

Ventilation and Fueling

Gasoline fumes are heavier than air and will settle to the lowest part of the boat's interior hull, the bilge. All motorboats, except open boats, must have at least two ventilator ducts with cowls (intake and exhaust). Exhaust blowers are part of most boat ventilation systems. Permanently installed fuel tanks must be vented.

Most boat explosions occur from improper fueling. Portable gas tanks should be filled on the dock or pier, not on board. The vent on the tank should be closed and the gas pumped carefully, maintaining contact with the nozzle and the tank's rim. Any spills should be cleaned up, the tank secured, and the vent reopened.

When filling inboard tanks, everyone should be sent ashore and the boat closed up. All electrical systems should be shut off. After filling up and before starting the engine, the blower should be run for at least 4 minutes. Take appropriate precautions to prevent spills. Avoid discharging oil and gas from your boat's bilge. Toxic substances must be disposed of properly. Noncompliance may result in fines.

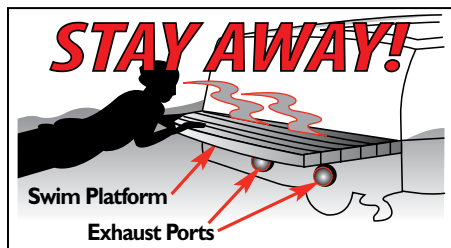
Boaters should routinely check for leaks in fuel lines and fittings, frayed wiring, and improperly rigged electrical systems.

Carbon Monoxide



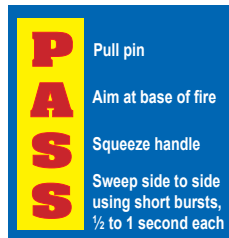
Carbon monoxide (CO) gas is a potentially deadly by-product of your boat's engine. Each year boaters are killed or injured by carbon monoxide. Stay away from exhaust areas and do not swim near exhaust vents. Never enter an enclosed area under a swim platform, where exhaust is vented. Only one or two breaths of the air in this "death chamber" can be fatal. Keep air moving through the boat to avoid problems.

Symptoms of carbon monoxide poisoning depend on exposure. Brief exposure may produce shortness of breath, mild nausea, and mild headaches. Moderate levels of CO exposure may cause death if headaches, dizziness, and light headedness symptoms persist for an extended period of time. High levels of CO may be fatal, causing death within minutes. If you suspect someone is experiencing CO poisoning, move the individual to fresh air immediately and call 9-1-1.



Fire Extinguisher Use

Fire extinguishers must be immediately available and installed (mounted away from the fuel source). They must be fully charged, in usable (good) condition, and inspected regularly. Make sure



everyone on your boat knows the location of the fire extinguisher and its use. Operation of a fire extinguisher is rather simple. Just remember PASS.

Running Aground

Keep a sharp lookout when traveling on waters that have shallow areas to avoid running aground. Navigational charts, buoys, and depth finders can assist in this task. If you run aground and the impact does not appear to cause a leak, follow these steps to refloat the boat:

- Do not put the boat in reverse. Instead, stop the engine and lift the out-drive.
- Shift the weight to the area farthest from the point of impact.
- Try to shove off the rock or bottom.

If this fails, contact help.

Water Hazards

It is important that boaters know the waters on which they are boating. Information about local hazards can be obtained by physically viewing their proposed route, consulting local boating sources, and utilizing web resources such as the PFBC website.

MOVING WATER: Safety on the water depends on developing respect for the power of water. The power of current is deceptive and should be taken into account by all boaters. A strainer is an obstruction in the water (such as a tree branch) that allows water to pass through but will hold and trap boats and boaters. Rivers and rapids are rated with the International Scale of River Difficulty (Classes I - VI), which is a guide established by the American Whitewater Affiliation. Parts of rivers could have a different class rating than the overall river's rating. The rating for any river will vary as water flow increases or decreases because of seasonal conditions.

