

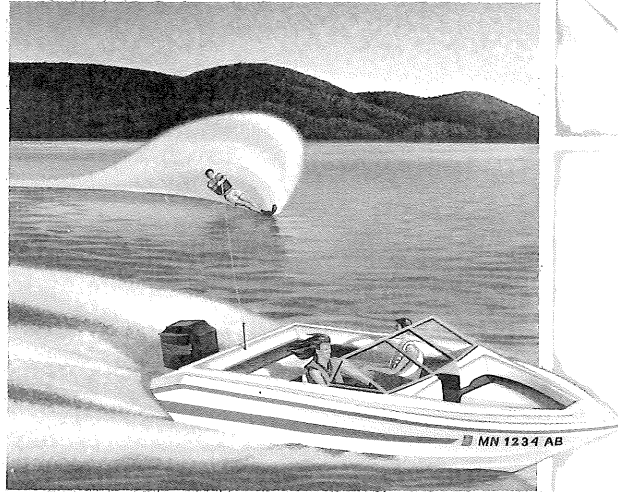
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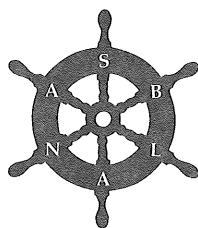
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BOATING & water safety

minnesota department of natural resources

BOATING & water safety

by Kim Elverum & Timothy M. Smalley



Contents approved by the
National Association of
State Boating Law Administrators
and recognized by the
United States Coast Guard



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of Natural Resources
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1

INTRODUCTION

The need for water safety programs

Minnesota has over 4,000 square miles of water, an area larger than the states of Rhode Island and Delaware combined. We have 12,000 lakes, innumerable ponds and marshes, and 25,000 miles of streams and rivers which, if linked together, would circle the globe. Some of these more inaccessible waters are used by a few hardy souls, while others, such as Lake Minnetonka near Minneapolis, are used by thousands for many recreational purposes.

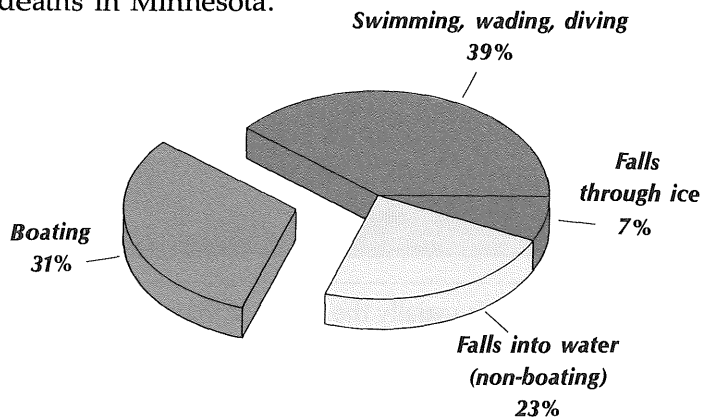
The use of recreational *watercraft** is a large segment of the water safety picture. There are more than 700,000 watercraft registered with the Department of Natural Resources License Center in St. Paul. They include: sailboats, rowboats, motorboats, canoes, *kayaks*, inflatable boats and paddlecraft. Some are large, some small, some inexpensive. Many are very dangerous in certain situations or when operated in an unsafe manner.

Considering the large number of participants in Minnesota, water-based recreation is a relatively safe pastime. Still, an average of 100 persons die in water accidents each year in the state. In addition, many more people are injured and hundreds of thousands of dollars worth of property damage results from boating mishaps.

****Each new term that is introduced will be printed in italics. Definitions of these terms can be found in the glossary starting on page 93.***

Water accidents

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



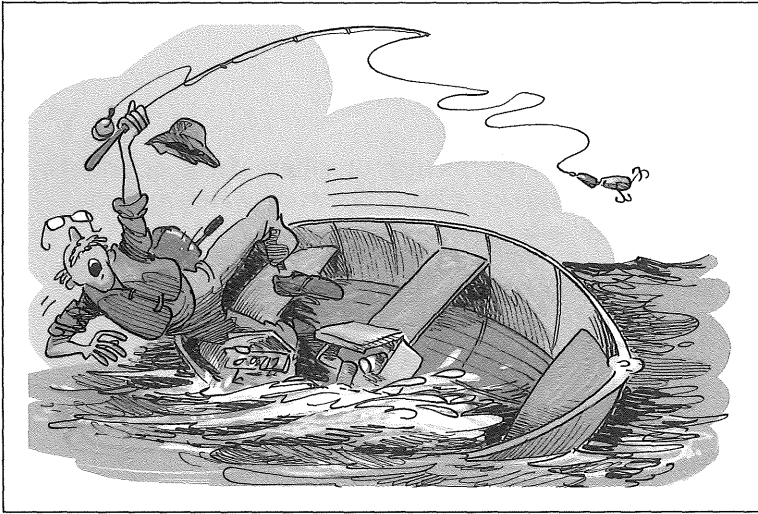
In understanding why boating accidents occur, it is necessary to look at the types of accidents and how they happen. The Department of Natural Resources annually compiles boating accident statistics and divides them into two groups: fatalities (where a death occurs) and non-fatal accidents (where only an injury or property damage occurs).

Fatal boating accidents

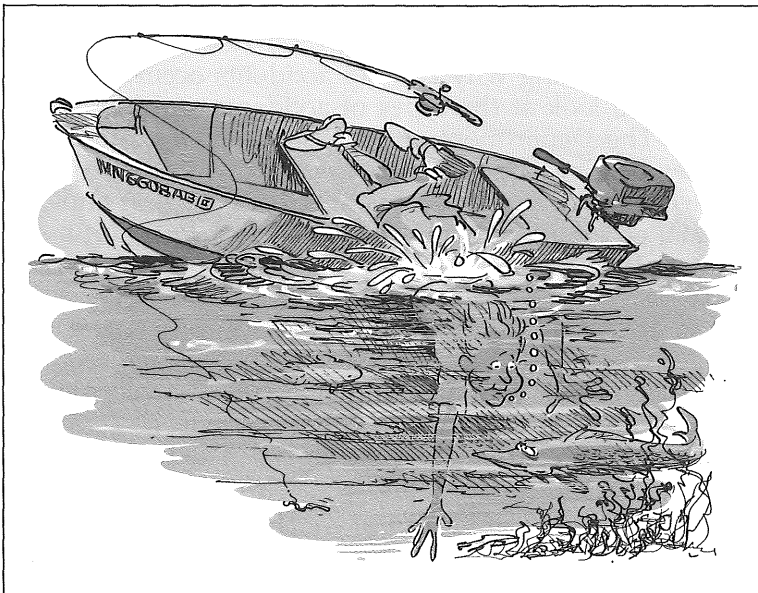
Generally, most boating fatalities occur in small, open boats powered by outboard motors (less than 40 horsepower) or in non-powered canoes. The three most common types of fatalities are:

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.



Capsizing (tipping over) is usually the result of improper loading, sudden turns or bad weather.



2. *Falling Overboard* — Many boaters, fishermen and hunters drown every year when they unexpectedly fall, or are thrown overboard. They may be riding on the *gunwale* of the boat. 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.



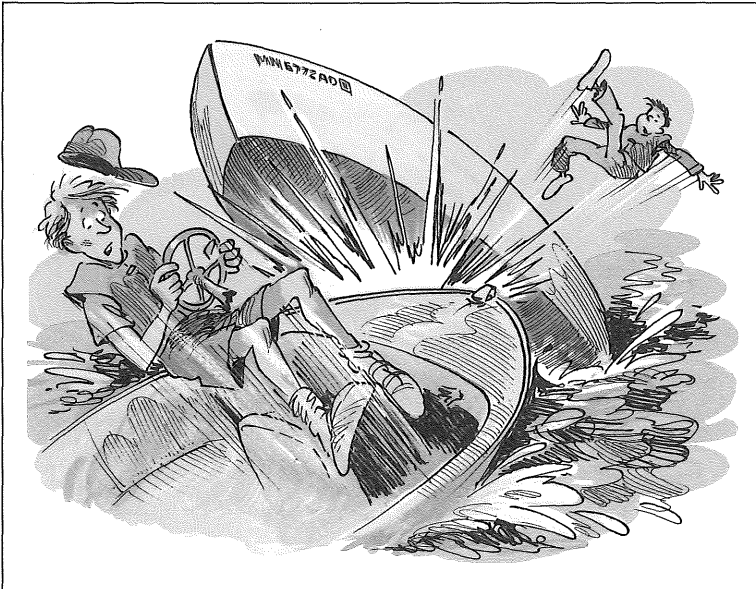
3. Swamping — This occurs when a boat takes in water over the sides or stern. Most swamping accidents occur when the operator disregards hazardous water conditions or slow down too quickly, causing the following wake to wash over the *transom*. A small, open boat, especially one that is improperly loaded or handled, can take in large amounts of water very quickly!

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:

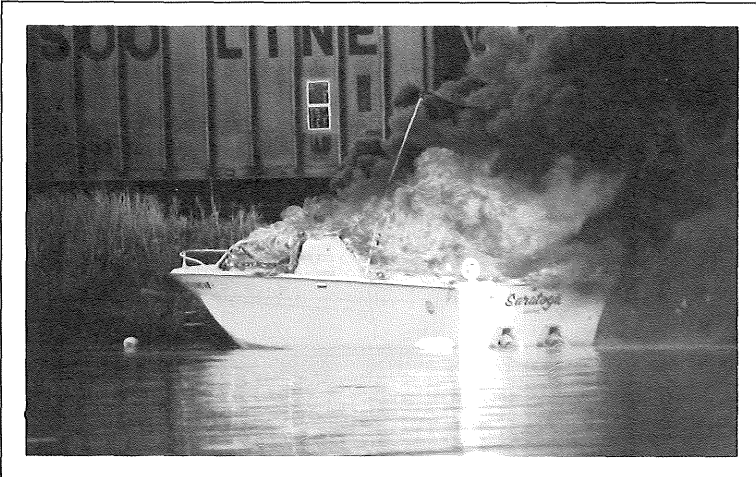
1. Collisions — Boating collisions usually involve two boats, or a boat and a fixed object. Collisions occur between boats when operators do not pay attention to where they are going, or if the "Rules of the Road" (See page 39) are not being followed. Collisions with fixed objects often happen when the operator is unfamiliar with the area, ignores navigation markers or simply does not keep a sharp forward lookout.

