NOAA Great Lakes
Environmental Research Laboratory

STRATEGIC PLAN 2024-2028

Researchers deploy a remotely operated vehicle (ROV) to observe sinkholes at the bottom of Lake Huron. The ROV uses a camera to search the lake floor, take photos, and measure temperature, depth and conductivity. The water found at the bottom of these sinkholes is high in sulfate and low in oxygen, making them inhospitable for fish and other organisms normally found in the Great Lakes. With no competition, this makes the sinkholes, an ideal habitat for microorganisms known as cyanobacteria. Research on these fascinating underwater features and the unusual creatures they support is on-going. *Photo Credit: David J. Ruck/Great Lakes Outreach Media.*

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NOAA GLERL IMPLEMENTATION PLAN 2022-2026

SUPPLEMENTAL INFORMATION

Cover photos: In 2017, NOAA GLERL deployed the world's first freshwater Environmental Sample Processor (ESP) to track the concentration of dangerous toxins produced by cyanobacteria that bloom each summer in the western basin of Lake Erie. Shown outside of its casing on the front cover, when deployed, the ESP collects water samples, analyzes, and sends data in near real-time. In the Great Lakes, the ESP is used to monitor for microcystin, the dominant algal toxin in western Lake Erie. This allows NOAA GLERL to provide drinking water managers with data on algal toxicity in near real-time, before the water reaches municipal water intakes. *Photo credits: Daryl Marshke/Michigan Photography*.

A MESSAGE FROM THE DIRECTOR

The National Oceanic and Atmospheric Administration (NOAA) Great Lake Environmental Research Laboratory (GLERL) was created in 1974 to "conduct research directed toward an understanding of the environmental processes in the Great Lakes and their watersheds." As one of sixteen laboratories and programs within NOAA's research division—Oceanic and Atmospheric Research (OAR)—our freshwater focus on Great Lakes, large lakes of the world, and coastal ecosystems makes us unique among NOAA OAR laboratories and programs. Our research contributes to the products and services that protect lives and livelihoods, the economy, and the environment of the Great Lakes region.

The Great Lakes basin is a vital freshwater resource that spans across U.S. and Canadian borders and enriches the lives of more than 34 million people who live, work, and recreate in the region. Our awareness and understanding of the fragile, complex, and interconnected nature of the Great Lakes is now more important than ever. As we look ahead, we must recognize the uncertainty that the dynamic forces of human-induced stressors and a changing climate bring to our work. NOAA's commitment to protecting and securing Great Lakes water and resources for future generations will not waiver. Our science, service, and stewardship will continue to contribute to an awareness and understanding that spans across the region.

The science program at GLERL is foundational to and interwoven across the core NOAA mission and is guided by OAR's goals—as described in the OAR Strategy 2020-2026—to explore the marine environment; detect changes in the ocean, Great Lakes, and atmosphere; make better forecasts; and drive innovation. Our approach to scientific research—integrated around physical, chemical, and biological interactions—serves as a framework to address the complex environmental challenges posed by a large-lake system in a state of flux, as well as a model for other freshwater and coastal ecosystems. Looking forward, we are strengthening our programs in 'omics, uncrewed systems, Great Lakes acidification, and stakeholder engagement. In the years ahead, we will continue to enhance our science program through partnerships and collaborations within the private sector, and greater integration into academia.

This strategic plan outlines GLERL's strategies, goals, and objectives for the next five years. We are poised to embrace future needs by building lasting partnerships, providing innovations in observing technology, leading cutting-edge experimental research, developing advanced ecosystem models, communicating science-based products and services, and contributing sound science to the Great Lakes management community.

Deborah H. Lee

Director, Great Lakes Environmental Research Laboratory

NOAA GLERL researchers collect field data from NOAA research vessels throughout the Great Lakes. GLERL focuses on priority ecological problems, and their interactive effects, in the Great Lakes and coastal ecosystems.

VISION, MISSION, VALUES

Vision

Deliver NOAA's Future
A trusted scientific enterprise to advance observation, modeling, understanding, and prediction of the Great Lakes and coasts to sustain resilient ecosystems, communities, and economies.

Mission

Research, Develop, Transition
Conduct research to understand and predict the Great Lakes and coastal ecosystems; develop technology to improve NOAA science, service, and stewardship; and transition the results so they are useful to society.

