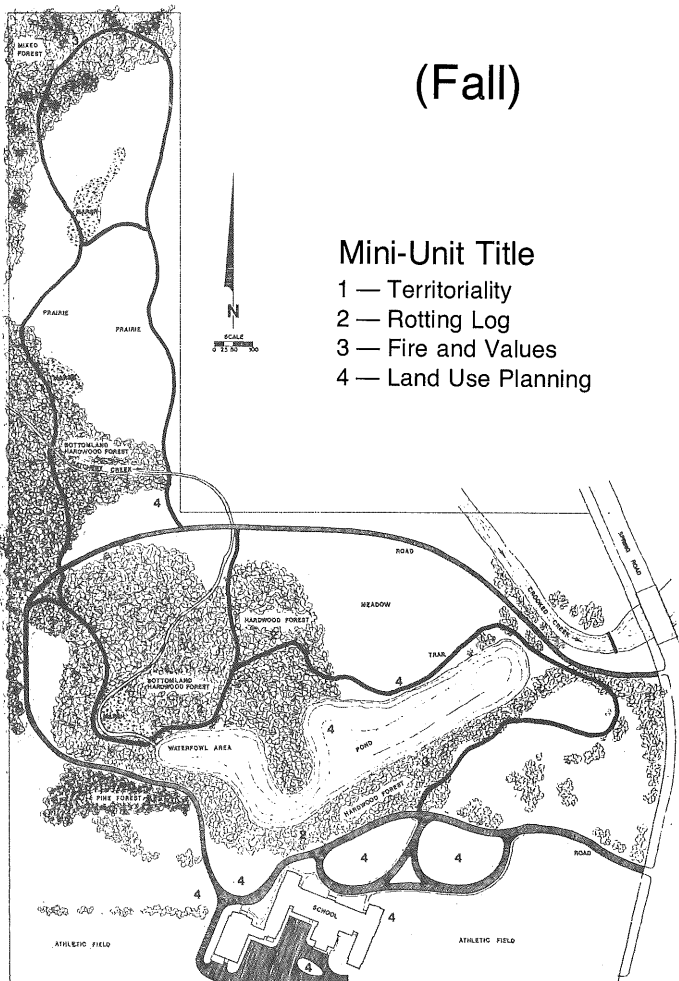
(Winter)



Mini-Unit Title

- 1 — Territoriality
- 2 — Rotting Log
- 3 — Fire and Values
- 4 — Land Use Planning

(Fall)



Mini-Unit Title

- 1 — Territoriality
- 2 — Rotting Log
- 3 — Fire and Values
- 4 — Land Use Planning

Management and Maintenance

Every outdoor education site must be properly maintained and managed over a long period of time. It is unfortunate that many exciting and innovative places fall victim to neglect. Within a surprisingly short period of time, these unmanaged sites can revert to problem areas rather than continuing to serve as valuable educational sources.

An adequate maintenance and management plan must be developed for each outdoor classroom area. Management is carried out by maintaining cover, controlling erosion and by providing diverse habitat. Countless other management techniques should be developed with the help of trained and informed resource managers. Many interesting experimental study sites can be developed. However, these should only be established if they can be managed over a sustained period of time.

Maintenance of a healthy and educationally valuable learning site is most important. Using a site and abusing a site are two different things, but they often go hand-in-hand. If samples are taken (leaves, twigs, nests, etc.), they should be limited to one sample per class or per team. This will enable other classes and groups to enjoy the site over extended periods of time.

Periodic litter removal, repainting of signs, and informational material should be planned. It may be necessary to build up trail surfaces with wood chips or other material after heavy usage. In some instances, maintenance may include the abandonment of certain trails or areas so they can recover naturally.

Keeping an "Eye" on your Site

A permanent record of site conditions can be made by taking photographs of study areas to show change over time. An example would be taking a picture of the forest understory in the spring and noting changes that took place during summer. In the fall look for any evidence of trampling, broken vegetation, dead limbs, etc. If damage does occur through overuse, you will have a permanent record and steps can be taken to remedy the situation.

Maintaining Trails

Access pathways should be examined periodically to ensure that erosion or compaction problems are alleviated. Replacement of rotten and worn-out timbers, log seats, corduroy roads, sign posts, and protective fencing should be undertaken at least annually.

Slippery surfaces should be avoided whenever possible. Traffic over algae-covered rocks, wet logs, and wet clay or peat present problems especially for groups. Remove obstacles from trailways and check for overhanging branches and limbs along trails. Trim to a 10-foot height so that snow-laden branches are above reach.