2. Fires or Explosions — These accidents often occur when the proper safety equipment, such as ventilation systems, fire extinguishers, etc., have not been installed



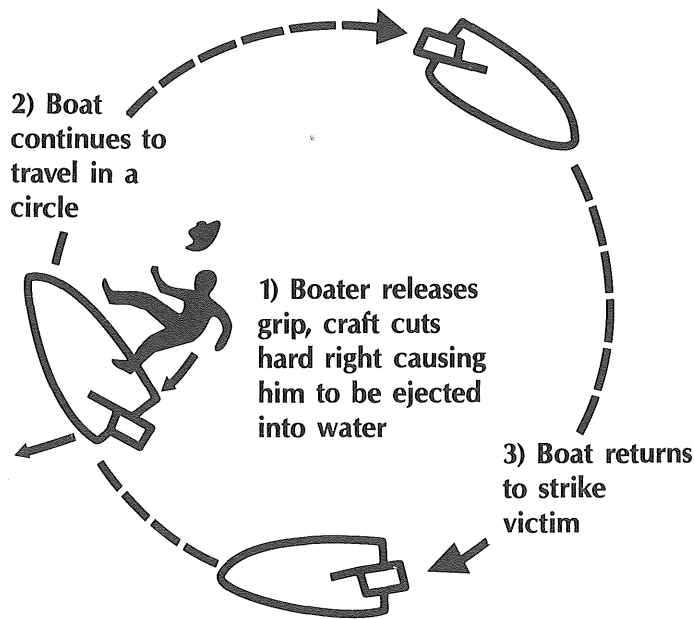
Collision, the most common type of non-fatal boating accident, is often due to operator inattention and use of alcohol or drugs.

or properly used. They also happen when proper fueling procedures are not followed, the fuel system is not properly maintained, or non-marine engine replacement parts are used.



Fires can usually be avoided by proper fueling procedures, regular and careful electrical and fuel system maintenance, carrying a fire extinguisher, and visual and "sniff" inspection of engine areas for fuel odors.

The Circle of Death



The "Circle of Death"

Every year, serious injuries and deaths occur when operators let go of the steering wheel or outboard steering handle. 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 then 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 large outboards and inboard-outboard craft, corrective measures may involve resetting the boat's trim tab,

that 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 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, lifejackets are on board the craft but are not being worn at the time of the accident.
- The use of alcohol is involved in about half of all boating accidents.
- Half of the fatal accidents occur when water temperatures are cold (less than 70 degrees F. or 21 degrees C.).
- Most boating accidents occur during the day and in clear weather.
- The majority of boat operators involved in accidents have considerable experience in using their craft but have never taken a formal boating safety course.

You are the key to water safety

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

Let's look at your responsibilities:

As a boat operator, you are the "captain of the ship." You are expected to know federal, state and local regulations that apply to your watercraft and the waters in which you are operating.

It is your obligation to have the safety equipment required by law, to keep it in good condition and always on board, and to 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 your passengers. You are responsible for your actions, and those of your passengers from the time you leave the dock until your return.

The water user has a final responsibility which frequently is 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 those of his own. For example, not all people enjoy water skiing.

There are great numbers of persons who enjoy sailing, fishing, canoeing, or skin diving. Everyone has the right to enjoy their interests and a right to use public waters, so long as they do not interfere with another person's right to enjoy his favorite activity. (Example: creating a large *wake* too close to someone who is fishing, thus disturbing the fisherman as well as endangering his life.)

To summarize, the watercraft user's responsibilities include:

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

The objective of any water 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 & SAFETY EQUIPMENT

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

Watercraft licensing

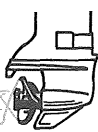
A law passed by the 1959 Legislature requires Minnesota watercraft owners to obtain a license for their craft.

The Department of Natural Resources (DNR) began to issue watercraft licenses on July 1, 1959, and by the end of that year, 160,000 boat owners had responded to 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 duckboats used during the appropriate season, non-motorized boats nine 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.

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 Bureau.



2. Fill out the license form for *new* watercraft.

3. Pay the fee and obtain a temporary permit if you wish to operate your watercraft immediately. If you do not receive a temporary permit, you *cannot* operate your craft until you receive your watercraft 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 31st of the third year).

5. You will receive your watercraft license from the DNR. 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 *Boating Guide*).

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

Watercraft license renewals can be made at the DNR License Bureau 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 45 days before the expiration of your current license.

A duplicate license card will be issued to you if you should *lose* the original *card*. You must sign an affidavit of loss and send it with the required fee to the License Bureau.

The DNR License Bureau 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 mail both forms and the required fee to the License Bureau within 15 days of the transfer of ownership.

If you destroy your watercraft, you must notify the DNR License Bureau within 15 days.

Watercraft operator's permit

Persons 12 through 17 years of age who operate boats of more than 30 horsepower must either: (1) be accompanied by someone at least 18 years of age, *or*, (2) possess a valid watercraft operator's permit from Minnesota or from the operator's state of residence. Persons less than 12 years of age must be accompanied by someone at least 18 years of age to operate a motorboat of more than 30 horsepower, except in an emergency.

There are special age restrictions for operators of personal watercraft (Jet Skis, Wet Jets, water scooters, etc.) See the personal watercraft section of this manual for specific information.

The watercraft operator's permit will be issued to individuals when they have successfully completed the approved educational program and passed the written test.

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

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 the National Park Service. Examples of these waters can be found in the current *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



MN DNR conservation officers and county sheriffs enforce Minnesota's boating laws as well as other regulations.

guilty of a misdemeanor. The penalty for committing a misdemeanor is a fine up to \$700 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 ten 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 13 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* 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.

6. To operate any watercraft in a manner which obstructs navigation.

7. To moor, attach or hold 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. To operate a watercraft within an area specifically marked or set aside as a swimming area.

9. To operate a watercraft so that its wash or wake will endanger, bother or unnecessarily interfere with any person or property.

10. To operate 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.

Safety equipment

Minnesota boating laws and regulations list the equipment you must have on board your watercraft. Good skippers check their equipment *before* they use their craft to be certain it's aboard, in good condition and they know how to use it especially during times of danger.

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 seagulls 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.

Personal Flotation Devices — PFDs

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 anticipated danger. Perhaps if they knew what was going to happen, they would have worn their personal flotation devices (PFDs, or life preserver).

Why are PFDs so important? Every year over 90 percent of all boating deaths were 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 Guard approved personal flotation devices (PFDs) for each person on board.

PFD is a collective term used for all types of approved flotation devices. These devices are described below and are most often made of *kapok*, fiberglass or plastic foam. Boaters should *check the latest state and federal regulations for specific PFD requirements!*

Most adults need an extra seven to twelve 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 PFD.

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 persons from a face downward to a vertical or slightly backward position in the water. The Type I PFD has a minimum of 22 lbs. of flotation.

Type II (Near-Shore Buoyant Vest). The buoyant vest usually looks like a bib with a collar behind the neck. It has a turning ability 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 three sizes. The Type II vest has a minimum of 15.5 lbs. 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, 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 PFD types for hypothermia (exposure to cold water). The Type III PFD also has a minimum of 15.5 lbs. of flotation.

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



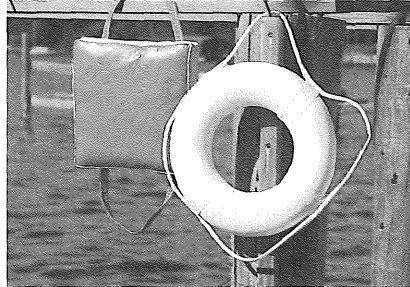
Off-Shore Life Jacket



Near-Shore Buoyant Vest



Flotation Aid



**Throwable Devices
Buoyant Cushion and Ring Buoy**

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 18 lbs. 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 16.5 lbs. of flotation.

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

Hybrid Type V PFDs have about 7.5 lbs. of buoyancy and when a special internal bladder is inflated have a total buoyancy of 22.5 lbs.

Some flotation devices, such as inflatable vests or jackets and ski belts, do not qualify for Coast Guard approval.

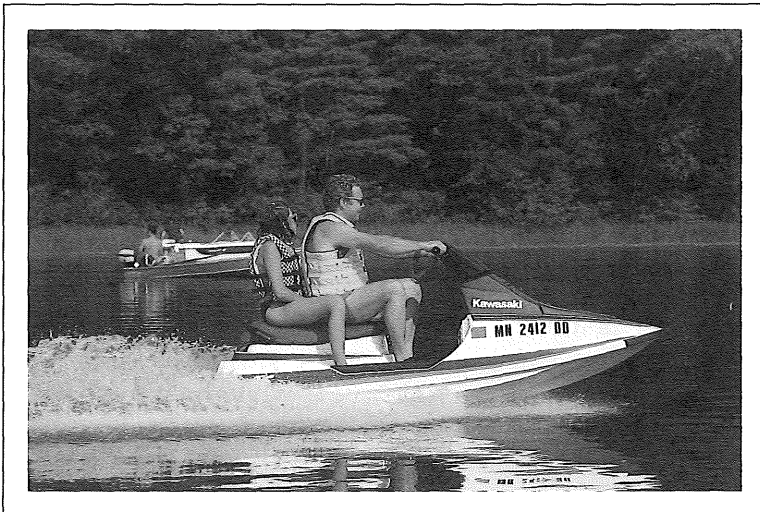
A final note about PFDs. Flotation devices will not last forever and should be checked periodically. Here are some other helpful hints:



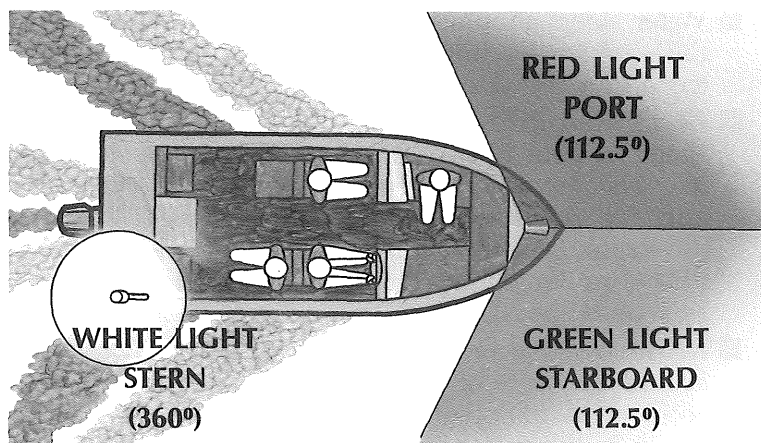
Many articles found in boats can act as emergency life saving devices. Soda coolers, gas cans, duck decoys and other floating items have all been used to save lives.

- *Always* purchase U.S. Coast Guard approved personal flotation devices. Be sure to remove the plastic bag covering most PFDs at the time of purchase and then check the label to be sure they *are* Coast Guard approved.
- PFDs are required to be either worn or readily accessible when you are aboard your boat. Readily accessible means easy to reach in an emergency. PFDs in locked lockers, under anchors or in plastic bags are not accessible.
- A law passed in 1991 makes it mandatory for operators and passengers of personal watercraft (Jet Skis,[™] Wet Jets,[™] water scooters, etc.) to WEAR a Type I, II, III or V PFD. See the section of this book on personal watercraft for more information on personal watercraft safety and regulations.
- Try out your PFD at least once a year in the water. This will show you how it works and give you confidence in its use.
- Be certain that everyone on your craft knows how to use his or her PFD. Make sure you have the correct size for each person aboard before leaving the dock.

