

Incorporating GIS Capabilities into National Park Service's Databases Using MapObjects

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Abstract:

- **Incorporating GIS Capabilities into National Park Service's Databases Using MapObjects**

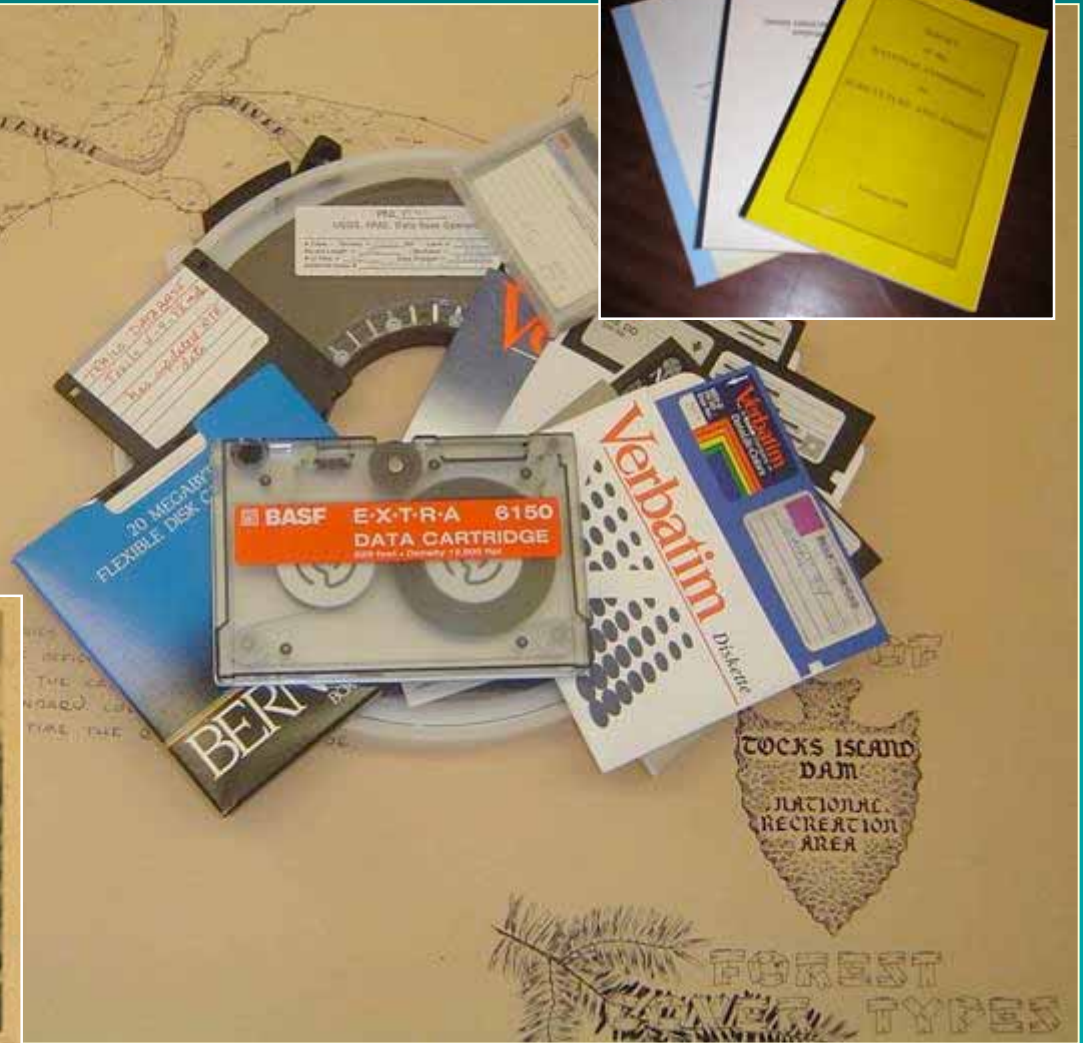
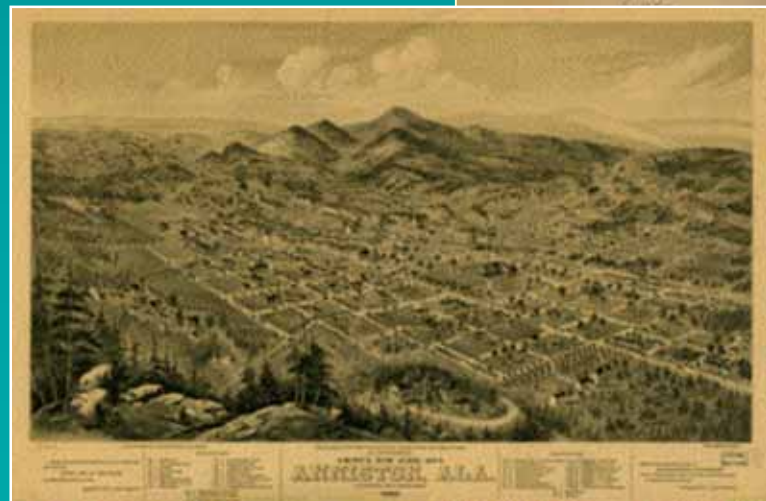
The National Park Service's Delaware Water Gap National Recreation Area has developed a technique for adding GIS functionality into current Database Applications using MapObjects and ArcObjects capabilities. Its first employment was to a Watershed-Based Data Library for natural resource datasets. The library includes a GIS Interface that allows entering and querying data based on the GIS Component. These geodatabase procedures will give a new face and functionality to valuable assets that for years didn't have a geographic component and have been unusable because of the varied, non-practical and non-standard formats that the GIS information resides in. This paper will explore the processes that were initiated to achieve the project's goals.