Values

Commit to Diversity
Strive to create a diverse workforce and an environment where all feel included, regardless of position, background, trait, or status. Recognize that a diverse workforce and an inclusive culture positions us to be the strongest and best equipped to serve all communities of the Great Lakes.

Explore to Solve
Conduct preeminent research, aligned with NOAA goals, to advance the state of science and knowledge that promotes sound decision making and ecosystem management. Integrate an interdisciplinary approach and use partnerships to strengthen research capacity.

Uphold Scientific Integrity
Execute research with integrity and quality, abiding by quality management, safety standards, and environmental compliance.

Engage from Local to Global
GLERL is involved locally, regionally, and internationally to understand the changing environment and inform stakeholders.

NOAA GLERL's Lake Michigan Field Station (LMFS) is located on Lake Michigan, in Muskegon, Michigan, right next to a popular pier that draws thousands of visitors year-round (top). This location provides a unique opportunity for engagement with tourists, recreational users, and community members of this diverse region. Based at the field station, the *RV Laurentian* (bottom) is NOAA GLERL's largest research vessel. NOAA GLERL's research staff and vessel operators coordinate to collect data to support integrated scientific research for NOAA and external partners.

COMMITMENT TO DIVERSITY & INCLUSION

At NOAA GLERL we strive to create a diverse workforce and an environment where all feel included, regardless of position, background, trait, or status. We recognize that a diverse workforce and an inclusive culture positions us to be the strongest and best equipped to serve all communities of the Great Lakes.

Across the federal government, including at NOAA, there is increased focus on the work that is needed to strengthen the Federal workforce through the promotion of diversity, equity, inclusion, and accessibility. GLERL is firmly committed to increasing the diversity within its workforce and creating inclusive work environments where everyone feels valued and experiences a true sense of belonging. The term "diversity" means the practice of including the many communities, identities, races, ethnicities, backgrounds, abilities, cultures, and beliefs of the American people, including underserved communities. The term "inclusion" means the recognition, appreciation, and use of the talents and skills of employees of all backgrounds. An inclusive culture values the unique attributes of all team members, and it provides an environment that is respectful, collaborative, supportive, and one that allows for equitable access. Inclusion requires active and intentional engagement on the part of everyone and provides a feeling of belonging.

GLERL will take direct steps to increase the diversity of its workforce as well as provide an inclusive, equitable, and accessible work environment for all employees. GLERL maintains an active diversity and inclusion committee, open to all staff, that promotes a range of initiatives. This committee also collaborates with groups outside of GLERL on diversity, inclusion, and equal employment opportunity activities.

GLERL strives to make current and future staff able to contribute their talents in a place they feel welcome, supported, and empowered to support NOAA's mission. In an effort to create an environment that is as diverse as the region it serves, GLERL will work to provide a "seat at the table" for all staff and stakeholders in the region, and provide everyone an opportunity to speak for themselves. We know the best results come from a diverse set of perspectives and we will work to foster a culture of respect and inclusion for all persons. The people of GLERL and the capabilities they provide are its greatest asset.

GLERL follows OAR's guiding principles for an inclusive work environment:

- We will treat each other with respect, always, regardless of rank or grade.
- Every employee deserves a work environment free from discrimination, disrespect, and fear.
- We promote open expression of our individuality and diversity within the bounds of courtesy, sensitivity, and respect, and will promote an environment of professionalism in our facilities.
- We will routinely seek to attract diverse talent in our workforce.
- We seek to resolve workplace conflicts in a prompt, impartial, confidential, nondiscriminatory, and constructive manner, without fear of reprisal, and at the lowest level through open communication.
- All employees are valued and included for the unique contributions they bring to the organization.
- Leaders and supervisors have a special responsibility to build and preserve this climate and culture of inclusion and mutual respect for all.
- People First, Mission Always.

OUR ORGANIZATION

The GLERL Ann Arbor facility houses staff from NOAA and other programs and partners. GLERL serves as a physical and virtual hub for the Great Lakes region. *Photo credit: Aerial Associates Photography, Inc. by Zachary Haslick.*

The Great Lakes Environmental Research Laboratory (GLERL) is a Federal scientific research facility based in Ann Arbor, Michigan, operating as part of the National Oceanic and Atmospheric Administration (NOAA) Office of Oceanic and Atmospheric Research (OAR). GLERL's Ann Arbor facility houses experimental and marine instrumentation laboratories furnished with state-of-the-art equipment and technology to support GLERL's scientific research. Integral to GLERL's operation is the Lake Michigan Field Station (LMFS), strategically located on the eastern shore of Lake Michigan in Muskegon, Michigan. The LMFS serves as the home base for field operations, research, and GLERL vessel operations—critical assets in providing physical access to the Great Lakes and advancing NOAA's mission in the region.

