Iowa Lakeside Laboratory Regents Resource Center
Report to the Board of Regents, State of Iowa
2017-2018

About the Iowa Lakeside Lab and Regent Resource Center

The Iowa Lakeside Lab and Regent Resource Center (Lakeside) is owned by the state of Iowa and operated through the Iowa Board of Regents. Lakeside's 147-acre campus is located on scenic West Okoboji Lake, on Little Miller's Bay. The bay and adjacent natural areas are used as outdoor classrooms for Lakeside's university courses and outreach programs. The campus is open year round, and visitors are welcome to visit during daylight hours. A description of the campus is included at the end of this report.

Mission:

The mission of the Iowa Lakeside Laboratory Regents Resource Center (ILLRRC) is to provide facilities and programing as a field station and community resource to support scientific education, research, and outreach programs of the Regents universities and other institutions.

The annual report documents activities during the past year that highlight how Lakeside is working to achieve our mission.

Student research provides opportunities to build 21st century skills. Val Cota is testing lake water for the presence of harmful algal toxins.

Organization of this Report

The 2017-18 report includes four sections:

I. Summer College Courses
II. Academic and Research
III. Community Engagement
IV. Future Directions

Students in the ecology class identify fish species in a Northwest Iowa stream.

I. Summer College Courses

The summer of 2018 saw strong university numbers with total enrollment that was higher than 2017. A new, streamlined website with enhanced information regarding scholarships (tuition, room and board, and research) is expected to have a positive impact on enrollment in 2019.

Courses offered this year included Soil Formation, Diatoms, Ecology, Archaeology, Algae, Aquatic Ecology, Acoustic Ecology, Geographic Information Systems (GIS), and Animal Behavior. New courses in 2018 included Glacial Geomorphology, Field Methods of Data Collection and Analysis of Data using R programming language. Core classes (Ecology and Diatoms) had waiting lists in 2018. Plans to offer a second session of Ecology will help alleviate this issue in 2019. The University of Iowa winter ecology course also utilized Lakeside for a week in January, which provided a unique learning experience for students.

Lakeside offers unique academic experiences such as *College Prep Diatoms* (college credit course for high school students) and the Okoboji Entrepreneurial Institute (OEI). College prep courses at Lakeside give high school students an authentic experience with "hands on – minds on" research in STEM fields. Students from four states (Iowa, Minnesota, Texas and California) participated in the College Prep Diatom (CPD) Course in 2018. The program was recently highlighted by the Diatoms of North America Association on their website https://diatoms.org/news/students-are-doing-great-things-in-iowa.

Lakeside courses focus on building interdisciplinary connections for students. Acoustic Ecology students record and measure sound waves to make inferences on species diversity and density.

CPD students have added more than 500 observations to iNaturalist, a global citizen science project. Graduates of the program are highly successful. Andy Tran (CPD Class of 2017) conducted water quality research with a professor at Grand View University and received a full scholarship at Drake University, where he will study pharmacy. Kevin Dong (CPD Class of 2015) completed an REU program this summer with Dr. Victoria Chraïbi at Tarleton State University, investigating the diatoms at Timberlake Biological Field Station. He won first place at a poster session and will be attending a national REU conference.

Left: 2018 CPD students at Silver Lake. Right: Kevin Dong (Class of 2015) won first place for his research.

Workshops and Special Events

The International Polar Marine Diatom Workshop was held at Lakeside from August 5-11, 2018. Forty-two participants from 10 countries traveled to Okoboji to share research and discuss common issues for the diatom community.