What type of data?

- **Field Reports**
- **Survey Notes**
- **Inventory Data**
- **Reports/Publications**

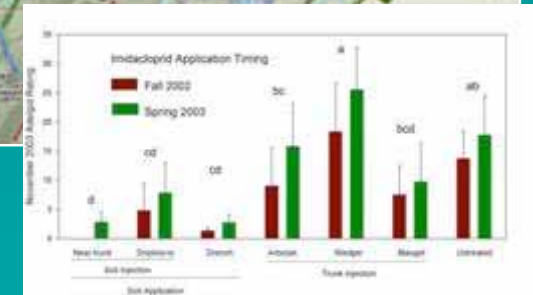
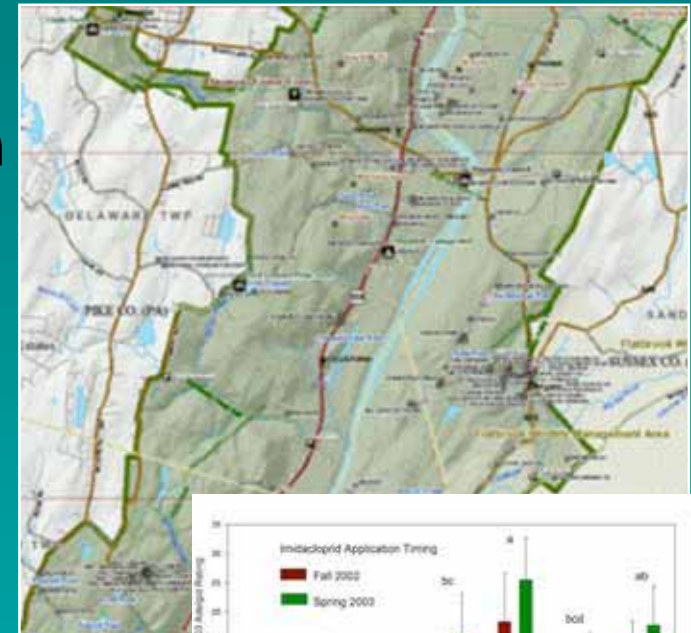


Various Formats of Data



Value of Having a Data Library

- Long Periods of Data Accumulation
- Ease Accessibility & Availability
- Organizing/Planning Tool
- Answer Current Problematic Questions



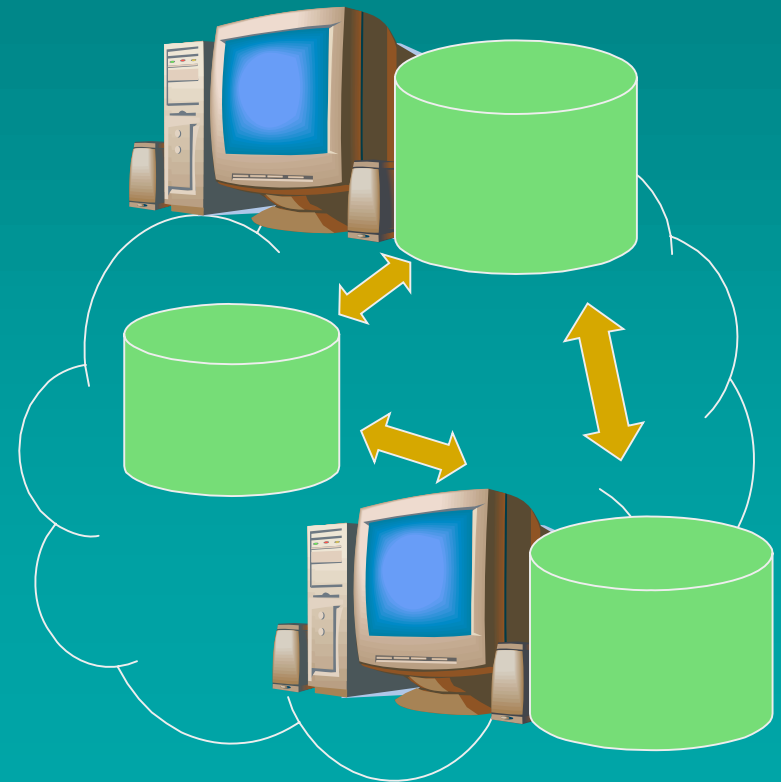
Data Library Creation

Desired Results...

