Shared Facility Overview

- **Mission:** Provide access to advanced scientific marine assets and trained operators to support the research, teaching, education, and outreach of Michigan Tech faculty, staff, and students on the Great Lakes and coastal oceans
- GLRC B001, B002, B005, B006, B006A, B006B + staff offices (3730 sq. ft.)
- Established 2013 (prior to university shared facilities establishment)

Director: Andrew Barnard
Manager: Jamey Anderson

- Beth Hoy (Admin)
- GLRC OA5
- Student Interns
- Stephen Roblee (Primary Captain)
- Chris Pinnow (Engineer)
- Travis White (Backup Captain)

Great Lakes Research Center
Michigan Tech
Staff Support

- Andrew Barnard - Departmental (MEEM 60%, GLRC 40%)
- Jamey Anderson – (MRAF 30%, CS&A 10%, Soft 60%)
- Chris Pinnow – (MRAF 22%, Soft 78%)
- Travis White – (MRAF 0%, Soft 100%)
- Stephen Roblee – (Agassiz use fee 100%)
- Student Interns – (MRAF 50%, Soft 50%)
- GLRC Admin (Beth Hoy / OA5) - (~$3500 / yr for MRAF)
Use Fee(s)

- R/V Agassiz: $125/hr, $500/half day, $1000/day
  - 20% discount for Agassiz on fully overheaded projects

- S/V Osprey: $90/hr, $360/half day, $720/day

- AUV IVER3: $70/hr, $280/half day, $560/day

* All fees include captain/operator and fuel, if applicable
Use Fee(s)
Use Fee(s)
# Supported Research

## Clients

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<thead>
<tr>
<th>CS&amp;A</th>
<th>CoE</th>
<th>SFRES</th>
<th>C/I</th>
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<td>• Val Gagnon</td>
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<td>• Jamey Anderson</td>
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</table>

## Funding

### External Grants & Contracts
- NSF, EPA, USGS, DARPA, MDNR, USACE, HMWF, MDEQ

### Internal Grants
- MRAF Shared Facility

### External Grants & Contracts
- NSF, ONR, NOAA, MI Sea Grant, State of WI, State of MI, MDEQ, DARPA, GM, USGS, KBIC, Various Enterprise Sponsors

### Internal Grants
- MRAF Shared Facility

### External Grants & Contracts
- Isle Royale Institute, KBIC

### External Grants & Contracts
- NSF, ONR, NOAA, State of MI, MDEQ, DARPA, USGS, KBIC, USAF, Army, UofM, GVSU, Ontario Power Generation, Enbridge, MI Sea Grant

### External Grants & Contracts
- MRAF Shared Facility
Other Shared Facility Use

- 7 Senior Design, Capstone and Enterprise teams to include:
  - SENSE (25 undergraduates / semester since 2016).
  - Robotics Systems Enterprise (RSE) (8 undergrads /semester over three years 2016 -2018)

- Logistical, field and data analysis support for >20 thesis and dissertations across departments/units.

- During the 2019 field season alone, MRAF staff salary and asset use fees have been charged to over 80 indexes.
Scholarly Activities

- Vessel & personnel **support for classes** to include: MEEM 4850, MEEM4901/4911, CEE3501, CEE4505, BL4421, MEEM 4990 and ENT L09.
- Pre-award **research development** with individual PI’s
- Post-award **project management** and report contribution
- **Guest lectures** for classes in BIO, CEE, MEEM and ECE
Outreach and Other Activities

Our shared facility outreach includes extensive support for:

- The Center for Science and Environmental Outreach
- Summer Youth Programs
- Alumni Relations
- Presentations to over 20 state/federal agency and political VIP’s to include:
- Logistical support for Michigan Tech units to include UMC, VPA, and Athletics
Outcomes

- Peer-reviewed journal article contribution with direct support for over 29 published articles and 3 co-authorships (J. Anderson).
- Logistical, field and data analysis support for >20 thesis and dissertations.
- Direct hire and mentorship of over 15 GLRC/MRAF interns since 2014.
- Conference and meeting presentations to include:
  - 2019 IVER Users Conference, San Diego, CA
  - 2019 Marine Technology Society Buoy Conference, Ann Arbor, MI
  - Great Lakes Association of Science Ships (GLASS) 2013-2019, Traverse City, MI
  - Great Lakes Observing System (GLOS) Annual Member Meeting 2010-2019, Ann Arbor, MI
# Equipment Maintenance and Services