Other Events:

- American Fisheries Society Meeting
- Soil and Water Conservation Society Meeting
- Iowa Water Center Annual Board Meeting
- University of Iowa Veterans
- Phycological Research Consortium

II. Academics and Research

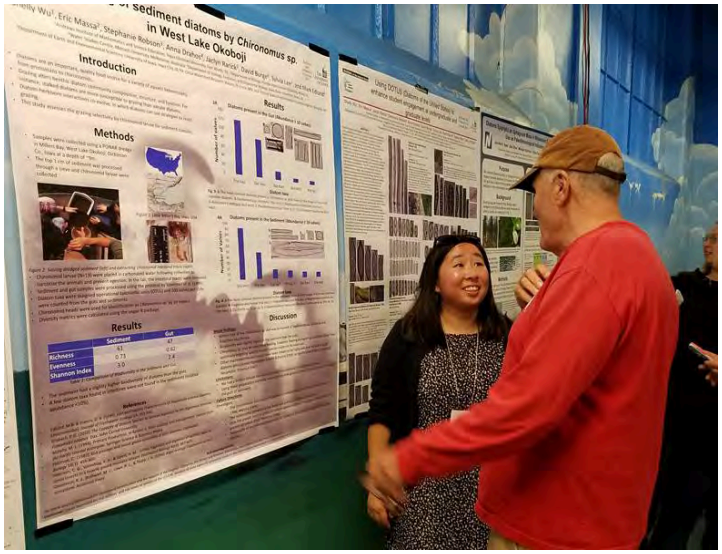
Faculty and Student Research

Increasing opportunities for student research was an area of focus for Lakeside Lab in 2018. The Friends of Lakeside provided financial support for three undergraduate research projects this year:

- Charla Wilson (Iowa State Student in the Louis Stokes Alliances for Minority Participation Program) completed a project on the factors influencing nesting success of purple martins.
- Sydney Weldon (Iowa State University) completed a "dark data" project that included digitizing more than 8000 archived specimens of birds, fungi and plants. The data from the project are entered into the https://www.zooniverse.org/ website and make the historical data housed at Lakeside available to scientists around the world.
- Val Cota (Buena Vista University) completed her second summer of research on the occurrence of algal toxins in the Iowa Great Lakes. Val's work will continue into the fall with a comparison of analytical methodologies using Enzyme Linked Immuosorbent Assay to traditional Gas Chromatography.

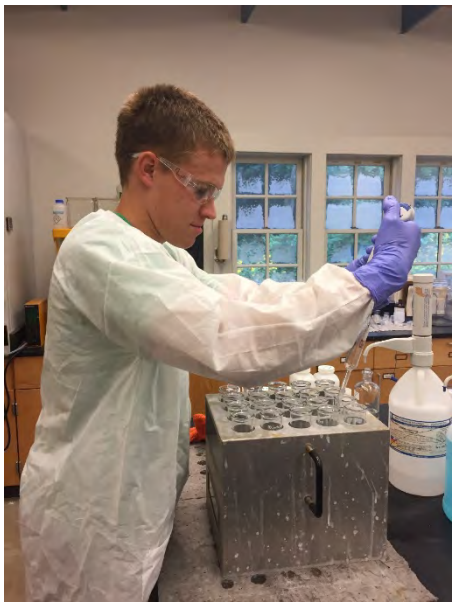
The Becker Family Fund of the Friends of Lakeside also supported graduate student research in 2018. Martin Simonson (Iowa State University) completed the first year of data collection on his dissertation regarding common carp and buffalo fish populations in northwest Iowa. Drs. Corey Markfort, Greg LeFevre and Mary Skopec (University of Iowa) received a Center for Health Effects of Environmental Contamination research grant to estimate algal toxin concentrations from hyperspectral cameras mounted on drones. The research grant will support a master's student in 2019-20.

Betsy Swanner (ISU) completed research on the role of micronutrients in harmful algae blooms in 2018 (with in-kind assistance from Lakeside). Results from the project are a key component in a new grant proposal to the Iowa Space Grant Consortium. The new project will investigate the source of sulfur in Okoboji sediment cores, which is relevant to NASA due to recent detection of organic carbon on Mars, likely preserved in association with sulfur in lake deposits. Lori Biederman (ISU) continued her work on the impact of nutrients on prairie plants, and Bob Cruden (University of Michigan) continued his research on wetland invertebrates.



