CLEAN BOATS CLEAN WATERS

Guidelines for Clean Boats, Clean Waters

MICHIGAN'S AQUATIC INVASIVE SPECIES VOLUNTEER PROGRAM

ACKNOWLEDGMENTS

The Clean Boats, Clean Waters program is promoted by the Michigan Lake and Stream Associations, Inc. and Michigan State University Extension.

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2013 Update

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CLEAN BOATS
CLEAN WATERS

Welcome to the Clean Boats, Clean Waters Aquatic Invasives Volunteer Program!

Michigan's greatest natural asset, and one of its clearly defining characteristics, is the abundant water resources — 3,300 miles of shoreline on four of the five Great Lakes, 35,000 miles of navigable streams, more than 11,000 inland lakes and thousands of square miles of wetlands. The state is rightfully known worldwide as a "water wonderland." These watery wonders are home to hundreds of species of fish, waterfowl, plants and many other forms of life. The Clean Boats, Clean Waters Aquatic Invasives Volunteer Program is for people who care about Michigan's waterways and who want to protect them into the future.

Aquatic invasive species have long been recognized as a serious threat to the United States. According to Cornell University research, introduced species of animals, plants and microbes cost the U.S. economy at least $148 billion a year. Invasive aquatic plants and animals jeopardize the future of Michigan waters.

With the arrival of aquatic invasive species, volunteers are needed now more than ever to help preserve and protect Michigan waters. Dozens of organizations, hundreds of teachers and thousands of students have participated in the Purple Loosestrife Project, inoculating infested Michigan wetlands with *Galerucella* beetles. Native plants have now returned to many of these wetlands. Fishing enthusiasts have joined Michigan's Angler Monitoring Network, reporting invasive species they find in the state's waters. Alert Michigan citizens have helped track the spread of zebra mussels to more than 200 inland lakes.

The mission of this program is to promote water resource stewardship by actively involving individuals in preventing the spread of harmful aquatic invasive species. To accomplish this goal the program provides materials including this handbook and educational information on aquatic invasive species to interested groups.

Through this program, volunteers are prepared to organize and conduct watercraft inspections and educational efforts in their community. Volunteers are the key to reaching people recreating on Michigan's waters. Volunteers who instruct boaters on how to perform watercraft inspections can help prevent new invasions and help to maintain Michigan's valuable water resources. Thank you for taking the time to learn, act, and protect Michigan's waters from invasive species.

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Section 1:
What is the program all about?

PREVENTION AND CONTROL OF AQUATIC INVASIVE SPECIES IN MICHIGAN

Michigan's vast water resources are at great risk from the invasion of non-native species. Most of the state's rivers and streams, ponds and lakes, shorelines and wetlands provide hospitable habitat for native and invasive species alike. Invasive species are attractive and accessible, making it all too easy for people to introduce them inadvertently as they enjoy the recreational opportunities of Michigan's water wonderland.

Invasive species can disrupt food webs, foul infrastructure and recreational equipment, spoil tourism and recreational experiences, devalue waterfront property, create public health hazards and wreak havoc on water-based businesses. The now infamous zebra mussel is an example; it has infested more than 300 of Michigan's inland lakes. Depending on the characteristics of the lake, zebra mussel infestation means it may now be more susceptible to blooms of blue green algae with toxic properties. Native clams may be destroyed. Boaters' recreational equipment may be more easily damaged.

Aquatic invasive species are costly to control once they're in a lake and have established reproducing populations. Riparians (waterfront property owners) have spent as much as $1,000 an acre in an attempt to keep Eurasian water-milfoil under control in the state's largest inland lake. Such species can reproduce in a variety of ways making them virtually impossible to eradicate once they are established in an environment.

Prevention is Key

Therefore, the best defense for Michigan's aquatic ecosystems is a good preventive offense. Taking steps to protect them will also protect valuable property, whether it's an expensive watercraft or a waterfront home with a spectacular view.