GLERL's research capacity is further strengthened by its in-house and regional partnerships. These include participating universities, municipalities, State, Federal, and international agencies, non-governmental institutions, and many others. These partnerships foster mutually beneficial research and collaboration, promote efficient information exchange and dissemination, and help identify and take advantage of shared resources and expertise.

GLERL serves as the financial management center for the distribution of funds throughout NOAA via the interagency Great Lakes Restoration Initiative. GLERL also provides regional small boat infrastructure and services to all NOAA line offices in the Great Lakes, producing operational efficiencies and cost savings to the government. The Ann Arbor facility serves informally as a regional operating center, providing access to NOAA's NMFS Habitat Restoration, National Marine Sanctuaries Regional Coordination, NMFS Office of Enforcement, National Geodetic Survey, Great Lakes Observing System, the NOAA Great Lakes Regional Collaboration Team, and the Cooperative Institute for Great Lakes Research.
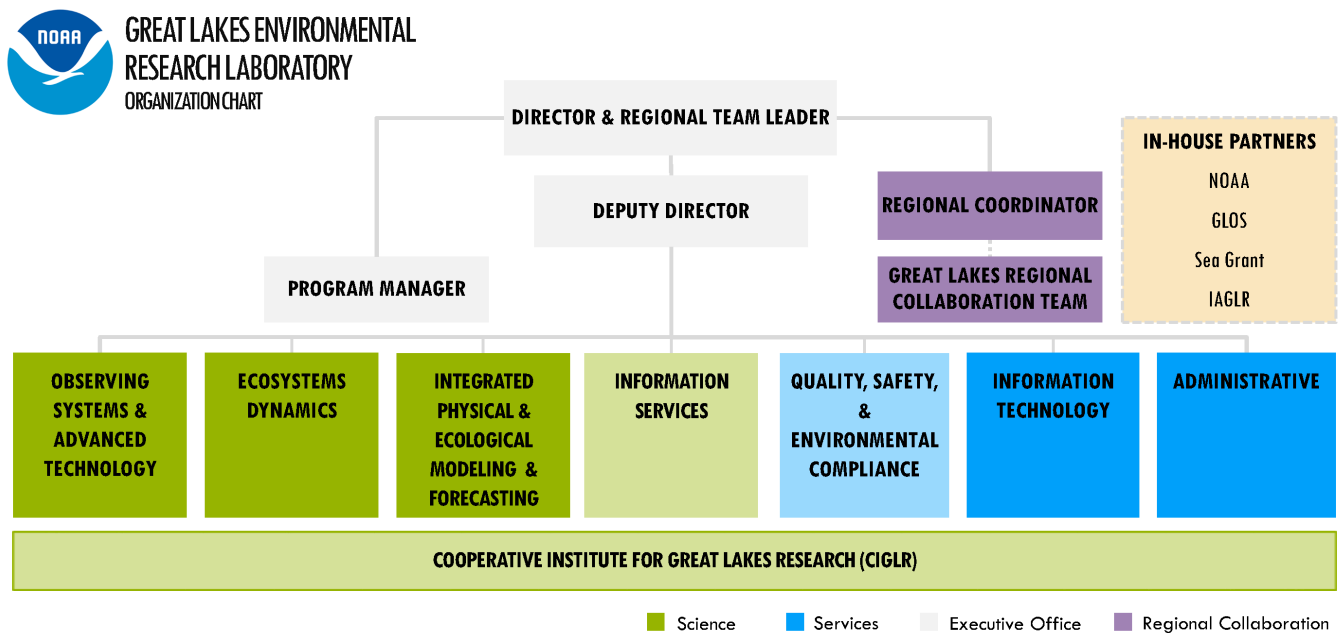
GLERL Science Branches

Observing Systems and Advance Technology (OSAT) - OSAT conducts scientific and engineering research and development, identifies emerging observational infrastructure needs, and provides environmental observations and data throughout the Great Lakes.

Ecosystem Dynamics (EcoDyn) - EcoDyn strives to monitor, analyze, understand, and predict changes in Great Lakes and coastal ecosystems to strengthen capacity for managing water quality, fisheries, invasive species, and ecosystem health.