Students from the Ecology and Systematics of Diatoms class presented their research at the North American Diatom Society meeting.

Student Internships



In a competitive job environment, internships are a key component of a resume. Internships build skills and provide experiences deemed valuable by potential employers. The Lakeside "Earn to Learn" program is a cooperative effort between the Iowa Department of Natural Resources, the Okoboji Protective Association (OPA) and Lakeside. Funding for the program comes primarily from the OPA (through a grant from the Dickinson County Clean Water Alliance) and includes tuition for one 4-credit summer class, room and board assistance, and a paid internship. Students in the program are trained by the Iowa DNR to conduct invasive species patrols at local boat ramps and communicate with boaters regarding the need to inspect and clean vessels. This program not only supports students financially, but also provides networking opportunities with future employers.

Lakeside also offers internships for students to work in the State Hygienic Laboratory (SHL) facility co-located in the Waitt Water Quality Lab. Students in the SHL internship learn to conduct common water quality analyses and become proficient in implementing quality control/quality assurance procedures, reporting results to clients and communicating with the public. A graduate of this internship (2016-17) was recently hired by the SHL in Ankeny – a direct result of his experience at Lakeside.

Green Iowa AmeriCorps

In 2018, Lakeside collaborated with the University of Northern Iowa and the Green Iowa AmeriCorps (GIA) program to become a host facility. The GIA works with communities to offer energy audits and energy efficiency assistance to low-income residents, conducts environmental education projects and assists with land and water management projects. During the summer of 2018, Lakeside hired three GIA staff (two recent graduates and one University of Iowa student).

Summer Externships

Lakeside Laboratory participated in the Governor's STEM Externship program by hiring two teacher externs in the summer of 2018. Joann Kenny is a teacher at Hartley-Melvin-Sanborn HS and teaches Biology, Environmental Science, Human Anatomy and Physiology. Megan Bezdicek is at Spirit Lake High School and teaches Earth Science, Conceptual Chemistry, and Conceptual Physics. The teachers studied three watersheds on the Lakeside Laboratory property to examine delivery of nutrients and sediment to West Lake Okoboji. Information from the teacher externs can be found at https://lakesidelabwatershed.blogspot.com/. Both teachers will incorporate their research experience into their respective classrooms.

Teacher externs collect water quality samples to assess water quality entering West Lake Okoboji.

III. Community Engagement

Community Assistance

Lakeside is a vital resource in the Iowa Great Lakes and assisted the local community in implementing several projects during the past year.

- Organized the Prairie Lakes Conference. Conference topics included lake management strategies, innovative lake research and field tours highlighting community practices that have been implemented to protect the Iowa Great Lakes.
- Served on the Curlyleaf Pondweed Management Task Force. Worked with the community to develop strategies to manage excessive aquatic plant growth in the Iowa Great Lakes.
- Conducted water testing in East and West Okoboji following treatment of the lakes with an aquatic plant herbicide to ensure that drinking water was not impacted.
- Served as a team member developing the Spirit Lake Sourcewater Protection Plan.
- Served as a team member in the Silver Lake Restoration Plan. Lakeside provided 20 years of data on Silver Lake to the team in order to set restoration goals.

Science Seminars

Lakeside Science Seminars provide a forum for the community to become more knowledgeable regarding a variety of science topics. Topics included stormwater management strategies, citizen science, science writing, solar cars, and use of diatoms to understand past environments. The local radio station (KUOO) highlights the upcoming presentation with short interviews with speakers each week. Speakers and topics included:

- *Running with the Sun*: ISU Solar Cars; Iowa State PRSM Students
- *A World of Change: Land Transformation in Iowa*; Connie Mutel (University of Iowa)
- *Harbingers of Change: Response of Great Lakes Diatoms to Climate Change*; Andy Bramburger (University of Minnesota Duluth)
- *Forgotten River: Why Science Writing Matters*; Lisa Dill (University of Delaware)

