

Waterway Safety Guide



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AQUARIUS
S Y S T E M S

INTRODUCTION

You are about to become the proud skipper of a very complex work boat, namely, an Aquarius Systems Aquatic Plant Harvester. The success of your aquatic plant removal program depends upon how well the equipment performs its harvesting function. If properly maintained and operated within its limits, the harvester will perform as intended. As the operator, it is your responsibility to see to it that the harvester is “properly maintained and operated within its limits.”

An aquatic plant harvester is a very safe machine. It becomes dangerous only when poor judgment is used. Any vehicle can be dangerous if operated in a reckless manner, so it is important to read this manual and be completely familiar with your machine. The Safety portion of this manual addresses numerous safety and responsibility topics which you need to be familiar with. It is not all-inclusive, but rather provides a starting point for your knowledge about safely operating your new equipment.

SAFETY SYMBOLS

These are the safety alert symbols used throughout this manual. They are used to alert you to potential personal injury hazards. Obey all safety messages that follow these symbols to avoid possible injury or death.

	indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury if ignored.
	indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury if ignored.
	indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.
	indicates a potentially hazardous situation which, if not avoided, may result in property or equipment damage.

Failure to adhere to and comply with the safety dangers, warnings and cautions that appear in this manual can lead to serious illness, injury or even death and/or damage to your equipment or the property of others. Beyond these warnings, operators have a personal responsibility to utilize a common sense approach while using any of Aquarius Systems Equipment.

STANDARD BOATING RULES



Operating your water equipment without proper experience and/or without full understanding of the equipment and its systems can cause serious injury. The owner/operator must read and understand this manual before operating the equipment. Do not operate the equipment if existing or anticipated conditions are beyond your level of experience

Water (equipment) safety cannot be overemphasized. Understand the rules of the road and operate your equipment in a safe manner. Understand the potential hazards of operation. Be prepared for emergencies.

GENERAL SAFETY PRECAUTIONS

Managing water equipment is an important activity. However, emergencies on the water do happen and as the owner/operator it is your responsibility to be prepared for them. This safety list is general in nature and not all-inclusive. Common sense is always the best route to follow when managing water equipment.

Mechanical Safety

- When working around operating machinery, such as the engines, wearing hearing protection and eye protection is always a good idea.
- Understand operating machinery becomes hot when in use; you should wear proper protection such as gloves.
- Take all proper precautions when working around moving parts. Wear tight fitting clothes as loose clothing may get caught in moving parts.
- Beware of toxic gases. What you don't see and/or smell can kill you.
- Understand all the safety precautions associated with mechanical maintenance.

Know the limits

- Understand your own limits.
- Understand the limits of your equipment. Don't overload the vessel. Distribute weight evenly.
- If you don't know how, learn to swim.
- Keep your equipment free of oil and grease. A fall on a slippery deck or ladder can have very serious consequences.
- Monitor the weather. Weather on the water can change rapidly. Be prepared.
- Be ready for emergencies.
- Carry the proper safety equipment. Carry a set of tools for emergency repairs. Keep extra batteries for flashlights and other battery-operated equipment.

RULES OF THE OPEN WATER

Just as there are rules that apply when driving a vehicle on the street, there are waterway rules that apply when you are driving water equipment. These rules are used internationally, and they are enforced by the United States Coast Guard and local agencies. You should be aware of these rules and follow them whenever you encounter another vessel on the water.

In various geographic locations certain rules prevail that may be unique to the locale, but all are basically the same as the International Rules of the Road.

The rules presented in this manual are condensed and have been provided as a convenience only.

STEERING AND SAILING RULES/SOUND SIGNALS

Any time two vessels on the water meet one another, one vessel has the right-of-way. It is called the **stand-on vessel**. The vessel that does not have the right-of-way is called the **give-way** or **burdened vessel**.

