

## GLERL Overview

**Dr. Marie Colton**  
Director



US Department of Commerce  
National Oceanic and Atmospheric Administration  
Office of Oceanic and Atmospheric Research  
2010 Great Lakes Environmental Research Laboratory Review

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Thank you to the Review Team and guests for coming to participate in the 2010 GLERL Lab Review – our first external review in 10 years.

Picture: MODIS color image of the Great Lakes from space

The first segment will provide some Regional and NOAA contexts of the Great Lakes, GLERL's Mission and a brief update of GLERL since the last review in 2000.

The Great Lakes contain the largest supply of freshwater in the world, holding about 20% of the world's total freshwater and about 95% of the United States' total freshwater.

The Great Lakes basin is home to 10% of the US population and 30% of the Canadian Population providing drinking water to those 40 million U.S. and Canadian citizens.

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**Detroit, MI** - Picture: Detroit skyline looking across the Detroit River from Windsor, Ontario. The Great Lakes have 10,210 miles of Coastline with a 1,000 mile international border.  
 Great Lakes waters provide 56 billion gallons of water per day for municipal, agricultural, and industrial use.

**Muskegon, MI** - Picture: Lake Michigan Field Station pre-renovation  
 The Great Lakes supports 250 species of fish and a \$4 billion sports fishery industry (1/3 of U.S. registered boaters). The Great Lakes is also a big tourism state with miles of beaches for leisure activities and water recreation – even surfing! Muskegon area is the 2<sup>nd</sup> largest watershed entering Lake Michigan and is home to the NOAA Great Lakes research fleet. NOAA research and the habitat restoration center have invested over \$1m American Recovery and Reinvestment Act and Great Lakes Restoration Initiative funding in the area.

**Chicago, IL** - Picture: Chicago Skyline. Currently a hot topic area – “Ground Zero” for Asian Carp.

**Duluth, MN** - Picture: Edwin Gott Freighter. The Great Lakes support commercial shipping of 200 million tons over 1,270 mile route. Duluth is the 4<sup>th</sup> busiest port in the country – “Highway H-0”

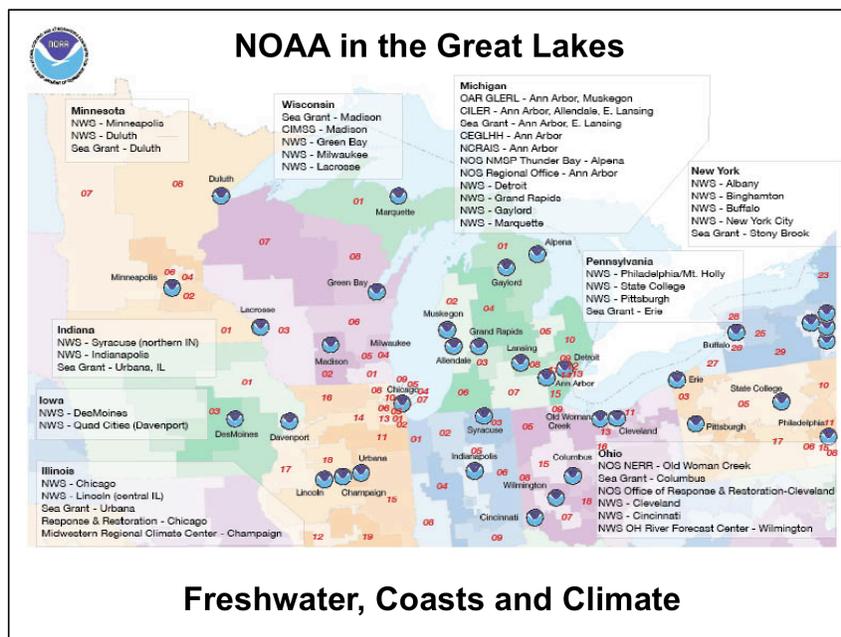
**Alpena, MI** - Picture: NOAA Thunder Bay Marine Sanctuary. On Lake Huron, Alpena is an area with immense cultural resources and a focus on maritime heritage. With strong, high quality collaborations, Alpena is a great spot to test advanced technology resources that you will hear about. A prime example of how Federal investment can spark a natural resources based economy.

**Au Gres, MI** - Picture: Au Gres from the water. You'll be hearing about Multiple stressors project, where toxics from industry meet intensive mid-western agriculture - impacting nutrient loading.

**Cleveland, OH** - Picture: Cleveland skyline with renewable energy wind turbine. NOAA supplies real-time information to the Cleveland Water Department to assist drinking water managers in making appropriate decisions to ensure a safe drinking water supply to approx. 1.5 million people.

**Ann Arbor, MI** - Picture: Aerial view of the building

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## Freshwater, Coasts and Climate

GLERL Works to develop science products and services throughout 2 countries, 8 states, and 131 watersheds  
 There are 40 Congressional Districts with Great Lakes shoreline.  
 NOAA's focus in the Great Lakes is possible through its numerous offices, programs and partnerships located across the region. This collaboration includes:

- 40 NOAA Facilities, 23 Weather Forecast Offices, 8 Geodetic Survey Representatives, 7 State College Sea Grant Programs, 7 Coastal Zone Management Programs, 2 Cooperative Institutes, Midwestern Regional Climate Center, National Marine Sanctuary at Thunder Bay, MI, National Estuarine Research Reserve at Old Woman's Creek, OH, Great Lakes Observing System Regional Association

And, our greatest resource – the 880+ employees located in the Great Lakes.

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## GLERL Drivers & Priorities

- International Agreements
- U.S. Legislation
- Interagency Agreements
- NOAA Strategic Plan
- NOAA Research Plan
- NOAA Next Generation Strategic Plan
- GLERL Strategic Plan





### CHART THE FUTURE

NOAA'S NEXT GENERATION STRATEGIC PLAN

Great Lakes Research Office as authorized in the 1987 Clean Water Act Amendments (33 U.S.C. 1268)

**Example of International Agreement:**

- GREAT LAKES WATER QUALITY AGREEMENT OF 1978—AMENDED 1987
- International Agreement between Canada and the United States which involves restoring and enhancing water quality in the Great Lakes System

**Examples of U.S. Legislation include:**

- 16 U.S.C. § 4722. AQUATIC NUISANCE SPECIES PROGRAM
- 33 U.S.C. § 145—HARMFUL ALGAL BLOOM AND HYPOXIA RESEARCH AND CONTROL ACT OF 1998
- National Ocean Policy

**Example of Interagency Agreement:**

- Great Lakes Restoration Initiative (GLRI) involves multiple federal agencies and leverages contributions and expertise from state, local, and nongovernmental partners. It is guided by a five-year action plan that sets outcome-oriented performance goals, criteria for measuring progress, and clear standards of accountability.

## What GLERL Does

- Freshwater / coastal ecology
- Stakeholder-driven, interdisciplinary ecosystem research
- Integrated ecological modeling and forecasting for the Great Lakes







Great Lakes Environmental Research Laboratory Review – Ann Arbor, MI    November 15-18, 2010

GLERL's mission is to conduct high-quality research and provide scientific leadership on important issues in both Great Lakes and marine coastal environments leading to new knowledge, tools, approaches, awareness, and services.

From the previous requirements and drivers GLERL focuses on:

- Freshwater / coastal ecology
- Stakeholder-driven , inter-disciplinary ecosystem research
- Integrated ecological modeling and forecasting for the Great Lakes

Which support the NOAA mission and benefit Great Lakes communities

Pictures from Left to Right: Buffalo NY; Beaver Island, Lake MI; Eastern Lake Ontario Dunes

## How GLERL Does It

- Long-term observations of important biological, chemical, physical variables
- Laboratory experiments and field studies to define ecological processes that drive and connect these variables
- Ecological modeling and forecasting on a variety of space and time scales



- Laboratories in Ann Arbor and Muskegon
- Observation Platforms, Sensor Development, Real-time Observations, Great Lakes Observing System Regional Association
- Satellite Remote Sensing
- Great Lakes Vessel operations
- Data acquisition and management

While the majority of our work is with freshwater in the Great Lakes, GLERL also has current coastal projects in Chesapeake Bay and the Gulf of Mexico. Historically the laboratory has also had projects involving other large lakes of the world Asia, Europe, Africa.... Western U.S.