- *Using Citizen Science and Dark Data to Illuminate Secrets of the Western Prairie Fringed Orchid*; Lori Biederman (Iowa State University)
- *The Ioway 2 Challenge, Hardship and Renewal*; Tammy and Kelly Rundle (Fourth Wall Films) and John Doershuk (State Archaeologist of Iowa)
- *Iowa's Megaflood? Big Boulders and Big History*; Kata McCarville (Upper Iowa University)
- *Quantifying Localized Impacts of Road Salts on Urban Waters*; Rebecca Kauten (University of Iowa)
- *Secrets of Diatoms: How Microscopic Algae from the Polar Regions Reveal Earth's History*; Beth Caissie (Iowa State University and colleagues from International Polar Marine Diatom Workshop)
- *Black Hawk Lake Restoration*; Ben Wallace *(Iowa Department of Natural Resources)*
- *Down the Drain: Managing Stormwater Flows*; Mary Skopec *(Iowa Lakeside Laboratory)*

Community members get hand's on training to identify polar marine diatoms.

Summary of Outreach and Public Programs
September 2017 - August 2018

Young Investigators: Connecting Children with Nature through Project Work: 2017 - 2018

- Multi-year professional development program in Nature – Based Project Approach with follow up classroom coaching
- Cohort IV finished final year of three-year training 35 teachers
- Basics of Nature Based Project Approach (for new teachers on existing teams) – 15 teachers
- Young Investigators is facilitated by Nature Connections, collaborative of early childhood educators in Northwest Iowa and professionals facilitated by Iowa Lakeside Lab
- Developed an on-line course for in-service teachers that will be able to extend the reach of the program beyond Northwest Iowa.

School Year Programs: Fall 2017–Spring 2018

- 477 pre K-12 students fall 2017
- 896 pre K- 12 students spring 2018
- 1373 total students served

Summer Camps (each pre K–12 camp capped at 12)

- 10 day camps for ages pre K- 12 students
- 96 students (each camp capped at 12)
- 2 additional camps in partnership with Okoboji Sailing School: 9 students
- 12 camperships (scholarships provided by the Friends of Lakeside Lab)

High School College Prep Diatoms

- 6 students from across Iowa (capped at 10 students), one High School TA from 2017 course
- Competitive application process
- One or two week course option with one to two college credits earned
- 6 tuition scholarships and 1 TA provided by Friends of Lakeside Lab

Summer Outreach Programs

- 160 participants – 7 Wild Wednesdays: family science programs
- 350 participants – Lakeside Treasure Hike: self-guided nature/literacy hike on Lakeside grounds, local library partnerships
- 11 Friends Science Seminars – 660 served: average attendance of 60 students and members of the public
- 4 Lakeside Artist in Residence Open House events, average attendance of 40 students and members of the public

Other Outreach

- Service groups (YMCA Y Kids, Girl Scouts, 4 H): 160
- Lakeside Halloween Hike 100 children and families
- Lakeside Winter Wonders Open House and Soup Fest: 100

- Earth Day Eagle Hike: 50
- Public writing workshops (4): Lakeside Writer in Residence programs: 20
- Total impacted: Approx. 430
- Lakeside Science Minute – weekly summer radio spots on science topics

Volunteer Programs

- 51 water monitoring (CLAMP) volunteers, 459 hours (approx. 9 hours/volunteer including 2 hour training)
- 30 Coffee and grounds, approx. 560 (approx. 10 volunteers/week x 2 hours x 28 weeks)
- 7 School year volunteers: approx. 65 volunteer hours (13 days x average 5 hours)
- Total of volunteer hours: 1084
- Total of volunteers: 88
- *Does not include Nature Connections team hours*

Lakeside collaborated with the Okoboji Sailing School to teach middle school children physics, weather, and biology in an integrated and interdisciplinary experience.

