

Standard Operating Procedure: Motorboat Safety, Operation, and Maintenance

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Change History

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ERMN River Water-Quality Monitoring Protocol and Quality Assurance Plan

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Overview

The Eastern Rivers and Mountains Network (ERMN) uses an aluminum jon-boat equipped with an outboard-jet motor to conduct ecological monitoring on the Delaware River and New River. The primary use of the boat is to conduct cross-section surveys as part of continuous river water-quality monitoring; additionally, the ERMN occasionally assists with park-based projects that require motorboat operation. The complexities of river and weather conditions that are associated with these activities require a need for continued training opportunities for ERMN boat operators. This Standard Operating Procedure (SOP) is based primarily on the SOP developed by Fire Island National Seashore (FIIS, 2006) and is intended to enhance boating safety for all employees that participate in ERMN boating activities. This SOP applies to all official motorboat operation by ERMN employees.

Training

The Program Manager must approve which ERMN employees operate the ERMN boat; furthermore, in accordance with the Department of the Interior's (DOI) Departmental Manual, part 485 (485 DM) Chapter 22, all authorized persons who independently operate vessels owned by the DOI must have successfully completed the standard DOI Motorboat Operator Certification Course (MOCC). Motorboat operator re-certification is required every five years per 485 DM 22 requirements. In addition, boat operators must complete a period of supervised boat operation sufficient in length for the employee to become adequately familiar with the waters in which he/she will be operating. The employee must acquire and demonstrate the boat handling skills needed for the position. Any fully qualified operator can supervise this period of operation. This may take place before, during, or after completion of the MOCC. Employees must qualify by demonstrating their boat handling ability, navigational skills, local knowledge of the waters, understanding of boating regulations and attitude toward safety.

Safety

General

Boat operators should be thinking about safety at all times. There are many hazards associated with boat operation. Injuries can occur suddenly or from long-term exposure. Safety briefings are encouraged for those employees who routinely operate boats before and after engaging in waterborne operations.

Personal Protective Equipment (PPE)

Some hazards can be mitigated by the use of appropriate PPE. Employees must be provided with the required PPE but employees may provide their own PPE with supervisory approval; however, personally provided PPE must meet or exceed the level of protection of PPE provided by ERMN.

Personal protective equipment for boat operation includes the following items:

1. **Hearing Protection:** Employees may be exposed to harmful levels of engine and wind noise. It is recommended that either earmuffs or earplugs be worn. Both combined can significantly reduce the harmful effects of engine and wind noise.
2. **Eye Protection:** Hazards to the eyes includes airborne debris, wind, and ultraviolet (UV) rays from the sun. Protective glasses are required when the boat is on plane. Sunglasses should cover the eye well enough to protect against UV rays, wind and debris. Clear lenses that provide equivalent protection from wind and debris should be worn during operations of low light or low visibility. Polarized sunglasses enhance the ability to read the water or observe submerged hazards to navigation.
3. **Skin Protection:** UV radiation is associated with short term and long term hazardous health risk. UV rays reflected off the water surface increases the potential health risks. Hats, long sleeves, and pants are recommended in addition to high quality sunscreen for all exposed skin.
4. **Foot, Knee, and Back Protection:** The pounding of small boats during choppy conditions can have acute and cumulative effects on backs, knees, and feet. Frequently wet and slippery deck surfaces can lead to slips and falls. Proper footwear is necessary to provide a slip-resistant sole, adequate cushioning, and good lateral support.
5. **Lifesaving Protection:** All persons aboard vessels owned by the Department of the Interior must wear a U.S. Coast Guard (USCG) approved Type I, II, or III Personal Floatation Device (PFD), as specified in the Departmental Manual 485 DM 22.

Cold Water

Hypothermia is a health condition that can be caused by exposure to water or air. Cold water less than 70 degrees F (21° C) can lower your body temperature. The loss of body heat results in loss of dexterity, loss of consciousness, and eventually death. The loss of body heat will also affect your ability to swim. PFDs can help you stay alive in cold water by protecting your body from cold water and allowing you to float without using energy.

