

Aquatic Work Hazards

This document describes the hazards and safety requirements for specific work in aquatic environments: using boats, SCUBA diving and snorkeling, and electrofishing.





Boat Safety

A. Boat Safety

Working from boats is a hazardous activity, and Central Michigan University has an interest in minimizing the risk of accidents and injuries to faculty, staff and students who perform work involving boats. The following policies are mandatory and failure to follow them will result in termination of all boat-based work privileges. Failure to ensure employees and students under one's supervision comply with these guidelines may result in disciplinary action, and also make one liable to criminal or civil prosecution in the event of a boating-related fatality or accident.

This policy differentiates between boat operators (the de facto captain of the vessel) and passengers who are not approved to operate a CMU vessel and who are required to follow the directions of the boat operator at all times. Boat operators who carry faculty, staff and students who are not qualified to operate a vessel under this policy must make sure that these individuals understand their obligation to follow this policy (e.g., wearing a PFD at all times) and the absolute requirement to follow the directions of the boat operator at all times.

In order to avoid confusion and debate under potentially hazardous conditions, when two or more personnel in the vessel are CMU approved boat operators, one must be designated as the primary operator for that specific trip and assume command of the vessel. The primary operator should be the individual with the greatest experience with the type of vessel and water body in question regardless of academic or supervisory rank.

1. Required Training and Research Vessel Operator Requirements

- a. All employees, students, and non-CMU researchers or students operating¹ CMU boats²

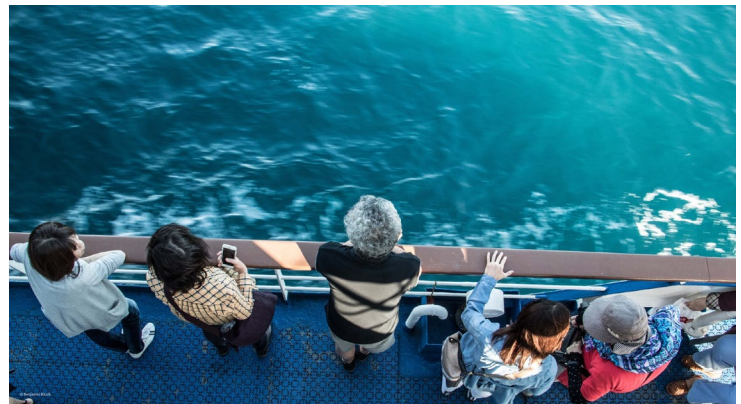
¹ Operating a boat means being ultimately responsible for the navigation and operation of the vessel and the safety of all passengers. Faculty, staff and students may ride in CMU boats as passengers without possessing a Michigan Boating Safety Certificate but are required to follow the directions of the boat operator at all times.

² This policy applies to all boats used for CMU research or education regardless of ownership, including but not limited to those boats owned by CMU, other Universities, State or Federal Agencies and CMU faculty, staff and students. For example, if a members of faculty, staff or students use their own boats for CMU research they are required to follow the policy regarding PFD use.

must possess a Michigan Boating Safety Certificate. The following website provides links to an online training course that should be completed.

<http://www.boaterexam.com/usa/michigan/>

- b. A copy of the boat operator's Michigan Boating Safety Certificate and any other documentation (e.g., US Coast Guard Captain's License) must be on file at either the CMUBS, IGLR, and the relevant department offices.
2. Students Taking Courses
 - a. Based on a ruling by the US Coast Guard, students taking courses are considered paying passengers and as such can only be carried on the Great Lakes in a vessel piloted by an individual with a US Coast Guard Captain's license of the appropriate class for the number of passengers in the vessel. This does not apply to students engaged in research projects or hired as employees. Research-based classes, however, fall under the Coast Guard ruling and the enrolled students count as paying passengers.
 3. Personal Flotation Devices (PFDs)
 - a. All employees, students and non-CMU researchers or students using CMU boats other than the M/V Chippewa are required to wear a personal floatation device (Type I, II, III or IV) **at all times**.
 - b. PFDs must be:
 - i. Coast Guard Approved
 - ii. In good condition (straps, etc.)
 - iii. Of the correct size for the wearer
 - iv. Have a whistle or other signaling device attached.
 - v. Inflatable PFDs are acceptable provided they are Coast Guard approved and a spare CO2 cylinder and arming mechanism are carried at all times.
 - c. Exceptions: The only exceptions to the PFD policy are as follows
 - i. Working on a boat securely moored at a dock.
 - ii. Working on an anchored vessel of at least 16 feet in length and a beam of at least 4 feet under calm conditions and with the express approval of the CMU-approved boat operator.
 4. Minimum Number in Party
 - a. Under no circumstance should any member of faculty, staff, or student body work alone in a boat. A minimum of two people are required for all boat-based work.
 - b. The only exception is where work is performed from single-person vessels (i.e. kayaks). In this case, the requirement would be for a minimum of two people to be in different vessels within in eye and earshot of each other.



