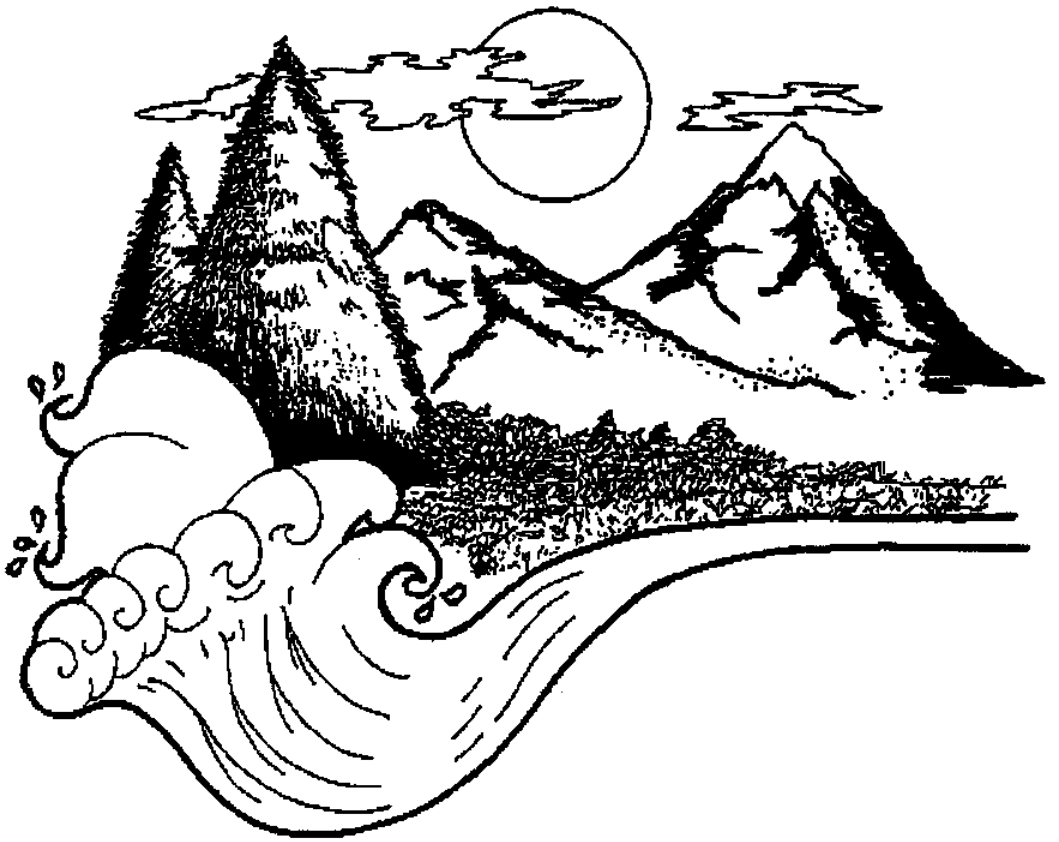
Great Lakes Solution Seeker



Environmental data and activities for teaching about the Great Lakes

The Ohio State University School of Natural Resources
with support from
The Great Lakes Protection Fund, Ohio Sea Grant College Program,
The George Gund Foundation, and Canadian Studies Program of the U.S.

Great Lakes

Solution  *Seeker*

Environmental data and activities for teaching about the Great Lakes

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The Ohio State University School of Natural Resources
with support from The Great Lakes Protection Fund, Ohio Sea Grant College Program, The George Gund Foundation, and Canadian Studies Program of the U.S.

GLSeeker is available from
Ohio Sea Grant Publications
The Ohio State University
1314 Kinnear Road
Columbus, Ohio 43212-1194
614/292-8949
http://www-ohiosg.osc.edu/OhioSeagrant/

The Ohio Sea Grant College Program is one of 29 state programs that works to increase understanding and wise use of the nation's ocean and Great Lakes resources for the public benefit in partnership with government, academia, and industry. Sea Grant fulfills its mission through promoting education excellence, responsive research and training, and broad, prompt dissemination of knowledge and technical information.

Great Lakes Solution Seeker Guide
Table of Contents

We wish to extend a special thanks to the many Great Lakes teachers and researchers who contributed to this project. Over the past several years, educational leaders all over the Great Lakes Bioregion have contributed to the work included here.

It would be impossible to name all of you but we would be remiss if we failed to acknowledge our large debt to your great efforts.

FRAMEWORK FOR EARTH SYSTEMS EDUCATION

UNDERSTANDING #1: Earth is unique, a planet of rare beauty and great value.

- The beauty and value of Earth are expressed by and for people of all cultures through literature and the arts.
- Human appreciation of Earth is enhanced by a better understanding of its subsystems.
- Humans manifest their appreciation of Earth through their responsible behavior and stewardship of its subsystems.

UNDERSTANDING #2: Human activities, collective and individual, conscious and inadvertent, affect Earth systems.

- Earth is vulnerable, and its resources are limited and susceptible to overuse or misuse.
- Continued population growth accelerates the depletion of natural resources and destruction of the environment, including other species.
- When considering the use of natural resources, humans first need to rethink their lifestyle, then reduce consumption, then reuse and recycle.
- Byproducts of industrialization pollute the air, land, and water; and the effects may be global as well as near the source.
- The better we understand Earth, the better we can manage our resources and reduce our impact on the environment worldwide.

UNDERSTANDING #3: The development of scientific thinking and technology increases our ability to understand and utilize Earth and space.

- Biologists, chemists, and physicists, as well as scientists from the Earth and space science disciplines, use a variety of methods in their study of Earth systems.
- Direct observation, simple tools, and modern technology are used to create, test, and modify models and theories that represent, explain, and predict changes in the Earth system.
- Historical, descriptive, and empirical studies are important methods of learning about Earth and space.
- Scientific study may lead to technological advances.
- Regardless of sophistication, technology cannot be expected to solve all of our problems.
- The use of technology may have benefits as well as unintended side effects.

UNDERSTANDING #4: The Earth system is composed of the interacting subsystems of water, rock, ice, air, and life.

- The subsystems are continually changing through natural processes and cycles.
- Forces, motions, and energy transformations drive the interactions within and between the subsystems.
- The Sun is the major external source of energy that drives most system and subsystem interactions at or near the Earth's surface.
- Each component of the Earth system has characteristic properties, structure, and composition, which may be changed by interactions of subsystems.
- Plate tectonics is a theory that explains how internal forces and energy cause continual changes within Earth and on its surface.
- Weathering, erosion, and deposition continuously reshape the surface of the Earth.
- The presence of life affects the characteristics of other systems.

UNDERSTANDING #5: Earth is more than 4 billion years old, and its subsystems are continually evolving.

- Earth's cycles and natural processes take place over time intervals ranging from fractions of seconds to billions of years.
- Materials making up Earth have been recycled many times.
- Fossils provide the evidence that life has evolved interactively with Earth through geologic time.
- Evolution is a theory that explains how life has changed through time.

UNDERSTANDING #6: Earth is a small subsystem of a Solar system within the vast and ancient universe.

- All material in the universe, including living organisms, appears to be composed of the same elements and to behave according to the same physical principles.
- All bodies in space, including Earth, are influenced by forces acting throughout the solar system and the universe.
- Nine planets, including Earth, revolve around the Sun in nearly circular orbits.
- Earth is a small planet, third from the Sun in the only system of planets definitely known to exist.
- The position and motions of Earth with respect to the Sun and Moon determine seasons, climates, and tidal changes.
- The rotation of Earth on its axis determines day and night.

UNDERSTANDING #7: There are many people with careers and interests that involve study of Earth's origin, processes, and evolution.

- Teachers, scientists, and technicians who study Earth are employed by businesses, industries, government agencies, public and private institutions, and as independent contractors.
- Careers in the sciences that study Earth may include sample and data collection in the field and analyses and experiments in the laboratory.
- Scientists from many cultures throughout the world cooperate and collaborate using oral, written, and electronic means of communication.
- Some scientists and technicians who study Earth use their specialized understanding to locate resources or predict changes in Earth systems.
- Many people pursue avocations related to planet Earth processes and materials.

The development of this framework started in 1988 with a conference of educators and scientists and culminated in the Program for Leadership in Earth Systems Education. It is intended for use in the development of integrated science curricula. The framework represents the efforts of some 200 teachers and scientists. Support was received from the National Science Foundation, The Ohio State University, and the University of Northern Colorado.

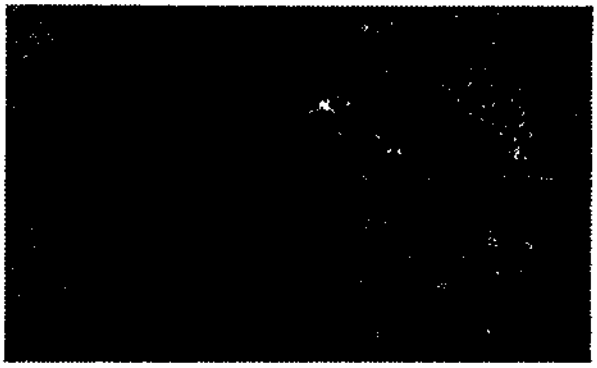
For further information on Earth Systems Education contact the Earth Systems Education Program Office, 2021 Coffey Road, The Ohio State University, Columbus, OH 43210.

Great Lakes Solution Seeker Guide

The purpose of GLSeeker is to provide the learner a rich resource of Great Lakes information and ideas for using the information to solve problems related to these waters. We feel strongly that individuals within the Great Lakes Basin must become proactive advocates of improving and protecting the Great Lakes. We believe this collection will provide support, information, and direction toward achieving that goal.

Overview

- Installation: Macintosh / WinTel
- GLSeeker Contents
- Great Lakes Solution Seeker Manual