The vessel with the right-of-way has the duty to continue its course and speed, except to avoid an immediate collision. When you maintain your direction and speed, the other vessel will be able to determine how best to avoid you.

The vessel that does not have the right-of-way has the duty to take positive and timely action to stay out of the way of the stand-on vessel. Normally, the give-way vessel should not cross in front of the stand-on vessel. Slow down or change direction briefly and pass behind the other vessel. You should always move in such a way that the stand-on operator can see what you are doing.

THE GENERAL PRUDENTIAL RULE

This rule is called Rule 2 in the International Rules and says, "In obeying and construing these rules due regard shall be had to all dangers of navigation and collision, and to any special circumstances, which may render a departure from the above rules necessary in order to avoid immediate danger."

RULES WHEN ENCOUNTERING VESSELS

There are three main situations in which you may encounter other vessels and you must avoid a collision. These are:

- Meeting** (approaching another vessel head-on).
- Crossing** (traveling across the other vessel's path).
- Overtaking** (passing or being passed by another vessel).

MEETING

If you are meeting another power vessel head-on, and you are close enough to run the risk of collision, neither of you has the right-of-way. Both of you should alter course to avoid an accident. You should keep the other vessel on your port (left) side. This rule doesn't apply if both of you can clear each other by continuing your set course and speed. (shown in figure 1 left)

CROSSING

When two power-driven vessels are crossing each other's path close enough to run the risk of collision, the vessel that views the crossing vessel to the starboard (right) side must give-way. If the other vessel is to the port (left) side, maintain your course and direction, provided the other vessel gives you the right-of-way as it should. (shown in figure 2)