- Water skiers should purchase and wear approved PFDs which are impact rated and provide good protection for the skier.
- Check your PFD regularly to be certain it's in good shape. If your PFD contains kapok, the kapok fibers may become waterlogged and lose their buoyancy after the vinyl insets are punctured or split. When the kapok becomes hard or soaked with water, the PFD is no longer serviceable and should be replaced as soon as possible.
- Remember that in most boating fatalities PFDs were aboard but were not being worn at the time of the accident. A PFD that's left on a boat seat does the victim in the water little good. **WEAR YOUR PFD!**
- There are some other common articles which can act as lifesaving devices when an emergency exists. Large vacuum 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. Remember the two men on Lake Mille Lacs who are alive today, thanks to a gas can!



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



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

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 **Boating Guide** or federal regulations for the lighting requirements for their craft. Generally, motorboats, when underway, are required to display a green light visible on the *starboard* (right) side, a red light visible on the *port* (left) side, and a 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.

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

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

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.



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

Fire Extinguishers

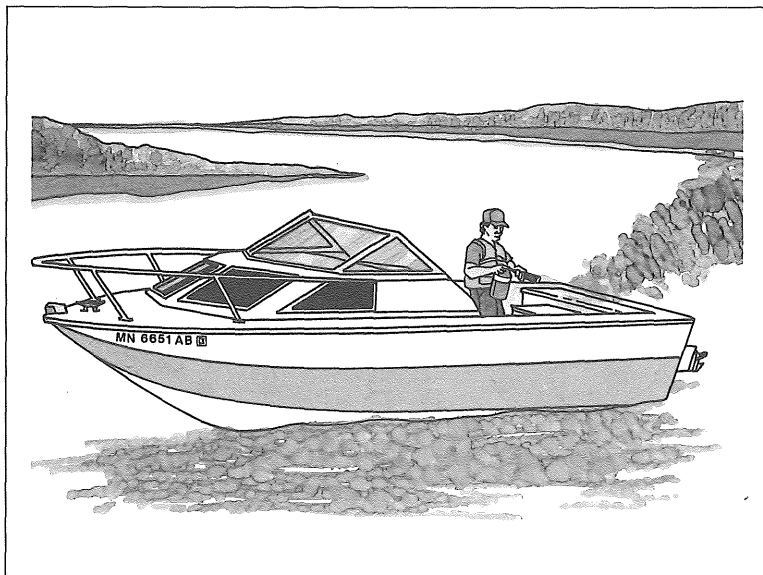
Fire extinguishers are classified by their size and the type of fire they will put out. Extinguishers approved by the Coast Guard for motorboats are hand portable and will have a B-I or B-II classification stamped on the label. The B-II extinguisher is the larger of the two. Fire extinguishers in either of these classifications can be used on *all* gasoline, oil and grease fires. Water should be used on wood or paper fires only.

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 **Boating Guide** for specific requirements.

Check extinguishers prior to each boating season to see that proper pressure is maintained, hoses are in order and that they are not damaged. Never try an extinguisher to see if it works properly, as gradual discharge may 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 PFDs.
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



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

forward, put the stern or back of the boat into the wind. This may 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 *ten* 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.

Newer inboard and inboard-outdrive boats will also have a power-operated bilge blower connected to the ventilation system. The blower should be run for several minutes before starting the engine and whenever the boat is operating below normal cruising speed.

The importance of a ventilating system cannot be overstressed. Gasoline fumes are heavier than air and will settle into out-of-the-way places. An explosion can result if these fumes are ignited.

Although no fool-proof ventilation system has been developed, the proper use of present systems can greatly *reduce* the possibility of an explosion.

Backfire Arresting Devices and Mufflers

All motors (except outboard motors) must have an approved device for stopping or arresting backfire attached to the carburetor.

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.

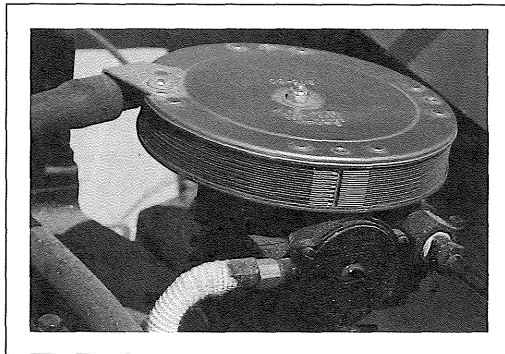
Signaling Systems

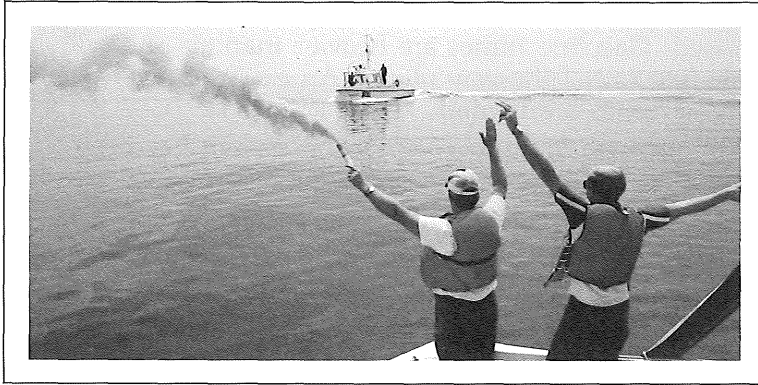
A whistle or horn is required on all motorboats 16 feet or longer. Check the current regulations for exact requirements. Larger boats should also carry a bell. Standard whistle signals are on page 39.

Here are some other points on sound-producing devices:

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

A flame arrestor prevents backfires from entering the engine compartment.





Visual distress signals are required on the great lakes and the ocean. There are several different types of Coast Guard approved devices such as flags, flares, and smoke.

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 Coast Guard approved visual distress signals. These can include flags, flares, distress lights or smoke signals. Before venturing out on these waters check federal regulations for specific requirements and exceptions.


Other Desirable Equipment

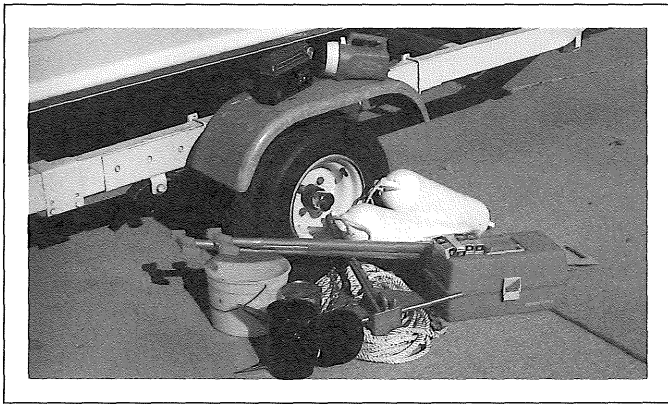
1. Bilge pumps and *bailing* devices: Always carry some type of bilge pump or bailing container (it could be a coffee can or minnow bucket) in your watercraft.
2. Anchor and line: Every boat should be equipped with an *anchor and line*. The type of anchor will depend on the size and weight of your craft, and the waters you cruise.
3. A tool kit and spare parts: It is always a good idea to carry a few basic tools such as a screwdriver, pliers, 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: Keeping these items in a small craft is absolutely necessary.
5. Extra fuel.

10. **Radio:** A portable AM radio is nice to have on any boat to pick up weather reports. On larger craft, a two-way radio (either CB or Marine Band) is recommended. Marine Band 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 agencies.

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, jail sentence, or other penalty can be imposed on anyone who is convicted of this offense. Remember, "If you carried it out, carry it back!"

Marine toilets are another source of pollution if not designed correctly. They must be of a sealed construction so that no waste can be discharged from the toilet into the water. See current **Boating Guide** for more information. 



A number of extra items not required by law, but valuable in case of engine breakdown or other emergency.

3

SAFE BOAT OPERATION

Boats

Selecting a boat to suit your needs can be a difficult problem, especially for a new boater. A boat that might be perfectly safe on a Minnesota lake of 60 acres would 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

Wooden boats have excellent riding and handling characteristics, but should 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.

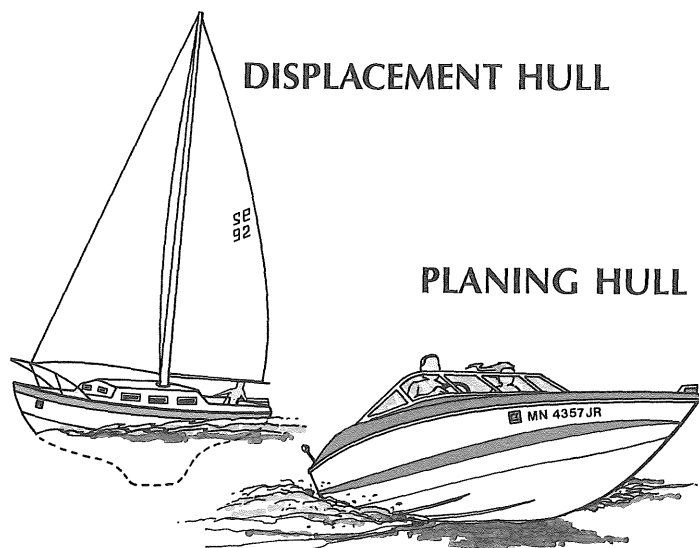
Most of the damage boaters encounter on an otherwise sound boat can be repaired. Localized rot can be cut away and the wood replaced. However, when rot has spread throughout a boat, it should be junked. Rough water can smash a rotted or poorly maintained boat.

Steel boats can become damaged by rust. Badly rusted 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 all 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 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 meshed 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.

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. More power makes it go even faster. A displacement hull plows through the water even when more power is added.

How a boat is to be used, and the usual speed at which it is to be operated determines whether you want a displacement or planing type hull.

Six common designs that include planing and displacement hulls are:

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

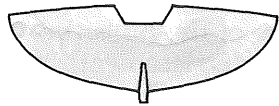
Flat bottom, square-sided boats include boxy, home-made utility boats, racing runabouts and deluxe 40-foot houseboats. Flat bottoms plane easily. This type of boat is good for fishing in smaller lakes and rivers because it rides flat on the water and will not top excessively when passengers move about. On the other hand, it is not stable in rough water.

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

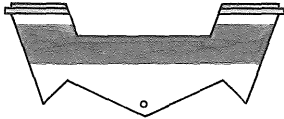
HULL TYPES



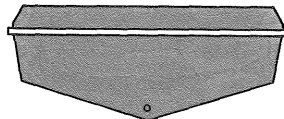
FLAT BOTTOM



ROUND BOTTOM



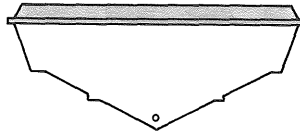
CATHEDRAL



V-BOTTOM



CATAMARAN



DEEP-V

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.

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.

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 popular on many fiberglass 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.

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.

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

Every boater should become thoroughly familiar with his boat so he knows 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. To help the purchaser decide the motor size he 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.

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 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.

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

1.

