The Research Agenda of the Wisconsin Coastal Atlas

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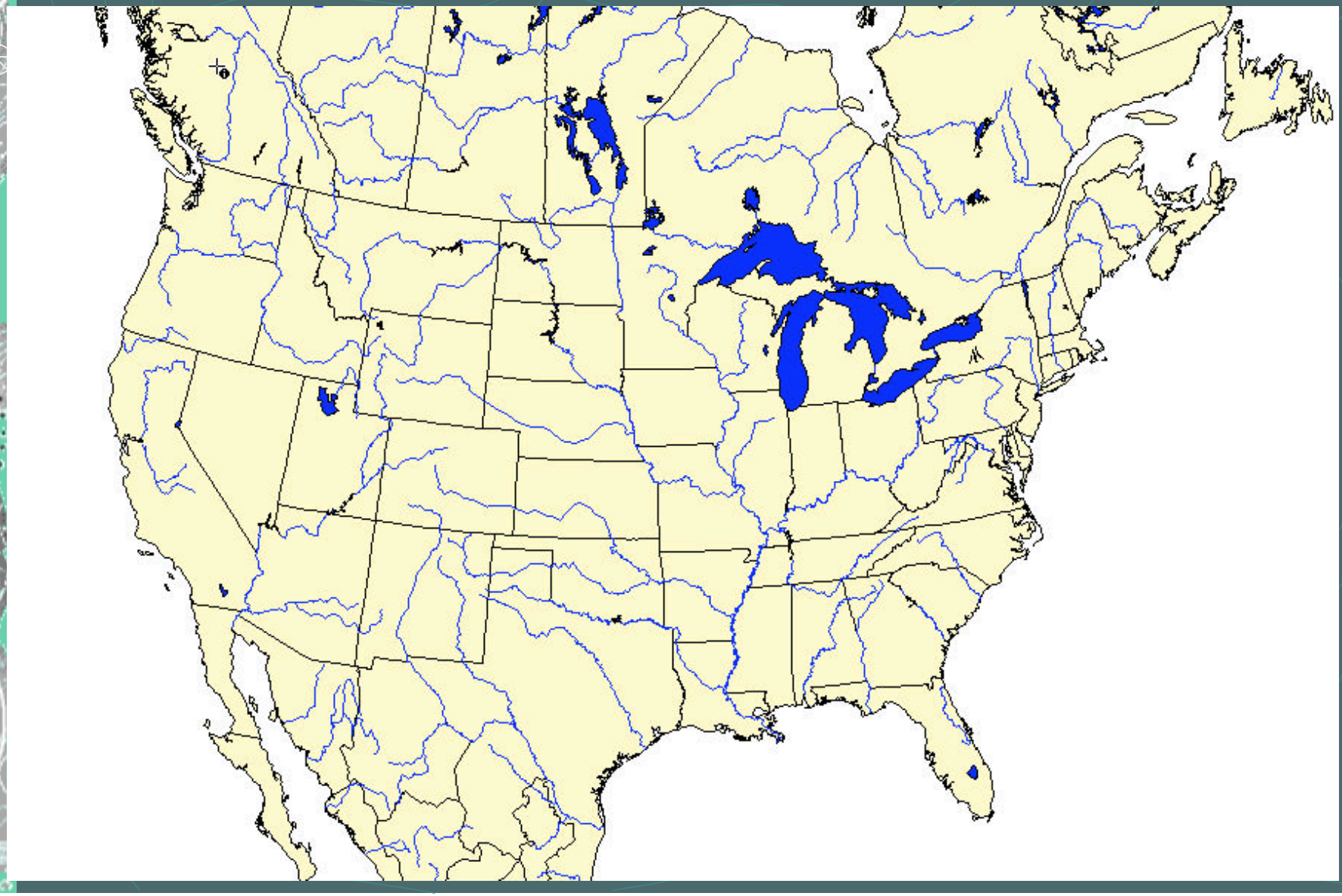
Presentation Outline

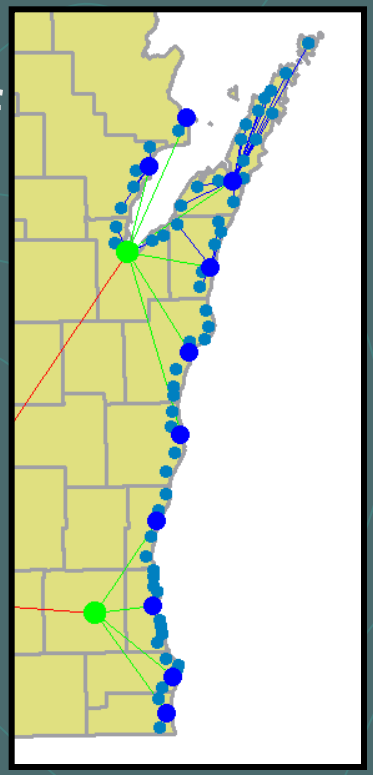
- Background
  - Wisconsin Coastal GIS Applications Project (1994-2009)
- Lessons Learned from Four Data Integration Projects
- The Research Agenda of the Wisconsin Coastal Atlas

Where are we?

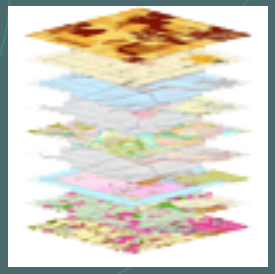


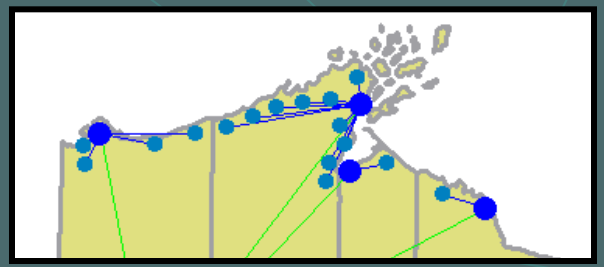
WI Coastal GIS Applications Project

- The mission of the Wisconsin Coastal GIS Applications Project is to teach the application of GIS and related geospatial technologies to support sustainable use of Great Lakes coastal resources.
- The primary audience has been local, regional, and state government professionals.
- A Sea Grant/LICGF partnership started in 1994.