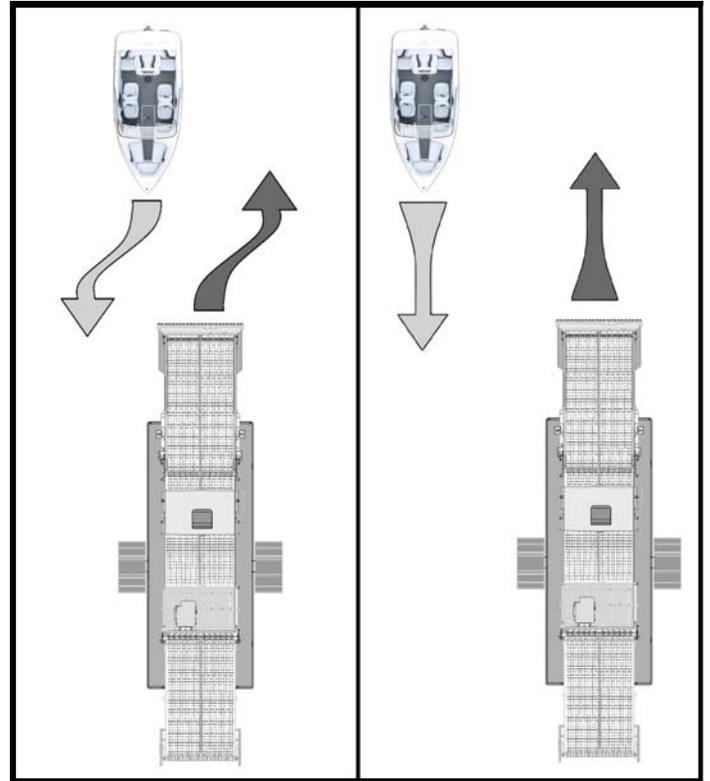


Figure 1

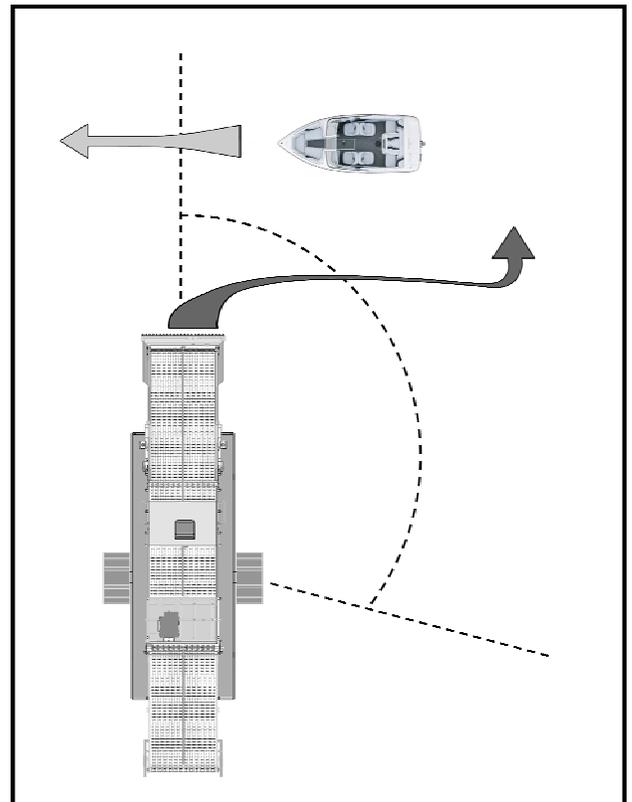


Figure 2

OVERTAKING

If you're passing another vessel, you are the give-way vessel. This means that the other vessel is expected to maintain its course and speed. You must stay out of its way as you clear it, altering course and speed as necessary. Conversely, if you are being passed by another vessel, you should maintain your speed and direction so that the vessel can steer itself around you.

OTHER SPECIAL SITUATIONS

There are other rules to always remember when driving your boat around other vessels:

When navigating in narrow channels, you should keep to the right when it is safe and practical to do so.

If the operator of a power-driven vessel is preparing to go around a bend that may obstruct the view of other water vessels, the operator should sound a prolonged blast on the whistle or horn for four to six seconds. If another vessel is around the bend, it too should sound the whistle or horn. Even if no reply is heard, the vessel should still proceed around the bend with caution.

SAILING VESSEL RIGHT-OF-WAY

Sailing vessels should normally be given the right-of-way. The exceptions to this are: When the sailing vessel is overtaking the power-driven vessel, the power-driven vessel has the right of way. Sailing vessels should keep clear of any fishing vessel. In a narrow channel, a sailing vessel should not hamper the safe passage of a power-driven vessel that can navigate only in such a channel.

FISHING VESSEL RIGHT-OF-WAY

All vessels that are fishing with nets, lines or trawls are considered under international rules to be fishing vessels.

Boats with trolling lines are not considered fishing vessels. Fishing vessels have the right-of-way, regardless of position. But these vessels cannot impede the passage of other vessels in narrow channels.

READING BUOYS AND OTHER MARKERS

The waters of the United States are marked for safe navigation by the lateral system of buoyage. The markers and buoys you will encounter have an arrangement of shapes, colors, numbers and lights to show which side of the buoy a boater should pass when navigating in a particular direction.

The markings on these buoys are oriented from the perspective of being entered from seaward while the boater is going toward the port. This means that red buoys are passed on the starboard (right) side when proceeding from open water into port, and the green buoys are to the port (left) side. When navigating out of port, your position to the buoys should be reversed: red buoys to port and green buoys to starboard.

Many boating bodies of water are entirely within the boundaries of a single state. The Uniform State Waterway Marking Systems have been devised for these waters. This system uses buoys and signs with distinctive shapes and colors to show regulatory or advisory information. These markers are white with black letters and orange borders. The information signifies speed zones, restricted areas, danger areas and general information.

Remember: Markings may vary by geographic location. Always consult local boating authorities before driving your boat in unfamiliar waters.

EQUIPMENT OPERATION

The operator is responsible for the actual day-to-day operation of the harvester. While the basic operation procedures are readily understood certain techniques, which apply to cutting, loading, storing and unloading, are a skill that must be learned. In general, this can

be accomplished in as little as a few days, and will improve with time and experience.