Integrated Physical and Ecological Modeling and Forecasting (IPEMF) - IPEMF conducts innovative research and development of numerical models to predict the physical, chemical, biological, and ecological response of the Great Lakes due to weather, climate, and human-induced changes.

Information Services (IS) - IS coordinates and supports information flow internally among NOAA staff, and externally with stakeholders and the general public to advance science, service, and stewardship of the Great Lakes and coastal ecosystems.

GREAT LAKES ENVIRONMENTAL RESEARCH LABORATORY
ORGANIZATION CHART

DIRECTOR & REGIONAL TEAM LEADER

DEPUTY DIRECTOR

REGIONAL COORDINATOR

IN-HOUSE PARTNERS
NOAA
GLOS
Sea Grant
IAGLR

PROGRAM MANAGER

GREAT LAKES REGIONAL COLLABORATION TEAM

OBSERVING SYSTEMS & ADVANCED TECHNOLOGY

ECOSYSTEMS DYNAMICS

INTEGRATED PHYSICAL & ECOLOGICAL MODELING & FORECASTING

INFORMATION SERVICES

QUALITY, SAFETY, & ENVIRONMENTAL COMPLIANCE

INFORMATION TECHNOLOGY

ADMINISTRATIVE

COOPERATIVE INSTITUTE FOR GREAT LAKES RESEARCH (CIGLR)

Science   Services   Executive Office   Regional Collaboration

NOAA Great Lakes Regional Partnerships

NOAA Cooperative Institutes - NOAA Cooperative Institutes are academic and non-profit research institutions that demonstrate the highest level of performance in the conduct of research, supporting NOAA's mission goals and strategic plan. The Cooperative Institute for Great Lakes Research (CIGLR) is sponsored by the NOAA Great Lakes Environmental Research Laboratory (GLERL) and hosted by the University of Michigan. CIGLR and GLERL staff work side-by-side on exciting new research, training the next generation of scientists, and turning research into action for safe and healthy Great Lakes communities.

NOAA Great Lakes Regional Collaboration Team (GLRCT) - The GLRCT serves to unify and integrate NOAA initiatives in the Great Lakes region by providing services that meet the evolving needs of stakeholders. The GLERL Director also serves as NOAA's Regional Team Lead for the Great Lakes, facilitating collaboration of more than 800 NOAA employees and partners representing the agency's diverse capabilities. The GLRCT Regional Coordinator is co-located at GLERL.

Great Lakes Sea Grant Network - Through its network of extension educators and its use of engaging communication and education techniques, the Great Lakes Sea Grant Network plays a central role in supplying the region and the nation with usable solutions to pressing problems and providing information needed to better manage Great Lakes resources for present and future generations of Americans. Located at GLERL, the Regional Sea Grant Specialist position facilitates information exchange between GLERL and Sea Grant regarding Great Lakes-related research, extension, education, and other programs.

Great Lakes Observing System (GLOS) - GLOS is one of 11 regional associations of the Integrated Ocean Observing System (IOOS), working to enhance the ability to collect, deliver, and use ocean and Great Lakes information. A bi-national nonprofit, GLOS provides end-to-end data services that support science, policy, management, and industry in the Great Lakes. GLOS is co-located with GLERL and coordinates on support for critical observing needs and data delivery to stakeholders.

Great Lakes Integrated Sciences and Assessments (GLISA) - As one of 11 NOAA Climate Adaptation Partnerships teams (formerly Regional Integrated Sciences and Assessments (RISA) teams), GLISA serves as a collaboration between the University of Michigan and Michigan State University. GLISA's team of social and physical scientists work at the boundary between climate science and decision makers, striving to enhance Great Lakes communities' capacity to understand, plan for, and respond to climate impacts now and in the future. GLERL collaborates with GLISA on the Annual Climate Summary for the Great Lakes Basin, climate modeling workshops, lake ice forecasting, and climate communications.

National Marine Sanctuaries Program - NOAA's Office of National Marine Sanctuaries serves as the trustee for a network of underwater parks encompassing more than 600,000 square miles of marine and Great Lakes waters. The Thunder Bay National Marine Sanctuary (TBNMS), based in Alpena, Michigan and encompassing 4,300 square miles of northwestern Lake Huron, is jointly managed by NOAA and the State of Michigan to discover, document, interpret, and protect a nationally significant collection of historic shipwrecks. TBNMS works in partnership with GLERL to facilitate additional research in sanctuary waters including biology, geology, and climate change studies, and relies on GLERL vessel and other technological support.

