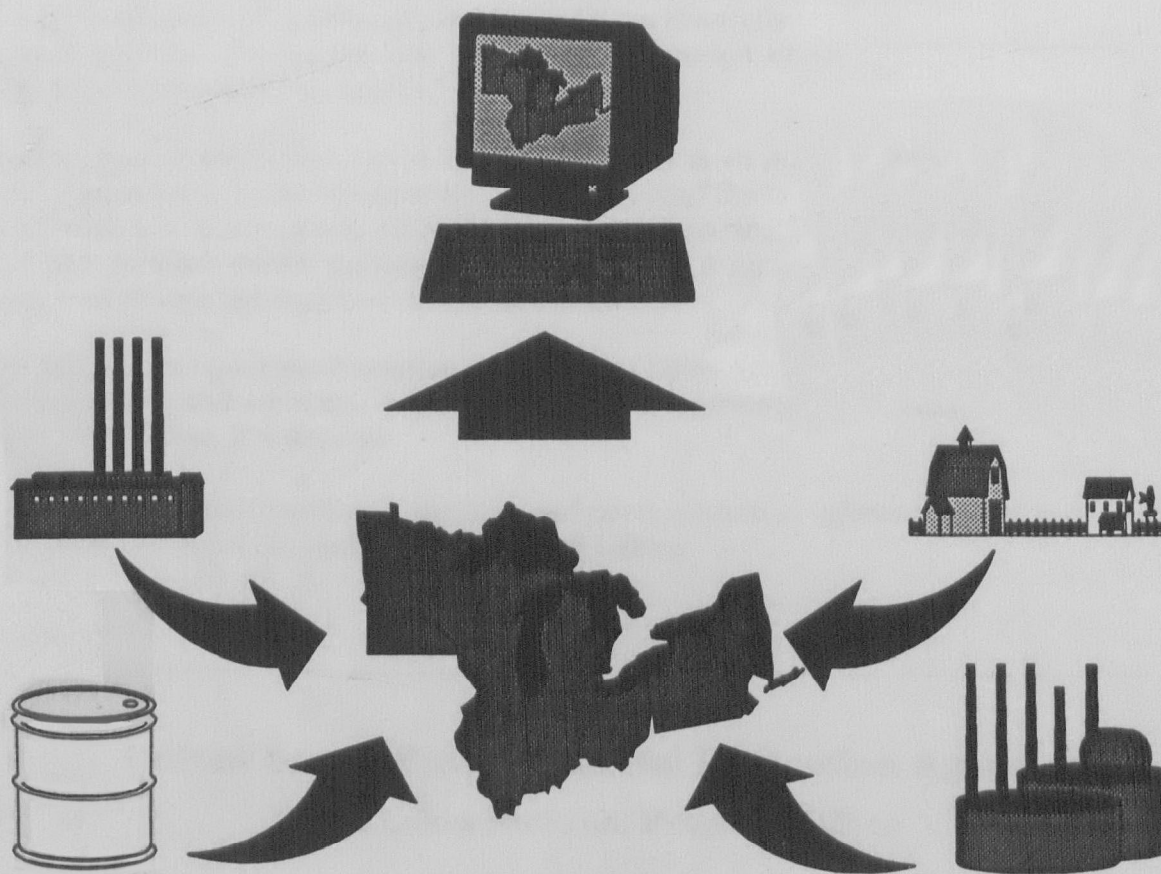


GREAT LAKES INFORMATION STRATEGY

GREAT LAKES ENVIROFACTS PILOT



United States Environmental Protection Agency
May 1993

FOREWORD

The EPA, States and other Federal agencies with interests in the Great Lakes share a common data dilemma which is accurately summarized in the following excerpt taken from Vice President Gore's book ***Earth in the Balance***. "Our current approach to information resembles our old agricultural policy. We used to store mountains of excess grain in silos throughout the Midwest and let it rot, while millions around the world died of starvation. It was easier to subsidize growing more corn than to create a system for feeding those who were hungry. Now we have silos of excess data rotting while millions hunger for the solutions to unprecedented problems." To remedy this situation, we need to accomplish two objectives. First, we must begin to understand the specific information required to make effective decisions on ecosystem management and target our resources accordingly. Secondly, recognizing our need to internalize the information we are already collecting, we need to develop systems that provide consistent, undemanding procedures for accessing our existing information, and the information analysis and presentation tools to turn that information into knowledge.

The Great Lakes Information Strategy Plan (ISP) has moved us toward the first of the above objectives by identifying the priority information needs for the Great Lakes. We are beginning to meet the second objective by initiating the Great Lakes Envirofacts Pilot Project which will address the highest priority information need, the "Determination of chemical loadings by lake, by tributary, by watershed and by facility."

