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THE "MARINATED" CLASSROOM

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A SOURCEBOOK OF

AQUATIC ACTIVITIES

FOR THE

SECONDARY CLASSROOM

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MMAU-8-32-20202

"MARINATED" CLASSROOM

BY: STEVEN J. RAKOW

This work was supported by a grant from the Minnesota Sea Grant Program.

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> UNIVERSITY OF MINNESOTA Minneapolis, Minnesota 1982

WHAT IS "AQUATIC EDUCATION"

"Aquatic" is defined by Webster as "of or pertaining to water." In its broadest sense, then, Aquatic Education would refer to any learning activities that relate to water. However, this broad definition has the potential of being confusing. There are two types of water environments that are of interest to educators, and these two environments differ greatly in their properties and characteristics. Teachers living in coastal regions will be most concerned about the salt water environment of the oceans, estuaries and salt marshes. For this reason, the term "marine" has generally been applied to activities related to the salt water environment. This leaves educators in the midwest, concerned primarily with the study of freshwater lakes and streams, without a good term of reference to describe this specific environment. It is becoming more and more common for the term "Aquatic Education" to be applied to the study of freshwater systems. While this is not a totally accurate use of the term, it is the best term available at this time.

WHY A HANDBOOK OF AQUATIC EDUCATION

Minnesota is termed the "Land of 10,000 Lakes" so it is not surprising that Minnesota students are both interested in and experienced with water environments. However, little teaching specifically related to this uniquely Minnesotan environment is going on in the schools. A frequently heard complaint from teachers is that there are no materials available to meet their needs. This handbook is an attempt to break down that myth.

Curriculum education projects related to Marine and Aquatic Education have gone on in many parts of the country. Some of these have been school district sponsored projects and some sponsored by Title IV-C. However, the vast majority of materials designed to help teachers teach about water have come from the National Sea Grant Program. This agency, part of the Department of Commerce under the auspices of the National Oceanic and Atmospheric Administration, was created in 1966. The goals were to provide the same sort of research emphasis and support to the "water" environment as the Land Grant College Program of the 1800's had to the field of agriculture.

When the program was established, they defined the Great Lakes region as our nation's fourth coastline. This provided the means for Great Lakes states to receive financial support from the program in the areas of Fisheries and Aquaculture, Coastal and Environmental Processes, Water Safety, Recreation and, of course, Education.

HOW TO USE THIS HANDBOOK

The handbook is divided into three sections.

Part I: INTRODUCTION (First section of white pages)

This section of the handbook provides an overview of aquatic education, a description of the use of handbook, and two indices to the curriculum materials. The first index lists the curriculum materials by source with full references for requesting the materials by mail. The second index lists the curriculum materials by their Minnesota Water topic Area. Those topics, with examples are listed below.

WATER TOPICS

- A. WATER AND SOCIETY
 - (1). Water in Our Daily Lives

e.g., water in our homes, city water supplies, transportational and recreational uses of water

(2). Water in History and as a Part of Culture

e.g., importance of water in the choice of sites for cities, importance of Lake Superior in Minnesota's cultural history

(3). The Water Quality Problem

e.g., water shortage, water pollution

- B. WATER IN NATURE
 - (1). Nature's Water Cycle

e.g., characteristics of lakes and streams, the water cycle, the water table, water in erosion, distribution of freshwater

(2). Properties of Water

e.g., physical and chemical properties of water

(3). Life in Water

e.g., biological properties of water, water organisms

- C. ATTITUDES AND EXPERIENCES
 - (1). Attitudes About Water

e.g., importance of protecting water supply, perceived magnitude of the water problem, value for freshwater resources

(2). Experiences With Water

e.g., field trips and vacations to lake areas, ability to swim, films and books about water

Part II: Curriculum Materials (Yellow pages)

For the purposes of this handbook, curriculum materials are defined as instructional materials providing ideas or plans for activities related to water activities. These may be complete courses of study, or they may be short collections of activities. These materials are listed alphabetically by title. In addition, an Index is given to each item so that it can be cross-referenced with the two indices in Part I. This number is composed of three parts. The first part (either CM or R) identifies the citation as referring to either Curriculum Materials or Resources. The second part (either E or S) identifies the grade level of the materials as Elementary or Secondary (both junior high and high school age). Finally the third part (a number) gives a sequential identifier to each of the materials. This might be thought of as a page number for the curriculum materials or the resources. Hence, an item with an Index of:

CM/S/25

would be a curriculum material for secondary students and would be the 25th listing in the yellow paged curriculum materials section.

Part III: Resources (Second section of white pages)

The last part of the handbook lists resources with short annotations. These resources include teacher and student references, trade books, bibliographies, pamphlets, and audio-visual materials and sources. The materials are arranged alphabetically and given an index number in the same manner as curriculum materials. Because many of these materials cover a wide range of topics, they have not been indexed by Minnesota Water Topic Areas.

SECONDARY CURRICULUM MATERIALS INDEXED BY SOURCE

ACID PRECIPITATION AWARENESS PROGRAM Independent School District #197 1037 Bidwell St. West St. Paul, MN 55118

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Acid Precipitation Awareness Program

COAST PROJECT Willard Hall Education Building University of Dealware Newark, Delaware 19711

ERIC-SMEAC 1200 Chalmers Rd. Columbus, OH 43212

Water-Related Teaching Activities

THE GARDEN CLUB OF AMERICA 598 Madison Ave. New York, NY 10022

The World Around You-- Environmental Education Packet

CM/S/64

CM/S/60

CM/S/2

HOLT, RINEHART AND WINSTON 901 N. Elm St. Hinsdale, Illinois 60521

MiniclimatesCM/S/32PollutionCM/S/42Running WaterCM/S/46Snow and IceCM/S/52

LA SALLE-PERU TOWNSHIP HIGH SCHOOL District #120 La Salle, Illinois 61301

Water: A Pollution Unit

MICHIGAN SEA GRANT School of Natural Resources University of Michigan Ann Arbor, Michigan 48109

Investigating the Great Lakes Environment--The Sea Lamprey CM/S/21

MINNESOTA SEA GRANT EDUCATION PROJECT c/o Dr. Eugene Gennaro 370 Peik Hall University of Minnesota 159 Pillsbury Dr. SE Minneapolis, MN 55455

Minnesota Sea GrantA Water Primer		CM/S/33
Minnesota Sea GrantEarth Science Modules	•	CM/S/34
Minnesota Sea GrantExtension Modules		CM/S/35
Minnesota Sea GrantLife Science Modules		CM/S/36

MINNESOTA SEA GRANT EXTENSION SERVICE University of Minnesota-Duluth 109 Washburn Hall Duluth, MN 55812

Lacustrine Lessons

NATIONAL SCIENCE TEACHERS ASSOCIATION 1742 Connecticut Ave., NW Washington, D.C. 20009

How To...Activities in Physical Oceanography

CM/S/18

CM/S/57

CM/S/25

NATIONAL WILDLIFE FOUNDATION Education Servicing 1412 16th St., NW Washington, DC 20036 CM/S/6Changes in a Small Ecosystem CM/S/12Fish and Water Temperature CM/S/53 Stream Profiles NORTHERN NEW ENGLAND MARINE EDUCATION PROJECT 206 Shibles Hall University of Maine Orono, Maine 04469 The ABC's of Celebrating the Year of the Coast in Your School CM/S/ICM/S/3Aquaculture CM/S/17 Have You Been to the Shore Before? CM/S/26 Lighthouses CM/S/37 Navigation CM/S/47 Seaweeds CM/S/49 Shipping, Ships and Waterways What Adventures Can You Have in Wetlands, Lakes, Ponds and CM/S/62 Puddles? OHIO SEA GRANT 283 Arps Hall 1945 N. High St. Columbus, Ohio 43210 CM/S/7Coastal Processes and Erosion CM/S/11 The Estuary: A Special Place 🚽 CM/S/14 Geography of the Great Lakes CM/S/15 Getting to Know Your Local Fish CM/S/16The Great Lakes Triangle CM/S/19 How to Protect a River How to Recognize, Record and Analyze Characteristics of a CM/S/20Sandy Beach Environment CM/S/23 It's Everyone's Sea or Is It? CM/S/24Knowing the Ropes CM/S/38 011 Sp111 CM/S/39 PCB's in Fish: A Problem? CM/S/48 Shipping on the Great Lakes CM/S/50 Shipping: The World Connection CM/S/56 To Harvest a Walleye POLLUTION CONTROL EDUCATION CENTER

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Union Public Schools Union, New Jersey 07083

Priority One Environment

CM/S/43 🐳

PUBLICATIONS DEPARTMENT Alameda County Public Schools Office 685 A. Street Haywood, CA 94541 Marine Ecology Research--Junior High Curriculum CM/S/28SEA GRANT COLLEGE PROGRAM Texas A and M University College Station, Texas 77843 Investigating the Marine Environment and Its Resources CM/S/22Marine Organisms in Science Teaching CM/S/29SHAWNEE MISSION SCHOOLS Shawnee Mission, Kansas Project CLEAN CM/S/44THOMAS ALVA EDISON FOUNDATION 2000 Second Ave. Detroit, MI 48226 Environmental Experiments ... from Edison CM/S/10US FISH AND WILDLIFE SERVICE Office of Extension Education Washington, DC 20240 Freshwater Marsh CM/S/13 YOUTH COASTAL EDUCATION PROGRAM 21 S. Grive St. East Aurora, NY 14052 Aquatic Activities for Youth CM/S/4

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SECONDARY CURRICULUM MATERIALS INDEXED BY MINNESOTA WATER TOPIC AREAS

A1. WATER IN OUR DAILY LIVES

The ABC's of Celebrating the Year of the Coast in Your School CM/S/1CM/S/2Acid Precipitation Awareness Program CM/S/4Aquatic Activities for Youth CM/S/10Environmental Experiments ... from Edison Investigating the Marine Environment and Its Resources CM/S/22CM/S/25 Lacustrine Lessons CM/S/33 Minnesota Sea Grant--A Water Primer CM/S/34 Minnesota Sea Grant--Earth Science Modules CM/S/35 Minnesota Sea Grant--Extension Modules CM/S/36 Minnesota Sea Grant--Life Science Modules CM/S/46 Running Water CM/S/57 Water: A Pollution Unit -- Project Creation CM/S/59 Water Quality and Treatment CM/S/60 Water-Related Teaching Activities

A2. WATER IN HISTORY AND AS A PART OF CULTURE

The ABC's of Celebrating the Year of the Coast in Your School	CM/S/1
Acid Precipitation Awareness Program	CM/S/2
Aquaculture	CM/S/3
Aquatic Activities for Youth	CM/S/4
Geography of the Great Lakes	CM/S/14
	CM/S/16
The Great Lakes Triangle Investigating the Great Lakes EnvironmentThe Sea Lamprey	CM/S/21
investigating the Great Lakes Environment and Its Resources	CM/S/22
Investigating the Marine Environment and Its Resources	CM/S/23
It's Everyone's Sea or Is It?	CM/S/25
Lacustrine Lessons	CM/S/26
Lighthouses	CM/S/33
Minnesota Sea GrantA Water Primer	CM/S/34
Minnesota Sea GrantEarth Science Modules	CM/S/35
Minnesota Sea GrantExtension Modules	CM/S/36
Minnesota Sea GrantLife Science Modules	
Navigation	CM/S/37
Seaweeds	CM/S/47
Shipping on the Great Lakes	CM/S/48
Shipping, Ships and Waterways	CM/S/49
Shipping: The World Connection	CM/S/50
Simulation Game: Superport	CM/S/51
Water-Related Teaching Activities	CM/S/60
What Adventures Can You Have in Wetlands, Lakes, Ponds and	
Puddles?	СМ/S/62