Top image: Sediment survey cruise, box corer

Middle image: Sensor in ballast tank of Great Lakes freighter, process study

Bottom image: Current profiler

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## 2000 Review: Substantial Progress

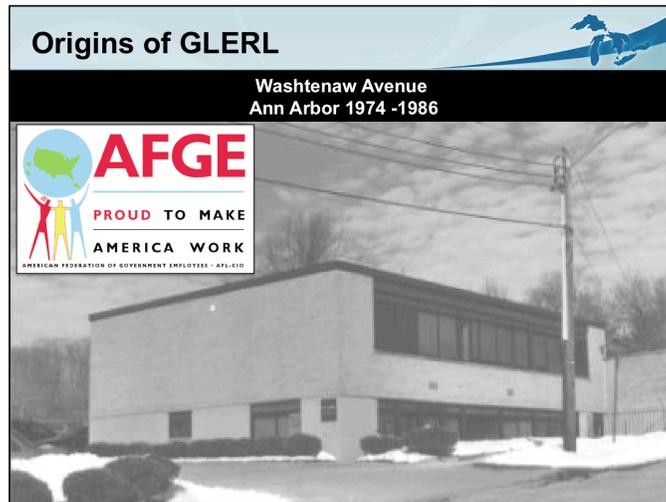
Recommendation	Action Taken
<b>Strategic Planning</b>	Created Strategic and Operations Plans 2007-2011
<b>Physical Resources</b>	Moved into a new Ann Arbor facility 2005 Lake Michigan Field Station renovation Increased fleet capabilities
<b>Workforce Management</b>	Reorganization into Science and Operations Summer Fellows program
<b>Scientific Expertise and Productivity</b>	Doubled publication rate
<b>Partnerships</b>	Cooperative Institute for Limnology and Ecosystem Research Regional Collaboration
<b>Communications</b>	Created Outreach and Education Branch

At our last science review we have been taking action on recommendations we received from our review team, several of which by the nature of them required years to accomplish.

Much has been accomplished but we recognize we still have work to be done in our workforce management and sustain our level of scientific expertise in the face of an aging workforce.

Also enough time has passed that we need to engage in a new cycle of strategic planning.

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GLERL established on April 25, 1974  
 Formed by combining staff of: the International Field Year for the Great Lakes project office (Rockville, Maryland), and the Limnology and Computer research divisions of the Lake Survey Center (Detroit, MI).  
 The Lake Survey research division:  
 Originally U.S. Army Corps of Engineers  
 Created by Congress in 1841  
 To conduct hydrographic surveys of the "Northern and Northwestern Lakes"  
 Absorbed into NOAA on July 1, 1970 by Reorganization Plan No.4 signed by President Nixon.  
**Washtenaw Avenue 1974 – 1986 (Leased)**

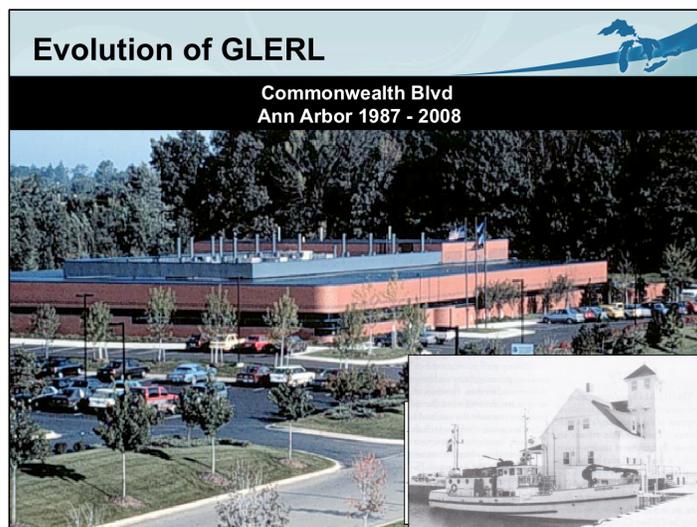
- 1975 - Leased 2 buildings with 13,000 sq. ft office/lab space
- Housed between 56-77 people (avg. 67)
- RV Shenehon operated out of Grand Haven, MI
- By 1981 – Leased 4 buildings in Ann Arbor with 23,900 sq. ft office/lab space

**AFGE**

- 1981 – January American Federation of Government Employees Local 3908 established in order that employees and management may work together toward the common goal of the accomplishment of the agency mission and increasing the efficiency of the agency

GLERL was threatened with closure when it was zeroed out of the FY1982 President's budget proposal. The Union along with the Great Lakes community successfully fought to have GLERL's budget restored.

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**Commonwealth Blvd 1987 – 2008 (Leased)**

- 1987 – GLERL moved into 24,600 sq. ft office/lab space
- Although total sq. ft of space essentially the same, this allowed for the consolidation of 4 buildings under one roof.
- Housed between 78 –120 people (avg. 90)
- Partners in the building (CILER, Sea Grant, International Association for Great Lakes Research (IAGLR), NOS)

**CILER**

- 1989 – CILER established with signing of an Memorandum of Understanding between the University of Michigan and the Undersecretary of Oceans and Atmosphere, Department of Commerce to foster University and NOAA partnerships in the Great Lakes
- Personnel grew to over 100 employees housed.
- In July 2007, new CILER was awarded to the University of Michigan as a host institution and 9 partner universities. (Ohio State University, Michigan State University, Pennsylvania State University, Stony Brook University, University of Illinois, University of Minnesota, University of Toledo, University of Wisconsin, Grand Valley State University)

**Lake Michigan Field Station 1990**

- 1990 – The base for Vessel Operations was moved from Grand Haven, MI to Muskegon, MI. 1.3 acres of land and two building was leased from the Coast Guard becoming the Lake Michigan Field Station
- 2002 GLERL acquired the Research Vessel Laurentian from the University of Michigan

In 2000 the external review noted the need for new facilities, which were outgrown and outdated.

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## Present Day GLERL

South State Rd  
Ann Arbor 2009



### South State Road 2009 (Leased)

- GLERL entered into another "epoch" by signing a 20 year lease
- This Ann Arbor facility double our office / lab space to 54,000 gross sq. ft increasing our capabilities
- Now includes this 150 seat lecture hall and multiple conference rooms - great collaborative meeting spaces
- Houses between 70 -110 people with high capacity in the summer

### Everything New

- New GLERL Director
- New CILER Director
- New Deputy Director
- New AFGE Management Partnership Council agreement ratified in 2010 under President's Executive Order 13522
- NOAA Regional Collaboration
- National Marine Fisheries Service – Habitat Restoration

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## Present Day GLERL

Lake Michigan Field Station  
Muskegon 2010



### Lake Michigan Field Station Today

2005 - Completed renovation project on the 100th anniversary of the building.

Great care was taken to recreate the exterior architecture and maintain the historic details of its original design.

Vessel base built up per recommendations from 2000 review - Dennis Donahue will present more later.