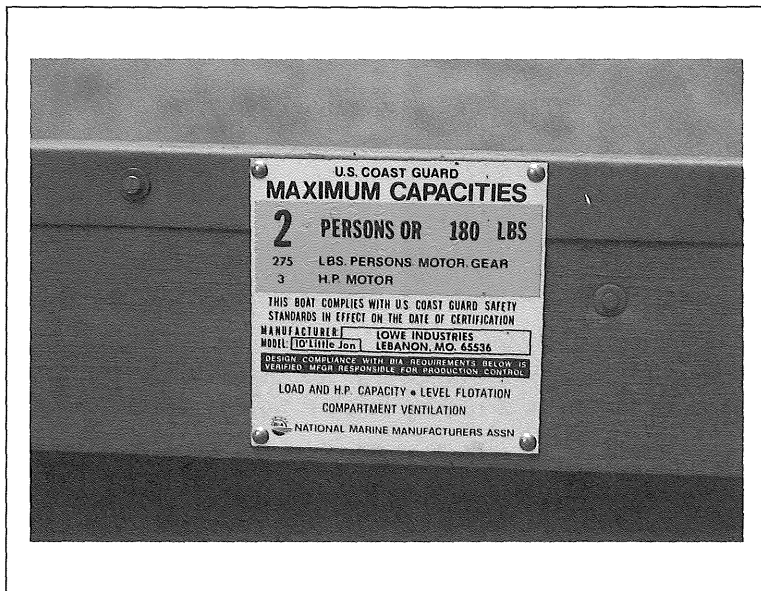
Multiply over all length _____ ft. x stern width _____ ft. = factor _____

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
H.P. capacity is	3	5	7½	10	15	(2 x factor) - 90	(½ factor) - 15	(.8 factor) - 25

H.P. capacity = _____ (raise to even 5 horsepower increment if factor is over 52)

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



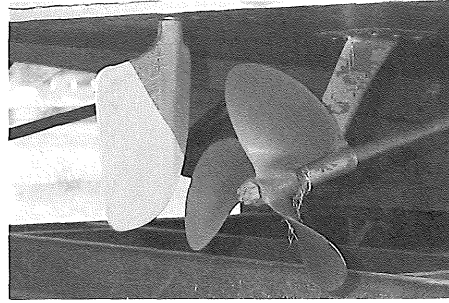
A capacity plate can be found on most new watercraft. It lists *maximum* outboard motor horsepower as well as carrying capacity of the boat.

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.

Outboards are usually gasoline powered and range in size from less than one to 300 horsepower. 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 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.

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 other moving parts.



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.

Inboard-Outdrive 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 7 of this book.

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 of the craft.



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

All *ports*, windows *hatches* and doors on the boat must be closed, and motors, fans or 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.

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 15 sticks 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 any leakage. Shaking of the boat by the engine or rough weather can often loosen connections.

Any gasoline taken aboard must be in a separate, 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. Immediately wipe up any spilled gasoline. Destroy the rag you used 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 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:

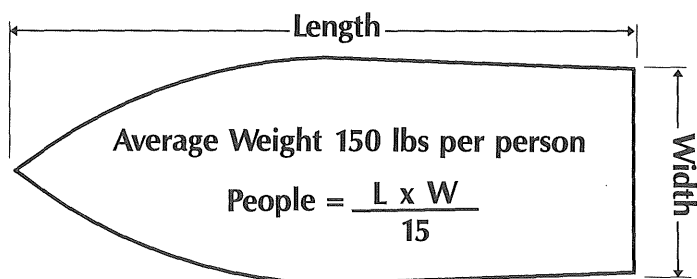
- The outboard or lower unit should be set at the proper tilt angle for the most efficient cruising or trolling.
- Plan cruises so you can "buddy-up" if possible, but remember not to overload.
- Outboard motors are controlled by internal temperature for instant warmup, so it isn't necessary to idle the 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 a 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 Calculation



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



On most watercraft, the capacity plate will indicate the maximum weight in pounds. An example of a capacity plate can be seen on page 31.

"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 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.

1. A person standing in a small craft can drastically change the boat's center of gravity. The result is a watercraft that will easily capsize.

2. 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.



Wrong!

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

3. 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.

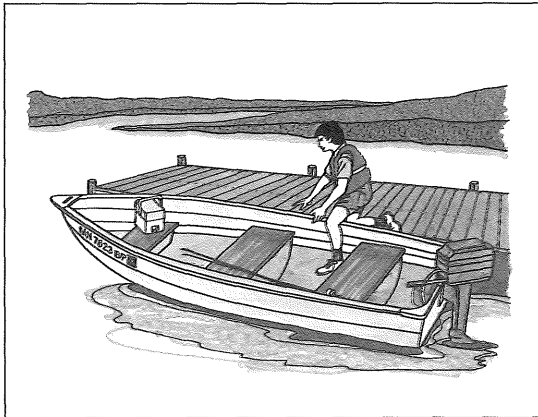
Boarding

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 him steady the boat from the dock while you board. Once in, steady the boat for others.

Right!

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



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

A father and his two sons were water skiing one Sunday night. The father had just dropped his one son off and was heading into shore with his other boy. He turned the boat sharply toward shore and the boat tipped up on its side, throwing him out. Fortunately for the youth, the boat righted itself and came to a stop.

The father, who could not swim and was not wearing a PFD, wasn't as fortunate. Despite efforts by his son and the rescue squad, he was dead on arrival at the hospital.

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.

The watercraft which has the right-of-way is the *stand on or privileged* boat (P); the boat which must yield to the other is the *give-way or burdened* boat (B).

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.

Whistle Signals — (International/Inland)

Short blasts - one second each.

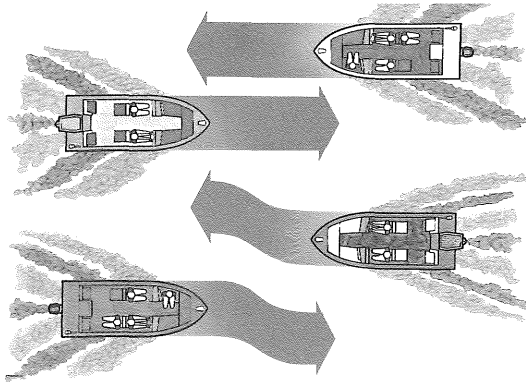
1 blast - I am turning to starboard (right) or, I will pass you on my port side.

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 blasts - 4-6 seconds each.

1 blast every two minutes when visibility is restricted.

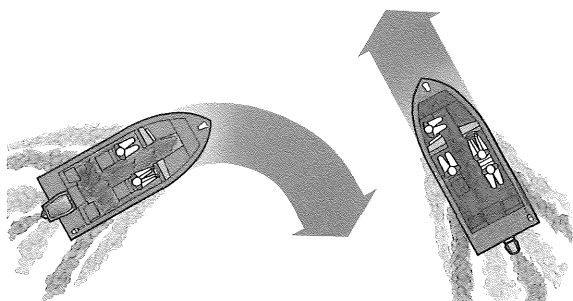
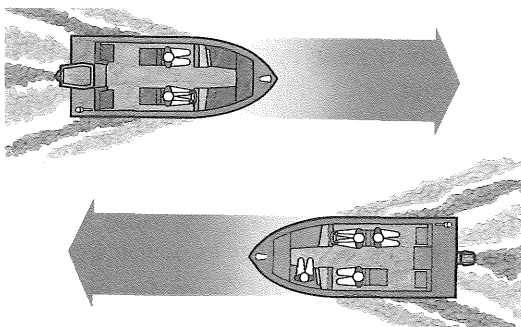


Port to Port or Head to Head

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

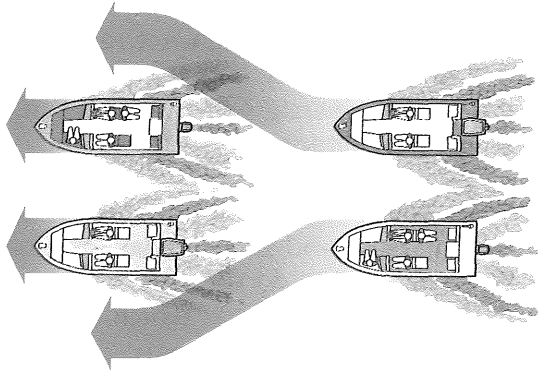
Starboard to Starboard

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.



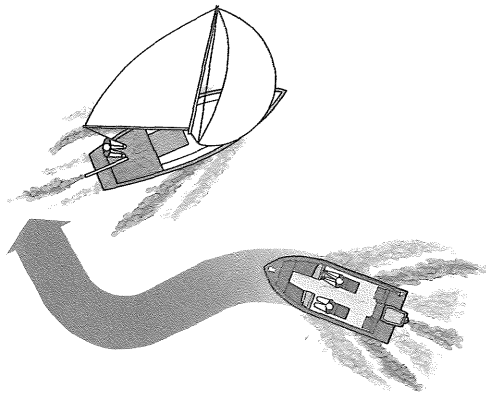
Crossing

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



Overtaking

In an overtaking situation, the boat being overtaken has the right-of-way 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.



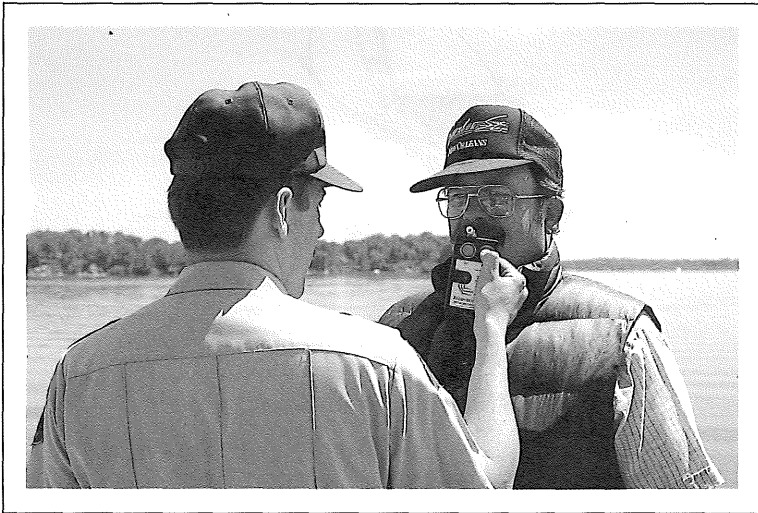
Non-Motorized Boats

Except when passing, sailboats and non-motorized craft have the right-of-way over motorized watercraft. Steer clear of them, and remember that your wake can cause them trouble. Keep your distance from large commercial vessels. Remember, you can maneuver more easily and quickly than they can.

Mindful boating procedures

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.
- Do not enter prohibited areas which are lawfully marked by buoys or signs.
- Keep to the right in narrow channels and operate at slow speeds.
- At night, running lights (See page 20) indicate which boat has the right-of-way. The green light is on the starboard (right) side and a red light on the port (left) side of the craft. If the red and white lights are the only ones visible, then that boat is privileged and has the right-of-way.
- Though you may have the right-of-way, always use common sense! Just because you're in the right, don't make yourself *dead* right.