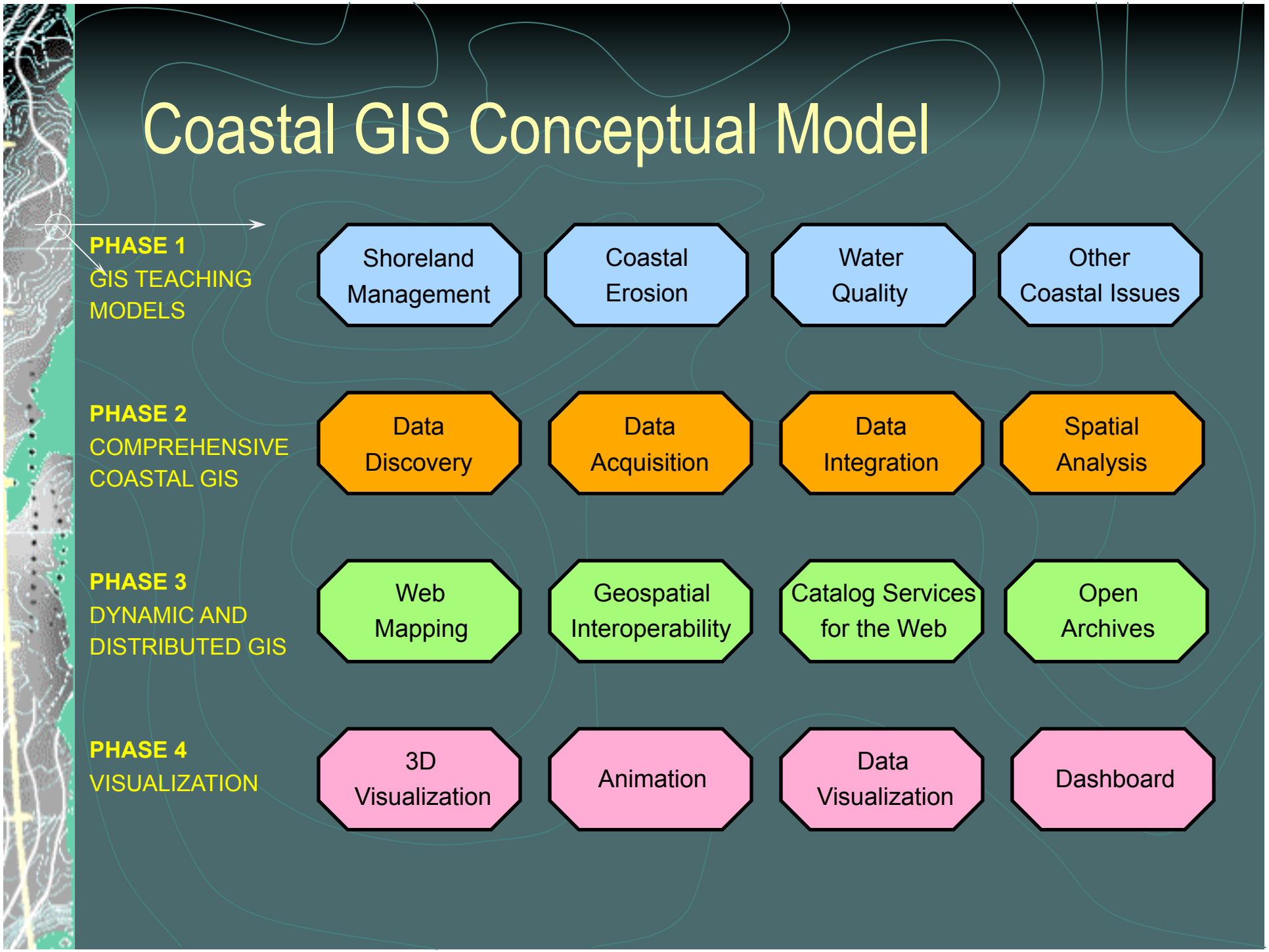


Sea Grant
University of Wisconsin





Coastal GIS Conceptual Model



CGIS Project Timeline

- 1994-96
  - Needs Assessment, Intro to Coastal GIS Training
- 1996-98
  - GIS “Teaching Models”
- 1998-00
  - Mobile GIS lab, LMPDS
- 2000-02
  - Coastal Orthoserver, Map Server, 3D Visualization
- 2002-04
  - LSCMP, Smart growth, Citizen-based land use planning
- 2004-06
  - Coastal visualization, Interoperability
- 2006-08
  - WFS, PSS, Hydrologic Dashboard, GLOS

Phase 1

Phase 2

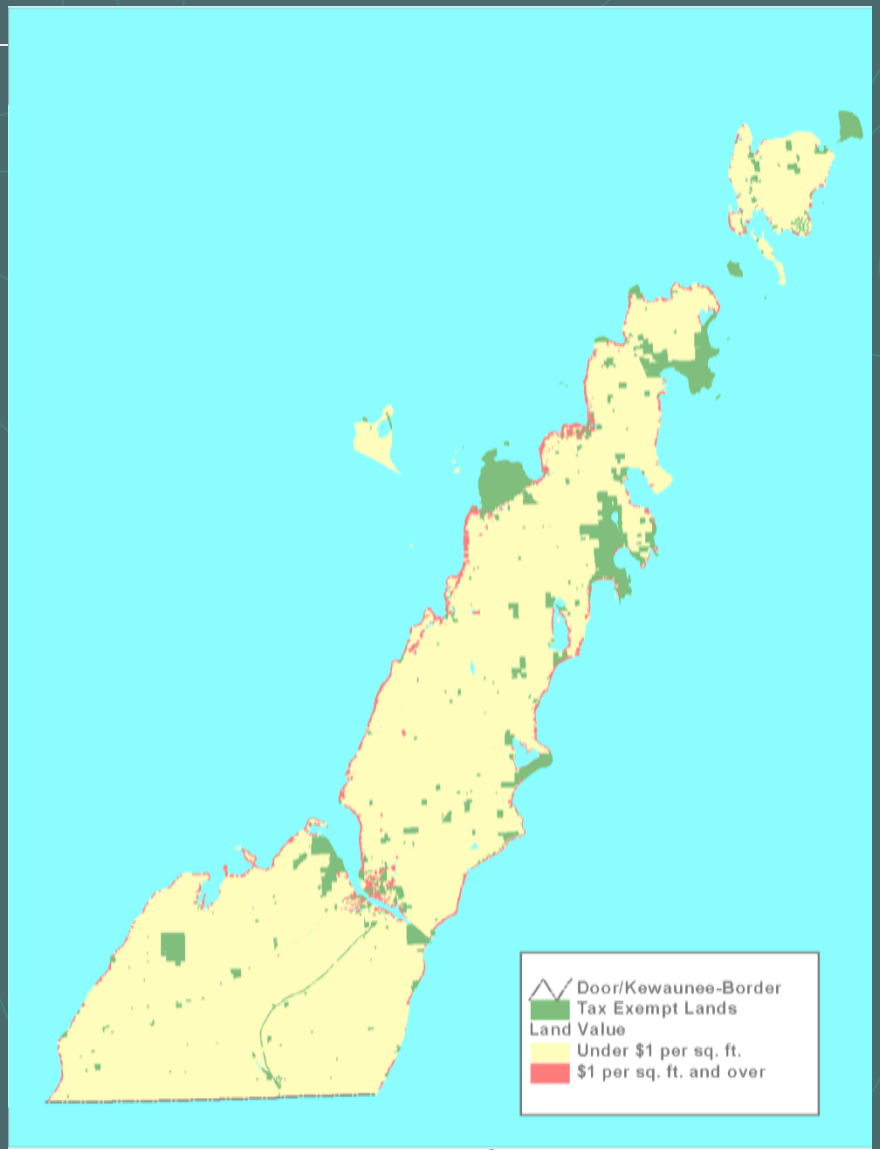
Phase 3

Phase 4

Coastal Data Integration Projects

- Lake Michigan Potential Damages Study (98-00)
  - Funded by U.S. Army Corps of Engineers
- Lake Superior Coastal Mapping Portal (02-04)
  - Funded by NOAA Coastal Services Center
- Wisconsin Coastal Guide (05-07)
  - Funded by Wisconsin Coastal Management Program
- Wisconsin Coastal Data Catalog (08)
  - Collaboration with Puneet Kishor and Sam Batzli

Lake Michigan Potential Damages Study



As part of a Corps of Engineers' project to assess potential damage along Lake Michigan arising from varying lake levels, digital spatial data including parcels, base maps, orthophotos, land use/ land cover, and soils were acquired and integrated for coastal counties and cities in Wisconsin.

Assessed Value of the Coast

Assessed Value of Parcels that Intersect the 1000' Jurisdiction Stipulated in State Shoreland Zoning Regulations (NR115)

Study Unit	Land Value	Improvement Value	Total Value
Marinette County[1]	33,230,950	73,506,600	$ 106,737,550
Oconto County	$ 17,715,600	$ 20,575,100	$ 38,290,700
Brown County	parcels as lines	parcels as lines	parcels as lines
Door County	$ 993,054,820	$ 908,584,360	$ 1,901,639,180
Kewaunee County	$ 32,691,220	$ 70,433,430	$ 103,124,650
Manitowoc County	no local hydro	no local hydro	no local hydro
City of Two Rivers	parcels as lines	parcels as lines	parcels as lines
City of Manitowoc	$ 16,440,400	$ 70,568,600	$ 87,009,000
Sheboygan County	$ 62,669,016	$ 53,410,850	$ 116,079,866
City of Sheboygan	parcels as lines	parcels as lines	parcels as lines
Ozaukee County	parcels as lines	parcels as lines	parcels as lines
Milwaukee County	no tax roll received	no tax roll received	no tax roll received
City of Milwaukee	parcels as lines	parcels as lines	parcels as lines
Racine County[2]	$ 7,535,700	$ 17,694,400	$ 25,230,100
Kenosha County	$ 75,868,100	$ 176,258,500	$ 252,126,600
Totals	**$ 1,239,205,806**	**$ 1,391,031,840**	**$ 2,630,237,646**

[1]Figures for Marinette County include only the Town of Peshtigo.