- **Accurate Spatial Domain for Each Dataset**
- **Datasets Summary in a Database Format Compatible with I&M Standards**



Datasets



Modernized Data Library

Watershed-Based Data Library

Based on
NPS Dataset Catalog

The screenshot displays the 'Dataset Catalog Entry Form Standard Mode' window. The title bar reads 'Dataset Catalog Entry Form Standard Mode'. The main window title is 'NPS Information Resources Dataset Catalog'. The interface is divided into several sections:

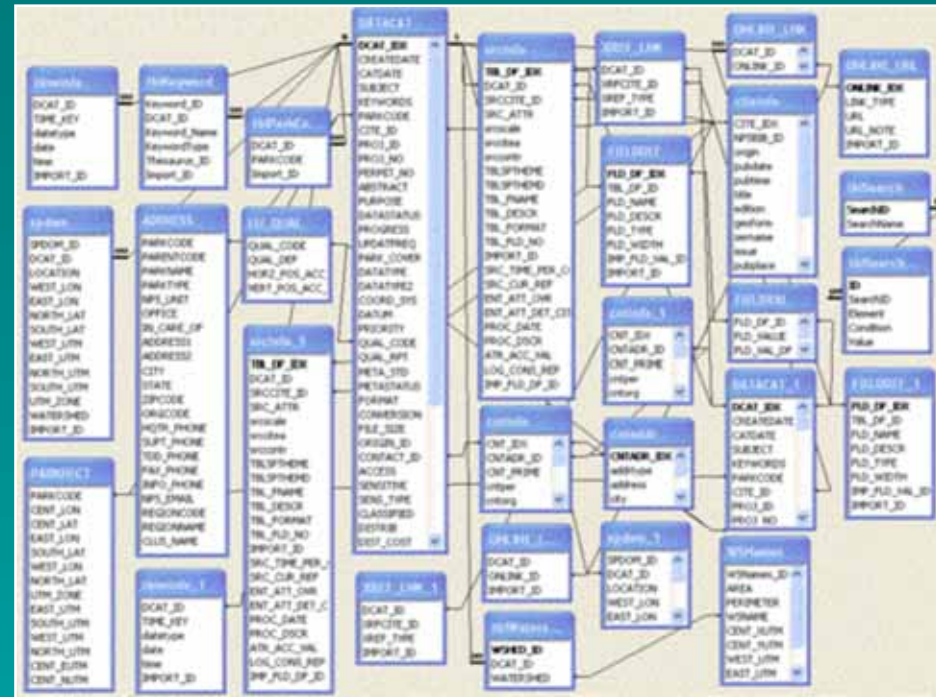
- Contact:** Includes fields for 'UnitCode(s)', 'Unit Info', 'Create Date', and 'Cat. Date'.
- Dataset Title:** 'Water Quality Tests'. Includes fields for 'Version', 'Proj. ID', 'Project No.', and 'Contact'.
- Keywords:** A list of keywords with a search icon.
- Abstract:** A text area for the abstract.
- Purpose:** A text area for the purpose.
- Related Citations:** A section with tabs for 'Related Docs', 'Related Data', and 'Source'.
- Table/Layers:** A table with columns for 'Source Info', 'Type', 'Edit Type', and 'Scale'.
- Dataset Date(s):** Fields for 'Single', 'Begin', 'End', and 'Multiple'.
- Update Frequency:** Fields for 'Update Frequency', 'Status', and 'Progress'.
- ID:** A field for the dataset ID.
- Metadata Information:** Fields for 'Metadata Contact', 'Status', 'Standard', 'Version', and 'Priority'.
- Data Protection Information:** Fields for 'Sensitive?' and 'View' (set to 'LITE').
- Record Operations:** Buttons for 'Create New Record', 'Copy Current Record', 'Delete Current Record', 'Export FGBC File', 'Export FGBC 187', 'Import FGBC At File', 'Save Record', 'Find Duplicates', and 'Reports'.

At the bottom, a status bar shows 'Record: 14 of 5'.

Database Creation

Data Set Matrix...

- Relationships
- Data Dictionary
- Quality Assurance
- Interconnectivity with other datasets



Field Name	Data Type	Description
WSNames_ID	AutoNumber	Unique record ID for records in this table
AREA	Number	Watershed's area
PERIMETER	Number	Watershed's perimeter
WSNAME	Text	Watershed name
CENT_XUTM	Number	UTM easting of the centroid of the watershed boundary
CENT_YUTM	Number	UTM northing of the centroid of the watershed boundary
WEST_UTM	Number	UTM easting of the westernmost watershed boundary
EAST_UTM	Number	UTM easting of the easternmost watershed boundary
NORTH_UTM	Number	UTM northing of the northernmost watershed boundary
SOUTH_UTM	Number	UTM northing of the southernmost watershed boundary

Field Name	Data Type	Description
ID	AutoNumber	Unique record ID for records in this table
SearchID	Number	Index number field that matches SearchID in tblSearch table
DCAT_ID	Number	Search result dataset's unique ID (DCAT_ID)
SUBJECT	Text	Search result dataset's subject
ABSTRACT	Text	Search result dataset's abstract