U.S. Coast Guard Center of Expertise for Oil Spill Preparedness and Response - The National Center of Expertise (NCOE) was established by the Frank Lobiondo Coast Guard Authorization Act of 2018 (PL 115-282, Sec. 807) to better prepare against any potential oil spill in freshwater environments. After an extensive evaluation, Lake Superior State University (LSSU) and GLERL were selected as dual locations for the NCOE. Given this new mission, GLERL was successful in adding LSSU to CIGLR during CIGLR's renewal period. The NCOE will lead the way on the research and testing of freshwater environments. The U.S. Coast Guard, NOAA GLERL, and the NOAA Office of Response and Restoration are working in partnership to identify gaps in Great Lakes oil spill research; conduct research, development, testing and evaluation for freshwater oil spill response equipment; help train first responders; and work with academia and the private sector to develop standardized maritime oil spill response training.

FORECASTING RESEARCH IN TIMES OF UNCERTAINTY

GLERL is committed to addressing the needs of the Great Lakes and coastal communities as we strategize our research priorities for the future. By almost any measure, the Great Lakes region is one of the world's most important economic and population centers, with a population of more than 34 million, a GDP of $6 trillion USD and 1.5 million Great Lakes-related jobs. Nearly one-third of U.S. and Canadian economic activity is centered in the Great Lakes region and they contain 95% of our nation's fresh surface water. The future strength of the Great Lakes Blue Economy and regional prosperity depends on society's ability to maintain their water quality, biological productivity, healthy coastal ecosystems, recreational and commercial access to the lakes and a safe navigation system.

The changing political and economic landscape adds layers of complexity that all environmental research communities encounter. As is true throughout NOAA, the operating landscape for the Great Lakes environmental science community is changing and this presents challenges and opportunities for GLERL. To help shape the strategic direction for research, NOAA laboratories, and programs, the NOAA 2020-

NOAA GLERL and CIGLR deployed and maintained a network of buoys and meteorological stations while following safety protocols during the COVID-19 pandemic. These instruments are an essential source of Great Lakes data, providing measurements like wind speed, water and air temperature, and wave height.

2026 Oceanic and Atmospheric Research Strategy identifies the following six factors that will impact our future operating environment and our capacity to remain leaders in environmental research:

- Society's perception of the natural environment.
- Shifts in funding.
- Technology is lowering barriers to entry.
- Integrated approaches and skill sets.
- On-demand culture.
- Increased competition for STEM talent.

For GLERL, these factors are informing our strategic approach for the coming years. In order to remain relevant and continue to provide global scientific leadership in ecosystem research, GLERL is programming for flexibility and placing a renewed emphasis on the importance of innovative partnerships and collaborations. We are acknowledging and embracing uncertainty as we set forth on new strategic directions, goals, and priorities for the future.