[2]Gaps exist in the local hydro representation of the Lake Michigan shore.

Issues: Digital Parcel Integration

- Data Acquisition Issues (primarily institutional)
  - Number of contact points for data requests
  - Cost of data acquisition
  - Time required to receive data after the request is made
  - Restrictions placed on the use and dissemination of digital data
- Data Integration Issues (primarily technical)
  - Media, file size, documentation, software format, map tiles, compilation methods, coordinate systems, data structure, parcel map/tax assessment data linkage

LMPDS Lessons

- When finished, we had an integrated data base
- The same data sets are used over and over again in coastal analyses
- Can address issues of regional concern
- But… information quickly goes out of date, much effort and cost to keep current
- Researchers and outreach specialists aren't very good spatial data librarians

Lake Superior Coastal Mapping Portal

- The University of Wisconsin Sea Grant Institute and Land Information and Computer Graphics Facility worked to develop a “dynamic and distributed GIS” to support integrated coastal management along the Lake Superior coast of Wisconsin.
  - The two-year project (June 2003 to June 2005) was funded by the NOAA Coastal Services Center.

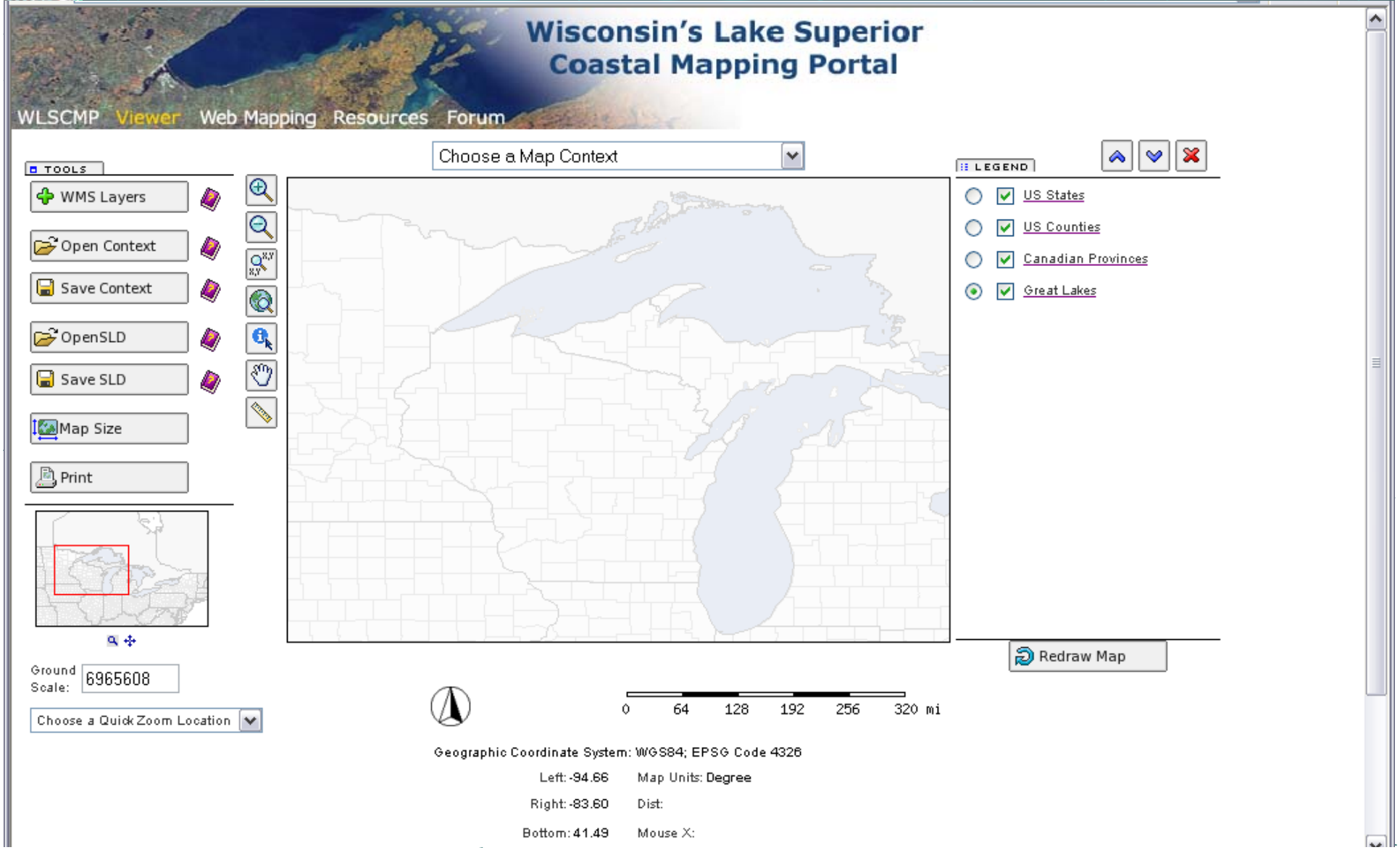


Source: Visualizing the Great Lakes, EPA

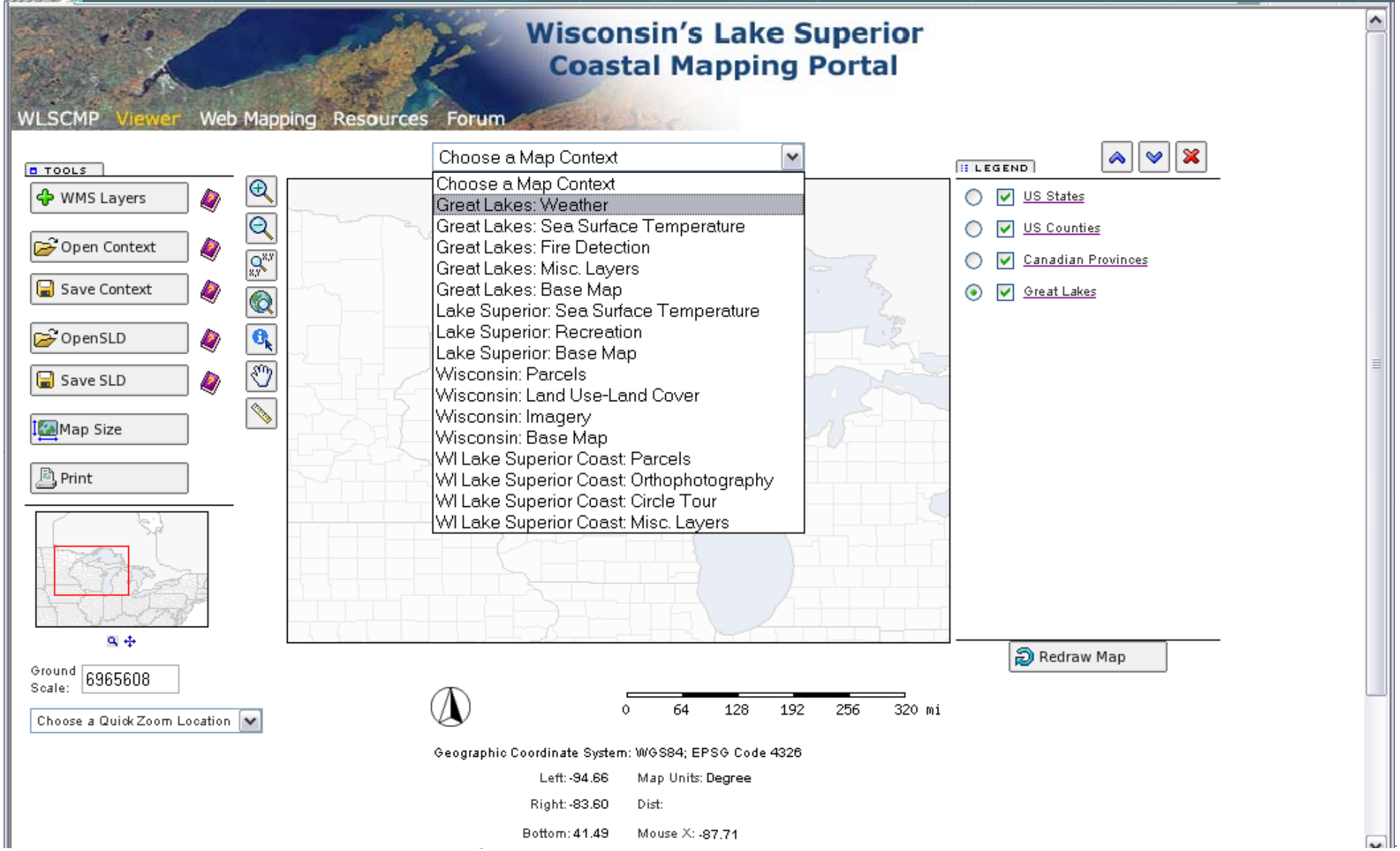
Project Tasks

- The first task involves the development of web mapping sites for coastal data custodians, with a primary focus on county government land information.
- The second task concerns the implementation of interoperable web mapping services that allow integration of disparate GIS data across political boundaries.
- The third task was originally conceived to build upon a successful coastal GIS training program developed as part of the Coastal GIS Applications project to teach local government professional staff, citizens, and other coastal constituents how to use these integrated web mapping services to address coastal issues.