Cold water as defined by the USCG is when the monthly mean low temperature of the water is less than or equal to 59 degrees F. Probability of death from hypothermia increases with decreasing water temperature (Figure 1); consequently, ERMN will provide all employees engaged in waterborne activities with hypothermia protection devices (anti-exposure suits and/or immersion suits) and a second layer protection (when required) to protect them from exposure to cold-water environments. Anti-exposure suits used by ERMN staff will be USCG approved and meet 485 DM 22 guidelines. Anti-exposure suits will be worn in accordance with 485 DM 22 policy based upon combined water and air temperature (Figure 2).

When the air temperature is less than 80° F and water temperature is less than 60° F, all persons aboard ERMN vessels shall have hypothermia protection devices readily available onboard the vessel. When the air and water temperatures are both less than 60° F, all persons aboard ERMN owned vessels shall wear a USCG approved anti-exposure suit in accordance with 485 (DM) 22. When the air and water temperatures are both less than 50° F, employees engaged in extensive operations should wear a second layer of protection (thermal liner or waterproof immersion module).

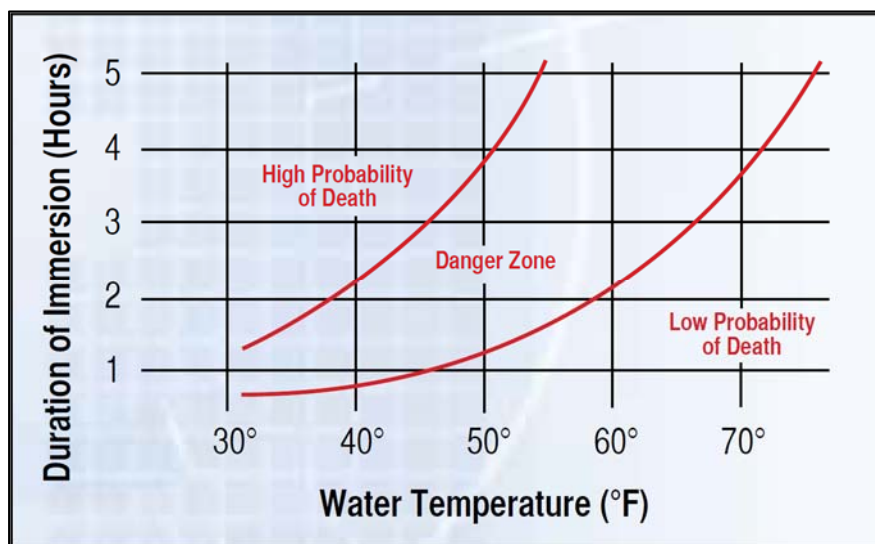


Figure 1. Probability of death from hypothermia as a function of water temperature and duration of immersion (from USCG, 2016)

