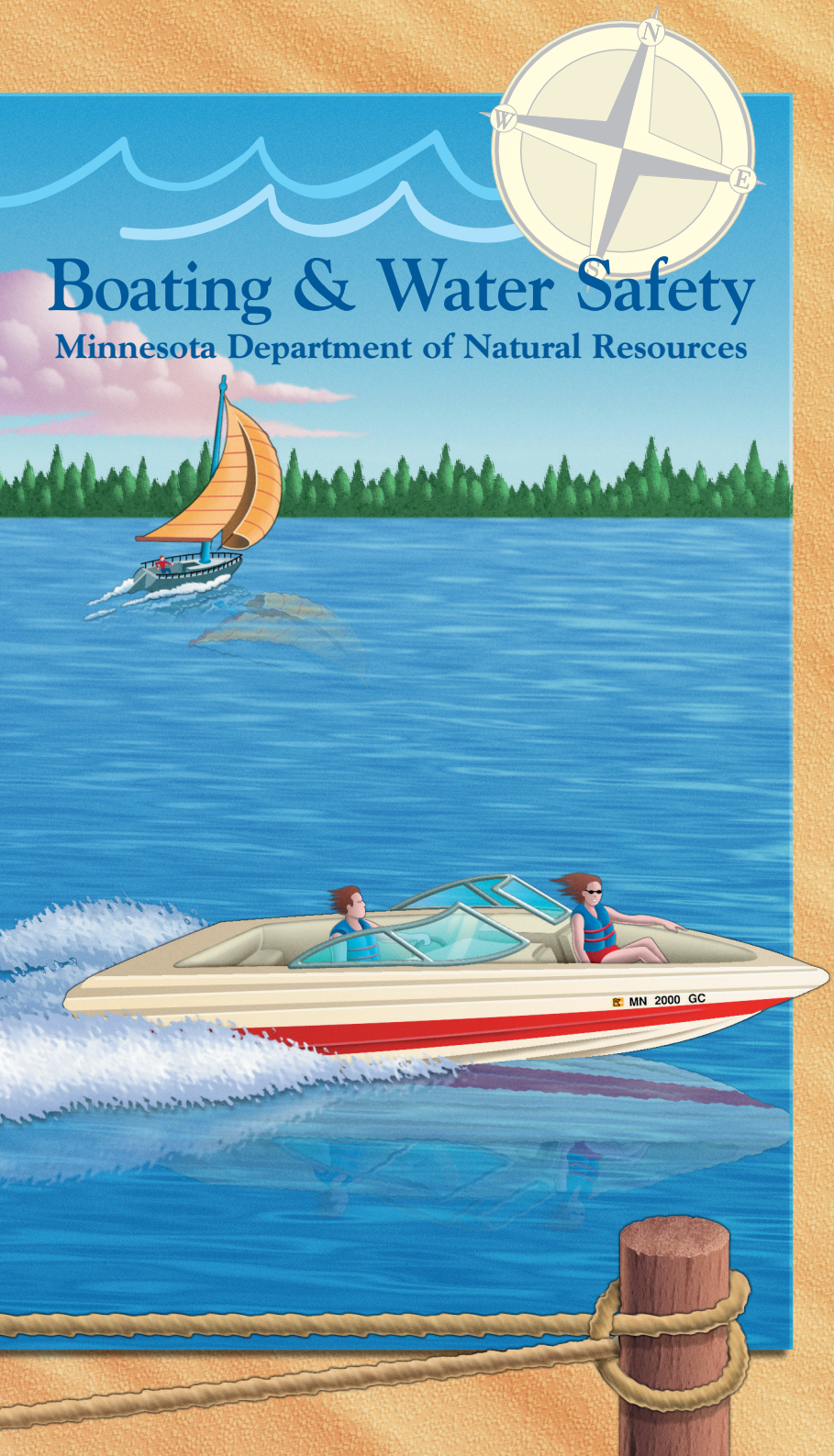
Boating & Water Safety

Minnesota Department of Natural Resources



Boating & Water Safety

Course approved by the National Association of State Boating Law Administrators and recognized by the U.S. Coast Guard.

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Please Note

Information in this publication may be subject to change through amendments to federal or state laws, rules and regulations. For the latest information, consult the current Minnesota Boating Guide or contact the Department of Natural Resources at the address, phone number, web site or e-mail listed in this manual.

Boating & Water Safety

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Minnesota Department of Natural Resources
Boat & Water Safety Section

1

Introduction

The Need For Water Safety Programs

Water recreation is a fun and popular way to enjoy the outdoors, particularly in a state with more than 12,000 lakes, 25,000 square miles of streams and over 800,000 registered watercraft. But these sports are only enjoyable if they are accident and citation free.

This book is your guide to avoiding trouble for you and your passengers while operating everything from a *personal watercraft* or canoe to a speedboat. The principles for each are the same: think safety first; prepare for the worst, anticipate the best; and know the laws that keep Minnesota's waterways and motorized and non-motorized watercraft secure.

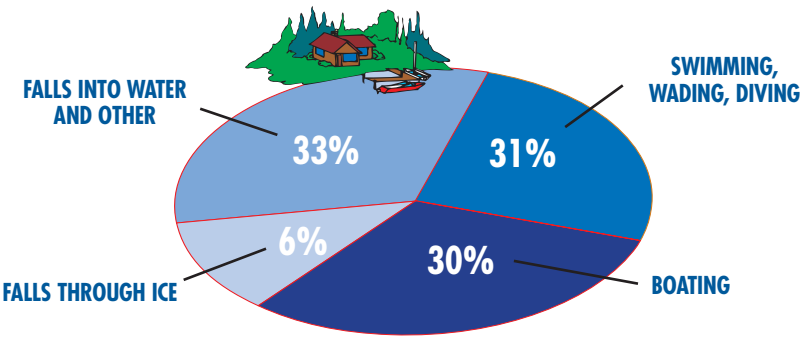
In this dramatic accident, the boat operator was thrown from his craft after hitting another boat's wake at high speed. The boat continued across the lake and collided with a boat lift near shore.

**Each new term introduced is printed in italics. Definition of many of these terms is found in the glossary starting on page 117.*

Considering the large number of boaters in Minnesota, water-based recreation is still a relatively safe pastime. Still, in a recent 10-year period, an average of 37 people died in non-boating drownings and 16 in boating accidents each year in the state. In addition, each year many more people suffered injuries and hundreds of thousands of dollars of property damage resulted from non-fatal boating mishaps.

Water Accidents

To give you a better picture of where the water accidents occur, the chart shows a breakdown of water-related deaths in Minnesota.



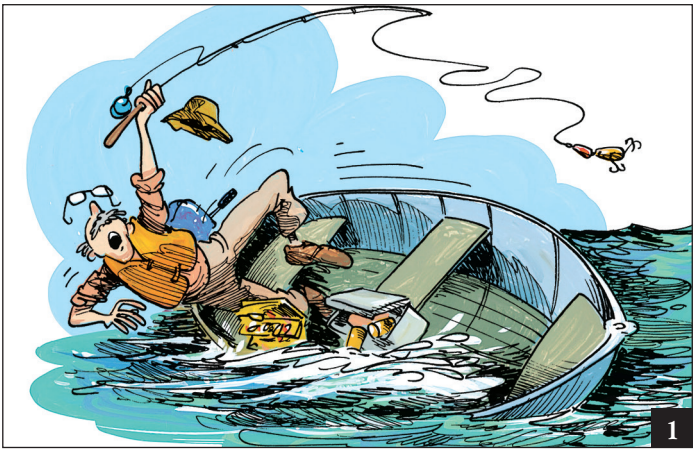
The Minnesota Department of Natural Resources (DNR) annually compiles boating accident statistics and divides them into two groups: fatalities (where at least one death occurs) and non-fatal accidents (where only an injury or property damage occurs).

Fatal Boating Accidents

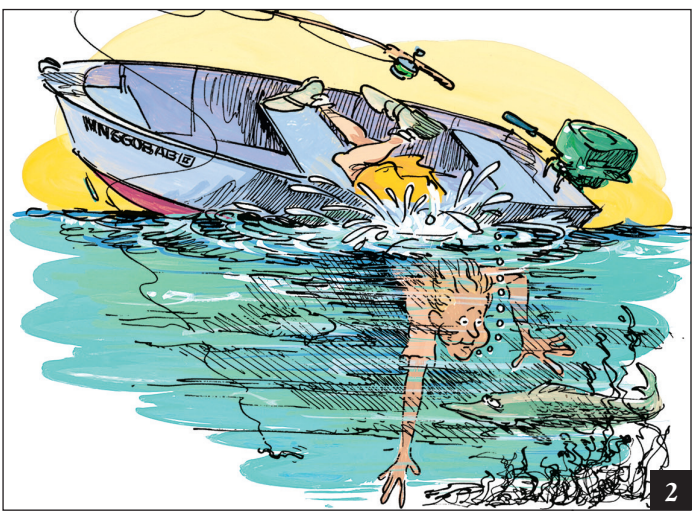
Most boating fatalities occur in small, open boats powered by outboard motors (less than 40 horsepower) or in non-motorized canoes.

The two most common types of fatalities:

1. **Capsizing (tipping over) —** These accidents are commonly associated with three unsafe boating practices:
   - Overloading or improperly distributing the weight of passengers and gear in the watercraft, making it unstable and hard to handle.
   - Sudden and sharp high speed turns.
   - Boating in bad weather or ignoring the obvious signs of an approaching storm.
2. **Falling Overboard —** Many boaters, anglers and hunters drown every year when they unexpectedly fall, or are thrown overboard. They may be riding on the boat's *gunwale*. They might be standing



up to start an outboard motor, or trying to net a fish. In any case, they lose their balance and end up falling into the water.

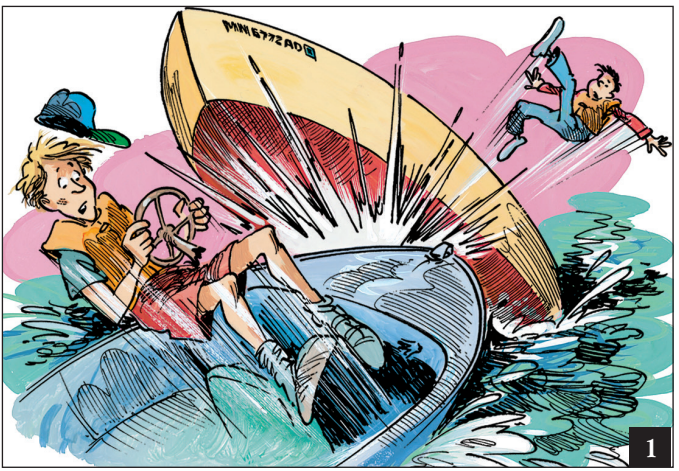


Non-Fatal Boating Accidents

Most non-fatal boating accidents involve higher-powered craft (over 40 horsepower). Non-fatal accidents result in personal injuries and/or property damage. The two most common types of non-fatal accidents are:

1. **Collisions —** Boating collisions usually involve two boats, or a boat and a fixed or floating object. Collisions between boats often occur when the operator of one or both boats is not paying attention to where they are going, or if the "*Rules of the Road*" (see page 42) are not

being followed. Boat operators need to be aware that traffic can exist on the water from all directions. Collisions with fixed objects, such as sand bars, rocks or other hazards to navigation often result because the operator is unfamiliar with the area, or ignores navigation markers. Striking a floating object in the water, such as a log or snag, is usually the consequence of not keeping a good forward lookout at all times.



2. **Water Sports Accidents —** Another common non-fatal accident involves boats towing water skiers or people on inflatable devices (tubes etc.). Injuries can result from falls off skis, falling off a tube after hitting a *wake*, two tubes hitting each other or the occupant of a tube swinging out away from the tow boat's path and hitting a swim raft, dock or moored watercraft.

While tubing can be fun when enjoyed safely, people are injured each year when their tubes are towed too fast, their heads slam together upon hitting a wave or their tube hits another boat, shore or other object.

The "Circle of Death"

Every year, serious injuries and deaths occur when operators let go of the steering wheel or outboard steering handle while the boat is moving. A phenomenon called steering torque forces the motor to slam left causing the boat to swerve sharply to the right, throwing the victim into the water.

The boat continues to travel in a circle and returns to strike the victim in the water, inflicting massive propeller wounds. Thus the term "circle of death."

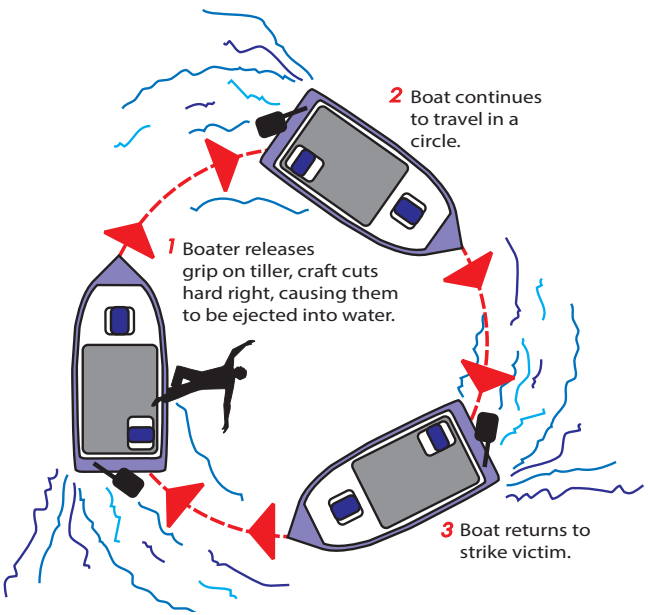
The way to avoid circle of death accidents is to avoid letting go of the steering wheel or handle until the boat ceases all forward motion.

If you notice that it takes extra pressure on the steering wheel or handle, have your boat serviced immediately. On some smaller outboards, repair may be as simple as tightening a bolt.

For outboards and inboard-outboard craft, corrective measures may involve resetting the boat's trim tab, the small fin mounted on the anti-ventilation or cavitation plate just behind the prop.

If the motor is equipped with an automatic kill switch, be sure to fasten the lanyard to your life jacket or some article of clothing such as a belt loop. If you do fall out of your boat, the lanyard, which is attached to the electrical

The Circle of Death



system, disables the motor, keeping the boat from circling back to hit you.

Be sure that clamp-on swivel seats are tightly secured and that seat backs are sturdy enough to withstand the shock of a victim being thrown against them.

Other points to note about boating accidents:

- In most cases, life jackets are on board the craft but not being worn at the time of the accident.
- The use of alcohol and drugs is involved in about a third of all boating fatalities.
- Over 30 percent of the fatal accidents occur when water temperatures are cold (less than 70 degrees).
- Most boating accidents occur during the day and in calm, clear weather with light winds.
- The majority of boat operators involved in boating accidents have considerable experience in using their craft, but have never taken a formal boating safety course.
- If your boat is in a boating accident involving a fatality, or an injury requiring medical attention beyond first aid, or property damage of $2,000 or more, you are required by law to file a report with the sheriff of the county where the accident took place. In fact, many insurance companies will not accept damage claims if the accident wasn't reported to legal authorities.

You are the Key to Water Safety

Your water fun depends on you, your equipment and other people who, like you, enjoy spending leisure time on, in, or near the water.

As a boat operator, you are the "*captain of the ship*." You are legally obligated to know the federal, state and local regulations that apply to your watercraft and the waters where you go boating.

It is also your obligation to have the safety equipment required by law, to keep it in good condition and on board, and know how to properly use these devices.

You must have a complete knowledge of your boat, its handling and the boating rules of the road.

Another responsibility of the boat operator is the boat's passengers. You are responsible for your actions, and those of your passengers from the time you leave the dock to the time you return.

You are also required to maintain a proper lookout at all times. Lack of proper lookout is the reason for most accidents.

Water users have a final responsibility which is frequently overlooked. This is an obligation to recognize that other people who enjoy our lakes and rivers have interests which may be similar to or directly opposite their own. For example, not all people enjoy water skiing or personal watercraft.

Everyone has the right to use public waters, as long as they do not interfere with other people's rights to enjoy their favorite activity. (*Example: creating a large wake too close to someone who is fishing, thus disturbing the angler as well as endangering their life.*)

To summarize, the watercraft user's responsibilities include:

- A knowledge of rules and regulations for watercraft use.
- A knowledge of safety equipment required by law to be on board their watercraft.
- A knowledge of the operation of their watercraft.
- Responsibility for the actions of all persons on board the watercraft.
- Maintaining a proper lookout.
- Acceptance of the fact that everyone has the right — and privilege — to use the state's water resources in a proper manner.

You are also responsible for operating your boat at a safe speed, obeying no-wake zones and waterway markers, avoiding propeller injuries, obeying motorboat noise laws, observing homeland security measures and being a safe and courteous boater.

The objective of any boating safety program is to inform the watercraft user of proper safety procedures. The number of accidents resulting in deaths, injuries and property damage can be reduced drastically but only if **YOU WILL HELP!**

2

Regulations and Safety Equipment

This is not a complete summary of regulations.
A current copy of both state and federal regulations should be consulted.

Watercraft Licensing

A law passed by the 1959 Legislature requires Minnesota watercraft owners to obtain a license for their craft. On July 1, 1959, the first licenses were issued and by the end of that year 160,000 owners had complied with the new requirement.

Since that time, licensing requirements for different types of watercraft have changed a number of times. As of January 1, 1983, *all watercraft*, except wild ricing and waterfowl boats used during the appropriate season, non-motorized boats 10 feet or less in length and seaplanes, are required to be licensed by the DNR. This rule does not apply if the watercraft is licensed by another state, federal agency or a foreign country. Also, if you visit another state with your boat, your current Minnesota registration will be honored for a certain period, usually 60 days. To be sure, you should check with that state's boating authorities before you go.

A boat must be registered in the state where it is usually used. So even if you live in Minnesota, but the lake cabin where you keep your boat is in

Wisconsin, you should register your boat there.

The licensing procedure for a *new* watercraft is simple:

1. If your watercraft is being licensed for the first time, go to the nearest deputy registrar's office or the DNR's License Center and bring along the bill of sale from wherever (or whomever) you bought the boat.
2. Fill out the license form for *new* watercraft. You may also need to apply for a watercraft title.
3. Pay the fee and you will receive your license card and decals over the counter. You *may not operate your craft* until you obtain your license card and place the decals and numbers on your boat as *required by law*.
4. The fees for watercraft licenses can be found in the current *Minnesota Boating Guide* and on the reverse side of new application forms. Watercraft licenses are for *three* calendar years. (They expire December 31 of the third year.)
5. Carry this license on your watercraft at all times.
6. The license number and Minnesota validation decal must appear on the hull of the watercraft. (See example in the current *Minnesota Boating Guide*.)

Non-motorized canoes, *kayaks*, sailboats, sailboards, paddle boats and rowing shells do not need numbering, but do require the placement of decals. These decals carry the registration number and must be replaced every three calendar years. Remember, only the *current* year license decals may be displayed on your watercraft.

Watercraft license renewals can be made on the DNR's website, at the DNR License Center in Saint Paul or any deputy registrar's office. Your license number will remain the same as long as you renew it accurately and promptly. You will receive a renewal notice in the mail about 15 days before the expiration of your current license.

A duplicate license card will be issued to you if you lose the original card. You will need to bring the boat's license number to the DNR License Center or deputy registrar in your area. You will be required to pay a small replacement fee.

The DNR License Center must be notified if you sell or trade your watercraft. The new owner of your watercraft must complete a transfer application form. You must sign the license card on the appropriate line and the new owner needs to mail both forms and the required fee to the License Center within 15 days of the transfer of ownership.

If you destroy or otherwise junk your watercraft, you must notify the

DNR License Center or deputy registrar within 15 days.

Display of Numbers

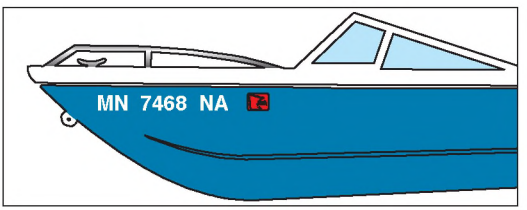
Except for non-motorized canoes, kayaks, rowing shells, paddle boats, sailboards and sailboats the numbers you are assigned by the DNR must:

- Be displayed on the hull on the forward half of both sides of the boat.
- Be at least 3 inches high, of a block character, and contrast with the background.
- Be between one-half to three-quarters of an inch wide. (Pinstriped "skinny" letters and fancy cursive lettering are not acceptable.)
- Read from left to right and always be visible and legible.
- Have a 3- to 4- inch space or a hyphen between the letter groups and number groups.
- Have the decal (license sticker) to the rear and within 4 inches of the number on both sides of the craft. No other number may be displayed within 2 feet of the license number.

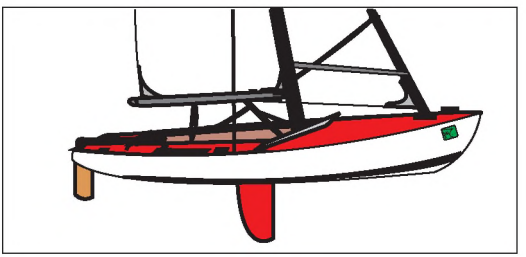
On non-motorized boats, kayaks, rowing shells, paddle boats, sailboards and sailboats over 10 feet long, you only need to attach the decals to the forward half of the craft. You don't need numbers or letters on these non-

Correct placement of license numbers and decals

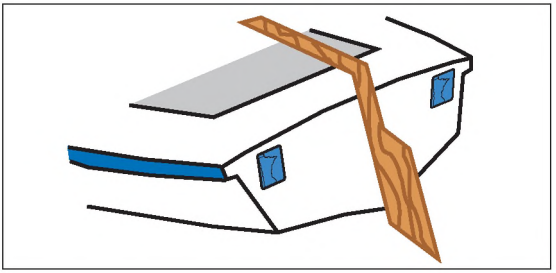
The license number which appears on your watercraft license card must be displayed on the forward half of the boat as shown here.



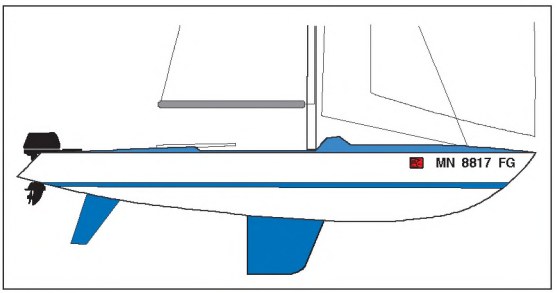
The license number issued to your craft appears on the decal and on the card. If your canoe, kayak, rowing shell, paddle boat, sailboard or sailboat **doesn't have a motor,** place the decal on each side of the forward half of the craft. No 3 inch numbers are necessary.



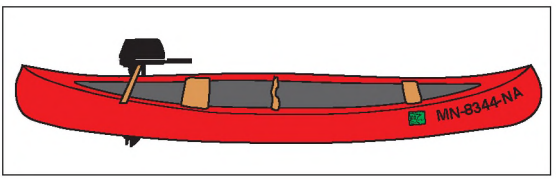
On sailboards and sailboats, you may also place decals on the stern if it is impossible, because of the boat's design, to place them on the bow.



If your canoe or sailboat is motorized, affix the 3 inch letters and numbers as previously described for other motorized craft. The square decal should be placed to the stern or to the rear of the number.



Canoes with motors are required to display numbers as well as the validation decal.



motorized boats. Also, the hull design of some sailboats makes it impossible to place the decals on the bow and have it remain above the waterline. In that case, you may place the decals on the stern (see illustration). Nonmotorized boats 10 feet long or less do not need to be registered or display a license number.

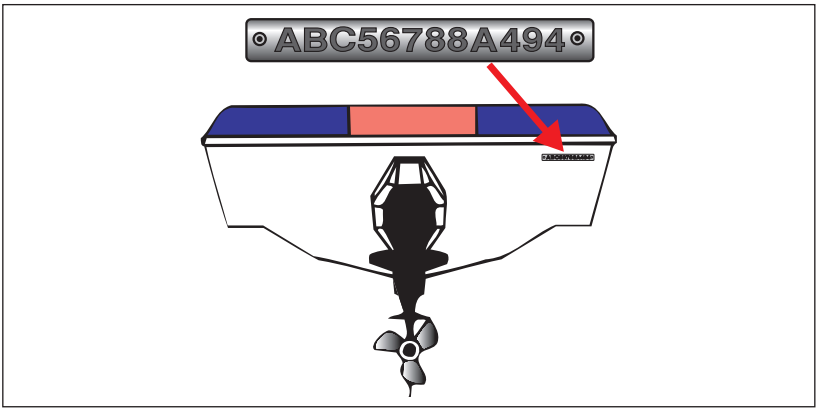
If your canoe or sailboat (or any other craft) is motorized, affix the 3 inch letters and numbers as described for other motorized boats.

Documentation

Recreational boats of 5 net tons or greater may be documented with the U.S. Coast Guard. Documented vessels don't need to be registered

by Minnesota or display state license numbers or decals. There are very specific requirements for documentation so check the latest federal regulations for more information.

The hull identification number, or HIN



Hull Identification Numbers

The hull identification number or HIN is required to be placed by the manufacturer on all recreational boats built after 1972. For most boats, the HIN will be on one of two areas of the boat; the starboard (right) side of the *transom* within 2 inches of the top edge or near the top edge of the hull within 2 feet of the stern. Be sure to write this number down and keep it in a safe place in case someday your boat is stolen and you need to make a report to the county sheriff or police department.