## Common Annual/Recurring Expenditures
- Required USCG vessel inspection fees
- Required USCG documentation fees
- Required crane/lift inspections
- Life raft and fire suppression inspection and maintenance
- Marine safety equipment (EPIRBs, etc) inspection/battery replacement fees
- Preventive maintenance (oil changes, filters)
- Var. scientific sensor calibration services
- Satellite communication services for IVER and handheld transceiver
- Vessel trailer maintenance (tires, bearings)
- Software license fees
- Misc. internal Facilities services charges

## Past Major/Uncommon Expenditures
- Agassiz turbo charger failure
- Agassiz starter failure
- Impeller replacement
- IVER sidescan transducer failure
- IVER navigation upgrades
- ROV thruster failure
- Polar outboard shift actuator failure
- Osprey lower unit alignment correction
- Agassiz Kohler generator installation
- Floating dock mounting adjustment and fabrication (lake level rise)
- Truck tires and brakes

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All maintenance/repair costs are covered largely by vessel use fees, and shared facility grants. When use fee funds are insufficient, IRAD funds are often used (GLRC, Meadows, Abbott, Anderson, Barnard).
Safety Inspections

• The most recent EHS safety facility inspection report (2-7-19).
  • There are no outstanding safety issues/concerns.

• The most recent USCG inspection of the R/V Agassiz (9-23-19) resulted in high marks and the re-issuance of our Certificates of Inspection and Documentation, certifying the vessel for continued operation.

• The most recent inspection of the marine travel lift and the pier crane (9-24-19) resulted in a passing grade with no significant infractions.

• Fire extinguishers on all vessels are inspected by MTU monthly throughout the field season, when the vessels are at the GLRC.
Financial Reporting

Use of Funds

- Staff (Anderson, Pinnow, Interns, White) - variable, from 50 - 85%
- Administration (Anderson, Hoy, early Cathy Jenich) - typically ~6%
- Equipment and Infrastructure - variable, from 2 - 40%
- Maintenance - typically ~3%
  - Paid from Use Fee where applicable, MRAF “Supplies” budget line and IRAD when Use Fee revenue is insufficient
- Internal Marketing and Materials - Tech Talks, MRAF Forum - typically <1%
- Cost share examples: MTRI (sensors), GRF and IT (software), IRAD
Financial Reporting

Use of Funds

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<tr>
<th></th>
<th>2016</th>
<th>%</th>
<th>2017</th>
<th>%</th>
<th>2018</th>
<th>%</th>
<th>2019</th>
<th>%</th>
<th>2020</th>
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<td>$80,142</td>
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<td>$90,575</td>
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<td>$81,060</td>
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<td>$74,998</td>
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<tr>
<td>Staff</td>
<td>$43,000</td>
<td>64%</td>
<td>$35,500</td>
<td>44%</td>
<td>$78,000</td>
<td>86%</td>
<td>$70,601</td>
<td>87%</td>
<td>$39,200</td>
<td>52%</td>
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<td>Admin Staff</td>
<td>$5,000</td>
<td>7%</td>
<td>$5,000</td>
<td>6%</td>
<td>$5,000</td>
<td>6%</td>
<td>$5,000</td>
<td>6%</td>
<td>$5,000</td>
<td>7%</td>
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<tr>
<td>Equipment &amp; Infrastructure</td>
<td>$18,000</td>
<td>27%</td>
<td>$31,500</td>
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<td>6%</td>
<td>$1,895</td>
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# Financial Reporting

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<td>Carry Forward</td>
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<td>-$2,211</td>
<td>$3,270</td>
<td>-$24,086</td>
<td>$5,252</td>
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<td><strong>Total</strong></td>
<td><strong>$25,000</strong></td>
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<td><strong>$83,412</strong></td>
<td><strong>$66,489</strong></td>
<td><strong>$86,312</strong></td>
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<td>Supplies, Equipment, Services</td>
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<td>$20,049</td>
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<td>Other</td>
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<td><strong>Total</strong></td>
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<td><strong>$61,519</strong></td>
<td><strong>$107,498</strong></td>
<td><strong>$61,237</strong></td>
<td><strong>$86,563</strong></td>
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</table>

| Year End Balance                     | -$2,211 | $3,270 | -$24,086 | $5,252  | -$251 |