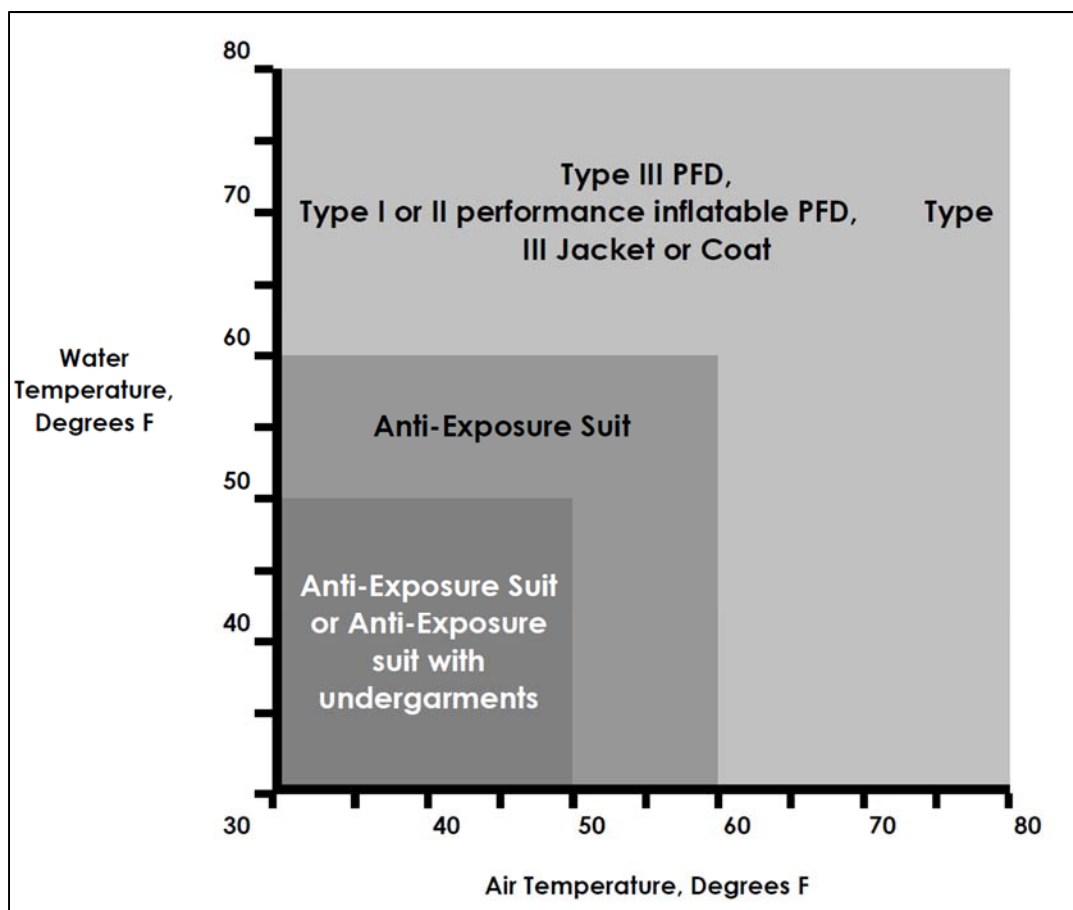


Figure 2. Personal Flotation Device (PFD) and Anti-Exposure suit requirements as dictated by water temperature and air temperature (from FIIS, 2006). To determine the type of PFD or anti-exposure suit to wear: 1) draw a horizontal line across the table equal to the water temperature, 2) Draw a vertical line up the table equal to the air temperature, and then 3) wear the equipment indicated in the shaded area where the lines intersect.

Operational Safety

Although boating safety is everyone's responsibility, the operator is responsible for the safety of all passengers on board.

All operators must:

1. Conduct a pre-voyage safety briefing with passengers.
2. Ensure that all required safety gear is on board, in good condition, and properly stored.
3. Ensure that all persons on board are wearing a PFD and appropriate PPE.
4. Be attached by lanyard to the kill switch whenever the boat is on plane.
5. Operate the boat at all times at a reasonable speed, which is practical under the prevailing conditions. The operator should take into consideration weather, current, visibility, hazards to navigation, boat traffic, persons in the water, the handling characteristics of the boat and their skill level.
6. DO NOT leave the controls when the motor is in gear.
7. Ensure that no one swims from the boat when the engine is running (except in cases of emergencies).
8. Perform check-out when leaving and check-in when arriving at identified destination.

Accidents

All personal injuries and damages to government property must be reported to the Program Manager as soon as practical. Accidents that (a) involve personal injury, (b) involve property damage of \$500 or more, or (c) involve any privately owned vessels must be immediately reported to the Chief Ranger of Visitor and Resource protection (V&RP) or directly to a V&RP Range – an updated list of park contacts will always be onboard. The Program Manager must document, in accordance with park and divisional procedures, any damage to government property of less than \$500.

Equipment

Equipment critical to the safe and efficient operation of the ERMN boat should always be on board and is considered required equipment. Boating equipment that will enhance safe and efficient operation of the ERMN boat is considered recommended equipment.