5. Research Vessel Requirements

- a. Each research boat (except for small, unpowered vessels exempt from this requirement under state law) must be registered with the State of Michigan, and copies of the registration must be filed in the IGLR and CMUBS office.
 - i. Boats can be registered in Michigan through the Secretary of State Office.
 - ii. Display boat registration numbers on the hull according to state regulations.
 - iii. Keep a copy of the boat registration on-board and a copy in the tow vehicle's glove compartment.
 - b. Research boats must be equipped with all required gear (i.e. navigation lights, horns, etc.) and all safety equipment (i.e. personal flotation devices, fire extinguishers, etc.) according to state regulations. These regulations vary according to boat lengths. See the Michigan Boat Guide or call the Michigan Department of Natural Resources, Law Enforcement Division for specifics. Contact the United States Coast Guard for additional information if research is being conducted on navigable waters. Note that the University's policy on PFD use is more stringent than the Michigan DNR requirements.
 - c. Except for small vessels of 16 feet or less used in inland waters, boats must also be equipped with the equipment listed below. When checking out boats from the IGLR or CMUBS offices, users will be provided with a dry-bag containing all required equipment. It is the user's responsibility to check that the equipment is present and in working condition. Please notify the IGLR or CMUBS office if equipment is missing or broken.
 - i. List of Equipment
 1. GPS Navigation System
 2. Compass
 3. Navigation Charts (Great Lakes only)
 4. 2-Way Radio
 5. Tool Kit and Spare Parts (i.e. sparkplugs and other easily replaced parts)
 6. Spare Batteries for Required Electronics
 7. Spare Fuel
 8. Oars or Spare Motor
 9. Anchor and Rope
 10. Spotlight and Emergency Flares
 - d. In addition to the required PFDs, small vessels of 16 feet or less (i.e. canoes, rowboats, and kayaks) must be equipped with spare oars or paddles.
 - e. All individuals working on boats must carry foul weather gear and extra warm clothes. A dry-bag for this gear is recommended unless the vessels possesses a weatherproof cabin or storage lockers.
6. All boat operators a required to demonstrate knowledge and competency in boat operation.

7. Float plans

- a. A float plan must be filed with a responsible party on shore. This could be the departmental CMUBS, or IGLR offices (assuming return is during normal office hours), or, when working from remote locations, with some other dependable person, preferably a CMU employee. The float plan must include:
 - i. Names of all persons on vessel including designated operator(s) of the vessel.
 - ii. Cell phone number of at least one person in the party (even if boat will be in radio contact).
 - iii. Destination(s)
 - iv. Departure Time(s)
 - v. Arrival Time(s)
 - vi. Return Time
 - vii. Overdue Time.
 1. No more than 3 hours after the time of return. This is the margin of safety before initiating search and rescue efforts. The time should be well under 3 hours when working in hazardous conditions (i.e. working at night or winter work on the Great Lakes).
- b. The responsible party on shore must be fully aware of what is expected of them. They must be available via phone or radio throughout the trip's duration. The responsible party must notify emergency services (local police for inland waters and the Coast Guard for the Great Lakes) if the boating party does not return or contact them before the overdue time.
- c. The boating party must contact the responsible party onshore as soon as they return to shore. They should also radio or telephone to report a later-than-anticipated return and give new times of return and overdue.