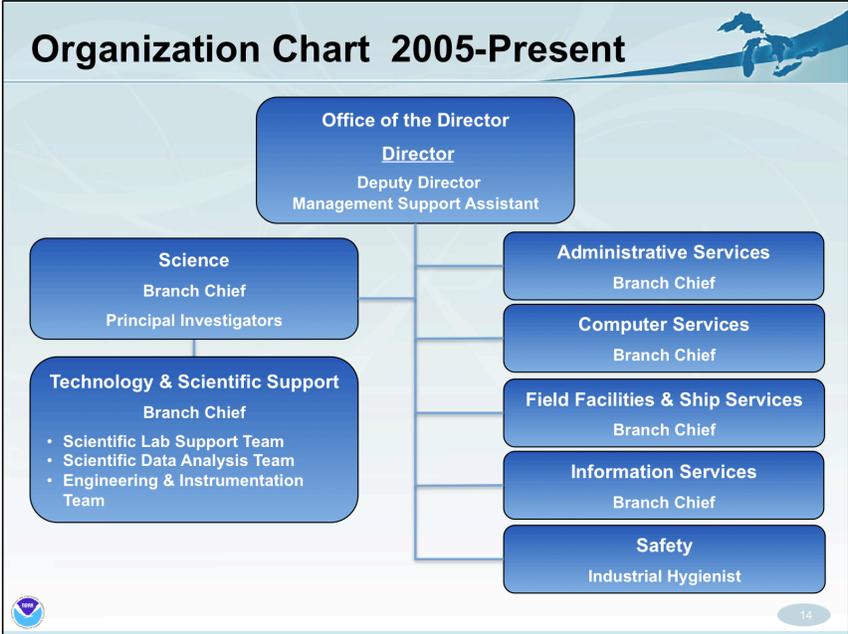
An upgrade to a second building on the site is in process

Includes consolidation of boat operations, storage, office space and a small lab space

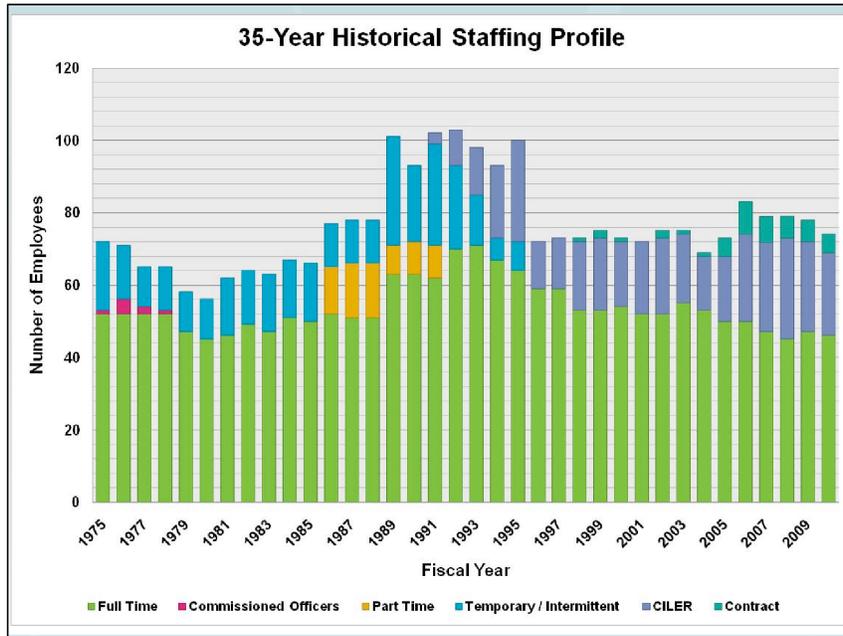
Focused on going Green - Platinum LEEDs rating.

**With the new Ann Arbor facility and the field station upgrade renovation, we've built up the infrastructure to move forward for the next 20 years.**

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Up until 2005 Disciplinary Groups  
 2005 - 2010 2 transitions  
 Branches 2 divisions – Science and Operations  
 The 2 Science branches reporting directly to the Director  
 The 5 Operations branches reporting to the Deputy Director  
 While maintaining 2 branches the Technology & Scientific Support reporting structure was rolled into the science branch with all federal science staff reporting up through the Science Branch Chief  
 Funds are distributed to each branch per budget request.  
 Approx. \$300k discretionary for internal competition yielded approximately 60 projects.  
 Web page categories: Ecological Prediction, Aquatic Invasive Species, Physical Environment, Environmental Observing Systems



Prior to 1989, all staff were federal; full time part-time, work study with a total of approximately 70.

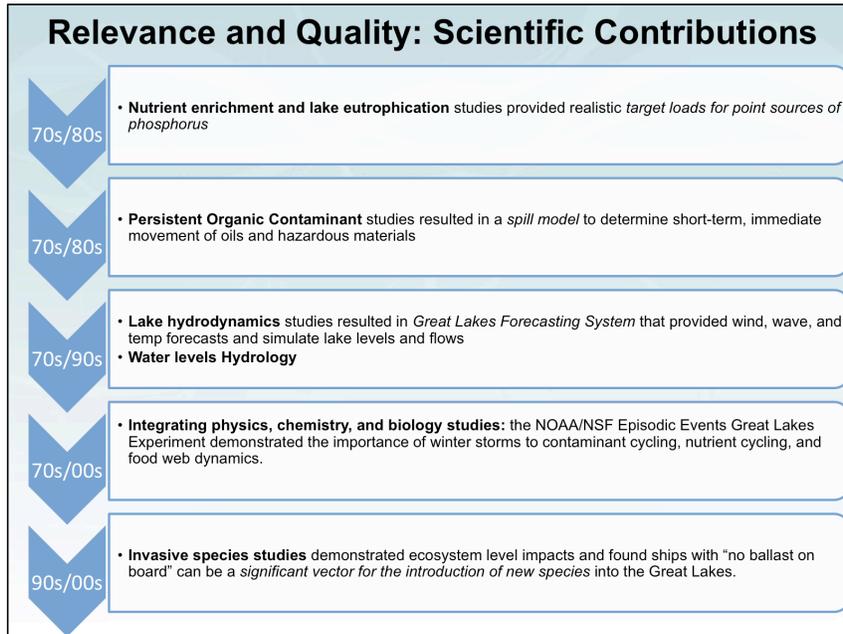
Within a few years of cooperative institute, nearly steady number of 20 CILER staff to meet science requirements.

Science Discipline Expertise	Scientist Type	2000	2010	2015
Biogeochemistry	PI	2	0	0
	Technical	2	2	1
Fish Ecology	PI	2	3	3
	Technical	0	0	0
Hydrodynamics	PI	6	2	0
	Technical	2	1	1
Hydrology	PI	3	1	1
	Technical	2	1	1
Ice Climatology	PI	1	1	1
	Technical	1	0	0
Lower Trophic Food Web	PI	5	4	0
	Technical	3	3	2
Meteorology	PI	1	1	1
	Technical	0	0	0
Ecological Modeling	PI	0	1	1
	Technical	0	1	1
Nonindigenous Species	PI	1	0	0
	Technical	0	0	0
Remote Sensing / Technology	PI	2	3	2
	Technical	3	3	2
Toxicology	PI	1	1	0
	Technical	2	1	1
<b>Totals</b>	PI	<b>24</b>	<b>17</b>	<b>9</b>
	Technical	<b>15</b>	<b>12</b>	<b>9</b>
<b>Aggregate Total</b>		<b>39</b>	<b>29</b>	<b>18</b>

Science Expertise

Make up of permanent staff is interdisciplinary and very experienced.

These data support the thematic team approach to reduce programmatic vulnerability to the loss of one individual. Also, needs of interdisciplinary thematic areas will guide workforce planning and hiring strategy.



- Nutrient enrichment and lake eutrophication studies (1970s/1980s) provided realistic target loads for point sources of phosphorus
  - The model supported reductions recommended by the Great Lakes Water Quality Agreement
- Persistent Organic Contaminant (1970s/1980s) studies resulted in a spill model to determine short-term, immediate movement of oils and hazardous materials
- Invasive species studies (1990s/2000s) demonstrated ecosystem level impacts and found ships with "no ballast on board" can be a significant vector for the introduction of new species into the Great Lakes.
  - Dreissenids were found to promote blooms of toxic, blue-green algae
- Lake hydrology studies (1970 - 1990s) resulted in design and calibration of a Great Lakes Forecasting System that provided wind, wave, and temperature forecasts for the Great Lakes and simulate lake levels and flows
- Integrating physics, chemistry, and biology studies (1970s-2000s) demonstrated ecosystem level impacts and found ships with "no ballast on board" can be a significant vector for the introduction of new species into the Great Lakes.