Watercraft Operator's Permit

Occasionally, the Minnesota Legislature changes the law that restricts the age of boat operators. For the most current information, please contact your county sheriff or the Minnesota DNR at the address listed in the Agency Directory in the back of this book.

There are special age restrictions for operators of personal watercraft (Jet Skis, Sea Doos, PWCs, etc.). See the personal watercraft section of this manual and the latest *Minnesota Boating Guide* for specific information.

A Minnesota Watercraft Operator's Permit will be issued to 12-17 year olds who successfully complete the approved educational program and pass the written test.

It is unlawful for a watercraft owner to permit the use of his or her watercraft in violation of the age restrictions.

MN DNR conservation officers and county sheriffs enforce Minnesota's boating laws, as well as other regulations, using many different kinds of watercraft.

Law Enforcement and Penalties

Whenever you are boating or fishing on Minnesota's lakes and rivers, you are subject to laws and rules similar to those in effect on our streets and highways.

Enforcement of these state regulations is the responsibility of DNR conservation officers and the county sheriffs. Conservation officers also enforce the state's natural resources laws. County sheriffs, in addition to their enforcement duties, inspect rental craft, place buoys and waterway markers and perform search and rescue operations. Both enforcement agencies are there to provide for your safety on the water.

Some waters of the state are also controlled by federal laws which are enforced by the U.S. Coast Guard and National Park Service. Examples of these waters can be found in the current *Minnesota Boating Guide*.

Penalties

Persons who violate Minnesota boat and water safety statutes (laws) or rules are subject to arrest. Upon conviction, the watercraft operator and/or owner may be found guilty of a misdemeanor. The penalty for committing a misdemeanor is a fine up to $1,000 and/or a jail sentence of up to 90 days.

In addition, individuals who cause great injury or death to another

while operating a watercraft under certain circumstances can be fined up to $20,000 and/or sent to jail for up to 10 years.

Juvenile boating law offenders (less than 18 years of age) are generally directed to a juvenile court. In some cases, however, the juvenile offender will be referred to a regular court. Persons 12 to 17 years of age can lose their watercraft operator's permit if they violate certain sections of the law. The revocation will last a year and the person must then complete another boating safety course to requalify for a permit.

General Operation

In Minnesota, it is unlawful to operate or permit the operation of your watercraft in disregard of the rights and safety of others.

Examples include:

1. Operating a watercraft without the safety equipment required by law.
2. Exceeding the carrying capacity or horsepower rating of the watercraft.
3. Allowing occupants to sit on a boat's gunwale, or decking over the boat's *bow,* sides or *stern* while underway, unless adequate guards or railings are provided.
4. Towing a water skier without an observer or wide angle rear-view mirror in the craft.
5. Operating a watercraft while under the influence of alcohol and/or a controlled substance, or allowing someone to operate your watercraft while under the influence of alcohol and/or a controlled substance.

A white marker with a blue stripe is a mooring buoy, the only buoy to which you may lawfully tie your boat.

6. Operating any watercraft in a manner which obstructs *navigation*.
7. Mooring, attaching or holding in any manner a watercraft to any *buoy*, other than a *mooring buoy*, or any other marking device or guide placed in the waters of this state by lawful authority.
8. Operating a watercraft within an area specifically marked or set aside

as a swimming area.

9. Operating a watercraft so that its wash or wake will endanger, bother or unnecessarily interfere with any person or property.
10. Operating a watercraft within 150 feet of a diver's warning flag.

Remember, the enforcement officer must use judgment in making a decision about the way you handle your watercraft. It will simplify his or her work if your boating procedures are never questioned and of more importance, it will mean you are not a menace to fellow boaters or yourself.

Local Regulations

A number of Minnesota counties and other local units of government have placed special regulations, called water surface use ordinances, on bodies of water that are within their boundaries. Ordinances range from slow-no wake zones to speed limits, and are enforced just as any other boat and water safety laws. To find out if a lake you are planning on boating has any of these special rules, contact the county in which the lake is located, check the DNR website, or call the DNR Boat and Water Safety Section for a current list of lakes with water surface use ordinances.

Safety Equipment

The *Minnesota Boating Guide* lists the equipment you must have on board your watercraft. Smart skippers check their equipment *before* they use their craft to be certain it's on board, in good condition and they know how to use it especially during times of danger.

Life Jackets (see *Minnesota Boating Guide* for legal requirements)

Many people believe that all they need to go boating is a boat and motor. Too often they have been found to be wrong - *dead wrong*. Neither one of the men in our story on page 16 anticipated danger. Perhaps if they knew what was going to happen, they would have worn their life jackets.

Why are life jackets so important? Every year about 80 percent of all boating deaths are drownings and most would have been prevented if the victims had been wearing a life jacket. Nearly all the victims had some swimming ability, but were not wearing life jackets, and were not able to put them on after the accident took place.

Life jackets protect against drowning and also can help ward off the chilling effects of *hypothermia* - the lowering of the body's core temperature to the point that it becomes impossible to stay afloat. Exposure to cold water may be involved in as many as one-half of all boating deaths.

Every watercraft must be equipped with the proper number of Coast

Not a Fish Story

A relaxing fishing trip suddenly became a terrifying nightmare for two men on Lake Mille Lacs.

They left the dock about 1:30 p.m. on Saturday. At 5 p.m., a storm began to develop, so they decided to head back. They believed they could make it safely, but they were wrong.

The winds were estimated at 60 to 70 miles per hour. After two 15-foot waves, their boat swamped and began to sink about a mile from shore.

As the boat sank, the men grabbed for anything that floated. One grabbed a buoyant cushion, the other a gas can. With these items between them, they managed to stay afloat for eight hours.

During their ordeal, they sang songs and even talked to the gulls to keep from falling asleep. Finally at 12:30 a.m., Sunday morning, they saw lights on shore and yelled for help. About an hour later they were rescued by Aitkin County deputies who rushed them to the hospital. Luckily, both men recovered.

Guard approved life jackets for each person on board.

Life jackets are most often made of *kapok* or plastic foam. Boaters should *check the latest state and federal regulations for specific life jacket requirements*.

Most adults need an extra 7- to 12- pounds of buoyancy to keep their heads above water. Below is a list of descriptions and the minimum buoyancy for each type of U.S. Coast Guard approved life jacket.

Types of Life Jackets

Type I (Off-Shore Life Jacket). These are the vest or yoke type devices designed for use on commercial craft. They are required to be orange in color, come in two sizes and must bear an inspector's stamp in addition to being approved. These devices are designed to turn most unconscious victims from a face downward to a vertical or slightly backward position in the water. The Type I life jacket has a minimum of 22 pounds of flotation.

Type II (Near-Shore Buoyant Vest). The near-shore buoyant vest usually looks like a bib with a collar behind the neck. It has the ability to turn a victim over similar to the Type I, but will not turn as many persons under the same conditions. Buoyant vests may be of any color and generally come in four sizes. The Type II vest has a minimum of 15.5 pounds of flotation.

Type III (Flotation Aid). These devices usually use plastic foam for flotation and come in a variety of sizes, colors and styles, including vests for canoeing, sailing, water skiing, personal watercraft riding, hunting, and general boating as well as full-sleeved jackets. Type III devices are designed to keep a conscious person in a vertical or slightly backward position. They also provide the best protection of all life jacket types for hypothermia (exposure to cold water). The Type III life jacket also has a minimum of 15.5 pounds of flotation. They are not designed to roll an unconscious person over in the water to a face up position.

Type IV (Throwable Devices). Buoyant cushions are primarily designed to be thrown to a victim in the water. They come in various sizes, shapes, and colors and are equipped with handles or straps for holding or throwing the cushion. *Never wear a buoyant cushion on your back.* If you must use the cushion in the water, put one of the straps over the head and one leg through the other strap, so the cushion rests on your chest. This will allow you to perform swimming movements to propel yourself through the water. Seat cushions have a minimum of 20 pounds of flotation.

Ring and horseshoe buoys are common on larger craft and around swimming areas as a throwable device. Preferably this is done with a line attached so the victim may be hauled back to safety. Buoys usually are made of plastic foam. Ring buoys have a minimum of 16.5 pounds of flotation. *NOTE: Type IV devices are no longer acceptable as a primary flotation device, but at least one is still required to be carried on all boats 16 feet or longer, except canoes and kayaks.*

Type V (Special Use Devices). These devices are designed and approved for specific activities such as sailboarding, whitewater canoeing or commercial uses.

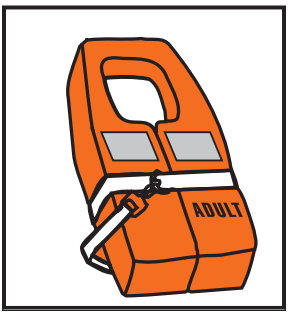
As an example, hybrid Type V life jackets have about 7.5 pounds of buoyancy and when a special internal bladder is inflated, have a total buoyancy of 22 pounds The hybrid inflatable life jacket is required to be worn to be counted in the total number of life jackets on board your boat.

Some flotation devices, such as ski belts and children's inflatable float cuffs, do not qualify for Coast Guard approval. Be sure to check the label for U.S. Coast Guard approval before you buy any life jacket.

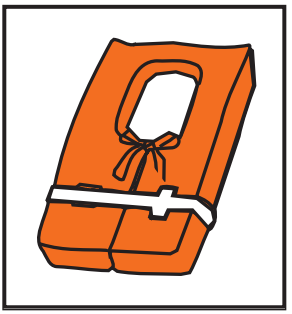
Inflatable Life Jackets

Inflatable life preservers have been around for many years. Their first recorded use was in 870 B.C. when the Assyrian army used the buoyancy of inflated goat skins to cross a castle moat to attack an enemy. The new U.S. Coast Guard approved inflatable life jackets do not use animal parts in their construction, but they are very effective in the battle to save lives.

Life Jackets

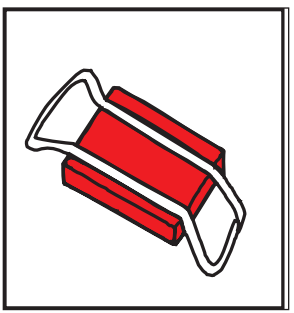


Type I

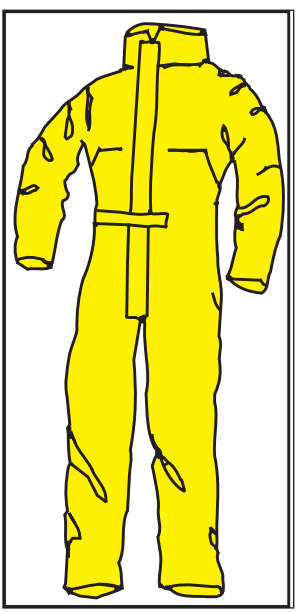


Type II

Type III



Type IV

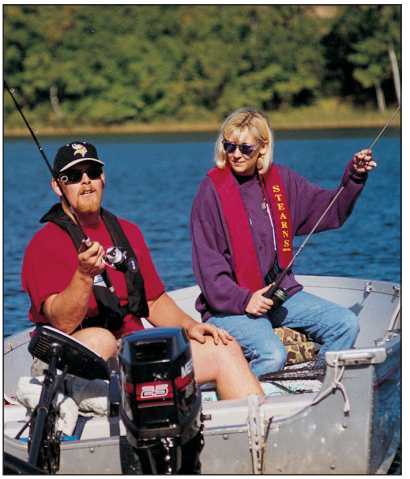


Type V

There are several types of inflatable life jackets. One design looks like a hiker's "fanny pack." In case of an emergency, the user pulls a lanyard, the vest inflates and the user puts the device over his or her head. Another design looks like a pair of suspenders and yet a third looks like a fishing vest.

The obvious advantage of inflatable life jackets is that they are very light, comfortable and aren't nearly as warm as a traditional life vest on a hot summer day. Also, some designs provide up to 34 pounds of flotation. That's as much flotation as vests found on ocean-going vessels.

A disadvantage is that they don't give as much protection from the effects of cold water as traditional vests — a major concern for much of Minnesota's boating season. Some approved inflatable flotation devices require that wearers be conscious so they can pull a lanyard to inflate the vest. There are also U.S. Coast Guard approved inflatable life jackets that inflate automatically when the wearer is immersed in water.



Inflatable life jacket's main advantage is their light weight and comfort, especially in warm weather.

Inflatable life jackets are not intended for use by children younger than 16 years old, non-swimmers, or to be used for high-speed water sports such as water skiing or personal watercraft riding.

Inflatable life jackets require regular maintenance that if not done, could cause the device to malfunction. Be sure to read the owner's manual carefully.

Nothing lasts forever

A final note about life jackets. Flotation devices will not last indefinitely and need to be checked at least once per year. Test the straps,

Many articles found in boats can act as emergency life saving devices. Beverage coolers, gas cans, duck decoys and other floating items have all been used to save lives.

Here are some other life jacket tips:

- *Always* purchase U.S. Coast Guard approved life jackets. There are some non-approved life jackets on the market so before purchasing, check the label to ensure they are Coast Guard approved. Coast Guard approval means the life jacket has gone through a rigorous series of tests to assure that it is an effective safety device. Also, don't forget to remove the plastic bag covering many life jackets come in when they are sold before you place it in your boat.
- Children under 10 years old are required in Minnesota to wear a life jacket on boats unless the craft is tied to a dock or permanent mooring, or if the child is below deck or in an enclosed cabin, or on a boat operated by a licensed captain (charter boat, etc.) or if the child is on an anchored boat that is being used as a platform for swimming or diving.
- Life jackets are required to be either worn or readily accessible when you are aboard your boat. Readily accessible means easy to reach in an emergency. Life jackets in locked lockers, under anchors or in plastic bags are not considered accessible.
- Operators and passengers of personal watercraft (Jet Skis,™ Wave Runners,™ etc.) are required by law to WEAR a Type I, II, III or V life jacket. Inflatable life jackets are NOT approved for use on personal watercraft — or any other high speed water sport such as water skiing, inner tubing, or wake boarding for that matter. See the section of this book on personal watercraft for more information on personal watercraft safety and regulations.
- Try out your life jacket at least once a year in the water. This will show you how well it works and give you confidence in its use.
- Be certain that everyone on your craft knows how to use his or her life jacket. Make sure you have the correct size for each person *aboard* before leaving the dock. Too large of a life jacket on a small person can be almost as dangerous as no life jacket at all.
- Water skiers should purchase and wear approved life jackets which are impact rated and provide good protection for the skier.
- Check your life jacket regularly to be certain it's in good shape. If your life jacket contains kapok, the kapok fibers may become waterlogged and lose their buoyancy if the vinyl inserts are punctured or split. When the kapok becomes hard or soaked with water, the life jacket is no longer serviceable and should be replaced.
- In most fatal boating accidents, in Minnesota, life jackets were on board but were not being worn at the time of the accident. A life jacket left under a boat seat does the victim in the water absolutely no good. WEAR YOUR LIFE JACKET!
- There are some other common articles which can act as lifesaving devices in an emergency. Large thermos jugs, pop coolers, waterfowl decoys, water skis, or an outboard motor gas tank (even when partially filled) will give support to a person who is unexpectedly thrown into the water.

buckles and zippers and make sure there are no leaks or tears in the fabric. And NO customizing or repairs; any physical alteration of a life jacket voids its U.S. Coast Guard approval. The best advice is to throw away any questionable life jacket.

Operators and passengers of personal watercraft must WEAR a U.S. Coast Guard approved Type I, II, III or V life jacket.

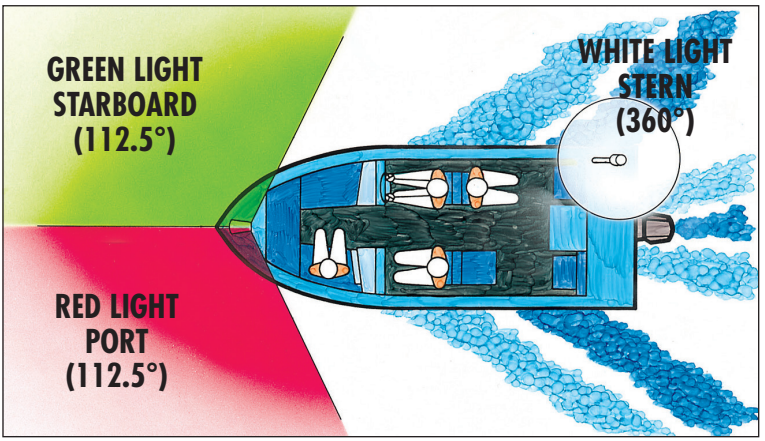
Lights

All watercraft must be equipped with navigation lights required by law when operating between sunset and sunrise. These lights are to warn others and in many cases indicate what the watercraft is doing.

Boaters should check the *Minnesota Boating Guide* or federal regulations for the lighting requirements for their craft. *Motorboats*, when underway, are generally required to display a green light visible on the *starboard* (right) side, a red light visible on the *port* (left) side and white light (or combination of white lights) visible in all directions. The red and green lights may either be combined or separated. The all-around white light is usually located on the stern (rear) half of the boat and must be higher than the red and green lights. None of the lights may be obscured in any direction by passengers or equipment.

Motorboats which are at anchor are also required to display an all-round white light.

Non-motorized craft (canoes, kayaks, small sailboats, rowboats, etc.) must carry at least a white light, such as a flashlight, and display it when meeting other watercraft.



All boats must display lights after sunset. This illustration shows a common light placement on motorboats.

A boat should never leave shore without having at least a flashlight in good operating condition for use in emergency situations. You may not plan to be afloat after dark, but trouble may develop making it impossible to return before nightfall.

Regulations on Federal waterways such as the Mississippi River and Lake Superior require that navigation lights be used when visibility is reduced, such as in fog or bad weather. It's always a good idea to switch on your navigation lights when you're boating with poor visibility.

Fire Extinguishers

When an enforcement officer asks to see their fire extinguisher, some uninformed boaters will say, "Why do I need a fire extinguisher? I'm surrounded by water!"

Some boat fires can be put out by dousing them with water, for instance if they are wood or fabric, but fuel, oil and electrical fires can only be put out with an extinguisher. Fires need three elements to keep burning; fuel, oxygen and heat. Fire extinguishers work by taking away one of these elements, thereby putting out the fire.

Fire extinguishers are classified by their size and the type of fire they will put out. Extinguishers must be approved by the U.S. Coast Guard to fulfill the legal requirements for motorboat use. They are portable and have a B-I or B-II classification and "USCG Approved" stamped somewhere on the label. The B-II extinguisher is the larger of the two; the letter "B" referring to the type of fire the extinguisher will put out. Type B fire extin-

Fire extinguishers are required equipment on many motorboats and are cheap insurance for your craft.

guishers can be used on *all* gasoline, oil and grease fires. Water should be used on wood or paper fires only. In an electrical fire, turn off the power and then use a B type extinguisher.

All watercraft using motors *should* carry an approved fire extinguisher. Both state and federal laws *require* fire extinguishers on watercraft carrying or using fuel or other inflammable fluid in any enclosure of the boat. Check the *Minnesota Boating Guide* for specific requirements.

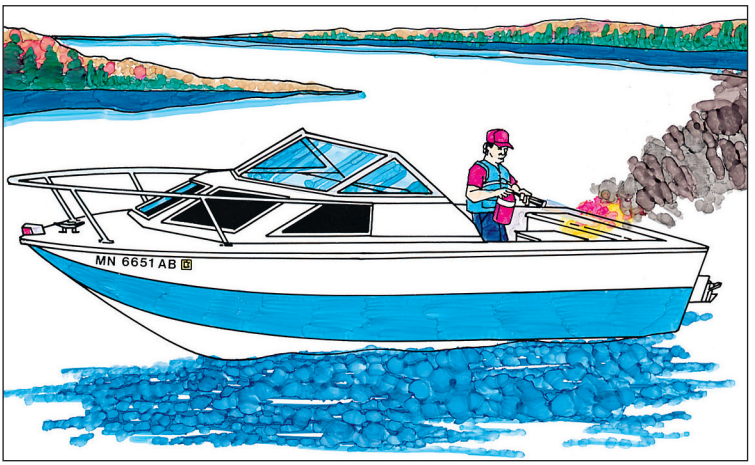
The extinguisher should be mounted in a location where it may be easily reached if a fire starts. A good spot is right near the steering position, but NOT near the engine compartment.

Inspect extinguishers prior to each boating season to see that proper pressure is maintained, hoses are in order and that they are not cracked or damaged. If it is a dry-chemical extinguisher, tip it upside down and pound on the unit with your hand to loosen up the powder inside that may become packed down from the jarring motion of the boat hitting waves all summer. Also, tap on the indicator gauge to make sure that it isn't stuck in the "fully charged" position when the extinguisher is really partially or completely empty.

Never try an extinguisher to see if it works properly, since gradual discharge will result. Always recharge the extinguisher as soon as possible after using it.

If there is a fire on board, follow these instructions:

1. Slow or stop the boat and put on your life jackets.



In case of a boat fire, slow down, turn the craft into the wind and aim the extinguisher at the base of the flames.

2. Keep the fire downwind - that is, if the fire is *aft*, or to the rear, head the boat into the wind. If the fire is forward, put the stern or back of the boat into the wind. This may help to keep the fire from spreading (see illustration).
3. Act promptly to extinguish the fire. Aim the extinguisher at the base of the flames and sweep back and forth. Remember it takes less than 10 seconds to empty a 2 pound fire extinguisher.
4. Have a fire plan of action for your boat...it could save your boat—and your life.

Ventilating Systems

All boats in which the engine or fuel tank is enclosed must have a ventilating system to remove any trapped explosive or flammable gas. There must be at least one intake duct, fitted with a *cowl* which extends midway to the *bilge* or at least below the level of the *carburetor* air intake, and at least one exhaust duct fitted with a cowl extending from the lower portion of the bilge of each fuel tank and engine compartment to the outside.

Inboard and inboard-outdrive boats built after 1980 also have a power-operated bilge blower connected to the ventilation system. Although no fool-proof ventilation system has been developed, the proper use of present systems can greatly reduce the possibility of an explosion. The blower should be run for four minutes before starting the engine and whenever the boat is operating below normal cruising speed.

The importance of a ventilating system cannot be over stressed. Gasoline fumes are heavier than air and will settle into out-of-the-way places, especially the bilge. An explosion will result if these fumes are ignited. Even the best blower system cannot remove liquid gasoline from the engine compartment so it is a good idea to open the hatch and do a "sniff test" for gas fumes and a visual inspection for liquid gas in the bilge. If you turn the key and the engine doesn't start right up or it starts but runs very rough, that can mean that there is a heavy concentration of gas fumes in the engine compartment and is "flooding" the carburetor. Stop immediately, turn off the ignition, open the compartment hatch and check it again. If liquid gas or fumes are present, have the engine serviced by a qualified technician.

A flame arrestor prevents backfires from entering the engine compartment.

Backfire Arresting Devices and Mufflers

All motors (except outboard motors) must have an approved device for stopping or arresting backfires attached to the carburetor if the engine is equipped with one. Some engines are fuel injected and don't need a carburetor. A backfire occurs if an intake valve on the engine is stuck open when the spark plug ignites the gas mixture. Part of the resulting flame shoots out the carburetor. The backfire flame arrestor is mounted on the engine where the air cleaner is usually mounted on an automobile. It often looks like a flattened cylinder with metal fins or wire mesh. Automobiles don't need a flame arrestor because a car's engine is exposed underneath and liquid gas or concentrated gas fumes can't readily collect. A boat engine, however, is in a sealed compartment that is a perfect place for an explosion to occur if gas fumes are present.

All motors must have a muffler, underwater exhaust or device which

adequately muffles any excessive or unusual noise. It is illegal to equip a motor with any type of cut-out.

Signaling Systems

A whistle or horn is required on all motorboats 16 feet or longer. Check the current regulations for exact requirements. Larger boats should also carry a bell. Standard whistle signals are on page 45.

Here are some other points on sound-producing devices:

- Whistles, horns and bells should be used only when required for safe operation, and not for "tooting" at friends.
- Sirens may not be carried or used aboard any boat other than authorized patrol craft.
- Be careful when using gas-powered horns since they may not work during cold weather.
- A whistle is a handy item to have aboard all watercraft as an emergency distress signal.

Visual Distress Signals (VDS)

If you are boating or fishing on Lake Superior (or any of the Great Lakes or the ocean) you are required by federal law to carry U.S. Coast Guard approved visual distress signals. These can include flags, flares, distress lights or smoke signals. There are specific requirements for daytime and nighttime devices, so check the federal regulations.

The Emergency Position Indicating Rescue Beacon (EPIRB)

The EPIRB is generally found on larger craft on the coasts or Great Lakes. When activated, a 406 MHz EPIRB broadcasts a unique, repeating SOS signal that can be

When activated, an EPIRB broadcasts an S.O.S. via satellite to rescue units on the ground.

detected by satellite from virtually any point on earth. When properly registered, the signal includes a description of the vessel and its location. This critical information is routed directly to rescue units on the ground, reducing search time dramatically. Experts recommend that boaters venturing outside reliable VHF radio range (about 20 miles offshore) carry a registered 406 EPIRB on board.