Required Equipment

- | | |
|--|-------------------------|
| 1. Personal Flotation Devices | 11. Spotlight. |
| 2. USCG approved visual distress signals. | 12. Mooring lines. |
| 3. Rescue line throw bag or self-rescue equipment. | 13. Tool kit. |
| 4. Bilge pump/Bailer. | 14. Boat Log |
| 5. First Aid Kit | 15. Cellular phone |
| 6. Anchor, chain, and line. | 16. Park radio |
| 7. A “kill” switch. | 17. Park contacts list |
| 8. Compass. | 18. Fire extinguishers. |
| 9. Chart. | 19. Whistle or horn. |
| 10. Boat hook/push pole. | 20. Oar/Paddle |
| | 21. Log Book |
| | 22. Jet rake |

Recommended Equipment

- | | |
|------------------------------------|---|
| 1. Fenders. | 5. Tow line (braided nylon) and/or Tow Kit |
| 2. Global Positioning System (GPS) | 6. Non-slip, shock-absorbing, safety floor mats at the helm position. |
| 3. Depth finder | 7. Personal Locator Beacon |
| 4. Binoculars | |

Boat Identification

The ERMN boat is marked in compliance with Title 36 Code of Federal Regulations (CFR) section 3.2.

Operation

Basic Skills

Basic boat handling skills are covered in the MOCC. Operators will continue to improve their boating skills as they gain experience as qualified operators.

Minimum Impact

The ERMN boat will be operated at all times to minimize impacts to: 1) submerged natural features, 2) wildlife, 3) visitor experience and 4) air, water, and noise pollution.

Fuel Economy

The ERMN boat should be operated at a speed that maximizes fuel economy whenever possible. Typically, fuel economy decreases as speeds increase. Selecting a specific cruising speed may involve some compromise between fuel economy and work productivity, but should never compromise safety.

Pre-Operation Checklist

1. Check local weather forecast.
2. Check fuel and oil levels.
3. Check the boat logbook.
4. Check boat hull and motor for damage.
5. Check steering.
6. Check safety equipment.
7. Check the anchor, GPS, compass, boat hook/pole, bilge pump, drain plugs and other required equipment.
8. Secure all cargo.
9. Ensure jet is clear of debris and submerged, then start engine.
10. Check the engine telltale for indication of adequate water pressure.
11. Provide a safety briefing for passengers.
12. Checking-out on departure and checking-in arrival constitutes a float plan.

Post-Operation Checklist

1. Shut down engine and turn off electric equipment.
2. Trailer boat squarely and ensure all tie downs are appropriately secured.
3. Pull drain plugs.
4. Remove all personal items.
5. Secure electronics, stow gear, and lock compartments.
6. Check the boat hull and motor for damage.
7. Check all switch positions.
8. Check bilge pump operation.
9. Make an entry in the boat logbook.
10. Rinse boat and motor with fresh water.
11. Fill with high octane fuel and fuel stabilizing additive. DO NOT leave the gas nozzle unattended.
12. Return key to its place.
13. Take the boat out of service if necessary.

Mitigating Risk of Moving Aquatic Invasive Species

The ERMN follows best management practices compiled by the Wisconsin Department of Natural Resources (Perdzock 2016) for the decontamination of boats, equipment, and gear moved between waters. These practices “...represent the most stringent actions water users can take to ensure aquatic invasive species (AIS) are not being moved by their activities, and will be periodically updated to reflect the latest scientific findings for decontamination” (Perdzock, 2016, pg. 4). A synopsis of these practices as they apply to ERMN activities is provided below and are particularly critical when transporting equipment between basins (i.e., Delaware River to New River or vice versa); see Perdzock (2016) for additional guidance if necessary.

Before Heading to the Field

- Be aware of infestations in the project area.
- If working on multiple water bodies, organize sampling so work goes in order of infestation magnitude, with least infested waters being monitored first and most infested waters last.
- Arrange sampling plans to progress from the least to the most likely to be contaminated areas when working within the same water body.
 - Plan sampling from upstream to downstream in a watershed or from areas of less weed growth to dense weed growth.