NAVIGATING YOUR LAKE

The harvester is designed to withstand occasional minor impacts. However, continually hitting the lake bottom or submerged objects such as tree stumps, pier stakes, raft anchors, rocks, etc. may cause serious damage to the cutter head and conveyor system. While cutting in shallow waters where water clarity is poor, do not attempt to cut at the maximum depth, as this makes it nearly impossible to detect obstacles. Harvesting equipment is expensive, and repairs can be costly and time consuming. It is best to harvest no deeper than visibility allows, and spare the equipment undue damage.

If you are cutting in shallow water and suspect that you might be very near the bottom of the lake, there is one tell tale sign to look for – BUBBLES. If the cutter head is getting too close to the bottom, you will start to see lots of little air bubbles coming up just in front of the cutter bar. Pull the cutter head up right away! Adjust the cutter head to a safe depth, or return to deeper water where the harvester is most effective. If you should start to take on mud or sludge from the lake bottom, reverse the #1 conveyor and dump the

material back in the lake! This material is very heavy, and may cause the harvester to begin loading unevenly – NEVER TAKE MUD ON BOARD!

In time, you will come to know the topography of your lake and which areas to avoid. You may want to consult locals in determining what areas might contain hidden hazards. If a survey of the lake has been done recently, ask to see any maps or photos that tell the story of your lake bottom. Remain alert at all times, and be prepared to handle an unexpected obstruction.

When you must cut in areas known to contain obstructions, do not attempt to cut at maximum speed. SLOW DOWN! Take your time and cut at a speed which allows you to maintain complete control of the harvester. Use extreme caution when harvesting near boats, rafts, piers, seawalls, etc. A small gust of wind can easily push the harvester into these objects, causing damage to one or both. NEVER harvest in areas where people are swimming!

LOADING THE HARVESTER

Always keep the #3 conveyor in its lowest position, except when discharging a load. Pay close attention to the way in which the harvested plant material is loading onto the harvester. If you are harvesting particularly heavy plant material, it may be necessary to take on smaller amounts and unload the equipment more frequently. In any event, it is very important that the harvester be loaded evenly to maintain the machine's balance. If the machine begins to list or lean to one side, it will continue to harvest deeper and load heavier on that side, making the problem increasingly worse.

The pinstripes on the side of your machine will help you determine the

harvester's stability under load. NEVER, under any circumstances, should you load the machine so heavy that water comes over the top of the barge. If there is water coming over one side or even one corner of the barge, a serious listing situation has developed and it should be handled very carefully.

If you notice that the harvester has a slight list with a partial load on it, it is best to discharge that load and start new. If the harvester is in a severe listing attitude with a full or almost full load on it, the situation has become dangerous and should be handled very precisely. This will be discussed under SAFETY PRECAUTIONS.

UNLOADING THE HARVESTER

Whenever you are unloading into a transport barge, shore conveyor, or trailer conveyor, it is important to maintain the harvester's balance. To do so, lower the #1 conveyor below the surface of the water while at the same time raising the #3 conveyor to hitch. Lowering the #1 conveyor into the water

serves as a keel and helps to stabilize the machine.

MACHINE CLEANING

It is important that the harvester be kept clean and orderly at all times. Do not leave ropes or lines lying loose on the operator's platform – these could entangle the operator or fall overboard and get caught up in the paddle wheels or cutters. Keep the operator's platform free of oil, grease, and other slippery substances. Keep all areas clear of loose objects.

As weeds are cut and conveyed onto the harvester, they tend to build up in certain places. These areas include: on the bow of the harvester just in front of the #2 conveyor; on the support bars under the #1 conveyor; and on the deck under the #3 conveyor. This accumulated plant material will cause damage to the conveyor mesh and frames if not removed regularly. Pay close attention to these areas while operating. It may be necessary to clean the harvester after three or four loads, or just once a day.