Pollution

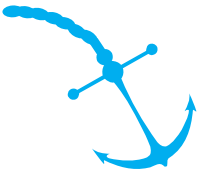
Many people receive bad cuts and injuries from trash thrown in our lakes and rivers. Throwing trash in the water is against the law. A fine, or other penalty can be imposed on anyone who is convicted of this offense. Remember, "If you carried out, carry it back!" If your engine is leaking fuel or oil into the water, take it to an authorized service center for repair. Boats 26 feet and longer are required by federal regulations to display a 9 by 4 inch placard (available at many marine dealers) that describes what is illegal to throw overboard. Boats 40 feet or longer have to have a written plan that names the person on board who is in charge of disposal.

Marine toilets, also called Marine Sanitation Devices or MSDs, are another source of pollution if not properly designed or maintained. They must be secured so that no waste can be discharged from the toilet into the water. See the current *Minnesota Boating Guide* for more information.

Some of the items pictured, such as tools, repair parts, bailing bucket, tape, rope, oars, bumper, flashlight and first aid kit are not required by law but can come in handy in case of an engine breakdown or other emergency.

Other Desirable Equipment

1. **Bilge pumps and bailing devices:** Always carry some type of bilge pump or *bailing* container (it could be a coffee can or minnow bucket) in your watercraft.
2. **Anchor and line:** Every boat should be equipped with an *anchor* and *line*. The type of anchor will depend on the size and weight of your craft, and the waters you cruise. A coffee can filled with cement and a few feet of water ski tow rope may be fine for use with a small boat on a 50 acre lake, but larger craft on larger waters need commercially available anchors to keep from grounding should the engine lose power.
3. **A tool kit and spare parts:** It is always a good idea to carry a few basic tools such as a screwdriver, pliers, a wrench and a hammer. In addition, carry certain spare parts such as spark plugs, shear pins (if used), wire, spare propeller and other items which are necessary for your particular type of engine.
4. **Paddle and/or oars:** It is absolutely necessary to keep *oars* or a paddle in a small craft.
5. **Extra fuel** (in a proper container).
6. **Fenders:** *Fenders* or bumpers keep a boat from banging against a dock or other craft. They are usually made out of plastic.
7. **Flashlight:** You may not plan on staying out after dark, but it pays to be prepared.
8. **Compass and suitable charts:** Useful on unfamiliar or large bodies of water.
9. **Depth finder:** Can help keep you from running aground in shallow areas of unknown waters.
10. **First aid kit:** Include supplies to treat cuts, burns, broken bones, other injuries and health emergencies. Also sign up for CPR and first aid courses offered by several national organizations including the American Red Cross.
11. **Radios:** A portable AM radio is nice to have on any boat to pick up weather reports. The static caused by far off lightning is a sure sign of an approaching storm. On larger craft, a two-way VHF marine radio can be a life saver. Marine radios are generally preferred on waters such as the Mississippi River (south of the Twin Cities), Lake Superior, the Lower St. Croix River, Lake Minnetonka, and Lake of the Woods because of their greater reliability and use among boaters and patrol and rescue agencies and 25 mile or more range. A cell phone can be handy, but is extremely limited in coverage and range in many parts of the state.
12. **Money:** Bring enough for gas or repairs.



3

Safe Boat Operation

Boats

Selecting a boat to suit your needs can be a real challenge, especially for a new boater. There is no such thing as the perfect boat for all situations. A boat that might be perfectly safe on a Minnesota lake of 60 acres might be completely unsafe on a lake as large as Mille Lacs Lake (132,480 acres). Boats are made for many different purposes. Decide what function you want your boat to serve. Then shop carefully until you find a boat that fits your needs.

Don't try to stretch your money and your luck. Make sure your boat is adequate for the waters you'll be using.

Boat Materials

Although their popularity has declined since aluminum and fiberglass *hulls* became common in the 1950s, wooden boats have excellent riding and handling characteristics, and are extremely popular with antique boat enthusiasts and other boating "purists."

Wooden hulls need to be checked often for breaks, cracks, loosened timbers and fittings. Probe along the joints, seams, bow and stern with a sharp knife for signs of rot. The top of a knife blade can be pushed easily into rotten wood. (Persons buying a used wooden hull should keep this tip in mind.) Any damage, including rot, should be repaired before the boat is launched.

Steel recreational boats are fairly uncommon. Steel can become damaged by rust, so badly corroded and cracked plates should be replaced. Always investigate areas where paint has bubbled. Scrape it away. Inspect to make sure the steel surface has not been seriously damaged by rust. Prime the cleaned area, and repaint.

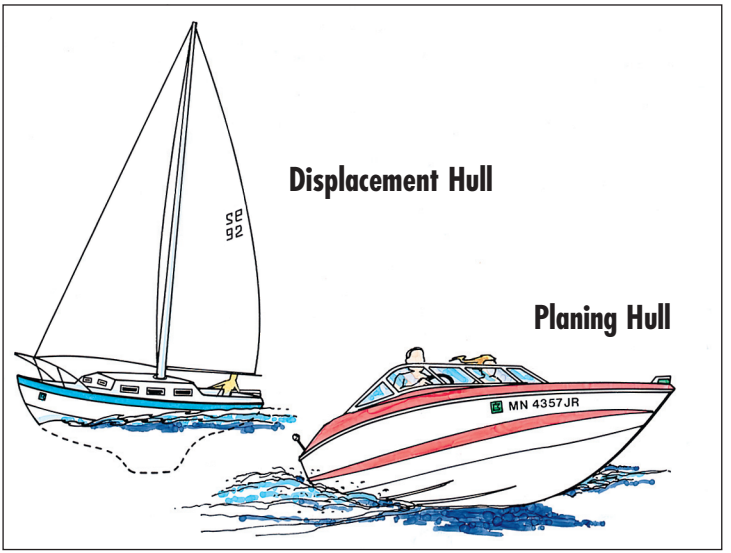
Aluminum is used in most types of recreational watercraft. It is light, resistant to corrosion when anodized, and requires a minimum of maintenance. Like all boat materials, however, it does require care and attention. Check periodically for serious dents, cracks and loose rivets at points of stress.

Fiberglass is one of the most popular materials used in construction of watercraft. It requires little maintenance, comes in many colors, and is very strong. Fiberglass boats can also become damaged, however. Look at areas where the finish is marred with a pattern of small cracks radiating outward from a central point. The central point is usually the point of impact. Check carefully. If the hull is soft or cracked at that point, it needs repair.

Most fiberglass hulls have some wood used as part of the construction. If the fiberglass is seriously cracked it can allow water to seep into contact with wooden ribs or decking and the resulting rot can cause serious problems.

Synthetic rubber-like materials are used in the construction of inflatable craft. They are popular with scuba divers, anglers and others who need a lightweight and easily transportable boat. Inflatable boats are often more stable and have greater weight carrying capacity than other comparably-sized hulls and have the advantage of being able to be deflated, rolled up and stored in a fraction of the space of other hull materials.

All boat materials require some maintenance. Inspect your boat often. You can save many dollars if you repair minor damage before it becomes a



major problem. You may also save a life—your own.

Hull Types and Their Uses

Boat hulls are of two basic designs—displacement or planing. A planing hull slides across the water at high speed as it is buoyed up by its forward motion. Up to a certain point, the faster the boat travels, the higher in the water the hull rides. Under these conditions it is said that this type of hull is "on plane" and adding more power makes it go even faster. A typical planing hulled craft would be a flat bottomed jon boat or an anglers' deep V.

A displacement hull plows through the water even when more power is added. Examples of typical displacement hulled boats would include large sailboats or cruisers.

How you are going to use a boat and the usual speed you will operate it determines whether you want a displacement or planing type hull.

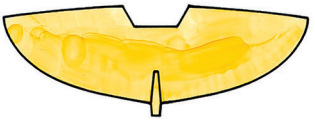
Six common designs that include planing and displacement hulls are:

1. Flat Bottom
2. Round Bottom
3. Cathedral
4. V-Bottom
5. Catamaran
6. Deep-V

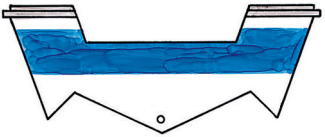
Flat bottom, square-sided boats include boxy, homemade utility boats, duck hunters' "jon boats," and deluxe 40-foot houseboats. Flat bottoms plane easily. This type of boat is good for fishing in smaller lakes and rivers because it rides flat on the water and will not tip excessively when pas-

Hull Types

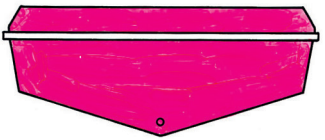
1. Flat Bottom



2. Round Bottom

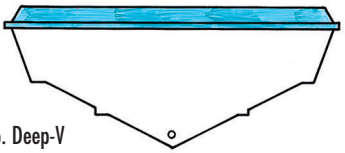


3. Cathedral



4. V-Bottom

5. Catamaran



6. Deep-V

sengers move about. On the other hand, it is not stable in rough water nor in high speed turns.

Round bottom boats move easily at slow speeds. They have a great tendency to roll unless they have a large flat area near the stern. A boat of this design will tip more easily if passengers move about, but will tend to ride out rougher water without capsizing if weight is kept low in the center of the boat.

These same qualities also influence the handling of boats under power. A round bottom boat is more maneuverable because the shape helps the boat turn. A flat bottom boat however, tends to dig into the water as it turns and can be dangerous if turned too sharply or at too high of a speed.

Cathedral or tri-hulls are a combination of deep V and catamaran. The twin "tunnels" along each side of the main hull trap spray and water to cushion the ride as well as to hold down spray when planing through waves. The cathedral hull design is seen on older fiberglass boats.

A *V-bottom* is an attempt to combine the better qualities of the flat and round bottom boats. It is an improvement over the flat bottom because it is more stable and rides better in rough water. It can be either a planing or displacement hull depending on the design.

Catamaran hulls were probably first used for stability. Any kind of boat or raft supported on two pointed floats uses the basic catamaran design. The twin-hulled design can be either planing or displacement, depending on the shape of the hulls. In sailboats, the twin hulls are normally displacement, but in power boats they are usually planing-type bottoms or pontoon boats.

The Deep-V is a hull with a sharp or deep V bottom. It planes well with a stern-drive motor and offers a very comfortable ride in rough water.

Many new boat designs are being developed, each in an effort to provide some unique riding quality.

Every boater should become thoroughly familiar with their boat so they know how it will respond under various load and water conditions. Do not take unnecessary chances with your life or the lives of your passengers.

Marine Engines

Selection

The motor you select for your boat must provide adequate power without making it dangerously overpowered. To help the purchaser decide the motor size they can safely use, boat manufacturers attach a capacity plate near the operator's position or on the transom of their boats which denotes maximum safe horsepower (hp). It is unlawful in Minnesota to operate a boat with a motor that is over the manufacturer's recommended maximum horsepower.

The motor selected must have sufficient power to control the boat under wind and water conditions where it will be used. If the motor cannot push the boat in any direction in heavy wind and waves, then it is

If your boat has no capacity plate, you can determine the maximum outboard horsepower from this two step formula.

1.
Multiply overall length _____ ft. x stern width _____ ft. = factor _____

2.

						Remote steering and 19″ transom	No remote steering or transom less than 19″	
							Flat bottom hard chine boats	Other boats
If this factor is :	thru 35	36-39	40-42	43-45	46-52	Over 52.5	Over 52.5	Over 52.5
hp capacity is :	3	5	7.5	10	15	(2x factor) - 90	(1/2 x factor) - 15	(.8 x factor) -25

hp capacity = _____ (raise to even 5 horsepower if factor is over 52)

Flat-bottom hard chine boats - reduce horsepower capacity one increment for factors through 52.

A capacity plate can be found on most new watercraft. It lists maximum outboard motor horsepower as well as carrying capacity of the boat.

The outboard motor is the most popular and perhaps most versatile form of boat propulsion.

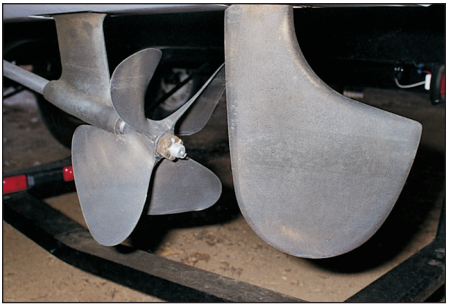
dangerously underpowered. A motor with more power than needed however, can cause the bow to rise out of the water and the stern to dip. Under these conditions, stability, maneuverability and visibility are reduced. Your boat could *swamp* by taking water over the stern.

Types of Motors

Outboards — Outboard motors power more boats than all other types combined. An outboard is a complete power unit with an engine and a drive shaft which connects it to the propeller. The entire unit is attached to a boat by clamps or bolts.

Outboards are usually gasoline powered (although many anglers' outboard trolling motors are battery powered) and range in size from less than one to 300 hp. Small outboards under 5 hp may have a self-contained fuel tank, but most have separate tanks that may either be portable or built into the boat. Most older outboards are two-cycle engines which require the mixing of small amounts of oil with the gasoline. Failure to mix oil with the gas can result in serious damage to your outboard. There are four-cycle and two-cycle oil injected engines now on the market that do not require a gas/oil mixture so be sure you know which one yours is.

Correct propeller size is extremely important. If the propeller is too large, the motor will not attain its most efficient speed. When the propeller is too small, your engine will run too fast. This will waste fuel, interfere with performance and cause serious damage to the motor's pistons and



The inboard-outdrive (left) offers the power of an inboard engine and the flexibility of an outboard. An inboard boat (right) is steered by means of a rudder located behind the propeller.

other moving parts.

Inboard-Outboard or Stern Drives — These units combine the size of an inboard engine with the flexibility of an outboard.

The outboard drive section acts as both a power device and a rudder. It can be raised and lowered mechanically to make trailering or beaching an easier job.

Inboards— Inboards are the oldest type of engine used to power a watercraft. Most larger craft are equipped with inboard engines.

Inboards are housed inside the hull of the watercraft and are connected to the propeller by means of a drive shaft.

The boat is steered by a separate *rudder* located behind the propeller. A transmission located between the engine and propeller permits the power to be shifted from forward to neutral to reverse.

Inboards may be gasoline or *diesel* powered. Gasoline engines are lighter, cheaper and usually faster. Diesel engines are more expensive and heavier, but are cheaper to run, more powerful and diesel fuel is much less dangerous to handle than gasoline.

Maintenance

- Marine engines (with few exceptions) are water cooled. The water intake must not be plugged and engines should not be run for long periods without an adequate supply of water.
- A basic knowledge of your engine and how to repair minor items may save on repair bills and keep you from having to paddle back should your motor "conk out." Keep your engine properly tuned. Check spark plugs, points, timing, carburetor, filters and belts often. Measure and

mix your outboard gas/oil mixture accurately.

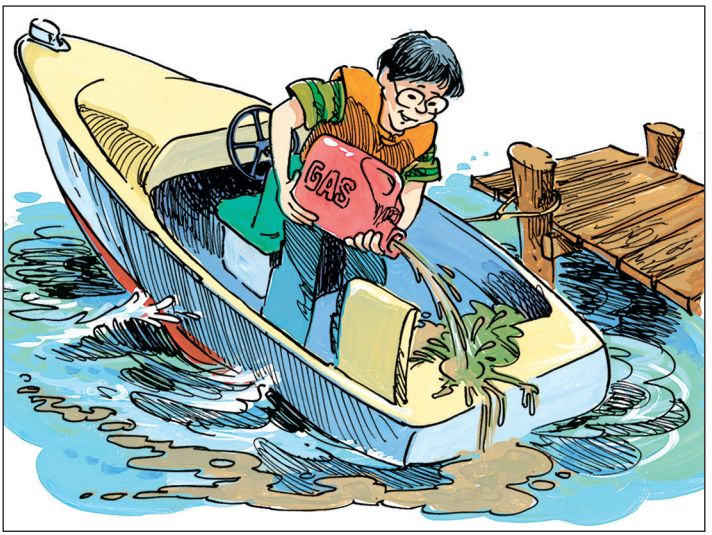
- Keep the engine and drive gears properly lubricated. Use only the marine-type lubricants recommended by the manufacturer.
- If your boat has a battery, check fluid levels often, make sure the terminals are kept clean and always use a covered battery box which is secured to the boat.
- Make sure to follow the preventive maintenance schedule in your owner's manual. Also remember the storage tips in Chapter 8 of this book.
- Check for fuel leaks before each use of the boat.

Fueling

Care must be taken when fueling any engine. If possible, it should be done in the daytime. If a fuel tank must be filled at night use only electric lights. No open flames or smoking should be allowed on or near the craft when gasoline is being handled. Portable tanks should be removed and filled outside the boat.

All *ports*, windows, *hatches* and doors on the boat must be closed, and motors, fans and engines shut off before fueling begins.

The spout from the gas pump must touch the fuel pipe or tank before gasoline is poured and should be kept in contact during fueling. If not done, static electricity could cause a spark and subsequent explosion.



Use a funnel if necessary to avoid spilling fuel into the water and wipe up any that happens to splash.

Recent studies have indicated many boat fires and explosions have occurred after refueling. Many times obvious warning signs have been ignored by the boat operator.

Occasionally, after refueling, an engine which had operated properly before may not start, miss, run rough or repeatedly lose power and stall. This could mean that the engine compartment contains so much gasoline vapor that combustion will not occur within the engine itself.

Vapors from a cupful of gasoline contain the same explosive force as a stick of dynamite. These vapors are heavier than air and will not rise from low pockets in the bilge of a boat unless forced out.

Check fuel connections for the leakage. Shaking of the boat by the engine or rough weather can often loosen connections.

Any gasoline taken aboard must be in a safety-approved tank and stored away from the engine where there is a good supply of fresh air.

Never fill a tank to the brim. Leave some room in tanks for gasoline to expand. After fueling, put the fill cap on as tightly as possible. Use a rag to wipe up any spilled gasoline immediately, and properly dispose of it on shore. *Don't ever throw it into the boat or water!*

After you have finished wiping up spilled gasoline, open all doors, hatches and windows. Force the air to circulate for five minutes. Check again for leaks. No fan can remove liquid gas or gas vapors that will result from a broken line or loose fitting.

Your nose is the best gas detector. Open gas and engine compartment enclosures and sniff. Remember explosion and fire is one of a boater's greatest dangers. When you have followed these procedures and are positive all vapor is gone, the engine can be started—but no sooner.

Fuel Conservation

To conserve fuel, some other tips are in order:

- The outboard or lower unit should be set at the proper tilt angle for the most efficient cruising or trolling.
- Plan cruises so you can "buddy-up" if possible, but remember not to overload.
- Outboard motors are controlled by internal temperature for instant warmup, so it isn't necessary to idle the engine for long periods before operating.
- Plan your trip so you operate on a straight course as much as possible.
- Get your boat up on plane quickly. Once there, throttle back until you are going as slow as possible while still planing. Operate your boat at

maximum speed only when necessary.

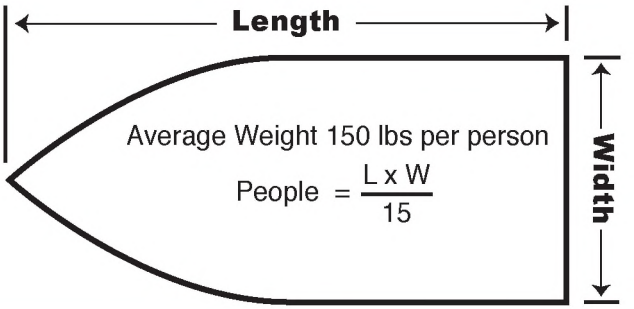
- Keep the hull clean. Obstructions and growth on the hull can reduce performance by 50 percent.

Watercraft Loading and Boarding

Safe Loading

Each watercraft can safely support a specific amount of weight. When a load exceeds a boat's safe capacity, the craft will become unstable, handle poorly and become extremely dangerous for its passengers.

Passenger Capacity Formula



If your boat does not have a capacity plate, use the formula above to estimate the number of persons you can safely carry in good weather conditions.

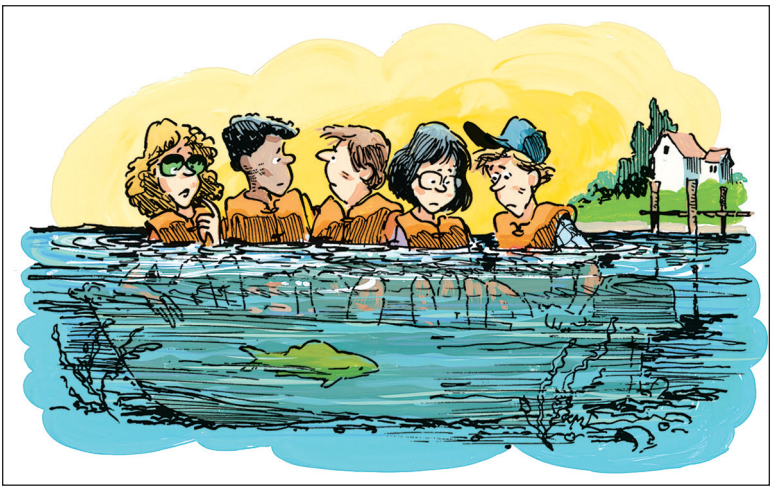
If you have a personal watercraft or other boat without a capacity plate, check the owner's manual or call the manufacturer for capacity information.

The boat's operator must limit the total horsepower, weight AND maximum number of passengers to that shown on the capacity plate installed by the boat's manufacturer. It is unlawful and dangerous to load or power your boat beyond its maximum capacity.

On most watercraft, the capacity plate will indicate the maximum weight in pounds. An example of a capacity plate can be seen on page 34.

"Does that mean I should actually add the weight of my passengers plus the motor and other gear before starting the engine?" *The answer is yes.* As your load increases, the *freeboard* (distance from the edge of the craft to the water's surface) decreases. Too little freeboard will result in flooding or taking in water during boat operation in rough water. It will greatly increase the possibility of the boat capsizing or swamping.

You can increase boat stability by spreading the weight of passengers



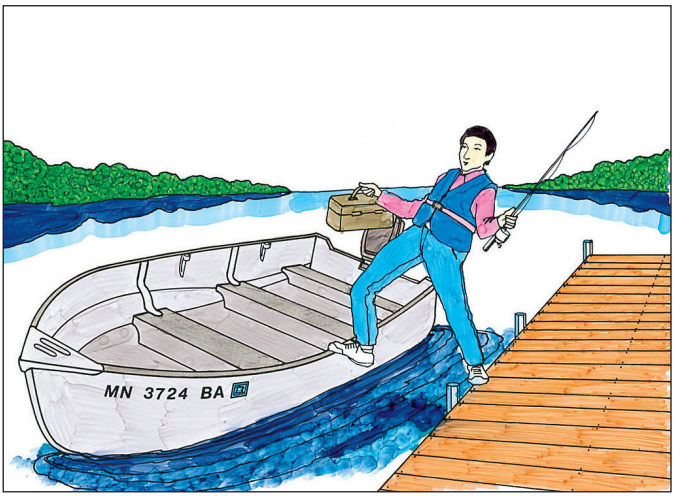
Never load your boat beyond its rated capacity.

and gear evenly throughout. Weight should also be kept low and as near the centerline as possible. Here are other ways to maintain boat stability:

- A person standing in a small craft can drastically change the boat's center of gravity. The result is a watercraft that could easily *capsize*.
- Persons changing position or moving about in a watercraft often move from a safe position along the centerline to a position along the edge. Watercraft (particularly small craft) are not designed for uneven weight distribution and will quickly turn over (capsize), spilling gear and occupants into the water.
- Before you leave the dock, make sure your boat is free of water. Water is easily noticed in small craft, but in larger boats it may be hidden by false floors or decking. Water weighs about one pound per pint. Loose water will shift as the boat turns causing the craft to lose its freeboard and stability.

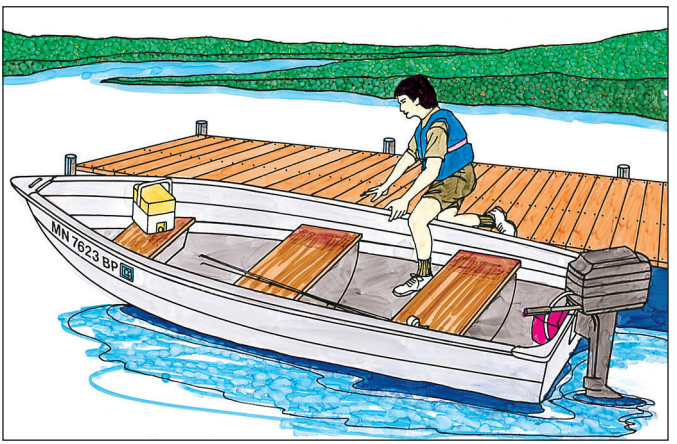
To avoid a capsizing or fall overboard accident, follow these simple tips:

- Avoid standing and sudden moves.
- Stay low and maintain three points of contact with the boat.
- Avoid overloading your boat.
- Balance the load in your boat, bow to stern and side to side. Move down the boat's centerline if possible.
- Avoid going out on rough water.



Wrong!

Never step on the edge of a small boat or board while carrying objects.



Right!

Step into a small boat as close to center as possible while holding onto the gunwales.

Boarding

Boarding is a common sense activity. From a dock or low pier, step aboard as close to the boat's center and bottom as possible. Keep low and steady yourself by holding onto the gunwales (top edge of the boat).

Never jump into a boat. The craft may roll or skid away and your equipment may get a dunking along with you. If you have someone with you, have them steady the boat from the dock while you board. Once in, steady the boat for others.