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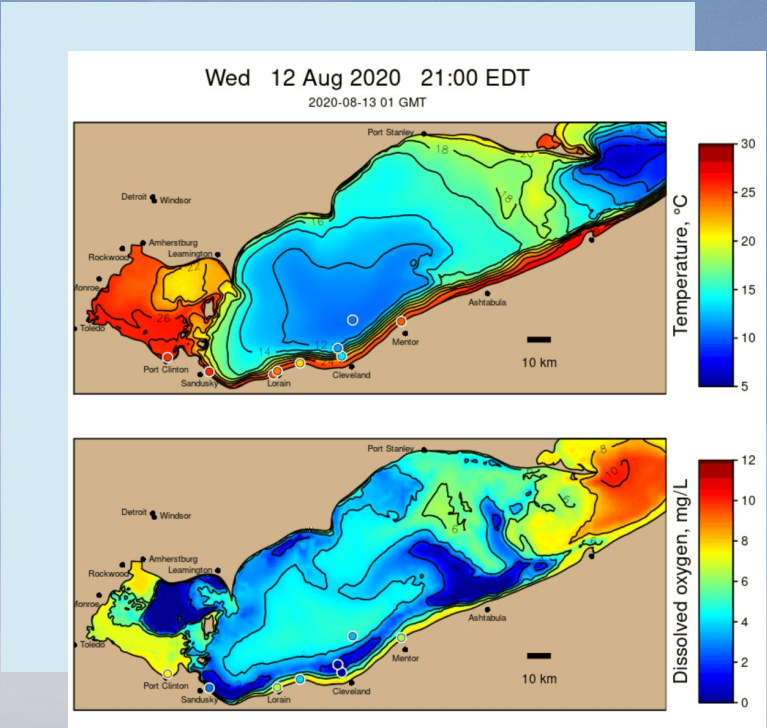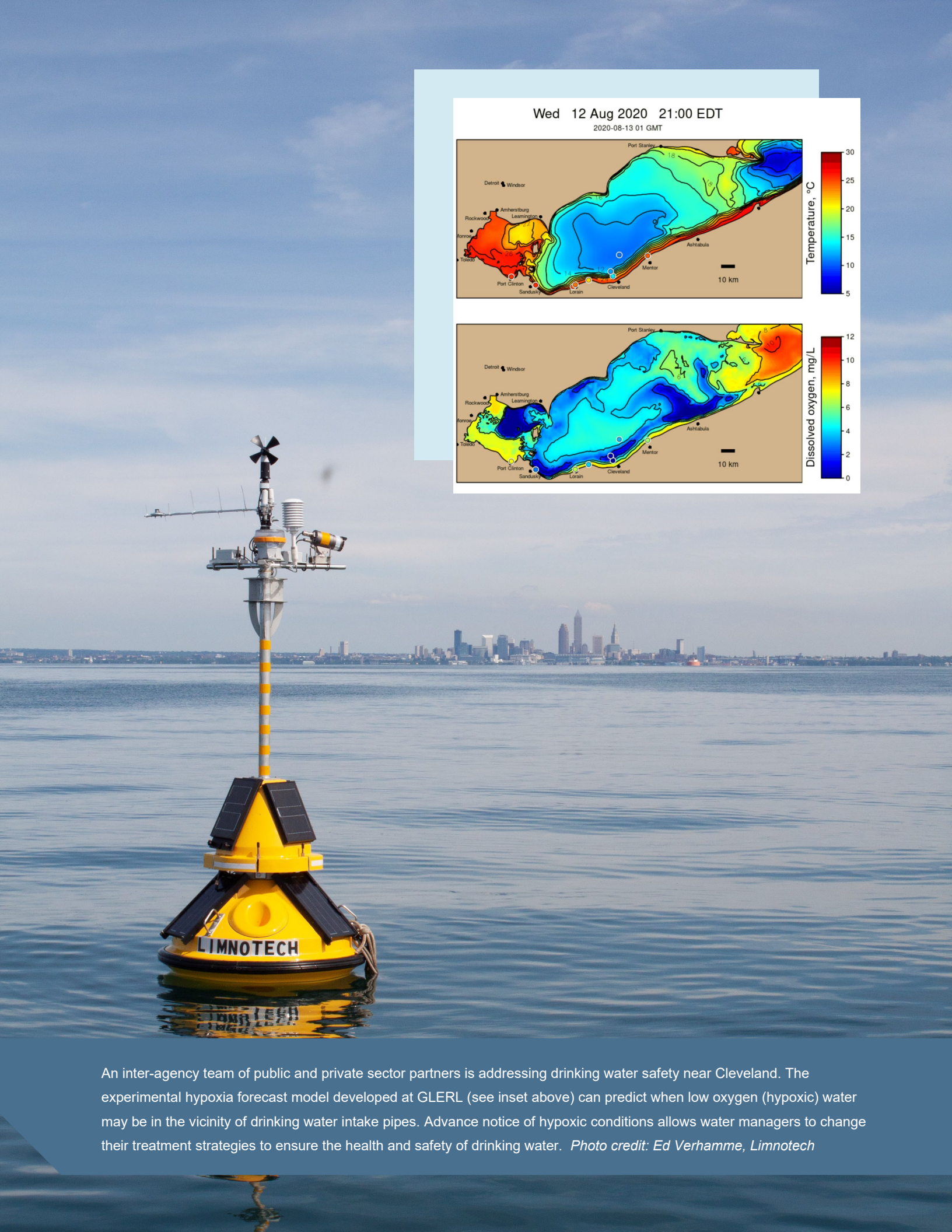
An inter-agency team of public and private sector partners is addressing drinking water safety near Cleveland. The experimental hypoxia forecast model developed at GLERL (see inset above) can predict when low oxygen (hypoxic) water may be in the vicinity of drinking water intake pipes. Advance notice of hypoxic conditions allows water managers to change their treatment strategies to ensure the health and safety of drinking water. *Photo credit: Ed Verhamme, Limnotech*

STRATEGIC APPROACH

GLERL's approach to scientific research—integrated around physical, chemical and biological interactions—serves as a framework to address the complex environmental challenges posed by a large-lake system in a state of flux as well as to serve as a model for other freshwater and coastal ecosystems. This integrated approach builds upon long-term observations, data collection, experimentation, modeling, prediction, and forecasting. The integration of research focuses scientific questions to strengthen understanding of the Great Lakes and toward solving environmental problems posing risks to the vitality and resiliency of the Great Lakes.