A3. THE WATER QUALITY PROBLEM

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Acid Precipitation Awareness Program	CM/S/2
Dissolved Oxygen Measured Qualitatively	CM/S/8
Environmental Experimentsfrom Edison	CM/S/10
The Estuary: A Special Place	CM/S/11
Fish and Water Temperature	CM/S/12
How ToAcitivities in Physical Oceanography	CM/S/18
How To Protect a River	CM/S/19
How to Recognize, Record and Analyze Characteristics of a	
Sandy Beach Environment	CM/S/20
Investigating the Great Lakes EnvironmentThe Sea Lamprey	CM/S/21
Investigating the Marine Environment and Its Resources	CM/S/22
Lacustrine Lessons	CM/S/25
Marine Ecology Research ProjectJunior High Curriculum	CM/S/28
Measuring Dissolved Oxygen Quantitatively	CM/S/30
MercuryIt's Chemistry in the Ecosystem	CM/S/31
Minnesota Sea GrantA Water Primer	CM/S/33
Minnesota Sea GrantEarth Science Modules	CM/S/34
Minnesota Seà GrantExtension Modules	CM/S/35
Minnesota Sea GrantLife Science Modules	CM/S/36
Oil Spill	CM/S/38
PCB's in Fish: A Problem?	CM/S/39
Pesticides and the Marine Environment	CM/S/40
Pollution	CM/S/42
Priority One Environment	CM/S/43
Project CLEAN	CM/S/44
Quantitative and Qualitative Analysis of Phosphates in Water	CM/S/45
Testing Water for Bacterial Pollution	CM/S/55
Water: A Pollution Unit	CM/S/57
Water-Related Teaching Activities	CM/S/60
We Can Help	CM/S/61

B1. NATURE'S WATER CYCLE

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Acid Precipitation Awareness ProgramCM/S/2Beaches: A Geological StudyCM/S/5Coastal Processes and ErosionCM/S/7	
Coastal Processes and Erosion CM/S/7	
Ecology of Sand Dunes CM/S/9	
Environmental Experiments from Edison CM/S/10	0
Geography of the Great Lakes CM/S/14	4
How to Protect a River CM/S/19	9
How to Recognize, Record and Analyze Characteristics of a	
Sandy Beach Environment CM/S/20	0
Investigating the Marine Environment and Its Resources CM/S/22	2
Lacustrine Lessons CM/S/25	5
Miniclimates CM/S/32	2
Minnesota Sea GrantA Water Primer CM/S/33	3
Minnesota Sea GrantEarth Science Modules CM/S/34	4

B1. NATURE'S WATER CYCLE, cont.

Minnesota Sea GrantExtension Modules	CM/S/35
Minnesota Sea GrantLife Science Modules	CM/S/36
Snow and Ice	CM/S/52
Stream Profiles	CM/S/53
Water: A Pollution Unit	CM/S/57
Water Density and Ocean Currents	CM/S/58
Water-Related Teaching Activities	CM/S/60
We Can Help	CM/S/61
What Adventures Can You Have in Wetlands, Lakes, Ponds and	
Fuddles?	CM/S/62

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B2. PROPERTIES OF WATER

The ABC's of Celebrating the Year of the Coast in Your School	CM/S/1
Acid Precipitation Awareness Program	CM/S/2
Aquatic Activities for Youth	CM/S/4
Dissolved Oxygen Measured Qualitatively	CM/S/8
How ToActivities in Physical Oceanography	CM/S/18
Investigating the Marine Environment and Its Resources	CM/S/22
Lacustrine Lessons	CM/S/25
Marine Ecology Research Project-Junior High Curriculum	CM/S/28
Measuring Dissolved Oxygen Quantitatively	CM/S/30
Minnesota Sea GrantA Water Primer	CM/S/33
Minnesota Sea GrantEarth Science Modules	CM/S/34
Minnesota Sea GrantExtension Modules	CM/S/35
Minnesota Sea GrantLife Science Modules	CM/S/36
Physical Properties of Water	CM/S/41
Project CLEAN	CM/S/44
Quantitative and Qualitative Analysis of Phosphate in Water	CM/S/45
Snow and Ice	CM/S/52
Water: A Pollution Unit	CM/S/57
Water Density and Ocean Currents	CM/S/58
Water-RElated TEaching Activities	CM/S/60
We Can Help	CM/S/61
What is Physical Oceanography	CM/S/63
Mat 10 Injoical occurrency	• • •

B3. LIFE IN WATER

The ABC's of Celebrating the Year of the Coast in Your Schoob CM/S/1CM/S/2Acid Precipitation Awareness Program CM/S/3Aquaculture CM/S/4Aquatic Activities for Youth CM/S/6Changes in a Small Ecosystem CM/S/11 The Estuary: A Special Place CM/S/12Fish and Water Temperature CM/S/13 Freshwater Marsh CM/S/15 Getting to Know Your Local Fish

B3. LIFE IN WATER, cont.

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Have You Been to the Shore Before?	CM/S/17
Investigating the Great Lakes Environment-The Sea Lamprey	СМ/S/21
Investigating the Marine Environment and Its Resources	CM/S/22
Lacustrine Lessons	CM/S/25
Marine Aquaría	CM/S/27
Marine Ecology Research Project-Junior High Curriculum	CM/S/28
Marine Organisms in Science Teaching	См/S/29
Minnesota Sea GrantA Water Primer	CM/S/33
Minnesota Sea GrantEarth Science Modules	CM/S/34
Minnesota Sea GrantExtension Modules	CM/S/35
Minnesota Sea GrantLife Science Modules	CM/S/36
PCB's in Fish: A Problem?	CM/S/39
Seaweeds	CM/S/47
The Subsets of a Pond	CM/S/54
To Harvest a Walleye.	CM/S/56
Water: A Pollution Unit	CM/S/57
Water-Related Teaching Activities	CM/S/60
What Adventures Can You Have in Wetlands, Lakes, Ponds and	
Puddles?	CM/S/62
The World Around YouEnvironmental Education Packet	CM/S/64
The world module for Day Loomsside	

C1. ATTITUDES ABOUT WATER

The ABC's of Celebrating the Year of the Coast in Your School	CM/S/1
Acid Precipitation Awareness Program	CM/S/2
Aquatic Activities for Youth	CM/S/4
Have You Been to the Shore Before?	CM/S/17
Investigating the Great Lakes EnvironmentThe Sea Lamprey	CM/S/21
Investigating the Marine Environment and Its REsources	CM/S/22
Lacustrine Lessons	CM/S/25
Minnesota Sea GrantA Water Primer	CM/S/33
Minnesota Sea GrantEarth Science Modules	CM/S/34
	CM/S/35
Minnesota Sea GrantExtension Modules	CM/S/36
Minnesota Sea GrantLife Science Modules	
Pollution	CM/S/42
Priority One Environment	CM/S/43
Water: A Pollution Unit	CM/S/57
Water-Related Teaching Activities	CM/S/60
	CM/S/61
We Can Help	•••
What Adventures Can You Have in Wetlands, Lakes, Ponds and	CM/S/62
Puddles?	Urij 5702

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C2. EXPERIENCES WITH WATER

The ABC's of Celebrating the Year of the Coast in Your School	CM/S/1
Acid Precipitation Awareness Program	CM/S/2 CM/S/4
Aquatic Activities for Youth Beaches: A Geological Study	CM/S/5

C2. EXPERIENCES WITH WATER, cont.

Freshwater Marsh	CM/S/13
Have You Been to the Shore Before?	CM/S/17
Investigating the Marine Environment and Its Resources	CM/S/22
Lacustrine Lessons	CM/S/25
Minnesota Sea GrantA water Primer	CM/S/33
Minnesota Sea GrantEarth Science Modules	CM/S/34
Minnesota Sea GrantExtension Modules	CM/S/35
Minnesota Sea GrantLife Science Modules	CM/S/36
Snow and Ice	CM/S/52
Stream Profiles	CM/S/53
Water-Related Teaching Activities	CM/S/60
We Can Help	CM/S/61
What Adventures Can You Have in Wetlands, Lakes, Ponds and	
Puddles?	CM/S/62

CURRICULUM MATERIALS

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NAME: The ABC's of Celebrating Year of the Coast in Your School

SOURCE: NNMEP (Northern New England Marine Education Project) PRICE: \$2.00 + \$1.50 Handling

GRADE LEVEL: K-12

SUBJECT AREA(S): Various

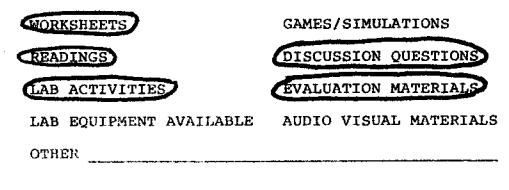
A2 A3 B1 B2 B3 C1 C2 MINNESOTA WATER TOPICS (A1) TOPICS:

STUDENT PREREQUISITES:

NO TEACHER BACKGROUND INFORMATION PROVIDED: YES

TIME REQUIRED:

MATERIALS PROVIDED WITH THE UNIT



EXTENSIONS OR RELATED ACTIVITIES

YES NO

NO

RESOURCES/REFERENCES CITED

COMMENTS: The unit is a collection of ideas for learning about the marine environment. An excellent resource.

NAME: Acid Precipitation Awareness Program

SOURCE: Acid Precipitation Awareness Program

PRICE:

GRADE LEVEL: Secondary

SUBJECT AREA(S): (on back)-6 Areas

62) MINNESOTA WATER TOPICS (AD) (A2)

TOPICS: (on back) topics listed under each area

STUDENT PREREQUISITES: Knowledge of Acid Rain and Environmental Problems. TEACHER BACKGROUND INFORMATION PROVIDED: (YES NO Before each unit background information is provided.

TIME REQUIRED:

MATERIALS PROVIDED WITH THE UNIT GAMES/SIMULATIONS WORKSHEETS DISCUSSION QUESTIONS READINGS EVALUATION MATERIALS LAB ACTIVITIES AUDIO VISUAL MATERIALS LAB EOUIPMENT AVAILABLE OTHER

EXTENSIONS OR RELATED ACTIVITIES

included.



NO

RESOURCES/REFERENCES CITED An extensive list of references and helpful resources is

COMMENTS: These units suggest ways in which teachers can help students learn science while also learning about a major environmental problem: acid precipitation. It is a flexible curriculum which could be used in an interdisciplinary manner.