The specific goal of the Great Lakes Envirofacts Pilot is to put multiple-source, toxic chemical loadings information into the hands of State and EPA staff that make decisions about environmental protection in the Great Lakes. Great Lakes program partners can provide significant direction to the project through active participation, resulting in a system that can directly support our environmental protection business in the Great Lakes.

We wish to facilitate your participation in the Great Lakes Envirofacts Pilot Project by providing desktop hardware and software in order to help you determine your detailed requirements for a full-scale Great Lakes Envirofacts.

We look forward to your continued support and participation in efforts to develop capabilities to meet our environmental challenges in the Great Lakes.

United States Environmental Protection Agency

Great Lakes National Program Office



Christopher Grundler, Director

May 1993

INTRODUCTION

In October and November of 1992, the EPA Great Lakes National Program Office (GLNPO) distributed a document entitled "Great Lakes Information Strategy - *Information Needs Summary*." That report summarized the initial results of our effort to collect the highest-priority, unmet information requirements of the Multi-Agency Great Lakes Program (GLP). As the *Information Needs Summary* was distributed, we asked our Program Partners for confirmation of the information needs and an indication of their relative importance. The purpose of this report is to capture the results of the information needs confirmation process, and to outline the expected next steps in the Great Lakes Information Strategy process including development of the Great Lakes Envirofacts Pilot.

CONFIRMATION OF INFORMATION NEEDS

In the spring of 1992, GLNPO and the EPA Office of Information Management (OIRM) began the development of the Great Lakes Information Strategy Plan (ISP). The primary objective of an ISP is to develop a strategy for the development of integratable/shareable information systems that can give program managers the information required to formulate and adjust strategies for managing the Great Lakes.



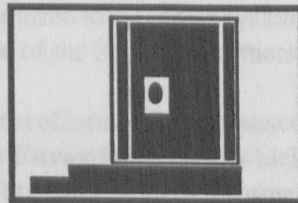
One of the important first steps in this process was the collection of GLP information needs. Key environmental managers from the Great Lakes States, tribal groups, USEPA and other Federal Agencies were interviewed to determine what information they required to effectively manage their programs under the Great Lakes 5-Year Strategy. Information needs were gathered with the expressed intent of prioritizing future systems development efforts based on the unmet information needs of highest priority to the GLP.

In October 1992, GLNPO published the *Information Needs Summary* detailing the results of the executive interview/information need collection process. Concurrent with the distribution of that report, members of the U.S. Policy Committee and participants in the executive interview process were given the opportunity to confirm whether the information needs collected were in fact critical to the GLP. Additionally, these Program managers

were given the opportunity to add unmet information needs that the ISP failed to uncover, and to edit the language of the listed information needs as appropriate.

RESULTS

The final prioritization of information needs is based on the responses to the request for confirmation, additions, and edits of the information needs collected through the ISP process. Thirty-five responses were received from seven Great Lakes States, six Federal agencies, one Tribal organization, and one non-profit organization. The respondents represent a good cross-section of the Great Lakes Program partners, and their input was used to prioritize the Program's information needs.



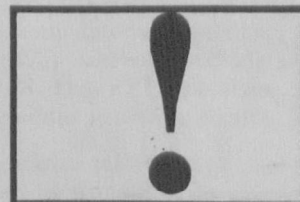
There was general consensus among the Program partners that virtually all of the initial information needs were important to the GLP, although some were clearly more critical than others. The information needs most often confirmed by the respondents as critical to the Great Lakes Program are listed as the top priorities for systems development. Subsequently, those information needs least often cited as being critical to the GLP are at the bottom of the priority list. The complete list of 30 GLP information need priorities is included in this report as Appendix A¹. The top five information need priorities for the Great Lakes Program are listed below:

Top 5 GLP Information Need Priorities:

- 1) Chemical loadings by lake, by tributary, by airshed, & by facility
- 2) Comprehensive baseline and trends of environmental indicators
- 3) Ecological and human health risks and identification of the problem
- 4) Sediment criteria standards
- 5) Ambient monitoring: baseline and trends of toxic concentrations

CONCLUSIONS

The robust response to the effort to prioritize the GLP information needs indicates that GLP managers take seriously their requirements for information. The majority of information needs identified through the ISP process reflect the cross-program, multi-media philosophy of the Great Lakes Program. The top five information needs: loadings, environmental indicators, risk identification, sedi-



ment, and ambient monitoring all clearly require integrated information that crosses both Program and environmental media boundaries. This is a clear indication that the Great Lakes Program is moving positively toward operating from an wholistic, ecological platform, rather than from the traditional single-media or programmatic base.