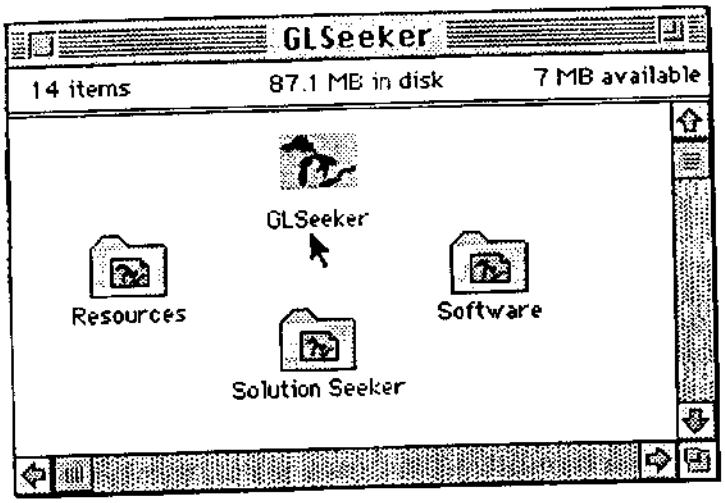


Return to: GLSeeker

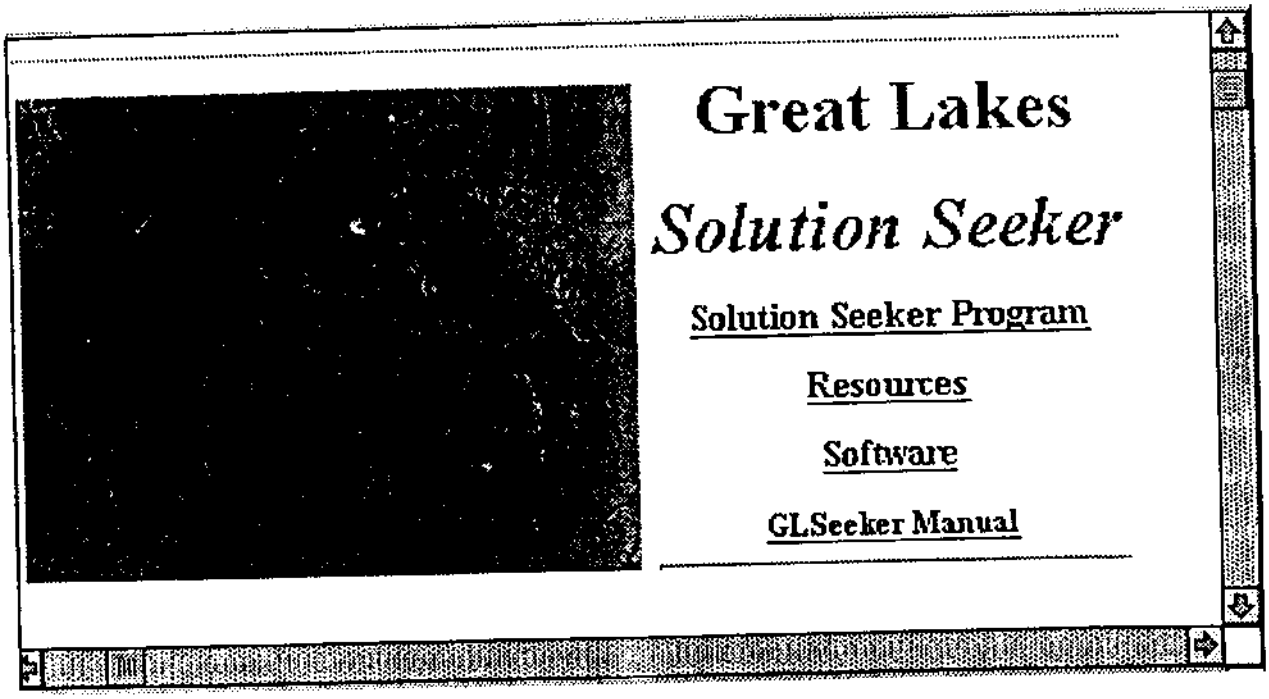
The CD is designed for use by both Macintosh and WinTel computer platforms. While not everything will be available for both systems, a great deal of overlap exists. GLSeeker contains a vast collection of information gathered from various Internet sources. GLSeeker reads the data directly from the CD or it can access the updated information found at the Internet sites if your computer is connected either directly or through a modem (slip/PPP) connection. You can access a set of Internet bookmarks by going to Data Sources and choosing Bookmarks.

Macintosh:

Place the CD in the player. Double click on the GLSeeker icon. GLSeeker will open to the window shown below. Double click on GLIndex. AOLpress (a web browser/editor) will open to the first index page of the CD. Once the index is open, simply click on underlined words/phrases that form links to other information. Use the back and forward arrows to navigate one page at a time.



AOLpress requires a minimum of 4096K RAM. If this is a problem, you may use your own web browser from your hardrive and use the **<Open File>** command to navigate to GLIndex. You will then be able to navigate by clicking on underlined links. Some of the links directly access information / data / graphics and others describe how to access information.



Windows / DOS Use:

Place the CD in the player. Install AOLpress and Acrobat Reader located in the **<Software>** folder. You can substitute your own browser for AOLpress if you prefer. Acrobat Reader is needed to view the activities located in the **<Lessons>** folder. You will need to have your browser configured to use Acrobat Reader to open pdf documents. Once you have a browser and Acrobat Reader installed you can navigate GLSeeker as follows.

- Open AOLpress or your own web browser.
- Access **<File>** menu and select **<Open>**.
  - With Netscape select **<Open File>**.
- Navigate to GLSeeker and select the file **<Start>**.

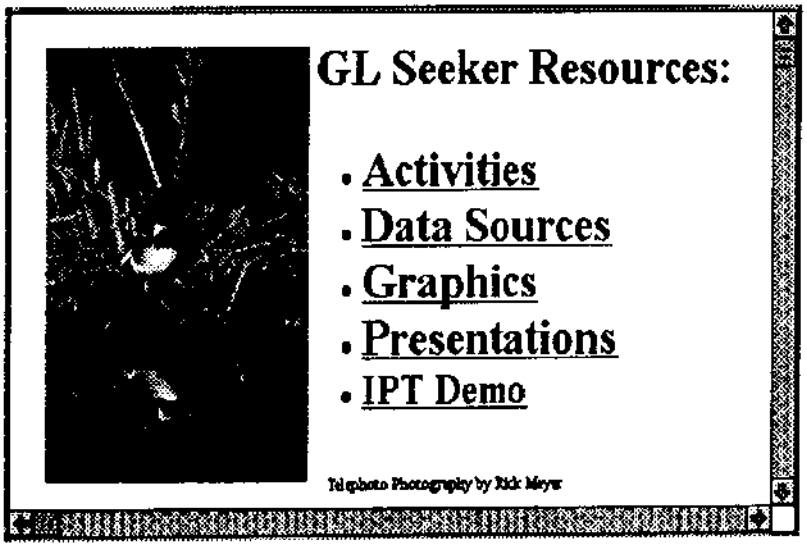
Once this index is open, simply click on underlined words/phrases that form links to other information. Use the back and forward arrows to navigate one page at a time. Some of the links directly access information / data / graphics and others describe how to access information.

The AOC Solution Seeker program is not part of this version of the CD. It is a Hypercard program and does not work on a Windows or DOS computer. To access the program use the CD in a Macintosh. ;) You can still access Great Lakes Areas of Concern resources by going to **<Data Sources>** once you have accessed the **<Start>** index.

GLSeeker Contents

Solution Seeker, a multimedia program, allows the user to investigate the Great Lakes Areas of Concern and to propose solutions to the problems encountered. This program is described elsewhere in this manual.

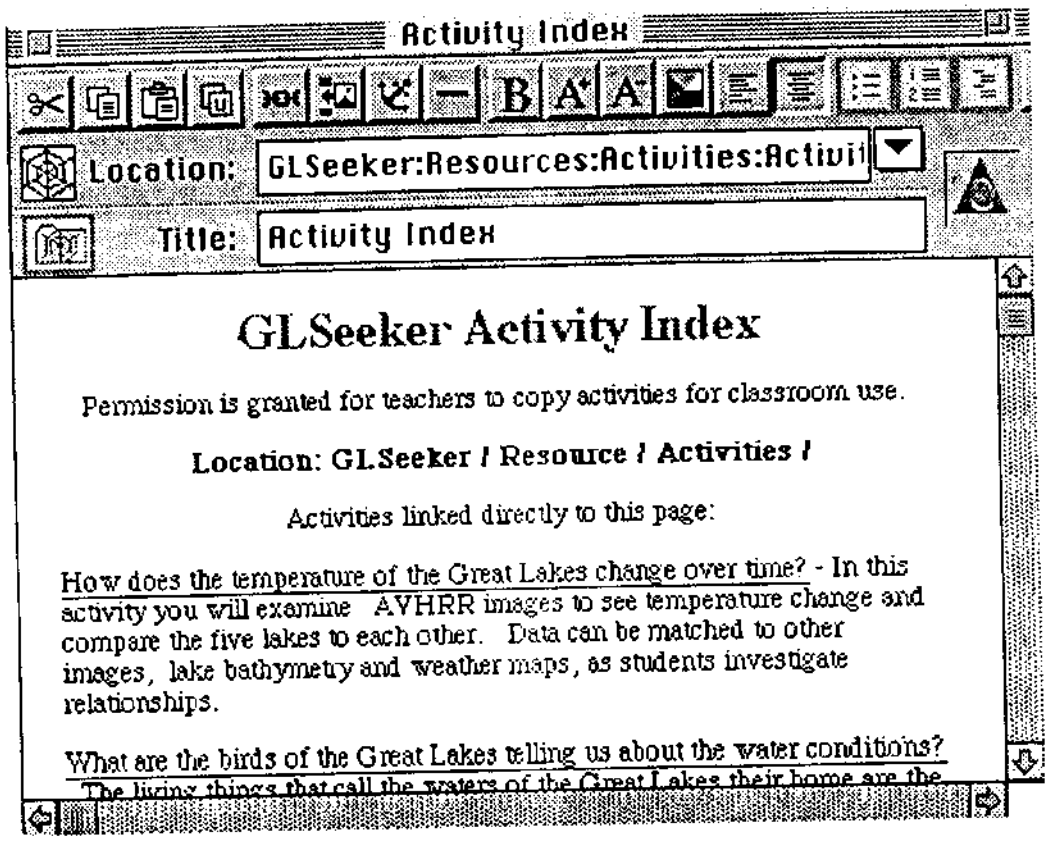
Resources:



The disk contains some 50 activities related to Great Lakes exploration and understanding. Many of these activities involve use of information technology while involving the learner in hands on explorations.

Just a few of the titles contained on the disk include:

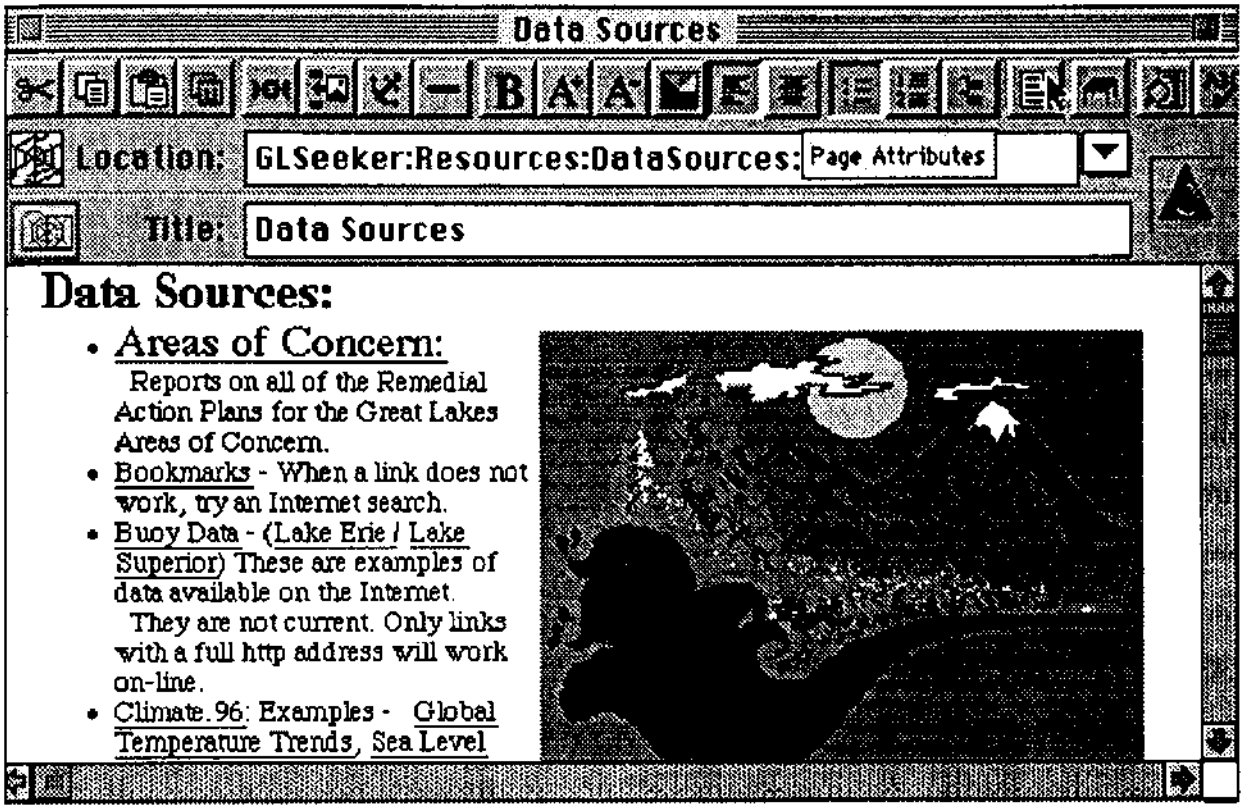
- Household hazardous products: A student centered search for alternatives
- What can you do to save a lakeside town from toxic sediment?
- How environmentally insulting can we get?