Never carry objects in your hands while boarding. Load them from the

Pre-departure Checklist

- Check weather forecast for boating area.
- Leave a float plan (see page 67) with someone who will know when (or if) you return.
- Run blower system before starting an inboard engine.
- Check that all safety equipment is on board and in good condition.
- Inform all your passengers about: the location of life jackets, fire extinguishers, visual distress signals, first-aid kit, how to anchor, marine radio operation, storm and rough water procedures, emergency boat operation and what to do if someone (like you!) falls overboard.

pier or board first and then have them passed to you. Free hands free your mind for safe boating.

If your boat is moored bow first into a slip or even beached, step aboard over the bow. This helps to keep the boat stable. Again, crouch low and use your hands to steady yourself. Any moving about should be done close to the centerline.

Boat Handling

Before heading out to open water, know how your boat maneuvers. Unlike an automobile, a boat turns by the rear (stern), not by the front (bow). You turn a motorboat by pushing the stern in the opposite direction of the turn. Outboards and stern drive units are much like a car, they respond almost instantly because the propeller and rudder turn as a unit.

As you turn, your bow makes a small circle while the stern swings out widely. Keep this "stern swing" in mind when in tight quarters such as alongside a pier. Either push off from the pier or run at a slight angle away from it until you have enough room to maneuver freely.

How fast can a watercraft stop? Does it take a longer or shorter distance than a car traveling at the same speed?

Every operator should know their boat's stopping distance at various speeds after the throttle has been closed. Boats do not have brakes such as an automobile. The only way to slow a boat quickly is to shift it into reverse. However, this should be done *only at slow speeds*.

A feeling for a craft's behavior can be developed by doing several turns at various speeds. A smart skipper never makes a tight, sudden, high-speed

turn. You could flip the craft or passengers may be thrown overboard. Many capsizing accidents are caused by sharp turns at high speed.

Reverse maneuvers should always be at low speed to keep water from washing over the stern. Be sure the reverse lock on the motor is engaged before shifting into reverse. To prevent damage to the motor, care must be taken to keep the lower unit from hitting the lake bottom or any other object. Remember the motor (on outboards) and the lower unit (on stern drives) cannot tilt while being operated in reverse.

Grounding

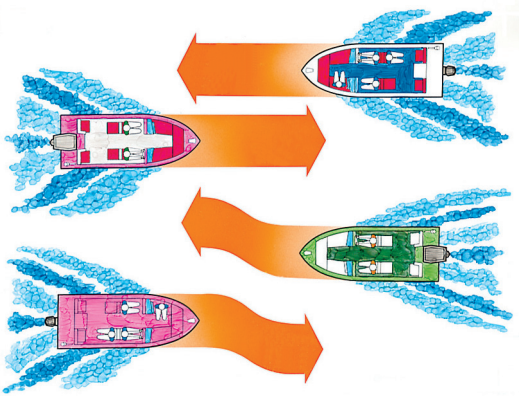
Running aground can be a problem for any boater. Hidden sandbars, rocks and shallows lie in wait for those who haven't checked out depth maps of the lake and asked local residents if there are any hazards to watch out for. Rising and falling water levels can make a sandbar that was no problem before, a trap for the unwary.

If you do run aground, there are several steps you can take to free your boat. First, as soon as you feel that you are aground, shut off the engine. Your natural instinct may be to gun the motor into reverse and try to power your way off the obstruction, but that may damage your boat or suck mud into the engine cooling system. Then, have all on board put on life jackets (if you aren't wearing them already) and check for any holes or leaks and plug them with towels or whatever you have handy. If there is damage or water coming in, stay put and call for assistance instead of getting back into deep water and sinking.

Next, raise the outboard motor or lower unit of an inboard-outdrive engine and shift weight in the boat away from the point of impact. Try to push off with an oar or a boat hook. If you are in a larger boat, you may have to be towed off by another boat or use a kedge. Kedging involves placing your anchor some distance from the boat and pulling on the anchor line from the grounded craft to free it up.

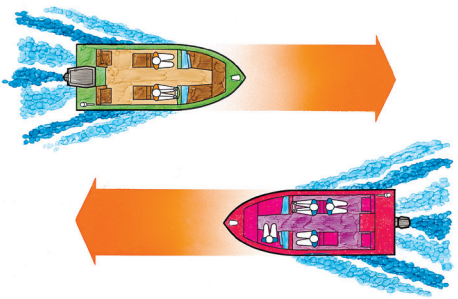
Rules of the Road

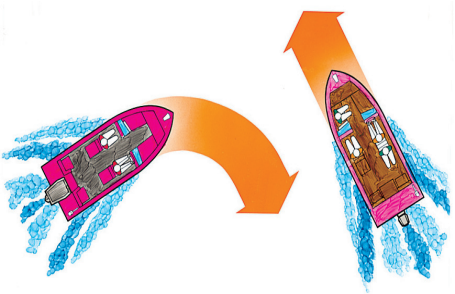
There are traffic rules afloat, as well as on our highways. Common sense tells us we should know what to do when passing, meeting and/or crossing the path of another craft. These rules are simple and they provide uniform patterns of passing and direction that otherwise would not exist. "Right-of-way" is a term often used in automobile driving rules. "Right-of-way" also appears in Minnesota Boat and Water Safety rules. However, by using the term we can be misled into thinking we have the ultimate right-of-way over all other boaters in every situation. Instead, we will use two new terms you need to learn: *stand-on* and *give-way*.



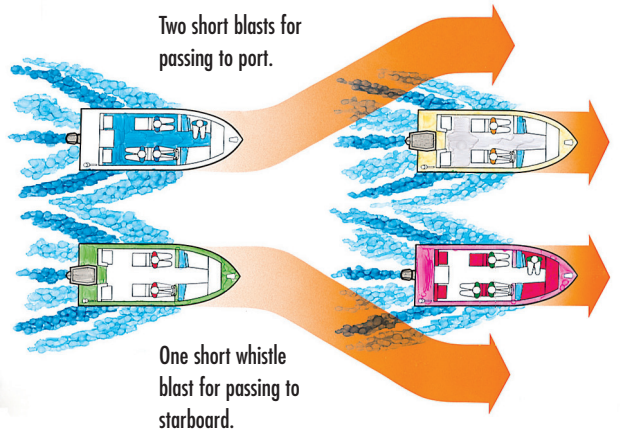
Port to Port or Head to Head
Each watercraft must pass on the port side of the other when meeting port to port, or head to head.

Starboard to Starboard
When courses of two boats are so far on the starboard or right of each other as not to be considered a head to head meeting, they may pass on the starboard side of each other.



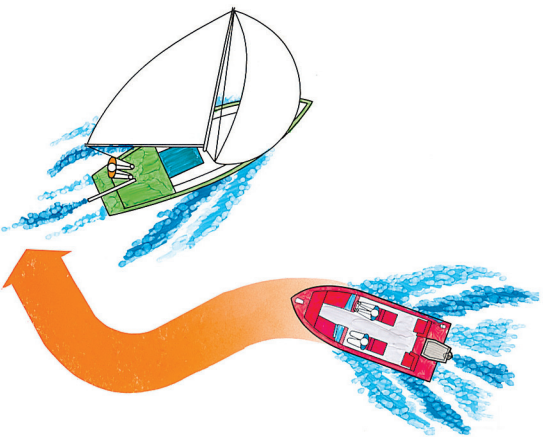


Crossing
When two boats approach each other at right angles, the boat on the starboard (right) is the stand-on boat and must hold course and speed while the give-way boat must keep clear and pass behind the stand-on boat.



Overtaking

In an overtaking situation, the boat being overtaken is the stand-on boat and must hold course and speed. To overtake and pass, signal well in advance by one short whistle blast for passing to starboard, two short blasts for passing to port. A boat should not pass until it receives a similar signal in answer from the boat being overtaken.



Non-Motorized Boats

Except when passing, sailboats and non-motorized craft are the stand-on boat and motorized watercraft must give way to them. Steer clear of them, and remember that your wake can cause them trouble.

The watercraft which under normal circumstances has to maintain course and speed is called the *stand-on* boat; the boat which must stay out of the other's way and take early and substantial action to do so by changing course and speed is called the *give-way* boat.

Learn and abide by the rules of the road in order to avoid accidents. The following explanations and illustrations apply to boats on inland waters. Rules on different waterways are generally similar. However, the boater should obtain and study those applying to his or her specific lake or river.

Keep your distance from large commercial vessels. Remember, you can maneuver more easily and quickly than they can.

Regarding Federal NAVRULES

Some waterways in Minnesota are under joint jurisdiction of both the State of Minnesota and the U.S. Coast Guard. In these cases, federal Inland Navigation Rules may apply. These rules were written to prevent

Whistle Signals - (International/Inland)

Short blast — 1 second each

1 blast - I am turning to starboard (right) or, I will pass you on my port side.

2 blasts - I am turning to port (left) or, I will pass you on my starboard side.

3 blasts - I am in reverse.

5 or more blasts - Danger!

Long blast — 4 - 6 seconds each

1 blast every two minutes when visibility is restricted.

Boat Smart

The following provisions, though not *rules of the road*, will aid in developing orderly and safe boating patterns:

- On open waters, operate your watercraft in a counterclockwise direction if possible.
- Operate your watercraft at a "slow-no wake" speed when you are close to swimming areas, docks, rafts, moored watercraft, and fishing boats or when signs or buoys direct you to do so. Slow-no wake means that you should be operating at the slowest possible speed to maintain steerage, but not greater than 5 miles per hour.
- Do not enter prohibited areas which are lawfully marked by buoys or signs.
- Keep to the right in narrow channels and operate at slow-no wake speed.
- At night, running lights (see page 21) indicate which boat is the stand-on boat and which is the give-way boat. The green light is on the starboard (right) side and a red light is on the port (left) side of the craft. If the red and white lights are the only ones visible, then that boat is the stand-on boat and you must give way to them.
- Be a courteous boater. Each boater has to take responsibility for his or her own actions and use common sense while boating. There is plenty of room for everyone to enjoy the water as long as each of us treats other boaters, shoreline residents and other water recreation enthusiasts as we would like to be treated ourselves. Our main message is: don't be a pain in the boat!
- You should not operate your boat at greater than a safe speed appropriate to the circumstances and visibility on the water.
- Find out about any local hazards in the lake or river you intend to boat.
- Though you may feel you have the right-of-way, always use common sense! Each boater has a legal responsibility to take adequate measures to avoid a collision. Just because you're in the right, don't make yourself *dead* right.

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collisions - not give right-of-way. No matter who seems to have the "right-of-way," under the Inland Navigation Rules, the responsibility to avoid a collision rests with both operators. If you intend on operating in waters that may be under joint jurisdiction, such as Lake Superior, the Mississippi (plus the lakes it flows through), Minnesota & Lower St. Croix Rivers, or border waters, please consult the U.S. Coast Guard's *Navigation Rules: International-Inland*. Larger marine dealers often carry this publication or you can order a copy from the U.S. Government Printing Office. Boats 12 meters (39.37 ft.) or longer are required to carry a copy of this publication when operating on joint-jurisdictional waters.

Besides being dangerous, operation of a motorboat while intoxicated is illegal and carries heavy fines and penalties.

Alcohol and Drugs

Alcohol and drugs are involved in approximately a third of all the boating fatalities that occur in Minnesota and the nation. This includes not only the spectacular collisions, but the lone angler who drowns after falling out of a boat on a peaceful northern lake.

The consumption of alcohol and use of drugs and boating have often been associated with one another. Within the last several years, however, it's been shown that alcohol and drugs have the same undesirable effects on the boater as it does for the driver on the highway, plus a few more. Here is a summary:

- *Balance* - Most people who die in boating accidents fall out of a craft which may or may not have capsized in the process. Balance is one of the first things affected by alcohol—even one can of beer. You may not notice this decrease, but your body will, and a small boat is not the most stable platform to debate the point.
- *Coordination* - As the alcohol level in your body increases, your ability to coordinate diminishes. An intoxicated boater will have extreme difficulty in trying to swim or reach a lifesaving device, despite his or her sober abilities.
- *Vision* - Vision is also affected by alcohol. A couple of beers and the average person reduces the eye fixations of his or her surroundings by as much as half those of their sober state. Add the "tunnel vision" effect induced by boat vibrations, a reduction in glare recovery time

and loss of some color vision, induced by alcohol and you have effectively put blinders on the boat operator.

- *Judgment and Risk Taking* - The average person will lose his or her ability to reason after a couple of drinks, causing them to take unnecessary chances. To put it simply; booze makes you stupid.
- *Reaction Time* - Physical reactions are slowed by alcohol. This creates a dangerous delay when the operator has to react quickly.
- *Stressors* - Even without drinking, several hours exposure to the sun, wind, glare, noise and vibration found in the boating environment can produce a kind of boaters' hypnosis which can slow reaction time almost as much as if you were intoxicated. Adding alcohol to these stressors intensifies their effects to a perilous level.

With a little common sense, boating is one of the safest and most enjoyable pastimes in our way of life. It's up to you, however, to apply that common sense to your consumption of alcohol when you engage in these activities. Give yourself a break and think before you drink.

Keep an eye on the weather.

The Weather

Weather is a major concern of boaters. No boater should start out in a storm. Weather can change suddenly and some of the worst storms seem to strike when least expected. There are a number of good sources of weather information. Before you set out, check local television and radio stations, read the forecast in the newspaper or call the nearest National Weather Service office.

A portable radio tuned to a local station or a weather radio are also valuable sources of weather information. Most stations broadcast routine weather forecasts and in addition, notify listeners of serious, unexpected storms. In addition, an AM radio will also emit static whenever a thunderstorm is in the vicinity.

Above all, be alert to weather you can see. There are no hard and fast rules regarding weather, but there are signs that do indicate changes:

- A buildup of dark clouds is often the first sign of an approaching thunderstorm.
- Check a barometer. A rising barometer indicates fair weather and a rise in wind velocity; a falling barometer indicates stormy or rainy weather.
- Bad weather changes in Minnesota usually come from a westerly direction.
- Watch for wind shifts.
- Watch for distant lightning in addition to the rough water that comes with most storms. Remember, your boat will be the tallest point in the immediate area and could be hit. Sailboats with metal or wooden masts are even more vulnerable to lightning strikes.

If any unusually severe storm hits and you are unable to reach shore, some emergency procedures to remember are:

1. First, put on your life jacket.
2. Head for shore if possible.
3. Head into the waves at an angle.
4. Reduce your speed, but keep just enough power to maintain headway.
5. Seat your passengers in the bottom of the boat, have them put on their life jackets, and stay as close to the centerline as possible.
6. Keep bilges free from water.
7. If motor fails, trail a sea anchor on the line from the bow to keep the boat headed into the waves. A bucket or shirt with neck and sleeves knotted together will do the job in an emergency.
8. Drop anchor and ride out the storm if all else fails.

If your boat starts to sink:

- Find out where the leak is coming from and attempt to plug it with anything that's handy. If you can't plug it, start to pump or bail out water.
- If you have an inboard or stern drive engine, let the engine help bail

the boat by disconnecting the water intake hose from the inlet valve and holding it below the water level in the boat. Don't forget to close the inlet valve.

- Signal for help by blowing your horn, waving a flag or any other way to attract attention.
- Stay with your boat if it stays afloat, even if it capsizes.

Operator Float Plan

If you are planning on an extended cruise or even a weekend fishing or boating trip, you should leave a float plan with a responsible person who can notify the county sheriff or U.S. Coast Guard (Great Lakes only), in case you don't return as scheduled. On page 67 is a sample of the minimum you should put on a float plan.

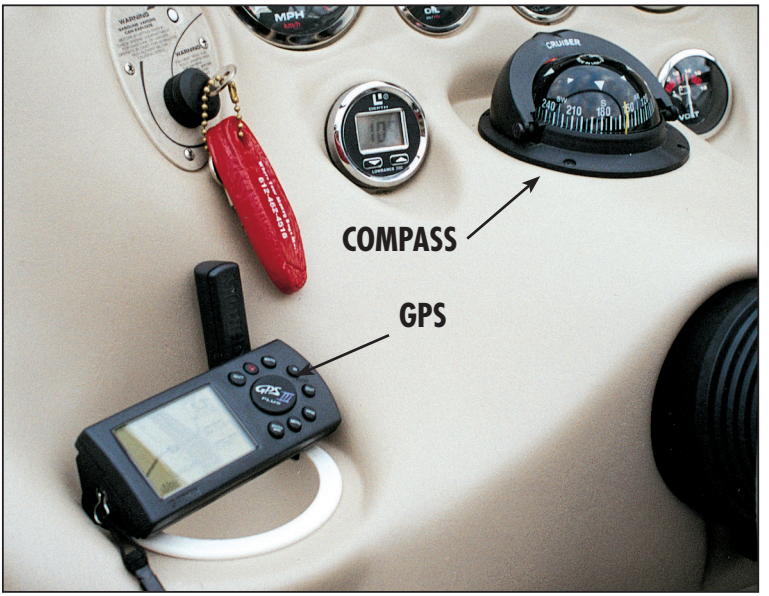
A nautical map is called a chart, and is a must for boaters who venture onto large and unfamiliar bodies of water.

Navigation

Charts, Compasses and GPS

Minnesota boaters seldom use navigational skills as complicated as those used on ocean-going vessels, but a good *compass* in addition to *charts* or maps are always handy to have. This is especially true for extended cruises on larger bodies of water such as Lake Superior or Lake of the Woods.

A boater will be glad when he or she has a compass on board when fog, darkness or a change of weather sets in. Make sure the compass is mounted away from iron, magnets, or electrical wiring and equipment. Hand



GPS units are popular because of their ease of use, small size and low cost. However, since batteries and electronics can and do fail, the smart boater also keeps a chart and compass handy when boating in unfamiliar waters.

compasses are usually unreliable on a boat and are easily lost.

Gain experience in steering by compass in good weather before you rely on it during darkness and fog. Then you can have confidence in your compass (and yourself) and enjoy your new boating skill.

Relatively new on the boating scene is the GPS or Global Positioning System. Popular because of their ease of use, small size and low cost, the GPS makes a great supplement to a compass and chart. By taking a series of fixes on the signals from a constellation of satellites operated by the U.S. government, the GPS can fix your position within 150 feet or so. But beware! Failed batteries can turn your GPS into just so much useless plastic so be sure to have a good chart and compass along and know how to use them.

Charts and maps are available from several sources. Charts of navigable federal waters (such as the Mississippi River and Lake of the Woods) may be obtained from the U.S. Army Corps of Engineers and the National Oceanic and Atmospheric Administration (NOAA). Survey maps of many Minnesota lakes are available from the Minnesota Bookstore or on the DNR web page: mndnr.gov. Further explanation and addresses can be found in the appendix of this book.

Recreational craft on the Mississippi River will encounter locks such as this one near Hastings.

These charts contain information on channels, sand bars, rocks and vegetation. Water depths pinpointed on these maps are of great value whether pleasure boating or fishing. This information can also make you a safer boater.

Aids to Navigation (ATON)

Navigational aids are signposts to guide the boater safely through our waterways. Depending where you are in the U.S., there are several differing systems of aids to navigation, sometimes called ATONs. (See Minnesota Waterway Markers page 53.)

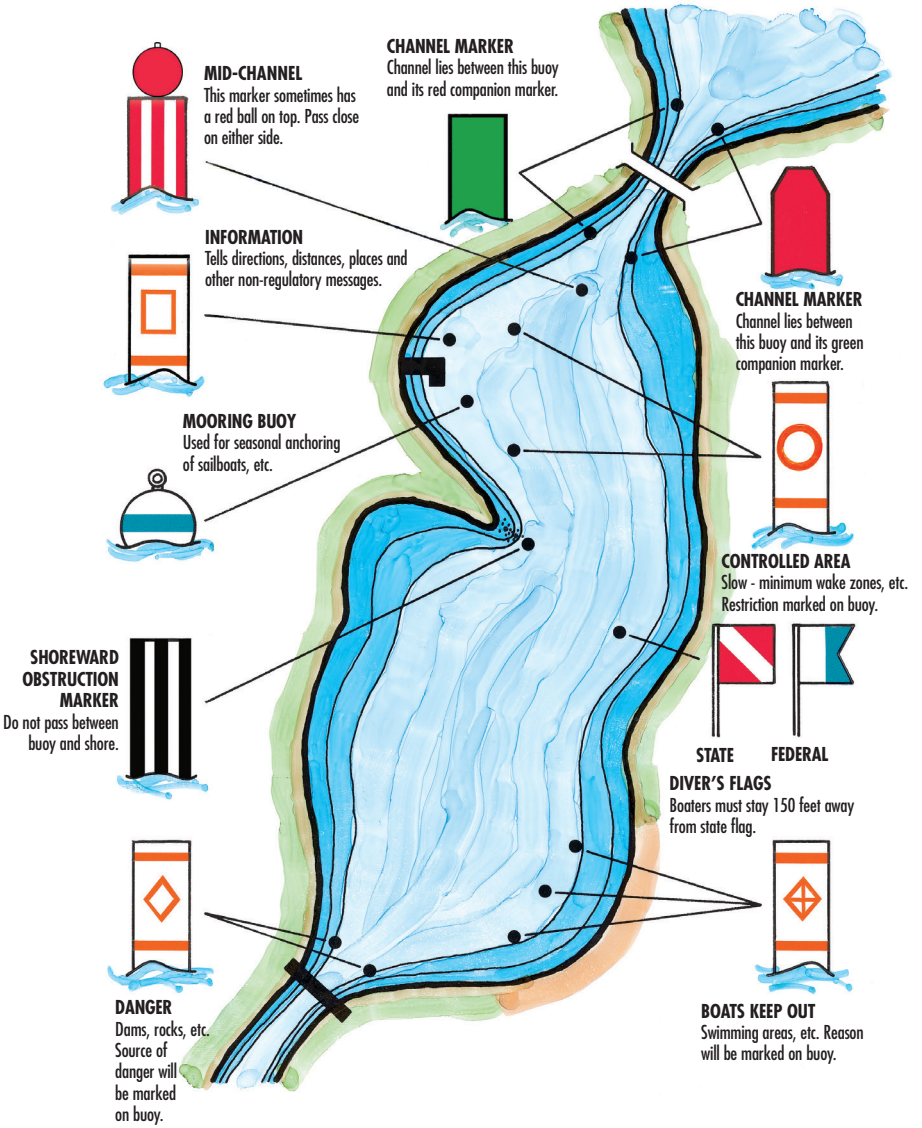
Remember the three R's in boating—*Red-Right-Returning*. This means: keep the *Red* buoys to your *Right* (starboard) when *Returning* to port or moving upstream. Red buoys have a crayon tip-shaped top and are called "nun buoys." Green buoys have a flat top and are called "can buoys." If numbered (not all are), nun buoys have an even number and can buoys have an odd number.

Changes

Due to a change in the US Aids to Navigation system, Minnesota's rules have also changed on striped navigation buoys. (See Page 53, or the latest copy of the *Minnesota Boating Guide* for illustrations):

- A black and white striped buoy means don't pass between this buoy and shore - usually this is due to shallow water or an obstruction.
- A red and white striped buoy (sometimes with a red ball at the top) is used to mark the center or midpoint of a channel - you should pass close on either side of the buoy.

Minnesota Waterway Markers



River Navigation

Dams on our riverways aid navigation, produce power, and prevent flooding. All craft should stay clear of dams. Dangerous *currents* above the structure can draw boats into water going over or through a dam. Areas below a dam are extremely hazardous to boats because of strong recirculating currents and turbulent waters.

To bypass Corps of Engineers' dams on the Mississippi River from Minneapolis downstream, it is necessary to go through a lock chamber. When approaching a lock, wait for the lockmaster's signal before entering. A flashing red light means stay clear. Approach slowly on the flashing yellow, and enter on the flashing green light. Always wear your life jacket when in a locking area, make sure your boat fenders are in place, and shut off your motor. Follow the lock attendant's instruction on securing your craft.

Pleasure craft usually have a low priority during periods of heavy commercial traffic. It may be necessary to wait for other traffic to lock through during these situations.

Usually, commercial traffic consists of a number of large barges secured together and pushed by a towboat. Tows of 10 barges are not uncommon. All craft should remain clear of them. These tows are difficult to maneuver or stop. Anyone caught in front of them is inviting danger. Strong suction currents alongside the barges are hazardous as is the large wake which extends out behind the towboat.

Docking and Mooring

Docking is like parking a car—you can improve on your skills with some practice. Put out anchored floats and practice docking from all sides. Learn how wind and current affect the docking of your boat.

Move slowly

Have your boat fenders in place and lines ready. Come into the dock at an angle so the bow points in. Learn to use forward, neutral and reverse gears. A good boater does not bump any part of the craft. Instead, they ease the boat to the landing carefully. Ramming a pier or dock can damage both the craft and the structure.

When close enough, toss your lines to a person on the pier. If help is not available, pull your boat into the pier using a boat hook or your hand, and step ashore with your bow line. (Never try to stop a moving boat with your arm or hand.)

Tying your boat to a dock is best done by using mooring lines or ropes. Mooring lines are an important part of your boating equipment. Keep lines

Give tow boats plenty of room because they require one-half mile or more to stop, they have a blind area directly ahead of their barges and have the right-of-way over recreational boats.

dry, coiled and free of kinks and they will last many years. Kinks put lines under strain and fibers are weakened causing them to wear faster. Nylon rope is strong and can stretch quite a bit without damage to the fibers. These qualities make it good for mooring and anchor lines. Polypropylene is commonly found in water ski tow ropes and its primary advantage is that it floats, thereby helping to keep it out of your boat's propeller. It also is inexpensive compared to other synthetic materials. The disadvantages of "poly" line is that it is weaker than nylon, it tends to be slippery, making it hard to tie a knot that will hold and it weakens when it is exposed to sunlight.