While the operating landscape for the environmental science community is changing, we are guided by the following five strategies developed by the NOAA Office of Oceanic and Atmospheric Research. GLERL will continue to conduct and deliver world-class science dedicated to the NOAA mission of science, service and stewardship.

1. Deliver world-class science together

GLERL will operate as an integrated, connected, and aligned organization with a shared vision to deliver world-class products. Recognizing that GLERL cannot succeed alone, GLERL will collaborate with other NOAA Line Offices, government, academia, nonprofit, industry, and international partners.

2. Develop the next-generation workforce

GLERL will grow the leaders of tomorrow. With a focus on diversity and inclusion, GLERL will broaden its talent pool to reflect multidisciplinary skill sets.

3. Prioritize mission-relevant research

GLERL will continue to contribute to fulfilling NOAA's vision of resilient ecosystems, communities, and economies. GLERL will anticipate future scientific and operational needs, while delivering on current expectations.

4. Strengthen internal and external collaboration

GLERL will leverage the breadth of expertise across GLERL, NOAA Line Offices, and external domestic and international communities to improve mission effectiveness.

5. Leverage new technology and advance computing capability

GLERL will engage the external community to maintain awareness of new technology and explore innovative ways to acquire and use it.

Eddy covariance stations (see inset above), such as that on the White Shoal lighthouse in Lake Michigan, provide key information for researchers to build models that more accurately reproduce lake conditions, allowing for better forecasts of water levels and lake-effect snow.

GOALS AND OBJECTIVES

Five goals reflect what OAR and GLERL desire to achieve, where to focus activities, and, ultimately, how to improve the organization's ability to deliver NOAA's future. The objectives, nested under each goal, are the areas of focus needed, and where GLERL is aligning to help OAR achieve its goals.

1

Explore and Improve Public Understanding of the Great Lakes Environment

Increase knowledge of the Great Lakes ecosystem to support equitable resource management and public awareness.

2

Detect Changes in the Great Lakes Ecosystem

Produce, analyze, and interpret long-term observation records needed to address climate change, understand the Great Lakes ecosystem, and inform the public.

3

Make Forecasts Better

Improve accuracy, precision, and efficiency of forecasts and predictions to save lives and property and support a vibrant economy.

4

Drive Innovative Science

Cultivate and deliver mission-relevant research to lead the environmental science community.

5

Commit to Equity, Diversity, Inclusion, and Accessibility

Increase workforce diversity and improve equitable delivery of information and services to underrepresented and underserved communities.

Goal 1: Explore and Improve Public Understanding of the Great Lakes Environment

Objective 1: Increase knowledge of the Great Lakes and the regional water budget to support resource management and public awareness.

Sub-objective 1.1 Survey and spatially characterize the Great Lakes.	Milestones ○ Coordinate and partner with others using a variety of characterization methods and techniques to acquire data for environmental, physical, and biological parameters
Sub-objective 1.2 Communicate to stakeholders and the public the ecological, economic, and cultural value of the Great Lakes	○ Provide equitable environmental data services and tools for the Great Lakes that inform decisions, policies, and resource management. ○ Communicate value to stakeholders by leveraging established networks and creating new collaborations. ○ Equitably engage the public to increase citizen participation in observations, exploration, and stewardship; and enhance Great Lakes literacy in the U.S. ○ Equitably engage with stakeholders early and regularly throughout research and development to understand user requirements, needs, and expectations.

Goal 2: Detect Changes in the Great Lakes Ecosystem

Objective 2: Produce, analyze, and interpret long-term observation records needed to address climate change, understand the Great Lakes ecosystem, and inform the public.