Access to a variety of data sources gathered from the World Wide Web is included. Providing examples of data on the CD is useful in itself, while also serving as a model of what is currently available on the `Net.

Datasets on GLSeeker include:

- Great Lakes Areas of Concern Remedial Action Plan Reports
  (French language versions are also included)
- Great Lakes Database of Historical and Environmental Data
- Toxic Chemical Fact Sheets



GLSeeker holds a wealth of graphic images and elements that users will find interesting to view and helpful in developing effective reports and presentations. These include access to a collection of Great Lakes images entitled Visualizing the Great Lakes.

Included on GLSeeker itself you will discover collections such as:

- Outline Maps of the Great Lakes
- Aerial photographs of the Areas of Concern
- Images from the Great Lakes Atlas

The presentation link will take you to two web demonstrations that can be used to illustrate the potential of the Internet without being on-line at the time of the demonstration. Three powerpoint presentations are included as well.

GLSeeker also contains an assortment of useful free and shareware software. The software is provided as a service. We encourage you to pay the shareware fee directly to the author if you find the software useful. Links to sources of other recommended software are included.

Great Lakes

SolutionSeeker

Greetings!

Our intent in designing SolutionSeeker was to provide users an opportunity to investigate the causes of water quality problems throughout the Great Lakes and more importantly, to help develop solutions to the problems discovered. The Great Lakes Areas of Concern include 43 specific locations around the Great Lakes having especially severe problems of toxic and/or hazardous wastes in or around the site. Each site has an action plan as well as a group of individuals dedicated to further developing and implementing the remedial actions. SolutionSeeker will connect you to those people.

Users will be able to find out about a particular site in great detail or explore patterns of problems evident in a number of sites. SolutionSeeker provides a sizable set of tools designed to help with the search for solutions. These tools include a sophisticated image analysis program, a concept mapping tool, built in internet access, and a set of writing tools. These tools may be used together with SolutionSeeker to collect, analyze, and evaluate information. More importantly, you will be able to use this set of interactive and interacting tools to create unique arrangements of information such as have never existed before. We believe this knowledge will lead to new perspectives and commitment to environmental quality.

The program is designed to interest a wide range of people. Even young children should be able to find their way around the lakes and enjoy the fascinating images contained in the program. Learners of all ages should have little difficulty using the creativity tools included. All Great Lakes investigators should be able to use and make sense from the vast amounts of information accessable both on the CD and through the internet.This manual is intended as a brief introduction to the power and potential of SolutionSeeker, but we recommend you treat the program as you would one of the Great Lakes it is intended to teach about....just jump in and get wet....enjoy!

Solution Seeker Contents

Instructional Approach

The primary purpose of SolutionSeeker is to provide the user an opportunity to develop solutions to problems encountered while exploring the sites. There is evidence to suggest that merely studying environmental problems may be an exercise in despair unless this activity is viewed as only a first step in a process leading to development and implementation of solutions to those problems. Absent this last step, the learner may be overwhelmed by the immensity of the problem and feel powerless to do anything about the situation. The goal of SolutionSeeker is to empower whomever uses it to become an open minded, but proactive advocate of specific solutions to problems encountered. The program seeks to provide an environment in which the user has the opportunity to construct her own understandings about the situation under investigation based upon her interpretation of the facts as she discovers them. The program attempts to provide a framework to facilitate this process without dictating the truths to be discovered or course of action to be followed. The structural members of this framework, after D.N. Perkins (1992) include:

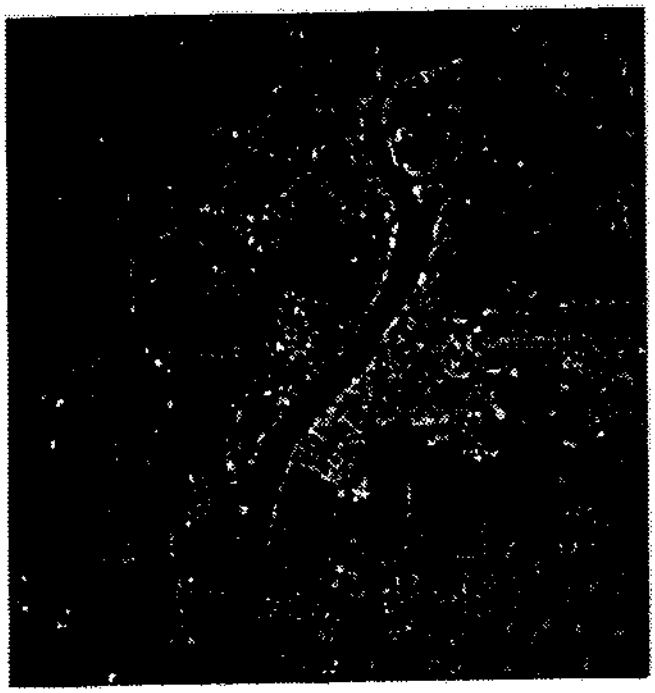
- Phenomenaria - An engaging set of phenomena to be explored.
- Information Banks -Bits of information and/or ideas capable of being assembled in unique ways.
- Construction Kits - An assortment of prefabricated parts and processes.
- Symbol Pad - A way to record thoughts and ideas about the information set.
- Management Tools - Strategies and suggestions for organizing learning.

Phenomenaria - An engaging set of phenomena to be explored.

This is a big word that means "cool place." The goal here is to grab the user's attention and get her to look more closely at the Great Lakes region and its concerns. We believe SolutionSeeker provides a richly provisioned environment worth exploring.

SolutionSeeker provides images of the entire planet and the solar system of which she is a part. It contains satellite images of North America, the United States, and the Great Lakes Bioregion. Each of these images is worthy of study on its own. Together, they help viewers to see the connections and relationships between these spatial units, to know and understand how each of these is a part of larger systems.

SolutionSeeker also provides aerial photographs of many of the areas of concern, intended to provide a stimulating entry point for "placing oneself in the scene," and beginning to explore the causes and possible solutions to the problems being experienced at each of the sites. The images are intended to make the sites real places and to provide an opportunity to "walk about" the place. The first activity in the users guide provides a framework for conducting such an exploration of the images.



St. Clair River, Lake Huron

Information Banks - Bits of information and/or ideas capable of being assembled in unique ways.

The information banks of Solution Seeker are contained in the data cards and the on-line information sources. The cards hold a general overview of each site, including a summary of the problems there, possible causes of the problem, as well as a general description of the site. Each card also contains phone numbers and addresses of various people involved with developing the remedial action plan for each site. Users may contact the individuals listed to obtain first hand, up to date information about the sites. One may think of this as a form of "remote ground truthing"! The **<toolkit>** located under the **<resource>** menu provides access to the complete and most recent site descriptions. This information is located on the CD itself or is available in its most current form through direct access to the world wide web.

Construction Kits - An assortment of prefabricated pieces capable of being assembled in new ways.

SolutionSeeker contains a number of such elements. Under the **<resources>** menu the user will find access to an expandable lexicon focusing on words related to the RAP process. The **<toolkit>** provides access to a whole set of mind construction tools including a word processor, a concept mapping tool, and an image analyzing tool. The **<find>** command allows the user to create unique collections of cards. Learners may use any or all of these tools to assemble existing information in new ways or create information that has never existed before.

Symbol Pad - A way to record thoughts and ideas about the information set.

Solution Seeker provides three separate symbol pads. Most pages in the program have a notepad available - an easy to access window which allows for quick recording of thoughts, ideas, and brainstorms. The program also has a built in method for collecting these ideas so that you can print your notes to paper or use them in a more powerful word processing tool.

You may also use the Designer Draw tool found in the toolkit to develop concept maps of the ideas and information you are collecting. This symbol pad might help you see relationships among the information that would might not otherwise discover.

Additionally, the program provides immediate access to the Simple Text word processor which allows the user to write larger chunks of information, or to organize note card entries while using the program. This access may be changed by the user to access any available word processor. By connecting this access to an integrated package, the user would have access to all the major computer applications.

Management Tools - Strategies and suggestions for organizing learning.

SolutionSeeker provides a number of management tools designed to assist the learner in organizing information. Each card contains an audio inquiry question suggesting a place to begin seeking information. These questions direct the user toward one of the key elements of the problem at the particular site.

Also, included in the manual is a set of open ended activities. These can be used to help focus an investigation, but remember, these are intended merely as starting places and not as complete projects. It would be more valuable to branch off on your own, asking your own questions, rather than relying on those provided for you.

Using Solution Seeker

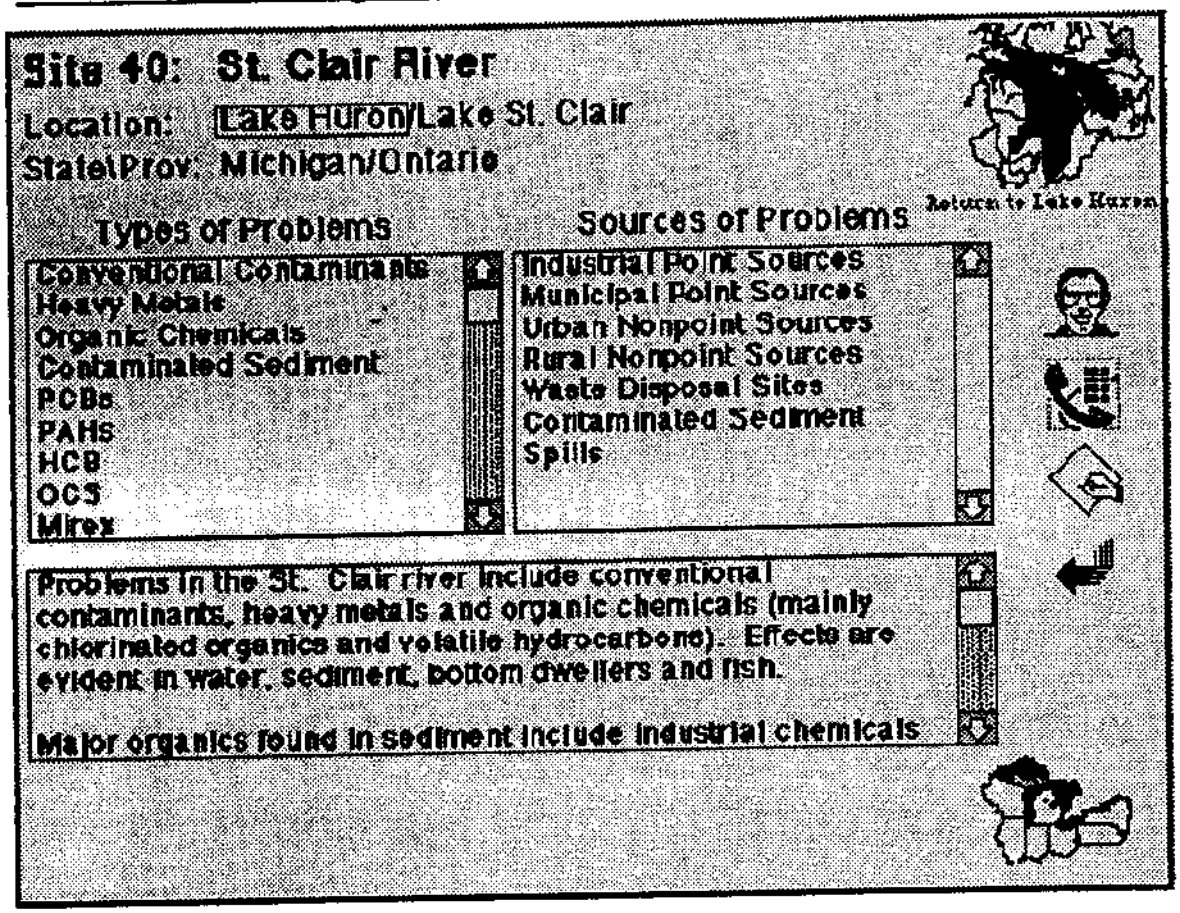
When you launch Solution Seeker, the first screen you will see is a map of the Great Lakes Bioregion. Enjoy the view, note the various lakes and features and locate the place where you live. Find a large river system, an elephant!, a cloud shadow, a small face (requires a bit of imagination), and a chunk of ocean.