Weeds may also tend to build up in the two corners of the horizontal cutter bar. To clean these, raise the cutter head so that the horizontal cutter bar is just below the surface of the water. Reverse both Paddle Wheels for about a minute. This will make water flow toward the front of the machine and swirl around the cutter head. As it does this, the weeds should come loose and be carried forward. Now lower the #1 conveyor and move forward to retrieve the weeds you have just loosened. If you find it necessary to leave the operator's platform to loosen these weeds manually, **TURN THE ENGINE OFF AND REMOVE THE IGNITION KEY FIRST!** NEVER leave the operator's platform if the engine is still running and NEVER attempt to service any part of the harvester with the engine on.

PERSONAL ATTIRE

Operators should wear clothing which provides protection from sun exposure and the elements. NEVER wear loose or dangling clothing that might get caught in moving parts, and long hair should be pulled up and kept out of the way. Nonslip footwear such as Aquasocks™ are also recommended.

Sunglasses are a must! There are several brands of Polarized glasses on the market which filter harmful UV rays. These will improve your ability to see into the water, and protect your eyes from the harsh glare of the sun reflecting

off the surface. These sunglasses can be rather expensive, so it is wise to attach a neck strap to avoid losing them in the water!

OPERATING PRECAUTIONS

Careless operation of powered equipment creates hazards that can lead to personal injury and property damage. Therefore, it is important to follow these precautionary measures:

1. Never allow an inexperienced person to operate harvesting equipment unsupervised.
2. Operators should be well rested and alert at all times. Operating under the influence of alcohol or other drugs must NEVER be tolerated!
3. Operators should never attempt to retrieve fish, debris or other materials from the load while the equipment is in operation.
4. Operators and maintenance personnel should not wear loose clothing and long hair should be restrained while working on or around the harvesting equipment. These may become entangled in machine parts and cause serious injury.
5. All guards and shields must be maintained in proper working order. Cutter bar guards should be in place AT ALL TIMES when machine is not in use. The engine should be off and the ignition key removed before cutter bar guards are installed.
6. Never attempt to remove obstructions from conveyors, discharge chutes, cutter bars, or any other moving parts while the machine is in use. TURN THE ENGINE OFF AND REMOVE IGNITION KEY BEFORE ATTEMPTING TO SERVICE ANY PART OF THE HARVESTER.
7. While operating, keep a safe minimum distance between you and anyone else using the water. Be especially careful of swimmers, children, other boats, and water skiers.
8. Never spin the harvester with the #1 and #3 conveyors raised. These conveyors should be down, and turns should be executed slowly and with complete control. This will cause the machine to possibly tip over, do to higher center of gravity.
9. Never attempt to start the engine with the paddle wheels or any other system turned on. All switches and levers should be in the neutral position.
10. Never tamper with the governor settings of the harvesting equipment, especially to gain more power. These are preset at the factory within safe operating limits. Over powering the equipment will not only shorten the life of the machine, but can also be very dangerous. Refer to the FACTORY SPECIFICATIONS sheet in the HYDRAULICS section of this manual for proper settings.