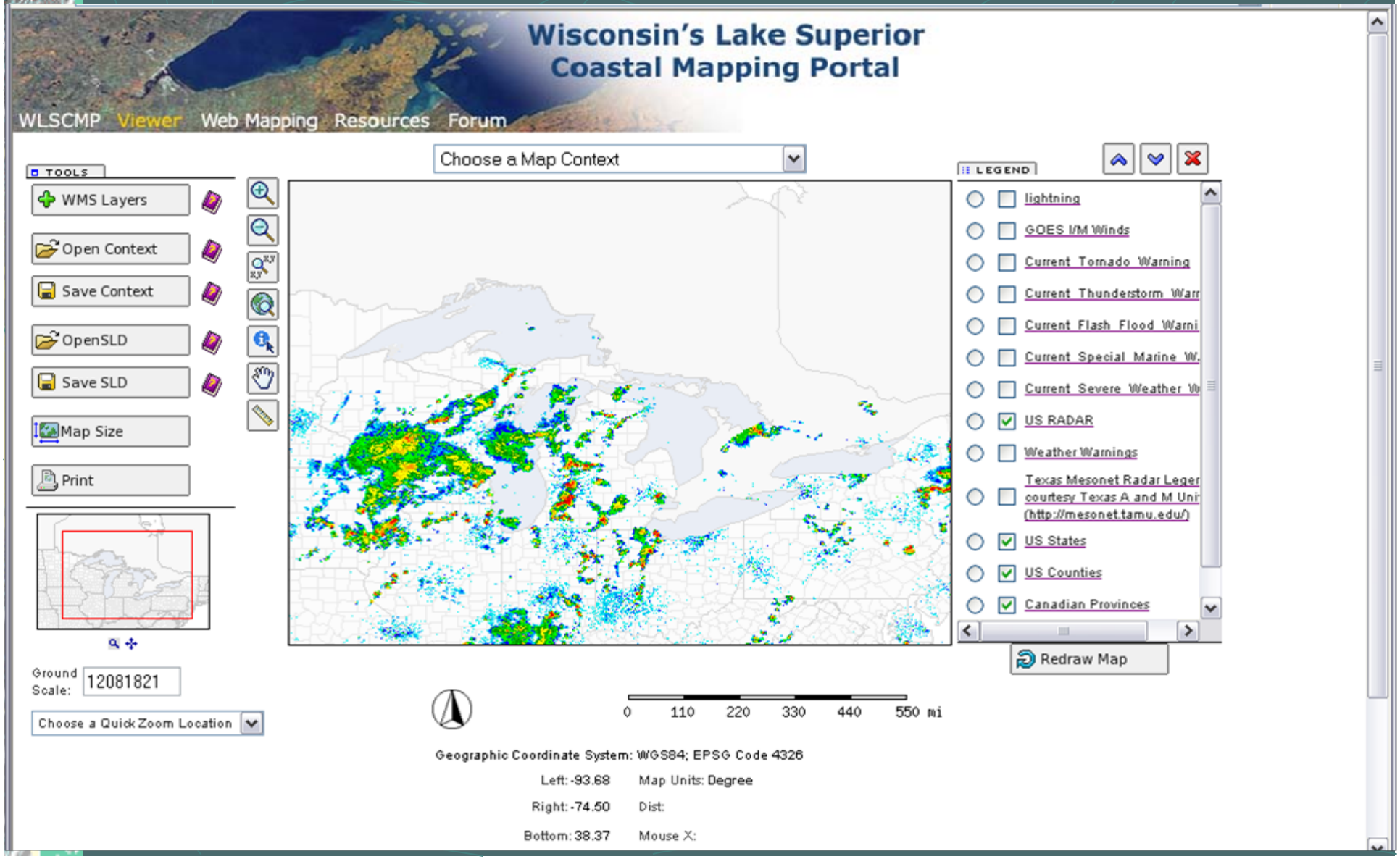
Lake Superior Coastal Mapping Portal

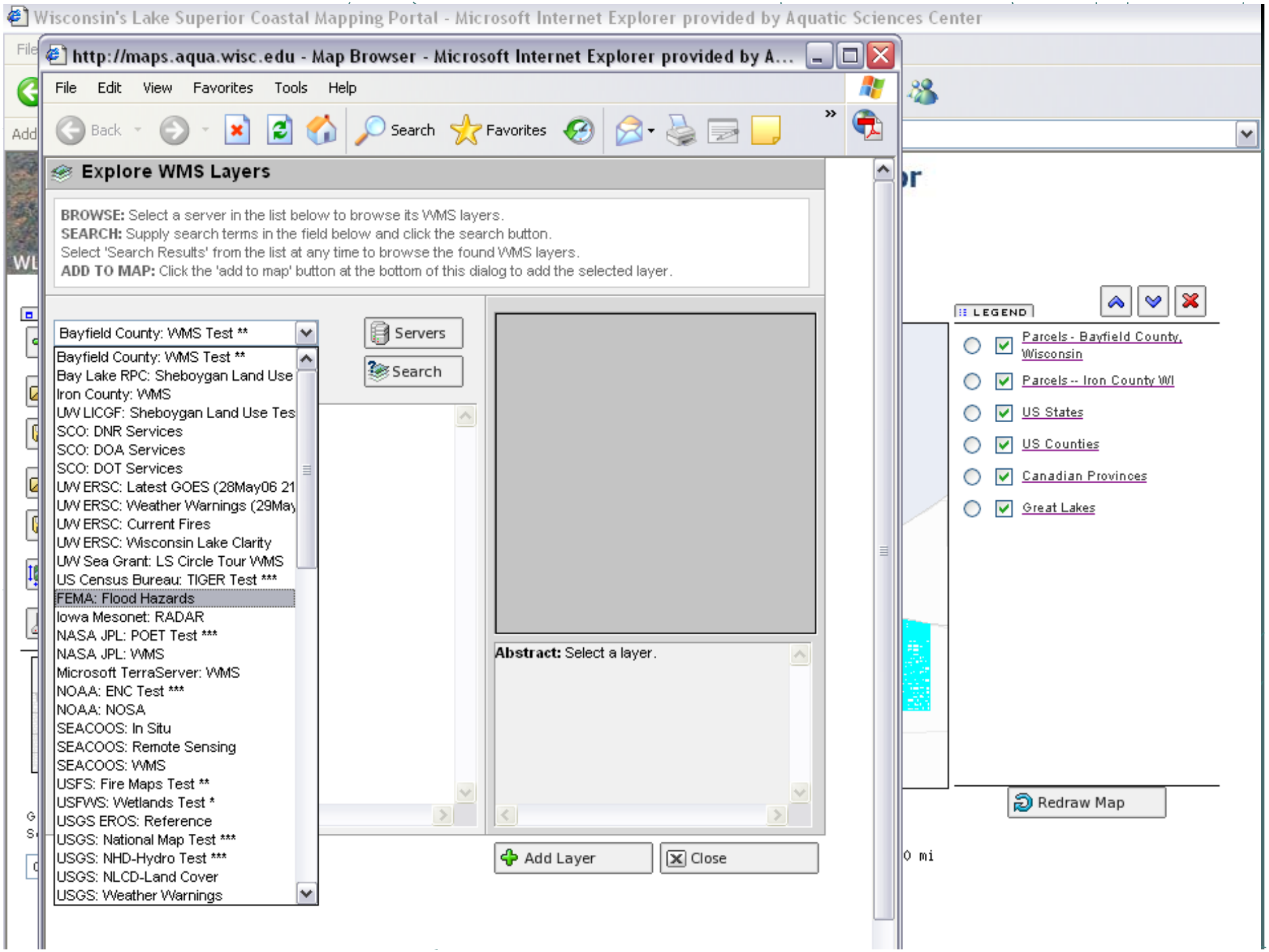


Lake Superior Coastal Mapping Portal



Lake Superior Coastal Mapping Portal




Wisconsin's Lake Superior Coastal Mapping Portal - Microsoft Internet Explorer provided by Aquatic Sciences Center
http://maps.aqua.wisc.edu - Map Browser - Microsoft Internet Explorer provided by A...
File Edit View Favorites Tools Help
Back Search Favorites
Explore WMS Layers
BROWSE: Select a server in the list below to browse its WMS layers.
SEARCH: Supply search terms in the field below and click the search button.
Select 'Search Results' from the list at any time to browse the found WMS layers.
ADD TO MAP: Click the 'add to map' button at the bottom of this dialog to add the selected layer.
Bayfield County: WMS Test **
Servers
Search
Bayfield County: WMS Test **
Bay Lake RPC: Sheboygan Land Use
Iron County: WMS
UW LICGF: Sheboygan Land Use Tes
SCO: DNR Services
SCO: DOA Services
SCO: DOT Services
UW ERSC: Latest GOES (28May06 21
UW ERSC: Weather Warnings (29May
UW ERSC: Current Fires
UW ERSC: Wisconsin Lake Clarity
UW Sea Grant: LS Circle Tour WMS
US Census Bureau: TIGER Test ***
FEMA: Flood Hazards