When you have finished you may choose between immediately beginning your investigation of the Great Lakes by clicking on **<map>**, or click **<tour>** to enjoy a brief detour through the solar system and perhaps marvel with us at seeing the Earth's relationship to her sister planets.

From the Great Lakes Bioregion map you may visit each individual lake by clicking on it. From each lake image you may travel to any of the areas identified as being of particular concern for the health and wellbeing of the life forms of the lake. Clicking on the site number will take you to an information page about that site.

In most cases the card will open on an aerial photo of the site; others contain line maps. Explore the page. There are a set of control buttons, as well as a set of text fields offering various sets of information. You may choose **<help>** from the **<Resources>** menu to obtain a complete description of how the buttons can be used, but simply clicking on the buttons and observing what happens is probably the best way to learn about them.

Card Data Arrangement



A wide range of information is provided about each site. Data access is provided in the following ways:

Site reports:
Each site has a data card summarizing the major problems at the site, a brief overview, and access to the complete site description located on the CD-ROM or on the world wide web if internet access is available at your workstation.

Images and maps:
Aerial photographs are available for most sites. These images provide a powerful overview of the site. Maps and additional images are available for many of the sites as well.

People to contact:
The program lists the names and numbers of individuals leading the effort at each site. You are encouraged to contact these people to collect additional information and to become personally involved in developing solutions to the problems you encounter.

Search Tools:

Solution seeker has a simple search tool intended to help you find patterns of problems throughout the Great Lakes region. You may access this tool by selecting **<find>** under the **<location>** menu.

Information Tools

Most cards contain a notepad tool that allows the user to quickly record thoughts and ideas while navigating around the stack.

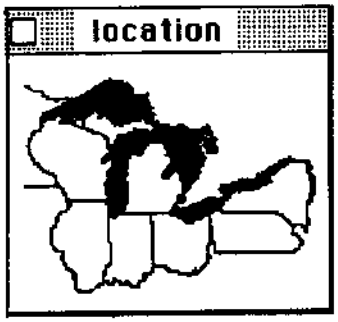
Navigation Tools

The program offers a number of ways to move about the stack. The map of the Great Lakes at the bottom of the stack will take you back to the Great Lakes Bioregion map. From there you may click on whichever lake you wish to visit. The individual lake image in the upper left hand corner of the card will take you back to the image of that lake. From there you may move to any of the Areas of Concern located on that lake. The back arrow icon will alwavs take you back to the card you just left.

Special Menus:

SolutionSeeker contains two special menus not normally found in HyperCard. These are the **<location>** menu and the **<Resources >** menu. You will find these items located on the right side of the standard hypercard menu bar at the top of the screen. This section will explain in some detail how the various items in these menus work.

Location Menu:



The location menu offers a set of tools for navigating through the stack.

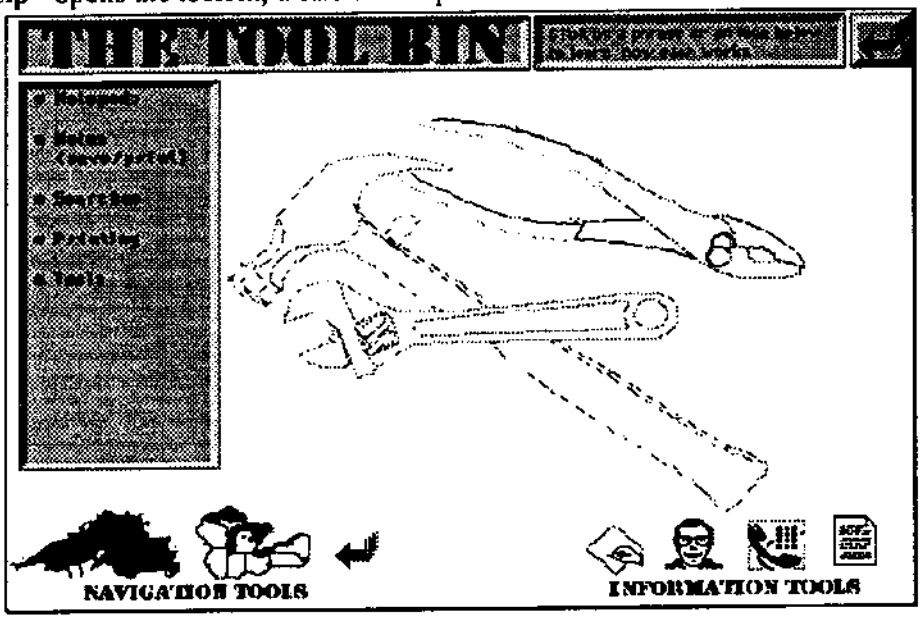
Choosing any of the **<Great Lake names>** will take you to the next Area of Concern located on that lake.

Choosing the **<Locator palette>** will open a palette on the desktop containing a miniature image of the Great Lakes bioregion. Clicking on an individual lake will take you to the next Area of Concern located on that lake. This tool is especially useful if you wish to view data cards without visiting the images first.

Resources Menu:

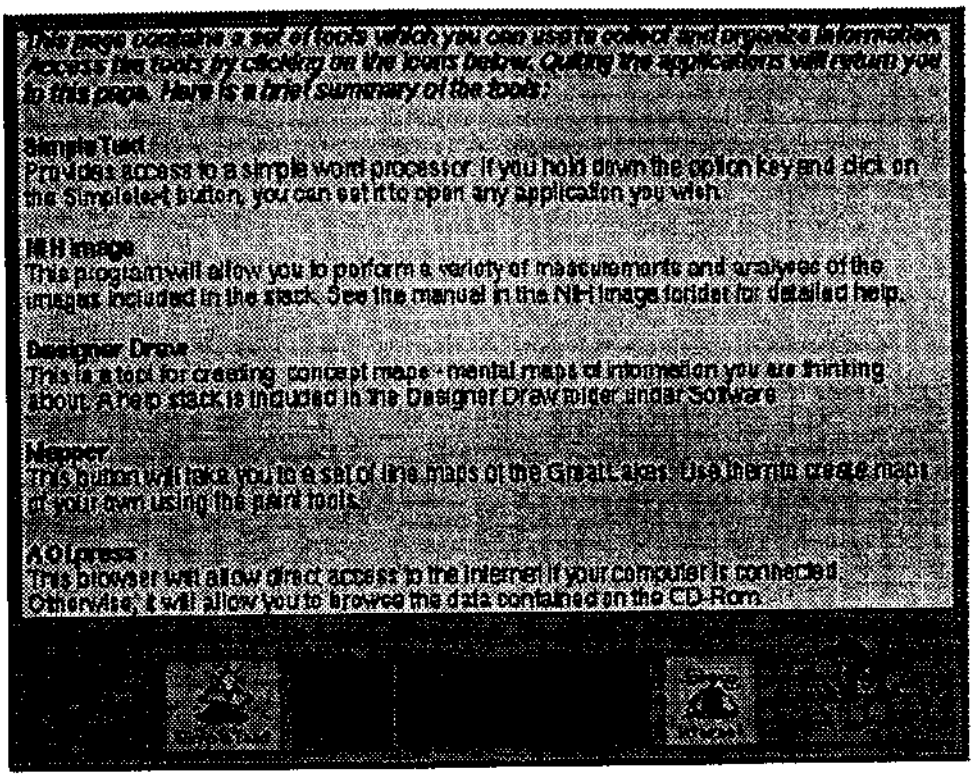
The resources menu contains several useful tools.

1. **<Help>** opens the toolbin, a card that explains the function of individual buttons and menu items.



2. **<Lexicon>** contains a list of words directly related to AOC information. Click on any word in the scrolling list to see its definition. Users may add to this list. Click on the question mark in the lower right hand corner and follow the directions.

3. <Toolkit> will take you to a card that provides a number of useful functions. These include internet access, concept mapping, note taking, and image processing.



Writing Tool

Clicking on the SimpleText button will launch a copy of Simple Text, a word processing tool with basic functions. This program may be more useful as a writing tool than the built in notepad if you are comfortable running multiple programs simultaneously in the Macintosh system.

Important: You may change this button to launch any word processor you prefer by holding down the **<option>** key while clicking the button. A dialog box will ask which application you wish to launch. Attaching an integrated software package like Works or ClarisWorks to this button will provide you with easy access to an entire suite of applications at the click of a button.

Image Processing

Clicking NIH Image will launch the program which can be used to analyze the images. A separate manual describing this program is included in the NIH Image folder found on the CD-Rom.

Concept Mapping

Designer Draw is a program that provides tools useful for construction of concept maps. Designer Draw help is a HyperCard stack which describes the program functions and how to use them. To prevent system conflict problems, you will need to open DesignerDraw outside of SolutionSeeker.

Cartographic Mapping

Clicking on the compass rose icon will provide access to a set of Great Lakes maps. You can use the drawing tools to construct new maps on top of the base maps. Open the <tools> menu and pull the mouse through the palette to open it. Choose the tool you wish to use. Print out the completed maps. Erase your work by double clicking on the eraser tool. The base maps will remain intact.

Internet Access

If your computer system is connected to a high speed modem (14.4 megahertz or better) or through a direct internet connection, clicking on the **<internet>** button will provide direct access to the world wide web beginning at the Great Lakes Areas of Concern web site. Users can obtain the latest available information about each of the sites. The bookmark menu also includes a number of sites relevant to exploration of Great Lakes issues.

Note: Web addresses change sometimes. If a boodmark does not work, do a Net Search using key words from the name of the site your wish to visit.

Find

The <**Find**> selection opens a search palette on the desktop. Click <**find** > and enter the word or phrase of interest. The search function will find the first instance of the phrase. Clicking <**Find Again**> will continue the search.

You may use this function to discern trends throughout the Areas of Concern. For example, you might wish to explore how many of the sites are troubled by high phosphorous levels. Search for the word "Phosphorous." Each card that scores a "hit" will appear on the screen. Users may then examine these sites to see what, if any, commonality exists between the sites, or perhaps to begin developing a region wide solution to the problem identified.

In addition, each card selected will also be marked. To print out only the selected cards choose <**Print**> from the file menu. In the resulting dialog box select <**marked cards**>. Using this menu you may also change the print size to allow multiple cards on each page.

Reset Workspace (Saving notes)

On nearly every page of the stack you will find an icon representing a notepad. Clicking on this icon will open a desktop writing pad. Use this tool for jotting any sort of quick note, reminder, thought or idea related to your investigation. Whenever you properly quit the program you will be asked if you wish to save your notes. If you choose <**Yes**> your notes will be collected on a single card. From this card you may choose to print the collected notes to paper, or save them as a text file that can be opened by any word processor.

You may access this **save** feature any time you wish by opening the <**Resources**> menu and choosing <**Reset Workspace**>. Choosing <**Yes**> will collect your notes, choosing <**No**> will direct the program to erase the contents of all the notecards.

Important note: Reseting the workspace can take a bit of time, if you accidentally select <**Yes**>, or wish to change your mind about collecting notes, simply hold down the <**option key**> and press <.>. This is the standard Macintosh **interrupt** command.