Wood chip pathways generally need resurfacing every three years. Under extremely wet conditions, annual upgrading may be required. Limit vegetation control techniques to mechanical means instead of chemical herbicides. This is especially critical on

areas where natural vegetation is reintroduced or being encouraged.

Trails should be checked periodically for over-use or erosion. A simple technique developed by Dr. Edwin Ketchledge, Professor, NYS College of Forestry shows how a monitoring system can be developed (Below). Records should be kept and a minimum of 10 sampling stations should be established in each outdoor area.

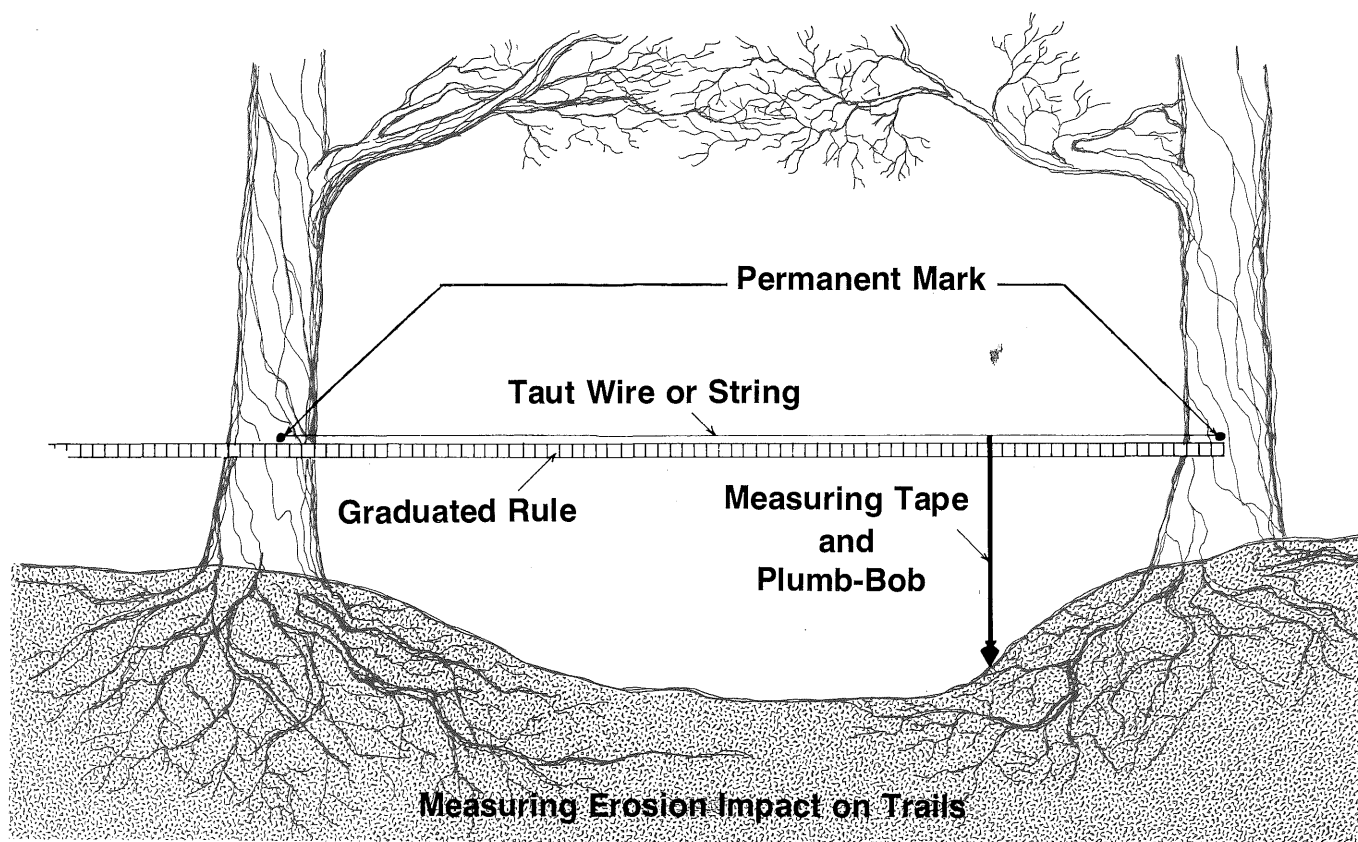
A Year-Round Job

A site that is abused is not a valuable learning area. The problem can become acute if a given school or class undertakes a project that is too large or cumbersome to complete and/or maintain. Maintenance is a year-round job. Provision must be made for care

during the summer months when schools are generally not in session. These periods are especially important because many sites are used by visitors who are unfamiliar with either the site or the activities being conducted in the outdoor classroom.