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## In-House Collaborative Partnerships

- Cooperative Institute for Limnology and Ecosystems Research
- NOAA Office of National Marine Sanctuaries
- NOAA Great Lakes Habitat Restoration Program
- NOAA Great Lakes Regional Collaboration Team
- NOAA Center of Excellence for Great Lakes and Human Health
- Great Lakes Sea Grant
- International Association for Great Lakes Research

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Another source of support is through partnerships, especially for non-resident expertise needed in collaborative projects.

In House: see magnetic white boards & basin displays, tab in notebook

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## External Collaborative Partnerships

- International
- U.S. Federal Agencies
- Other NOAA Line Offices
- State Agencies
- Academia
- Municipalities
- Not-For-Profit Research
- Private Industry

Visiting scientists bring an international "large lakes" perspective and complementary skills.

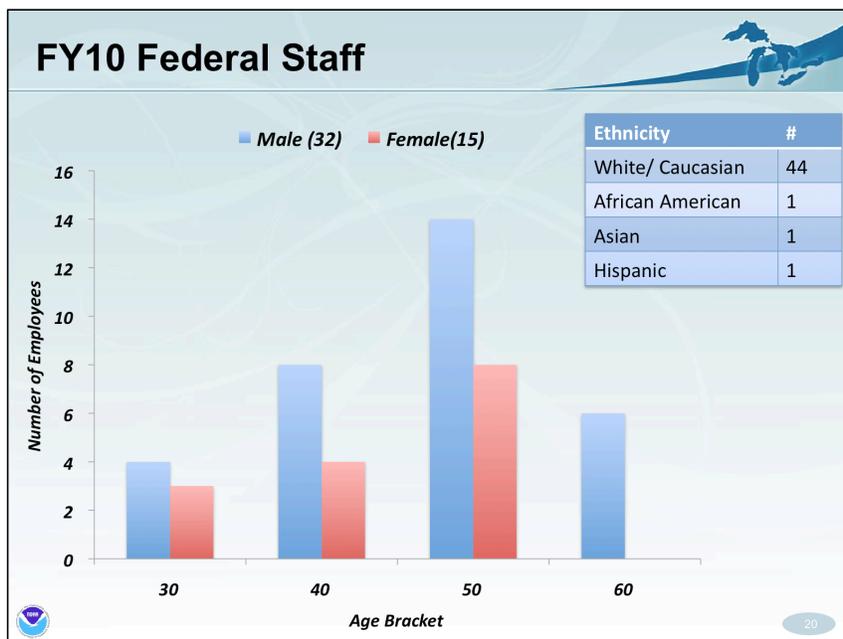
**FY 2010 Visiting Scientists**

Marjorie Perroud - CILER post-doc Ph.D. from the University of Geneva (Lofgren)

Tamas Kramer – Budapest Univ. of Technology & Economics (Schwab)

Huijuan Tang – South China Agricultural University (Vanderploeg)

External: Stakeholders session, also each presentation will be highlighting a partnerships



Gender ratio 2:1, but overall diversity remains and issue. GLERL is aware and aggressively recruits underrepresented groups in ALL hiring actions.

## Future Scientists



Great Lakes Environmental Research Laboratory Review – Ann Arbor, MI

November 15-18, 2010

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Summer Fellows, 2009

This slide shows that a major cultural change at GLERL will happen in the next few years and we want to be prepared by having overlap between generations.

We know what the future generation looks like and bring the youth on board when possible.

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## Personnel Summary

- Total full time personnel requirement has held steady at ~ 75 with surge to 100 during field season
- Distribution of personnel from all Federal has changed
- Scientific directions extremely sensitive to resident, long-term expertise
- Diversity remains an issue when coupled with limited options for recruitment and hiring
- International scientists offer global “large lakes” perspective
- Partnerships bridge gaps and sustain scientific directions



Great Lakes Environmental Research Laboratory Review – Ann Arbor, MI

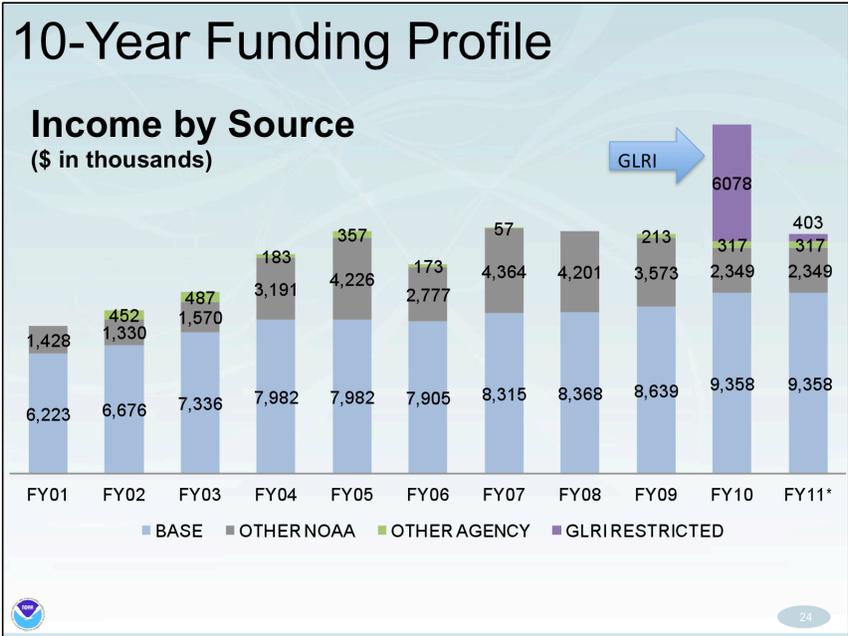
November 15-18, 2010

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GLERL has significant hiring needs to first sustain capability and then support scientific requirements over time. Appropriations must be stable and increased to hire permanent staff.

Each thematic and interdisciplinary group need at least 3 new hires to 1) replace recent retirees with similar but updated expertise, 2) include synergistic expertise reflective of new interdisciplinary approaches to environmental sciences, and 3) technical support in labs, field, IT data analysis and visualization.

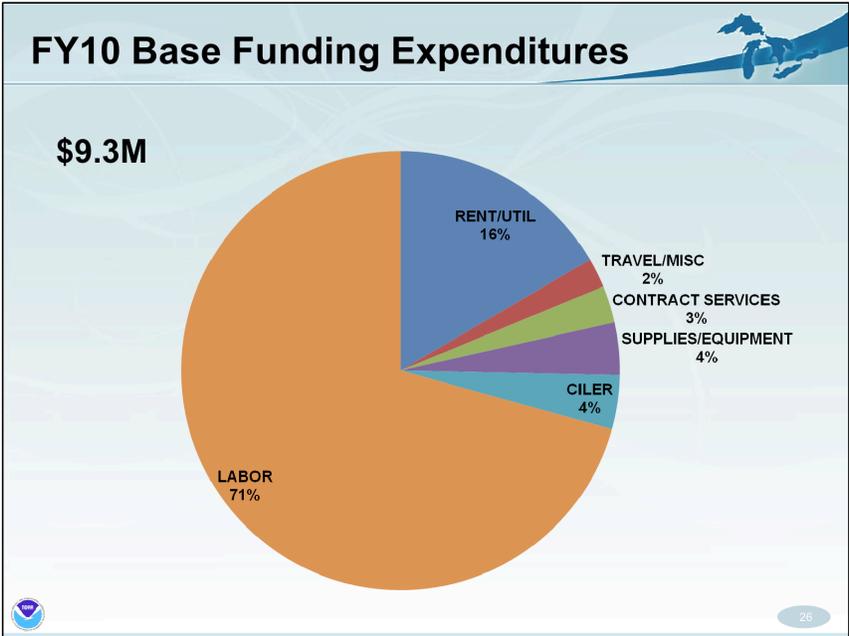
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Appropriations nearly flat in real dollars for approximately 10 years.  
 Other NOAA funds are variable from year to year.  
 Large external programs can have major impacts, Great Lakes Restoration Initiative.