Trouble Shooting

Installation

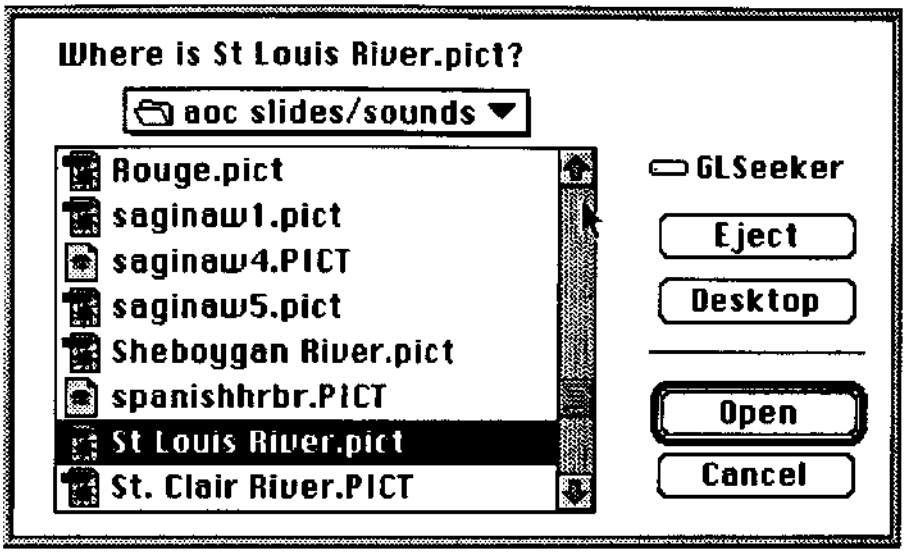
You may operate SolutionSeeker directly from the CD-Rom. If you wish to use the full capability of the program, including notepads and mapping tools, you will need to install the program on your hard drive using this procedure:

- Create a new folder on your hard drive named **<SolutionSeeker>**.
- Insert the CD-Rom and open the folder **<SolutionSeeker>**.
- Drag <SolutionSeeker>, <Hypercard Player>, <Color Tools> and <Home> to the new folder.
- Double click on the **<Solution Seeker>** stack icon to begin.

Images fail to open

One reason may be that there is a memory problem. SolutionSeeker requires 5 meg of RAM to run properly. Quit all applications and restart.

If Hypercard is unable to locate the images it will display the following dialog box asking where the images are located. Click on the **<desktop>** button, then on the **<GLSeeker>** disk icon, then on **<SolutionSeeker>** folder icon and finally, on the **<aoc slides/sounds>** folder icon. This will display an alphabetical list of images. Locate whatever filename hypercard is requesting. Double click on this item. From then on, SolutionSeeker will be able to find the images without needing to ask.



Can't find the images from NIH Image

Open the **<file>** menu and choose **<open>**. In the dialog box that appears choose **<aol.slides/sounds>**. This will display an alphabetical list of images. Scroll to the one you are looking for and double click.

Tools won't open

Often, a computer system does not have enough RAM memory available to open multiple programs. The stack requires five megabytes of RAM. AOLpress requires eight megabytes. NIH Image requires two megabytes. Try closing all programs and restarting the computer. Try switching to another browser that requires fewer resources. Consider upgrading your system.

If you have moved any of the parts of the program around (for example, moving the program to a writeable drive) you may need to tell hypercard where the other programs are located. When the dialog box opens and asks you where **<program name>** is located, choose **<desktop>**. Next choose **<GLSeeker>** then **<SolutionSeeker>**. Find the tool you are looking for and double click. If you have moved any of the tools, you will need to describe a different path.

Sounds don't play or I want to turn the sound off

You may need to direct SolutionSeeker to the sound files. Hypercard will display a dialog box asking where a particular sound is located. In the dialog box that appears choose **<desktop>**; **<GLSeeker>**; **<SolutionSeeker>**. Double click on the **<AOC.Sounds>** stack.

If you want to turn off the sound you will need to access the **<sound>** control panel and set the speaker volume to zero.

Notepad entries won't save properly

You must move SolutionSeeker to your hard drive if you wish to use the notepad to collect information.You must also remember to close the notepad each time you leave a page if you wish to store your notes for later use. Nor can you write on the notepads unless SolutionSeeker has been moved to a writeable drive on the computer.

SolutionSeeker
Construction Notes

1. The activity Toxics in the Lake: Where do they come from? Which way do they go?, found on the CD makes specific use of the SolutionSeeker program. It asks learners to look for patterns evident in the distribution of problems found at various AOC's and use online or CD based data sources to investigate the causes of the patterns found.

2. A complete list of the inquiry voice questions found on each of the data cards is included as a text file in the <SolutionSeeker> : <AOC slides/sounds> folder.

3. A complete list of the images used in SolutionSeeker, as well as many additional images, is included as a text file in the <SolutionSeeker> : <AOC slides/sounds> folder. These images can be opened in NIH Image as well as used in other graphic software. Many of the images found in Visualizing the Great Lakes (GLNPO/Minn. Sea Grant) are also related to the AOC sites. The <Harbors> section in particular contains some very interesting images. Muskegon and Milwaukee Harbors are especially dramatic images when compared with the stack images.

4. When using the tour of the solar system, you must click on each card along with the music. This was a deliberate design decision (requiring considerable agonizing, I might add) intended to more actively involve the user.

5. On the St. Clair AOC site (41) you will find a button leading to the Black River Lesson. This is a hypercard stack that simulates a jouney down a river where local students are involved in a water quality monitoring program. If you are so inclined, you can modify this program (relatively)easily to by substituting images and data from your own monitoring site. If you try this, please contact the authors, who would be most interested in learning of your efforts.

6. We have included a special low memory version of the SolutionSeeker program at the bottom of the Solution Seeker folder. This stack has been reduced in size by placing the soundbites in a separate stack called AOL sounds. You may install this version on your hard drive by creating a new folder and placing the following programs inside <SolutionSeekersss>, <Hypercard Player>,<Color Tools>,<home>,<Page1.htm>. This entire folder will contain less than 3.5 megabytes.The program will run fine, but internet access will require the user at times to locate specific files for the browser. Simply trace a path back to the CD Rom whenever a missing file dialog box appears.

7. Even when running SolutionSeeker with Hypercard player the drawing tools are active. This means that with the stack located your hard drive you will be able to construct maps using the Mapper tool. You should also be aware that double clicking the eraser tool on some of the other stack cards will cause some elements to be erased. Should this happen, simply replace the damaged stack with a fresh version from the CD.

Beauty in a Bird's Eye
Lookin' down on it all!

Purpose: To explore the notion that Earth is unique, a place of rare beauty and great value.

Understandings: #1, 2, 3, 7
Themes: Perspective, Pattern Movement, Region

Steps:

1. Students will view aerial images of urban areas around the great lakes.

   A. Learners will identify patterns and make observations about relationships.
   B. Learners will produce an esthetically pleasing image of some local region located in an image and later verified with ground truthing techniques.

Materials:
Computer stations with CD-ROM.
Groups may range from three to five students.
Great Lakes SolutionSeeker
Themes.pwp powerpoint presentation

Non Computer Option:
Large group activity
View images in AOC Sounds/slides using computer projection system
Themes.ovh presentation

Vocabulary:
perspective, pattern, movement, region, aesthetic, interpretation, analyze.
The goal here is for learners to understand the words spoken in context. Some or all of them may be omitted depending on the situation.

Strategies:
Analysis, Interpretation (critical thinking)
Pattern recognition (problem solving)

Procedures:

A. Review geography concepts using **Themes.present**

B. Introduce **SolutionSeeker** HyperCard program

C. Allow learners sufficient time to explore the environment, noting buttons of interest and routes worth exploring.

D. Reconvene whole group and debrief. The idea here is to share as many leads, thoughts and ideas as possible.

E. Allow a second period of exploration. Encourage students to change partners as common interests emerge. Explore further. Examine the image for patterns. Note roads, residential areas, bodies of water, farmland, different sorts of groundcover.

Possible products at this point might include a "route map" using the cartographic mapping tool in SolutionSeeker, A discussion of pattern or perspective, or an electronic journal entry recording field notes.

F. Direct groups to look now at a local region. The remaining activities in this unit will be described using the St. Clair River Site.

G. Open the image card. Locate the school site on the image (or any generally familiar landmark) on the image. Using the strategies introduced above, examine the region around the school. Share findings.

H. Take a walk outside the school and visit the region observed on the satellite image. Use the previously practiced techniques for observation (See "Exploring the School Site" activity).
What new information was discovered? Share observations.

I. Students will present a (computer generated) illustration related to some aspect of the activity found to be esthetically pleasing. This image should contain some combination of text and graphics. It should express some thought, idea, or insight which occurred as a result of the multisensory exploration of place.

Extended Activity: Groups will produce and deliver a short presentation of findings using multimedia tools. Useful tools might include paint/draw programs, graphics viewers and presentation software.

Evaluation:

Image activity may be evaluated based upon cogency of text and graphics. In addition, specified aspects of esthetics may be evaluated based upon prediscussed criteria.

Ask students to write a brief evaluation of the activity including what they did, what they learned, and how they felt about the activity. Writers should use the terms included in the vocabulary list where appropriate.

GLSeeker Activity Index

Aliens V: What is the role of exotic species in the Great Lakes? - Students will be able to understand and recognize patterns associated with human activities and the Great Lakes ecosystem by utilizing information on-line and putting it into a useful database. Creation of a bulletin board of world maps and species posters will visually emphasize the impact on a global scale.

Are we being invaded? The case of the brown headed cowbird. This activity has the students use data from the Christmas Bird Count to solve the mystery.

Are wetlands disappearing? - Learners use data to examine the question. The folder for the activity includes the database from the activity in an electronic format. (Great Lakes Basin Map)

Beauty in a bird's eye: Lookin' down on it all! - An introductory activity to the AOC hypercard activity on GLSeeker. Students examine satellite photographs of the Areas of Concern.

Contaminated sediment mini-unit - A series of activities geared for middle school grades to be used over a 5-7 day time span. Activity titles: What is an Area of Concern? / What does biomagnification have to do with AOCs? / How do contaminated sediments cause problems? / What are RAPs? and the RAP RAP song.

ES-EAGLS - A series of four publications of activities published by Ohio Sea Grant. Five activities are included on GLSeeker and the indexes for the publications are also included. Location: GLSeeker / Resource / Activity / ES.EAGLS

Titles of the five activities are:

- How does stratification affect water quality?
- How does water move in the Great Lakes basin?
- Out one lake and in another -How long does it take water to flow through the Great Lakes?
- What factors impact ice coverage on the Great Lakes?

Draft Indexes to the Publications:

- Environmental Issues
- Climate and Water Movement
- Great Lakes Shipping
- Land/Water Interactions
- Life in the Great Lakes

Exploring the school site: Increasing environmental sensitivity close to home - This multi-disciplinary activity teaches learners to make observations using multiple senses and to record and report data.

Great Lakes in My World - This is a Lake Michigan Federation publication of 35 activities for grades

K-8. Approximately one half of the activities are included on GLSeeker with the Federation's permission. For a hard copy of the activities and or a list of other materials available from the Federation contact: Lake Michigan Federation, 59 E. Van Buren, Suite 2215, Chicago, IL 60605.

GLIMCES - These activities are from the book GREAT LAKES INSTRUCTIONAL MATERIALS FOR THE CHANGING EARTH SYSTEM (GLIMCES). GLIMCES provides a packet of scientific scenarios of how global warming could affect the Great Lakes region, a review of climate models, and methods of teaching about those changes in secondary science and social studies classes.

- Do Christmas Bird Count data reflect trends associated with global change? Students examine Christmas Bird Count data from the Great Lakes Basin. The data are in spread sheet format with an introductory powerpoint presentation. **Location: GLSeeker: Resource: Activities: CBC Bird Count**

- How big is the problem of airborne toxins?

- Should chlorine be banned from the Great Lakes?

- What do scientists know about invader species of the Great Lakes and the effects that global climate change will have on them?

- What Great Lakes factors will increase and what will decrease as a result of global warming?

- What happens when nutrients enter a lake?

- Where do all the toxins go?