NAME: Aquaculture

SOURCE: NNMEP (Northern New England Marine Education Project) PRICE: \$2.00 + \$1.50 handling GRADE LEVEL: 9-12 SUBJECT AREA(S): Biology, Social Studies, Home economics MINNESOTA WATER TOPICS A1 `A3 B1 B2 C1 C2 Ά2

TOPICS: Preparing meals from marine organisms

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS



LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER

GAMES/SIMULATIONS

NO

YES

DISCUSSION QUESTIONS

EVALUATION MATERIALS

EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED



NO

COMMENTS:

Specifically related to marine organisms. May be difficult to obtain specimens for activities.

NAME: Aquatic Activities for Youth

SOURCE: Youth Coastal Education Program, PRICE: 9 units x 35¢ each **GRADE LEVEL: 4-9** SUBJECT AREA(S): Science, Social Studies MINNESOTA WATER TOPICS (A) (A2) **63 C** A3 в1 TOPICS: Introduction; 1-Fish Aquariums; 2-Raising Earthworms; 3-Entomology and Water; 4-Rope; 5-Calculating Stream Flow; 6-Cobbler's Cove; 7-A Saltwater World in a Jar; 8-Fish in Your Diet STUDENT PREREQUISITES: None TEACHER BACKGROUND INFORMATION PROVIDED: NO **T**YES TIME REQUIRED: Variable MATERIALS PROVIDED WITH THE UNIT GAMES/SIMULATIONS WORKSHEETS DISCUSSION QUESTIONS READINGS EVALUATION MATERIALS LAB ACTIVITIES AUDIO VISUAL MATERIALS LAB EQUIPMENT AVAILABLE OTHER NO EXTENSIONS OR RELATED ACTIVITIES NO RESOURCES/REFERENCES CITED

COMMENTS: Units were originally designed for 4H and scouting groups. Material easy to obtain except for some which are specific to the marine environment.

NAME: Beaches: A Geological Study

SOURCE: COAST

PRICE: \$1.50

GRADE LEVEL: 8-12

SUBJECT AREA(S): Earth Science, General Science

TOPICS: Erosion, beach formation

MINNESOTA WATER TOPICS A1 A2 A3 (B1

B2 B3

C2

C1

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 5-10 Class periods (1 day field trip) MATERIALS PROVIDED WITH THE UNIT

EXTENSIONS OR RELATED ACTIVITIES



NO

RESOURCES/REFERENCES CITED

COMMENTS: Presents plans for building equipment to study a beach and adjacent lake region.

NAME: Changes in a Small Ecosystem

SOURCE: National Wildlife Federation, PRICE: \$1.50 GRADE LEVEL: 5-9 SUBJECT AREA(S): Science MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2 TOPICS: Field Trip, classroom observation, sampling

STUDENT PREREQUISITES: None TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 21 days (minimal observation each day) MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER	
EXTENSIONS OR RELATED ACTIVITIES	YES NO
RESOURCES/REFERENCES CITED	NO NO

COMMENTS: Materials common and easily obtained. Many open-ended activities. "Lots of inquiry." "We have many places where students can apply these activities."

NAME: Coastal Processes and Erosion

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and student guide)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3

TOPICS: Effect of shoreline erosion; methods of controling erosion

B2

B3

NO

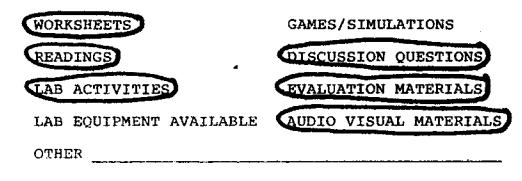
C1

C2

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 2-3 class periods MATERIALS PROVIDED WITH THE UNIT



EXTENSIONS OR RELATED ACTIVITIES YES NO RESOURCES/REFERENCES CITED YES NO

NAME: Dissolved Oxygen Measured Qualitatively

SOURCE: COAST PRICE: \$1.40 GRADE LEVEL: 7-10 SUBJECT AREA(S): Biology, Chemistry, General science C1 C2 B3 **(**B2 B1 MINNESOTA WATER TOPICS A1 A2 **(**A3) TOPICS: STUDENT PREREQUISITES: Basic lab and science skills NO TEACHER BACKGROUND INFORMATION PROVIDED: YES TIME REQUIRED: 4-5 class periods MATERIALS PROVIDED WITH THE UNIT GAMES/SIMULATIONS WORKSHEETS DISCUSSION QUESTIONS READINGS EVALUATION MATERIALS LAB ACTIVITIES LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER YES NC EXTENSIONS OR RELATED ACTIVITIES

YES NO

RESOURCES/REFERENCES CITED

NAME: Ecology of Sand Dunes

SOURCE: Coast PRICE: \$.50 GRADE LEVEL: 7-12 SUBJECT AREA(S): Science MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2 TOPICS:

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 1 class period

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS GAMES/SIMULATIONS READINGS DISCUSSION QUESTIONS LAB ACTIVITIES EVALUATION MATERIALS LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER _____

EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED

YES (NO

YES NO

NAME: Environmental Experiments ... from Edison

SOURCE: Thomas Alv. Edison Foundation

PRICE:

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS

(A1)

A2

(A3)

В2

C2

C1

в3

NO

TOPICS: Water from Plants; A Model Water Filter; Water Holding capacity of Soils

/В1

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 1 class period

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS

LAB ACTIVITIES

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER

RESOURCES/REFERENCES CITED

GAMES/SIMULATIONS

 \mathbf{YES}

DISCUSSION QUESTIONS

EVALUATION MATERIALS

EXTENSIONS OR RELATED ACTIVITIES

YES

YES

COMMENTS: Easily obtained materials

NAME: The Estuary: A Special Place

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2

A2 (A3) B1 B2

TOPICS: Ecological Sampling; Organisms in an Estuary, Effects of human forces on estuaries.

STUDENT PREREQUISITES: None.

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 2 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS

LAB ACTIVITIES

GAMES/SIMULATIONS

DISCUSSION QUESTIONS

C1

B3

NO

C2

EVALUATION MATERIALS

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER

EXTENSIONS OR RELATED ACTIVITIES



YES

RESOURCES/REFERENCES CITED

NAME: Fish and Water Temperature

SOURCE: National Wildlife Federation

PRICE: \$1.50

GRADE LEVEL: 4-9

SUBJECT AREA(S):Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Thermal pollution, behavior of fish

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 4-5 days

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER	

NO

NO

NO

VES

EXTENSIONS OR RELATED ACTIVITIES

.

RESOURCES/REFERENCES CITED	E
Teacher and student lists.	

COMMENTS: Material easily obtained.

NAME: Freshwater Marsh

SOURCE: U.S. Fish and Wildlife Service

PRICE: Trial Edition currently limitedly available - Free GRADE LEVEL: 7-9 SUBJECT AREA(S):Science MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

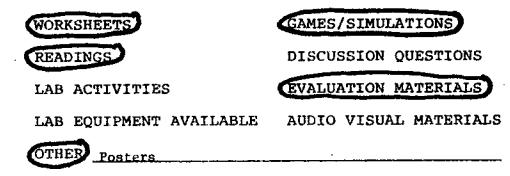
TOPICS: Marsh Succession; Marsh Settlers; A Model Marsh

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 3-5 periods

MATERIALS PROVIDED WITH THE UNIT



EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED



NO

YES



COMMENTS: "All materials are easily adaptable" "Information is clearly described."

NAME: Geography of the Great Lakes

SOURCE: OEAGLS (Ohio Sea Grant)

A1

PRICE: \$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS

A2 A3

TOPICS: Names of Great Lakes and major Great Lakes Cities; Mapping activity; Volume by water displacement

STUDENT PREREQUISITES: Mapping skills TEACHER BACKGROUND INFORMATION PROVIDED: YE

TIME REQUIRED: 3-4 class periods MATERIALS PROVIDED WITH THE UNIT

 WORKSHEETS
 GAMES/SIMULATIONS

 READINGS
 DISCUSSION QUESTIONS

 LAB ACTIVITIES
 EVALUATION MATERIALS

 LAB EQUIPMENT AVAILABLE
 AUDIO VISUAL MATERIALS

 OTHER
 OTHER

EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED

YES NO

C1

в2

в3

NO

C2

NO

Index: CM/S/15 NAME: Getting to Know Your Local Fish SOURCE: OEAGLS (Ohio Sea Grant) PRICE:\$1.00 (teacher and student guides) GRADE LEVEL: 7-9 SUBJECT AREA(S): Science MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 C2 C1 B. TOPICS: Classification STUDENT PREREQUISITES: TEACHER BACKGROUND INFORMATION PROVIDED: YES NO TIME REQUIRED: MATERIALS PROVIDED WITH THE UNIT GAMES/SIMULATIONS WORKSHEETS DISCUSSION QUESTIONS READINGS EVALUATION MATERIALS LAB ACTIVITIES LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER YES EXTENSIONS OR RELATED ACTIVITIES YES RESOURCES/REFERENCES CITED

COMMENTS:

5010;

NAME: The Great Lakes Triangle

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and Student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies, Literature

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Great Lakes Triangle, Bathymetric charts, The Wreck of the Edmund Fitzgerald

NO

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

.....

.

TIME REQUIRED: 2-3 class periods

MATERIALS PROVIDED WITH THE UNIT

GAMES/SIMULATIONS
DISCUSSION QUESTIONS
EVALUATION MATERIALS
AUDIO VISUAL MATERIALS
YES NO
YES NO

COMMENTS: Excellent background material on the wreck of the Edmund Fitzgerald in Lake Superior.

NAME: Have You Been to the Shore Before?

SOURCE: Northern New England Marine Education Project

PRICE: \$2.00 + \$1.50 handling

GRADE LEVEL: 7-9

SUBJECT AREA(S): Life Science, Biology

MINNESOTA WATER TOPICS A1 A2 A3 B1

TOPICS: Life at the Shore; Seashore life; Beach field activities

B2

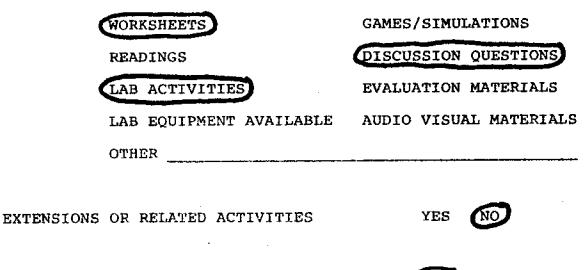
ГВ3

NO

STUDENT PREREQUISITES: Some basic biology would be helpful TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT



RESOURCES/REFERENCES CITED Film and book list

COMMENTS: Major focus is on ocean seashore.