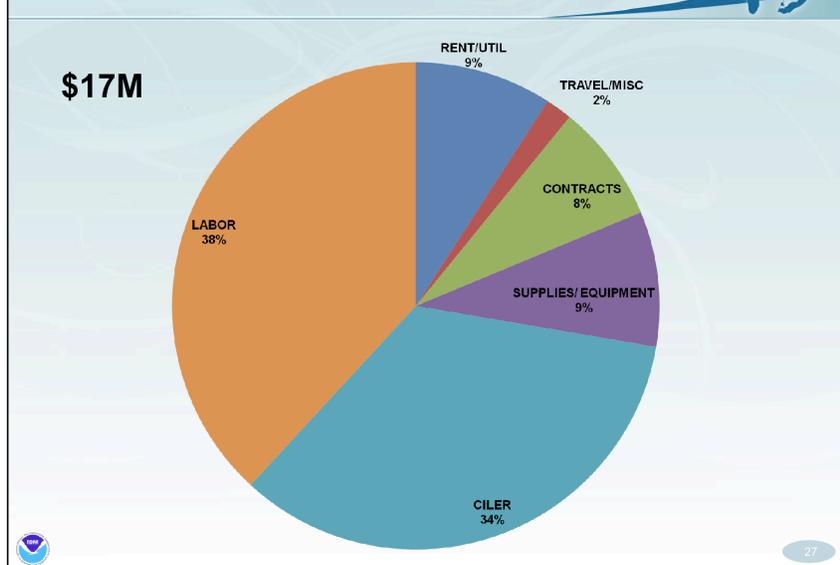


This Initiative is a well-orchestrated, well-coordinated effort among EPA & the Great Lakes Federal Interagency Task Force to fund the highest priority activities in order to protect & restore the Great Lakes. Federal projects & over \$250 million in grants & project agreements will be initiated through Requests for Proposals in the summer of 2009 to jump-start achievement of long term goals: safely eating fish & swimming at our beaches, assuring safe drinking water, & providing a healthy ecosystem for fish & wildlife. Subject to appropriations from Congress, the multi-agency Initiative will provide funding to 16 federal organizations to fund activities in the stated 5 areas.



Must pays (labor, overhead and rent) =90%  
 Infrastructure and investments (buildings, ships, equipment)  
 CILER is Task I Administrative costs

## FY10 Base and External Expenditures



Internal funds are highly leveraged against external projects.  
Soft funding cannot (should not) be used to support permanent employees and mission requirements.  
New funds/grant awards mostly through CILER in FY10.

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## Funding Summary

- Base funding with small inflationary adjustment pays for labor and overhead primarily
- Competing requirements for investments of base funds create “Solomon’s choice”, either
  - (Capacity) Infrastructure: facilities, vessels, equipment
  - (Capability) Workforce development and new scientific directions
- External funding opportunities introduce inter-annual variability in investments
- External funding cannot support NOAA mission activities



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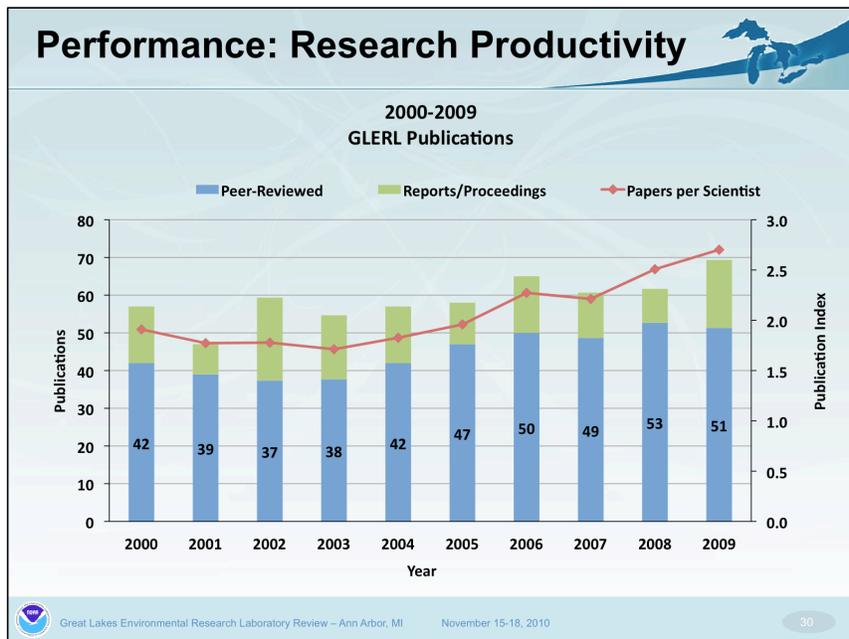
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# Quality, Relevance, and Performance



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## Performance: Research Productivity



	2000	2009
Median	1	3
Average	1.8	2.7

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H-Index	Total Pubs	Total Citations
32	82	2555
28	69	2087
19	64	1063
19	63	849
19	31	724
17	58	1409
16	37	758
15	30	954
13	41	440
13	30	407
12	29	336
12	20	633
12	20	346
11	16	440
10	35	539
9	12	268
6	12	122
5	20	171
5	15	117
4	7	23

## Research Relevance Citations

Many "Award winning" papers  
 The index was created to quantify the cumulative impact and relevance of an individual's scientific research output. The H-index gives an estimate of the importance, significance and impact of a scientist's cumulative research contributions.

- The index is easy to compute
- The index is computed on the number of publications and number of citations
- Useful criteria to evaluate scientific achievement
- With large error bars, at major research universities, h~10 to 12 might be a value for an Associate Professor and h~18 and higher for a full Professor.

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Great Lakes Coastal Forecasting System Prototype developed in 1991-92 with Ohio State University

Operational at NOS CO-OPS in 2003

National Ocean Service - Center for Operational Oceanographic Products and Services

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## Relevance: Product Development & Delivery

**CoastWatch Great Lakes Node**  
<http://coastwatch.glerl.noaa.gov/>

**CoastWatch Great Lakes Website**  
**Domain Summary**  
 7/1/2008- 2/28/2010  
 20,085,569 visits

Satellite Imagery delivered to customers via the NOAA CoastWatch Great Lakes Node: from GLERL web site

MODIS True Color: Lake Huron – True Color, 250 m resolution 10/19/2010  
 AVHRR (Advanced Very High Resolution Radiometer): radiation-detection imager that can be used for remotely determining cloud cover and the surface temperature.  
 Imagery: water surface temperature, Lake Huron w/ Saginaw Bay, 10/27/2010  
 Customers:

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## Relevance: Knowledge and Information Services

- Web Site
  - Publications
  - Databases
  - Experimental Forecasts
- Seminar Series / Webinars
- Social Media
- Publications
- Workshops
- Conferences
- Needs Assessments
- Great Lakes Information Network



Great Lakes Discovery Exhibit 34

**Images: NOAA Great Lakes Google Earth Tour:**

In April 2009, Google added the capability to view the Great Lakes from beneath the water surface. The Great Lakes Environmental Research Laboratory (GLERL) has developed a basic narrated Great Lakes tour that highlights points of interest in each of the five Great Lakes and identifies a few unique underwater features. [http://www.glerl.noaa.gov/pr/ourlakes/gl\\_tour.html](http://www.glerl.noaa.gov/pr/ourlakes/gl_tour.html)