Forms

Watershed-Based Library Main Menu



The National Park Service
Inventory and Monitoring
Watershed-Based Data Library
Delaware Water Gap NRA
Version Number: 1 Release Date: 12/01/2004

[Application Report](#)
[Watershed-Based Data Library Contact](#)
[I&M Program Contacts](#)
[Dataset Catalog Webpage](#)

Data View
 Standard Mode
 "LITE" Mode

 Browse Datasets
 Tools
 Add New Dataset
 Reports
 Search Datasets
[Exit Application](#)

Tools

Library Tools



[File Links](#)
[Import Metadata Text File](#)
[Close](#)

Library Entry Form Standard Mode

Contact Watershed-Based Data Library Library Help

View: [Change to LITE Mode](#) [Close](#)

Dataset General Info | Dataset Details | Dataset Geographic Extent

UnitCode(s): DEWA Create Date: 20041214
Unit Info: Dataset Date: 01-03-2005

Dataset Title: Aquatic Plants
Version: Proj. ID:
Permit #: Proj. No:

Contact: Geta Draguz - Delaware W/G
Abstract: Subject: Vascular Plants
Aquatic Plants Survey

Purpose:
Monitoring the inst.

Data Protection Information
Sensitive?: No
Sens. Type:
Classification: Public
Restrictions:

Metadata Information
Metadata Contact:
USGS
Status: Complete
Standard: FGDC
Version:
Priority:

Record Operations
[Create New Record](#) [Copy Current Record](#) [Delete Current Record](#)
[Export FGDC File](#) [Export FGDC 1&7](#) [Import FGDC .txt File](#)
[Save Record](#) [Find Duplicates](#) [Reports](#)

Record: 14 of 3

Main Menu

Watershed-Based Library Main Menu



The National Park Service
Inventory and Monitoring
Watershed-Based Data Library
Delaware Water Gap NRA
Version Number: 1 Release Date: 12/01/2004

[Application Report](#)

[Watershed-Based Data Library Contact](#)

[I&M Program Contacts](#)

[Dataset Catalog Webpage](#)

Data View

Standard Mode

"LITE" Mode



Browse Datasets



Tools



Add New Dataset



Reports



Search Datasets

[Exit Application](#)

Add/Edit Records

- LITE/Standard Interface
- General Info Entry Tab
- Details Entry Tab
- Geographic Extent Entry Tab

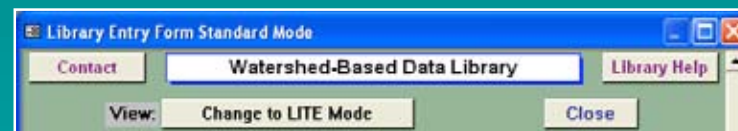
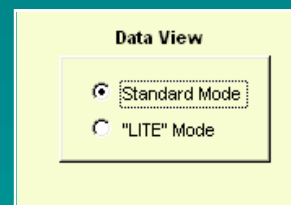
The screenshot shows a software window titled "Library Entry Form Standard Mode" for the "Watershed-Based Data Library". The interface includes a "View:" section with a "Change to LITE Mode" button and a "Close" button. Below this are three tabs: "Dataset General Info", "Dataset Details", and "Dataset Geographic Extent". The "Dataset General Info" tab is active, showing fields for "UnitCode(s)" (DEWA), "Unit Info", "Create Date" (20041214), and "Dataset Date" (01-03-2005). The "Dataset Title" is "Aquatic Plants". Other fields include "Version", "Permit #", "Proj. ID", and "Proj. No.". The "Contact" field is "Geta Dragut - Delaware Wal". The "Abstract" is "Aquatic Plants Survey" and the "Subject" is "Vascular Plants". The "Purpose" is "Monitoring the river". There are two sections: "Data Protection Information" with fields for "Sensitive?", "Sens. Type", "Classification", and "Restrictions"; and "Metadata Information" with fields for "Metadata Contact", "Status", "Standard", "Version", and "Priority". At the bottom, there is a "Record Operations" section with buttons for "Create New Record", "Copy Current Record", "Delete Current Record", "Export FGDC File", "Export FGDC 1&7", "Import FGDC .txt File", "Save Record", "Find Duplicates", and "Reports". The status bar at the bottom indicates "Record: 14 of 3".