Iowa Mesonet: RADAR
NASA JPL: POET Test ***
NASA JPL: WMS
Microsoft TerraServer: WMS
NOAA: ENC Test ***
NOAA: NOSA
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SEACOOS: WMS
USFS: Fire Maps Test **
USFWS: Wetlands Test *
USGS EROS: Reference
USGS: National Map Test ***
USGS: NHD-Hydro Test ***
USGS: NLCD-Land Cover
USGS: Weather Warnings
Abstract: Select a layer.
Add Layer
Close
LEGEND
Parcels - Bayfield County, Wisconsin
Parcels -- Iron County WI
US States
US Counties
Canadian Provinces
Great Lakes
Redraw Map

LSCMP Lessons

- While the LSCMP served as an early testbed showing the potential of integrating web mapping services in Wisconsin, it suffered from slow performance and maintenance issues.
- The Chameleon interface proved to be poorly suited to maintain a functional catalog of interoperable web mapping services.

Lake Superior Coastal Mapping Portal

http://maps.aqua.wisc.edu/lscmp/

My Circle Tour Trip

Summer 1996

Rossport

Spirit Tree

Manitoulin Island

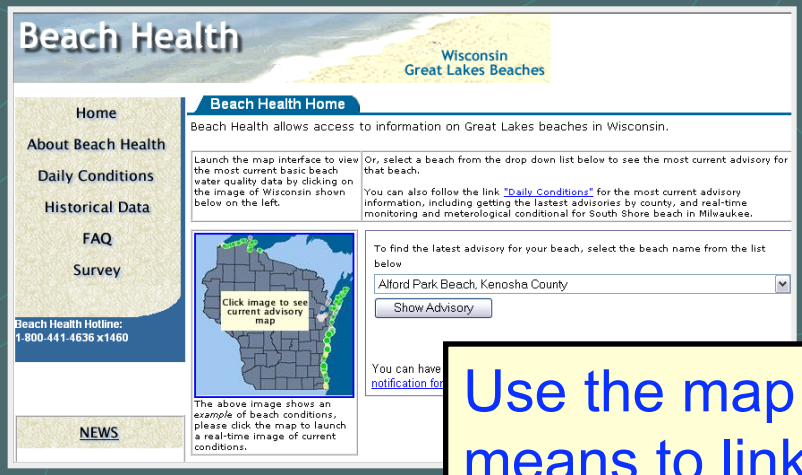
S.S. Badger

Goderich

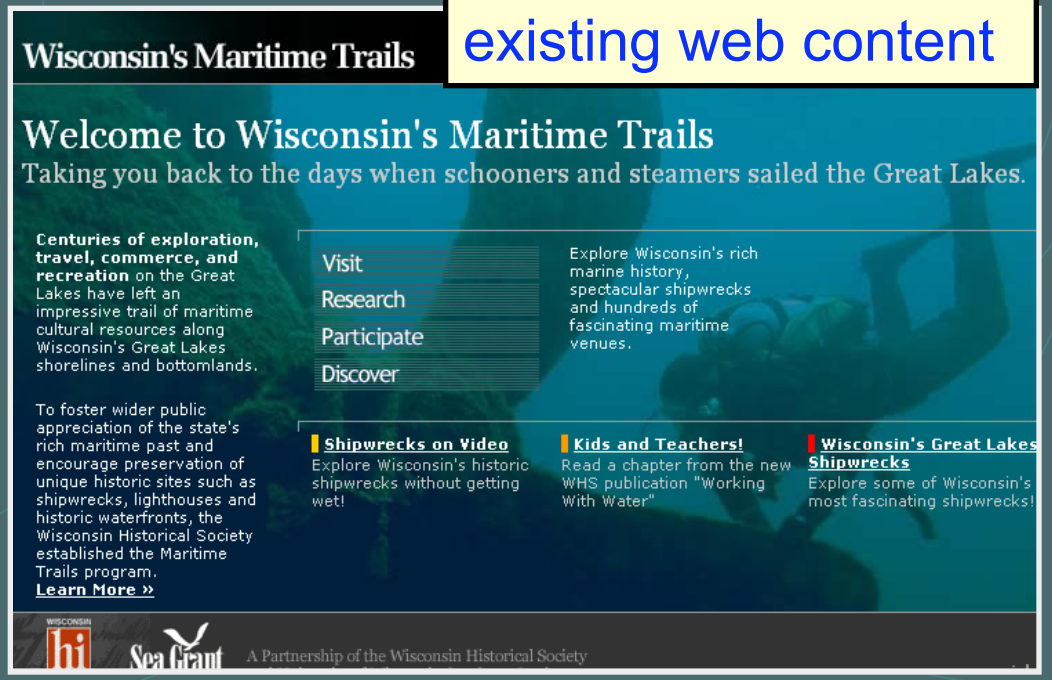
Lake Superior
Lake Huron
Lake Michigan
Lake Erie
Lake Ontario
St. Lawrence River
Ontario
Québec
Wisconsin
Michigan
Illinois
Indiana
Ohio
New York