Rotating Study Sites

With increasing traffic on the outdoor classroom site, it is essential that trails and other learning areas be established and maintained. Sampling areas for soils and other natural materials may have to be rotated. Most areas can recover from moderate usage in three to four weeks time. If use is extensive, it may be necessary to limit access and control usage for longer periods of time.



Update and Revision of Plans

Once an outdoor classroom site is established, periodic review and updating of plans is necessary. Initial response to the outdoor classroom may be limited. Perhaps only two or three classes may participate during the first year. Traffic and use will increase once people become familiar with the site and the types of activities that can be conducted on it.

A follow-up type of survey should be conducted after extensive use of outdoor areas. An impact card (at right) can be modified for your locality and needs. The planning committee for the outdoor classroom should keep the impact cards for updating management plans and establishing new study sites or rotating existing facilities.

Impact Card	
Date _____	Study Group _____
Teaching Location Used No. _____	
Impact or Damage Noted:	
Vegetation <input type="checkbox"/>	Litter <input type="checkbox"/>
	Severe
Vandalism <input type="checkbox"/>	Compaction <input type="checkbox"/>
Other <input type="checkbox"/> (Specify) _____	
Trail Condition:	
Good <input type="checkbox"/>	Wet <input type="checkbox"/>
Eroded <input type="checkbox"/>	Impassable <input type="checkbox"/>
Comments _____	

Summary

The Department of Natural Resources is keenly interested in assisting you and your school district in the development of outdoor classrooms. The environment is an everywhere laboratory for all of us to explore. This booklet is another component in an on-going program designed to provide instructional materials and assistance to complement your environmental education program. If your Department of Natural Resources can be of help, please contact us.

Appendix

(DNR Mini-Units)

	Mixed Forest	Hardwood Forest	Pine Forest	Spruce-Fir Forest	Bottomland Hardwoods	Marsh	Swamp	Open Water	Bog	Cultivated Land	Meadow	Prairie	Indoor	Any Outdoor Site - Rural or Urban	Spring	Summer	Fall	Winter	Recommended Group Size
Magnets													X		X	X	X	X	30
Duplicating Nature's Colors	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X	X	25
Adopt A Tree Or Bush	X	X	X	X	X									X	X	X	X	X	30
The World Through Children's Eyes	X	X	X								X			X	X	X	X		25
A Collection of Sounds	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	25
A Collection of Natural Colors	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	25
Collecting Rocks & Making Plunks											X		X	X	X	X	X		25
Fingerprinting Trees & Bushes	X	X	X	X	X									X	X	X	X		30
Classroom Pets													X		X	X	X	X	30
Needs & Requirements For																			
Keeping People Alive	X	X	X	X	X						X		X	X	X	X	X		25
An Animal To Experiment With		X									X	X	X	X	X	X	X		30
What Do We Eat													X	X	X	X	X	X	30
Needs & Requirements In																			
Many Lands													X	X	X	X	X	X	30
Other Social Environments													X		X	X	X	X	30
Discovering Regions &																			
Social Boundaries													X		X	X	X	X	30
Regions Of The Community													X	X	X	X	X	X	30
Traffic Survey													X	X	X	X	X	X	30
Real Problems of Land Use													X	X	X	X	X		30
Collecting Bugs —	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		30
Lots of Litter																			
Waste Basket Archeology													X		X	X	X	X	30
How Many Ways To Say Litter													X		X	X	X		30
Tree Litter To Sow Bug Litter	X	X	X	X	X									X	X	X	X		30
Insulation	X	X	X	X	X	X	X	X	X	X	X	X	X					X	30
Air Movement														X	X	X	X	X	30
Hot Spots — Cold Spots													X		X	X	X	X	30
Using Electricity													X		X	X	X	X	30
Fire Building	X	X	X	X	X									X	X	X	X	X	30
Fire and Values	X	X	X	X	X									X	X	X	X	X	30
Meal In Your Pocket	X	X	X	X	X	X	X				X			X	X	X	X		30
Rotting Log	X	X	X	X	X									X	X	X	X		30
Natural Communities	X	X	X	X	X	X	X	X	X	X	X	X		X	X	X	X		30
Jobs Make Communities Work	X	X	X	X	X	X	X	X	X	X	X	X		X				X	30
Wildlife Ecology														X					
Junk On The Shoreline								X	X					X	X	X	X		30
It's Only Me													X		X	X	X	X	30
Environmental Doctor													X		X	X	X	X	30
Runoff	X	X	X	X	X	X	X			X	X	X		X	X	X	X		30
Soil Texture	X	X	X	X	X	X	X			X	X	X		X				X	30
Animal Territories						X							X	X	X				30
The Value of Waste													X	X	X	X	X		30
Webs and Wonders	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X		30

Teaching Aids

This is a listing of audio-visual materials available on loan from the Bureau of Information & Education. These materials are supportive to the State Environmental Education Curriculum Units.