IV. Future Directions

Lakeside staff, stakeholders and representatives from UI, ISU and UNI completed a draft strategic plan in 2018. The goal of the planning process was to identify new educational and research opportunities, ensure long-term financial stability (including increased support from outside sources), enhance community engagement, and serve as a focal point for research and education by the Board of Regents universities in the Iowa Great Lakes. The plan layouts strategic priorities for five main objectives:

Objectives

1. **Education.** Provide formal and informal learning in the sciences and foster environmental literacy.
2. **Research.** Serve as a site for research about ecosystems and human-environment interactions.
3. **Community Engagement.** Engage citizens of all ages in understanding and appreciating the natural world.
4. **Arts -** Serve as a site for artistic exploration at the intersection of art, science, and the environment**.**
5. **Entrepreneurship and Economic Development**: Develop and promote partnerships to inform public policy and spur environmentally sustainable economic development.

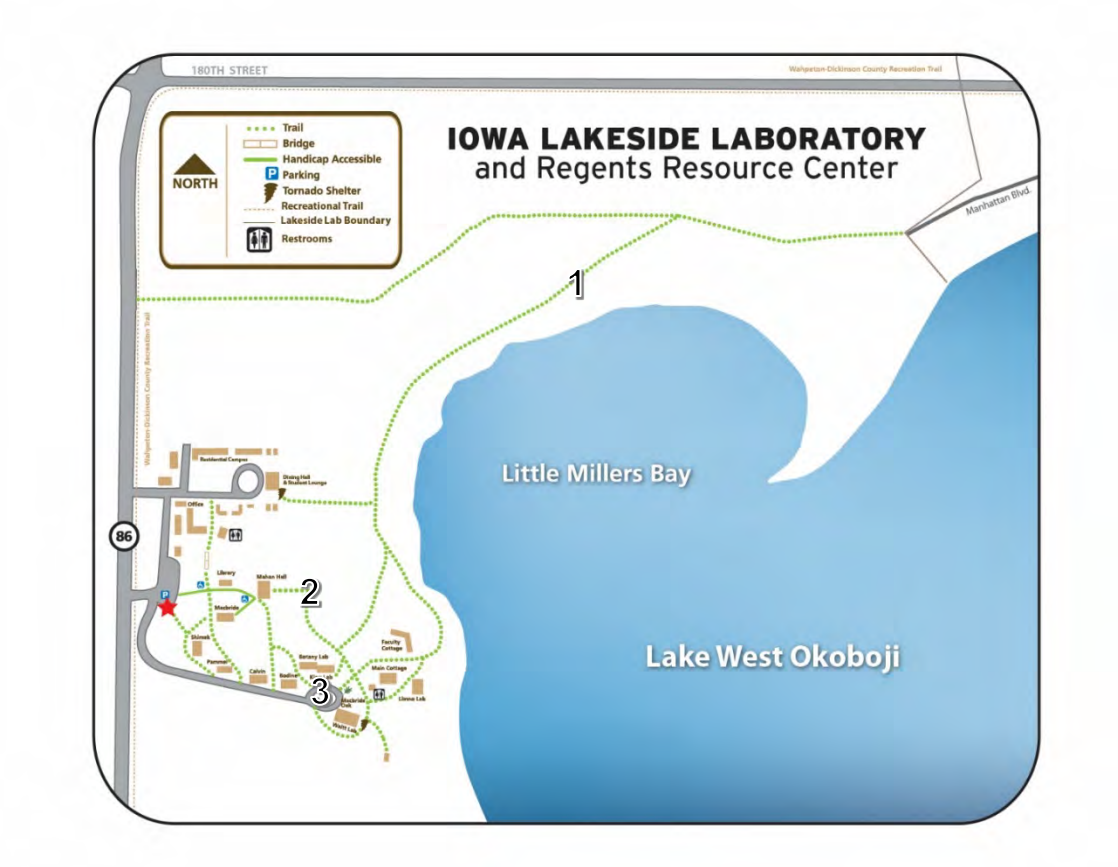
Next Steps:

The next step will be to prioritize strategic actions and implement them based on available funding, staffing and infrastructure capacity. Additionally, the development of metrics to assess progress toward organization goals will help to ensure that corrective actions can be taken if needed.