Learn how to tie a few firm knots, and then practice until you have mastered each. If you practice tying a knot successfully 10 times in a row, you will usually remember it. When both bow and stern lines are fastened, cut the motor. Make sure lines have enough leeway to allow for changes in water level and wave action.

Anchoring

At some point, you may wish to anchor your boat, whether to fish, swim or to keep your boat (and you and your passengers) from going over a dam after an engine failure. The type of anchor you select will depend on the size of your craft and the waters you'll cruise. If you are going to be fishing on a calm lake with a mud bottom in a 14 foot boat, a cement-filled coffee can for an anchor and line that is a few feet longer than the depth of the water might be sufficient. However, for boats that are going to be

When leaving a dock, follow these procedures:

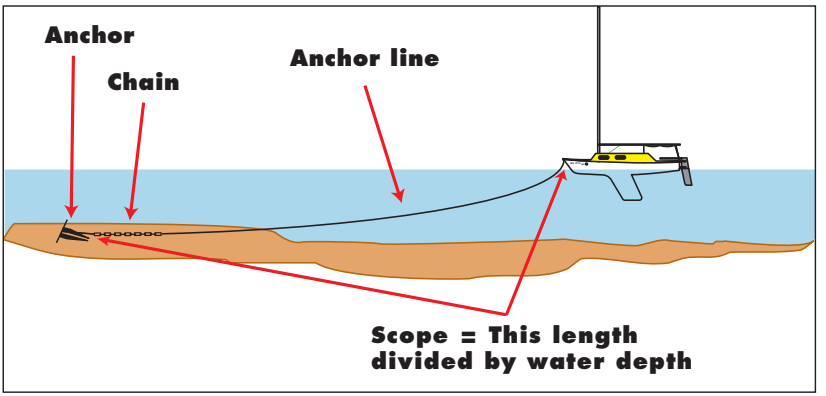
If the boat is being pushed into the dock by the wind:

- Cast off stern line, keeping bow secured.
- Turn the motor or rudder to carry the stern away from the pier.
- Shift into forward and go slowly ahead of bow mooring.
- After stern swings from the pier, shift to reverse to gain slack in the bow line and cast off, free and clear.
- Shift to forward. Angle away from the dock and watch your wake.

When the wind is blowing the boat away from the dock, do the following:

- Cast off lines.
- Use an oar or paddle and push to keep boat clear of dock.
- Let wind or currents carry the boat out.
- Shift the motor to forward, angle away from the dock, and watch your wake.

Once underway, pull in fenders. Be sure all lines are in the boat and coiled. Go slowly until safely away from docks, floats and swimmers. *Remember the Rules of the Road.*



For the strongest hold, the scope of the anchor line should be at least 6 to 1. In other words, the length of the anchor rode should be at least six times the depth of the water.

anchored overnight, or in strong winds or for long periods you need a commercially made anchor designed for the size of boat you are operating.

There are several types of anchors on the market. Some, like the mushroom anchor (called that because of its shape) just sit on the bottom and hold the boat by virtue of its weight. Others, like the Danforth (its inventor's name) dig into the bottom for a more firm hold.

The anchor line and chain is also called the rode. The ground tackle usually consists of the anchor, fastened to a short length of chain that is fastened to the line that is attached to the boat. The chain, besides protecting the anchor line from chafing or cutting on sharp rocks and getting mucky on mud bottoms, also lowers the angle of pull on the rode and increases the anchor's hold, because the chain lies on the bottom.

Be sure the anchor line is strong enough and long enough to anchor your boat. Nylon is a good choice due to its inherent strength and high elasticity (ability to stretch without breaking and then return to its original length). Polypropylene (like water ski rope) isn't a good choice for anchoring due to its relatively low strength, poor elasticity and short life.

The ratio of the length of the anchor line from where it is fastened to the boat to the depth of the water is sometimes called the "scope" of the line.

The *scope* should be at least six times as long as the maximum depth over which you will anchor. At twelve times, the anchor's holding power will double, and at three times you will give up a significant amount of holding power and may experience problems setting the anchor. Strong winds or rough water may require a line twice as long. Some boaters mark their anchor line at 5 to 10 foot intervals to help determine water depths. Be sure to check the knots on your anchor line several times each boating season since they must hold fast at all times. When possible, use *splices*; knots weaken a line by about 30 percent.

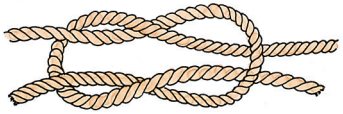
Never throw or heave the anchor into the water. Before lowering your anchor, check to see if the line is coiled and will feed out smoothly. Be sure your feet and gear are out of the way; then, lower it slowly and evenly from the bow.

Coil the line as you raise the anchor and place it in the boat carefully. Dropping the anchor on the *deck* or bottom of the boat can cause damage. Be sure to allow the anchor line to dry before storing. Your anchor and your boat will last much longer if you follow these suggestions.

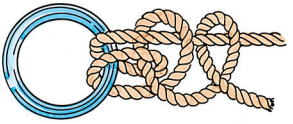
Never run at any speed while dragging an anchor and never anchor from the stern of your boat, especially when anchored in a current.

If your motor conks out in high winds, a sea anchor will keep your bow heading into the waves to help avoid swamping. A sea anchor looks like

Know These Knots



Square Knot



Anchor Bend

Clove Hitch

Cleat

Bowline

a parachute that drags in the water on the end of a line secured from the bow. You can rig an emergency sea anchor from a minnow bucket or even a shirt tied at the corners.

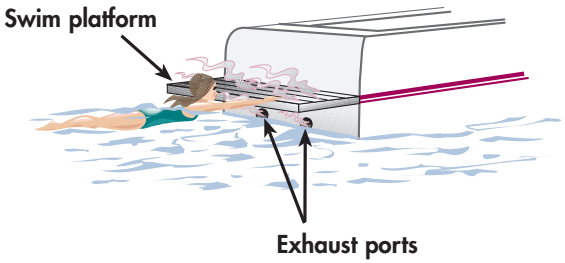
The Silent Killer - Carbon Monoxide

Passengers of nearly any boat with a motor on board can be victims of carbon monoxide poisoning. Carbon monoxide is an odorless, colorless, tasteless gas that can be toxic even in very small quantities.

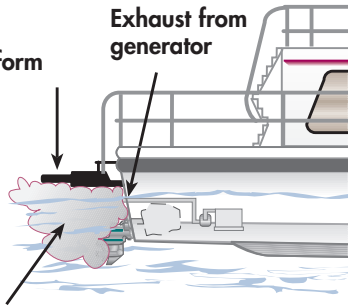
Carbon monoxide's effects are cumulative over time and there have been injuries and deaths caused by the infiltration of this poisonous gas into boats' living and sleeping spaces, and also on the stern deck and swim platform area.

Common signs of carbon monoxide poisoning include irritated eyes, headache, nausea, weakness and dizziness. These symptoms can often be misdiagnosed as seasickness or intoxication.

A newly recognized phenomenon has been discovered where a swimmer died when they ventured too closely to a houseboat's swim platform while engines or generators were running or have been overcome while being towed or dragged too near the stern of a boat. The U.S. Coast Guard has issued the warning that if your boat "has a swim platform and its electrical generator vents through the transom into a stern cavity, do not run your generator when not underway if someone is swimming in the area near the stern or sitting on the stern deck or swim platform."



Teak surfing, dragging and water sking within 20 feet of a moving watercraft can be fatal.



DANGER! Carbon monoxide and propeller hazards under the platform.

To help avoid the dangers of carbon monoxide on your watercraft:

- Keep air flowing throughout the boat whenever any gas or diesel engine, generator or propane appliance is running.
- Stay away from any area where engine or generator exhaust is vented.
- Do not allow anyone to swim near the stern of the boat or sit on the stern deck or swim platform when the generator is running.
- Do not leave your generator running at night, or when anchored, or when people are near the stern of a boat that is not in motion.
- Do not ski, drag, or tube closer than 20 feet from a motorboat. Any

closer, and carbon monoxide can be fatal.

- Install carbon monoxide detectors in the living areas of your boat, test them frequently and never remove the batteries unless you are replacing them with new ones.
- Keep your boat and motor properly maintained including keeping exhaust clamps tight and in place. Also, it's a good idea to replace exhaust hoses if there is cracking or deterioration.
- If your boat is more than a few years old, hasn't been regularly professionally inspected and maintained or the generator or other engine was originally installed by a "backyard mechanic," have it checked by a service technician before you use it!

Transporting Watercraft

Choosing a Trailer

When shopping for your new boat, motor and trailer, make sure that the items you buy are designed for one another. The fit of boat to trailer is very important. The trailer should be about the same length and width as your boat, and it must be rated to handle the total load of boat and equipment. Look for the manufacturer's trailer load capacity. The trailer capacity should exceed the weight of the boat and motor by at least 20 percent.

Be especially careful about wheel and tire size. Larger tires will not bounce in and out of small holes, or sink in soft ground.

Trailer rollers should be adjustable to fit the hull, and tiedowns must be provided to hold down your boat. The winch and its line must be heavy enough to launch your craft and reload without breaking. A power winch (if used) should be capable of hand operation. (NOTE: A tilt-bed trailer will simplify your launching chores.)

The trailer hitch on your car or truck is extremely important. Frame-mounted hitches reduce trailer swing. The trailer must be hooked so that no part of the boat or trailer (except the hitch) can contact your car during a sharp turn.

A well-balanced trailer will not cause the rear end of your car to sag. A trailer is well-balanced when the hitch weight is 7-10 percent of the gross trailer weight and can be handled easily by the average person. Too little tongue weight will cause the trailer to fishtail, too much will cause steering problems.

Trailer Requirements

Minnesota highway laws require safety chains. The safety chains should be installed as shown, with enough slack to allow for maximum turns. Too

much slack and the chains will drag; too little and sharp turns will be hampered (see photo to right).

Hitches should be firmly attached to car frame. Safety chains are crossed so the coupling will not fall to the road if the trailer comes unhitched.

Brakes are required on boat trailers with a load capacity of 3,000 pounds or more. Some boat trailers have two wheels on each side. All wheels on these trailer types must have braking capabilities.

Lighting is also required by Minnesota law. For complete information on taillights, clearance lights, turn signals, brake lights and other trailer requirements, contact your local Minnesota State Patrol office.

Trailer Maintenance

Wheel bearings should be greased at least once a year and more often if the wheels get wet during launching. To check the bearings for wear, pull the trailer a mile or less and then feel the hubs. If there is any sign of heat, the bearings should be greased immediately. With a properly rigged trailer you should be able to unload a boat without backing great distances into the water, unless the launching site is especially shallow.

Tires on your trailer and car should contain the correct amount of air. Low air pressure on one or both sides of the trailer will cause it to rock from side to side. Low pressure in the rear tires of the car could cause the boat to bounce heavily on the trailer frame on rough roads.

Trailer brakes should be examined periodically. Wheels that are evenly adjusted prevent excessive tire wear and allow smooth, even stops. Wildly swaying trailers have caused many serious accidents.

Trailering Tips

- Steer wider on corners and the trailer will clear the curb and other vehicles. Stay on your side of the center line on curves. A little practice backing and turning in any empty parking lot will be of great value once on the road.
- When passing, remember the trailer adds weight to your car, thus, it takes longer to gain speed and more room to safely pass another vehicle. Don't cut-in too soon after passing! Change lanes smoothly to avoid whipping the trailer.
- As a courtesy to others, remove all tie-downs except the bow winch

line at the launch site *before* you back down the ramp.

- Tilt up your outboard motor or stern drive to avoid hitting the bottom during the launch.
- If your boat has a drain plug, be sure it is in place.
- Disconnect the wiring plug between the vehicle and trailer (this will keep the lights on the trailer from blowing when they hit the water).
- Before you launch your boat, tie a line to the bow in addition to the winch line so you will have control after the launch from the trailer.
- As you back down the ramp, don't make the common mistake of backing your trailer too far into the water. It should not be necessary to completely submerge the wheels if your trailer is set up properly. By keeping wheel bearings out of water, you will save on repair bills.
- When you have backed your car or truck and trailer to the proper position, set your emergency brake. Remember, the park mechanism of your transmission is not adequate for positive holding on a slanting launch site. Avoid the embarrassing situation of submerging your car and damaging your boat.
- If you are trailering a sailboat, be extremely careful of overhead electrical wires.
- Use the winch on the trailer to load your boat onto its trailer. Using the engine to load your boat on the trailer is called *power loading*. The main reason you should avoid this is that propeller wash creates a deep hole at the end of the ramp and builds a mound of sediment beyond the hole. This can result in trailer damage, boat groundings and costly repairs to the access.
- After retrieving your boat back onto the trailer, be sure to immediately pull away from the launch ramp to clear the way for the next boater.

Car Top Boat Transportation

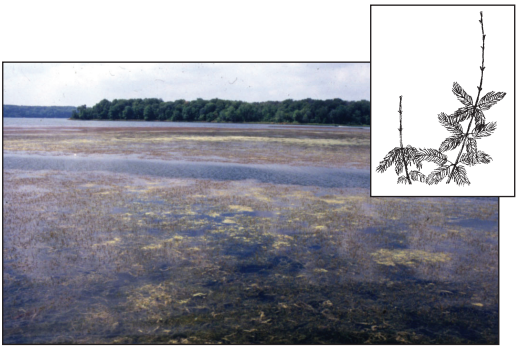
Car top boat carriers have been used effectively by thousands of small boat owners. It should be of good quality and securely attached to your motor vehicle.

Be sure to securely fasten the bow and stern of your boat to your vehicle with good quality rope. The car top straps will prevent side to side movement and the ropes will prevent blow off or forward movement in case of a sudden stop.

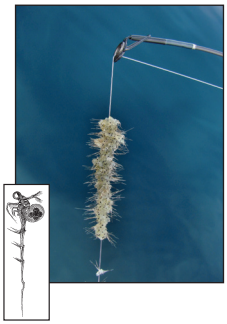
A note of caution...Be careful not to tie ropes to bumpers or stamped metal parts with sharp edges which may cut the rope.

Aquatic Invasive Species

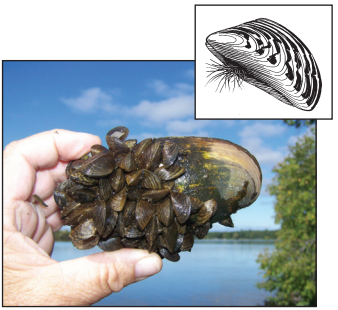
There are several aquatic invasive species (AIS) threatening Minnesota waters. These nonnative species have been introduced to the state from other areas and harm fish populations, water quality, and water recreation including boating, fishing, and swimming. Examples of these invaders are included below.



Eurasian watermilfoil is an aquatic plant that can form thick underwater stands of stems and vast mats at the water's surface in nutrient-rich lakes. In shallow areas the plant can interfere with water recreation such as boating, fishing, and swimming. The plant's floating canopy can also crowd out important native water plants. A single segment of stem and leaves can take root and form a new colony. Fragments clinging to boats and trailers can spread the plant from lake to lake.



Spiny waterfleas eat zooplankton which are an important food for native fishes. The long, barbed tail spine on this invasive can prevent predation by small larval fish as well as other aquatic animals, although large fish consume high numbers of them. When abundant they can be a nuisance if they clog the guides of fishing rods. Waterfleas could be transported to other waters in bilge or bait water, attached to anchor and fishing lines, and in sediment on anchors.



Zebra mussels and a related species, the quagga mussel, can cause problems for boaters, lakeshore residents, and water recreationists. Mussels attach to motors and clog cooling systems. When they attach to rocks, swim rafts, and ladders, shells can cut the feet of swimmers and dogs. Zebra mussels can also attach to and kill native mussels. The mussels filter plankton (tiny plants and animals) from the water which

increases water clarity, causing more aquatic vegetation to grow at deeper depths, and impacting the food chain by reducing food for larval fish.

Mussels attach to boats, docks, and boat lifts, and could be transported on any of these objects. They also attach to aquatic plants, making it critical to remove all vegetation before transporting boats and trailers. Microscopic larvae (veligers) could be carried in water contained in bait buckets, bilges, or any other water moved from an infested lake or river.

Actions to Prevent the Spread of AIS

There are a number of things you can do to avoid spreading aquatic invasive species. Some actions are required by law and others are recommended precautions. They should be regular parts of watercraft use and maintenance.

Required Actions - It's the law!

Clean all visible aquatic plants, zebra mussels, and other prohibited invasive species from your boat, trailer, and other water related equipment before leaving the water access.

Drain water from the boat, ballast tanks, portable bait container and motor, *and* drain bilge, livewell, and baitwell by removing drain plugs before leaving a water access or shoreland property. Keep drain plugs out and water-draining devices open while transporting watercraft.

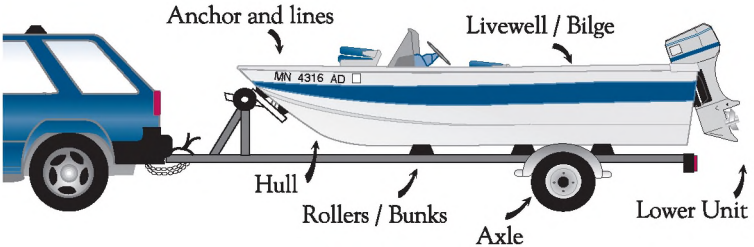
Dispose of unwanted bait, including minnows, leeches, and worms, in the trash. If you want to keep your live bait, you must refill the bait container with bottled or purified tap water.

You may not:

- Transport watercraft without the drain plug removed.
- Arrive at a lake access with drain plug in place.
- Transport aquatic plants, zebra mussels, or other prohibited species whether dead or alive.
- Launch a watercraft with prohibited species attached.
- Transport water from Minnesota lakes or rivers.
- Release live bait into the water.

Recommended Actions to Protect Your Waters.

Spray, Rinse, or Dry boats and recreational equipment to remove or kill species that were not visible, before transporting to another water body, especially after leaving zebra mussel or spiny waterflea infested waters.



Do one or more of the following:

- **Spray** with high-pressure water
- **Rinse** with very hot water*
- **Dry** for at least 5 days

*These water temperatures will kill zebra mussels and some other AIS: 120°F for at least 2 minutes; or 140°F for at least 10 seconds.

More Information

For more information on AIS and current laws, contact the DNR Invasive Species Program, Ecological and Water Resources, at (651) 259-5100 or (888) 646-6367 or visit mndnr.gov/AIS.

Public Water Access

Minnesota has 3,000 public accesses in lakes and rivers. Free maps showing individual accesses are available for most counties.

McQuade public access. 10.5 miles from the Duluth Harbor entry.

When using an access, please keep the launch area clear, park in designated areas only and take your trash with you. Also, remember that camping, shooting, open fires and the consumption of alcoholic beverages are unlawful on an access.

When the public access is busy, the line is formed on land by the vehicles and trailers, not the boats in the water or at the dock.

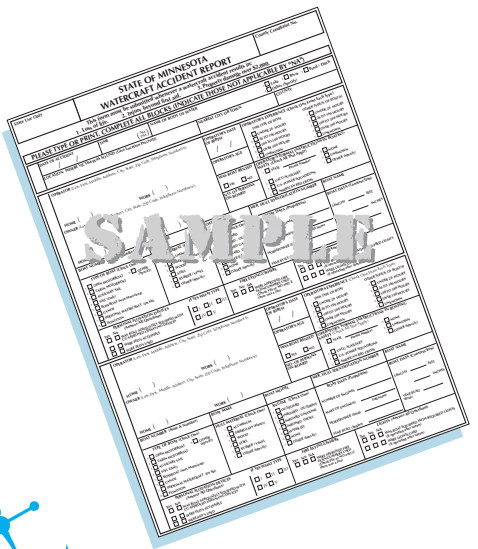
For further information, the DNR contact information is listed at the end of this book.

Watercraft Accident Report

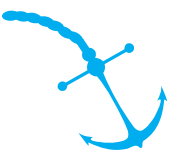
This is an example of the form used by the county sheriff to report boating accidents to the Minnesota Department of Natural Resources.

Remember that any time you have a boating accident, you are required by law to follow these steps:

1. Stop and assist others who are in trouble if you can do so safely - don't risk your life to save equipment.
2. Call help by dialing 911.
3. If a second boat is involved, exchange your name and boat number with the operator of the other boat.
4. Promptly report all boating accidents to the county sheriff when there is property damage of $2,000 or more, or personal injury or a death, or if the boat completely sinks.


STATE OF MINNESOTA
WATERCRAFT ACCIDENT REPORT

SAMPLE



Tear out the float plan and give to someone that will know if you don't return.

OPERATOR FLOAT PLAN

Description of boat

size _____

color _____

make _____

boat's registration number

MN-_____

Names and addresses of all people on board

_____ _____

_____ _____

_____ _____

_____ _____

Trip Plan

When Leaving _____

Where _____

Expect to return by _____

Vehicle parked where _____

Description and license of vehicle _____

_____

Can be contacted by calling *(radio call letters, cell phone, destination)*

_____

_____

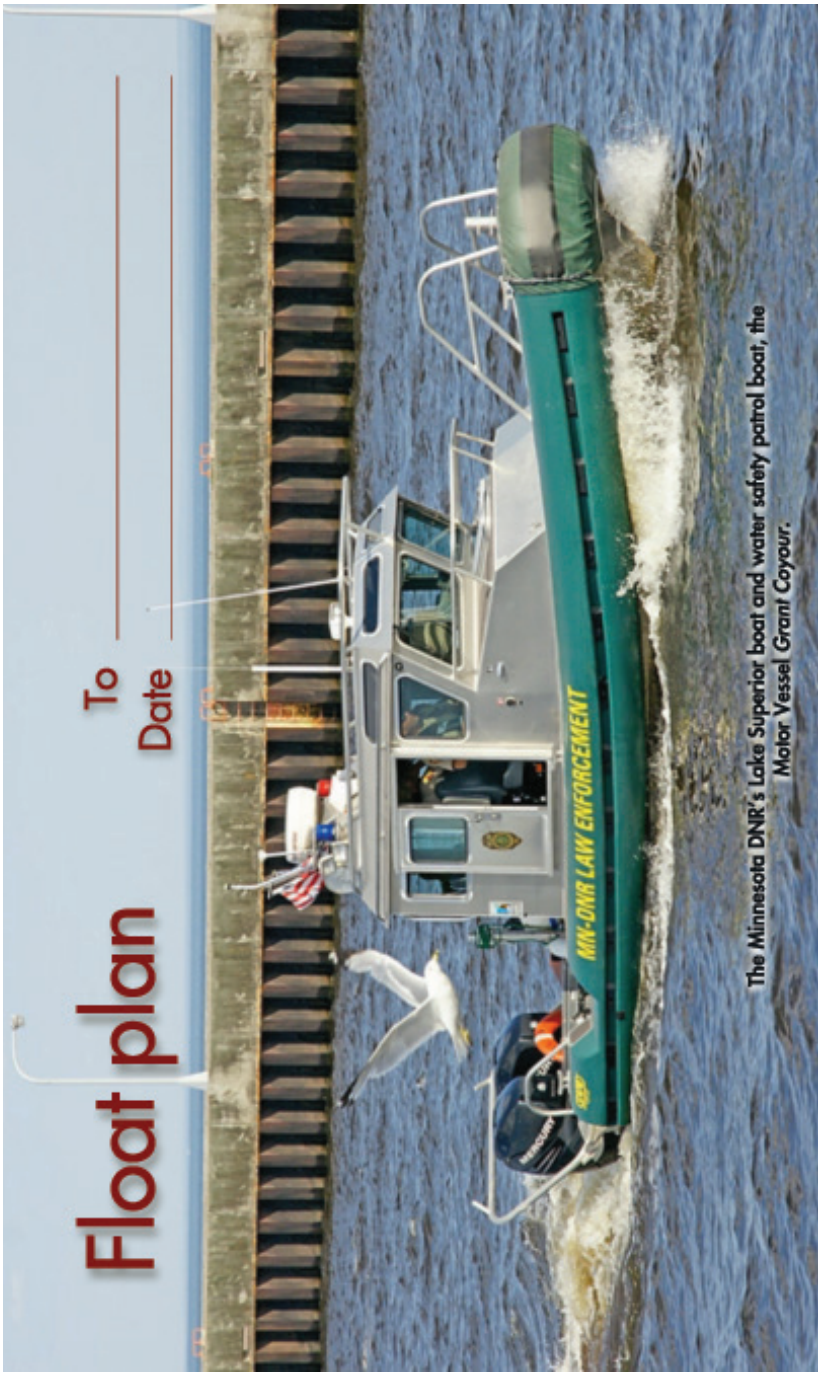
_____

If not returned by (time) _____ Call the following:

❑ _____county sheriff at ( ) _____

❑ U.S. Coast Guard at ( ) _____

Don't forget to cancel your float plan when you get home.



The Minnesota DNR's Lake Superior boat and water safety patrol boat, the Motor Vessel *Grant Coyour*.

4

Personal Watercraft

Sometimes known as Jet Skis, Wave Runners, PWCs, etc., a personal watercraft is defined by law as a motorboat that: 1) is powered by an inboard motor powering a water jet pump or by an outboard or propeller-driven motor; and 2) is designed to be operated by a person or persons sitting, standing, or kneeling on the craft, rather than in the conventional manner of sitting or standing inside a motorboat.