**Great Lakes Environmental Research Laboratory YouTube Channel:**

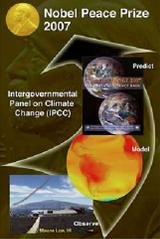
35 uploads; ballast tank flow, underwater clips and equipment deployment are the most popular videos. <http://www.youtube.com/user/oaaglerl>

**Great Lakes Traveling Exhibit launched 10/4/2010 at Ann Arbor Hands On Museum:**

In partnership with the Ann Arbor Hands-On Museum, the NOAA Great Lakes Environmental Research Laboratory, NOAA Great Lakes Sea Grant Network, NOAA Thunder Bay National Marine Sanctuary, and the State of Michigan, designed and fabricated a traveling hands-on exhibit to educate visitors about Great Lakes science and maritime heritage

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## Quality: Awards and Recognition



**Nobel Peace Prize 2007**  
Intergovernmental Panel on Climate Change  
(Brent Lofgren, Raymond Assel, Frank Quinn)

**Green Gov Presidential Green Dream Team Award 2010**  
Interagency Working Group on Climate Change and Health  
Team for "A Human Health Perspective on Climate Change"  
(David Schwab, Juli Bressie, Sonia Joseph Joshi)



**Department of Commerce Gold Medal 2008 - David Reid**  
For research resulting in improved environmental stewardship related to maritime commerce and implementation of regulations enhancing Great Lakes ecosystem protection from invasive species via ballast water

**White House Closing the Circle Award 2007**  
**Department of Energy Federal Energy Management Program Award 2006**  
For the conversion of ships from petroleum-based fuels and lubricants to bio-based products  
(Dennis Donahue)




**International**

Nobel Peace Prize 2007: Intergovernmental Panel on Climate Change  
Brent Lofgren, Raymond Assel and Frank Quinn contributed significantly to the IPCC process and thus share in the credits.

**National**

Green Gov Presidential Green Dream Team Award – This award recognizes exceptional leadership by an interagency green team to effectively place a Federal sustainability idea into action.

The Interagency Working Group on Climate Change and Health, formed in 2009, focuses on the impacts of climate change on the health of our nation's people and communities. The Working Group's report, "A Human Health Perspective on Climate Change," provides a baseline assessment of the current state of knowledge of the health impacts of climate change and informs projections of future impacts.

Department of Energy's Federal Energy Management Program 2006

The NOAA R/V Huron Explorer, the first modern U.S. research vessel to operate free of petroleum products, was given this award during an Earth Day Week event. It was part of the DOE's "You Have the Power" campaign.

For full list of Awards see: [http://www.glerl.noaa.gov/review/awards\\_and\\_honors.html](http://www.glerl.noaa.gov/review/awards_and_honors.html)

## Quality: Awards and Recognition

**GLOS Special Achievement Award 2009 - David Schwab**  
For recognition of significant contributions to the Great Lakes Observing System

**IAGLR Chandler - Misener Award 2008**  
For the most notable paper "Biophysical model of larval yellow perch advection and settlement in Lake Michigan"  
(Dmitry Beletsky, Doran Mason, David Schwab, Edward Rutherford)

**NOAA Administrator's Award 2005 - David Schwab**  
For the development and implementation of a Great Lakes hydrodynamic wave model which led to improved wave height forecasts for Great Lakes maritime users.

**OAR Outstanding Scientific Paper Award 2008**  
For "Anatomy of the recurrent coastal plume in Lake Michigan and its impacts to light climate, plankton and nutrients."  
(Henry Vanderploeg, Thomas Johengen, Gregory Lang, Joann Cavaletto, Brian Eadie, Jim Liebig, Steven Ruberg, and Michael McCormick)




GLOS is the Great Lakes Regional Association of IOOS.

The Chandler-Misener Award is presented annually to the author(s) of the peer-reviewed paper in the current volume of the Journal of Great Lakes Research judged to be "most notable." Papers are evaluated on the basis of originality, contribution and presentation.

For full list of Awards see: [http://www.glerl.noaa.gov/review/awards\\_and\\_honors.html](http://www.glerl.noaa.gov/review/awards_and_honors.html)

GLERL scientists are recognized in the region and around the world and are highly sought after as invited speakers, symposium leaders, panelist and committee members.

## Summary of Quality/Relevance Performance

- GLERL science has evolved over decades and continues to advance new issues
- GLERL scientists are productive and well-recognized as shown by several inter-related indicators of progress
  - Publications in appropriate journals
  - Products developed and delivered to users
  - Transitions completed
  - Awards received
- GLERL scientists are recognized leaders in the community and communicate regularly with public

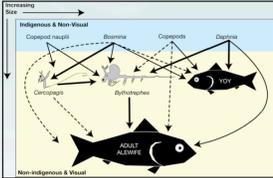


## Questions



### What have we learned?

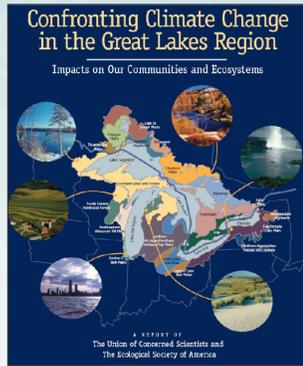
- New technologies need to be developed and deployed in the Great Lakes
- The Great Lakes need a sustained and robust year-round observing system
- Now in an invasive species dominated ecosystem, we must think about holistic ecological approaches
- The Great Lakes ecology is complex, but the Lakes are an ideal test-bed for examining the full realm of possibilities for ecological forecasting

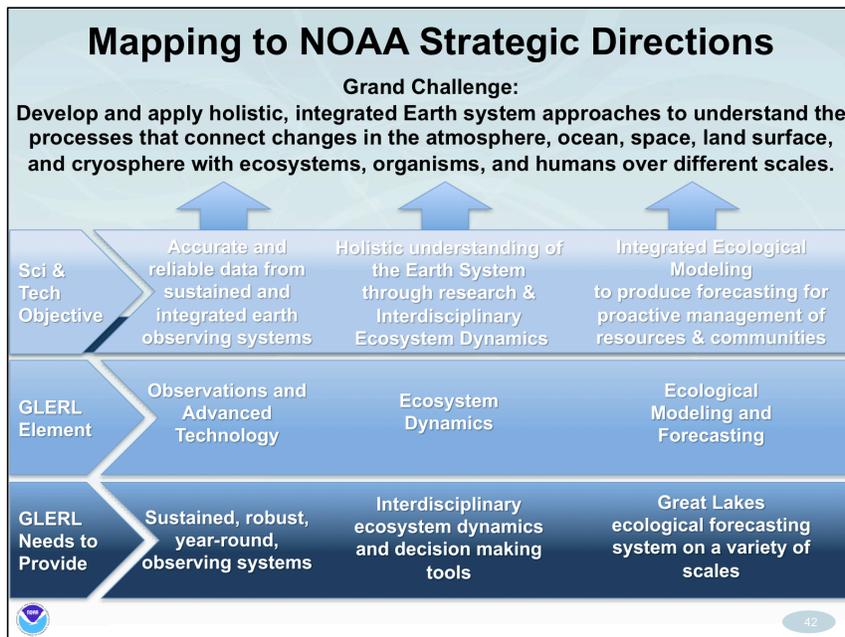

Images: (Top) Autonomous Underwater Vehicle; (Middle) The current Great Lakes epilimnetic (and metalimnetic) food web is dominated by the visually preying non-indigenous vertebrate (alewife) and invertebrate predators (*Bythotrephes* and *Cercopagis*) that prey on the indigenous zooplankton; (Bottom) Huron to Erie Connecting Waterways Forecasting System (HEWWFS) surface currents, simulated river tracers, water levels <http://www.glerl.noaa.gov/res/hecwfs/>

## Current Climate: Change

- Development and release of the NOAA Next Generation Strategic Plan
- Transition to a new NOAA budgeting process
- New NOAA Oceanic and Atmospheric Research
  - Creation of Climate Services
  - Restructuring of OAR
- New GLERL



As seen on the previous slide there have been major ecological changes and at the same time we are experiencing major organizational changes as well. All of these have impacts on GLERL and mean that we must be very deliberate in how we map our activities to user requirements.