While on a Waterbody

- Keep an eye out for any invasive species that may not have been previously recorded but may get on your gear if present. Adjust decontamination plans as necessary.
- Sample from upstream to downstream in a watershed or from areas of less weed growth to dense weed growth.
- Minimize wading and avoid running boat into sediment or through infested areas when possible.
- Reduce the amount of plants, sediment, or organisms that are removed from the water into boats or sampling gear.
- Get in the habit of regularly inspecting and cleaning gear while working.

Decontaminating Boat, Trailer, and Live Well after Fieldwork is Complete

- Fully inspect equipment on-site and hand-remove any visible aquatic or terrestrial organisms present.
 - Remove organic material from boats, trailers, and live wells.
 - Drain water from live wells, bilges and pumps.
- Only use pressure washing if it is used in conjunction with hot water or on-site; otherwise, it can aid in the spread of AIS because it removes organisms but does not kill them.
- Whenever possible, scrub equipment with a stiff-bristled brush and/or wash with soapy water. This will aid in the removal of small organisms and seeds, as well as remove organic materials that make disinfection less effective.
- Do not clean equipment or gear in or near rivers or streams – it may promote the spread of invasive species downstream. The exception is for cleaning mud and debris off of gear before exiting the same waterbody that the mud and debris came from.
- When cleaning equipment, make sure to keep wind to your back to prevent being sprayed with disinfectant (e.g., GS-256). Any gear and clothing that needs cleaning should be taken off before applying a disinfectant spray to decontaminate.
- The outside and inside of the boat, trailer, live wells, bilges and pumps should be steam cleaned or sprayed with the disinfection solution and left wet for the appropriate contact time.

- o Due to the difficulty of ensuring appropriate contact times, steam cleaning is the preferred method for decontamination when possible.
- o Run pumps so they take in the disinfection solution and make sure that the solution comes in contact with all parts of the pump and hose.
- o The boat, trailer, live well, bilges and pumps should be rinsed with clean water after the appropriate contact time.
- o Every effort should be made to keep the disinfection solution and rinse water out of surface waters. Pull the boat and trailer off the ramp and onto a level area where infiltration can occur and away from street drains to minimize potential runoff into surface waters.
- o After removing from the water, scrub sediments off the exterior of the motor and then tip the motor down and allow water to drain from engine

Towing

Boat towing puts increased strain on the towboat's transom and motor. There is a potential risk of personal injury and property damage. Operators of the ERMN boat should, in general, arrange for either private or commercial assistance for disabled privately owned boats.

When deciding to tow a boat, the operator must consider their experience level. Operators should not attempt to tow another boat unless they have the proper equipment, training, expertise, and are confident it can be accomplished safely. In situations involving visitor safety or risk of property damage, consider alternatives to towing. If possible, secure the disabled vessel and transport the passengers to shore. If the decision is made to tow, the disabled vessel should be towed to the nearest safe anchorage. Be aware that a towline that parts under strain is extremely dangerous.

All tows involving visitors boats must be reported to Law Enforcement of the park where the tow was conducted.

Passengers

Operators are permitted to carry the following passengers aboard the ERMN boat. Except for emergencies, the Program Manager must authorize all trips involving the transportation of unofficial passengers.

Official passengers include the following when engaged in DOI programs:

- Officers, employees, and volunteers of the federal government.
- Members of Congress and their staff employees.
- Representatives of cooperating federal, state, county, or local agencies.
- Representatives of foreign governments.
- Representatives of academic institutions.
- Contractors.
- Film crews.
- Volunteers-in-Park

Unofficial passengers include:

- Members of the public.
- Family members.

Proper Dress

ERMN employees are non-uniformed National Park Service employees. All employees or persons in plain-clothes aboard the ERMN boat shall wear practical/functional clothing that will present a favorable or conservative public image for the engaged waterborne activity. Bare feet should be worn only while engaged in swimming or appropriate water activities. Shoes must be of a type that will provide a slip-resistant sole, adequate cushioning, and good lateral support.