All personal watercraft are considered motorboats and therefore, any regulations that govern other motorboats (such as fishing boats, cabin cruisers, etc.), also govern personal watercraft. In addition, there are also specific laws that apply only to personal watercraft. As with any law, they are subject to change by the Minnesota Legislature, so be sure to check a current copy of the *Minnesota Boating Guide* for the latest update of boating regulations.

Besides the laws that specifically govern the use of their craft, PWC operators must also obey the laws that affect the use of other motorboats.

Personal Watercraft Laws

In summary, the personal watercraft laws require that:

- Personal watercraft are required to have a rules decal (provided at no charge by the DNR) in full view of the operator.
- Anyone operating or riding on a personal watercraft must **wear** a U.S. Coast Guard approved Type I, II, III or V personal flotation device (life jacket).
- You may operate a personal watercraft only between 9:30 a.m. and one hour before sunset.
- You may not travel at greater than a slow-no wake speed, within 150 feet of any shoreline, dock, swimmer, swimming raft, any moored or anchored watercraft, or non-motorized watercraft at any time. *(Slow-no wake is defined as the operation of a watercraft at the slowest possible speed necessary to maintain steering, but in no case greater than five miles per hour.)*
- If you tow a person on water skis, kneeboard, inflatable or any other device, there must be an additional person on board to act as an observer, or there must be factory-installed, or factory-specified accessory wide-angle rearview mirrors. The person being towed must also be wearing a life jacket or there must be one for them on board.
- If the machine is equipped, by the manufacturer, with a lanyard-type engine cutoff switch, it must be attached to the person, life jacket or clothing of the operator when underway to shut off the engine if the operator falls overboard.
- You may not operate a personal watercraft if any part of the spring-loaded throttle system has been removed or tampered with so it interferes with the

A law summary decal provided at no charge by the DNR must be attached to the PWC in full view of the operator while operating the craft.

return-to-idle system.

- You may not chase or harass wildlife.
- You may not travel through emergent or floating vegetation at greater than slow-no wake speed.
- You may not operate a personal watercraft in a manner that unreasonably or unnecessarily endangers life, limb or property.
- You may not weave through congested watercraft traffic, or jump the wake of another watercraft within 150 feet of the other watercraft. This includes other personal watercraft.

Age of Operator Requirements

Under 13 years old

A person under 13 years old may not operate a personal watercraft, regardless of the horsepower, *even if there is an adult on board the craft*.

Age 13

A 13-year old operating a personal watercraft must have a watercraft operator's permit (available from the DNR at the address at the end of this manual). The 13-year old must also be under continuous observation by a person 21 years of age or older.

Age 13-17

Persons 13 through 17 may operate a personal watercraft without a watercraft operator's permit if someone 21 or over accompanies them on board the craft.

To operate a personal watercraft without an adult on board, riders 13 through 17 must have a Watercraft Operator's Permit. Thirteen-year-olds must also be under continuous observation by someone at least 21 years old. Under 13, you may not operate a PWC even with an adult on board.

Age 14-17

Any person at least 14 years of age but less than 18 years of age, may operate a personal watercraft without an adult present, regardless of horsepower, if they have a valid watercraft operator's permit.

It is also unlawful for the owner of the personal watercraft to permit its operation in violation of the age restrictions.

Penalties

Violation of any of the watercraft safety laws is a misdemeanor, and punishable by a fine of up to $1,000 and/or 90 days in jail.

Personal Watercraft Concerns

Over the last decade, personal watercraft have been the most rapidly growing segment of the marine industry. Their numbers have doubled in the last few years in Minnesota and although sales have slowed somewhat, there seems to be no end in sight to their popularity.

Unfortunately, along with the rapid growth in machines has come a rapid growth in accidents and complaints from lakeshore residents, other boaters and water recreation enthusiasts. In 2006, personal watercraft were less than six percent of the boats registered in Minnesota but were involved in 24 percent of the accidents.

Ride With Pride

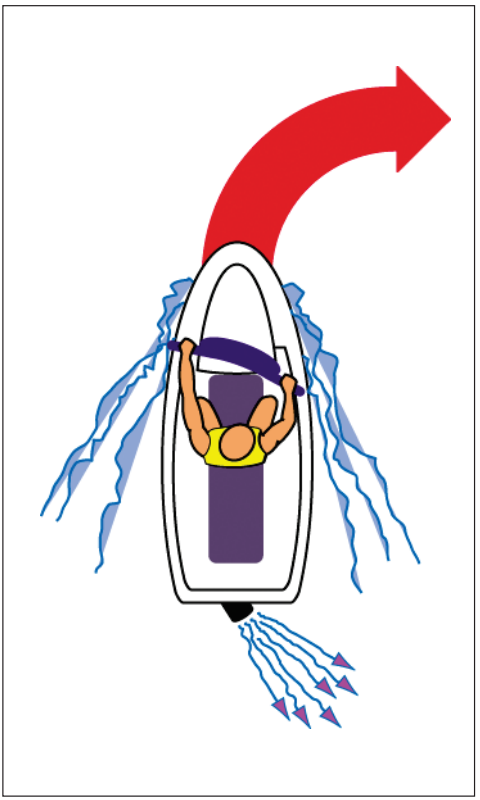
A study recently completed by the National Transportation Safety Board shows that many personal watercraft accidents involve new and inexperienced riders who haven't received adequate training. If you or your family own a personal watercraft or are going to purchase one, be sure to ask the dealer to provide you with any safety information they may have for your craft. All machines are supplied with an owner's manual and many come equipped with a safety video. Be sure everyone who operates the machine (including friends and guests) watches the video and reads the safety information and knows all the special laws that regulate personal watercraft before they are allowed to operate the craft.

Be sure to think twice before loaning out your personal watercraft. Is this a person that you would allow to use your 100 hp fishing boat or your automobile? If the answer is no, offer to take them for a ride, but don't let them operate this high-powered craft capable of speeds of 50 or 60 mph.

Steering

Personal watercraft are unlike most other kinds of boats you've operated, especially when it comes to the way they steer. Most boats have a part of the engine or steering gear that protrudes below the water surface and acts as a rudder to help steer the boat, even if the engine loses power or stops.

On the other hand, personal watercraft turn side to side by directing a jet of water out the rear of the machine by means of a steerable nozzle. The nozzle is steered by moving the handlebars. When you turn the handlebars to the left, the nozzle directs the water jet to the left and the craft turns left. When you turn the handlebars to the right, the nozzle directs the water jet to the right, turning the PWC to the right.



When you turn a PWC's handlebars, the water jetting out the steerable nozzle at the stern of the craft pushes the PWC in the direction you want to turn. You can only turn if the throttle is depressed.

For most PWCs if you pull the cutoff lanyard or release the throttle control so there is no water jetting out the nozzle, you can turn the handlebars as much as you want, but the craft will keep going straight in the direction you were heading before the engine quit.

Some newer brands of PWC have the ability to stop and/or steer even after the throttle has been released. Check the owner's manual to see if your PWC has this feature.

Many accidents occur because the operators forget (or never learned) that a personal watercraft will not turn unless you apply the throttle. There is no rudder, so the only way it will turn is if there is water jetting out the steering nozzle. This seems simple, but it's amazing how easy it can

be to forget when you are hurtling towards some fixed object. A normal reaction might be to cut the power and then turn the handlebars. This is a huge mistake! Remember, *to make a turn, you must keep the throttle depressed* as you move the handlebars.

Saddle up

When you buy a new machine and at the beginning of the boating season, read the owner's manual to familiarize yourself with all the features of your particular make and model of PWC and review all the PWC laws. Have the other people who operate your craft do the same.

Before launching your craft, open your PWC's engine compartment and perform these safety checks:

- *Check the hull* for cracks, leaks or other damage.
- *Do a sniff test* for gasoline odors by opening the engine compartment and do a visual test to be sure that all electrical components and mechanical parts are in working order and all hoses are firmly attached to their fittings. If you find a problem, have your craft repaired at an authorized service provider.
- *Check the pump intake grate* on the bottom of the machine to make sure there are no weeds or other foreign objects stuck inside. When done for the day, remember Minnesota law requires you to remove any weeds or any other exotic plants or animals from your boat and trailer before you leave the public access.
- *Make sure that there is plenty of fuel* and oil and that the fuel reserve switch is in the correct position (see your owner's manual). Follow the "one-third rule" of fueling. Use one-third of the fuel to head out, one-third to return and leave one-third of the fuel in reserve for an added safety margin.
- *Check the steering* and make sure that when the handlebars move, the nozzle turns in the correct manner.
- *Check that the throttle moves freely* and doesn't stick.
- *Start the engine twice*. Turn it off once with the stop switch and once with the cutoff lanyard to make sure both are working correctly. When you are taking a break from riding, always remove the cutoff lanyard and take it with you when you leave the watercraft— even for just a "few minutes." There have been cases where toddlers and very young children having learned to start a PWC by watching a grownup, get on the craft and take off by themselves at high speed; often with tragic results.
- *Check that the drain plugs* are screwed or latched firmly in place and when you re-trailer at the end of the day, be sure to drain any water

that may have accumulated inside your craft. Minnesota state law requires that the drain plug be removed from bilges and live wells and all water draining devices must remain open while transporting on a public road.

- *Your registration card is required* to be on board as well as a fully charged U.S. Coast Guard approved Type B fire extinguisher and all the other safety equipment required by law. It's a good idea to carry along some optional items such as a small tool kit, extra spark plugs, first aid kit and a tow rope in case you or a companion breaks down. Zip other items including sunscreen, maps or charts and some money into a plastic zipper-lock freezer bag.

Launching and Loading

When you are ready to launch your PWC, remove the stern tie-down that holds the boat to your trailer. Do NOT remove the winch line until you have backed the trailer into the water and the stern of the craft is in the water. Either push or have someone back the PWC off the trailer and pull slowly away from the ramp. If you are doing this alone, be sure you have a bow line attached so you can pull your craft back to you.

At the end of the day when you're ready to load the PWC back onto the trailer, simply reverse the process. Only this time, winch the boat onto the trailer, do NOT use power loading to drive on. It's amazing how easy it is to come up a little too fast, hit the winch assembly, and all of a sudden the operator is ejected over the top of the car. Power loading can also cause expensive wash-out damage to boat launch ramps, so just don't do it!

All boaters need to do their part to avoid the further spread of Aquatic Invasive Species. Besides performing the steps listed on page 64 under the heading "Required Actions...It's the law!," personal watercraft operators should also turn on the engine for 5 to 10 seconds after removing the watercraft from the water to expel the water and organisms inside the impeller. You also need to remove the drain plug and leave it out while trailering or transporting your PWC. See the DNR website (mndnr.gov/AIS) for more information about AIS.

Maneuvering

To avoid a collision accident, follow these tips:

1. Stay a safe distance away from other boats, especially other personal watercraft.
2. Know and obey the nautical "rules of the road."
3. Don't make any sudden maneuvers. Personal watercraft are able to make very sudden and sharp turns. Just because it's possible, doesn't mean that it's a smart idea. A sudden maneuver may cause a colli-

sion with another boat whose operator didn't anticipate which way you were going to turn.

4. Look both ways before turning and make gradual turns.
5. Don't forget that you have to apply throttle to turn.

Climb on from the stern when reboarding a PWC in deep water, and the operator should get on before the passengers.

Reboarding

Reboarding a personal watercraft in deep water can be a little tricky if you haven't practiced it a few times. When in deep water, PWCs should be reboarded from the stern and the operator gets on first. Trying to board the craft from either side will probably result in you getting dumped back into the water. If there is another person on the craft, make sure they don't start the engine until you are on board and ready to go. A forceful blast of water from a personal watercraft's jet can be dangerous to eyesight and cause other injuries.

The direction you right an upside down craft (clockwise or counter-clockwise) can be critical. If you turn some types of PWCs in the wrong direction, you may pull water into the engine causing very expensive damage. So read the owner's manual to see which way you need to roll your craft if you flip it over. Some machines also have a sticker at the stern, that illustrates which way to turn it right side up.

Sound Judgment

Personal watercraft noise complaints are one of the most common types of calls received by water safety officials. Although the sound emitted by

personal watercraft is generally less than the legal noise limit for motorboats, the way that some people operate their machines causes a great deal of concern among other people on the lake.

Personal watercraft noise calls are among the most common complaints received by watercraft law enforcement officials each summer. Avoid operating for long periods in the same small area and don't ride your craft so it repeatedly jumps out of the water.

Some personal watercraft riders tend to run their machines for long periods of time in a relatively small area. Many of their neighbors find that having to listen to one or more PWCs buzzing around for several hours in front of their property is very disturbing. The problem became so severe on one Minnesota lake, local authorities banned personal watercraft operation for more than 30 minutes in one area. Jumping personal watercraft out of the water causes an increase in noise levels and a change in pitch which can also be irritating to quite a few people.

Manufacturers are making great strides in reducing the noise emissions from new personal watercraft, but riders still need to be careful about bothering their neighbors with excessive riding in a small area.

Be a Good Neighbor

It's not a bad idea to talk to your neighbors before you bring your new machine home. Tell them to feel free to let you know if the noise from your machine is disturbing them and that you'll try to not operate in the same area for a long period of time. If you're going to jump waves, you had best do it far enough out in the lake so the noise won't bother people trying to enjoy a day of quiet relaxation. You might also offer to take them for a ride, too. It's amazing how understanding people become after they experience the fun of riding a personal watercraft.

Protect Your Riding Privileges

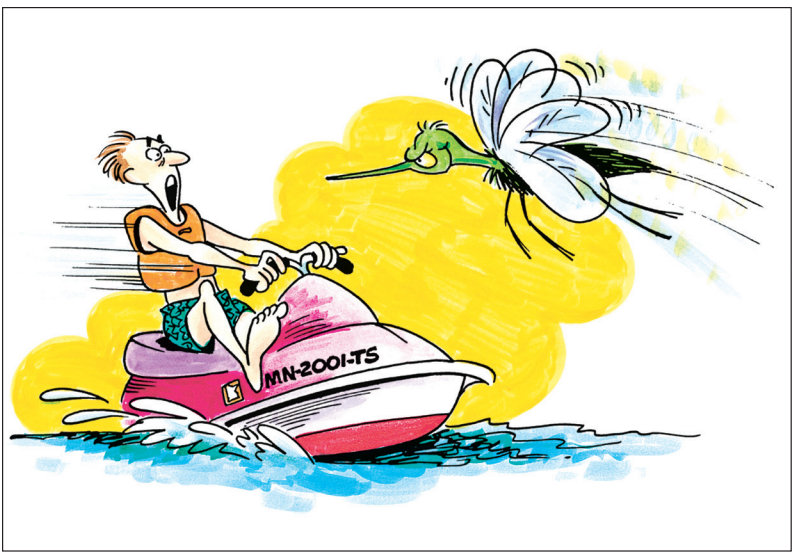
Personal watercraft can be safe and enjoyable as long as enthusiasts learn how to operate their machine carefully, become familiar with Minnesota's personal watercraft laws, and respect their neighbors' peace and quiet by moving around the lake rather than operating in just one small area. Discourteous riders give a black eye to everyone who rides PWCs.

Personal watercraft riders will continue to be able to enjoy their sport without a great deal more regulation as long as they obey the laws and ride responsibly.

Riding Gear

Besides the equipment that is required by law, there are several items that can make your riding experience safer and more comfortable. Here is a list of optional equipment that you might think about taking on your next ride:

- *Wet suit or dry suit.* Although most PWC riding in Minnesota is done from mid-June through early September, a good wet or dry suit can lengthen your riding season by a month or more. A wet suit is much more effective than thin bathing suit material at preventing what some personal watercraft manufacturers refer to as the "body orifice trauma" that can result from a high-speed, seat-first landing or accidentally getting your rear in front of the water jet as it exits the nozzle. Enough said?
- *Foot protection* is almost a necessity for most PWC riding. Besides making it more comfortable to board in rocky areas, water socks or other footwear can help you lean to steer your craft.
- *Neoprene gloves* help you grip controls and keep your hands toasty on chilly days.



Goggles or sunglasses can protect your eyes from water spray or the occasional monster-sized insect.

- *Whistle*. A good quality whistle hanging on your life jacket can serve as a signaling device as well as being great in case of emergency.
- *Goggles or sunglasses*. A good pair of shatter-resistant UV absorbing goggles or sunglasses can help protect your eyes from water spray and the occasional bug as well as the eye damaging ultraviolet rays of the sun. It's a good idea to use a floating lanyard on that expensive eyewear in case you take the sudden spill.
- *Sunscreen*. The sun's ultra violet (UV) rays reflected off the water can equal a much longer time on shore, even on a cloudy day. Too much exposure to UV can lead to premature wrinkling and sagging skin, tumors and skin cancer. Use waterproof sunscreen with an SPF rating of 30 or more and apply it 20 minutes before exposure to the sun to allow it time to soak in. Even "waterproof" sunscreen needs to be reapplied every few hours.
- *Tool kit and tow rope*. Even the best maintained engine can give problems from time to time. A tool kit with pliers, screwdrivers, extra spark plugs and a strong nylon tow line may come in handy — for yourself or a traveling companion.
- *Impact rated life vests*. Although the law allows any U.S. Coast Guard approved life jacket (other than an inflatable) to be used on a personal watercraft, it's a good idea to wear a life jacket that is "impact rated." That means that the testing lab certifies the vest will stay on the wearer when he or she enters the water at a given speed. Impact rated life jackets have several nylon straps that buckle in front that are much stronger than the zipper that is commonly used on a fishing vest. Be aware that an impact rating does NOT mean that the wearer will be somehow magically protected from the impact, but the vest will stay on the wearer's body after entering the water at the rated speed.

"Impact rated" or "strength tested" life jackets aren't designed to protect wearers from the impact of a crash but they are certified not to come off at the rated speed. These vests are recommended for high speed water sports such as water skiing or tubing and personal watercraft riding.

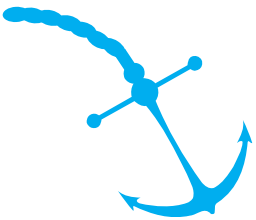
To determine if a life jacket is impact rated, look on the package of a new device or inside the vest near the U.S. Coast Guard approval statement. It will read "Impact Rated or Strength Tested to 50 mph" or some other speed.

Know Your Limit

You can have a lot of good, safe fun on a personal watercraft as long as you obey the laws, learn how to properly handle the machine and are aware of your limitations and the limitations of the personal watercraft. For example; a 60 year old may not be able to operate for as long without becoming fatigued as say a 25 year old. A very small person may not be able to control a powerful personal watercraft as well as a larger person. A novice rider will not be able to handle a PWC as well as someone who has had lots of practice. Be realistic in estimating your own skill and don't try maneuvers that are beyond your ability.

Personal watercraft have limitations to be considered, too. For instance, each craft has a set number of passengers it can carry safely. Personal watercraft are not meant to be operated at night; that's why there are no navigation lights provided by PWC manufacturers (and night operation isn't permitted by law). Watercraft with smaller engines may not have enough horsepower to be able to safely pull water skiers or water toy riders, where a craft with a larger engine probably does.

Manufacturers and dealers are good resources for information about your make and model of personal watercraft. Read the instruction manual and talk to the dealer to make sure you understand the capabilities and limitations of your craft.



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Safety in Other Activities

Fishing

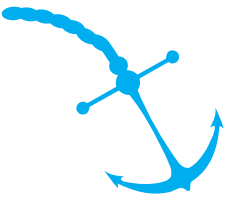
Each year in Minnesota, anglers are the victims of many boating and water fatalities on our lakes and streams.

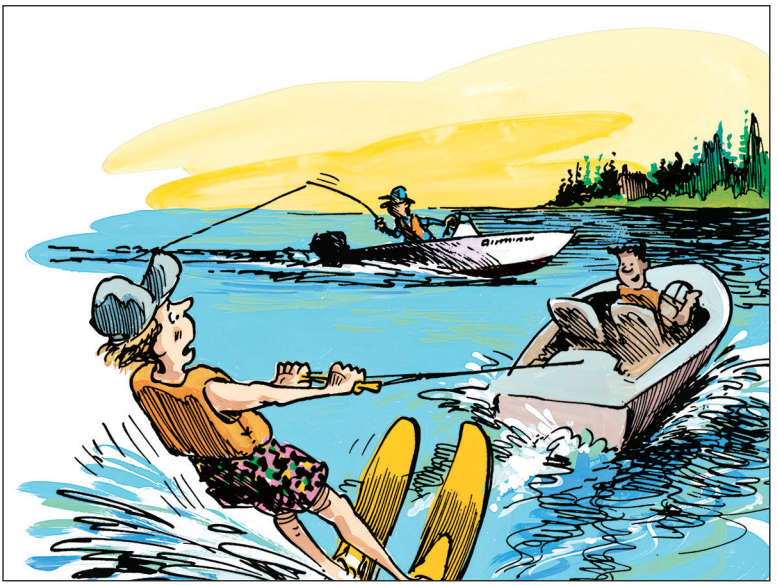
Fishing fatalities involving boats usually fall into three accident categories: falls overboard, capsizing and swamping. They generally involve small, open boats powered by outboard motors and occur on waters of less than 70 degrees where hypothermia is a factor. Alcohol use is also involved in many fishing accidents.

Fishing Tips

Here are a few tips which can keep you or your fishing partner from being involved in an accident:

- Resist the urge to stand up or move around unnecessarily in a small boat. If you must move around, keep your weight low and close to the centerline of the craft.
- Don't try starting an outboard motor while standing...even if you remembered to put the gear-shift into neutral.
- Never overload or overpower your boat beyond the maximum limits listed on the capacity plate.
- When you load your fishing boat, distribute persons and gear evenly. The boat will be steadier in the water and will handle better.
- Use the proper navigation lights after sunset and before sunrise (see Chapter 2). Even if you don't plan on staying out after dark, a small flashlight can prove to be a handy item in your tackle box.
- Booze is bad news! Even in moderate amounts, alcohol (including beer) adversely affects such vital body functions as balance, coordination, judgment, and red-green vision.
- Don't stretch your money and your luck. Use the proper boat for the waters you'll be fishing. A small, open boat on a large, open lake can spell trouble.
- Stay with your boat if it stays afloat and it's not in danger. Most fishing boats have built-in flotation and provide support for victims of a swamping or capsizing accident.
- In cold water, the body loses heat rapidly. This is called hypothermia. Your survival time in cold water is increased if you are wearing your life jacket, and can re-enter your craft rather than trying to swim.
- Keep an eye on the weather. (Most bad weather in Minnesota comes from a westerly direction.) If you are caught out in rough weather, head for the closest shore. In heavy waves, your boat handles best when you head *into* the waves at an angle.
- Wear your life jacket at all times when aboard a small boat. Remember, most fishing fatalities are falls overboard and capsizings where there is no time to reach for a life jacket. Approved models are now stylish, comfortable and practical for the angler.





Water skiing and tubing accidents can be avoided. Steer clear of congested areas and have a competent observer on board. The observer should never distract the operator.

Water Skiing and Tubing

Water skiing and tubing are considered "safe sports," but with more participants and heavier boat traffic, skiers and tubers should be more safety conscious.

Safe water skiing starts with safe equipment, a thorough knowledge of skiing skills, good instruction and an efficient, careful tow boat operator.

A Coast Guard approved impact-tested life jacket designed for skiing, along with some swimming ability is a *must* for water skiers and tubers. A beginner will find that they float easier with an approved life jacket and have an easier time recovering and putting on the skis—especially in deep water. Experienced skiers learning new tricks and maneuvers receive the same benefits. In addition, they have "cheap life insurance" if they suffer an injury in a fall.

A good tow boat usually is relatively light, highly maneuverable, and has adequate power to attain speeds necessary for effective, comfortable and safe skiing.

Other items that can add to the skier's comfort and safety are a lightweight boarding ladder and an accurate speedometer. A wide-angle rearview mirror is required by law in Minnesota if a boat operator does not have another person on board as an observer.

Water skis should be in good shape. Hardware should be simple and free from sharp or protruding surfaces.

Your ski hitch can be attached to the transom or installed inside the boat, forward of the motor. Its purpose is to hold the tow rope away from the propeller.

Tow rope and handles should be free of complicated hooks, eyes and other devices, as well as unnecessary loops that might entangle or cut the skier. Ordinarily, tow ropes float and are made of polypropylene, which is braided for strength.

The boat operator is not driving for their own pleasure, but solely for the benefit, satisfaction and safety of the skier. Never start the motor while anyone is near the stern. Even in neutral and at idling speed, the propeller is turning fast enough to inflict a serious wound.

The driver should not accelerate until they receive visual and/or audible go-ahead from the skier. The signal or start should never be given until the skier has the tow handle in their hands. All parts of the body and skis should be free of the rope and ski tips up.

The boat's take-off should be in a straight line. Sharp turns and excessive speed can cause dangerous falls. Any turns should be made slowly with the skier staying well within the wake.

A towing speed between 12 and 16 mph is sufficient for most beginning skiers, depending upon their weight. Skiing with one ski can be learned at about 18 mph. Rarely does a novice or amateur skier need speeds of more than 25 mph.

A good driver constantly checks their skier and the surrounding water, even if they have an observer (or mirror) on board.

The skier should never put the tow handle or rope around their body or limbs. This is inviting disaster—a broken limb, neck or even drowning.