Films (16mm Color)	Length	Grade Range	Mini-Unit Title
Electric Connection	12 min.	5 - 8	Using Electricity
Tragedy Of Waste	5 min.	5 - 9	Value of Waste
Spaced Out	5 min.	6 - 9	Territoriality
The Walk	10 min.	3 - 5	Regions of the Community
Virgil The Wolf	5 min.	4 - 6	Jobs Make Communities Work
Lemonade Stand	10 min.	5 - 8	Value of Waste
Anybody Got The Time	5 min.	Adult	General Use — To Develop Support For Environmental Education

Filmstrips	Length	Grade Range	Mini-Unit Title
Andrew I, II, III (3 Filmstrips)		K - 3	Adopt a Tree or Bush
Litter		4 - 6	How Many Ways to Say Litter
Fire and Values		4 - 6	Fire and Values

Slide Series	Length	Grade Range	Mini-Unit Title
Wastebasket Archaeology		4 - 6	Wastebasket Archeology
Snow and Survival		5 - 9	Snow and Survival
Why Should We?		5 - 9	Value of Waste
Mine the Dumps		5 - 9	Junk Along The Shoreline
Wildlife Refuge		6 - 9	Wildlife Refuge
Natural Communities		6 - 9	Natural Communities

Tapes		No Specific Unit
Bobby and the Loon	K - 3	Related to Language Art

Bibliography

Teaching in The Outdoors, Hammerman & Hammerman, Burgess Pub. Co., Mpls., Minn. 1964.

Nature Trails, by Dayton M. Larsen and William R. Miles, Extension Bulletin 368, Agricultural Extension Service, University of Minnesota, St. Paul, Minnesota.

School Building Guide, Minnesota Department of Education, Capitol Square Building, St. Paul, Minnesota.

Forestry for Minnesota Schools, Minnesota Education Association, 41 Sherburne Avenue, St. Paul, Minnesota 55103, 1972.

School Site Planning Guide, Minnesota Environmental Sciences Foundation, Inc., 5400 Glenwood Avenue, Minneapolis, Minnesota, 1970.

Information Leaflets, Minnesota Department of Natural Resources, Centennial Office Building, St. Paul, Minnesota 55155.

Minnesota Environmental Education Areas, Minnesota Department of Natural Resources, Bureau of Information & Education, Centennial Office Building, St. Paul, Minnesota, 1972.

Invite Wildlife to your Backyard, National Wildlife Federation, Washington, D. C. 20036, price \$.25.

Managing Natural Resources, by Michael J. Naylor and Carl E. Vogt, Minnesota Department of Education, Vocational-Technical Education Division, St. Paul, Minnesota 55101.

Plants/People/and Environmental Quality, by G. O. Robinette, United States Government Printing Office, Stock No. 2405-0479, 1972.

Ten Ten-Minute Field Trips, by Helen Ross Russell, J. P. Ferguson Publishing Company, Chicago, Illinois, 1973.

Teaching For Survival, by Mark Terry, Friends of the Earth / Ballantine, New York, New York, 1971.

Site Planning for Environmental Education, by Dennis Thompson and Carl Vogt, Minnesota Environmental Sciences Foundation, Inc., 5400 Glenwood Avenue, Minneapolis, Minnesota 55422, 1974.

Conservation in Miniature, by Ralph I. Turner, The Resources Agency, State of California, Sacramento, California, 1970.

Outdoor Classroom, Environmental Education Guides, United States Bureau of Sport Fisheries and Wildlife, 1973.

Managing Woodlands for Wildlife, U.S. Department of Agriculture, Forest Service, Northeastern Area State and Private Forestry, Upper Darby, Pennsylvania, 1970.

Land Management for Animals and Birds, U. S. Department of Agriculture, Soil Conservation Service, Lincoln, Nebraska, 1971.

Outdoor Classrooms on School Sites, United States Department of Agriculture, Soil Conservation Service, PA-975, January, 1972.

*Learning is FUN
in the
Outdoor Classroom*



LEGISLATIVE REFERENCE LIBRARY
STATE OF MINNESOTA