NAME: How To... Activities in Physical Oceanography

SOURCE: National Science Teachers Association

A2

PRICE: \$1.00

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1

TOPICS: Water Hardness, Freshwater from Sea Water, Water Pressure and Depth, Waves, Beach Formation and Erosion, Density Currents, Icebergs

[A3

B1 ·

(В2

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:



C1

B3

C2

TIME REQUIRED: 1 calss period for each activity

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS

LAB ACTIVITIES

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER

RESOURCES/REFERENCES CITED

EXTENSIONS OR RELATED ACTIVITIES



GAMES/SIMULATIONS

DISCUSSION QUESTIONS

EVALUATION MATERIALS

YES	NO
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COMMENTS:

Minimal number

NAME: How to Protect a River

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS

A1 A2 A3

TOPICS: River characteristics, river pollution

STUDENT PREREQUISITES: Map reading skills TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 2-3 class periods

MATERIALS PROVIDED WITH THE UNIT

EXTENSIONS OR RELATED ACTIVITIES



YES

B2

B3

NO

C2

C1

RESOURCES/REFERENCES CITED

COMMENTS: References a river in Ohio, but could be adapted to local needs.

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NAME: How to Recognize, Record and Analyze Characteristics of a Sandy Beach Environment
SOURCE: COAST
PRICE: \$5.60
GRADE LEVEL: 10-12
SUBJECT AREA(S): Biology
MINNESOTA WATER TOPICS A1 A2 (A3 (B) B2 B3 C1 C2
TOPICS: Dune Formation
STUDENT PREREQUISITES: None
TEACHER BACKGROUND INFORMATION PROVIDED: YES NO
TIME REQUIRED: Variable
MATERIALS PROVIDED WITH THE UNIT
WORKSHEETS GAMES/SIMULATIONS
READINGS DISCUSSION QUESTIONS
LAB ACTIVITIES EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS
OTHER
EXTENSIONS OR RELATED ACTIVITIES YES NO
EXTENSIONS OR RELATED ACTIVITIES
EXTENSIONS OR RELATED ACTIVITIES YES NO

.

NAME: Investigating the Great Lakes Environment - The Sea Lamprey Story

SOURCE: Michigan Sea Grant,

PRICE: \$37.50 (186 Pages and film strip)

GRADE LEVEL: 6-8

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 (CI)

TOPICS: The Sea Lamprey (life cycle, history, control)

C2

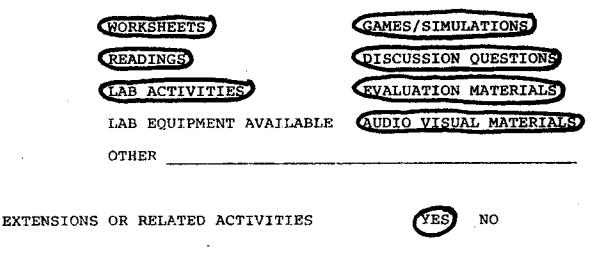
NO

NO

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Varies from 1 period for some activies to 14 periods for the whole unit. MATERIALS PROVIDED WITH THE UNIT



RESOURCES/REFERENCES CITED

COMMENTS: A comprehensive approach to a single environmental issue utilizing a variety of techniques. "Reading level seems high for 7th-8th graders." "Even though we are not right on the Great Lakes in Mpls/St. Paul, it's important to stress the interrelationships of animals, especially when a foreign organism is intorduced into a new environment." "Materials are too indepth-and too specific."

NAME: Investigating the Marine Environment and Its Resources

SOURCE: Sea Grant College Program, Texas A & M University PRICE: \$8.00 (500 pages)

NO

VES.

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science, Social Studies, language, art

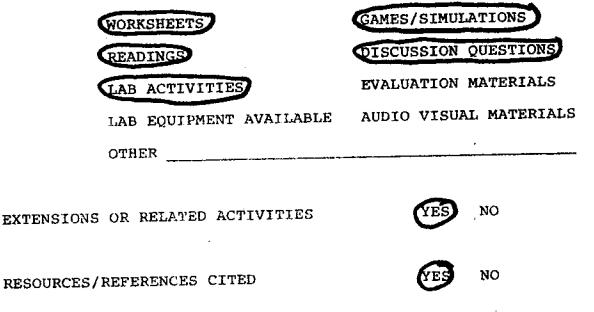
MINNESOTA WATER TOPICS (A) (A) (A) (B) (B) (B) (C) (C)

TOPICS: Extremely comprehensive and varied

STUDENT PREREQUISITES: Variable

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable (most activities designed for 1-2 periods) MATERIALS PROVIDED WITH THE UNIT



COMMENTS: The single most comprehensive collection of marine activities available.

NAME: It's Everyone's Sea or Is It?

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and student guide)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Topography of Atlantic Basin; International Trade and Regulations

STUDENT PREREQUISITES: Map reading skills TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 2-3 Class periods

MATERIALS PROVIDED WITH THE UNIT

YES

RESOURCES/REFERENCES CITED

NAME: Knowing the Ropes

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and student guides) GRADE LEVEL: 7-9 SUBJECT AREA(S): Science, Social Studies, Language MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2 TOPICS: Rope construction, Sailor's knots

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 2 class periods

MATERIALS PROVIDED WITH THE UNIT

EXTENSIONS OR RELATED ACTIVITIES YES NO

RESOURCES/REFERENCES CITED

YES NO

COMMENTS: Activities relating the construction, history and folk-lore of ropes on sailing vessels.

NAME: Lacustrine Lessons

SOURCE: Minnesota Sea Grant Extension Service

PRICE: Free

GRADE LEVEL: K-12

MINNESOTA WATER TOPICS

SUBJECT AREA(S): Science, Social Studies

TYES

NO

TOPICS: Variety including Freshwater Aquaria, Turn-over, Gyotaicu, Building a Coastal City, Acid Rain

STUDENT PREREQUISITES: Varies

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Generally 1-2 class periods per activity

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS CITED CAMES/SIMULATIONS READINGS DISCUSSION QUESTIONS EVALUATION MATERIALS EVALUATION MATERIALS OURCES/REFERENCES CITED CAMES/SIMULATIONS DISCUSSION QUESTIONS EVALUATION MATERIALS AUDIO VISUAL MATERIALS NO

COMMENTS: A periodic newsletter published by Minnesota Sea Grant listing aquatic activities.

14

NAME: Lighthouses

SOURCE: _{NNMEP} (Northern New England Marine Education Project) PRICE: \$2.00 + \$1.50 Handling

GRADE LEVEL: 8

SUBJECT AREA(S): Literature, Social Studies, Math

(A2)

A1

TOPICS: Reminiscences of a lighthouse keeper, navigation activities.

A3

B1

B2

B3

NO

C2

C1

STUDENT PREREQUISITES:

MINNESOTA WATER TOPICS

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Various

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS GAMES/SIMULATIONS READINGS OISCUSSION QUESTIONS LAB ACTIVITIES EVALUATION MATERIALS LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER EXTENSIONS OR RELATED ACTIVITIES YES IN

RESOURCES/REFERENCES CITED

COMMENTS: Would need major revision to be suitable for MN. Could be used before a trip to Split Rock Lighthouse.

NAME: Marine Aquaria #3	
SOURCE: COAST	
PRICE: \$.50	
GRADE LEVEL: K-12	
SUBJECT AREA(S): Science	
MINNESOTA WATER TOPICS A1 A2 A	A3 B1 B2 B3 C1 C2
TOPICS:	
STUDENT PREREQUISITES: None	-
TEACHER BACKGROUND INFORMATION PROV	IDED: YES NO
TIME REQUIRED: Variable	
MATERIALS PROVIDED WITH THE UNIT	
WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER	
EXTENSIONS OR RELATED ACTIVITIES	YES NO
RESOURCES/REFERENCES CITED	TES NO

COMMENTS:

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Index: CM/S/27

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NAME: Marine Ecology Research Project - Junior High Curriculum

SOURCE: Publications Dept., Alameda County Schools Office,

PRICE: \$5.50

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Language

MINNESOTA WATER TOPICS A1 A2 (A3) B1 (B2

TOPICS: Estuaries, Intertidal zones, intertebrates, taxonomy, fish, plankton, food web, marshes, seaweeds, saltwater.

C1

NO

C2

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

Films, loan books, children's books - Extensive

TIME REQUIRED: Complete curriculum (activities of variable length) MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS GAMES/SIMULATIONS READINGS DISCUSSION QUESTIONS LAB ACTIVITIES EVALUATION MATERIALS LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER EXTENSIONS OR RELATED ACTIVITIES (FE) NO RESOURCES/REFERENCES CITED

COMMENTS: Wide variety of activities. Most marine oriented, but many of interest to or adaptable for MN students. (esp. section on plankton, food web, and some fish activities).

NAME: Marine Organisms in Science Teaching

SOURCE: Sea Grant College Program, Texas A & M University

PRICE: \$4.00 (192 pages)

GRADE LEVEL: 4-12

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2 TOPICS: Marine Organisms

STUDENT PREREQUISITES: Variable (from none to basic biology) TEACHER BACKGROUND INFORMATION PROVIDED: YES NO Only minimal background given

TIME REQUIRED: Variable depending on activity (most activities designed for 1-2 periods). MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS

LAB ACTIVITIES

LAB EQUIPMENT AVAILABLE

GAMES/SIMULATIONS

DISCUSSION QUESTIONS

EVALUATION MATERIALS

AUDIO VISUAL MATERIALS

OTHER

EXTENSIONS OR RELATED ACTIVITIES



YES	NO
UES	NŲ

RESOURCES/REFERENCES CITED

COMMENTS: Each unit uses the format: pre-lab, lab, post-lab. Some organisms (brine shrithp) easily available to MN teachers. Others (e.g. sea anemone's) could be ordered. A list of supplies is given.

COMMENTS:

STUDENT PREREQUISITES: Chemistry skill TEACHER BACKGROUND INFORMATION PROVI	\sim
TIME REQUIRED:Variable	
MATERIALS PROVIDED WITH THE UNIT	
WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER	
EXTENSIONS OR RELATED ACTIVITIES	YES NO
RESOURCES/REFERENCES CITED	YES NO

GRADE LEVEL: 10-12 SUBJECT AREA(S): Biology, Chemistry MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

NAME: Measuring Dissolved Oxygen Quantitatively

SOURCE: COAST

PRICE: \$1.20

TOPICS:

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Index: CM/S/30

NAME: Mercury - It's Chemistry in the Ecosystem

SOURCE: COAST

PRICE: \$1.35

GRADE LEVEL: 10-12

SUBJECT AREA(S): Chemistry, Biology

MINNÉSOTA WATER TOPICS A1 A2 TOPICS:

STUDENT PREREQUISITES: Chemistry skills TEACHER BACKGROUND INFORMATION PROVIDED: NO

TIME REQUIRED: 1-4 periods

RESOURCES/REFERENCES CITED

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

DISCUSSION QUESTIONS READINGS EVALUATION MATERIALS LAB ACTIVITIES LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER NO EXTENSIONS OR RELATED ACTIVITIES YES

C2

C1

B3

B1

B2

GAMES/SIMULATIONS

NAME: Miniclimates

SOURCE: Holt, Rinehart, Winston

PRICE:

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 A3 BD B2 B3 C1 C2

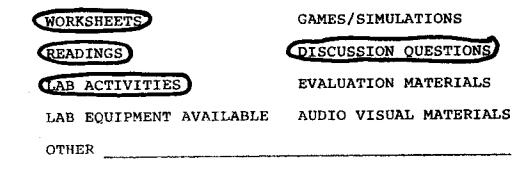
TOPICS: Temperature; Light; Moisture; Wind; Soil

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT



EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED

YES NO

NO

NAME: Minnesota Sea Grant - A Water Primes

SOURCE: Minnesota Sea Grant Education Project

PRICE: Free

GRADE LEVEL: 5-8

SUBJECT AREA(S): Science/Social Studies

MINNESOTA WATER TOPICS (A) (A) (A) (B) (B) (B) (C) (C)

TOPICS: Water Properties; Water Pollution; Acids and Bases; Acid Precipitation

STUDENT PREREQUISITES: None

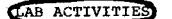
TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS



LAB EQUIPMENT AVAILABLE A OTHER

GAMES/SIMULATIONS

Y E S

DISCUSSION QUESTIONS

NO

EVALUATION MATERIALS

AUDIO VISUAL MATERIALS

EXTENSIONS OR RELATED ACTIVITIES



NO

RESOURCES/REFERENCES CITED

COMMENTS: Open-ended activities providing a background knowledge for the study of water pollution.