WIND AND WAVES: The definition of wind is "moving air that is described by the strength and the direction of its source." Wind acts on the surface of the water, creating waves. The greater the force and duration of the wind, the bigger the waves will be. Large waves in big water can place small craft in danger. When crossing waves or another boat's wake, head into the waves or wakes at an angle (45 degrees) to reduce pounding.

Large bodies of water such as oceans or Lake Erie provide different challenges and dangers than moving water. Large, relatively shallow lakes, such as Lake Erie, may develop large waves faster than deeper, similar waters. Small inland boats should not venture out on large waters such as Lake Erie

TIDES AND TIDAL CURRENT: Tides and tidal currents affect where a boater can travel or anchor safely. They also affect how long it takes to get to a destination, the speed needed to arrive at a given time, and the heading that must be maintained.

Tides are the regular rise and fall of ocean water (and waters affected by the ocean) caused by the gravitational pull of the moon and sun. The moment

the tide changes direction is known as "slack water." "High tide" is the highest level a tide reaches during ascending waters, and "low tide" is the lowest level a tide reaches during descending waters.

The tidal cycle is the high tide followed approximately 6 hours later by low tide (two highs and two lows per day). The tidal range is the vertical distance between high and low tides. The tidal range varies from 1 to 11 feet in Pennsylvania on the Delaware River. Boaters should consult tide tables for times of high and low tides.

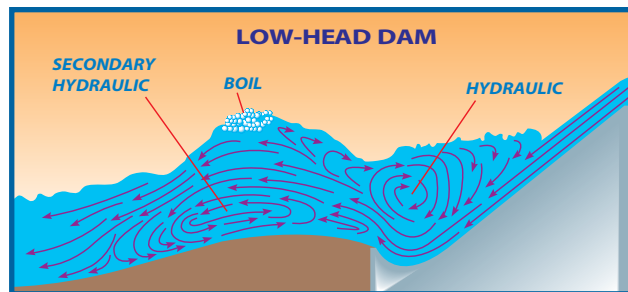
Dams

Dams on our rivers aid navigation, produce power, and prevent flooding. Keep away from dams! Dangerous currents above the structure can draw boats into water going over or through a dam. Areas below a dam are also extremely hazardous to boats because of strong recirculating currents and turbulent waters.

The most dangerous hazard on a river is a low-head dam. There are hundreds of such dams on rivers and streams throughout Pennsylvania, and dams are true "drowning machines."

Water going over a dam creates a back current or undertow that can pull a boat into the turbulence and capsize it. This hydraulic can trap and hold a person or boat. Many dams are not marked and are almost impossible to see from upstream.

State law requires that many low-head dams in the Commonwealth be marked with signs and, when practical, buoys upstream and downstream from these dangerous structures. The signs detail restrictions for boating, swimming and wading, and hazards posed by the dam. Restrictions are enforced by the PFBC Waterways Conservation Officers. Dams must be avoided and may be located by checking water trail guides, other maps, and the PFBC's website.



Weather

Weather can cause boaters problems. Having a mishap in cold water or in a remote area can result in hypothermia or other problems. Getting caught in a storm can have serious consequences. Never underestimate the weather.

Factors that determine weather conditions can be observed and measured. These factors include temperature, barometric pressure, and wind. Weather affects the condition of open water and can change suddenly. Check local forecasts the night before going boating and again in the morning. The National Weather Service typically issues a new marine forecast every 6 hours on designated VHF radio channels.

Signs that dangerous weather may be approaching include:

- Clouds gathering, darkening, and increasing in size.
- A sudden temperature drop, a rapid wind shift, or change in speed.
- Static on the AM band of the radio may indicate an approaching thunderstorm.
- A drop in the barometric pressure (check a barometer).

IF A STORM IS NEAR...

In a small boat, put on your life jacket and head for the nearest shore. Beach your boat and find shelter on the downwind (leeward) side of the land.