11. Do not vary the hydraulic relief valve settings from those outlined on the FACTORY SPECIFICATIONS sheet. Relief valves provide protection to the operator and the equipment. Too much pressure can put undue strain on hydraulic components and wear them out quickly.
12. Never let the engine idle unattended, not even for a brief moment. The engine should be turned off any time the operator must leave the operator's seat.
13. A fully charged fire extinguisher should be readily available at all times.
14. Operators and passengers must wear personal flotation devices while operating this equipment. There should always be at least one flotation device for each person aboard. Consult local officials to determine regulations and requirements concerning safety equipment.
15. The operator should always cut and harvest the load in an even balanced manner. Loading the harvester unevenly will cause a list and could result in a very dangerous situation including rolling the machine.
16. Harvesting equipment is never to be used for dredging purposes. Do NOT attempt to pick up mud, silt, or rocks. In the event that unwanted material starts coming up the #1 conveyor, it should be discharged immediately by reversing the #1 conveyor.
17. Do NOT mount large tools or storage boxes on the operating platform. Carry only the tools necessary to service the harvester in an emergency situation. Major repair work should be done while the harvester is docked. Excessive weight located above the center of gravity will decrease load capacity and create a dangerous situation.
18. NEVER OVERLOAD HARVESTING EQUIPMENT! Standard harvesters are painted light blue with a wide pinstripe of yellow/black/yellow on the side. Even if your harvester is a different color, it will still have a wide, two tone pinstripe. This pinstripe indicates how heavily the harvester can be loaded. With a standard load, the pinstripe may be at the level of the water's surface. If the pinstripe is completely submerged and water is coming over the top of the barge, the machine is overloaded. If at any time there is water coming over the top of the barge, the harvester is unstable and in serious danger. DISCHARGE THE LOAD INTO THE LAKE IMMEDIATELY!
19. IMPORTANT: In the event of an impending capsizing, follow these specific steps:
 - a) stop the paddle wheels immediately;
 - b) lower the #1 conveyor to its maximum depth – it will act as a keel, lowering the center of gravity;
 - c) carefully discharge the load into the lake as soon as possible;
 - d) should all of this occur during heavy winds and rough seas, keep the #1 conveyor lowered, but try to keep it pointing into the wind;
 - e) if your harvester has an operator's cab, do not stay inside the cab if you feel a capsizing is inevitable;
 - f) if the harvester does capsize,

jump clear of the danger, but do not leave the area as the harvester will not sink; once it is upside down, you can climb on the bottom and wait for help to arrive.

20. BATTERIES – Use extreme caution when handling the 12-volt battery. It is filled with acid that can eat through clothing and burn skin and eyes. Batteries also give off highly flammable hydrogen gases while being charged. Avoid starting the engine until these gases have cleared the area. Refer to the BATTERY GUIDE in the MECHANICS section of this manual.
21. BURNS – Do not touch or work around a hot engine or exhaust parts. Allow the engine to cool sufficiently before attempting to service or make adjustments.
22. ELECTRICAL SHOCK – Do not touch electrical and ignition systems. While electrical shock from the ignition system may not be strong enough to cause injury, reaction to the shock may cause you to pull away, injuring yourself in some other way.
23. NOISE – All harvester engines are furnished with a muffler system. Do not operate the harvester without a muffler or with a faulty exhaust system. Exposure to excessive noise is tiring and annoying, and can lead to hearing impairment. Use ear plugs if necessary.
24. STORMS – If a storm blows in while the harvester is working, get off the water immediately – lightning kills!

SUMMARY

- Discuss all operating conditions, potential operating situations, and emergency procedures with your supervisor prior to operating the harvester. Be prepared for any emergency situation, and remain calm should one occur.
- Keep the #3 conveyor in its lowest position at all times while harvesting, except when transferring or discharging a load into another machine. While transferring a load, the #1 conveyor must always be lowered to the maximum depth possible before raising the #3 conveyor. This is very important in maintaining a lower center of gravity.
- Always load the harvester evenly and balanced. If the harvester begins to list or lean to one side, stop the harvester immediately and lower the #1 conveyor to its maximum depth, while keeping the #3 as low as possible. If you are still unable to stabilize the load and the harvester remains unsteady, DISCHARGE THE LOAD INTO THE LAKE IMMEDIATELY! The load can be retrieved once you have corrected the problem – your first concern MUST be to stabilize the machine as soon as possible!
- IMPORTANT: If the harvester is seriously listing or leaning to one side, DO NOT OPERATE THE PADDLE WHEELS! Operating the paddle wheels will cause the listing side of the machine to “dig” into the water even further. This may accelerate a capsizing situation.