Boat Logbook

A logbook is required on the ERMN boat at all times. The logbook will serve to provide basic information about the boat. The logbook will notify operators to any existing problems and shall include a data page and standard log (Appendix A) entries as follows:

Data Page

Basic information about the boat shall be placed on a 'Data Page' in the front of the logbook and shall include the following information:

1. Boat model, year, length, and make.
2. Hull identification number (HIN).
3. Boat property number.
4. Boat fuel tank capacity.
5. Approximate rate of fuel consumption (gallon/hour) at cruising speed.
6. Approximate cruising range (hours) at cruising speed.
7. Draft of boat.

Standard Log Entries

Operators shall make a log entry each time the boat is used. Entries shall include at a minimum the following information:

1. Date.
2. Operator's name.
3. Boat use purpose.
4. Number of persons on board.
5. Beginning and ending hour.
6. Fueling details.
7. Weather and river conditions.
8. Conditions that will affect future operation.

Maintenance

Maintenance is critical to successful boat operations. Safety, productivity, and economic efficiency depend on the cooperative efforts of all operators; however, the Aquatic Ecologist is responsible for ensuring that proper maintenance is routinely performed.

Preventive maintenance will lengthen the life of boats, motors, and equipment, and will reduce cost. It will also reduce the frequency and duration of repair maintenance. Operators must provide routine care for the boat and ensure preventive maintenance is scheduled and completed.

Operator Responsibility

1. Keep boat trailered properly.
2. Rinse boat, trailer, and motor with fresh water after each use.
3. Keep boat topsides and equipment clean.
4. Keep fasteners tight.
5. Inspect all systems after each use.
6. Report any deficiencies to the Aquatic Ecologist.
7. Mark appropriate logbook entry.

Aquatic Ecologist Responsibility

1. Keep all anchor and mooring lines in good condition.
2. Keep boat equipment in good condition.
3. Replace boat equipment as needed.
4. Keep boat markings in good condition.
5. Clean boat for preventive maintenance.
6. Schedule and coordinate preventive maintenance and repairs.

Preventative Maintenance

Trailer

The operator should check the following items every time a trailer is used to transport the ERMN boat:

1. Check lights.
2. Check landing boards, rollers, and stays.
3. Check winch operation and cable.
4. Check tires and tire pressure.
5. Check hitch.
6. Grease and seal hubs as required.

Boat

The following service items shall be performed on all DOI owned boats at the specified intervals by the boat shop mechanics. Programs may elect to have this maintenance conducted by a commercial provider. When possible, the operator should work with the mechanic during the service.

1. Check oil in lower gear housing. Change as needed.
2. Check lower gear housing for chips.
3. Check for wear on hub.
4. Replace fuel filter.
5. Grease steering cable.
6. Check steering.
7. Check all cables for rust and breakage.
8. Grease all fittings.
9. Check operation of lights and electrical accessories.
10. Check all gauges.
11. Treat motor and electrical wiring with corrosion control lubricant.
12. Check operation of bilge pump.
13. Check power trim oil.
14. Check hull for damage.
15. Check warning alarm systems.
16. Check battery fluid and connections.
17. Check bow trailering eyebolt, cleats, and transom tow bolts.
18. Inspect engine.
19. Check power trim/tilt.
20. Check sacrificial zinc tabs and replace annually.
21. Check water pressure and telltale, water pump housing and impeller if necessary.

Literature Cited

FIIS. Fire Island National Seashore. 2006. Fire Island National Seashore Boating-Standard Operating Procedure. 14 p.

USCG. U.S. Coast Guard. 2016. A boater's guide to the federal requirements for recreational boats. Washington, D. C. 45 p. <https://www.uscgboating.org/images/420.PDF>.

Appendix A. Eastern Rivers and Mountains Network Boat Log

Date	Begin time	End time	Fuel Used
Purpose			
Passengers			
River conditions		Weather conditions	
Issues or other Notes			
Date	Begin time	End time	Fuel Used
Purpose			
Passengers			
River conditions		Weather conditions	
Issues or other Notes			
Date	Begin time	End time	Fuel Used
Purpose			
Passengers			
River conditions		Weather conditions	
Issues or other Notes			