**Here the example**  
**Observations and Advanced Technology**  
 Next Generation Strategic Plan Science and Technology Enterprise: calls for accurate and reliable data from sustained and integrated earth observing systems  
**Ecosystem Dynamics**  
 NOAA Next Generation Strategic Plan Science and Technology Enterprise Objective: calls for a holistic understanding of the Earth System through research  
**Ecological Forecast Modeling**  
 Next Generation Strategic Plan Science and Technology Enterprise: calls for an integrated environmental modeling system  
 NOAA Science Advisory Board RECOMMENDATION 12: NOAA should expand capacity in forecasting trajectories of ecosystem components under different hypotheses for environmental and anthropogenic forcing and in linking these forecasts to potential consequences for resource users, coastal residents, and management options.  
 Suggested regional centers of excellence where modeling and forecasting can be developed for regional needs

## How We Will Meet Objectives

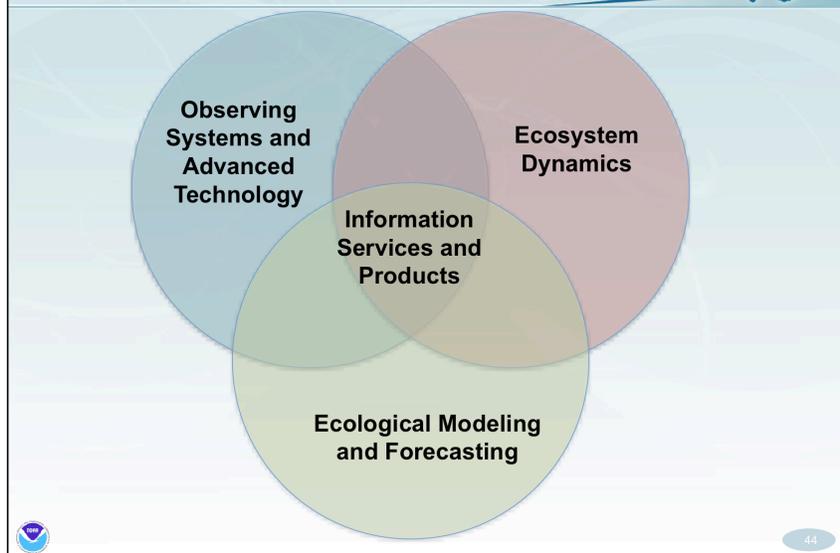
- Update GLERL strategic plans to support new NOAA directions
- Renewed focus on GLERL science program in the new NOAA budgeting process
- Align organization with core capabilities
- Utilize strategic partnerships to satisfy regional and other external requirements
- Engage users in experimental design and development of products and services
- Monitor and evaluate our progress using formal performance management approach



Step 1: We have stated that we need to write new strategic plans to support the new directions. Next few slides show how we will address the rest of the steps to meet plan requirements

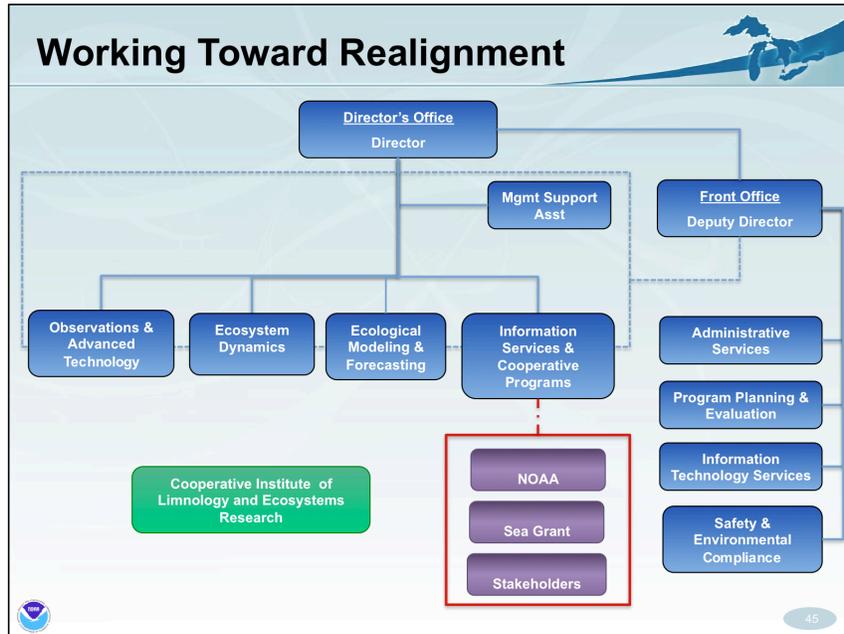
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## Thematic Alignment



Lab resources allocated to core projects  
Provides direction for science and staff planning  
Will determine internal restructuring / organization of the lab  
Setting requirements and risk assessment  
Partnerships (from NOAA to Regional levels)  
    Science, Operations, Labor/Union  
Examples of re-alignment  
    GLOS – Observing Systems  
    Models  
    HABs

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Our official organization structure must be aligned with strategic science goals. In the past year, GLERL has been working in these thematic areas to evolve systematically towards this new organization.

### Observations & Advanced Technology

**Be Sustainable:**

INDEX: SUSTAINABLE (BODIDIESEL STANDARDS) ARE IN THE PRELIM

June 2007

BIODIESEL  
MAGAZINE

Treading Lightly on the Great Lakes

Great Lakes Environmental Research Laboratory Vessels Use Biodiesel and Biomotor, Petroleum-Free Mechanical Parts

U.S. Proposed Biodiesel Fuel Law 2007

# Leadership

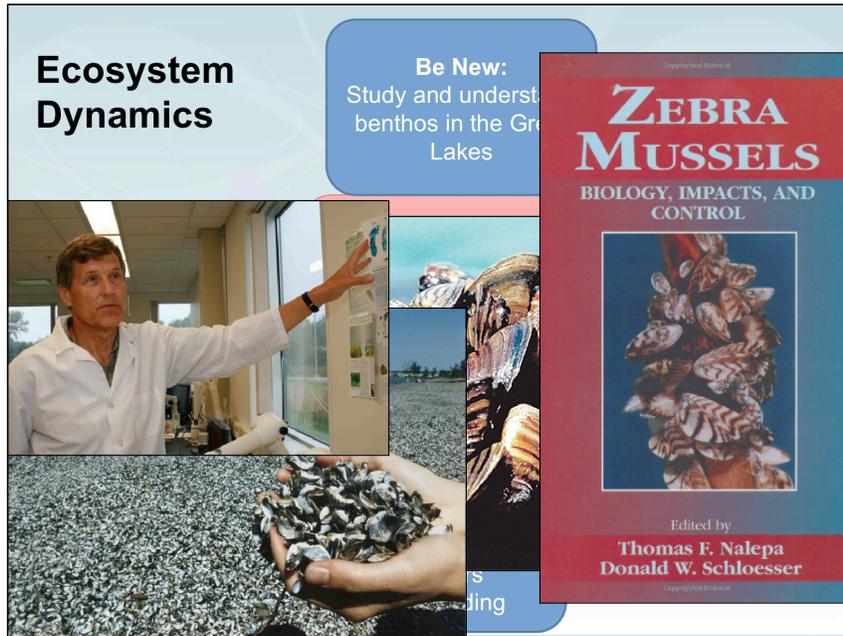
The National Oceanic and Atmospheric Administration (NOAA) Great Lakes Environmental Research Lab set a goal to minimize the use of petroleum products onboard research ships and demonstrate operational benefits of bio-fuel in marine applications. This introduced soy biodiesel as an alternative for ship propulsion and gens, a significant advancement in alternative diesel fuels that were based upon a 20% blend soy oil with petroleum oil.