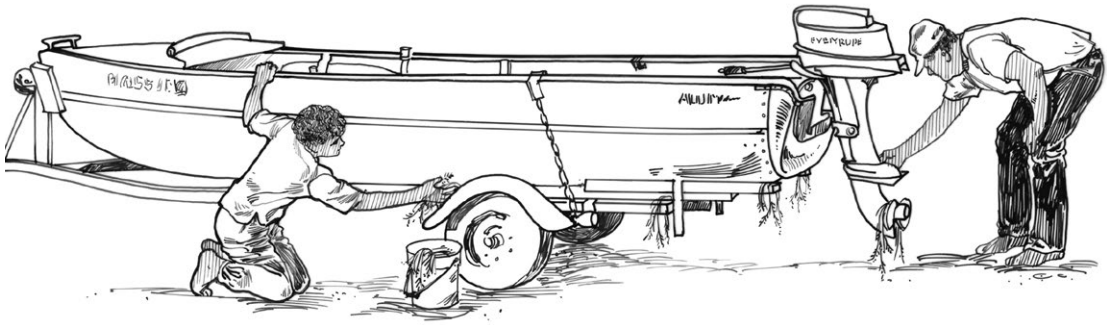
Preventing the introduction of invasive species may seem overwhelming, even impossible, because of the multitude of potentially invasive plants and animals and the vast array of potentially affected resources. However, as political philosopher Edmund Burke is credited with saying, "No one could make a greater mistake than he who did nothing because he could only do a little." And most people can do a little. In this situation, the consequences of one careless action can be enormously destructive, and the consequences of one preventive action can be enormously constructive.

How do we prevent new introductions of invasive species?

Fortunately, some of the best preventive, protective measures are simple, inexpensive and involve just a little time, energy, readily available materials and elbow grease. For example, if every boater spent a few minutes inspecting critical components of a watercraft and trailer and a little effort cleaning and drying the boat, that risk of spreading invasive species would be significantly reduced.

Research indicates that most of the owners of Michigan's approximately 900,000 licensed boats have some awareness of invasive species and they want to take the appropriate action, but may not do so because they're uncertain what to do and how to do it.

One solution is education. That's the purpose of Clean Boats, Clean Waters — to educate boaters about the steps they can take to prevent the spread of invasive species and protect Michigan waters.



THE CLEAN BOATS, CLEAN WATERS AQUATIC INVASIVE SPECIES VOLUNTEER PROGRAM VISION

The Clean Boats, Clean Waters Aquatic Invasive Species Volunteer Program promotes healthy ecosystems and a healthy economy by actively involving individuals in preventing the spread of harmful aquatic invasive species that threaten Michigan's ecosystems. Citizen involvement in demonstrating watercraft inspections will increase public awareness about the threats of aquatic invasive species. Volunteers educate boaters on how to prevent the spread of invasive species by inspecting their watercraft and removing aquatic plants and animals from their boats and equipment.

To accomplish these objectives, the volunteer program supports:

- Watercraft inspection demonstrations for aquatic invasive species.
- Communication with the public about the laws and issues surrounding the existence, spread and impact of invasive species to Michigan's waters.
- Response to technical inquiries from the public concerning invasive species.

FOUR REASONS TO CARE ABOUT AQUATIC INVASIVE SPECIES:

1. **Economics** – The costs of controlling invasive species in the United States increase every year. A typical consumer absorbs these costs through higher water and electric bills. A Cornell University study reports that invasive species on land and water already cost the United States $148 billion annually. The Great Lakes sport and commercial fishing industry, valued at more than 7 billion annually, is at risk due to the growing numbers of invaders such as the zebra and quagga mussel, spiny water flea, sea lamprey, ruffe and round goby that prey on invertebrates of all sizes, large fish, as well as fish eggs and small fish. Large water users in the Great Lakes, including municipalities and industries, spent about $120 million from 1989 to 1994 to combat the spread of zebra mussels alone.

2. **Health** – Some invasive species may cause significant health problems. For example, a South American strain of human cholera bacteria was found in ballast water tanks of ships in the port of Mobile, Alabama, in 1991. Cholera strains also were found in oyster and fin/fish samples in Mobile Bay, resulting in a public health advisory to avoid handling or eating raw oysters or seafood. Temporary bans on commercial harvest may be put into effect when health concerns exist.

3. **Ecology** – The rapid spread of zebra and quagga mussels in the Great Lakes shows how profoundly an invasive species can alter the aquatic environment. These tiny mussels reproduce rapidly. Coupled with consumption of microscopic plants and animals, zebra mussels affect the aquatic food web, decimate native mussel/clam populations, and place valuable ecological communities' resources at risk.

4. **Recreation** – Invasive species such as the sea lamprey, ruffe, and round goby can harm native fish, such as lake trout, walleye, yellow perch and catfish. They threaten a national sport and commercial fishing industry that supports 81,000 jobs in the Great Lakes. Aquatic invasive plant species such as purple loosestrife and Eurasian water-milfoil quickly establish themselves and have, in some cases, replaced native plants. The proliferation of these invasive plants impairs boating, swimming, fishing, navigation and flood control and degrades water quality, as well as fish and wildlife habitat.