* FY20 VPR Shared Facility support $74,998
** Use Fee Index balances, if positive, are spent out annually on operator S&W, maintenance, and upgrades
MRAF Strategic Plan 2020 - 2024

• Continue to deliver on our current mission for our constituents
• Major equipment acquisitions, maintenance, and repairs
  • Agassiz engines near end-of-life
  • Expect to add to MTU autonomous fleet through external funds (MRAF would support operations and maintenance)
  • Potential for new research vessel through external funds (MRAF would support operations and maintenance)
• Growth and Stability Strategy
  • Continue external soft funding for MRAF employees to reduce financial burden on MRAF
  • Continue strong marketing push for services around campus and beyond
  • Work with SSC and MARS to expand autonomy reach
• Staff funding and projections  next slide
• Staff changes – None expected
  • Will evaluate adding MRAF staff as we continue to expand
## Salary Projections

### Staff Position Projections - Anderson

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<thead>
<tr>
<th>Jamey Anderson</th>
<th>FY20</th>
<th>FY21</th>
<th>FY22</th>
<th>FY23</th>
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<td>0.42 Salary</td>
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**Secured**
- GLOS 2019 (Pi Meadows) | E45229 | $2,422
- GLOS 2020 (Pi Meadows) | NA | $2,888 | $1,444
- GLOS 2021 (Pi Meadows) | NA | $2,888 | $1,444
- Enbridge 2019 (Pi Abbott) | E45039 | $1,036 | $604
- MRAF 2020 | D95561 | $17,720
- Ontario Power Generation (Pi Brooks) | E46089 | $14,919
- Keweenaw Bay - Sand Point Sediment (Pi MacLennan) | E42165 | $1,480
- Autonomous and Remotely-Operated Surveys of River Habitat and Nearshore River Plumes in the Huron Mountains (Pi Marcarelli) | E45338 | $844
- USGS Computer Vision/RIVER (Pi Rousseau) | NA | $1,406
- Fieldwork support for Grand Valley State University (Pi Anderson) | NA | $1,378

**Secured Subtotal** | $43,591 | $4,936 | $1,444 | -

**% Secured** | 59% | 6% | 2% | 0%

### Staff Position Projections - White

<table>
<thead>
<tr>
<th>Travis White</th>
<th>FY20</th>
<th>FY21</th>
<th>FY22</th>
<th>FY23</th>
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<tbody>
<tr>
<td>0.58 Salary</td>
<td>$75,212</td>
<td>$77,468</td>
<td>$79,792</td>
<td>$82,186</td>
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<tr>
<td>Fringe</td>
<td>$28,430</td>
<td>$29,283</td>
<td>$30,161</td>
<td>$31,066</td>
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<tr>
<td>Total Salary</td>
<td>$103,641</td>
<td>$106,751</td>
<td>$109,953</td>
<td>$113,252</td>
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</table>

**Secured**
- GLOS 2019 (Pi Meadows) | E45229 | $492
- GLOS 2020 (Pi Meadows) | NA | $3,888 | $1,994
- GLOS 2021 (Pi Meadows) | NA | $3,888 | $1,994
- Enbridge 2019 (Pi Abbott) | E45039 | -
- MRAF 2020 | D95561 | $23,780
- High Frequency Radar (Pi Meadows) | E45005 | -
- Ontario Power Generation (Pi Brooks) | E46089 | $15,635

**Secured Subtotal** | $43,885 | $5,881 | $1,994 | -

**% Secured** | 42% | 6% | 2% | 0%

### Staff Position Projections - Pinnow

<table>
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<th>Christopher Pinnow</th>
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<th>FY22</th>
<th>FY23</th>
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<td>0.58 Salary</td>
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<td>$106,751</td>
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<td>$113,252</td>
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**Secured**
- GLOS 2019 (Pi Meadows) | E45229 | $492
- GLOS 2020 (Pi Meadows) | NA | $3,888 | $1,994
- GLOS 2021 (Pi Meadows) | NA | $3,888 | $1,994
- Enbridge 2019 (Pi Abbott) | E45039 | -
- MRAF 2020 | D95561 | $23,780
- High Frequency Radar (Pi Meadows) | E45005 | -
- Ontario Power Generation (Pi Brooks) | E46089 | $15,635