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

Alcohol

It's been estimated that the use of alcohol is involved in approximately half of all the boating accidents that occur in Minnesota and the nation. This includes not only the spectacular collisions, but the lone fisherman who drowns after falling out of his boat on a peaceful northern lake.

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

1. *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.

2. *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.

3. *Vision* — Vision is also affected by alcohol. A couple of beers and the average person reduces the eye fixations of his surroundings by as much as half those of his 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.

4. *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.

5. *Reaction Time* — Physical reflexes are slowed by alcohol. This creates a dangerous delay when the operator has to react quickly.

With a little common sense, boating is one of the safest 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. Remember, you can't walk away from a boating accident!

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 is also a valuable source 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:

- 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 the west and particularly from the southwest.
- 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. Put on your PFDs if you haven't done so already.
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 PFDs and stay as close to the centerline as possible.
6. Keep bilges free from water.



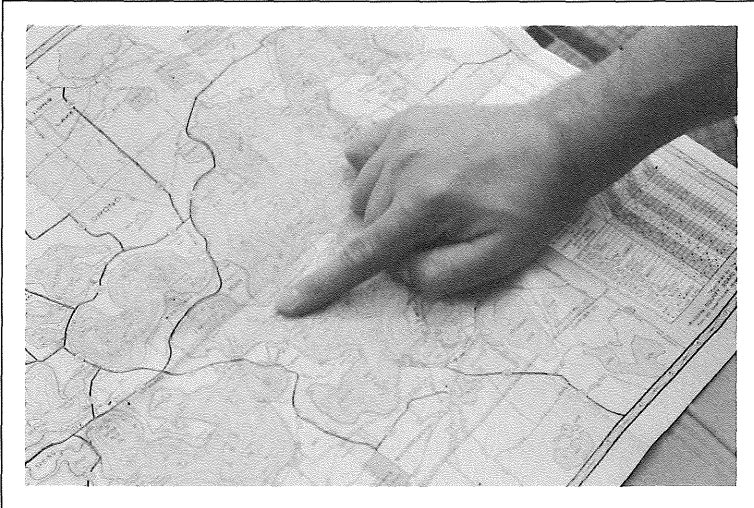
Keep an eye on the weather. When it starts to blow it's time to go.

7. If motor fails, trail a sea anchor on a 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 does start 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!*



Navigation

Charts and Compasses

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.

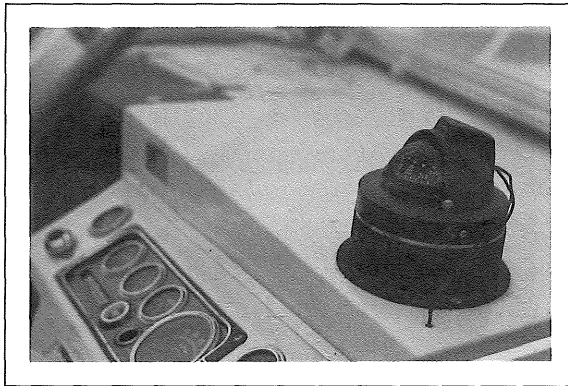
A boater will be glad he has a compass on board when fog, darkness or a change of weather sets in. Make sure the compass is mounted away from iron, magnets, or electrical wiring and equipment. Hand compasses are usually unreliable on a boat and are easily lost.

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.

Charts and maps are available from several sources. Charts of navigable waters may be obtained from the National Ocean Survey Office and U.S. Army Corps of Engineers. Survey maps of most Minnesota lakes are available from the Documents Section of the State of Minnesota. Addresses can be found in the appendix of this book.

These charts contain information on channels, sand bars, rocks and vegetation. Water depths pinpointed on

A good compass is useful during darkness and fog especially when on large bodies of water.



these maps are of great value whether pleasure boating or fishing. This information can also make you a safer boater.

Aids to Navigation

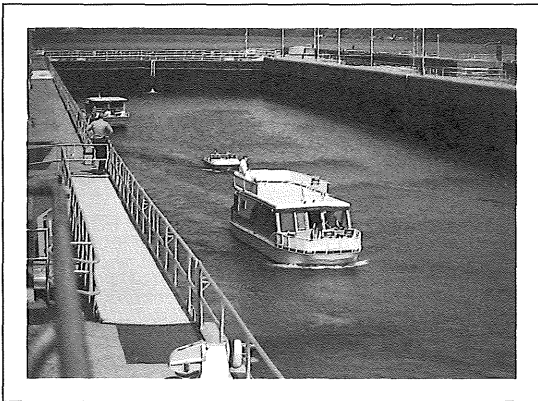
Navigational aids are signposts to guide the boater safely through our waterways. Boaters will be primarily concerned with buoys and signs found on inland waterways. — (See Inland Waterway Markers on page 49).

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.

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 PFD 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.



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

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

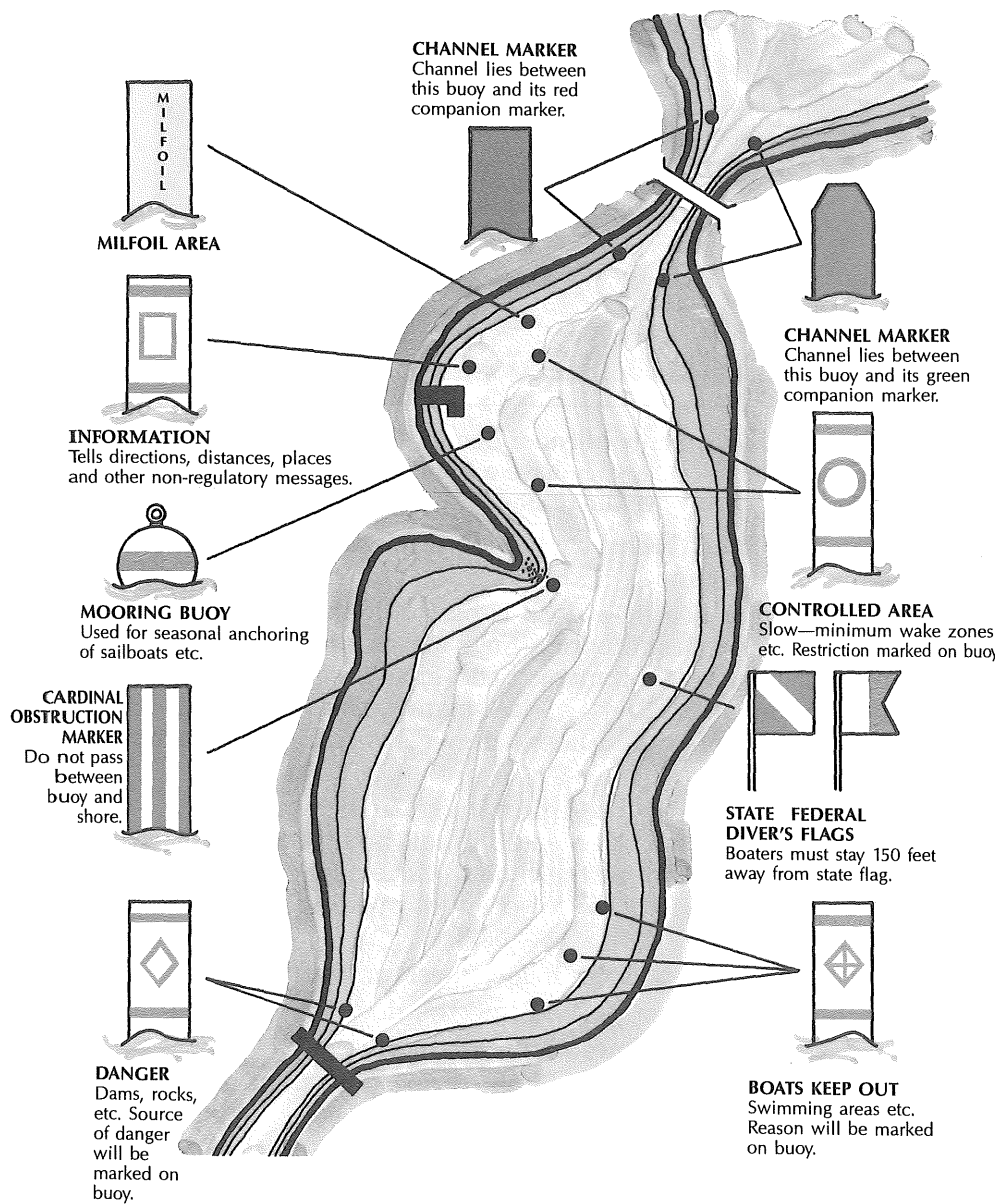
Docking is like parking a car — you can improve on your skills with some practice. Put out anchored floats and practice docking from all sides. Learn how wind and current affect the docking of your boat.

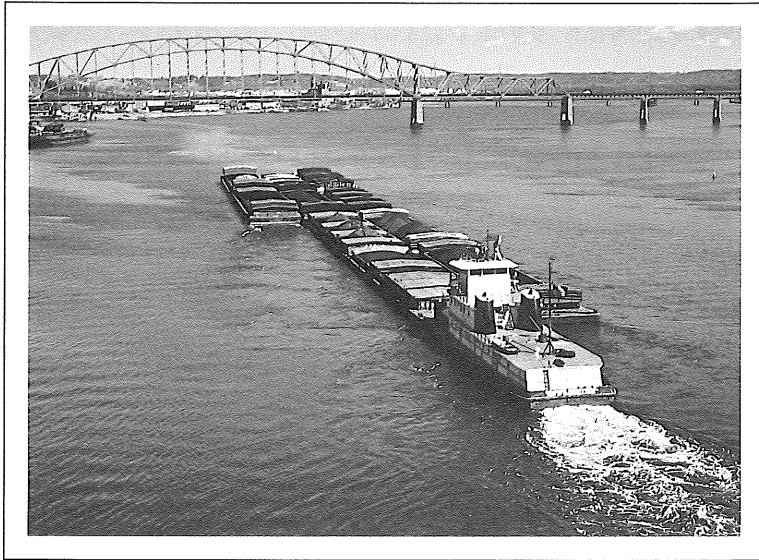
Move slowly!

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, he eases 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 boathook or your hand, and step ashore with

INLAND WATERWAY MARKERS





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.

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 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.

Learn how to tie a few firm knots, and then practice until you have mastered each. 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.

When leaving a dock, follow these procedures:

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

1. Cast off stern line, keeping bow secured.
2. Turn the motor or rudder to carry the stern away from the pier.
3. Shift into forward and go slowly ahead of bow mooring.
4. After stern swings from the pier, shift to reverse to gain slack in the bow line and cast off, free and clear.

5. 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:

1. Cast off lines.
2. Use an oar or paddle and push to keep boat clear of dock.
3. Let wind or currents carry the boat out.
4. 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*.

On the water, you may wish to anchor your boat, whether to fish, swim or for some other reason. The type of anchor you select will depend on the size of your craft and the waters you cruise.

Be sure the anchor line is strong enough and long enough to anchor your boat. A good rule of thumb is for the line to be at least six times as long as the maximum depth over which you will 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 periodically as 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.

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.