Great Lakes Circle Tour – Map Features

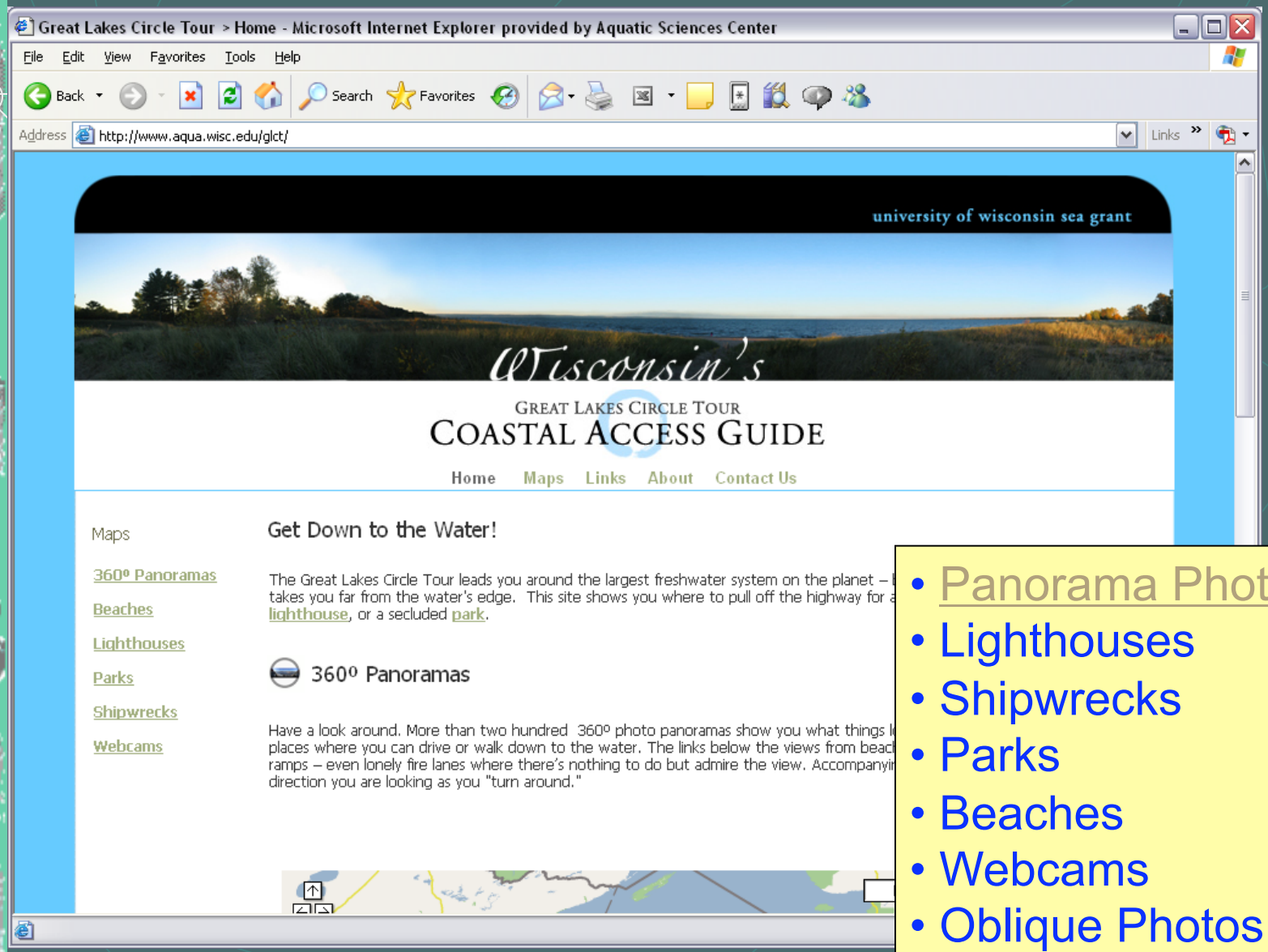
- Land
  - Circle Tour route
  - Parks
- Shore
  - Beaches
  - Lighthouses
  - Boat Access
- Water
  - Shipwrecks
- Viewing
  - Panorama photos
  - Oblique photos
  - Webcams



Use the map as a means to link to existing web content

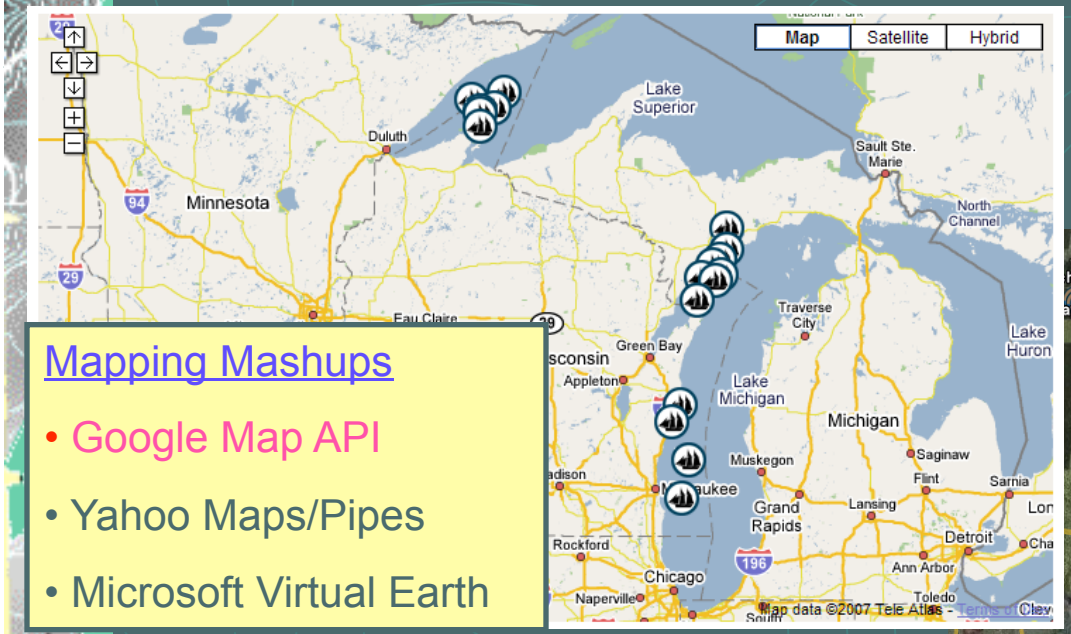


Wisconsin Coastal Guide



- Panorama Photos
- Lighthouses
- Shipwrecks
- Parks
- Beaches
- Webcams
- Oblique Photos

Wisconsin Coastal Guide – Map Interfaces

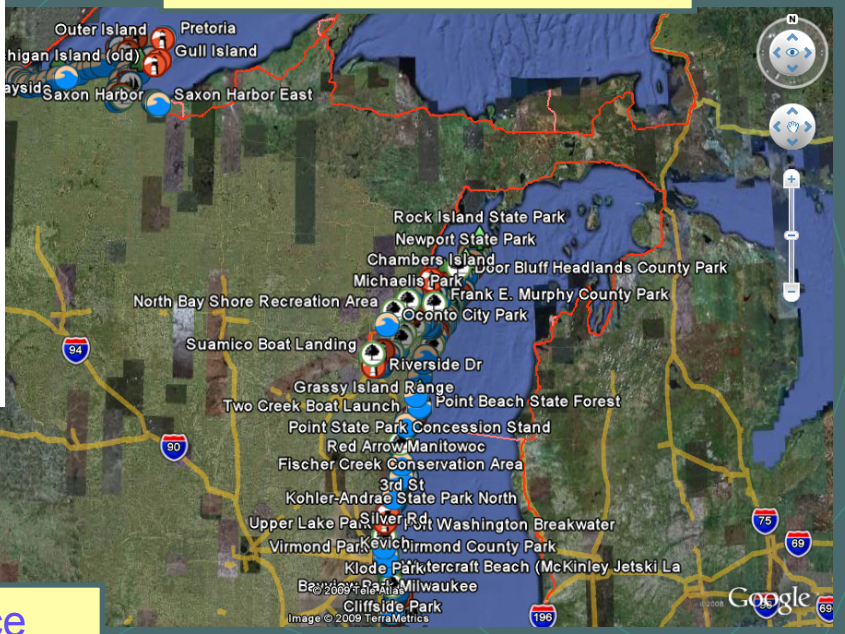


Mapping Mashups

- Google Map API
- Yahoo Maps/Pipes
- Microsoft Virtual Earth

Virtual Globe

- Google Earth
- NASA World Wind



Web Mapping Interface

- OpenLayers
- MapServer/Chameleon
- GeoServer
- ESRI ArcIMS

What are the benefits and drawbacks of different approaches to web mapping?

WCG Lessons

- KML is now an OGC standard that promotes interoperability. Providing a stable URL to the KML files promotes their use in other web mapping applications (i.e. GLOS HarborView)
- This initial foray into the world of mapping mashups has been beneficial in promoting coastal heritage tourism, but showed how little guidance exists on deciding among the various approaches to developing web mapping interfaces.