Add/Edit Records

- LITE/Standard Mode -

LITE Mode

- Simplified Data Entry
- Minimally FGDC-compliant metadata record
- Hides Fields of the Main Entry Form



Add/Edit Records

- General Info Entry Tab -

- Unit Code(s)
- Title/Version/Permit
- Contact/Metadata
- Abstract/Purpose
- Data Protection Info

Dataset General Info		Dataset Details	Dataset Geographic Extent
Unit Code(s):	DEWA	Create Date:	20041214
Unit Info	*	Dataset Date:	01-03-2005
Dataset Title: Aquatic Plants			
Version:		Proj. ID:	
Permit #:		Proj. No:	
Contact:	Geta Dragut - Delaware Wal		
Abstract:	Aquatic Plants Survey		
Subject:	Vascular Plants		
Purpose:	Monitoring the river.		
Data Protection Information		Metadata Information	
Sensitive?:	No	Metadata Contact:	USGS
Sens. Type:		Status:	Complete
Classification:	N/A	Standard:	FGDC
Restrictions:		Version:	
		Priority:	

Add/Edit Records

- Details Entry Tab -

- **Date(s)**
- **Status/Progress**
- **Keywords/Comments**
- **File Location/Distribution**
- **Data Quality**

The screenshot shows the 'Dataset Details' entry tab with the following fields and values:

- Dataset Date(s):** (mm/dd/yyyy)
 - Single: []
 - Begin: 19940101
 - End: 19941231
 - Multiple: []
- Update Frequency:** As needed
- Status:** Survey Finished in
- Progress:** Complete
- ID:** 17
- CITE_ID:** 13

Keywords section:

- Keywords: Aquatic Theme
- Thesaurus: Vascular Theme
- Plants Theme

Format: Microsoft Windows 2000 Version 5.1 (Build 2600) Service Pa

Comments: Use_Constraints: None

Conversion? No File Size (MB): 0.153

File Location: []

At Park? No Distribution Cost: []

Distribution: []

Online Link: \\UNPDEWASHERIDANVandM\DEWA Biotic Inventories

Data Quality: [] (Blank or Null) Unknown Data Quality

Quality Report: []

Add/Edit Records

- Geographic Extent Tab -

- Watershed(s)
- Bounding Rectangle(s)
- Coverage/Data Type

Dataset General Info | Dataset Details | Dataset Geographic Extent

Watersheds:

WATERSHED
▶ Raymondskill Cree
* []

Add Watersheds Bounding Rectangles

ADD Additional Bounding Rectangle

WEST UTM	SOUTH UTM	NORTH UTM	EAST UTM	Location
▶ 473610.3	4545063.6	4604779.5	526102.5	Pike Co sites
499563.6	4568058.2	4579992.7	513996.0	Raymondskill Creek

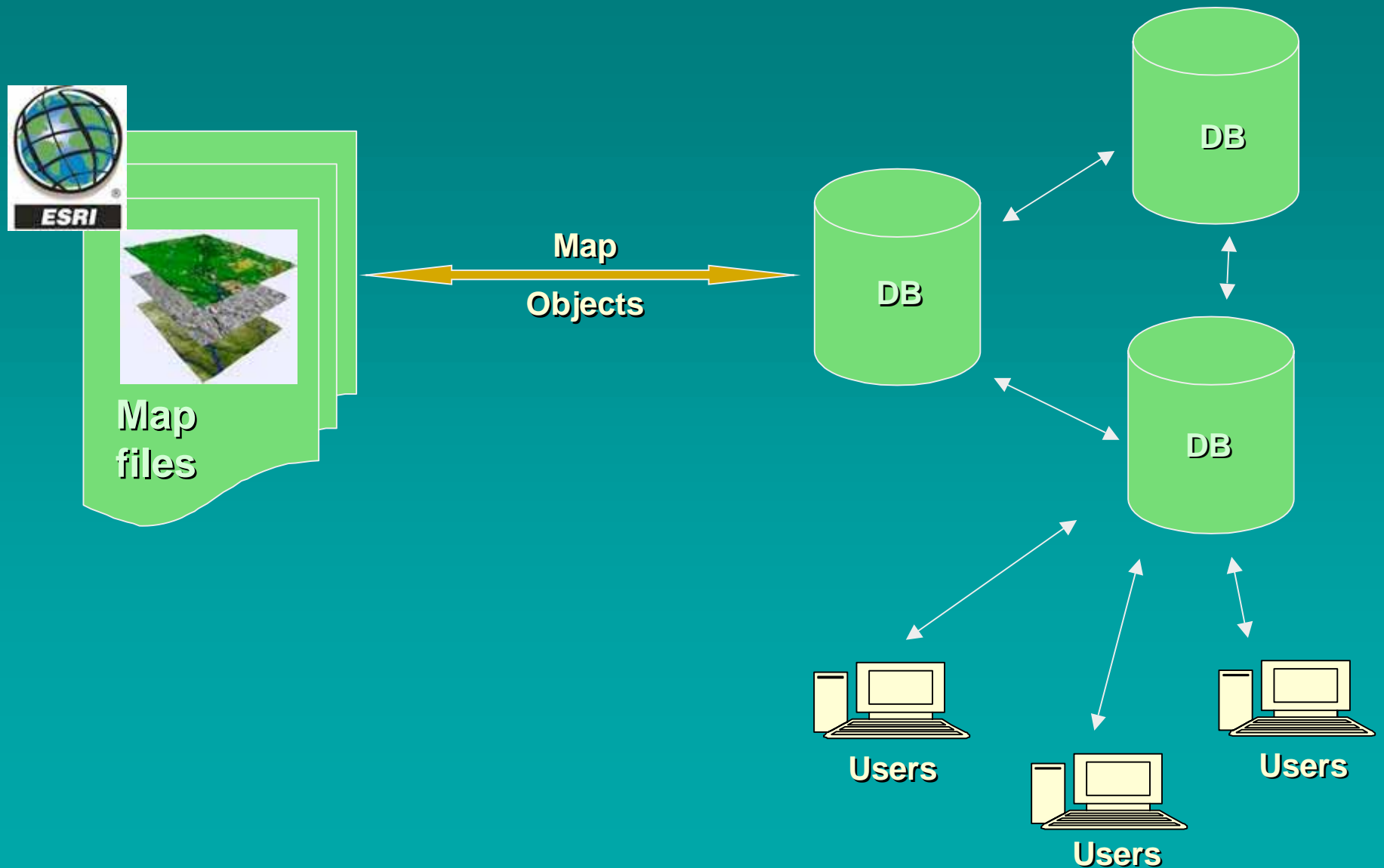
Coverage: []