Occasionally anchors take too firm a bite on the bottom or become wedged between rocks and other objects. If this occurs, circle the anchor with your boat under power. When the anchor breaks free, stop your boat. Never run at any speed while dragging an anchor.

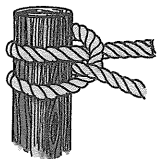
Know These Knots



Square Knot



Anchor Bend



Clove Hitch



Cleat



Bowline

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. If the weight of boat and motor is within 100 pounds, buy the next larger trailer because your gear will certainly total over 100 pounds (example: motor gas weighs 6.6 pounds per gallon).

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 im-

portant. Frame-mounted hitches are superior to bumper hitches because they reduce trailer swing (a common occurrence with a bumper hitch). 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 (40-125 pounds) can be handled easily by the average person.

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 the top of page 54.)

Brakes are required on boat trailers with a load capacity over 3,000 pounds. 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 tail lights, clearance lights, turn signals, brake lights and other trailer requirements, contact your local Minnesota State Patrol office.

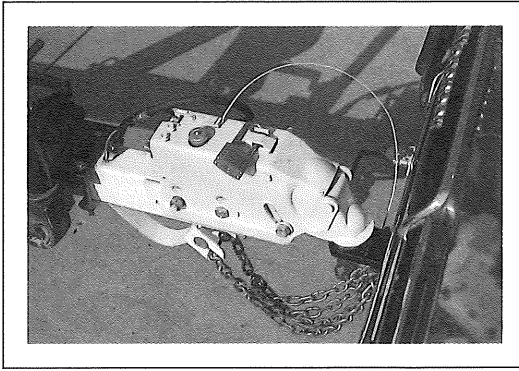
Trailer Maintenance

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.

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



Trailer 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 immerse 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 and trailer to the proper position, set your brakes. Remember, the park mechanism of your transmission is not adequate for positive holding on a slanting launch site. Be sure to set your emergency brake. Avoid the embarrassing situation of submerging your car and damaging your boat.
- A hitch added to the front bumper of your car can aid launching or loading. A front hitch allows you to maneuver your trailer easily on a tight or winding ramp, and headlights provide plenty of light for night time handling.
- If you are trailering a sailboat be extremely careful of overhead electrical wires.

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.

Public water access

Minnesota has over 1,900 public accesses in lakes and rivers. Approximately 1,100 of these are managed by the DNR. Free maps showing individual accesses are available for most counties.

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.

For further information, contact the DNR Public Water Access Section listed in the agency directory located at the end of this book. 



4

SAFETY IN OTHER ACTIVITIES

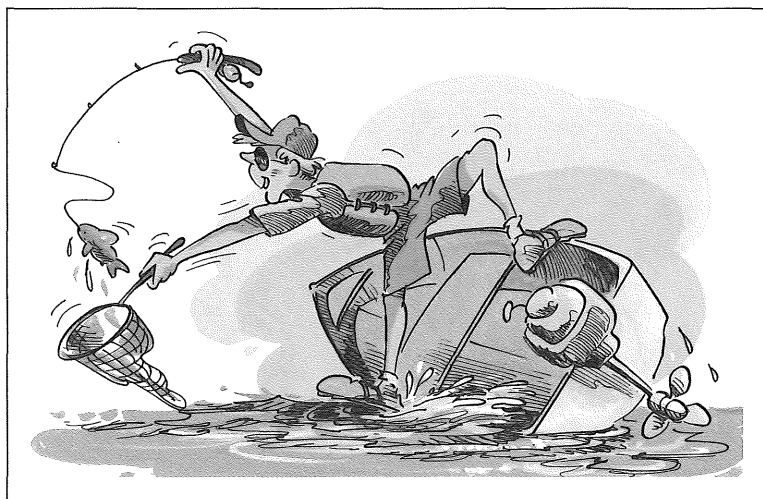
Fishing

Each year in Minnesota, fishermen 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 F. where *hypothermia* (exposure) is a factor. The use of alcohol is also involved in many fishing accidents.

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

1. 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.
2. Don't try starting an outboard motor while standing...even if you remembered to put the gear-shift into neutral.
3. Never overload or overpower your boat beyond the maximum limits listed on the capacity plate.
4. When you do load your fishing boat, distribute persons and gear evenly. The boat will be steadier in the water and will handle better.
5. 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.

6. Booze is bad news! Even in moderate amounts, alcohol (including beer) adversely affects such vital body functions as balance, coordination and judgment.

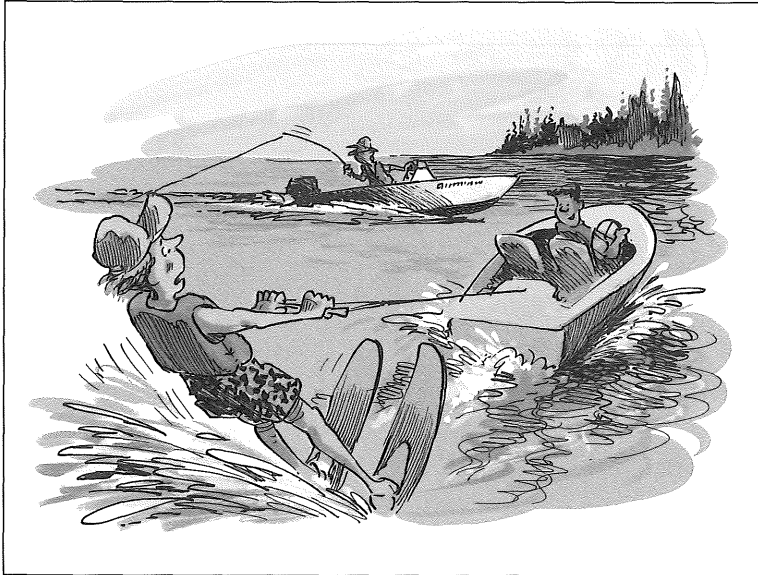
7. Don't stretch your money and your luck. Use the proper boat for the waters you'll be fishing. A small, open boat on a large, open lake can spell trouble.

8. Stay with your boat if it stays afloat and it's not in danger. Most new fishing boats will have built-in flotation and provide support for victims of a swamping or capsizing accident.

9. 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 PFD, and can re-enter your craft rather than trying to swim.

10. Keep an eye on the weather. (Most bad weather in Minnesota comes from the west or southwest.) 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.

11. Wear your personal flotation device (PFD) 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 PFD. Approved models are now stylish, comfortable and practical for the angler.



Water skiing 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

Water skiing is increasing in popularity each year. It is considered a "safe sport," but with more participants and heavier boat traffic, skiers 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 PFD designed for skiing, along with some swimming ability is a *must* for water skiers. A beginner will find that he floats easier with an approved PFD and has an easier time recovering and putting on his skis. An experienced skier learning new tricks or stunts receives the same benefits. In addition he has "cheap life insurance" if he suffers 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. Loose runners or foot harnesses can make skiing difficult and dangerous.

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, lines are made of 1/4-inch plastic, manila or linen, which is braided or twisted for strength.

The boat operator is not driving for his 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 he receives a 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 his 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 m.p.h. is sufficient for most beginning skiers, depending upon their weight. Skiing with one ski can be learned at about 18 m.p.h. Rarely does a novice or amateur skier need speeds of more than 25 m.p.h.

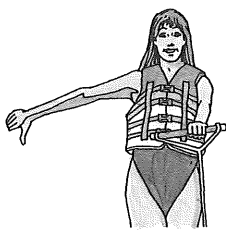
A good driver constantly checks his skier and the surrounding water, even if he has an observer (or mirror) on board.

The skier should never put the tow handle or rope around his body or limbs. This is inviting disaster — a broken limb, neck or even drowning. Show-boating on water skis can only lead to serious injury.

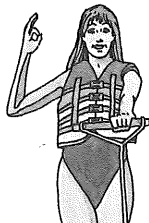
SKIING SIGNALS



FASTER



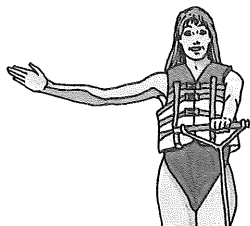
SLOWER



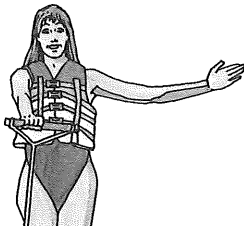
SPEED O.K.



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!**

Although not usually required by law, skiers should stay at least 150 feet from docks, swimmers, boaters, fishermen 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 he is injured or in distress, to protect him from any nearby boat traffic, or to return the ski rope so he may resume skiing instead of wasting energy treading water.

Turning or curving around a skier to return the tow rope can wrap it around his body, possibly causing a burn or entangling him. Better yet, slowly pass by him in a fairly straight line while trailing the rope. The skier should allow the rope to slide through his 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 and boat should be the deciding factor.

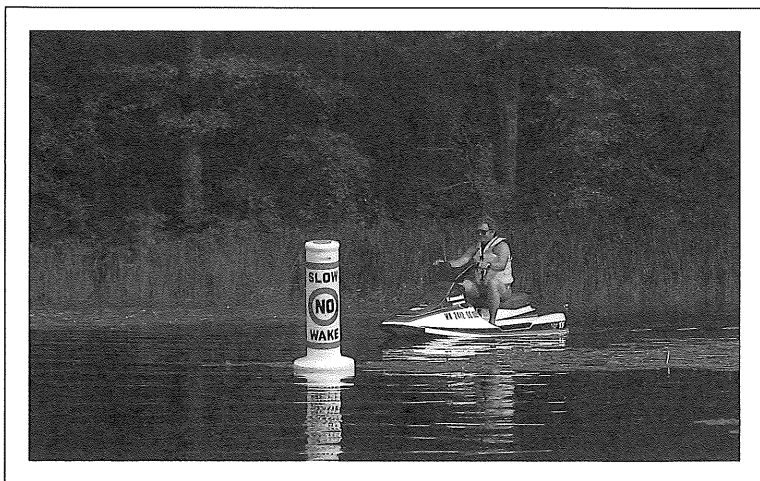
A novice skier should receive instructions from an experienced skier or ski school and become familiar with standard water ski signals.

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, his 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.

Night skiing may seem glamorous and exciting. But only the foolhardy, exercising extremely poor judgment would attempt anything so dangerous. It is also illegal.

Courtesy is important to enjoyable water skiing. This sport requires plenty of elbow room and competition for a place to ski is growing each year. A safe, sane and courteous approach to skiing will guarantee its rightful place among our water sports.



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

Personal watercraft

What is a personal watercraft? Sometimes known as *Jet Skis, Wet Jets, Wave Runners, Sea Doos*, water scooters 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.

Personal Watercraft Legislation

During the 1991 legislative session, additional regulations specifically governing the use of personal watercraft were adopted. In summary, the new laws require that:

- 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 (PFD or life jacket).
- You may not operate a personal watercraft between sunset and 8:00 a.m. the following day.

- You may not travel at greater than a slow-no-wake speed, within 100 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 a factory-installed, or factory-specified accessory wide angle rear view mirror. The person being towed must also be wearing a PFD 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.
- 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 return-to-idle system.
- You may not chase or harass wildlife.
- You may not travel through emergent 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 100 feet of the other watercraft. This includes other personal watercraft.