**Secured Subtotal** | $43,885 | $5,881 | $1,994 | -

**% Secured** | 42% | 6% | 2% | 0%
Conclusion

MRAF has supported research, teaching, and outreach for more than 11 departments, 3 colleges and schools, and 3 institutes over the past 5 years. The staff that support the MRAF have been professional, responsive, and successful in servicing our clients. The mission and capability of the MRAF continues to add value to Michigan Tech proposals for many PIs.
Backup Slides
PLATFORMS
Marine Research Assets

Shared Facility (MRAF)

Shared Assets

Sampling/Field Equipment
- Water/Bottom Sampling - Niskin, Van Dorn, Go-Flo, ponar, box corer, plankton nets
- Drop Cameras/Moveable Cameras - fish cam, GoPro, deep water streaming video
- Portable Generators - 12kW, 9kW, 5kW, 3.5kW
- Safety and Survival Gear - assorted PFDs, float coats, immersion suits, exposure suits

Marine Sensors/Acoustics
- Seabird CTD/CPG, multiple SBE/SBE CTDs, SeaTech CastAway CTD, Turner Humasoner
- Current Meters (ADCP/FOMS) - Nortek ANAC, Nortek Aquadop, Nortek Vector, Ruder
- EdgeTech 4105 Side Scan Sonar Towed - advanced bottom mapping sonar
- USBL (Ultra Short Baseline) subsea positioning system, beacons, pingers, hydrophone
- Multi-parameter Sondes - YSI EXO3

Marine Autonomy/Remotely Operated/Motor Vehicles
- L3 OceanServer 3 - Autonomous Underwater Vehicle (AUV), w/SOS, camera, $7/hr
- Boeing Liquid Robotics S2V Wave Glider (NOAA GLERL cooperations loan)
- Remotely Operated Vehicles (ROV) - Outland 1000 D w/ 500’ & 1000’ umbilicals
- GMC Truck - 6’ bed covered bed, capable of towing ~9500 lbs, Polaris ATV

Research/Survey Vessels
- RV Agassiz - A/Ph Research Vessel with twin 200 HP diesel engines, $125/hr
- SV Cascade - 24’ enclosed vessel with small work deck and fully finished cabin, $90/hr
- SV Polar - 22’ center console, open deck platform, single 150HP four-stroke outboard
- SV Aluminum Pontoon w/ trolling motor, 8’ High/Inflatable Brat (8HP) w/ 2HP outboard
- Two Jet Skis - trailer, small survey vessels for bottom mapping/side scan sonar work

Location and Staff

On The Water Research Facilities
- Docking, deep water moorage, 2 ton heavy lift per diem, walk-out access to vessel and dock, immediate access to labs and workspaces. Temporary office space.

Professional Technical Staff
- Proposal support, project scoping, feasibility, budgeting, project management. Post award support of field efforts, work in all Great Lakes and Coastal Oceans, data analysis, project reporting support.

Please visit: http://www.mtu.edu/grealtakes/shared-facility/mraf/ for full equipment list, staff bios, and contact information.
• Feasibility
• Scoping/Planning
• Pre-proposal support
• Cost share exploration
• Budget development
• Vendor engagement

• Field support
• Project management
• Analysis
• Reporting
• Partnering and support for C2E2, REF’s
“The Marine Research Assets Shared Use Facility was instrumental in achieving the objectives for the DARPA YFA that we have been working on. The use of vessels and other resources in the MRAF allowed us to collect samples in ports throughout the Great Lakes as well as perform validation cruises across large stretches of Lake Superior.”

- Dr. Stephen Techtmann
Biological Sciences
“The MRAF has been critical in several areas of my research, particularly underwater acoustics measurements in and around Lake Superior. Without the MRAF, I wouldn't have been able to generate preliminary data crucial to funding opportunities, or provide adequate facilities justification to support my proposed projects.”

- Dr. Andrew Barnard
Mechanical Engineering – Engineering Mechanics
“The availability of the Agassiz and Polar, and skilled personnel to operate these vessels, have been critical to my ability to write competitive grants and successfully complete my research projects. Technical staff are always ready to assist with equipment and training needs, and enhance the research capabilities of my lab.”

- Dr. Cory McDonald
Civil and Environmental Engineering
“...the support of the GLRC technical staff have contributed enormously to the success of our external grant writing (including my NSF CAREER Award) and scholarly activities, and provided considerable student learning opportunities.”

- Dr. Zhaohui Wang
Electrical and Computer Engineering