NAME: Minnesota Sea Grant Earth Science Modules

SOURCE: Minnesota Sea Grant Ed. Project

PRICE: Free

GRADE LEVEL: 5-8

SUBJECT AREA(S): Science/Social Studies

MINNESOTA WATER TOPICS (A) (A) (A) (B) (B) (B) (C) (C)

TOPICS: The Water Cycle; Minnesota's Glacial Past; Acids and Rocks; Stream Tables

STUDENT PREREQUISITES: Basic knowledge of acids **MES**

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS

LAB ACTIVITIES

AUDIO VISUAL MATERIALS LAB EQUIPMENT AVAILABLE

OTHER



GAMES/SIMULATIONS

DISCUSSION QUESTIONS

EVALUATION MATERIALS

NO

YES 1	10
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EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED

NAME: Minnesota Sea Grant - Extension

SOURCE: Minnesota Sea Grant Education Project

PRICE: Free

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science/Social Studies



TOPICS: The Acid Rain Game; A B.W.C.A. Case Study; The Acid Rain Controversy

62

NO

NO

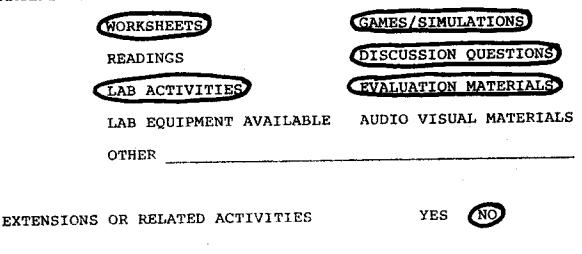
TYES

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT



RESOURCES/REFERENCES CITED

NAME: Minnesota Sea Grant - Life Science Modules

۰.

SOURCE: Minnesota Sea Grant Education Project

PRICE: Free

GRADE LEVEL: 5-8

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS



NO

TOPICS: A Model Ecosystem; Food Chains; Acids and Brine Shrimp; A Field Trip Guide

STUDENT PREREQUISITES: Basic knowledge of Acids **(**YES

LAB EQUIPMENT AVAILABLE

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT



READINGS



GAMES/SIMULATIONS

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DISCUSSION QUESTIONS

EVALUATION MATERIALS

AUDIO VISUAL MATERIALS

OTHER

RESOURCES/REFERENCES CITED

EXTENSIONS OR RELAYED ACTIVITIES



NO

NAME: Navigation

SOURCE: NNMEP (Northern New England Marine Education Project) PRICE: \$2.00 + \$1.50 handling GRADE LEVEL: 9-12 SUBJECT AREA(S):Math MINNESOTA WATER TOPICS A1 (A) A3 B1 B2 B3 C1 C2 TOPICS: Dead reckoning, determining latitude and longitude,

bearings

STUDENT PREREQUISITES: Range of background knowledge from algebra to trigonometry depending on problems chosen. TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETSGAMES/SIMULATIONSREADINGSDISCUSSION QUESTIONSLAB ACTIVITIESEVALUATION MATERIALSLAB EQUIPMENT AVAILABLEAUDIO VISUAL MATERIALSOTHERMath Problems

EXTENSIONS OR RELATED ACTIVITIES



NO

RESOURCES.	/REFERENCES	CITED
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COMMENTS: Of primary value only to those living on the ocean or a very large lake. Some extension activities can be adapted to land use.

NAME: 0il Spill

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (student and teacher guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

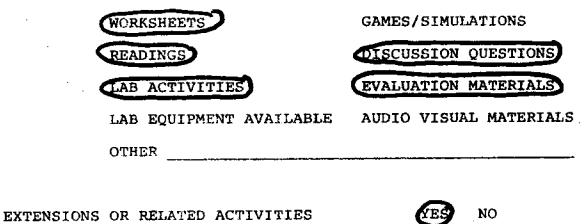
MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Sources of oil spills, cleaning-up spills, effects of oil on organisms

STUDENT PREREQUISITES: Decimal multiplication skills TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 3 class periods

MATERIALS PROVIDED WITH THE UNIT



NO

1

RESOURCES/REFERENCES CITED

COMMENTS: Contains several highly motivating activities dealing with various methods of cleaning up oil spills.

Index: CM/S/39 NAME: PCB's in Fish: A Problem? SOURCE: OEAGLS (Ohio Sea Grant) PRICE:\$1.00 (teacher and student guides) GRADE LEVEL: 7-9 SUBJECT AREA(S): Science B1 B2 C1 C2 MINNESOTA WATER TOPICS A1 A2 (A3) TOPICS: PCB pollution STUDENT PREREQUISITES: graphing skills NO TEACHER BACKGROUND INFORMATION PROVIDED: TIME REQUIRED: 1-2 class periods MATERIALS PROVIDED WITH THE UNIT GAMES/SIMULATIONS WORKSHEETS DISCUSSION QUESTIONS READINGS EVALUATION MATERIALS LAB ACTIVITIES LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER YES EXTENSIONS OR RELATED ACTIVITIES

NO

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COMMENTS:

RESOURCES/REFERENCES CITED

NAME: Pesticides and the Marine Environment

SOURCE: COAST

PRICE: \$1.05

GRADE LEVEL: 7-12

SUBJECT AREA(S): Biology

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Effects of pesticides on photosynthesis

STUDENT PREREQUISITES: Some knowledge of pesticide toxicity TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 1-2 periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER	

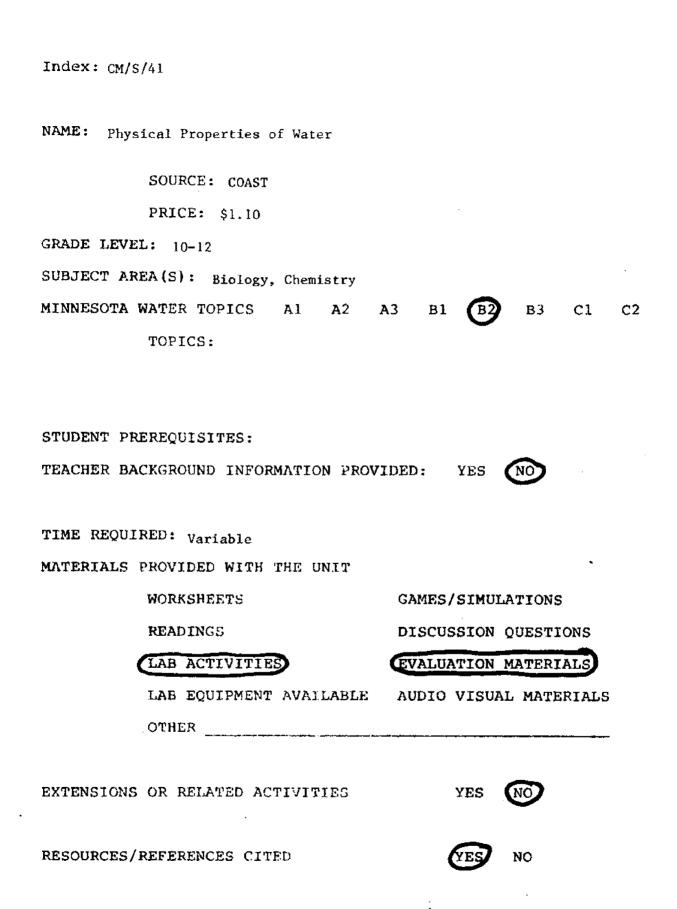
EXTENSIONS OR RELATED ACTIVITIES

YES NO

YES NO

RESOURCES/REFERENCES CITED

COMMENTS: Activity is a "dry lab' designed by students. Masters for data are provided for duplication.



4.11

COMMENTS: Presents a general outline for the study of water properties. Includes transparency masters for duplication.

		···				
	Holt, Rinehart,	Winston				
PRICE:						
GRADE LEVEL: 7-9						
SUBJECT AREA(S): Set		\sim		P 0	ЪĴ	6
MINNESOTA WATER TOP	PICS AL A2	(A3)	B1 .	BZ	CQ	
TOPICS:						
STUDENT PREREQUISI	res: _{None}		_	_		
		PROVIDED	: YE	5	NO	
STUDENT PREREQUISIT TEACHER BACKGROUND	INFORMATION 1	ROVIDE	o: YE		NO	
TEACHER BACKGROUND	INFORMATION D able WITH THE UNIT	r	o: YE			IS
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED	INFORMATION 1 able WITH THE UNIT	r Gł		MULA	TION	_
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED WORKSHE	INFORMATION D able WITH THE UNIT ETS	r Gž	AMES/SI	IMULA	TION	TIONS
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED WORKSHE READING LAB ACT	INFORMATION I able WITH THE UNIT ETS SU TVITIES		AMES/SI ISCUSSI VALUATI	IMULA	TION UEST	TIONS
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED WORKSHE READING LAB ACT LAB EQU	INFORMATION I able WITH THE UNIT ETS IVITIES	r GZ EV BLE AU	AMES/SI ISCUSSI VALUATI UDIO VJ	IMULA ION C ION M	UEST MATEF	TIONS
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED WORKSHE READING LAB ACT LAB EQU	INFORMATION I able WITH THE UNIT ETS SU TVITIES	r GZ EV BLE AU	AMES/SI ISCUSSI VALUATI UDIO VJ	IMULA ION C ION M	UEST MATEF	TIONS
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED WORKSHE READING LAB ACT LAB EQU OTHER	INFORMATION I able WITH THE UNIT ETS SU IVITIES	r Gž Ev BLE A	AMES/SI ISCUSSI VALUATI UDIO VJ	IMULA ION C ION M	UEST MATEF	TIONS
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED WORKSHE READING LAB ACT LAB EQU	INFORMATION I able WITH THE UNIT ETS SU IVITIES	r Gž Ev BLE A	AMES/SI ISCUSSI VALUATI UDIO VJ	IMULA ION C ION M	UEST MATER	TIONS
TEACHER BACKGROUND TIME REQUIRED: Vari MATERIALS PROVIDED WORKSHE READING LAB ACT LAB EQU OTHER	INFORMATION I able WITH THE UNIT ETS IVITIES IPMENT AVAILA	r Gž Ev BLE A	AMES/SI ISCUSSI VALUATI UDIO VJ	IMULA ION C ION M	UEST MATER	TIONS

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NAME: Priority One Environment

SOURCE: Pollution Control Education Center, Union Public Schools, Union, NJ 07083 PRICE: \$5.50 - Teacher Guides

GRADE LEVEL: 7-12

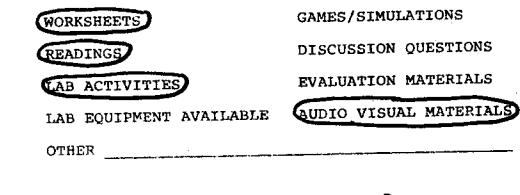
SUBJECT AREA(S): Science, Social Studies, Language MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 CD C2

> TOPICS: Air Pollution and Your Health; Open Lands and Wildlife; Water Supplies; The Energy Challenge

STUDENT PREREQUISITES: Basic science skills TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT



EXTENSIONS OR RELATED ACTIVITIES

YES NO

YES

NO

RESOURCES/REFERENCES CITED

NAME: Project CLEAN

SOURCE: Shawnee Missions Schools

PRICE:

GRADE LEVEL: 9

.