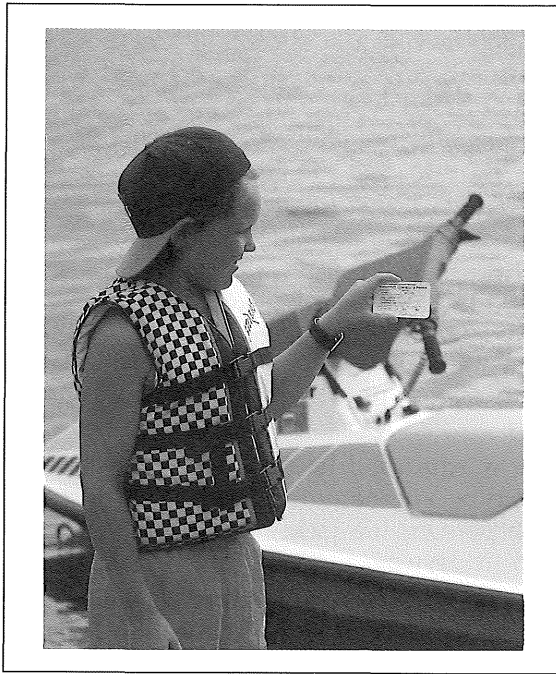
Age of Operator Requirements

Under 13 years old

A person under the age of 13 years may not operate a personal watercraft, regardless of horsepower, unless there is a person 18 years of age or older also 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 brochure). The



To operate a water scooter without an adult on board, riders 13 through 17 must have a Watercraft Operator's Permit. Thirteen-year-olds must also be within unaided view of an adult.

13 year old must also be under unaided observation by a person 18 years of age or older. (The observer may be on shore watching the operator, but he or she must be within sight without the aid of binoculars, etc.)

Age 13-17

Persons 13 through 17 may operate a personal watercraft without a watercraft operator's permit if someone 18 or over accompanies them on board the craft.

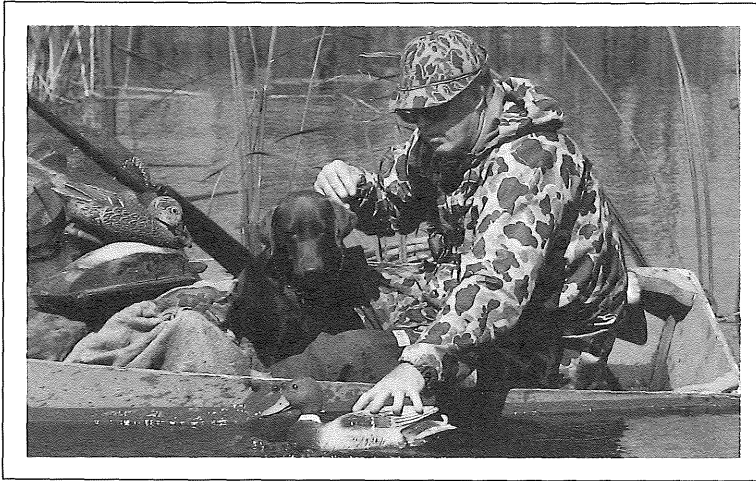
Age 14-17

Any person at least 14 years of age but less than 18 years of age, may operate a personal watercraft alone, 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 \$700, and/or 90 days in jail.



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

Boat safety for the hunter

Watercraft have been used by hunters since the days of the dugout canoe. Like his ancient forefathers, the modern day sport hunter finds watercraft important to his hunt.

The waterfowl hunter would be severely handicapped without his duck boat. 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. The hunter nearly always uses a small boat. Often it has a flat bottom which is poorly suited for rough water. If he has 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. PFDs can be purchased in hunting colors. Wear them when traveling between locations.

5. Fall weather is very changeable and can be deadly for the boating hunter. The November 11, 1940, Armistice Day storm is a tragic reminder. Hundreds of hunters were stranded, and scores were drowned when boats capsized or swamped in six-foot waves whipped by 50 m.p.h. winds. Don't let bluebird weather at the start of a hunting day lull your senses to sleep. Be sure your boat is suitable for the water conditions you might encounter. Carry adequate clothing for changing weather conditions and get an up-to-date weather report before setting out.



Duck boats are legally required to carry a readily accessible USCG approved PFD for everyone on board. PFDs come in a variety of hunting styles including the camouflage suit, vest, seat cushion and float coat shown.



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

Canoeing

The canoe has been a favorite recreational watercraft in Minnesota for many years and is currently very popular.

There are dangers in canoeing, however, that can only be lessened with knowledge, preparation and practice. Primary hazards are capsizings, swamping or just falling out of the canoe. Obviously, canoeists should be strong swimmers. They and other small boat users should be able to swim at least ten minutes while fully clothed. Even then, PFDs 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 Safety Tips:

1. Always wear a Coast Guard approved personal flotation device (PFD or life preserver). Contrary to popular belief, there are approved devices on the market which are lightweight, comfortable and designed for the canoeist. The emphasis here is on *wearing* the PFD, not sitting on it or storing it under the seat. A PFD that is not worn is useless, especially in a whitewater situation, because of the speed at which items like loose PFDs are swept away after an accident.

In addition, wearing a PFD 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.

2. 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 the American Red Cross, Boy or Girl Scouts, YMCA, or the Minnesota Canoe Association.

3. 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.

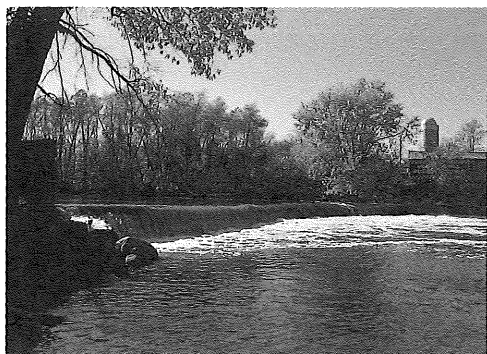
4. Make sure all ropes and loose gear are securely tied down so there is no danger of becoming entangled should you capsize.

5. 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.

6. 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.

7. Never attempt to canoe over or near dams. You could be trapped in recirculating currents at the bottom.

8. 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



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

head. Don't fight the current.

9. 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.

10. If you are caught in high waves on a lake, paddle from a kneeling position and head for the nearest shore.

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*.

The sailboater must remember that he needs 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 PFD is recommended when sailing.

Falling overboard is also common. Have an extra PFD 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



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

important in most rescue operations. Be sure to set up procedures for emergency situations and practice until you can perform them efficiently.

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 PFD. There are models available which are designed for sailing.
- 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 **Boating Guide**.)
- 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.



Supervised beaches are required to be marked with buoys such as this one which mean "Boats Keep Out."

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.



An air mattress may let you sleep forever if used while swimming. Inner tubes and other inflatables are equally as hazardous. A gust of wind can blow them into deep water or a leak can cause them to deflate, leaving the poor swimmer in a potentially fatal situation.

- ***Know your own swimming ability and never exceed it.*** Trying to swim great distances or under adverse conditions can be dangerous.
- ***Never swim alone.*** Always swim with a group or at least one other good swimmer who has the ability to help when necessary.
- ***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 alcohol, when you are overheated, tired, or after strenuous exercise. An estimated 65 percent of all drownings in the United States each year are alcohol-related.
- ***Care must be taken 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 80).

Scuba and skin diving

Skill and strength are needed for *skin* or *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 diving card to obtain compressed air at any good scuba 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 and white flag authorized under the federal rules of the road which is only flown from a boat. See page 49 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.



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

A diver is usually swimming face down anywhere from one to as much as 100 feet below the surface. His vision is limited, and he is usually concentrating on something underwater. Usually, he does not know what is going on above him, yet he may have to surface suddenly. Thus, a boat operating in his diving area can create three serious hazards:

1. A moving boat could run him down.
2. He could hit his head on the bottom of a boat or motor.
3. In an emergency, he might wait too long before surfacing because of a boat operating in his diving area.

If the diver is exploring or looking for something, he may drag his 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



Don't let thin ice be your downfall! It takes at least seven and a half inches of solid ice to support a car.

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 two-feet deep in one place, and only one-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, fishermen and skaters on foot need four inches of ice. At least five inches is sufficient for a snowmobile while seven and one-half inches is required for a two-ton automobile. Eight inches will hold a light truck, ten inches a medium truck, and 12 inches a heavy truck. The ice must be clear; slushy, melted ice could be dangerous.

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!




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

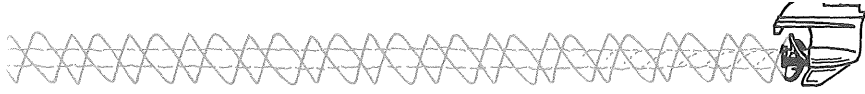
If you *drive* your car on a frozen lake, make sure the ice is thick enough and follow the tracks of the other cars. Be sure to leave the car doors open and/or roll down the windows. Be prepared to jump out immediately if the car should break through.

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

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*. 



5

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. Next, you should attempt to reboard your craft if at all possible. If this isn't possible, hang on to the boat and use it as a support. Most newer 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.

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 F. or 21



Stay with your boat if it stays afloat!

degrees C.) commonly associated with boating fatalities in Minnesota:

1. If you have your PFD on, make sure it's securely fastened so the device will not slip off in the water.
2. Items left floating after an accident (PFDs, 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 fishermen can also use air trapped in hip boots and waders to assist them in floating.
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 jellyfish 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 F. 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.

Hypothermia

As mentioned before, hypothermia is a factor in about half 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. 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 F. 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 many times faster than air at the same temperature.

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 PFD! A PFD 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 PFD 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 PFD, 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 HELP (Heat Escape Lessening Posture) position. If two or more people are in the water, huddling together with arms around each other's waist is the best way to reduce heat loss.

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

HYPOTHERMIA CHART*

Water Temp. (° F)	Exhaustion or Unconsciousness	Expected Time of Survival
32.5	Under 15 Min.	Under 15-45 Min.
32.5-40.0	15-30 Min.	30-90 Min.
40-50	30-60 Min.	1-3 Hr.
50-60	1-2 Hr.	1-6 Hr.
60-70	2-7 Hr.	2-40 Hr.
70-80	3-12 Hr.	3-Indef.
Over 80	Indef.	Indef.

*These times are approximate only. They may vary from person to person.

Basic rescues

Many drownings occur each year within a few feet of safety. Even a nonswimmer can save a life if he knows how to use some basic rescue techniques. Surprisingly, most of these methods don't even require that you get wet!

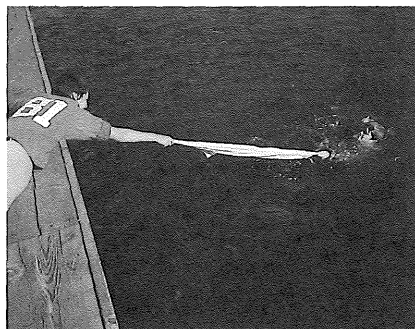
1. If the victim is within arm's reach, lie flat on the pool deck or the dock and extend your arm to the victim. Grasp the victim's hand or wrist and pull him to safety. Do not overreach or you may be pulled into the water.