Data Types Information []

Coord. System: []

Datum: []

GIS Embedded Functionality



Map Tool

Dataset Boundary Data

Spatial Domain Data

Help BOUNDING COORDINATES FOR DATASET

Unit Info Delaware Water Gap National Recreation

Location:

LONGITUDE/LATITUDE

West: East:
North: South:

UTM EASTING/NORTHING UTM Zone:

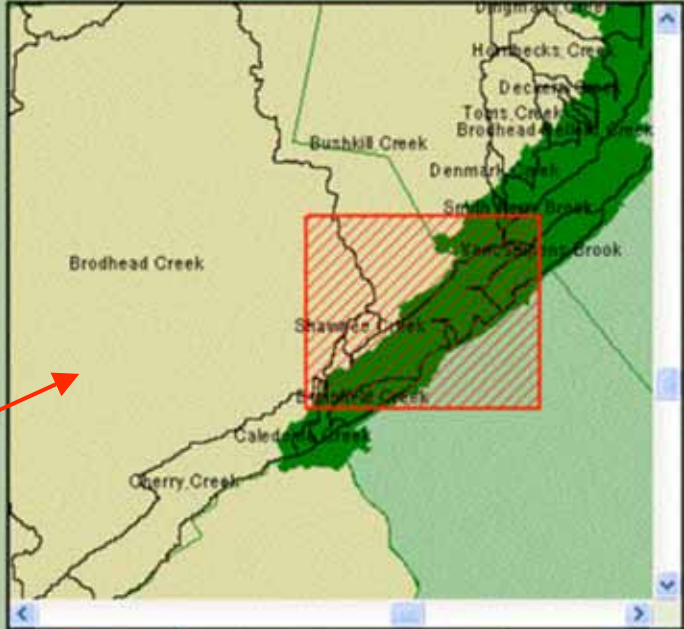
West: East:
North: South:

Note: Defaults are based on the park boundary.

Use Map to navigate to the Dataset Location and define bounding coordinates

Map : Form

BOUNDING RECTANGLE DETERMINATION



Tools

- Zoom In
- Zoom Out
- Fixed Zoom Out
- Pan
- Full Extent
- Draw Location Box
- Erase Location Box
- See/Rescale labels

Zoom to Watershed

Info COORDINATES FOR DATA SET (Bounding rectangle or location centroid)

Note: These are based on the dataset location box boundary. Please navigate to the Dataset location and define the bounding rectangle by drawing a box using the appropriate tool.

UTM NORTHING/EASTING Zone:

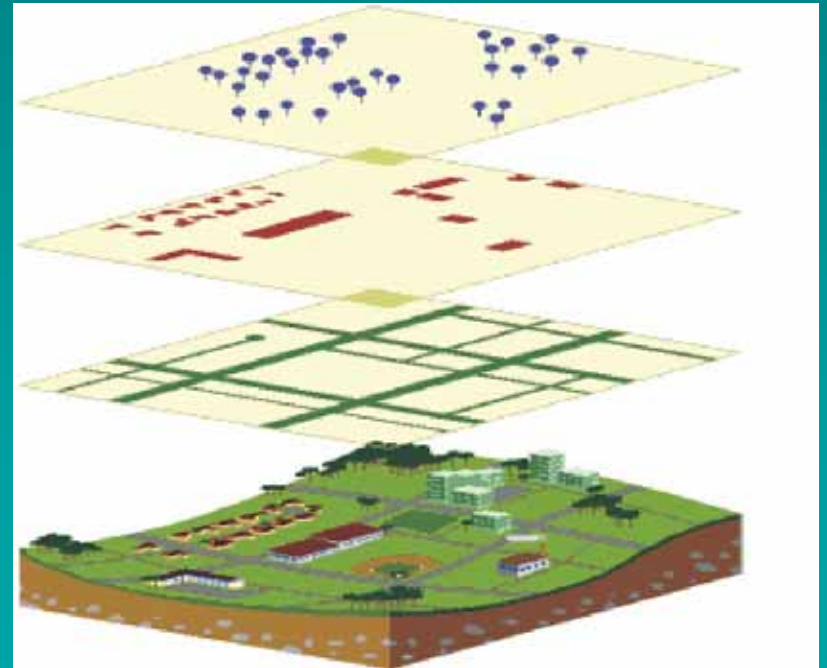
OR

West: East:
North: South:

Note: Only after you set the Coordinates

GIS Data Layers Accessed

- **Watersheds Boundary**
- **Park(s) Boundary**
- **River Centerline**
- **Counties Boundary**
- **Roads & Trails**



Record Operations

- **Search Records**
- **Add / Edit / Find Duplicates**
- **Extract Metadata**
- **Generate Reports**



Search Datasets



- Search by Content
- Search by Geographic Location
- Search by Date(s)
- Or Combination of Them

Search Datasets Form

LIBRARY DATASET SEARCH

Content Info | Geography | Date

Define search criteria

Subject:

Search Element: Condition: Value:

Element	Condition	Value
▶ Abstract	Includes the word(s)	Water
Theme keyword	Equals	Pollution
Location	Includes the word(s)	Delaware

Datasets being searched has to meet all search criteria (criteria are ANDed)

SEARCH RESULT

Search with Content Info Criteria

- **Subject**
- **Define Search Elements**
- **Set Value**
- **Add Search Conditions**

Content Info | Geography | Date

Define search criteria

Subject:

Search Element: Condition: Value:

	Element	Condition	Value
▶	Abstract	Includes the word(s)	Water
	Theme keyword	Equals	Pollution
	Location	Includes the word(s)	Delaware

Datasets being searched has to meet all search criteria (criteria are ANDed)

Search with Geographic Criteria

- **Zoom to Watershed**
- **Draw AOI Box**
- **Or Type Coordinates**
- **Set Criteria**
 - **Entirely within Location**
 - **Overlapping Location**

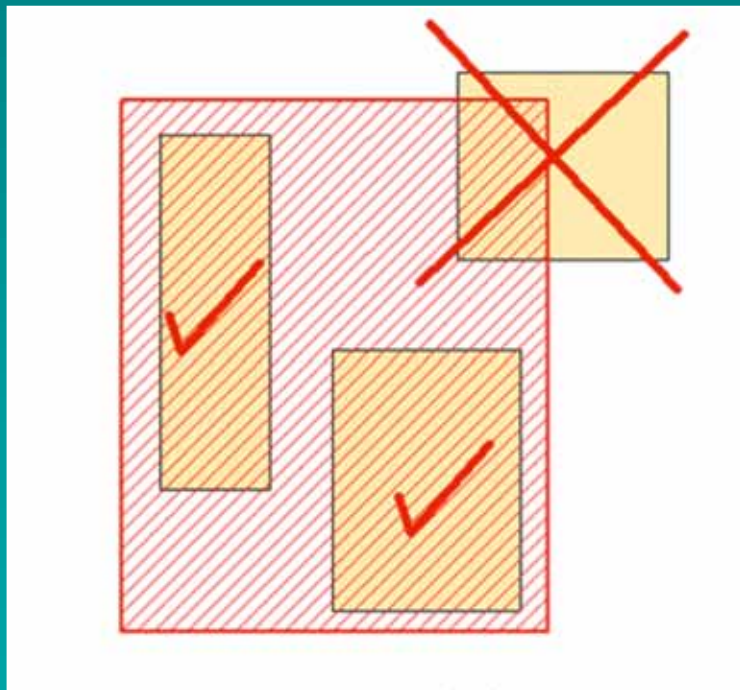
The screenshot displays a search interface with three tabs: "Content Info", "Geography", and "Date". The "Geography" tab is active. A checkbox labeled "Use geographic location in search" is checked and circled in red. Below this, there are two main sections: "Draw a search area box" and "Zoom to a watershed".

The "Draw a search area box" section includes a toolbar with icons for drawing a box, a line, a circle, a polygon, a hand, a magnifying glass, and a search icon. Below the toolbar is a map showing a watershed area with a red box drawn over it.