In a large boat, put on your life jacket, start your engine, or secure your sails (whichever is applicable). Stow anything that is unnecessary. Secure your dinghy (if you have one) and turn on your running lights. Close up the boat and decide what to do. If land is near, head for it. If not, you may have to ride out the storm. Do so by keeping your bow (front) headed into the waves, wind, and/or current. If your motor fails, a sea anchor on a line from the bow will keep the boat into the waves. A bucket will work as a sea anchor in an emergency.

Capsizing and Falls Overboard

Many boating accident deaths are caused by capsizing. If a small, open boat capsizes, everyone should take a head count, check for injury, and stay with the boat. Most small boats have enough flotation to keep from sinking. If possible, the boat should be turned upright and the water bailed out. It can then be paddled to shore. It is also possible to paddle a swamped boat to shore. The golden rule if a boat capsizes is for everyone to stay with the boat.

SWAMPING AND CAPSIZING

If you do capsize or swamp the boat, stay with the boat and make sure everyone has a life jacket. Stay calm. If the boat can be righted, bail out as much water as possible, get in, and paddle towards shore. If your boat capsizes or you fall overboard in moving water, such as a river, get in the self-rescue position with your feet pointed downstream and near the surface to avoid potential head injury and foot entrapment.

FALLS OVERBOARD

Falls overboard are dangerous situations. People fall overboard even when wind and seas are calm. The shock of falling into the water, especially cold water, can be life-threatening. Wearing a life jacket can be your only source of survival. The best means of survival is to already have a life jacket on and stay with the boat.



PREVENTION

- When getting into or moving around in a small boat, always maintain three points of contact, keeping your weight low and close to the centerline. Don't overload your boat.
- Do not allow passengers to stand in small boats, including canoes and kayaks, or sit on foredecks, gunwales, engine boxes, seat backs, or transoms. Small boats, especially canoes and kayaks, are more likely to capsize when someone stands up.
- Watch crew members and frequently check that everyone is aboard.
- Wear deck-gripping shoes (bare feet have poor traction).
- Avoid rough water and weather conditions whenever possible.
- Practice a procedure for recovering someone lost overboard. Toss a life jacket over the side while moving. Test to see how long it takes to stop the boat, turn, and retrieve the life jacket.

Propeller Strikes

When people and motorboats share the same water, propeller strikes can and do occur. A typical recreational propeller can rip an average person from head to toe in less than one-tenth of a second. **MOST**



PROPELLER STRIKES CAN BE PREVENTED!

Before starting your boat:

- Put on your life jacket!
- Walk to the stern and look in the water to make certain there is no one near your propeller (people near the boat's propeller may not be visible from the helm).
- Attach your engine cut-off switch lanyard to your life jacket. If the lanyard is removed from the switch, the engine will shut off.

Educate passengers:

- Explain the dangers of a motorboat running into a swimmer.
- Show the location and danger of the propellers and all safety equipment.
- Turn off the engine if anyone is near the prop to prevent injury.
- Establish clear rules for swim platform use, boarding ladders, and seating (if possible, passengers should remain seated at all times).
- Talk about safety procedures and emergency action plans.
- Discuss preventing falls overboard:
 - Maintain three points of contact, keep your weight low, and close to the centerline (balance issues may occur).
 - Watch crew members and frequently check that everyone is aboard.
 - Wear deck-gripping shoes (bare feet have poor traction).
 - Avoid rough water and weather conditions whenever possible.
 - Limit alcohol use and discuss physical effects resulting from on water activities.
- Discuss swamping and capsizing prevention.
 - Don't overload your boat.

If capsizing occurs, stay with the boat and make sure everyone has a life jacket. Stay calm. If the boat can be righted, bail out as much water as possible, get in, and paddle towards shore. If capsized or overboard in a river, swim downstream, feet first, to avoid potential head injury and entrapment.

Keep a lookout:

- Assign a passenger to keep watch around the propeller area of your boat when people are in the water.
- Never allow passengers to board or exit your boat from the water when the engine is on or idling (your propeller may continue to spin). Turn the engine off.
- Be especially alert when operating in congested areas, and never enter swimming zones.
- Take extra precautions near boats that are towing skiers or tubers.
- Never permit passengers to ride on the bow, gunwale, transom, seat backs, or other locations where they may fall overboard.
- Children should be watched carefully while onboard.