2. When the victim is farther out, use a shirt, towel, branch, oar, pole, rope or other object. Allow the victim to grab one end and pull him back to safety. Watch your balance to avoid being pulled into the water.

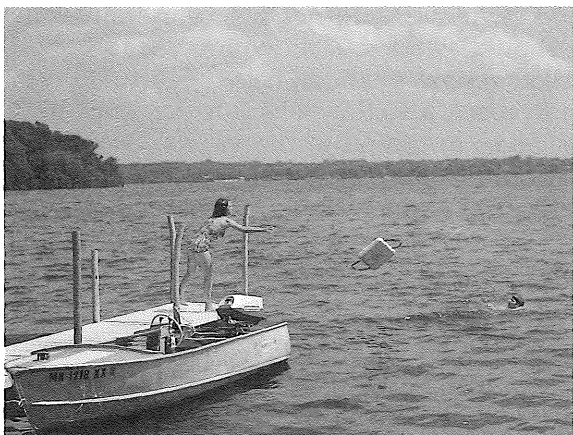
Elementary Rescues



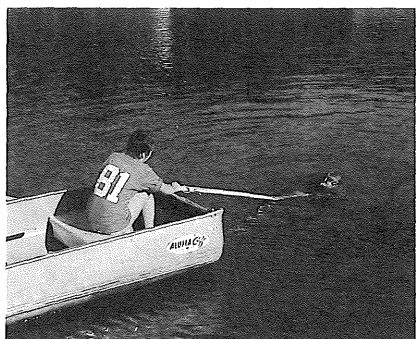
Reaching assist.



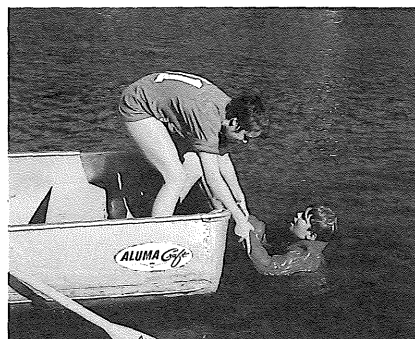
Reaching assist using a towel.



Throwing assist using cushion.



Boating assist using an oar.



Bring the victim over the transom.

3. 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* him or her.

4. If a boat is handy, row to the victim and extend an oar or paddle. Bring him to the stern (back) of the boat and have him hold on. Row slowly back to safety while he hangs on. If the victim is too weak or too scared to hang on, hold him until more help arrives.

5. 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.

6. 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. If you swim to reach a victim, take a towel, shirt or any object that floats 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 or cardiopulmonary resuscitation (CPR) course should be taken from the American Red Cross by anyone who participates regularly in water sports. Every boat should have a first aid kit which should include enough supplies to take care of most minor accidents.

Artificial Respiration

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 artificial respiration are to maintain an open airway through the mouth and nose, and to restore normal breathing.

Follow these steps:

1. Begin immediately.
2. Place the victim on his 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 12 times a minute for adults, and 20 times a minute for small children.

Shock

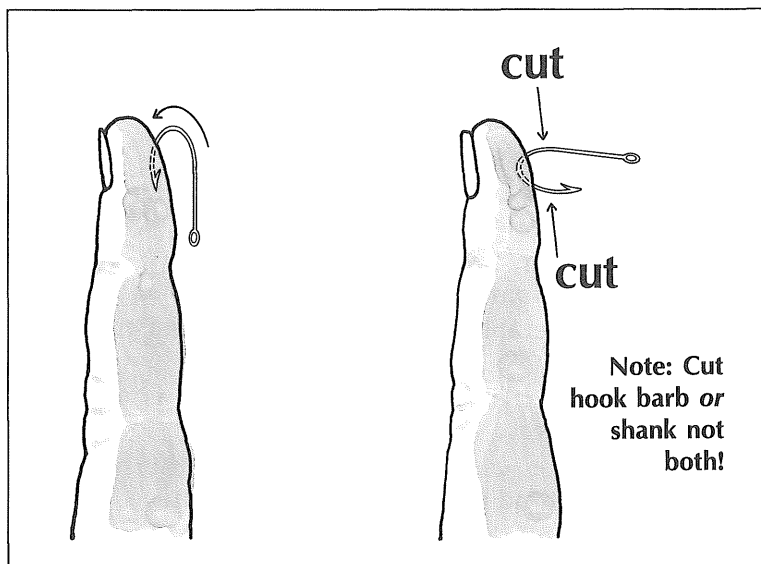
Any person who has a serious injury should be treated for shock. Keep the victim lying down, warm and still.

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. Using 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 have the victim drink liquids if he is conscious. 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, Dislocations 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.

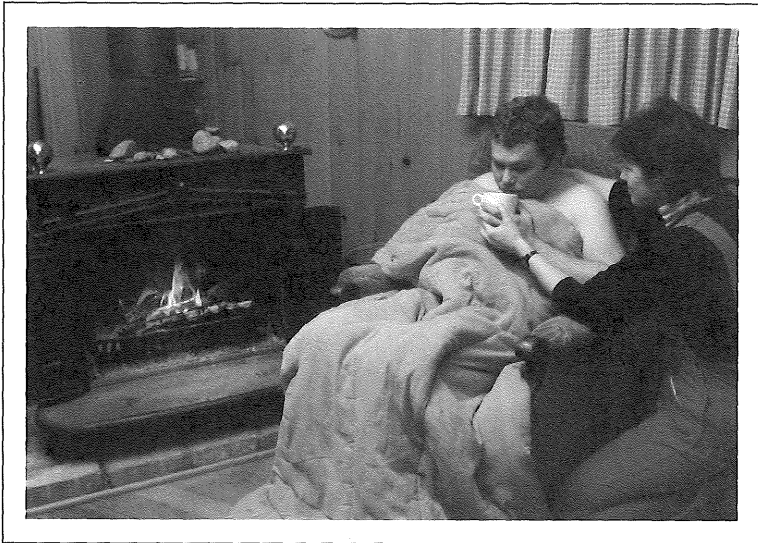


Uncontrollable shivering is one of the first signs of hypothermia.

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 he can move his feet, legs, arms and hands. If he has 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 his head to turn forward or sideways, or the back to bend. If he is in the water and not in danger, *do not remove him!* 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 him from further injury while he is being moved to the hospital.



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).

Hypothermia

The effects and symptoms of hypothermia can vary with the temperature and length of exposure. One of the first indicators, however, 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 his 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. 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.
2. Replace wet clothing with dry. Wrap the victim in a sleeping bag or blankets and keep him or her warm.
3. Transport the victim to a hospital immediately.



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

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 F.) for a relatively long period of time 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. ⚓



6

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 and scribe your ID number on *all* hard-surfaced pieces of equipment. An engraving tool is available 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 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 burglar 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.

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.

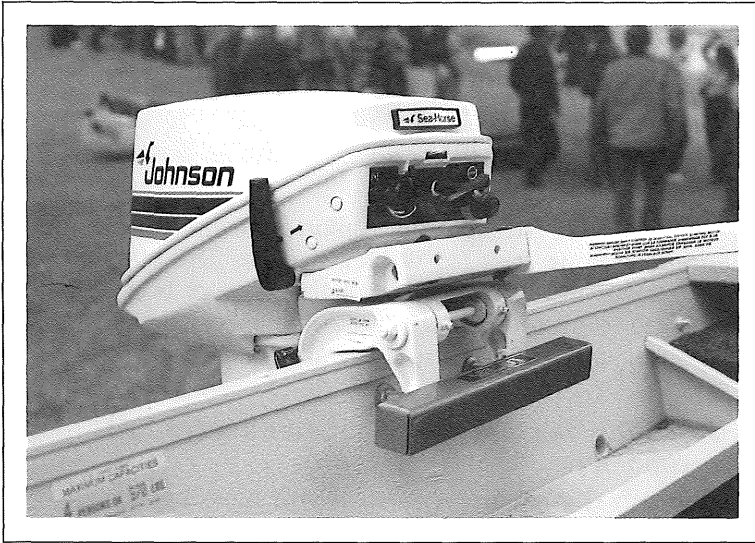
6. On the water or off, remove all valuable portable items such as depth finders, binoculars, personal flotation devices, compasses, and radios and lock them in a safe place.

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 a 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 their portability and salability.

To prevent motor thefts remove the motor, if possible. If not, use a motor lock or a chain and a case-hardened padlock across the clamp screws.

On larger, permanently-mounted motors, use special transom retainer bolts. These 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).




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

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 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 fishermen must take the initiative to protect their property. Remember, "Opportunity makes the thief!" 

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:

1. Engine

- Fill the fuel tank(s) full and use a good fuel conditioner.
- Flush the cooling system 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.
- Drain oil and refill crankcase on inboard-outdrives and inboards. Also change oil filter.
- Change gear case lubricants on lower unit of outboards and I.O.'s.
- Check for worn or loose parts.
- Check propeller and lubricate shaft as necessary.
- Run outboards with fuel line disconnected until motor stops.
- Store outboards in upright position.

2. 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.

3. Trailer

- Check wheel bearings — repack or replace as necessary.
- Examine tires — check air pressure.
- Put the trailer up on blocks over the winter, it will make tires last longer and help prevent theft.

8

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 he is 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 (burdened) 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.

PFD — Personal Flotation Device (or life preserver).

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,[™] water scooters, wet cycles.

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).

Skin Diving — Diving underwater using mask, snorkel and fins only.

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

Stand-On Boat — The boat (privileged) 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.

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

AGENCY

TYPE OF PROGRAM

State of Minnesota:

Department of
Natural Resources —

Boat & Water Safety Section
500 Lafayette Road
St. Paul, Minnesota 55155-4046

Boat and Water Safety
Information and
Education Programs

Division of Enforcement
500 Lafayette Road
St. Paul, Minnesota 55155-4047
or

Enforcement of Watercraft
Laws and Rules

Check the phone directory
for the name of the local
conservation officer.

License Bureau
500 Lafayette Road
St. Paul, Minnesota 55155-4026

Watercraft Licensing

Public Water Access Section
500 Lafayette Road
St. Paul, Minnesota 55155-4052

Access Development
and Maps

American Red Cross:

Mpls. Chapter
Safety Programs
11 Dell Place
Mpls., MN 55403

Swimming, Lifesaving,
Small Craft and First Aid
Classes and Programs

St. Paul Chapter
Safety Programs
100 South Robert Street
St. Paul, MN 55107

Northland Chapter
Safety Programs
Ordean Building
424 W. Superior St.
Duluth, MN 55802

U.S. Coast Guard:
U.S. Coast Guard (b)
1430 Olive Street
St. Louis, MO 63103

Boating Safety, Nav. Aids,
Enforcement of Regulations
and Rescue Operations on
Federal Waters

Coast Guard Station Duluth
1201 Minnesota Street
Duluth, MN 55802