Wisconsin Coastal Guide

http://www.wisconsincoastalguide.org/

Wisconsin Coastal Data Catalog

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Username Password L

What?

Where?

Open Map Viewer

- Any -

Search

Reset Advanced Options

Categories

- Applications
- Audio/Video
- Case studies, best practices
- Conference proceedings
- Datasets
- Directories
- Interactive resources
- Maps & graphics
- Other information resources

Welcome to the Sea Grant/SSEC Coastal Map Atlas

We hope this online atlas will help you:

- improve access to and integrated use of spatial data and information
- support decision making
- promote multidisciplinary approaches to sustainable development
- enhance understanding of the benefits of geographic information

Our Coastal Atlas allows easy sharing of geographic data between different organizati

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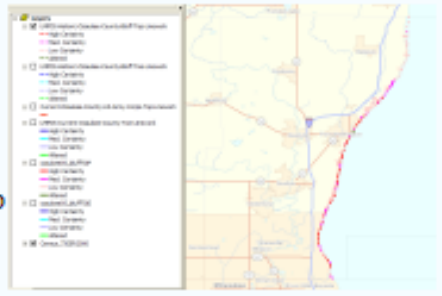
Featured map

LAKE MICHIGAN BLUFF TOP - OZAUKEE COUNTY, WISCONSIN - 1956



This is a shapefile containing polylines that delineate the bluff top for Ozaukee County as it existed in 1956.

Sea Grant University of Wisconsin SSEC

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What? bluff toe

Where?

Open Map Viewer

- Any -

Search

Reset Advanced ⊞Options

Categories

- Applications
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- Case studies, best practices
- Conference proceedings
- Datasets
- Directories
- Interactive resources
- Maps & graphics
- Other information resources
- Photo

Recent Changes

GeoRSS

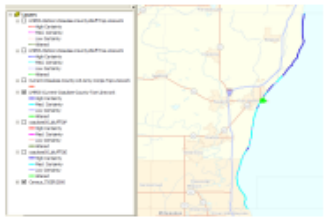
- Lake Michigan Bluff Toe - Ozaukee County, Wisconsin - 1956

Aggregate Results matching search criteria : 1-3/3 (page 1/1), Sort by Relevance

Logo

Lake Michigan Bluff Toe - Ozaukee County, Wisconsin - 1999

Rate It



Abstract This is a shape file containing polylines that delineate the bluff toe for Ozaukee County as it existed in 1999.

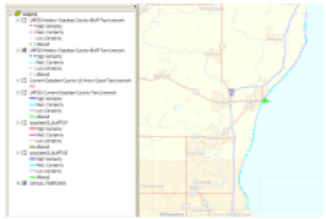
Keywords Landform, Bluff Toe, Environmental/Hazard, Land Status, Coastal Erosion, Wisconsin, Lake Michigan, Village of Bayside, Town of Port Washington, Ozaukee County, City of Mequon, Town of Grafton, Town of Belgium, City of Port Washington, 1999, Downloadable Data

⊞Metadata

Logo

Lake Michigan Bluff Toe - Ozaukee County, Wisconsin - 1956

Rate It



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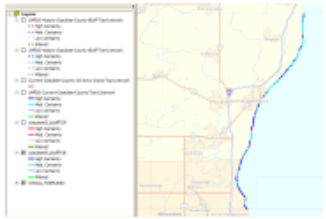
⊞Metadata Download Interactive Map

Logo

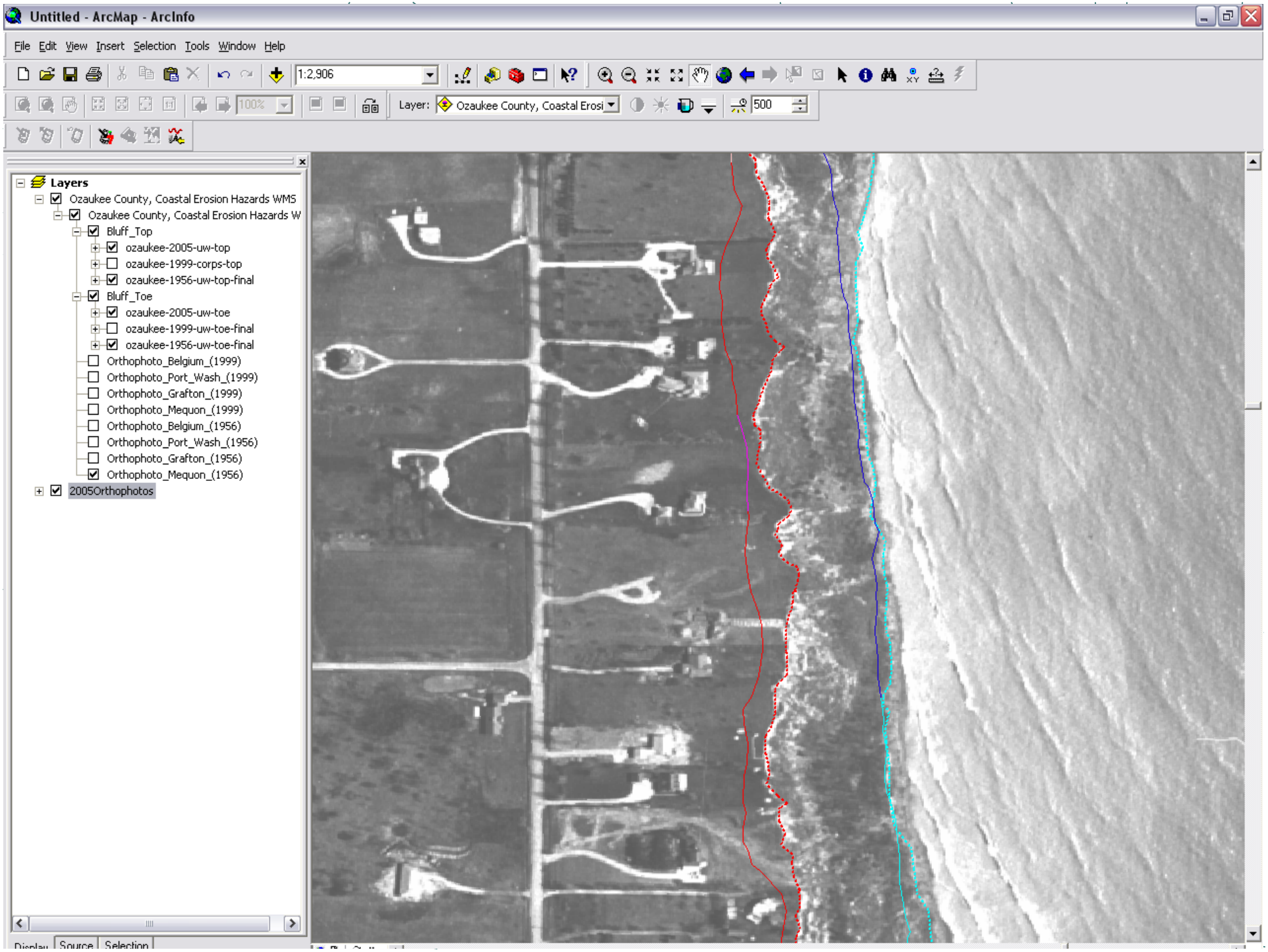
Lake Michigan Bluff Toe - Ozaukee County, Wisconsin - 2005

Rate It



Abstract This is a shapefile containing polylines that delineate the Lake Michigan bluff toe for Ozaukee County as it existed in 2005.

Keywords Hazards, Environment, City of Port Washington, City of Mequon, Ozaukee County, Town of Port Washington, Lake Michigan, Village of Bayside, Town of Grafton, Wisconsin, Town of Belgium, Riparian, Land Surface, Aquatic, Biosphere, Spring, 2005, Downloadable Data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Layers
Ozaukee County, Coastal Erosion Hazards WMS
Ozaukee County, Coastal Erosion Hazards W
Bluff_Top
ozaukee-2005-uw-top
ozaukee-1999-corps-top
ozaukee-1956-uw-top-final
Bluff_Toe
ozaukee-2005-uw-toe
ozaukee-1999-uw-toe-final
ozaukee-1956-uw-toe-final
Orthophoto_Belgium_(1999)
Orthophoto_Port_Wash_(1999)
Orthophoto_Grafton_(1999)
Orthophoto_Mequon_(1999)
Orthophoto_Belgium_(1956)
Orthophoto_Port_Wash_(1956)
Orthophoto_Grafton_(1956)
Orthophoto_Mequon_(1956)
2005Orthophotos
Display Source Selection

WCDC Lessons

- Several problems were experienced during the process of installing and utilizing GeoNetwork
  - customizing interface
  - metadata import
  - displaying WMS, KML through the GeoNetwork interface
  - harvesting CSW
- Despite many drawbacks, GeoNetwork still provides the best open source option for implementing a coastal spatial data catalog.