8. Specialized Vessels: Electroshocking Boat and M/V Chippewa
 - a. The electroshocking boat requires extensive training and demonstration of competency and knowledge of the vessel. Further, all electroshocking requirements listed below must be met.
 - b. The M/V Chippewa requires extensive training and demonstration of competency and knowledge of the vessel. The captain must hold a USCG Captain's License and be enrolled in a random drug testing program. The first mate must be trained in vessel operation, hold a boater's safety certificate, and be enrolled in a random drug testing program. When necessary, the captain may waive the requirements of the first mate unless tuition-paying students are aboard (Section A.2.a of this document).
9. Boat Towing Information
 - a. Register boat trailers with the Michigan Secretary of State Office and submit copies of the registration to CMUBS or IGLR and the relevant department.
 - b. License plate must be properly secured on the trailers.
 - c. Signals and lights must be properly working.
 - d. Individuals must demonstrate competency in towing their boat prior to heading to field sites. Competency is assessed by the PI, project leader, or other individual with notable experience in transporting boats on trailers.
10. General Towing Information
 - a. Individuals are encouraged to practice towing their boat on campus prior to heading to field sites.
 - b. Do not exceed the maximum towing capacity for the trailer, ball and hitch, or towing vehicle.
 - c. A proper match must be made between the ball and hitch. Trailer safety chains must be properly connected to the towing vehicle.
 - d. Trailer wheel bearings, tire inflation, and tire tread and general condition should be checked frequently. This can be a part of a routine maintenance schedule with one or two individuals trained in maintenance and capable of signing off on the trailer's functionality.
 - e. Check boat trailer lights for proper function before towing.
 - f. The boat engine must be secure and radio antennas lowered (if applicable) before towing. Remove or tie down all gear which can potentially blow out of the boat when towing.
 - g. Carry a spare trailer tire.
 - h. Drive at a speed appropriate for the trailer. Do not exceed the posted speed limit.
11. Other Guidelines
 - a. Check if weather conditions are favorable before leaving the dock. No one should be on the water during thunder or lightning. It is recommended to take a weather band radio to the field to monitor weather conditions.
 - b. Carry an extra set of truck and boat keys in case a set is lost overboard.
 - c. Place boat keys on a floating key ring and store an extra set in the towing vehicle.
 - d. Carry a change of clothes on-board or in the towing vehicle.



B. SCUBA Diving and Snorkeling

Individuals using SCUBA for their research must be certified by PADI (Professional Association of Dive Instructors), NAUI (National Association of Underwater Instructors), YMCA, or SSI (SCUBA Schools International). It is highly recommended that individuals be specialized in low visibility and cold-water diving. Individuals using SCUBA and snorkeling should be comfortable in water environments and strong swimmers. It is against Central Michigan University policy for individuals to dive or snorkel alone. SCUBA diving must be done using the buddy system with at least two qualified divers in the water at all times. An attendant on shore, or in a boat, is not acceptable because they are unable to provide assistance in case of an underwater emergency. An attendant on shore, or in a boat, is acceptable for snorkeling work provided they are both a strong swimmer and immediately ready to enter the water to effect a rescue.

1. Training Availability
 - a. For PADI Courses: <https://www.padi.com/education>
 - b. For SSI Courses: <http://www.ssiusa.com>
 - c. For NAUI Courses: <http://www.naui.org>
2. Required SCUBA Procedures
 - a. All SCUBA divers must do a check-out dive with a certified SCUBA diver before each field season.
 - b. All SCUBA divers must be trained in the use of dive tables and emergency procedures.
 - c. Pre-dive planning must include informing a contact person of the dive schedule (location, time, and names of divers). Complete a SCUBA Dive Itinerary and attach it to the Field Safety Plan.
 - d. Dive location must be marked by a dive flag and a tethered buoy attached to a vessel and a description of the marker should be provided in the SCUBA Dive Itinerary.
 - e. **Dive equipment** should be properly maintained. Individuals using SCUBA should pay attention to using the appropriate equipment given environmental conditions (i.e. wetsuits v. drysuits). SCUBA tanks are required to be visually inspected every year and hydrostatically tested every five years.
 - f. All divers are required to purchase and keep dive logs. Dive logs should be kept with dive time and maximum depth.
 - g. It is paramount that divers familiarize themselves with rules and regulations for particular dive sites as some locations (i.e. National Parks) may require pre-dive approval (i.e. diving ability and accessibility).