Of course, hidden behind each of the multi-media information requirements, is the need for clear, quality-assured data from each of the media programs and across agency boundaries. The primary reason that the GLP does not currently have information systems to adequately address our strategic information needs is not the lack of technology to develop systems, but a lack of data to support such systems. Therefore, to facilitate the development of useful information systems, GLP Partners will have to cooperate in collecting high quality information on a timely basis. To fully integrate GLP data, and to maximize use and sharing of data, our major data collection activities must be coordinated to ensure consistency in the types of information collected and to ensure consistency in our data management practices.

NEXT STEPS

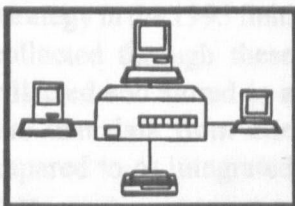
Over the remainder of 1993, the GLNPO will focus on three major efforts under our information strategy including system prototyping, integration of Great Lakes monitoring and inventory efforts, and data access and visualization.

SYSTEM PROTOTYPING

The Information Need Priorities List (Appendix A) will be used to prioritize systems development and information collection efforts for the Great Lakes Program. Those information

needs at the head of the list will become the top system development priorities. The feasibility of systems development will be based primarily on the existence of sufficient data to support such systems. Instances in which data quantity and/or quality is insufficient to support high-priority systems development efforts will obviate the necessity for improved data collection efforts.

In Calendar Year (CY) 1993, GLNPO, in conjunction with OIRM and EPA's Office of Water, will take the first step in the systems development process under the Great Lakes



ISP. This effort will focus on *toxic loadings*, the highest priority information need for the GLP. The long-term, multi-year goals of this effort are to produce an integrated system for the assessment of toxic chemical loadings to the Great Lakes from all of the environmental media sources, and to explore the technology required to make this system available for use on the desktops of the Program Partners.

In 1993, our systems development efforts will be focussed on delivering *The Great Lakes Envirofacts Pilot*, which will enable users to access facility/point-source information (e.g. Permit Compliance System, Toxic Release Inventory, etc.) for all eight Great Lakes States, as well as environmental monitoring information for a specific geographic area and view it in a spatial context.

Based on the existence of a rich, multi-media, dataset from the Green Bay Mass Balance Study (GBMB), the Green Bay/Fox River watershed is the proposed geographic extent for the environmental monitoring information for this Pilot. The five Great Lakes Areas of Concern that are the focus of EPA's Assessment and Remediation of Contaminated Sediments (ARCS) study are also being considered due to the quality of the resultant sediment data.

Great Lakes Envirofacts will be designed by environmental professionals from State and Federal programs to empower GLP staff members to *access, analyze and communicate* Great Lakes information from the desktop. This system will also be used to evaluate users' technical requirements for information systems, and ultimately to facilitate the development of a system that supports environmental protection and management on an ecosystem or geographic basis. Lastly, data quality feedback mechanisms will be established to facilitate correction of data quality problems.

ENVIROFACTS/GATEWAY

The Great Lakes Envirofacts Pilot will build upon and test the utility of the *Envirofacts/Gateway* concept developed by OIRM for solving geographic data access problems.

ENVIROFACTS is a relational database containing downloaded information from EPA's databases including TRIS, FINDS, PCS, and CERCLIS. Other EPA databases (AIRS, RCRIS, STORET) will be added as soon as possible.

GATEWAY is a common user interface, or user access tool, allowing environmental information to be easily retrieved from a variety of relational databases including Envirofacts. Perhaps most importantly Gateway will allow geographically referenced retrieval and analysis of the information from the users' desktop.

INTEGRATION OF GREAT LAKES MONITORING AND INVENTORY EFFORTS



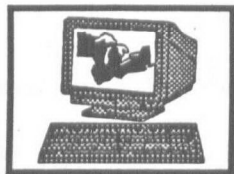
Several major Great Lakes monitoring efforts will begin in 1993 and 1994 including Great Lakes EMAP (Environmental Monitoring and Assessment Program) and the Lake Michigan and Lake Superior Lakewide Management Plan (LaMP) monitoring efforts. The GLNPO will also be initiating implementation of its' new monitoring strategy in the 1993 field season. The information collected through these individual efforts must be collected and stored in a coordinated fashion to ensure that data from one project could be directly compared to or integrated with data from the other efforts.