Students develop lifelong friendships at Lakeside.

GROUNDS AND NATURAL AREAS

Lakeside occupies 147 acres, including the entire shoreline of Little Miller's Bay of West Okoboji Lake (see map below). Most of the campus is natural land. The campus is divided into three areas: 1) the Ecological Studies Campus, 2) the Residential Campus, and 3) the Teaching Campus.



1) The **Ecological Studies Campus** occupies more than three-fourths of the land mass at Lakeside, including the entire northern portion. The northwest part, long called "The North 40" by faculty and staff, is being restored to prairie. Another 23 acres to the immediate east is reconstructed prairie, planted in 2002-03. A second-growth woods of box elder and other trees separates these areas from West Okoboji Lake and the Residential Campus to the south.

2) The **Residential Campus** includes the Lakeside Office, the Facility Manager's residence, faculty and student housing, the bathhouse, the dining hall, and adjacent lawns. A ravine shaded by bur oaks and other trees separates this part of Lakeside Lab from the Teaching Campus to the south.

3) The **Teaching Campus** features a high knoll that slopes down to Little Miller's Bay. The Waitt Lab, Mahan Hall, the Library, all laboratories, Tamisiea Cottage, and Main Cottage are located here. The landscape is very naturalistic, with prairie and meadows occupying the higher ground and oak woods/savanna growing near the lake.

IOWA LAKESIDE LABS REGENTS RESOURCE CENTER	FY14 Actual		FY15 Actual		FY16 Actual		FY17 Actual		FY18 Actual	FY19 Budget
REVENUE										
Carry forward	$65,554		-$9,103		-$27,569		-$14,106		$35,621	$98,576
Regent university allocation	$573,286		$625,144	[1]	$592,061		$592,061		$592,061	$592,061
Room and Board	$68,267	[5]	$47,516	[5]	$63,176		$66,326		$39,206	$70,000
Center revenue	$68,994		$101,465		$107,794		$87,776		$126,704	$98,000
Friends & Other Support	$71,644	[5]	$97,248	[5]	$88,085		$89,506		$100,333	$103,000
Course Fees	$3,085		$0		$0		$0		$0	$0
TOTAL REVENUE	**$850,830**		**862,270**		**823,547**		**821,563**		**893,925**	**961,637**
EXPENDITURES										
Salaries and benefits	$483,415		$483,710		$412,473		$464,452		$506,152	$525,000
Travel and hospitality	$37,829		$54,619		$50,793		$49,058		$55,288	$58,000
Supplies and Other	$45,301		$6,830		$21,044		$21,519		$29,708	$30,000
Utilities	$53,679		$49,616		$47,738		$53,158		$63,110	$65,000
Maintenance and repairs	$156,992	[2]	$228,224	[3]	$235,803	[4]	$141,076	[6]	$91,468	$214,637
Equipment	$49,698		$47,991		$20,066		$22,108		$3,867	$25,000
Marketing	$2,122		$493		$2,046		$1,373		$999	$2,000
Scholarship Expense	$30,896		$18,356		$47,690		$33,198		$44,756	$42,000
TOTAL EXPENDITURES	**$859,934**		**889,838**		**837,653**		**785,942**		**795,349**	**961,637**
NET BALANCE	**-$9,103**		**-$27,569**		**-$14,106**		**$35,621**		**$98,576**	**$0**

[1] Includes one time additional UI funding of $40,393

[2] FY14: Includes cost to move donated house $18,000 - Forbes

[3] FY15: Includes $127,785 costs related to donated house

[4] FY16: Includes $ 108,180 costs related to donated house

[5] Adjusted Friends reimbursement for Room/Board scholarships from Center Revenue (tuition) to Friends Support for FY12-FY15 for comparison to FY16

[6] FY17: Includes $74,833 costs related to donated house