Sub-objective 2.1 Sustain and advance Great Lakes observational capacity.	Milestones: o Advance the Great Lakes research observational capacity using shipboard operations, monitoring infrastructure, and uncrewed systems; expand use and application of technology to enhance remote sensing capacity for assessing ecosystem impacts and for use in modeling and forecast development. o Conduct assessments of ecosystem health and trends relative to climate. o Integrate physical measurements, physical processes and observations to improve predictions of Great Lakes water levels, water budget, and ice cover and expand the knowledge base of Great Lakes extreme events.
Sub-objective 2.2 Identify and address gaps in Great Lakes observations needed to understand causes of variability and change in freshwater and regional ecosystems.	Milestones: o Improve and expand the capacity to forecast effects of climate change on the Great Lakes and its ecosystem to reduce risk and improve resilience. o Expand the current suite of Great Lakes observations and sampling to fill knowledge gaps and address prioritized needs. o Improve Great Lakes understanding, forecasts, applied knowledge, and predictions for high-impact events. o Test and develop observation technologies, experimental tools and capabilities through partnerships and/or research efforts to better address these needs in the coming decade.

Goal 3: Make Forecasts Better

Objective 3: Improve accuracy, precision, and efficiency of forecasts and predictions to save lives and property as well as support a vibrant and resilient economy.

Sub-objective 3.1 Develop Great Lakes components of the unified and integrated Earth System Model.	Milestones: ○ Develop a coordinated Great Lakes modeling system to improve forecast capability of lake hydrodynamics, lake ice, hydrological response, ecological processes, water quality, and climatic variability and trends across spatial and temporal scales. ○ Establish protocols for routine model skill assessment and explore approaches to probabilistically quantify model uncertainty.
Sub-objective 3.2 Design tools and applications to forecast high-impact Great Lakes weather, water, climate, and ecosystem events.	Milestones: ○ Invest in the development of tools, technologies, experimental methods, and processes to advance models and increase the relevancy of forecasts. ○ Improve the capability to understand observation and forecast uncertainty and better communicate the uncertainty.
Sub-objective 3.3 Transition science to operational products that meets users' current and future needs	Milestones: ○ Research to Operations (R2O): Research-based models are transitioned to operations through collaboration with NOAA partners. ○ Research to Applications (R2A): Research-based models are transitioned to applications through collaboration with important stakeholders or other government agencies.

Goal 4: Drive Innovative Science

Objective 4: Cultivate and deliver mission-relevant research to lead the environmental science community.

Sub-objective 4.1 Reinforce a culture of innovation and adaptability.	Milestones: ○ Strengthen processes, governance, and structures that cultivate innovation and the behaviors of innovation. ○ Establish processes for risk acceptance and management across the organization. ○ Create a culture of resilience by fostering an appreciation for risk and creating a structure that is adaptive and flexible.
Sub-objective 4.2 Invest in high-risk, high-reward science.	Milestones: ○ Identify and conduct new and innovative science and assess the impacts, risks, and opportunities. ○ Lead research on identified high-risk, high-reward areas to advance NOAA's mission and guide the environmental community.
Sub-objective 4.3 Accelerate the delivery of mission-ready, next-generation science.	Milestones: ○ Expedite the delivery of mission-ready science, services, and technologies. ○ Prioritize mission-driven science and research agendas, addressing NOAA's most pressing requirements in a relevant, timely manner.

Goal 5: Commit to Equity, Diversity, Inclusion, and Accessibility

Objective 5: Increase workforce diversity and improve equitable delivery of information and services to underrepresented and underserved communities.

Sub-objective 5.1 Build and retain a diverse, highly-capable workforce.	Milestones: o Create an inclusive, equitable, and accessible work environment that connects all staff and celebrates their contributions o Provide a respectful, collaborative, and supportive environment free from discrimination and fear for all employees, affiliates, and visitors. o Recognize, use, appreciate, and celebrate the talents and skills of employees of all backgrounds o Encourage communication, flexibility, and fairness o Diversify and enhance partnerships with minority-serving organizations o Reduce barriers and biases in recruitment, retention, and advancement o Create opportunities for staff and stakeholders to speak for themselves.
Sub-objective 5.2 Enhance outreach and equitable delivery of information and services to under-represented and underserved communities.	Milestones: o Conduct assessments of the needs of underrepresented and underserved communities in the Great Lakes region. o Plan and develop research programs that address needs of underrepresented groups. o Use social science-based approaches to tailor outreach, products, and services to expressed community needs. o Reduce barriers to information access and services for underserved communities.