Although not usually required by law, skiers should stay at least 150 feet from docks, swimmers, boaters, anglers and other fixed objects. When approaching an object or the beach at a speed faster than expected, sit back on the skis and drag your hands. Try to avoid falling forward, even under normal conditions.

A fallen skier should be picked up as quickly as possible. This allows those aboard to assist the skier if they are injured or in distress, to protect them from any nearby boat traffic, or to return the ski rope so they may resume skiing. A fallen skier should hold up a ski to be more visible to other boats.

Turning or curving around a skier to return the tow rope can wrap it

around their body, possibly causing a burn or entangling them. Better yet, slowly pass by them in a fairly straight line while trailing the rope. The skier should allow the rope to slide through their hands until the handle is near enough to grasp.

If you bring your skier aboard over the stern, be sure the motor is off. It is better to use a boarding ladder over the side or to bring the skier over the bow. Whatever is safest for the skier should be the deciding factor.

Multiple skiing with ropes of varying lengths is *not* recommended. Many skiers enjoy crossing back and forth, over and under one another's ropes. However, if the skier on the long rope falls, their rope can easily entangle the other skier. Always give fellow skiers plenty of room. Don't ski close beside or directly in front of another boat or skier.

Know the area you are skiing. Sand bars, rock piles, swimming or diving rafts, wing dams, shallow water and numerous other hazards can cause bad falls or result in serious injury.

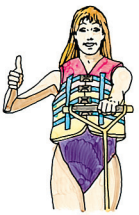
Tubing

Tubes are affected mostly by the maneuvers of the tow boat, similar to a clock pendulum. Riders do not have the directional control that water skiers have, so the boat operator has to take special precautions.

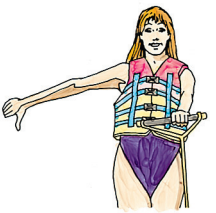
Many tubing accidents are directly related to the boat going too fast. Most tube manufacturers recommend a maximum of 15-20 miles per hour to reduce the likelihood and consequences of an accident. Turns must be made gradually and well away from shore, docks and other boats, to avoid swinging the tube and riders into one of those obstacles.

Tow only one tube at a time to avoid head injuries caused by tubes crashing together and do not put more riders on a tube than the manufacturer recommends. Be sure your tow rope is rated for the number of passengers on the tube. Do NOT use a waterski rope for towing a tube unless it is specifically rated for that purpose. If the tow rope breaks while pulling a tube, it could snap back and injure a passenger in the boat or on the tube.

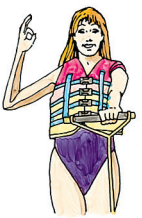
SKIING AND TUBING SIGNALS



FASTER

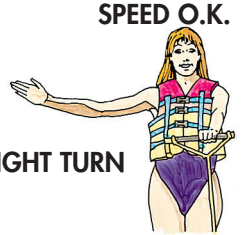


SLOWER

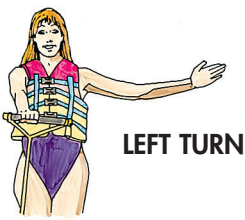


SPEED O.K.

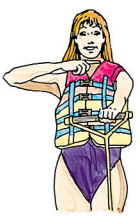
BACK TO DROP-OFF AREA



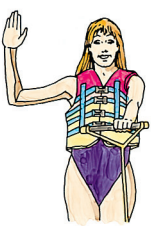
RIGHT TURN



LEFT TURN



CUT MOTOR



STOP

SKIER O.K. AFTER FALL

PICK ME UP OR
FALLEN SKIER-WATCH OUT!

Overloaded boats and lack of life jackets are the two greatest causes of waterfowl hunter deaths.

Boat Safety for the Hunter

Watercraft have been used by hunters since the days of the dugout canoe. Like their ancient ancestors, modern day sport hunters find watercraft important to their hunt.

Waterfowl hunters would be severely limited without their waterfowl boats. Many deer, grouse and moose hunters use watercraft in their sport, even if only for transportation. And, more than one squirrel hunter has paddled a narrow river to bag a limit of squirrels from its wooded banks.

Hunting from a boat can be pleasant and very effective, but under certain conditions, very dangerous. Hunters must cope with all of the hazards mentioned previously plus several more peculiar only to their sport.

1. Hunters nearly always use a small boat. Often it has a flat bottom which is poorly suited for rough water. If they have a canoe or small round bottom boat, the danger of rolling over (capsizing) is ever-present. Hunters should avoid crossing large bodies of open water. Stay as close to shore as possible when traveling to and from hunting locations.
2. Boats used in hunting should be checked to see if they will float when filled with water. A hunting boat must also be able to support you and all your gear. The weight capacity of your craft must be strictly observed. Because most hunting boats are designed with low sides, any attempt to overload will result in a dangerous loss of freeboard. Too little freeboard is often the prelude to being swamped by the first large wave that hits your boat.

3. Never crowd two hunters into a one-hunter boat.
4. Life jackets can be purchased in hunting colors. Wear them when traveling between locations.
5. Fall weather can change at any moment. Every boater —including hunters— should check the weather conditions before heading out on the water. No hunter should ever set out in a storm.

Paddle Sports

Paddling– canoeing, kayaking and stand up paddleboarding— has become a popular water recreation activity in Minnesota. About 20 percent of registered boats in Minnesota are paddle craft. Minnesota's life jacket law also applies to paddlers (see page 15).

There are dangers in paddling which can be lessened with knowledge, preparation and practice. Primary hazards include capsizing, swamping or falling out of canoe or kayak. Paddlers should be strong swimmers. They and other small boat users should be able to swim at least 10 minutes while fully clothed. Life jackets should be worn at all times.

Safety procedures that apply to small boats are even more important in canoeing. Avoid unnecessary movement, keep the center of gravity low and keep the canoe trim. Don't panic if you find yourself in the water. Stay with the canoe, and if possible, use it as a life raft. A moderate breeze can blow the canoe away faster than you can swim. Under these conditions, don't tire yourself in a futile attempt to catch it.

Canoeing is an enjoyable sport, but great care must be taken to avoid capsizing. Paddle craft make up about 20 percent of Minnesota's boats, but some years are involved in nearly 50 percent of the boating deaths.

Lowhead dams don't look dangerous, but they can be deadly both above and below the dam. Five people died in the recirculating current below this dam. The sign indicates the danger area.

Sailing

Sailboats, in most cases, have the right-of-way. An exception is when the sailboat is the overtaking boat. Sailboaters must use common sense, and not demand the right-of-way when approaching large commercial craft. However, collision possibilities can be reduced if the power boat operator gives sailboats a wide *berth*.

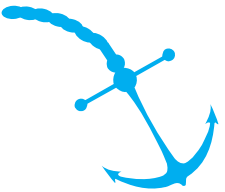
Sailboaters must remember that they need plenty of room to change course. Who had the right-of-way will be immaterial when you are stowed away in Davy Jones' locker.

Capsizing is not uncommon to sailing. Most sailors are prepared for an occasional dunking. This is why most sailing courses require participants to be strong swimmers. It is also why wearing a life jacket is recommended when sailing.

Falling overboard is also common. Have an extra life jacket handy for anyone who might have fallen overboard. To get the victim back on board, stop the boat or sail it back to the person as quickly as possible. Time is extremely important in most rescue operations. Be sure to set up procedures for emergency situations and practice until you can perform them efficiently.

Paddling Safety Tips

1. Always wear a Coast Guard approved life jacket. Contrary to popular belief, there are approved devices on the market which are lightweight, comfortable and designed for the paddler. The emphasis here is on *wearing* the life jacket, not sitting on it or storing it under the seat. A life jacket that is not worn is useless, especially in a whitewater situation, because of the speed at which items like loose life jackets are swept away after an accident.
2. In addition, wearing a life jacket will reduce the effects of immersion hypothermia (a reduction of body temperature through exposure to cold water). During the spring, water temperatures in whitewater streams are usually close to freezing. A person can die from hypothermia in less than 15 minutes. Get out of the water as quickly as possible. Don't lose your life to save your canoe or equipment.
3. Check your equipment and your skills before attempting a canoe trip. Start with an easy run and, if possible, go with someone who is experienced. Better yet, get proper canoeing instruction through Boy or Girl Scouts, YMCA, or the Minnesota Canoe Association.
4. Don't canoe alone. Two or three canoes are necessary for maximum safety on an extended trip in the BWCA wilderness, or a whitewater run.
5. Make sure all ropes and loose gear are securely tied down so there is no danger of becoming entangled should you capsize.
6. Stop, get out of your canoe and examine from shore all rapids and danger spots. If in doubt, portage the craft around the trouble spot.
7. Beware of overhanging trees, log jams, brush piles and other obstacles that water flows through rather than around. You could be pinned against them (possibly underwater) by the force of the current.
8. Never attempt to paddle over or near dams. You could be trapped in recirculating currents at the bottom.
9. If you do overturn, stay on the upstream side of the canoe so you won't be crushed between it and a rock. Should you be swept downstream, try to go feet first to fend off rocks and to keep from striking a rock with your head. Don't fight the current.
10. On a river, remember the river current is faster on the outside of the bend. Be aware that V's in the water pointing upstream indicate rocks, while downstream V's indicate gaps between rocks.
11. If you are caught in high waves on a lake, paddle from a kneeling position and head for the nearest shore.



Sailing Tips

- Stay off the water during storms or periods of extremely high winds. A sailboat mast can be the perfect target for a lightning bolt.
- All sailors should wear a life jacket. There are models available which are designed for sailing.
- Be aware of overhead powerlines whenever you're sailing or launching your craft. Although electrical code requirements call for minimum powerline height above water, sailboat electrocutions occur each year in the United States. Commonly these accidents occur in areas near shore. In several cases in Minnesota, sailboats were blown against shore and their masts came in contact with powerlines located along the water's edge.
- Carry a flashlight if you expect to remain on the water after dark.
- If you use an auxiliary engine, the red/green and white navigation lights are required (see *Minnesota Boating Guide*).

Although sailboats usually have the right-of-way over powered boats, sailors must use common sense around larger, more powerful craft.

Swimming

The best water safety advice we can give is *learn how to swim properly*. Lessons are readily available from the American Red Cross, YMCA, YWCA, schools and many other institutions.

Two youths from Fergus Falls set out in their boat using old planks as paddles. They both jumped from the boat and began swimming. The choppy water soon pushed their anchorless boat away. One of the twosome was a poor swimmer and the other attempted to hold him up. Both cried for help. When help came, however, the stronger swimmer had gone under from exhaustion. The weaker swimmer had somehow managed to keep afloat and was rescued by nearby boaters.

This incident emphasizes the need for a few simple rules of safety, even for good swimmers:

- *Never dive into water of unknown depth.* When you do dive, keep your arms over your head for protection.
- *Know your own swimming ability and never exceed it.* Trying to swim great distances or under adverse conditions can be dangerous.
- *Swim at a supervised beach or pool* if possible and obey the rules.
- *Children should be closely supervised around water.* Remember, swimming lessons at the youngest age possible are the best insurance against drowning.
- *Don't swim immediately after heavy meals*, if you have been drinking

Supervised beaches are required to be marked with buoys such as this one. The diamond with a cross through it means "Boats Keep Out."

Inner tubes, air mattresses and other inflatables are equally hazardous. A gust of wind can blow them into deep water or a leak can cause them to deflate, leaving a weak swimmer in a potentially fatal situation.

alcohol, when you are overheated, tired, or after strenuous exercise. An estimated one-third of all drownings in Minnesota each year are alcohol-related.

- *You must take care when swimming from a boat.* Swim near shore and away from boating lanes. Anchor your craft before you enter the water. Have a lifesaving device handy and keep one person in the boat as an observer.
- *Do not substitute inflated tubes, air mattresses, or other artificial supports for swimming ability.* They are easily punctured and a wind could blow you to deep water.
- *Learn some of the basic rescues* (see page 101).

Scuba Diving and Snorkeling

Skill and strength are needed for *snorkeling* and *scuba* diving. Anyone planning to participate in these sports must be in good health, and a better-than-average swimmer. In addition, it is essential that you successfully complete an approved course in diving. (You must have your scuba diving certification card to have your tank filled at any reputable dive shop.)

Minnesota law requires scuba divers to display a warning flag when diving. This flag is red with a white stripe running diagonally from corner to corner and may be displayed from a float or on a boat. There is also a blue

Don't let your curiosity kill a diver! Stay at least 150 feet away from the red and white diver's flag.

and white flag authorized under the federal rules of the road which is only flown from a boat. See page 53 for examples of both of these flags. They are used only when diving is in progress. No person may operate a watercraft within 150 feet of the red and white flag.

Divers usually swim face down anywhere from one to 100 feet or more below the surface. Their vision is limited and they are usually concentrating on something underwater. Usually they don't know what is going on above them and may have to surface suddenly. With these factors in mind, a boat operating near a scuba diver can create three serious hazards:

- A moving boat could run a diver down.
- A diver could hit his or her head on the bottom of a boat or motor.
- In an emergency, the diver might wait too long before surfacing because of a boat operating in their area.

Divers exploring the bottom of a lake may drag their flagged buoy from place to place. Once you have spotted it, remember, it might be in a different place the next time you see it. You should also:

- Learn to recognize the scuba diver's flags—both state and federal.
- If you see one, respect it and stay out of the area. Don't let your curiosity put someone in the hospital.
- If you see bubbles, stop! Do not pass over them.

Winter Activities

Water safety should not take a winter vacation. Many people die each year in ice and water-related accidents.

To prevent these accidents...

Don't be the first to walk or snowmobile on a newly-frozen lake. Lakes do not freeze evenly. The ice may be 2 feet deep in one place, and only 1 inch thick in another.

If you are on a body of water for the first time, ask locally as to where *thin ice* may be found.

Avoid using the ice on rivers and streams as much as possible. Water movement and springs create thin sections of ice and open water which may spell disaster.

Generally, anglers and skaters on foot need 4 inches of ice. At least 5 inches is sufficient for a snowmobile while 7.5 inches is required for a 2 ton automobile. 8 inches will hold a light truck, 10 inches a medium truck, and 12 inches a heavy truck. The ice *must* be clear; slushy, melted ice can be dangerous.

If you *drive* your car on a frozen lake, make sure the ice is thick enough and follow the tracks of the other cars. Be sure to leave the car doors open and/or roll down the windows. Be prepared to jump out immediately if the car should break through.

Rescuing someone who has fallen through the ice can be difficult and dangerous.

Tom Chapin photo

Pressure ridges in the ice often conceal open water, and can open up in a matter of a few hours.

Ice Cold Facts

Three DNR conservation officers began a rescue operation for three stranded snowmobilers who were fishing on Mille Lacs Lake.

Finding the ice in a slushy condition, the officers located a small boat and began dragging it out over the ice in the direction indicated by the anglers' frantic companion.

The officers broke through the ice several times, but eventually reached a point 50 feet from the stranded fishermen. The anglers were standing on their submerged snowmobiles to keep their heads above water.

A rope was attached to the boat and thrown to the anglers, who pulled the boat to them and managed to climb in. The officers then retrieved the boat and the weary fishermen. All finally returned safely to shore but only after breaking through the ice several more times in the process.

The anglers were suffering from hypothermia and required hospitalization. But they were alive and safe!

To help you, here are some important points to remember. Fight the urge to run up to the hole and give them a hand. Look first for a light boat to push across the ice ahead of you, like the conservation officers. If this isn't possible, organize a human chain of rescuers lying prone on the ice. If you are sure the ice will carry your weight, lie on your stomach and push a ladder or pole ahead of you for the victim to grasp.

Keep calm and think out a solution. It will do the victim and yourself little good to unnecessarily endanger your life.

Victims of ice accidents may also require artificial respiration as well as treatment for hypothermia and shock. See the section on *First Aid*.

Items found on shore or in a car, such as jumper cables, garden hose, branches, or skis, can be thrown or extended to victim.

6

Emergencies

An accident *can* happen whenever you are on the water despite all precautions you may have taken. If an accident does occur, follow these simple steps:

1. Assist yourself and others who are in trouble, if at all possible. Use the basic survival, rescue and first aid methods outlined in this chapter, unless you have had more advanced training.
2. Never risk your life or the lives of others to save equipment.
3. Summon help, if necessary.
4. Report all boating accidents to the county sheriff as soon as possible. This is required by law if there is substantial property damage, injury or a death.

Survival

In a boating accident, you may be forced into the water or fall overboard. Your immediate concern is to stay with the boat if it is still afloat and not in danger. Put on your life vest if you haven't already. Make sure all your passengers are accounted for.

Next, you should attempt to reboard your craft if at all possible. Even if the boat is upside-down (sometimes called "turtled") it may still be possible to climb onto the craft. It is especially important in cold water conditions to get as much of your body out of the water as you can. If this isn't possible, hang on to the boat and use it as a support.

Most craft have built-in flotation and can support the weight of the occupants even after a capsizing or swamping. Also remember that a boat, even if it's overturned and partially submerged, can be spotted by rescuers more easily than a survivor in the water. Use a whistle or other device to

Stay with your boat if it stays afloat!

call for assistance. Here's where that whistle on your life jacket comes in handy!

If your boat does sink or drift away, you have several other options for survival and rescue. Here are some suggestions, with emphasis placed on the problems of cold water (generally less than 70 degrees) commonly associated with boating fatalities in Minnesota:

1. If you have your life jacket on, make sure it's securely fastened so the device will not slip off in the water.
2. Items left floating after an accident (life jackets, gas cans, minnow buckets, coolers, oars, etc.) can be used as improvised flotation devices.
3. Ordinary clothing can preserve body heat in cold water and help you float. Therefore, you should consider taking it off only if it hampers movement. While still being worn, your shirt or coat can be used as a flotation aid by simply buttoning it up at the collar and forcing air into it either by blowing in the space between the top buttons and collar, or by using the palm of your hand to splash air from the surface into the front of the garment at the bottom. Hunters and anglers can also use air trapped in hip boots and waders to assist them in floating. Contrary to popular myth, hip boots or waders will not turn the practiced wearer upside down.
4. Survival floating (drownproofing) or treading water may be necessary until help arrives if you have no other means of support. Survival floating is basically a jelly fish float with a slow, coordinated arm and leg stroke as the head is raised for a breath. In cold water, treading

water is preferred over survival floating, since there is less heat loss when the head remains out of the water. Remember in either technique to utilize large, slow movements.

5. Swimming for shore should be considered only as a last resort if no other means of survival is at hand. It has been shown that in water of 50 degrees, a good swimmer has about a 50 percent chance of making shore that is one mile away! In warmer water, however, or if shore is relatively close (distances are deceiving over water), swimming may be advisable. Once again, use swimming strokes which will keep your head out of the water as much as possible to reduce heat loss.

Cold Water Shock and Hypothermia

Cold water can kill in at least four ways…

1. **Cold water shock** causes the victim to involuntarily inhale water and drown. It may also cause a sudden increase in blood pressure and heart failure within three minutes of entering the water.
2. **Swimming failure** can happen from three to 30 minutes of entering the water. Cold water stiffens your muscles, making swimming to stay afloat, zip on a life vest, or reboarding a boat, almost impossible!
3. **Hypothermia.** After 30 minutes, the body's inner temperature begins to fall, which can lead to unconsciousness and eventually death!
4. **Post-immersion collapse** happens during the rescue or after you are rescued from cold water. As the body begins to rewarm, cold blood that was trapped in the extremities can rush to the heart, possibly leading to heart failure. Also, water that may have been inhaled can damage the heart and lungs.

As mentioned before, cold water shock and hypothermia are factors in over 30 percent of Minnesota's boating fatalities each year. Hypothermia simply means that the body is losing heat faster than it is producing it, causing a decrease in the body's inner temperature below 95 degrees. It can occur on land during exposure to wet, cold and windy weather or through immersion in cold water which is generally less than 70 degrees. The greatest danger to those persons using boats, however, is from immersion in cold water. Here are a few suggestions to increase your survival time in cold water in addition to those mentioned previously:

1. The importance of reboarding your craft, even if it's filled with water or capsized, cannot be over-emphasized. The more of your body you can get out of the water, the better off you are, since water takes heat from the body 25 times faster than air at the same temperature.

Cold Water Immersion

1-10-1 Principle

1 Minute

- Get breathing under control.

10 Minutes (or more) of meaningful activity

- Assess the situation and make a plan.
- Prioritize, and perform most important functions first, such as locating other party members.
- Self-rescue.
- Emergency communication and signaling.

1 Hour (or more) of useful consciousness

- Focus on slowing heat loss.

2. Don't take off your clothing unless it's absolutely necessary, since it helps trap body heat like a diver's wet suit.
3. Don't move any more than necessary. Swimming, treading water or survival floating all use up valuable energy and increase the heat loss from your body.
4. Wear your life jacket! A life jacket increases survival time in cold water for two reasons: It decreases the movement necessary to remain afloat and it helps to insulate against heat loss. The Type III life jacket using foam for flotation is the best protection against hypothermia, especially in the full-sleeved jacket models.
5. If you can't reboard your craft and are wearing a life jacket, draw your knees up to your chest and hold your upper arms to your sides. In cold water, this protects the three major heat loss areas of the body (the head, sides of the rib cage and groin area). This is called the self huddle or Heat Escape Lessening Position (H.E.L.P). If three or more people are in the water, by "huddling" with others in the water, body heat can be shared, victims are kept from being separated and the moral support that can mean the difference between survival and death is provided. Smaller people can be placed in the middle of the group.

Note: The treatment for hypothermia victims is covered in the first aid section of this chapter.

Your Last Gasp...

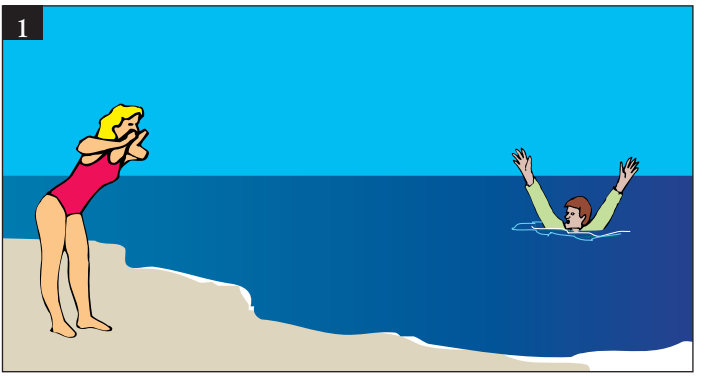
A sudden plunge into cold water can cause cold water shock and an involuntary gasp that causes you to inhale water and possibly drown without ever coming back to the surface. That's one reason why people with good swimming ability drown in cold water boating accidents. Cold water shock may also result in sudden increase in heart rate and blood pressure causing your heart to stop. Cold water immersion can also result in immediate loss of consciousness. Wearing your life jacket is the one thing you can do to increase the likelihood of survival if you are suddenly immersed in cold water.

Basic Rescues

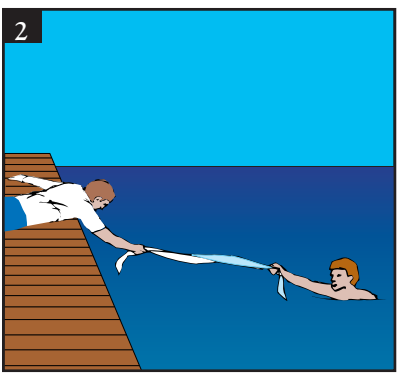
Many drownings occur each year within a few feet of safety. Even a nonswimmer can save a life if they know how to use some basic rescue techniques. Surprisingly, most of these methods don't even require that you get wet! Just remember *"Preach, reach, throw, row and go."*

1. **PREACH -** If the person is too far to reach and there is no boat available, yell encouragement to the victim; *"Swim!", "You can do it!", "Come on, it's just a little farther!", "Don't give up!"*
2. **REACH -** If the victim is within reach, lie flat on the pool deck or the dock and extend an object such as a towel to the victim. If the person starts to pull you in, let go and if possible, try again. If the victim is unable to grasp the object you have extended to them, grasp their hand or wrist and pull them to safety. Watch your balance and don't overreach or you may be pulled into the water.
3. **THROW -** If the victim is too far away for a reaching-type rescue, throw a paddle, spare tire, gas can, insulated jug, ice chest, water ski, picnic bench or anything that will float. Be careful not to *hit* them.
4. **ROW -** If a boat is handy, row to the victim and extend an oar or paddle. Bring them to the stern (back) of the boat and have them hold on. Row slowly back to safety while they hang on. If the victim is too weak or too scared to hang on, hold them until more help arrives. If a motorboat is used, *stop the engine a few feet away and glide* to the victim from the downwind or *leeward* side. Moving the shift lever to neutral *may not* stop the propeller. Pull the victim into the craft, while being careful to stay away from sharp or hot motor parts. A boarding ladder or steps will help in this rescue. If there is no motor and the boat is too small, or you are unable to pull the person into the boat, have them pull their arms up on the transom while you row back to shore. If they are too weak to hang on, pin their arms against the transom with your feet.