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 (A3) B1

TOPICS: Properties of Acids; Acid Pollution

в3

C1

C2

STUDENT PREREQUISITES: Completion of Chapter IV in IPS TEACHER BACKGROUND INFORMATION PROVIDED: (YES) NO

TIME REQUIRED: 10 days

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER	
EXTENSIONS OR RELATED ACTIVITIES	YES
RESOURCES/REFERENCES CITED Very limited	VES NO

COMMENTS: "Introductory unit on Acids."

Quantitative and Qualitative Analysis of Phosphate in Water NAME:

SOURCE: COAST

PRICE: \$1.00

GRADE LEVEL: 11-12

SUBJECT AREA(S): Chemistry

MINNESOTA WATER TOPICS

TOPICS: Spectiophotometric analysis of phosphate. Qualitative analysis of phosphate.

A2

A1

B1

STUDENT PREREQUISITES: Advanced chem/math skills

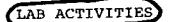
TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 6 periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS



LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER

GAMES/SIMULATIONS

IYES

DISCUSSION QUESTIONS

EVALUATION MATERIALS

C1

В3

NO

C2

EXTENSIONS OR RELATED ACTIVITIES



NO

RESOURCES/REFERENCES CITED

COMMENTS: Quantitative method requires a spectrophotometer.

NAME: Running Water SOURCE: Holt, Rinehart, Winston PRICE: GRADE LEVEL: 7-9 SUBJECT AREA(S): Science, Social Studies C1 C2 в2 B3 MINNESOTA WATER TOPICS A2 A3 B1 **(**A1) TOPICS: STUDENT PREREQUISITES: None TEACHER BACKGROUND INFORMATION PROVIDED: NO YES TIME REQUIRED: Variable MATERIALS PROVIDED WITH THE UNIT GAMES/SIMULATIONS WORKSHEETS DISCUSSION QUESTIONS READINGS LAB ACTIVITIES EVALUATION MATERIALS LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER NO EXTENSIONS OR RELATED ACTIVITIES NO RESOURCES/REFERENCES CITED

COMMENTS:

Index: CM/S/46

۰.

NAME:Seaweeds

SOURCE: NNMEP (Northern New England Marine Education Project)

B1

B2

ES

GAMES/SIMULATIONS

DISCUSSION QUESTIONS

EVALUATION MATERIALS

AUDIO VISUAL MATERIALS

NO

PRICE: \$2.00 + \$1.50

GRADE LEVEL: 9-12

SUBJECT AREA(S): Biology, Chemistry, History

MINNESOTA WATER TOPICS A1

TOPICS: Marine plants, industrial uses, ecology of marine plants

A3

(A2)

STUDENT PREREQUISITES:

TEACHER BACKGROUND INFORMATION PROVIDED: Extensive background on marine plants

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS

LAB ACTIVITIES

LAB EQUIPMENT AVAILABLE

OTHER

EXTENSIONS OR RELATED ACTIVITIES



C2

C1

(ES) 1	10
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RESOURCES/REFERENCES CITED

COMMENTS: Specimens would be difficult to obtain in Minnesota.

NAME: Shipping on the Great Lakes

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

TOPICS: Transportation on the Great Lakes, map reading.

STUDENT PREREQUISITES: Decimal manipulation; map reading TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 1-2 class periods MATERIALS PROVIDED WITH THE UNIT

 WORKSHEETS
 GAMES/SIMULATIONS

 READINGS
 DISCUSSION QUESTIONS

 LAB ACTIVITIES
 EVALUATION MATERIALS

 LAB EQUIPMENT AVAILABLE
 AUDIO VISUAL MATERIALS

 OTHER
 OTHER

RESOURCES/REFERENCES CITED

1

NO

NAME: Shipping, Ships and Waterways

SOURCE: NNMEP (Northern New England Marine Education Project) PRICE: \$2.00 + \$1.50 handling GRADE LEVEL: 7 SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2 TOPICS: Types of ships

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

EXTENSIONS OR RELATED ACTIVITIES



YES N	0
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RESOURCES/REFERENCES CITED

COMMENTS: Primary focus on ocean shipping. It does have an extensive appendix on the wreck of the Edmund Fitzgerald in Lake Superior.

NAME: Shipping: The World Connection

SOURCE: Ohio Sea Grant (OEAGLS)

PRICE: \$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 (A2) A3 B1 B2 B3 C1 C2

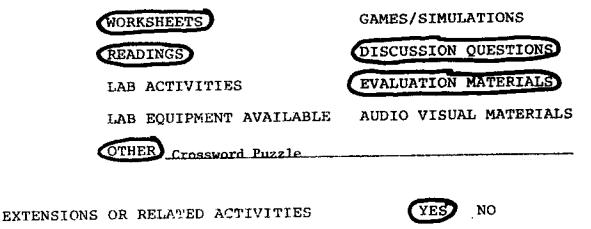
TOPICS: Locks along the Great Lakes, international shipping on the Great Lakes.

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 2 class periods MATERIALS PROVIDED WITH THE UNIT

RESOURCES/REFERENCES CITED



YES NO

NAME: Simulation Game: Super-port

SOURCE: COAST

PRICE: \$1.65

GRADE LEVEL: 10-12

SUBJECT AREA(S): Social Studies

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Simulation of the effect of a "super-port" on the marine environment.

STUDENT PREREQUISITES: None TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 12 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS

LAB ACTIVITIES

LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER

RESOURCES/REFERENCES CITED

EXTENSIONS OR RELATED ACTIVITIES

YES NO

GAMES/SIMULATIONS

DISCUSSION QUESTIONS

EVALUATION MATERIALS

YES NO

NAME: Snow and Ice

SOURCE: Holt, Rinehart, Winston

PRICE:

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 A3

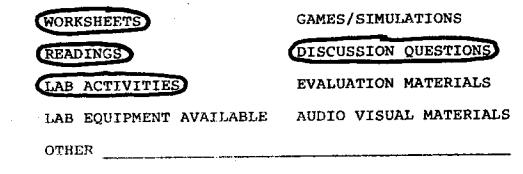
TOPICS: Structure of Snow

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT



EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED



B3

(В2

/B1

C1

[C2

NO

NAME: Stream Profiles

SOURCE: The National Wildlife Federation

PRICE: \$1.00

GRADE LEVEL: 4-9

SUBJECT AREA(S): Science, Math

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2 TOPICS: Survey of a stream

STUDENT PREREQUISITES: Basic mathematics skills TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 4-5 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS GAMES/SIMULATIONS READINGS DISCUSSION QUESTIONS LAB ACTIVITIES EVALUATION MATERIALS LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER EXTENSIONS OR RELATED ACTIVITIES YES NO

YES NO

NO

RESOURCES/REFERENCES CITED

COMMENTS: Materials easily obtained. High degree of student involvement.

NAME: Testing Water for Bacterial Pollution #205

SOURCE: COAST	
PRICE: \$1.30	
GRADE LEVEL: 8-12	
SUBJECT AREA(S): Biology	
MINNESOTA WATER TOPICS A1 A2	A3 B1 B2 B3 C1 C2
TOPICS:	_
STUDENT PREREQUISITES: Basic biology s	kills
TEACHER BACKGROUND INFORMATION PROV	IDED: YES NO
TIME REQUIRED: 3-4 periods	
MATERIALS PROVIDED WITH THE UNIT	
WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILABLE	AUDIO VISUAL MATERIALS
OTHER	
EXTENSIONS OR RELATED ACTIVITIES	YES NO
	_
RESOURCES/REFERENCES CITED	YES NO
	,

1 1

NAME: The Subsets of a Pond

SOURCE: COAST

PRICE: .95¢

GRADE LEVEL: 7-9

SUBJECT AREA(S): Math

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: Set theory applied to marine examples

STUDENT PREREQUISITES: basic 7th grade math skills TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 1 class period MATERIALS PROVIDED WITH THE UNIT

> WORKSHEETS GAMES/SIMULATIONS READINGS DISCUSSION QUESTIONS LAB ACTIVITIES EVALUATION MATERIALS LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER Math problems

EXTENSIONS OR RELATED ACTIVITIES



YES

NO

RESOURCES/REFERENCES CITED

COMMENTS: Uses marine organism relationships to develop the concept of sets.

NAME: To Harvest a Walleye

SOURCE: OEAGLS (Ohio Sea Grant)

PRICE: \$1.00 (teacher and student guides)

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science/math

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2 TOPICS: Population dynamics of walleye, Food webs

STUDENT PREREQUISITES: basic math TEACHER BACKGROUND INFORMATION PROVIDED: YES NO

TIME REQUIRED: 1-2 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETSGAMES/SIMULATIONSREADINGSDISCUSSION QUESTIONSLAB ACTIVITIESEVALUATION MATERIALSLAB EQUIPMENT AVAILABLEAUDIO VISUAL MATERIALSOTHERMasters for game boards

EXTENSIONS OR RELATED ACTIVITIES YES NO RESOURCES/REFERENCES CITED YES NO

NAME: Water - A Pollution Unit - Project Creation

SOURCE: La Salle-Peru Township High School

PRICE: \$2.25

GRADE LEVEL: Secondary

SUBJECT AREA(S): Earth and Life, Biology, Chemistry

MINNESOTA WATER TOPICS (A) A2 (A3

TOPICS: Water's Cycle and the Ecosystem, Source of Water Pollution, BOD: Organic Water Pollution, the Government and Water Pollution

(BD)

(B2)

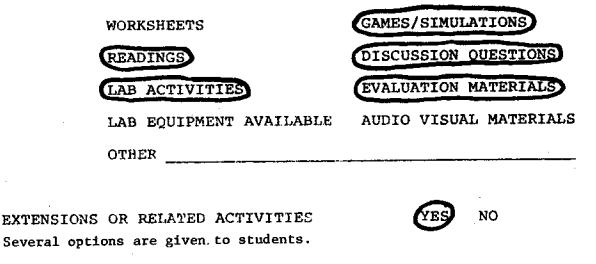
YES

C2

STUDENT PREREQUISITES: Student Background info. in provided in the unit. TEACHER BACKGROUND INFORMATION PROVIDED: YES

TIME REQUIRED: 17-23 hours

MATERIALS PROVIDED WITH THE UNIT



RESOURCES/REFERENCES CITED

COMMENTS: The Water Pollution Unit is one of 15 Creation Units, an interdisciplinary curriculum (science/social studies) in High School environmental education. It is designed to prepare students to to examine local water pollution problems and to understand why citizens must develop an environmental ethic based on sound technological choices. (The materials needed are easy to locate or are provided.)