3. Recommended SCUBA Procedures
 - a. Full refresher courses are highly recommended for infrequent divers and those who were previously certified but will be using SCUBA for their research.
4. Recommended Snorkeling Procedures
 - a. Become familiar with the physical features of the body of water to avoid placing oneself in dangerous situations. Use buoyancy control devices in open water.
5. Documentation
 - a. A photocopy of SCUBA certification cards must be submitted to IGLR, CMUBS, and the relevant department office.

Electrofishing



C. Electrofishing

Electrofishing is an inherently hazardous activity – electrical energy used in electrofishing is sufficient to cause electrocution. Thus, it is the policy of Central Michigan University that all individuals using electrofishing will make safety their primary concern. The project leader will ensure that all individuals involved in electrofishing are familiar with the safe use of electrofishing gear and familiar with the risks associated with the technique. All individuals will be instructed on how to respond if someone falls in the water while electrofishing is in progress.

1. Required Procedures

- a. Prior to the field season, anyone planning to use electrofishing as a sampling tool is required to complete the following electrofishing course:
https://www.doi.gov/doitalent/nondoil_learners
 - i. Select the link “Search Our Public Catalog” in the center of the page.
 - ii. Select the “Public Catalog” tab in the upper left of the page.
 - iii. Search for the course number FIS2202 in the search box.
 - iv. Select the course, then select “Request a New Account”. You need to enter “USFWS” in the “reason box”.
 - v. Set up a new account with DOI Learn.
 - vi. Once you receive a username and password, login and complete the course.
 - vii. Once the course is completed, print out a certificate and give it to a service employee at the sampling event.
- b. Field person using electrofishing must be certified in CPR. Any exposure of the skin to water while electrofishing may result in an electrical shock that can stop the heart. Waders should be worn at all times and checked for leaks prior to electrofishing. Insulated rubber gloves should be worn by all personnel (netters and probe handlers) involved in electrofishing.

- c. Never electrofish alone. All members of an electrofishing crew should understand the electrofishing equipment (including location and use of kill switches), the safe use of the equipment, and what to do if someone falls in the water or feels the electric current. Avoid large crews as they cause confusion and lead to mistakes. Make sure that one person has control of the power source.
 - d. The project leader should have a thorough working knowledge of the equipment. All equipment must be in good repair prior to the field season. Any problems with the equipment should be immediately repaired. Equipment that is not functioning should be tagged with pertinent information.
 - e. When using a boat-mounted electrofishing apparatus, the policies regarding boat safety should also be followed.
 - f. Follow instructions for safe use of generators found in the owner's manual. Never fill the gas tank while the engine is still hot – wait at least 3 or more minutes for the engine to cool. Follow the maintenance schedule recommended by the manufacturer.
 - g. When using backpack shockers, use sealed batteries that are the correct voltage for the unit being used. When charging batteries, be careful to follow instructions for the batteries and the chargers.
2. Recommended Procedures
 - a. Make a checklist of all required equipment before loading the truck and heading into the field. The checklist should include:
 - i. Electrofishing Unit
 - ii. Generator or Batteries
 - iii. Probes
 - iv. Insulated Gloves
 - v. Fiberglass-Handled Nets
 - vi. Approved Gas Container if Needed
 - vii. First Aid Kit
 - viii. Fire Extinguisher (ABC Type)
 - ix. Tool Kit (Minor Repairs)
3. Documentation
 - a. A Field Safety Plan must be completed, filed, and approved prior to leaving for an electrofishing trip. The appropriate safety inspection form ([Daily Field Check Sheet – Electrofishing Boat](#), [Daily Field Check Sheet – Electrofishing Shore Unit](#), [Daily Field Check Sheet – Backpack Electrofishing Unit](#)) and the Electrofishing Safety Checklist should be filled out prior to any field activity.