Consider purchasing propeller safety devices for your boat. A variety of safety devices are available to help prevent propeller strikes.

EMERGENCY ACTION FOR FALLS OVERBOARD AND PROPELLER STRIKES

1. Shout "Man Overboard" immediately.
2. Signal for assistance from passengers, crew, or other boaters. Have someone call for assistance over the radio, if available.
3. Stop the boat immediately.
4. Toss a life jacket to the person overboard or any item that will float such as an empty ice cooler. Even if the person is wearing a jacket, it will help improve visibility and provide additional flotation.
5. Assign someone to constantly point at the person in the water. Never let the victim out of sight.
6. Avoid running the person over.
7. Approach against the wind, waves, or current.
8. Come close to the victim.
9. Shift into reverse to stop forward motion.
10. Put engine in neutral gear or shut off the engine to stop the propeller from turning. It may be safer to trail a life jacket on a line astern and circle until the person can grasp it.
11. If the boat has a low freeboard, bring the person over the transom. Be alert for hot motors, exhaust pipes, and carbon monoxide.
12. High freeboard, use a swim platform or ladder and rig a sling, rope ladder, or knotted line.
13. A non-powered vessel must be stabilized before attempting to bring the victim into the boat.

Rescue and Survival

No one should ever count on being rescued. Boaters must be prepared for mishaps on the water. Drowning can occur within a few feet of safety. Even those who cannot swim can save a life if they know some basic rescue techniques.



RESCUE SEQUENCE

- 1. Self rescue:** The rescuer should try to talk the person in trouble into self-rescue and avoid endangering themselves unnecessarily.
- 2. Reach:** A fishing rod, shirt, towel, branch, oar, pole, boat hook, or other object can be used to reach out to the victim. If nothing is available and the victim is within arm's reach, the rescuer should lie flat and extend a leg to the victim, pulling them to safety.
- 3. Throw:** If the victim is too far for the reach rescue, the rescuer should throw a rope, life jacket, empty jug, ice chest, gas can, or anything else that will float to the victim. Rescue line bags are excellent items to keep on a boat.
- 4. Row:** The rescuer may boat out to the victim and extend an oar or paddle. The victim should be brought back onboard over the stern (back) of the boat. They should be pulled onboard as carefully as possible. If it isn't possible to bring them onboard, the rescuer should have them hold on to the boat or hold them until help arrives.
- 5. Go:** Swimming rescues are for trained lifesavers only. A swimming rescue should never be tried until all other basic rescue methods have been ruled out. Rescuers who must swim to a victim should wear a life jacket and take a floating object with them to extend to the victim. Rescuers should avoid personal contact with the victim unless they have had lifeguard training. Even then, it is used only as a last resort.



The method of rescue depends on the rescuer's training and skill, the condition and location of the victim, the equipment available, and what additional support is available at the scene.

Cold Water Shock

Cold water shock is a major factor in boating fatalities. It happens when someone is suddenly immersed in cold water. The water does not have to be freezing; cold water shock often occurs in water temperatures above 50° F.

The body's first response to cold water shock is usually an involuntary gasp (torso reflex). Hyperventilation (rapid breathing) and breathlessness

follow. The person may feel claustrophobic, panicked, and confused. Cold water greatly reduces the victim's ability to hold his breath, control breathing, and impairs the ability to swim.

Hypothermia

Hypothermia is the lowering of the body's core temperature. It is a factor in many fatal boating accidents. Cold water robs the body of heat much faster than cold air of the same temperature.

Hypothermia begins with shivering and a loss of feeling in the extremities. Cold, blue skin, decreased mental skills, and slurred speech are common symptoms. Unconsciousness can be followed by death. Warm layered clothing, a life jacket, and eating high-energy foods will help prevent hypothermia.