NAME: Water Density and Ocean Currents

SOURCE: COAST

PRICE: \$.90

GRADE LEVEL: 7-10

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3

TOPICS: Density of water, currents

STUDENT PREREQUISITES: None

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TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED:

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS READINGS LAB ACTIVITIES

LAB EQUIPMENT AVAILABLE

GAMES/SIMULATIONS DISCUSSION QUESTIONS

NO

(BD

[B2,

TYES:

B3 C1

Ç2

EVALUATION MATERIALS

AUDIO VISUAL MATERIALS

EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED

YES NO

YES NO

NAME: Water Quality and Treatment

SOURCE: COAST

PRICE: \$1.15

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science, English

A2 A3 B1 B2 B3 C1 C2 MINNESOTA WATER TOPICS (A1)

TOPICS: Treatment of Drinking Water, Tap Water

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 2 class periods

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS READINGS



LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS

OTHER

DISCUSSION QUESTIONS EVALUATION MATERIALS

GAMES/SIMULATIONS

NO

YE

EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED

YES

NO

NAME: Water-Related Teaching Activities

SOURCE: ERIS-SMEAC

PRICE:

GRADE LEVEL: K-12

SUBJECT AREA(S): Science, Math Social Studies, Art, Language Art, Music MINNESOTA WATER TOPICS (A) (A) (B) (B) (B) (B) (C) (C)

TOPICS: Collection of activities appearing in ERIC documents

STUDENT PREREQUISITES: Variable, but generally none TEACHER BACKGROUND INFORMATION PROVIDED: YES NO Minimal

TIME REQUIRED: generally 1 period per activity MATERIALS PROVIDED WITH THE UNIT

NAME: We Can Help

SOURCE: U.S. Fish and Wildlife Service

PRICE: \$20.00 for 24 units + \$1.00 postage

A2

[A3]

GRADE LEVEL: Level I (4-6) Level II (7-12)

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1

TOPICS: Examples are: Water Flow and Impoundment; Snow; Fish Hatcheries; Water Quality Analysis; Waterfowl Nest Structures; Wetlands and Wildlife; Fish Populations

B1

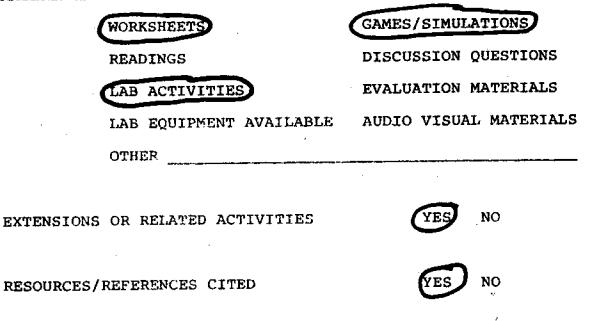
B3

NO

 \mathbf{YES}

STUDENT PREREQUISITES: Variable TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: 1 day for each unit MATERIALS PROVIDED WITH THE UNIT



COMMENTS: The focus is specifically on outdoor education. Good supplement to an environmental field trip.

NAME: What Adventures Can You Have in Wetlands, Lakes, Ponds and Puddles?

SOURCE: Northern New England Marine Education Project

PRICE: \$2.00 + \$1.50 Postage/handling

GRADE LEVEL: 7-9

SUBJECT AREA(S): Life science; social studies

MINNESOTA WATER TOPICS A1 (A2) A3 (B1) B2

TOPICS: Introduction to Wetlands, streams, lakes, ponds and puddles. Fieldguide, classroom model ecosystem, aquatic art activities.

[B3

NO

NO

STUDENT PREREQUISITES: Some basic biology would be helpful.

TEACHER BACKGROUND INFORMATION PROVIDED: Excellent background information

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS	GAMES/SIMULATIONS
READINGS	DISCUSSION QUESTIONS
LAB ACTIVITIES	EVALUATION MATERIALS
LAB EQUIPMENT AVAILAB	LE AUDIO VISUAL MATERIALS
OTHER	· · · · · · · · · · · · · · · · · · ·
EXTENSIONS OR RELATED ACTIVITIES	YES NO

RESOURCES/REFERENCES CITED				
Teacher	and	student	booklist	provided.

COMMENTS: Some materials for the field trip may be difficult to obtain. Interdisciplinary approach used.

NAME: What is Physical Oceanography

SOURCE: COAST

PRICE: \$1.00

GRADE LEVEL: 7-9

SUBJECT AREA(S): Science

MINNESOTA WATER TOPICS A1 A2 A3 B1

TOPICS: Properties of Sea water, Physical properties of water, Physical features of the ocean.

STUDENT PREREQUISITES: None

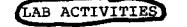
TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS

READINGS



LAB EQUIPMENT AVAILABLE

OTHER

GAMES/SIMULATIONS

YES

DISCUSSION QUESTIONS

C2

C1

B3

NO

EVALUATION MATERIALS

AUDIO VISUAL MATERIALS

EXTENSIONS OR RELATED ACTIVITIES

RESOURCES/REFERENCES CITED

YES NO

YES

NAME: The World Around You - Environmental Education Packet

SOURCE: The Garden Club of America

PRICE: Free

GRADE LEVEL: 6-9

SUBJECT AREA(S): Science, Social Studies

MINNESOTA WATER TOPICS A1 A2 A3 B1 B2 B3 C1 C2

TOPICS: General topics in environmental education

NO

YES

STUDENT PREREQUISITES: None

TEACHER BACKGROUND INFORMATION PROVIDED:

TIME REQUIRED: Variable

MATERIALS PROVIDED WITH THE UNIT

WORKSHEETS GAMES/SIMULATIONS READINGS DISCUSSION QUESTIONS LAB ACTIVITIES EVALUATION MATERIALS LAB EQUIPMENT AVAILABLE AUDIO VISUAL MATERIALS OTHER Posters

EXTENSIONS OR RELATED ACTIVITIES YES NO RESOURCES/REFERENCES CITED YES NO

RESOURCES

edited b Sea Grar Universi College Newark, Ma	AS AND THE WORLD OF WATER by Harold Goodwin at Publication ty of Delaware of Marine Studies DE 19711 1977 arine specialists contribute the chapters that recall the aportance of the world of water to Americans everywhere.
James T. Marine J Texas A College Th fr fr	SCIENCE - MARINE FISHERIES BIOLOGY Davis, and Deborah J. Lightfoot Information Service, Sea Grant Program & M University Station, Texas 77843 he information about food chains and webs could be used in study on reshwater. Otherwise most of the activities are most appropriate or marine science. However, the suggested activities could be lapted for freshwater study.
Margares Univers: Wiscons: A Su	THE SHORES OF LAKE SUPERIOR: A GUIDE TO HISTORIC SITES t Beattie Bohue, and Virginia A. Palmer ity of Wisconsin Press in Sea Gratn College Program 1979 book to enrich anyone's historic background about the Lake uperior Region and would promote an appreciation for the nique qualities of the area.
H. E. W Univers Minneap T t o s	L REPORT: LIMNOLOGICAL RESEARCH CENTER right, Jr., Director ity of Minnesota olis, MN 55455 1978-79 he Limmological Research Center, located in Pillsbury Hall with he Department of Geology and Geophysics, consists of a number of ffices and laboratories for chemical, biological, and historical tudies of lakes. The "Biennial Report" summarizes current immological research, includes a list of cited references, ublications, and theses completed during 1978-79.
Edmund Science North C St. Pau T u w	Museum of Minnesota entral Publishing Co.

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R/S/6 **BIOLUMINESCENCE IN MARINE ORGANISMS** Steven McDonough Marine Education Program Office of the Los Angeles County Superintendent of Schools 9300 E. Imperial Highway Dorney, CA 90242 This report defines bioluminescence as light produced by chemical reactions in a living system, mainly found in organisms that live in the sea. An interesting account, but probably more useful with marine biology. R/S/7 CANADA Canadian Embassy 1771 N. Street NW Room 300 Washington, DC 20035 The acid rain problem in the lakes of eastern Canada and the northeastern U.S. is explored including the economic, biological, and political ramifications. In this volume, Canada Today surveys some of the damage done, considers possible damage in the future, and suggests solutions. An excellent resource to increase a teacher's knowledge and awareness about this complex issue. R/S/8 A CITIZEN'S GUIDE TO MINNESOTA'S OUALITY MANAGEMENT PLAN Minnesota Pollution Control Agency 1935 County Road B2 Roseville, MN 55113 This Booklet explains what Minnesota's Water Quality Management Plan is, how it works, what some of its programs are and what are some of the future plans concerning water quality. R/S/9 EARLY LOGGERS IN MINNESOTA - VOL. II J. C. Ryan Minnesota Timber Producers Association 200 Christie Building Duluth, MN 55802 1976 A book filled with pictures that tell the story of logging themselves. A teacher could read excerpts from the script, which is rich with descriptions of the lumberjacks lives, to help students increase their awareness of the early lumber industry.

R/S/10

THE EDGE OF THE SNOWHEAD Ryck Lydecker Minnesota Marine Advisory Service, Office of Sea Grant National Oceanic and Atmospheric Administration U.S. Dept. of Commerce Agricultural Extension Service Continuing Ed. and Extension Univ. of MN 1976

This book explores the Minnesota coast, its setting and its history, its problems and potentials. It's purpose is to aid in the conservation and development of the nation's coastal resources through educating the public.

R/S/11

EDUCATOR'S GUIDE TO GREAT LAKES MATERIALS Pam Johnson University of Wisconsin Sea Grant College Program Sea Grant Communications Office 1800 University Ave Madison, WI 53706

A bibligraphy of contemporary materials on many aspects of the Great Lakes which will aid educators in locating appropriate books, maps, charts, pamphlets, and films for classroom use.

R/S/12

80 A DECADE FOR DECISIONS WATER The Freshwater Society Journal of Freshwater - Special Report/Fall & winter 1980 Freshwater Foundation for members of the Freshwater Society 2500 Shadywood Road, Box 90 Navarre, MN 55392

This report explores four major water issues, water and health, water quantity, water and energy, and water law. The issues are stated from differing viewpoints and the values they involve. It is intended to be used by teachers, students, and others as a reference and springboard for discussion.

R/S/13

ENVIRONMENTAL EDUCATION - GUIDELINES AND ACTIVITIES FOR TEACHERS S. Audean Allman, O. W. Kopp, and David L. Zufelt Charles E. Merrill Publishing Co., A Bell & Howell Co. Columbus, Ohio 43216 1976

Some education encounters directly related to water pollution and conservation. A good resource book to get started, but lacks detailed info. needed for student activities, but a list of concepts and related encounters is listed at the beginning of the book.