Hot and bothered: What are the temperature effects on the Great Lakes? - Temperature is an extremely important parameter in determining the overall quality of aquatic environments like rivers and lakes. This activity uses the *Great Lakes Forecasting System* to explore the effects on the Great Lakes.

Household Hazardous Products: A Student Centered Search for Alternatives - Learners will investigate prevalence of hazardous chemicals in home products and explore possible alternatives to their use. Several versions of the database are included. They are located: GLSeeker: Resources: Activities: Home Inventory.

How can we know about things that we can't see? - This activity will help learners understand how a theory can have value even though we may never be able to directly observe the phenomenon.

How do I find information about the Great Lakes on the Internet? - An introductory activity to using Netscape or another web browser to locate information at GLIN, Great Lakes Information Network. Written for a teacher workshop.

How environmentally insulting can we get? - In this activity students will be conducting and evaluating data to measure and compare the environmental impact of various human activities and decide what is more or less insulting.

How has the Earth changed over time? "Earthscapes in Time" - (Student Handout) An introductory

activity for use with the "Earthscapes in Time" CD that is part of the Small Blue Planet series produced by Now What Software.

Lake effect: Does it affect me? - As a result of this activity students will develop an understanding of weather systems, primarily the degree to which the Great Lakes affect weather systems. They will collect weather data locally and also gather data from the Internet.

Lake Superior / Great Lakes unit - A series of four activities that explore the Great Lakes and some of our perceptions of them. Instructions for building a physical model for drawing lake bottom profiles is included.

- What are your perceptions of the Great Lakes?
- How do we know what the bottom of a lake is like? / (Student handout)
- How do the Great Lakes compare? / (Datatable)
- How do the Great Lake basins compare? / (Map)
- Physical model instructions / (Map)

Name that sphere - Use music that you or students collect to play a quiz game based on the seven Earth Systems Understandings.

Paddle to the Sea - Classroom-ready readings, worksheets, games, labs, transparency masters, detailed diagrams and complete instructions for teacher use to illustrate the important concepts in the classic children's book **Paddle-to-the-Sea** by Holling Clancy Holling. One activity is included on GLSeeker: How big is a crowd? Paddle-to-the-Sea Activity Index.

Should contaminated sediments be dredged from a harbor? - The students will be asked to role play some of the interested groups in the debate over whether the contaminated sediments should be dredged from the bottom of a harbor.

Toxics in the Lake: Where do they come from? Which way do they go? - This activity uses the AOC stack resource databases to allow learners to investigate the presence and effects of toxic chemicals in the Great Lakes.

WaterU drinking in your water? - When you turn on your faucet you get water, but where does it come from, what's in it, and where does it go?

What can data tell us about the Great Lakes? - In this activity, learners will use a database of information about the Great Lakes and the region and try to find out what the data can tell them. A database is included in the folder - **Location: GLSeeker: Resource: Activites: GL Database**

What can you do to save a lakeside town from toxic sediment? - In this activity, students will make use of their prior knowledge about sediment transport in a local watershed to draw conclusions about the pollution situation in the fictional lakeside town of Pleasantville. Students will work in small groups to design and construct a toxin diversion or interception device. Student tasks / Request for proposal form

What if ....? - We know that the water in Lake Erie is not stationary. How does the water move within the lake? How will this movement affect the flow of materials that come into the lake?

GLSeeker Activity Index

Permission is granted for teachers to copy activities for classroom use.

Location: GLSeeker / Resource / Activities /

Activities linked directly to this page:

How does the temperature of the Great Lakes change over time? - In this activity you will examine AVHRR images to see temperature change and compare the five lakes to each other. Data can be matched to other images, lake bathymetry and weather maps, as students investigate relationships.

What are the birds of the Great Lakes telling us about the water conditions? The living things that call the waters of the Great Lakes their home are the most affected by the harmful substances found there. We can learn from them, but we also have a responsibility to them. This activity, and its related resources, looks at the Double-Crested Cormorant, its interaction with pollutants and the associated problems.

Activities to be viewed with Acrobat Reader: Click here to view.

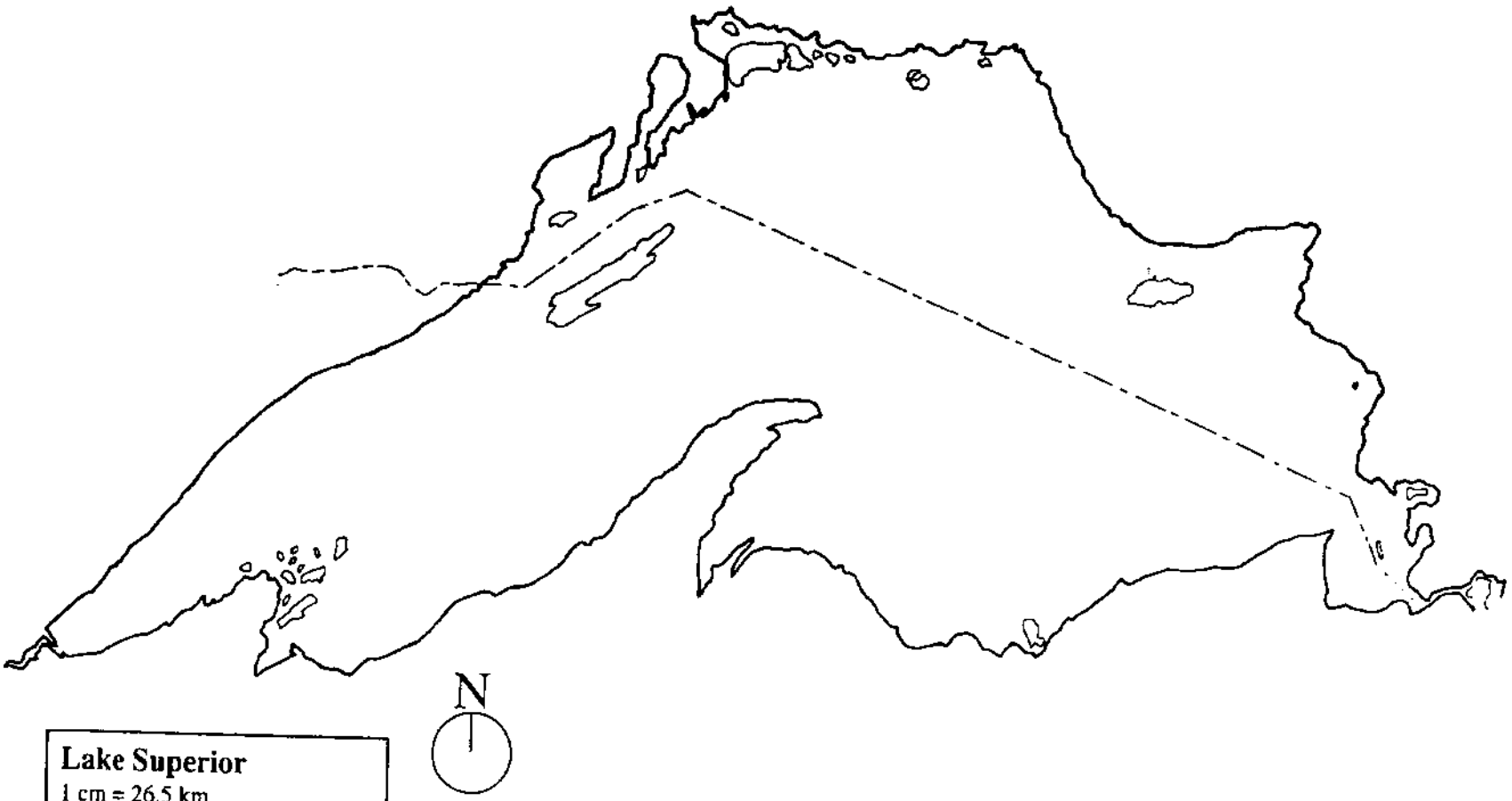
The majority of the activities on GLSeeker are in pdf format. Clicking above will start Acrobat Reader (freeware software) and the Activity Index will be displayed. Clicking on the titles will allow you to view the activities.

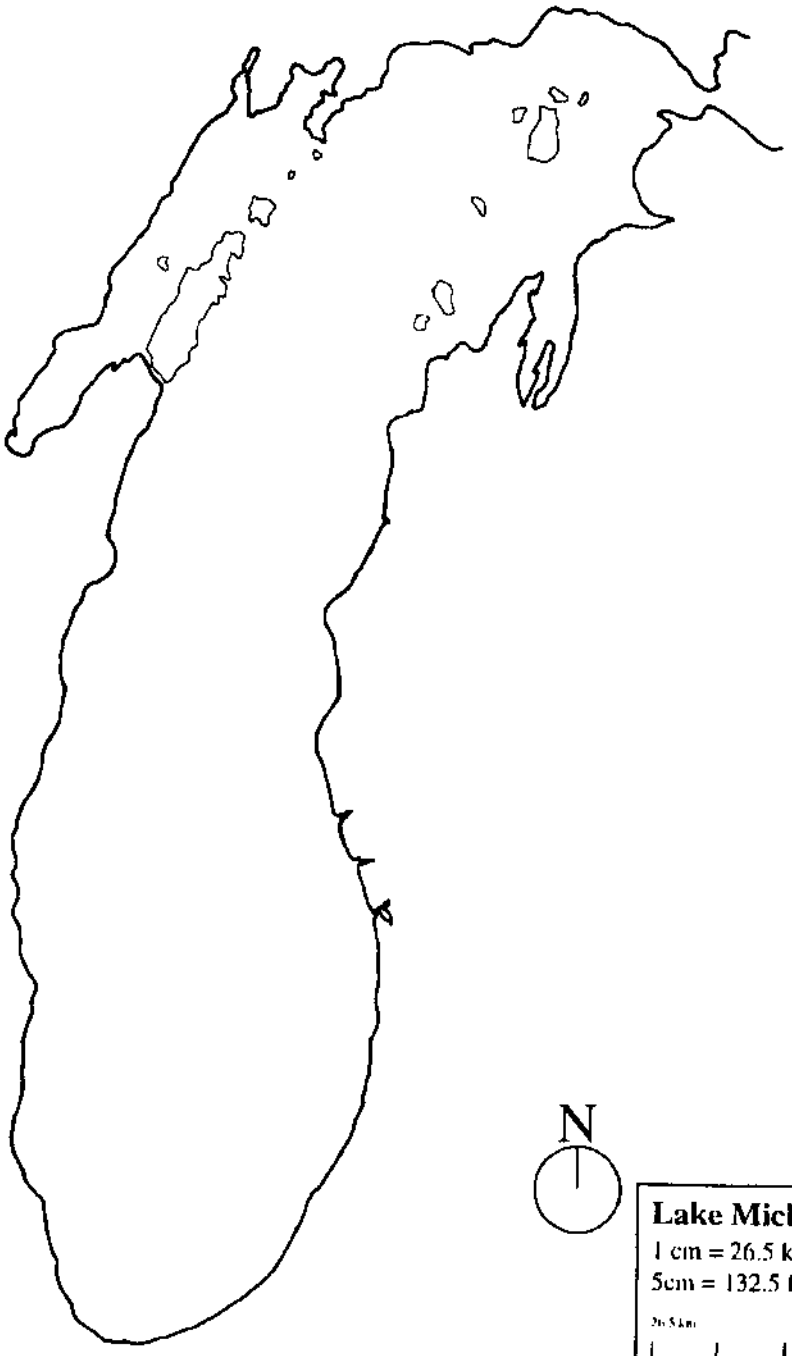
Problem Solving:

- If Acrobat Reader will not start, go to the software folder on GLSeeker and install the program on your computer.
- If Acrobat Reader displays the message - "Could not open the specified file", quit open applications. Locate <Activity.pdf> in the <Resource> : <Activity> folders and open it. This will start Acrobat Reader with sufficient memory to view the activities.