The project was then expanded to replace all petroleum lubricants (hydraulic, transmission, and oils) with products formulated from renewable stock such as canola soy oils. In August of 2005, *Huron Explorer*, serving the National Marine Sanctuary, Thunder Bay, became the first research vessel to operate on petroleum products, demonstrating NOAA's commitment to the environment.

YOU HAVE the POWER

United States Department of Commerce  
Federal Energy Management Program

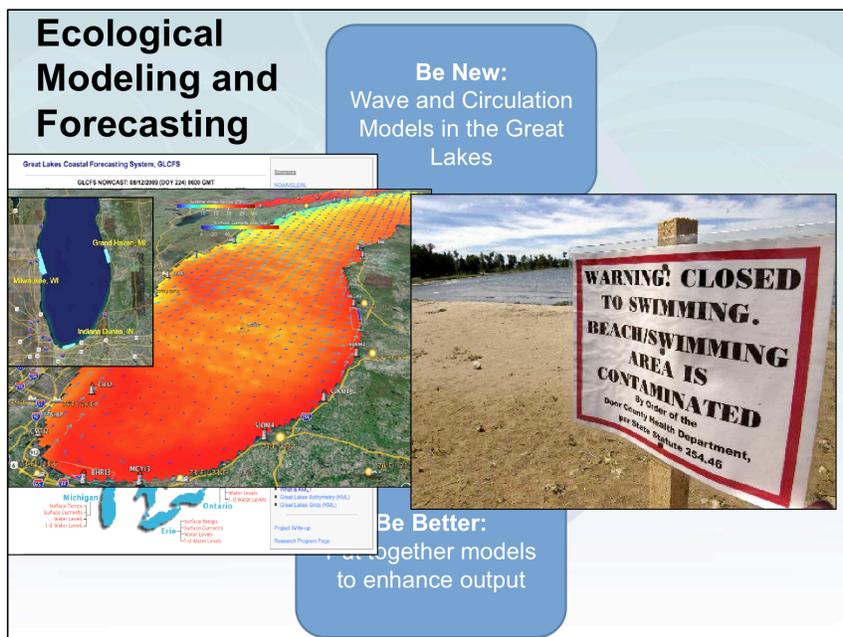
- Ways in which each of the theme areas have been operating successfully to show signs of great research. They are in all domains from concept to execution.
- Executive Order (E.O.) 13423, Strengthening Federal Environmental, Energy, and Transportation Management, was signed on January 24, 2007, to strengthen key goals for the Federal Government.
1. Be NEW: In 2000 – The Shenehon was converted to B100 and showed immediate reductions in visible emissions, smoke, and offensive odor with unchanged performance in main engine or generator.
  2. BE FIRST: This was the first federal vessel in the nation to operate on 100% biodiesel.
  3. BE BETTER: 2005 – R/V Huron Explorer converted to the first petroleum-free vessel through use of B100 and biomotor, hydraulic, steering, and transmission oils. Not only was the fuel petroleum-free, but so were lubricants and all other oils.
  4. BE SUSTAINING: April 2006 - Department of Energy Award in recognition of GLERL leadership in Green Ship Initiative. In May, all three GLERL vessels transitioned to total petroleum-free operation.



Provide resource managers with information of decision making  
Tom Nalepa -

1. Be NEW: Study benthos in the Great Lakes as part of lower food web understanding and long-term observations program.
2. BE FIRST: He saw the change in the ecosystem others did not due to rapid growth in zebra mussels and recognized the need for resource managers to have information.
3. BE BETTER: Participated in workshops and worked with DNRE to inform fisheries management decisions
4. BE SUSTAINING: Became an expert and authored reference material on zebra mussels – working on a 2<sup>nd</sup> edition of his book.

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Improve wave and current beach quality forecasts in the Great Lakes

1. Be NEW: Create wave and circulation models in the Great Lakes
2. BE FIRST: Developed the Great Lakes Coastal Forecasting System
3. BE BETTER: Put models together with health information to provide a new service
4. BE SUSTAINING: Get the information out to the public and resource managers.

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## NOAA Vision

*Healthy ecosystems, communities, and economies that are resilient in the face of change need knowledge to make informed decisions.*

### GLERL Science → Service

- Science to service culture requires an interdisciplinary workforce strategy that includes social sciences and communication
- Service-type Research & Development infrastructure needs funds and an acquisition strategy
- Interdisciplinary science teams need long-term funding investments for maintaining expertise
- Science to service performance management system recognizes new ideas, technology transfer, operational support, and communications
- Science organizations must be nimble enough to adapt



GLERL scientists are recognized leaders in the community and communicate regularly with public.

From the "History" and "Pre-eminence" parts of this presentation, data indicate that

*Science to service culture requires inter-disciplinary workforce strategy that includes social sciences and communication*

GLERL scientists are productive, deliver results, and well-recognized as shown by several inter-related indicators of progress

Data from the Management section of this presentation indicate that

• *Service-type infrastructure needs acquisition strategy and funds in addition to research funding*

• *Interdisciplinary science teams need long-term funding source (appropriations) for maintaining expertise*

• *Science to service management system recognizes new ideas, technology transfer, operational support, and communications to produce high-performing organization and develop personnel*

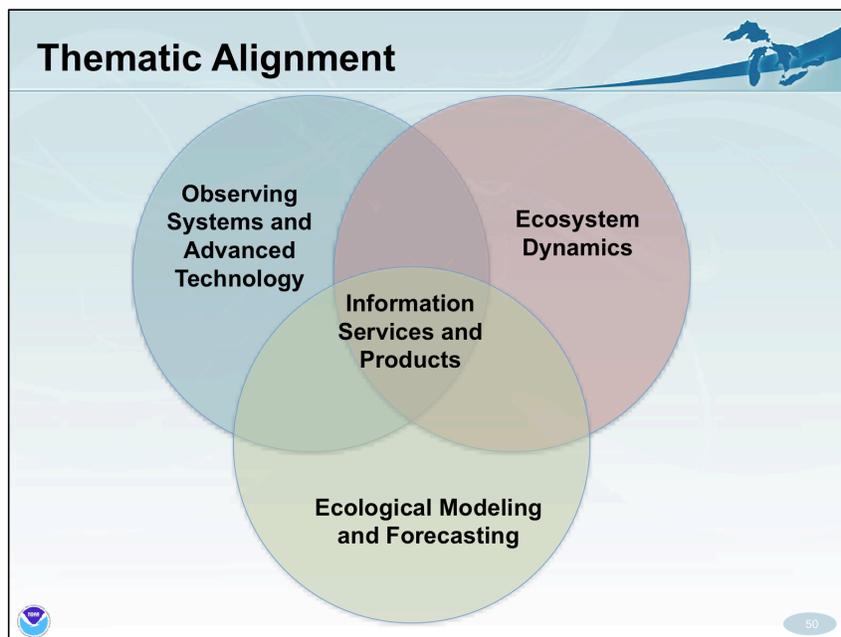
GLERL has evolved over decades and continues to lead on Great Lakes science issues, now preparing to adapt again to its new "ecosystem"

*Science organizations must be nimble enough to adapt to change*

*Science-based services needed*

- Invasive species and ballast water, Beach quality, Observations and modeling, Coastal forecasting, Climate change impacts, Ecological services: HAB bulletins, Response and restoration, Navigation and maritime transportation, Maritime heritage, Renewable energy, Economics of the Environment, Great Lakes Restoration Initiative (GLRI)

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Science Presentations to follow organized by thematic area with team leads providing overview, then more detailed specific projects.

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# Questions