Basic Rescues

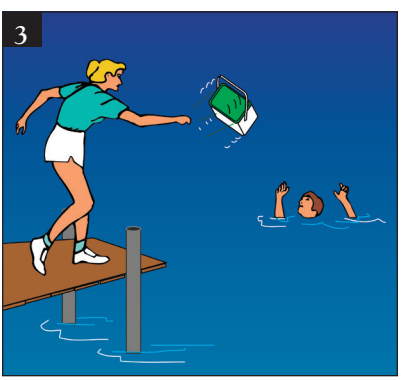


Preach

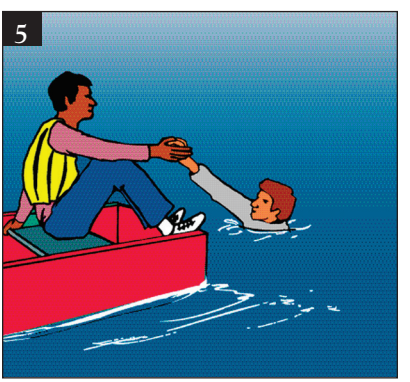


Reach

Row



Throw



Go

5. **GO -** A good swimmer who has not been trained in lifesaving should swim to a drowning victim only after *all* other basic rescue methods have been ruled out. A boat is much safer. If you have to swim to reach a victim, take a towel, shirt or any object that floats such as a life jacket or cushion to extend to the victim. *Avoid* personal contact with the victim *unless you have had lifesaving training;* even then, use it only as a last resort.

First Aid

Most boaters will run into situations where knowledge of first aid will come in handy. When this occurs, try to provide immediate and temporary care for the victim until a physician or other professional help arrives. Do not substitute this brief guide as a complete course in first aid. A first aid and/or cardiopulmonary resuscitation (CPR) course should be taken from the American Red Cross by anyone who participates regularly in outdoor sports. Every boat should have a first aid kit which should include enough supplies to take care of most minor accidents.

Rescue Breathing

The most effective way to restore normal breathing is to use mouth-to-mouth (or mouth-to-nose) breathing. It is most effective when started *immediately* after the victim stops breathing, so don't waste time moving the victim to shore and going for help. Start breathing for the victim immediately; it will not hurt him or her, and can save a life.

Objectives in rescue breathing are to maintain an open airway through the mouth and nose, and to restore normal breathing.

Rescue Breathing

Follow these steps:

1. Begin immediately.
2. Place the victim on their back if at all possible. However, if the airway (mouth and throat) is clear and the victim can't be moved, mouth-to-mouth breathing can be given with the victim in any position, even in the water.
3. Clear the airway of any foreign matter or obstruction.
4. Tilt the head backward so the chin is pointed upward and the air passage is open.
5. Pinch the nostrils to prevent air leakage.
6. Place your mouth over the victim's mouth so that you form an airtight seal.
7. The first breath should determine whether or not there is a clear air passage.
8. You should be able to see the victim's chest rise and fall.
9. Listen for the rush of air from the victim as you remove your mouth.
10. If you do not hear air coming, recheck the head and jaw position and clear the victim's mouth.
11. The breathing rate should be: one breath every five seconds for an adult, one breath every three seconds for a child/infant.
12. Stop and recheck the victim's pulse and breathing every two minutes to ensure the heart has not stopped.

Shock

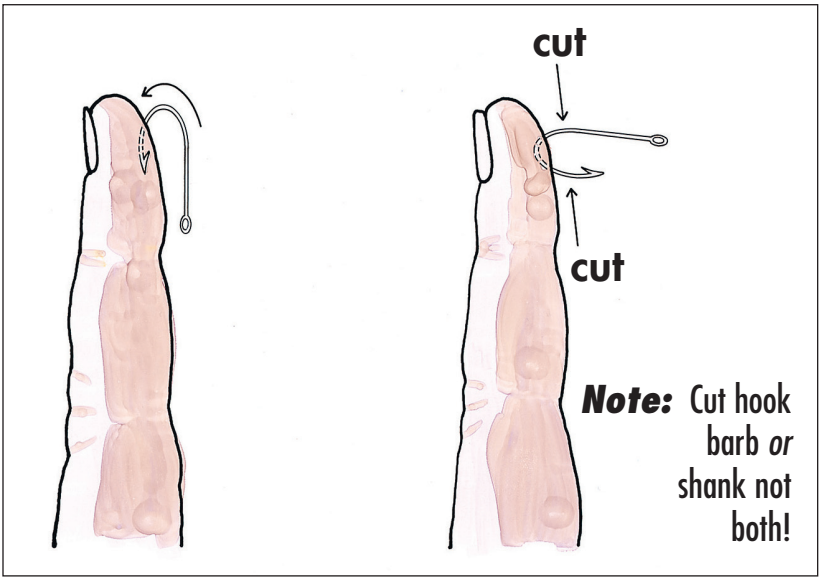
Any person who has a serious injury should be treated for shock. Keep the victim lying down, warm and still.

Wounds and Bleeding

Bleeding from wounds, whether serious or not, can usually be controlled by applying direct pressure to the wound. Press on the wound with a clean cloth or your bare hand. For serious bleeding a large cloth should be applied and bandaged into place. If it becomes soaked with blood, more layers of cloth should be added without removing the original dressing.

If an arm or leg is bleeding severely, but is not broken, it should be raised slightly while applying direct pressure to stop the bleeding.

Removing a fish hook which has penetrated the skin is not difficult—if you know how. Often only the point of the hook enters, not penetrating deeply enough to allow the barb to catch. In this case, remove the hook



by backing it out. If the barb is embedded, the wisest thing is to have a physician remove it. If medical help is not available, push the hook through until the barb protrudes. Use a cutting tool to snip the hook either at the barb or at the shank and remove the hook. Cleanse the wound and cover it with a bandage. A physician should see the wound as soon as possible.

Burns

A burn is a serious and painful injury and should be treated carefully. First aid objectives are to relieve pain, prevent infection, and treat for shock.

Burns are classified into three degrees. First degree burns redden the skin, second degree burns blister the skin and third degree burns char the burn area.

Burns that are not serious should be placed immediately in cold water (not ice water). Do not apply water if the skin is broken or charred. First degree burns do not require further treatment. Ointments, sprays or antiseptics should *not* be applied to any severe burn, or one that might require medical care. For extensive second degree burns and for third degree burns only, apply a dry, sterile dressing to the burn and, if they are conscious, have the victim drink liquids. Leave all additional treatment to a physician.

Sunburn can be just as severe and painful as other burns. The only completely effective method of prevention is coverage by clothing. A sun

cream that filters out the harmful rays should be used freely and often on exposed skin. Remember too, your eyes need the protection of sunglasses, especially on bright days. Sunglasses also enable you to see better as a boat operator.

Broken Bones, Dislocation and Spinal Injuries

Broken bones or fractures are of two general types, closed and open. A closed fracture does not break the skin. An open fracture has a connecting open wound. First aid for the two types is similar, though the wound and bleeding must receive attention in open fractures. Swelling, change of shape, pain or change in color are indicators of common fractures. If a fracture is suspected, the limb must be supported or splinted in some manner. The splint should immobilize the broken bone and the joints above and below the joint fracture. Padding between the limb and the splint should be used to protect the limb.

A dislocation is the slipping of the end of a bone from a joint. Don't try to put a dislocated bone back into place. Immobilize and protect the dislocation in a comfortable position until the victim can reach medical care.

Injuries to the neck, head and back may result from water accidents. A boater who has struck an object, or a diver who has hit the bottom might have a brain concussion and/or spinal injuries. If the victim is conscious, see if they can move their feet, legs, arms and hands. If they have any loss of movement, or feeling, or if there is pain in the back or neck, a spinal injury should be suspected.

Never move the victim any more than necessary. Don't allow their head to turn forward or sideways, or the back to bend. If they are in the water and not in danger, *do not remove them!* The water will act as an excellent support until proper help can be obtained. If transportation is absolutely necessary, use a firm, full-length support, such as a door or picnic bench. Do not attempt to remove the victim until a firm support is available! If mouth-to-mouth breathing is necessary, tip the head back only as far as needed to open the airway.

If the victim is unconscious, you should suspect a head injury. Some symptoms of a head injury are bleeding from the head, ears or nose; pupils of the eyes unequal in size; and either a slow and strong or fast and weak pulse rate. Nothing can be done by the first aider except to make the victim comfortable and protect them from further injury while they are being moved to the hospital.

Cold Water Immersion

The effects and symptoms of cold water immersion can vary with the temperature and length of exposure. One of the first indicators, however,

Conscious victims, with only slight cases of hypothermia, can be allowed to shiver themselves warm if under close supervision and given plenty of warm sugary liquids (never alcohol).

is uncontrollable shivering which may give way to muscle spasms and loss of the use of arms and legs. During the time these symptoms are occurring, the victim may be confused and deny that there is any problem. As the victim's body temperature continues to fall, pulse and breathing decrease and their heartbeat becomes uneven. If no action is taken by the rescuer at this point, the body temperature will continue to drop and the victim will die from heart and respiratory failure.

If you rescue someone who has been in cold water for any length of time, here are the important points to remember:

1. Call 911.
2. Get the victim out of the wind and rain. If the victim is in the water, use care in rescue to avoid being pulled in yourself.
3. Replace wet clothing with dry. Wrap the victim in a sleeping bag or blankets and keep him or her warm.
4. Handle hypothermia victims gently, do not allow them to walk unless absolutely necessary.
5. If semi-conscious or worse, try to keep the victim awake. If there is difficulty in breathing, insure an open air passage. If breathing stops, use mouth-to-mouth resuscitation or, if you are properly trained, cardiopulmonary resuscitation (CPR) if no pulse is detected.
6. In some cases you may encounter a victim who has been immersed in cold water (less than 70 degrees) for a relatively long period of time

A makeshift lean-to shelter and a fire at a distance cuts down heat loss from the wind as victim warms under close supervision.

and is not breathing. Your action should be to begin mouth-to-mouth resuscitation or CPR immediately, even if it appears hopeless for the victim, and seek immediate medical assistance. There have been cases where victims of cold-water accidents have been successfully resuscitated without brain damage after periods of almost one hour underwater. This is possible because of an involuntary reaction of the body to cold water which may extend survival time (especially in children) by: 1) diverting blood from the arms and legs to the heart, lungs and brain and 2) slowing circulation down to conserve oxygen in the body.

Stages of Hypothermia

1. Uncontrollable Shivering
2. Loss of Dexterity
3. Slurred Speech
4. Clouded Consciousness
5. Shivering Stops
6. Muscular Rigidity
7. Total Loss of Consciousness
8. Heart Arrhythmia
9. Death

7

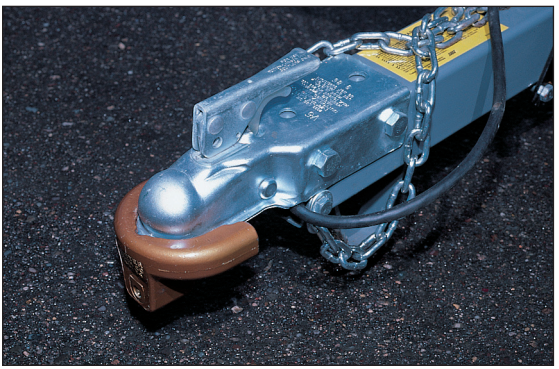
Boat Theft

Like automobiles and bicycles; boats, motors, trailers and other boating items are the subjects of numerous thefts each year.

Although some thefts are the result of organized rings, most incidents of stolen property could be prevented with a bit of forethought. Simple precautions are generally enough to deter most thieves, since many crooks just won't take the time to cope with basic anti-theft measures.

Here are some ways you can do this:

1. Join Operation Identification at your local police department and scribe your ID number on *all* hard-surfaced pieces of equipment. The operation ID number enables law enforcement to find you through a national computer database. (As long as you keep the police informed of your changes in address!)



Although a determined thief can steal almost anything, it's a good idea to make your boat as unattractive as possible to crooks and lock it up securely on the road and at home.

Join Operation Identification and mark the assigned number or your boat's "MN" registration number on all your boating gear.

An engraving tool is available for loan from your local sheriff or police department. Soft materials such as tents, covers and sleeping bags can be marked with a magic marker or with a special invisible ink pen that shows up under ultraviolet light. ID numbers, if visible, may deter a thief and will greatly aid the police or sheriff in returning recovered items.

2. Most boats built since 1972 will have a Hull Identification Number (HIN) engraved or stamped on the outboard side of the transom. This number is essential to identify your boat, since the manufacturer, model, serial numbers, and date of construction can be determined from it. It is a wise idea also to scribe this number and your operation ID number in a second, but hidden, location on your craft. This provides positive identification if the boat is recovered after a theft and the primary HIN is altered.

3. "Out of sight is out of mind." Although this is an old adage, it still holds true. If you park your car for any length of time, remember to put all gear in the trunk, lock it, and when possible, leave it in a well-lighted area. A car alarm may also be a good investment.

4. At home, if your boat is on a trailer, a length of case-hardened chain and a padlock are usually all you'll need to protect it. The best bet is to sink a case-hardened eyebolt in cement, then pass the length of chain around the axle of the trailer and padlock it tight. Remove all valuable items which can be easily stolen. Also run the chain through the seats, welded-on handles or other permanently fastened item in your small boat or canoe so it can't be carried away by a couple of strong crooks.

5. Jacking-up the trailer and removing one wheel (lock it in the trunk

of your car) works well whether you're home or away. During the winter, remove both wheels and store them in your house (don't forget the chain mentioned in #4). A trailer hitch lock is also valuable—it prevents the trailer from being removed from your car, and, when parked, prevents it from being hitched up.

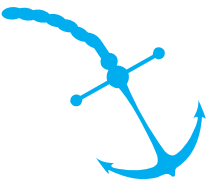
6. On the water or *off*, remove all valuable portable items such as depth finders, fishing tackle, personal flotation devices, compasses and radios and lock them in a safe place.
7. If you keep your boat on the water, secure it to the dock, mooring buoy or boat lift with a length of chain and padlock. Always remove the keys and registration card when you're away from the craft. Overnight, you may also wish to remove the portable gas tank(s) and a vital engine part (ignition wire, distributor rotor, etc.). Another ploy is to install a *hidden* cutoff switch between the engine and ignition power.
8. If thieves can't steal your boat, they may settle for just your motor. The most sought after motors are outboards under 25 horsepower, because of the portability and salability. To prevent motor thefts, remove the motor, if possible. If not, use a motor lock or a chain and case-hardened padlock across the clamp screws. On larger, permanently-mounted motors, use special transom retainer bolts. These

Outboard motors are popular targets of thieves. A bar lock such as this one makes theft much more difficult.

replace the standard bolts and consist of retainer nuts which can be removed only through the use of a special keyed socket (many combinations are available).

9. Cooperate with your neighbors in watching for activity or strangers that might be suspicious. Record description and license numbers for later reference. Challenge anyone who looks suspicious and report any unusual activity (particularly at night) to enforcement officials.

10. Be prepared if theft does occur. Keep a complete inventory of boating and fishing equipment. This includes serial numbers and color photos or a video of the more important items. This will help authorities recover your gear. You should also check your insurance coverage. While a homeowner's policy might give you partial protection, marine coverage may be in your best interest. These policies cover all perils, including boat, motor, trailer and associated gear. They generally have low premiums. These tips are by no means complete, but they can go a long way to prevent theft. It's up to boat owners, however, to put them into practice. In the final analysis, law enforcement officers consistently agree that boaters and anglers must take the initiative to protect their property. Remember, make it hard enough to steal and most thieves will go somewhere else.



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Storage

Each fall after the boating season is over, you should prepare your craft for winter storage. The steps you take each autumn will vary with the type of boat you own. Here are a few tips to make the job easier and make sure you're ready for the water in the spring:

Engine

- Fill the fuel tank(s) and use a good fuel stabilizer to reduce possibility of condensation and to keep gas fresh for spring.
- Flush the cooling system — especially if you have been operating in muddy water. Remove plugs and drain all water, especially in inboards and inboard-outdrives.
- Check spark plugs and fuel lines, and replace as necessary. Before putting spark plugs back in, spray in a good quality "fogging oil" to coat the cylinder walls to help keep them from rusting.
- Drain oil and refill crankcase on inboard-outdrives and inboards. Also change oil filter.
- Change gearcase lubricants on lower unit of outboards and IO's.
- Check for worn or loose parts, especially through-hull fittings such as live well inlets and bilge pump hoses.
- Check propeller and lubricate shaft as necessary.
- Run outboards with fuel line disconnected until motor stops.
- Store outboards in upright position.

Boat

- Clean inside and out.
- Drain out all water in bilge—leave transom plug out over winter.
- Cover boat, but allow for air circulation under cover.

Trailer

- Check wheel bearings—grease, repack or replace as necessary.
- Examine tires—check air pressure.
- Put the trailer up on blocks over the winter and remove tires and put inside. It will make tires last longer and help prevent theft. Smaller boats and canoes should be chained to some hard-to-move object to help discourage crooks from picking up your boat and carrying it away.

By removing the tires and putting your boat and trailer on blocks for winter storage, your tires will last longer and it will help discourage theft. Cover the wheels with a breathable canvas cover to avoid rust.

9

Homeland Security

Due to heightened national security, please note the following:

On some occasions, you may encounter U.S. Navy ships on Lake Superior or in the Duluth Superior Harbor. You must stay at least 100 yards away from these vessels, and operate at a slow - no wake speed within 500 yards.

Avoid all commercial ships (foreign and domestic) and commercial port areas on Lake Superior.

Observe restricted areas near power plants, dams and bridges anywhere in the state. When possible avoid anchoring near these areas.

Report any suspicious activity immediately by using your cell phone to call 911, or marine radio to contact the U.S. Coast Guard, state or local enforcement officials.

See graphic on next page.

WARNING!

Do not approach within 100 yards of any U.S. Naval vessel.

If you need to pass within 100 yards of a U.S. Naval vessel in order to ensure a safe passage in accordance with the Navigation Rules, you must contact the U.S. Naval vessel or the Coast Guard escort vessel on VHF-FM channel 16.

The U.S. Naval vessel, USS Freedom, enters the Duluth ship canal. Photo by Kenneth Newhams.

You must operate at minimum speed within 500 yards of any U.S. Naval vessel

and proceed as directed by the Commanding Officer or the official patrol.

Violations of the Naval Vessel Protection Zone are a felony offense, punishable by up to 6 years in prison and/or up to $250,000 in fines

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Appendix

Glossary of Common Boating Terms

Abeam - Used in reference to the position of an object; at right angles to the fore and aft (center) line of the boat. For example, another boat or dock is abeam when it's alongside your boat.

Aboard - On board. A person is aboard when they are on the boat.

Aft - Toward the stern or rear of the boat.

Anchor - A heavy object lowered by an attached line to the bottom to keep a boat in place.

Astern - Behind the boat; backwards. An object is astern when it is behind the boat. A boat is going astern when it is moving backwards.

Bail or Bailing - To remove water from the boat either by pump or bailer.

Beam - Greatest width of a boat. A boat is said to have a five foot beam if it measures five feet across at the widest part.

Bearing - The direction or the point of the compass in which an object is seen.

Berth - *1)* Enough space to keep clear of another boat, or *2)* the space for a boat at a dock or pier.

Bilge - The lower internal part of a boat.

Bow - The forward or front part of a boat.

Buoy - A floating navigational aid or signpost to the boater.

Capsize - To turn over.

Carburetor - A device in which air and gasoline are combined to make an explosive mixture in a gasoline engine.

Chart - Boater's version of a road map, showing buoys, water depths, etc.

Cleat - A piece of wood or metal with projecting ends to which lines are tied or made fast.

Compass - An instrument which shows the course of the boat.

Cowl - Hooded openings used for ventilation.

Current - Movement of water in a horizontal direction, such as in a river.

Deck - Any permanent covering over a compartment, hull or any part of the boat.

Diesel - A type of internal combustion engine which burns fuel oil and uses compression instead of an electric spark for ignition as in a gasoline engine.

Draft - The depth of the boat below the waterline.

Dry Rot - A fungus decay which causes wood to become brittle and fall apart.

Fenders - Objects placed along the hull to prevent wear or chafing. These are usually made of plastic.

Fore - Used to distinguish the forward part of a boat. It is the opposite of aft.

Freeboard - The height of the deck or edge of the boat above the water.

Galley - The kitchen area on a boat.

Give-Way Boat - The boat which must yield or stay clear of the boat having the right-of-way (stand-on boat).

Grappling Hook - An iron hook or set of hooks used for recovery of objects from the bottom.

Gunwale - The upper edge of a boat's side (pronounced "gunnel").

Hatch - An opening in the boat's deck to allow persons or cargo to go below.

Head - A marine toilet.

Hull - The body of a boat.

Hypothermia - A physical condition in which the body is losing heat faster than it is producing it.

Kapok - A plant fiber used as flotation material in some PFDs.

Kayak - A type of canoe which is covered completely by material stretched over a frame except for an opening for the paddler.

Keel - The boat's backbone. It is the center, lengthwise, main member of the bottom of the boat.

Lee, Leeward - On the side away from the wind.

Line - All ropes used aboard a boat.

Mooring - The means by which a boat may be permanently anchored in one location.

Motorboat - Any watercraft propelled by machinery, including those equipped with removable outboard motors.

Navigation - The art of moving a watercraft from port to port or place to place.

Oar - A long, wooden instrument with a flat blade at one end, used for propelling boats.

Personal Watercraft - A motorboat which uses an inboard engine powering a water jet pump as its primary source of propulsion. Commonly known as Jet Skis,™ or Wave Runners,™ etc.

Port - The left side of the boat as you are facing forward. It can also be used to mean a destination, or a window in a boat.

Rudder - A device used for steering the boat, usually flat sheet metal attached behind the propeller on inboard boats.

Rules of the Road - The regulations for preventing collisions.

Scope - The length of the anchor line. A seven to one scope means the length of the anchor line from the boat to the anchor is seven times the depth of the water.

Scuba Diving - Diving underwater using Self-Contained Underwater Breathing Apparatus (compressed air tanks).

Snorkeling - Diving underwater using mask, snorkel and fins only.

Splice - To join two lines by weaving together the ends.

Stand-On Boat - The boat having the right-of-way.

Starboard - The right side of a boat as you are facing forward.

Stern - The rear or back end of a boat.

Swamp - A boat is swamped when it fills with water from over the sides.

Transom - The width-wise planking which forms the stern of a small boat. Outboard motors are usually attached to the transom.

Wake - The waves or path that a boat leaves behind.

Watercraft - Any device used or designed for navigation on the water. (See exceptions in current regulations.)

Windward - The direction from which the wind is blowing.

Boat and Water Safety Agency Directory

(More information can be found at the back of the latest Minnesota Boating Guide)

AGENCY/ORGANIZATION	PROGRAMS OFFERED
State of Minnesota: Department of Natural Resources:	
Boat & Water Safety Section 500 Lafayette Road Saint Paul, MN 55155-4039	Boat and Water Safety Information and Education Programs
Division of Enforcement 500 Lafayette Road Saint Paul, MN 55155-4047 or check the phone directory for the name of the local conservation officer.	Enforcement of Watercraft Laws and Rules
License Center 500 Lafayette Road Saint Paul, MN 55155-4026	Watercraft Licensing
Public Water Access Section 500 Lafayette Road Saint Paul, MN 55155-4039	Access and Safe Harbor Development, Public Access Maps, Canoe & Boating Route Maps
Minnesota Bookstore 660 Olive Street Saint Paul, MN 55155	Lake Maps for many Minnesota lakes, or you can use the DNR web site: mndnr.gov
American Red Cross: **Minneapolis Chapter Safety Programs** 1201 W. River Parkway Minneapolis, MN 55454 **Saint Paul Chapter Safety Programs** 100 S. Robert Street Saint Paul, MN 55107 **Northland Chapter Safety Programs** 2524 Maple Grove Rd. Duluth, MN 55811	Swimming, Lifesaving and First Aid Classes and Programs

AGENCY/ORGANIZATION	PROGRAMS OFFERED
U.S. Coast Guard:	
U.S. Coast Guard 1240 E. 9th St. - Room 2047 Cleveland, OH 44199 **Coast Guard Station Duluth** 1201 Minnesota Ave. Duluth, MN 55802	
U.S. Coast Guard Auxiliary **Flotillas located in:** Mpls.-Saint Paul Metro Area, Duluth, Fargo-Moorhead, International Falls, Rochester/Winona	Public boating safety courses, Vessel Safety Checks
U.S. Army Corps of Engineers: **Saint Paul District** 180 5th St. E. Saint Paul, MN 55101	Operation of locks, Maintenance of Channels, Mississippi River Charts
National Oceanic & Atmospheric Admin. (NOAA) ***Office of Coast Survey*** nauticalcharts.noaa.gov/staff/chartspubs.html	Charts of the Great Lakes and the Minnesota-Canadian boundary waters, such as Lake of the Woods
U.S. Power Squadrons: **Duluth** **Hiawatha Valley *(Twin Cities)*** **Minnetonka** **Saint Paul**	Boating Safety, Boating and Seamanship Classes
Local County:	
County Sheriff	Enforcement, search and rescue and general water safety
Deputy Registrar	Licensing of watercraft

Equal opportunity to participate in and benefit from programs of the Minnesota Department of Natural Resources is available to all individuals regardless of race, color, creed, religion, national origin, sex, marital status, public assistance status, age, sexual orientation, disability or activity on behalf of a local human rights commission. Discrimination inquiries should be sent to the Affirmative Action Officer at Minnesota Department of Natural Resources, 500 Lafayette Road, Saint Paul, MN 55155-4049 or the Office of Civil Rights, U.S. Coast Guard, 2100 2nd Street SW, Washington, DC 20593-0001.

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This information is available in alternative formats to individuals with disabilities by calling the phone numbers in the front of this manual.

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NOTES

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boatandwater.dnr@state.mn.us

MAN