Data Sources:

- Areas of Concern: Reports on all of the Remedial Action Plans for the Great Lakes Areas of Concern. Click on the "French" link to view French versions.
- Bookmarks - A collection of Internet links. Links change; if one does not work, try an Internet search.
- Buoy Data - (Lake Erie / Lake Superior) These are examples of data available on the Internet. They are not current.
- Climate.96 - Examples - Global Temperature Trends, Sea Level Changes
- Vertical Movement Map - Superior - Envir. Canada
- Endangered Species - U.S. Fish and Wildlife Service
- Exotics - Fish / Crustations / Zebra Mussels / Zebra Mussel Maps Also check out the Great Lakes Database.
- G.L. Scenarios - What will happen to the Great Lakes if the climate warms up? This set of ten scenarios will help you to explore possible consequences.
- Great Lakes Database - Environmental, historical and human data.
- GLERL - Web address and page showing what is available as of July, 1996.
- Indicators - "Links to a series of environmental indicators (graphs with interpretation) which shed some light on the topic of toxic contamination of the Great Lakes food web, particularly PCB contamination."
- Lake Erie Maps - Use NIH Image to animate the images to view changes. Seiche Images / Turnover Images
- Lake Levels - U.S. Army Corps of Engineers, Detroit District. Description of files on GLSeeker.
- Organizations - A list of Great Lakes organizations with descriptions, addresses, phone numbers and e-mail links. It also includes a glossary of some terms.
- Ozone Data - Examples of images from the TOMs www page. (Total Ozone Mapping Spectrometer)
- Sea Surface Temperature Images - This page shows examples of surface temperature images that are located on GLSeeker at Resources / Data Sources / Sea Images.
- Toxins - Fact sheets for some of the toxins of greatest concern for the Great Lakes.
- Trends'91,93 - Great Lakes and global climate change data in spreadsheet form. Data sources included as text files.


N
Lake Superior
1 cm = 26.5 km
5 cm = 132.5 km
26.5 km
132.5 km
1 cm
5 cm
Ohio Sea Grant Education
Program — GLIMCES
© The Ohio State University, 1995


N
Lake Michigan
1 cm = 26.5 km
5cm = 132.5 km
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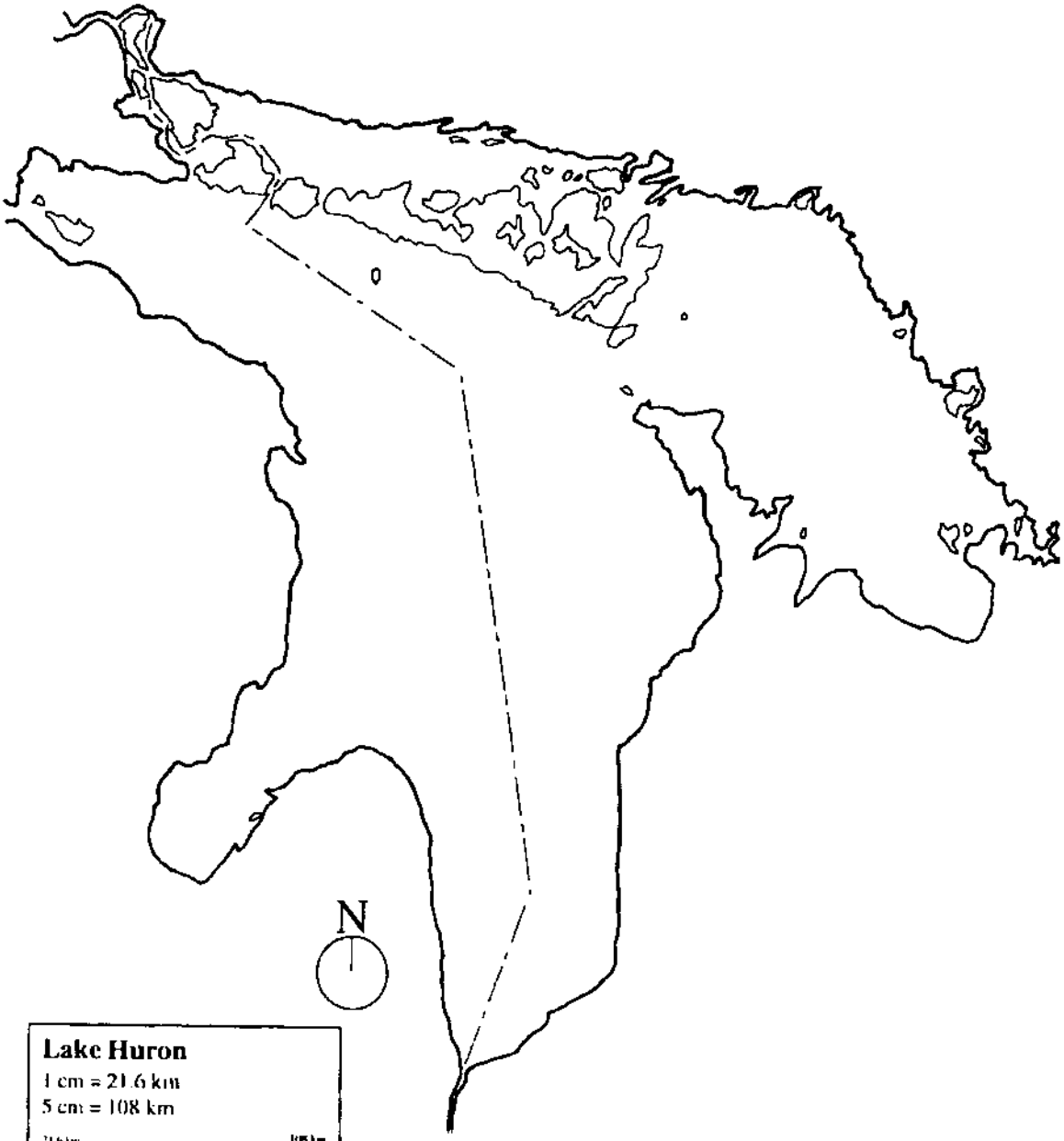
N
Lake Huron
1 cm = 21.6 km
5 cm = 108 km
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Program — GLIMCES
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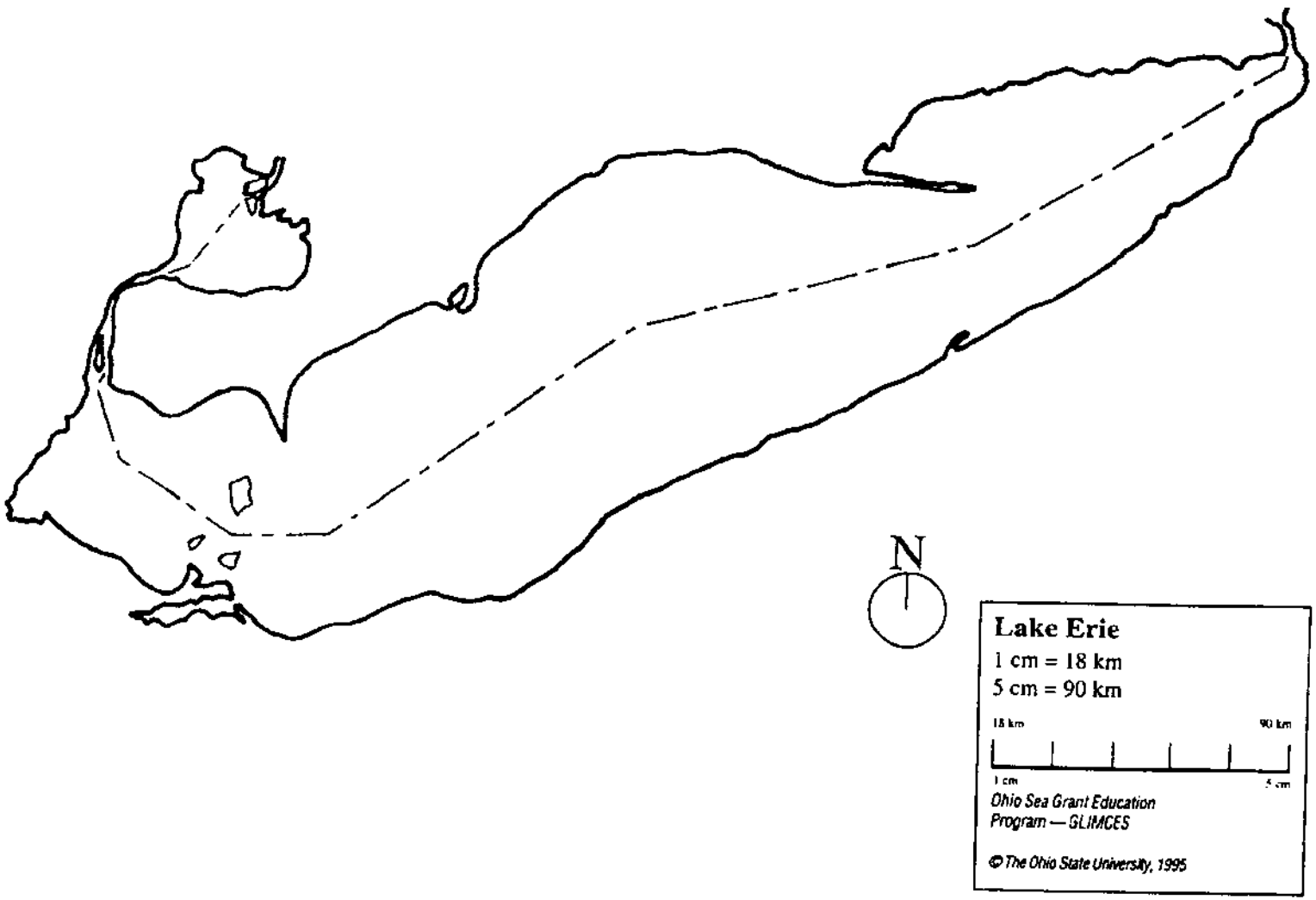
N
Lake Erie
1 cm = 18 km
5 cm = 90 km
18 km
90 km
1 cm
5 cm
Ohio Sea Grant Education
Program — GLIMCES
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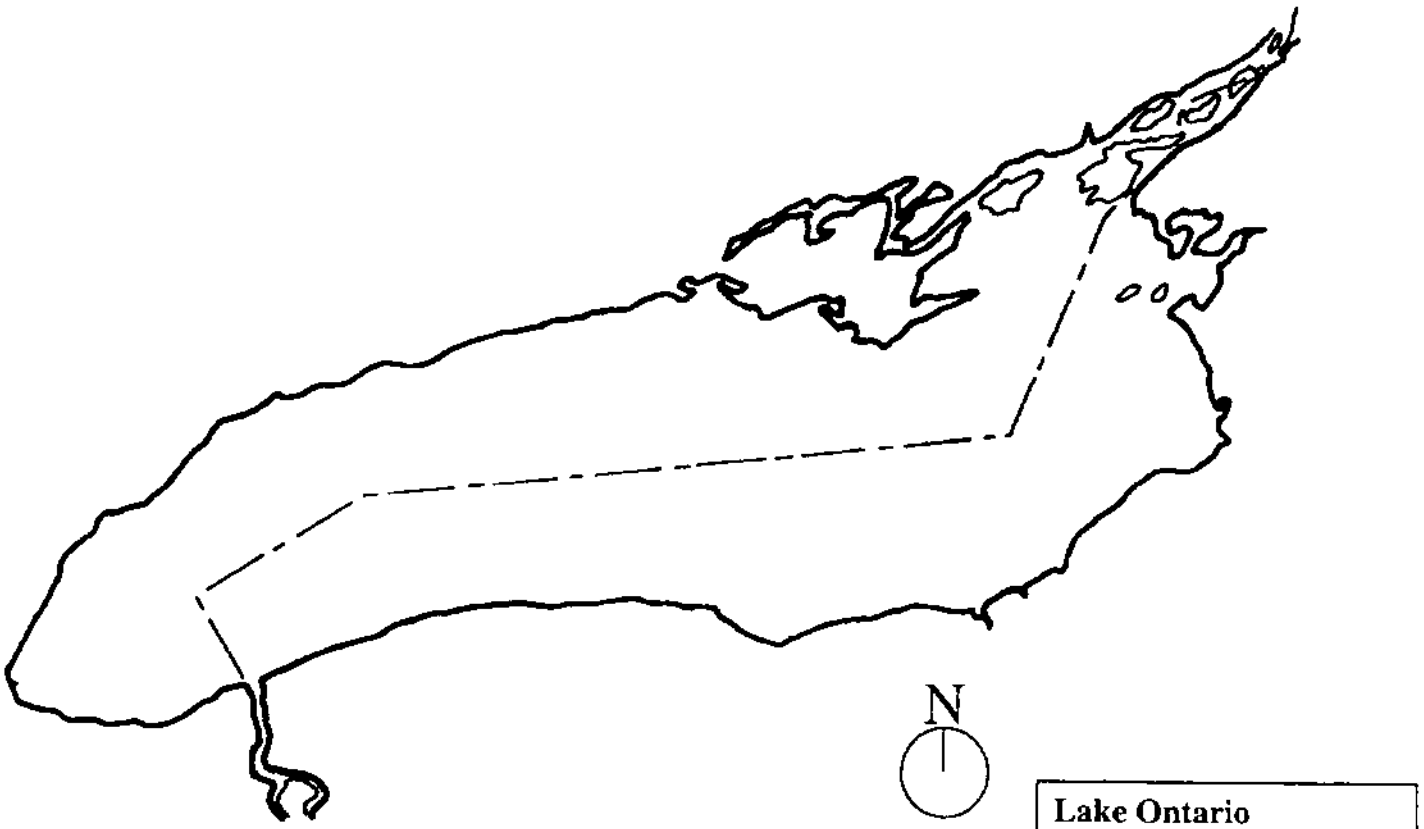
N
Lake Ontario
1 cm = 16 km
5 cm = 80 km
16 km
80 km
1 cm
5 cm
Ohio Sea Grant Education
Program — GLIMCES
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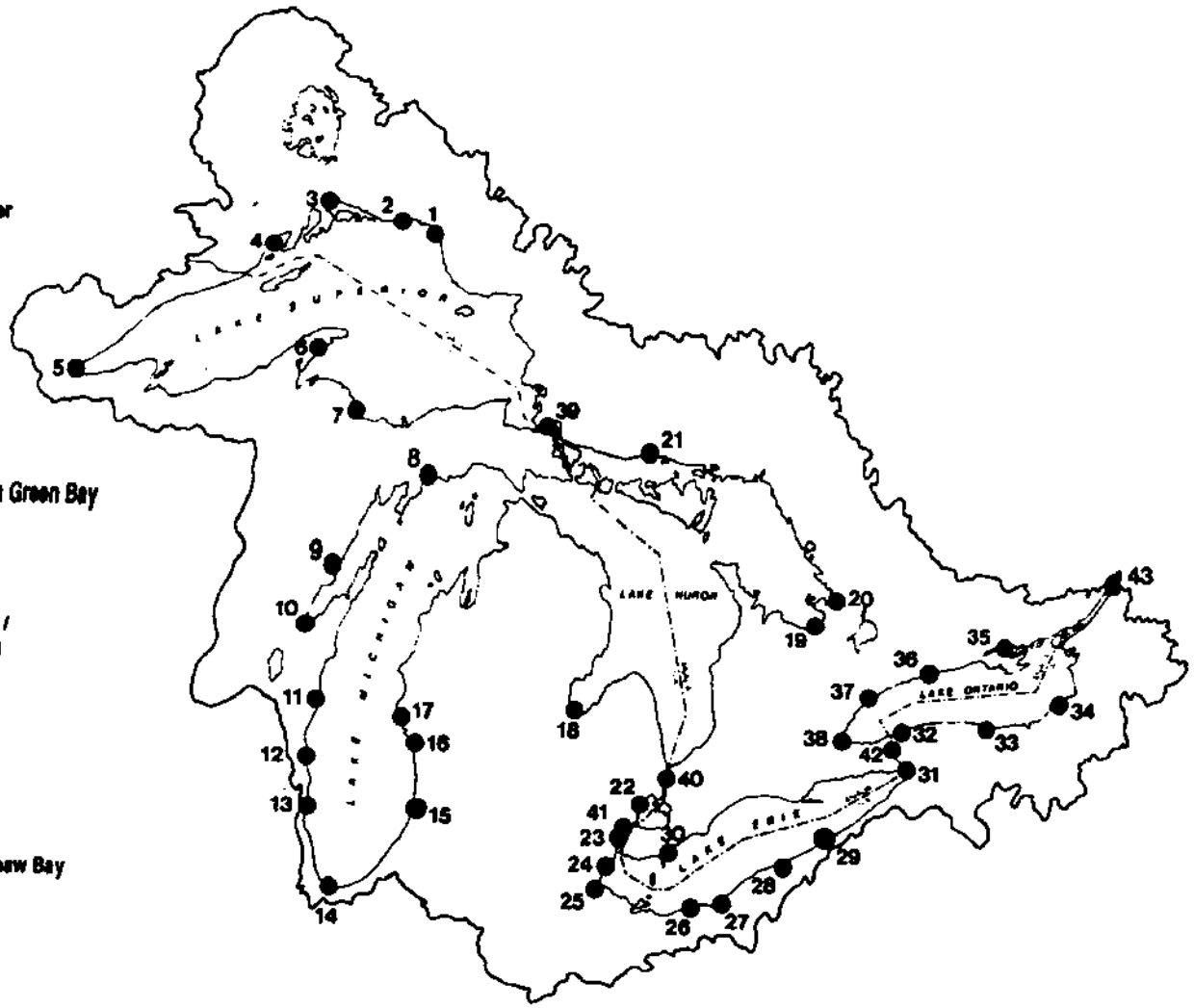
FORTY-THREE AREAS OF CONCERN IDENTIFIED IN THE GREAT LAKES BASIN