FOUR STAGES OF COLD WATER IMMERSION

Cold water shock is a rapid development of a number of shock responses caused by cold water immersion that can result in sudden drowning.

- 1. Initial cold shock (first 3-5 minutes).** Sudden immersion in cold water causes the gasp reflex, this can result in water inhalation, hyperventilation, changes in heart rate and rhythm and blood pressure, and panic. All of these reactions may result in death, especially for those with pre-existing heart conditions.
- 2. Short term swim failure (3-30 minutes).** Cold water saps energy and arms and legs become weak. Movement is difficult and slow. Death can occur by drowning, as the victim can no longer stay afloat.
- 3. Long term hypothermia (30 minutes+).** The body loses heat to cold water 25 times faster than cold air. The body becomes hypothermic when it loses heat at a rate faster than it can generate heat. Continued exposure leads to unconsciousness and death. At this stage, death may occur without drowning.
- 4. Post immersion collapse.** This stage occurs during or after rescue. The body is still hypothermic and death may occur due to complications from inhaling water or lowered body temperature.

FIRST AID FOR HYPOTHERMIA

1. Get the person out of the water or weather as quickly as possible.
2. Replace wet clothing with dry clothing. Wrap the person in blankets to warm the person slowly.
3. Handle hypothermia victims gently and do not give anything by mouth if they are unconscious. Never give alcohol to a hypothermia victim.
4. Get medical help as soon as possible.

COLD WATER SURVIVAL

- Wear a life jacket. Flotation coats also offer insulation from the cold.
- Wear clothing that still insulates when wet such as wool, fleece, or other synthetics.
- If you know you are about to fall into cold water, cover your mouth and nose with your hands, so you don't inhale water.

- Do not remove your clothing.
- Get back into or climb on top of the boat.
- If you can't get out of the water and shore is too far, get into the Heat Escape Lessening Posture (HELP).



Alcohol and Boating

When on a boat, the effects of alcohol are magnified and cause reduced judgement. Combined with stresses from wind, motion, and heat, your ability to think and perform basic tasks needed to safely operate your boat may become impaired. It is illegal to operate a boat while under the influence of alcohol or a controlled substance. Alcohol is prohibited on land and water at all state parks and at most U.S. Army Corps of Engineer projects. Pre-arrest breath tests can be used by officers to determine the probability that a boat operator is under the influence. A blood alcohol concentration of 0.08% or more is considered to be over the legal limit (0.02% blood alcohol concentration for minors). Penalties include loss of boating privileges, significant fines, and imprisonment. An officer can stop a boat and arrest.

Courtesy Vessel Safety Checks

A Vessel Safety Check (VSC) is a free courtesy examination of private recreational boats to verify the presence and condition of safety equipment required by state and federal regulations. The vessel examiner is a trained member of the U.S. Power Squadrons or the USCG Auxiliary. Persons whose boats fail the examination are informed of all shortcomings, so they may correct them and be given a chance for reexamination and the awarding of the decal. Vessels that pass may display the distinctive VSC decal, which entitles the boat owner to discounts at some marine dealers (see website for details). Learn more about VSCs or arrange a free VSC by visiting www.cgaux.org/vsc.

Boating Accidents

Each operator of a boat involved in a boating accident must stop, render assistance, and offer identification if doing so will not endanger yourself or passengers. If the accident results in a death or disappearance, the Pennsylvania Fish and Boat Commission must be notified immediately, followed by a written boating accident report within 48 hours. If the accident results in an injury that requires treatment beyond first aid, a written boating accident report must be submitted within 48 hours. If the accident results in damage to the vessel or other property exceeding \$2,000, or if there is a complete loss of the vessel, a written boating accident report must be submitted within 10 days. All reports are confidential and for the use of the Commission for boating safety purposes only. Boating Accident Report Forms (PFBC 260) are available on the Commission's website. Reports must be sent to: Pennsylvania Fish and Boat Commission, Bureau of Law Enforcement, P.O. Box 67000, Harrisburg, PA 17106-7000.