R/S/14

ENVIRONMENTAL EDUCATION REPORT - POLLUTION Center for Environmental Education, Inc. Suite 206 1925 K Street NW Washington, DC 20006 1980 This volume contains several articles on Acid Rain and has a section for A-V resource and suggested children's and Resouce Books. R/S/15 FISH OF LAKE SUPERIOR - FISH OF LAKE MICHIGAN Warren Downs Univ. of Wisconsin, Sea Grant College Program Sea Grant Communications Office 1800 University Ave. Madison, WI 53706 Good resources for information about the information about the fish found in the Lake Superior and Lake Michigan. R/S/16 RISH KILLS CAUSED BY POLLUTION IN 1975 - 16TH REPORT U.S. Environmental Protection Agency Office of Water Planning and Standards Monitoring and Data Support Division Washington, DC 20460 This annual fish kill report includes a total summary of fish reported killed in 1975 and then statistics for each state is given. The information concerning the pollution - caused Fish Kill would certainly raise the awareness of students and teachers about this problem. In an effort to encourage individuals to report kills to state officials the Appendices list the State Agencies to be notified, give a sample form to show the report information desired of the types of operations identified as pollutant sources. R/S/17 FRIENDS OF THE BOUNDARY WATERS WILDERNESS 1783 Lindig Street St. Paul, MN 55113 Oct. 1978 This publication summarizes the history of the Battle for protective

legislation for the Boundary Waters. It includes a map of the area and a list of the provisions of the Boundary Waters Canoe Area

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Wilderness Act.
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R/S/18

A GEOLOGIC FIELD TRIP ACROSS MINNESOTA Donald A. Johnson, and David L. Williams Minnesota Field Trip P.O. Box 1582

St. Cloud, MN 56301

Two MN earth science teachers developed this guide for students to take a geologic field trip across their own state via cartoons, photographs, slides, and written explanations. It would enhance an earth science classroom motivating interest in students and making geology more relative to them.

R/S/19 THE GEOLOGY OF COOK COUNTY Frank F. Grout, Robert P. Sharp and George M. Schwartz The Lund Press, Inc. Minneapolis, MN This book covers the complex geology of Cook County, the extreme Northeastern top of Minnesota. It would be a useful reference for a teacher to find any needed information about the geology of this area. R/S/20 GOPHER HISTORIAN Minnesota Historical Society Cedar and Central St. Paul, MN 55101 A periodical publication of the Minnesota Historical Society contining articles of interest about Minnesota history. THE GREAT LAKES Hawkhill Associates 125 E. Gilman St. Madison, WI 53703 A series of three sound-filmstrips (Beginnings, Voices and Environmental Problems). Narration, graphics and photography highlight the environmental problems in the region. R/S/22 THE GREAT LAKES GUIDEBOOK--LAKE SUPERIOR AND WESTERN LAKE MICHIGAN George Cantor The University of Michigan Press Ann Arbor, MI A book for teachers to use to become familiar with the Great Lakes region. R/S/23 THE GREAT LAKES REGION IN CHILDREN'S BOOKS Edited by Donna Taylor Green Oak Press Brighton, Michigan An annotated guide to works about the Great Lakes region including hard and soft cover books, pamphlets and magazines. Very useful when locating materials about the Great Lakes, especially because it is divided by states. There are several indices included which further aid in finding appropriate materials.

R/S/24 GUIDE TO THE MARINE EDUCATION SYSTEM Susan C. Gammsib and James A. Lanier SEA Grant Program Virginia Institute of Marine Science Oboucester Point, Virginia 23062 This book consists of an explanation of the Marine Educational Materials System (MEMS) and how to use it, an ongoing list of the publications which have been entered, an index of descriptors and listings of entries by author and grade level. Using the index of descriptors, it is possible to conduct a manual crossreferenced search of MEMS entries. R/S/25 MINNESOTA'S BOUNDARY WITH CANADA - ITS EVOLUTION SINCE 1783 William E. Tass Minnesota Historical Society Press Public Affairs Center Publications St. Paul, MN 1980 This book includes more than a comprehensive history of the boundary line demarcation between Minnesota and Canada, but it also represents the aspirations, successes, frustrations, failures, and compromises of these two countries. Readers will have a better understanding of America - Canadian relations which would help in realizing the political complexities of the Boundary Waters Canoe Area issues today. R/S/26 MINNESOTA'S ROCKS AND WATERS George M. Schartz, and George A. Thiel University of Minnesota Press Minneapolis, MN This volume is a general summary of the major geological features of the state. A useful resource, but no activities are included for students - so it would mainly be used as a reference book. R/S/27 VOLUME I: MINNESOTA WALK BOOK - A GUIDE TO BACKPACKING AND HIKING IN THE ARROWHEAD AND ISLE ROYALE James W. Buckanan Nodin Press 519 North Third Street Minneapolis, MN 55401 Lists the necessities for backpacking and hiking in the Arrowhead and Isle Royale regions and describes the trails that can be used. Helpful in promoting positive attitudes about enjoyment of water nature and its recreational pleasure.

R/S/28 MINNESOTA WATER QUALITY - REPORT TO CONGRESS SECTION 305(b) Minnesota Pollution Control Agency 1935 West County Road B-2 Roseville, Minnesota 55113 1980 This report concerns the quality of Minnesota's waters including 12,000 lakes of ten acres or more, many miles of streams and three major river systems: the Mississippi, the Minnesota, and the Red River of the North. It lists the 1972 Federal Water Pollution Control Act requirements, describes some of the various water quality programs in the state, some of the various water problems, and an overall program evaluation and a discussion of possible modifications to existing water pollution control programs. It would be a useful classroom resource when studying water quality in Minnesota. R/S/29 OUR GREAT LAKES University of Wisconsin Sea Grant College Program Sea Grant Communications Office 1800 University Ave. Madison, WI 53206 A useful pamphlet of information on the Great Lakes - great for expanding the teacher's background knowledge about the region. R/S/30 OUTCROP MAP OF SOUTHERN PART OF DULUTH COMPLEX AND ASSOCIATED KEWEENAWAN ROCKS, ST. LOUIS AND LAKE COUNTIES, MINNESOTA Bill Bonnicksen Miscellaneous Map Series Map M-11 The University of Minnesota Minneapolis, MN 1971 This series of Minnesota maps includes hydrogeologic, bedrock and various topographic maps of Minnesota, with a special map of the Duluth - Lake Superior area. R/S/31 PADDLE-TO-THE SEA Holling Clancy Holling Houghton Mifflin Company Boston, MA 1941 & 1969 Story of a young Indian boy's canoe as it floats through the Great Lakes to the Atlantic Ocean. R/S/32 PIONEER FACES AND PLACES Cook County Historical Society Arrowhead Printing, Superior, WI 1979 This book contains a collection of photographs which help explain the lives, hardships and toils of the pioneers in the Arrowhead Region of Lake Superior. Brief descriptions are given for each picture, but otherwise there is little script. Students can find out a great deal about the hopes and heartbreaks of the pioneers by just viewing the photos.

R/S/33 A PLUG FOR THE GREAT LAKES BASIN COMMISSION Robin J. Irwine Supplement to Wisconsin Natural Resources D.N.R. Bureau of Planning Box 7921 Madison, WI 53707 This supplement reports on the development of a management plan for the entire Great Lakes basin and the issues of concern, including wetlands policy, wastal hazards, water quality, water conservation and hazardous waste management. R/S/34 A PRIMER ON LIMNOLOGY John B. Lundquist Limnological Research Center University of Minnesota March 1975 The purpose of this book is to provide an introduction to limnology, the scientific study of inland waters, including lakes, ponds, and rivers. It also identifies some of the lake problems that are influenced by human activities, and outlines some procedures for studying individual lakes, which would be especially useful when planning this type of field trip activity. R/S/35 ROOTS Minnesota Historical Society 1500 Mississippi Street St. Paul, MN 55101 Each magazine provides a study guide which lists possible student activities, discussion questions from the articles in the magazine, glossar jof new terms, and a resource list. R/S/36 SAVING LAKE SUPERIOR Wendy W. Adamson Dillon Press, Inc. South Third St. Minneapolis, MN 55415 1976 Traces the geologic and industrial history of Lake Superior, the pollution of the lake, and steps being taken to save it. R/S/37 TRANS - MISSISSIPPI BIOLOGICAL SUPPLY Jerry Hawkins 550 Cardigan Road St. Paul, MN 55112

R/S/38

THE VOYAGEURS AND THEIR SONGS Theodore C. Blegen Minnesota Historical Society St. Paul, MN 1966

This pamphlet contains a vivid description of the lives of voyageurs in the Great Lakes Region. It would be an excellent resource for depicting the history and for capturing the flavor of our heritage in song. An interesting account that could be read by the teacher to the class.

R/S/39

THE VOYAGEUR'S HIGHWAY Grace Lee Nate The Minnesota Historical Society St. Paul, MN

Depicts the life of the voyageur, fur trading, logging industries as well as famous persons during this era and physical features. A chronology of famous events and people is also provided.

R/S/40

EPA 905/9-80-005

TOXIC SUBSTANCES IN THE GREAT LAKES June 1980 United States Environmental Protection Agency

Washington, DC

This pamphelt summarizes the affects of toxic substances in the Great Lakes, and lists toxic substances by use, describes each probable source, shows where it is found, and characteristics/ health effects.

EPA 600/8-80-026

RESEARCH SUMMARY

INDUSTRIAL WASTEWATER June 1980 United States Environmental Protection Agency Washington, DC

This pamphlet reports about the research on industrial wastewater, what treatments are now being used for the various toxins, and future research. It lists individual research projects and publication for further information.

EPA

CLEAN WATER AND THE DAIRY PRODUCTS INDUSTRY United States Environmental Protection Agency Washington, DC

This pamphlet was written for persons in the dairy products industry to inform them about how water pollution laws affect the dairy industry and why water pollution must be controlled.

R/S/41 WATER - EXPERIMENTS TO UNDERSTAND IT Boris Arnov Lothrop, Lee & Shepard Books William Morrow & Co., Inc. 105 Madison Ave. New York, NY 10016 Properties of water are demonstrated through simple experiments. Cookbook approach, little room for child's creativity and somewhat uninteresting because of this approach. Good teacher reference on experiments on chemical and physical properties of water. R/S/42 WATER POLLUTION Charles W. Lavaroni & Patrick A. O'Donnell Addison-Wesley Environmental Studies Series Addison-Wesley Publishing Co., Inc 1843 Hicks Road Rolling Meadows, IL 60008 1971 Possibly most useful as a teacher resource and then modified for student use - Cookbook experiments on water pollution. R/S/43 WHEN ALL THE CLEAN WATER IS GONE Kathleen Brandl and Linda Watson Minnesota Department of Natural Resources Centennial Office Building St. Paul, MN 55101

A colorful, appealing pamphlet that could be used at several grade levels as a starting point for discussing the political, economic, and esthetic problems associated with water pollution.