To facilitate the coordination and eventual integration of Great Lakes monitoring data, the GLNPO will work with the project teams responsible for the monitoring efforts with the goal of developing a single data structure and a set of data collection standards that could accommodate all of the forthcoming Great Lakes monitoring data. As one of the early steps in

this process, we will test the Water Systems Modernization (WSM) data structure developed by EPA's Office of Water for its' ability to handle these data. Testing of the WSM structure will take place under two separate tasks. First, GLNPO will host several requirements analysis sessions for the monitoring teams to determine the types of data they intend to collect and the requirements for data storage. The WSM data structure will then be analyzed for its ability to accommodate these data. The requirements analysis process will also provide an opportunity to analyze each monitoring effort to recommend steps to increase ability to integrate with other significant efforts. In a second, concurrent effort, the existing GBMB and ARCS data sets will be modelled into the WSM database. This will allow the GLP to assess the effectiveness of the WSM structure for housing Great Lakes monitoring data and to develop a data structure that facilitates the use of monitoring data.

DATA ACCESS & VISUALIZATION

Computer and data management technology are advancing rapidly. As machines and communication links become faster, many exciting capabilities are appearing on the horizon for Great



Lakes Program data users. Not only is access to information becoming faster, it is becoming increasingly user friendly. In order to take advantage of this situation, GLNPO will continue to investigate, test and demonstrate new technologies for information access and data visualization. Elements of the Great Lakes Envirofacts pilot system will be developed in a modular approach, allowing incorporation of more capable analytical tools as they become available.

The sources of Great Lakes information are distributed among the GLP Agencies, in Universities, environmental organizations and private companies. GLNPO is testing Wide Area Information Servers (WAIS), GOPHER and other shareware/public domain protocols for providing broad access to Great Lakes information from multiple sources. WAIS is an information delivery system that is designed to allow computer users of all expertise levels to search for and retrieve data from numerous remote sources, stored in different structures and formats.

The following excerpt from *Earth in the Balance* by the Vice President speaks to the need for better utilization of the information we are collecting. "We have generated more data, statistics, words, formulas, images, documents, and declarations than we can possibly absorb. And rather than create new ways to understand and assimilate the information we already have, we simply create more, and at an increasingly rapid pace." The Great Lakes ISP, and other initiatives, are focusing information collection efforts on the data *critical* to Great Lakes ecosystem management. The Great Lakes Envirofacts Pilot and subsequent system development projects will provide the tools needed to more effectively make environmental decisions, and will improve our ability to communicate the reasons for those decisions.

For more information regarding:

Great Lakes information program initiatives

Great Lakes ISP documentation/references

"INFORMATION NEEDS SUMMARY"

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Appendix A:

Great Lakes Program Information Need Priorities

- 1) Chemical loadings by lake, tributary, airshed, & facility (incl: emissions inventory, agri & urban runoff)
- 2) Comprehensive baseline and trends of environmental indicators by geographic location
- 3) Ecological and human health risks (baseline & trends) and identification of the problem
- 4) Sediment criteria standards
- 5) Ambient monitoring: baseline and trends of toxic concentrations in the Lakes
- 6) Ability to link deposited toxic substances to the source
- 7) Chronic sediment toxicity data: Ecological significance and solutions
- 8) Environmental impacts (performance indicators) of programs, by ecoregion and geographic location
- 9) Quality of data: Methods, standards and consistency, adherence to QAPP, etc.
- 10) State priorities and plans linked to 5 year strategy
- 11) Baseline inventory of biological and ecological diversity (incl: species by location/habitat)
- 12) Location and migration of contaminated sediments including spatial characterization
- 13) Information about air quality (toxic contaminant levels)
- 14) Catalogue of standard methods for monitoring, analysis, loadings calculation etc.
- 15) Assessment of the functions of Great Lakes wetlands
- 16) Geographic acreage data for habitats and specific habitat items (incl: GL wetlands inventory)
- 17) Water quality information (in a single cross-program database) vs. water quality standards
- 18) General program information (resources, priorities, objectives, milestones, money)
- 19) Demographic information on health problems
- 20) Technology/mechanisms to monitor habitats
- 21) Better access to biological & ecological information on species and communities of concern
- 22) Characteristics of wetlands impact
- 23) Scientific literature database access
- 24) Program effectiveness and impact information including Customer satisfaction and public perception
- 25) Resource demand by organization/activity and \$ available from Federal and outside sources
- 26) Record of who is using which data and their assessment of quality
- 27) *Program* cost effectiveness information
- 28) Migration and impact of *selected pollutants* on the Great Lakes
- 29) Shoreline erosion problems
- 30) Available technology of customers by customer by location

Additional Needs Identified Through the Review Process:

Causes of use impairments

Levels of contaminants below which fish, wildlife, and humans are safe

The original list, as found in the Information Needs Summary document, contained some duplicate and overlapping information needs. In the final list, the overlapping items were collapsed and redundancies were eliminated based on the comments of the respondents. Some information needs, although related to the same topic (e.g. loadings), were left separate when they represented distinctly different types of information. Several information needs were not clearly worded in the initial list which may have resulted in lower prioritization (ex: #27 Cost effectiveness information, and #28 Migration and impact).