Wisconsin Coastal Data Catalog

http://speedy.ersc.wisc.edu:8080/geonetwork/

Wisconsin Coastal Atlas

- Goal 1: The WCA will serve as the portal to geospatial data for the Great Lakes coasts of Wisconsin
- Goal 2: The WCA will promote the development of a spatial data infrastructure for the Great Lakes coasts of Wisconsin through methods for cataloging, archiving, and semantic integration
- Initial focus on implementing the maps and search components for coastal hazards
- Synchronized with a two-year NOAA Coastal Management Fellow who will help build a Great Lakes spatial decision support toolbox

Wisconsin Coastal Atlas – Portal Objectives

- Objective 1 – Design and evaluate the WCA using a formalized development process
  - WCA Advisory Committee
  - LOGIC Model for Wisconsin Coastal Atlas

The LOGIC Model could serve as a template to aid design and evaluation of other CWAs.

Wisconsin Coastal Atlas – Portal Objectives

- Objective 2 – Develop the web portal interface for the WCA
  - The WCA will be based on the successful Oregon Coastal Atlas
  - The OCA serves as a catalyst for data sharing and development of decision support tools for the coastal management community
  - The map interface has become a common framework for discussing coastal management issues
  - Extension of the four main components (maps, search, tools, learn)
  - Collaborate with Oregon State University and the Oregon Coastal Management Program (learn from their experience, share code…)

Wisconsin Coastal Atlas – Portal Objectives

- Objective 3 – Design, develop, and evaluate web mapping interfaces for the WCA
  - Explore and evaluate the range of web mapping technologies, including geospatial mapping APIs, virtual globes, and internet map servers. Prepare a guidebook for the developers of web mapping portals on the appropriate choice of web mapping technologies for a variety of purposes.
  - Work with the Wisconsin State Cartographer's Office and the Cartography Lab at UW-Madison to ensure that the mapping interfaces employ strong cartographic design principles. Prepare a guidebook for ensuring strong cartographic design in CWAs.

The guidebooks will be useful for CWA developers and the GIS community.

Wisconsin Coastal Atlas – SDI Objectives

- Objective 4 – Develop and implement a CWA geospatial data catalog with concurrent archiving capabilities.
  - data catalog developed specifically for Great Lakes coastal issues (start with coastal hazards)
  - document technical and institutional barriers to the development of a spatial data catalog of current and historic coastal data
  - robust data archiving procedure to manage data sets over time
  - work with coastal hazards stakeholders to promote the use of catalog open access and data archiving procedures

Advance the development of domain spatial data infrastructures.

Development of effective methods for archive of digital geospatial data will help resolve a critical problem facing data custodians.

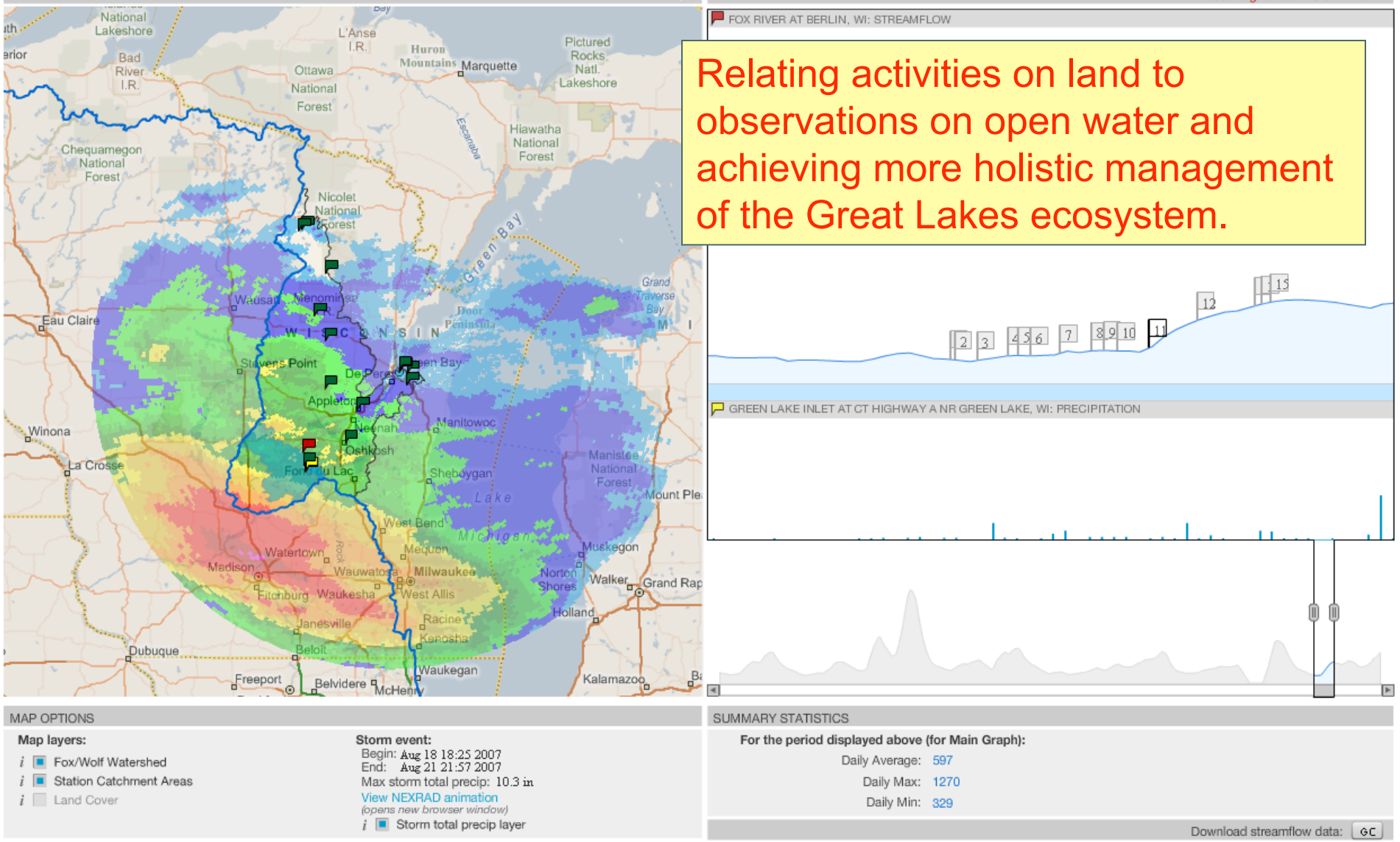
Wisconsin Coastal Atlas – SDI Objectives

- Objective 5 – Develop ontologies for coastal hazards in Wisconsin to promote semantic integration
  - Develop and conduct two spatial queries to test semantic interoperability for the entire the Great Lakes coasts of Wisconsin using data from local partners as it resides in the geospatial catalog
    - calculate the assessed value of land and improvements of coastal parcels
    - calculate current land use by general zoning categories within the 1000 foot shoreland zoning jurisdiction for the Great Lakes
  - Add the WCA as a node in the ICAN interoperability prototype by mapping theme keywords to the global ontology

WCA Impacts – SDI/Ontology Research

- Application of ontology tools to promote semantic mediation of local government spatial data sets will enable "just-in-time" spatial analyses of coastal issues at a regional scale
- Participation in the ICAN interoperability prototype will demonstrate how the WCA relates to other CWAs and will be a first step in linking state and provincial atlases to form a Great Lakes Coastal Atlas

Moving Towards SimGreatLakes



Questions?

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