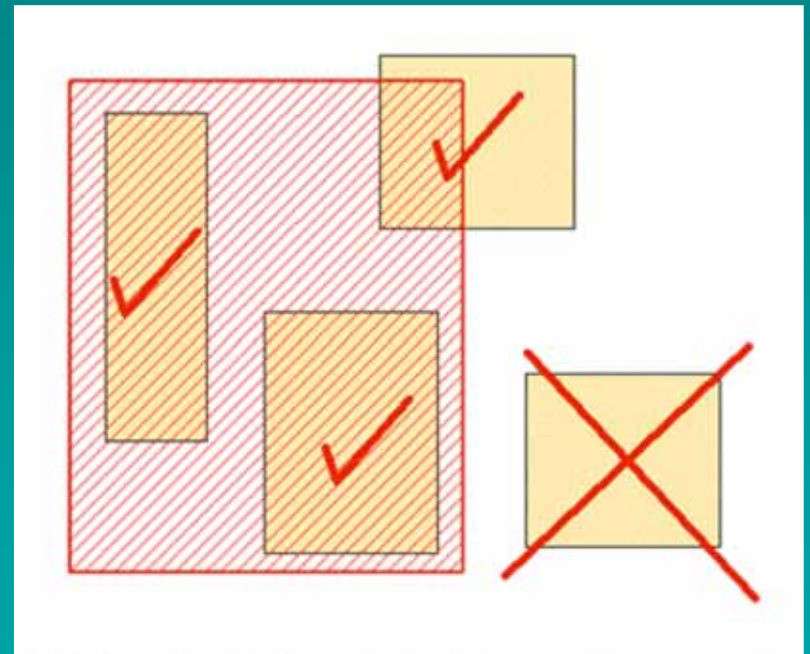
The "Zoom to a watershed" section has a dropdown menu with "Raymondskill Creek" selected. Below this is a section for "Specify coordinates of a box" with input fields for North (4579992.721), West (499563.6354), East (513996.0282), and South (4568058.155). At the bottom, there are two radio buttons: "Find data entirely within location" (selected) and "Find data overlapping location".

Search with Geographic Criteria

- Entirely within Location -



- Overlapping Location -



Search with Temporal Criteria

- Use Pop-Up Calendar
- Set Time Interval
 - “Before” a Specific Date
 - “During” a Specific Period
 - “Equal To” a Specific Date
 - “After” a Specific Date
 - “During the previous” Number of Days/Months/Years

The screenshot shows a search interface with tabs for 'Content Info', 'Geography', and 'Date'. The 'Date' tab is active. There are two radio button options: 'All (The search will not take in consideration any dates)' and 'Find Dataset Date(s)'. The 'Find Dataset Date(s)' option is selected. Below this, there are two rows of options. The first row has a dropdown menu set to 'During', followed by a date input field containing '1/24/2003', a 'through' label, and another empty date input field. The second row has a radio button for 'during the previous', followed by an empty input field and a dropdown menu for 'Day(s)'. A pop-up calendar window titled 'Set the end date' is overlaid on the bottom right. It shows the month of January for the year 2005. The days of the week are labeled 'Su', 'Mo', 'Tu', 'We', 'Th', 'Fr', 'Sa'. The date 24 is circled in red. The calendar has 'Ok' and 'Cancel' buttons at the bottom.

Search Results

- Generate Reports
- Edit Datasets
- Refine Search
- New Search

SEARCH RESULT - 7 record(s) matching found

DCAT_IDX	SUBJECT	ABSTRACT
17	Vascular Plants	A data processing task was neede
19	Watershed Management/Assessment	The DRBC is conducting a Watershe
21	Water Resources	The Delaware River Basin Compact
22	Water Quality	Since 1969 DRBC has conducted su
23	Water Quality	Since 1984, DRBC and NPS have cc

Selected Dataset Details/Report Selected Dataset Details/EDIT All Datasets Report



Reports



Watershed-Based Data Library Record - Summary 24 Jan 2005

DATASET TITLE	PROJECT ID	FCM	DATE	CONTACT
An Evaluation of Stream Water Quality Data (1992-1998) in Relation to the Special Protection Waters Regulatory Standards for the Delaware River	DEWA	1992001	19941201	Richard Evans
Aspects Plans	DEWA	1994001	19941201	Gene Dragut
Environmental Quality of Five County Streams using Measurement Techniques	DEWA	2000001	20000000	Harvath Stefan
Recreational Biological Criteria For The Middle Delaware Scenic And Recreational River	DEWA	1994001	19941201	
Water Resources Program Report	DEWA	1996001	19961201	
Watershed Prioritization Workshop Report	DEWA			Parsons V-Cross

WATERSHED-BASED DATA LIBRARY December, 2004

Library Report: Aspects Plans

DEWATER
Delaware Water Gap Federal Recreation Area (DEWA)
Upper Delaware Scenic & Recreational River (USDR)

Library Title: Delaware Water Gap National Recreation Area
Library Title: Upper Delaware Scenic & Recreational River

Project ID: 1994001
FCM: 1994001
DATE: 19941201
CONTACT: Gene Dragut

Aspects Plans
This report provides a summary of the Aspects Plans for the Delaware Water Gap National Recreation Area. It includes information on the location of the river, the quality of the water, and the impact of human activities on the river. The report also provides information on the various uses of the river, such as fishing, boating, and recreation.

Library Report: Aspects Plans

DEWATER
Delaware Water Gap Federal Recreation Area (DEWA)
Upper Delaware Scenic & Recreational River (USDR)

Reports

Data Library Reports

- List of All Library Records
- Report of Current Dataset
- Reports of All Library Datasets



Gene Dragut
GIS Analyst

Results...

- **Significantly improved usability of existing datasets**
- **Designed GIS tools to be used inside of MS Access Database**
- **Gained the ability to enter and search data using a GIS Interface**
- **Produced a utility that will store and manage all datasets available**

Contact:



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GIS Analyst

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National Park Service

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