Lake Superior

1 Peninsula Harbour
2 Jackfish Bay
3 Nipigon Bay
4 Thunder Bay
5 St. Louis Bay / River
6 Torch Lake
7 Deer Lake - Carp Creek / River

Lake Michigan

8 Manistique River
9 Menominee River
10 Fox River / Southern Green Bay
11 Sheboygan River
12 Milwaukee Estuary
13 Waukegan Harbor
14 Grand Calumet River / Indiana Harbor Canal
15 Kalamazoo River
16 Muskegon Lake
17 White Lake

Lake Huron

18 Saginaw River / Saginaw Bay
19 Collingwood Harbour
20 Severn Sound
21 Spanish River Mouth

Lake Erie

22 Clinton River
23 Rouge River
24 River Raisin
25 Maumee River
26 Black River
27 Cuyahoga River
28 Ashtabula River
29 Presque Isle Bay
30 Wheatley Harbour

Lake Ontario

31 Buffalo River
32 Eighteen Mile Creek
33 Rochester Embayment
34 Oswego River
35 Bay of Quinte
36 Port Hope
37 Metro Toronto
38 Hamilton Harbour

Connecting Channels

39 St. Marys River
40 St. Clair River
41 Detroit River
42 Niagara River
43 St. Lawrence River (Cornwall / Massena)

From IJC - Review and Evaluation of the Great Lakes RAP Program, 1991

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Global Change in the Great Lakes Scenarios

The Ohio Sea Grant Education Program has produced a series of short publications designed to help people understand how global change may affect the Great Lakes region. By explaining the possible implications of global change for this region of the world, it is hoped that policy makers and individuals will be more inclined to make responsible decisions about global change policy issues. The scenarios describe the scientific community's prevailing interpretations of what may happen to the Great Lakes region in the face of global warming. The scenarios are written in terms the general public can understand, they include the most recent information available on a variety of subjects, and their content has been reviewed for accuracy by a panel of experts.

Introduction	Understanding Climate Models
Scenario #1	How Will Water Resources in the Great Lakes Region be Affected?
Scenario #2	Will Biological Diversity in the Great Lakes Region Suffer?
Scenario #3	What Could Happen to Great Lakes Shipping?
Scenario #4	How Will Agriculture in the Great Lakes Region be Affected?
Scenario #5	Will it Affect Airborne Circulation of Toxins?
Scenario #6	What are the Implications of Low Water Levels in Great Lakes Estuaries?
Scenario #7	Will it Speed Eutrophication in the Great Lakes?
Scenario #8	What Could Happen to Great Lakes Recreation?
Scenario #9	How Could Fish Populations in the Great Lakes be Affected?
Scenario #10	How Will Forests in the Great Lakes Region be Affected?

Additional Resources Available from The Ohio Sea Grant Education Program

Oceanic Education Activities for Great Lakes Schools (OEAGLS)

OEAGLS (pronounced "eagles") are designed to take a concept or idea from the existing school curriculum and develop it into an oceanic and Great Lakes context, using teaching approaches and materials appropriate for children in grades five through nine. Investigations are characterized by subject matter compatibility with existing curriculum topics, short activities lasting from one to three classes, minimal preparation time, minimal equipment needs, standard page size for easy duplication, student workbook plus teacher guide, suggested extension activities for further information or creative expression, teachability demonstrated by use in middle school classrooms; and content accuracy assured by critical reviewers. Each title consists of a student workbook and a teacher guide and costs $3.00 for the publication, postage, and handling. If ordering EP-026, add an additional $4.00 to cover the cost of the computer disk.

These publications are currently being revised and all titles may not be available.

The Effect of the Great Lakes on Temperature	(EP-001)	The Estuary: A Special Place	(EP-016)
The Effect of The Great Lakes on Climate	(EP-002)	The Great Lakes Triangle	(EP-017)
Ancient Shores of Lake Erie	(EP-003)	Knowing the Ropes	(EP-018)
How to Protect a River	(EP-004)	Getting to Know Your Local Fish	(EP-019)
Changing Lake Levels	(EP-005)	Shipping: The World Connection	(EP-020)
Erosion Along The Great Lakes	(EP-006)	We have Met the Enemy	(EP-021)
Coastal Processes and Erosion	(EP-007)	It's Everyone's Sea: Or is it?	(EP-022)
Pollution in Lake Erie: An Introduction	(EP-008)	PCBs in Fish: A Problem?	(EP-023)
Yellow Perch in Lake Erie	(EP-009)	A Great Lakes Vacation	(EP-024)
Evidence of Ancient Seas in Ohio	(EP-010)	Storm Surges	(EP-025)
To Harvest a Walleye	(EP-011)	River Trek (with computer program)	(EP-026)
Oil Spill!	(EP-012)	Waves	(EP-027)
Shipping on The Great Lakes	(EP-013)	Lake Layers: Stratification	(EP-028)
Geography of The Great Lakes	(EP-014)	Nutrients in The Great Lakes	(EP-029)
Ohio Canals	(EP-015)	Eating Like a Bird	(EP-030)

OEAGLets

In the primary grade range we have three activities. All use Lake Erie information applied to all primary subject areas.

Lake Erie — Take a Bow	(EP-031)	$5.00
Build a Fish to Scale	(EP-032)	$5.00
A Day in the Life of a Fish	(EP-033)	$5.00

Additional Educational Materials

Supplemental Curriculum activities to Accompany Holling C. Holling's *Paddle-To-The-Sea*	(EP-076)	$10.00
Holling C. Holling's *Paddle-To-The-Sea*	(EP-076/B)	$10.00
The Ohio Sea Grant Education Program: Development, Implementation, Evaluation	(EP-075)	$8.00
Sea Grant's Marine Education Bibliography		free
Abstracts of Research in Marine and Aquatic Education: 1975-1990	(EP-077)	$4.00
Great Lake Erie	(EP-079)	$10.00

Make payment payable to The Ohio State University in U.S. dollars.
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