(List adapted from the Aquatic Nuisance Species Task Force and the Great Lakes Panel on Aquatic Nuisance Species.)

CLEAN BOATS CLEAN WATERS

Section 2:
Who are the people involved?

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Section 3:
What do volunteers need to know about aquatic invasive species management in Michigan?

MICHIGAN AQUATIC INVASIVE SPECIES

The following is a list of some of the invasive species which are present in Michigan.

PLANTS

Common name	Latin name	Habitat
Curly-leaf pondweed	*Potamogeton crispus*	Aquatic
Eurasian water-milfoil	*Myriophyllum spicatum*	Aquatic
European frogbit	*Hydrocharis morsus-ranae*	Aquatic
Flowering rush	*Butomus umbellatus*	Aquatic, wetlands
Phragmites	*Phragmites Australis*	Aquatic, wetlands
Purple loosestrife	*Lythrum salicaria*	Aquatic, wetlands
Starry stonewort	*Nitellopsis obtusa*	Aquatic
Yellow water flag	*Iris pseudacorus*	Aquatic, wetlands

ANIMALS

Common name	Latin name	Habitat
Alewife	*Alosa pseudoharengus*	Aquatic
Bighead carp	*Hypophthalmichthys nobilis*	Aquatic
Black carp	*Mylopharyngodon piceus*	Aquatic
Grass carp	*Ctenopharyngodon idella*	Aquatic
Fishhook water flea	*Cercopagis pengoi*	Aquatic
Quagga mussel	*Dreissena bugensis*	Aquatic
Rainbow smelt	*Osmerus mordax*	Aquatic
Round goby	*Neogobius melanostomus*	Aquatic
Ruffe	*Gymnocephalus cernuus*	Aquatic
Rusty crayfish	*Orconectes rusticus*	Aquatic
Sea lamprey	*Petromyzon marinus*	Aquatic
Silver carp	*Hypophthalmichthys molitrix*	Aquatic
Spiny water flea	*Bythotrephes cederstoemi*	Aquatic
Swimmer's itch[1]	*Schistosoma spp.*	Aquatic
White perch	*Morone americana*	Aquatic
Yellow perch parasite	*Heterosporis sp.*	Fish parasite
Zebra mussel	*Dreissena polymorpha*	Aquatic

1 Native nuisance species.

MICHIGAN'S AQUATIC NUISANCE SPECIES STATE MANAGEMENT PLAN

Prevention, Detection, and Management in Michigan Waters — 2013 Update

Michigan's Aquatic Invasive Species State Management Plan was recently updated as a collaborative effort by the Michigan Departments of Environmental Quality, Natural Resources, Agriculture and Rural Development, and Transportation. The public was engaged through an open comment period and a public meeting. Michigan's Aquatic Invasive Species Advisory Council, composed of 23 members including state agency, industry, and environmental group representatives, also provided input. The federal Aquatic Nuisance Species Task Force reviewed and ultimately approved the updated plan in 2013. The plan is available at www.michigan.gov/aquaticinvasives.

The comprehensive plan outlines new actions in addition to maintaining and enhancing existing efforts to manage aquatic invasive species (AIS) in Michigan. State agencies are currently working with partners to implement the plan. The goals of the plan are designed to address different stages of AIS invasion from introduction and dispersal to colonization and include addressing harmful effects resulting from each.

Specifically, the four goals of the plan are:

Goal I: Prevent new introductions of AIS into Michigan waters.

Goal II: Limit the dispersal of established populations of AIS throughout Michigan waters.

Goal III: Develop a statewide interagency early detection and rapid response (EDRR) program to address new invasions of AIS.

Goal IV: Manage and control AIS to minimize the harmful environmental, economic, and public health effects resulting from established populations.

Several general overarching recommendations from the plan have direct relevance to the Clean Boats, Clean Waters program, including:

- Continue and enhance AIS information and education efforts
- Develop capacity for EDRR activities, including monitoring and detailed response planning, coordinated at regional and state scales
- Support AIS management and control efforts, especially through technical assistance and the development of best management practices

The plan recognizes water recreation (including boating, fishing and other recreational activities) as an important pathway for the introduction and spread of AIS. Specifically, the plan states that AIS can be dispersed with the movement of equipment (e.g., boats and trailers) from one body of water to another but preventative measures can limit this dispersal.

Actions such as checking and cleaning boats, fishing equipment and trailers can dramatically reduce the likelihood of lake-to-lake transfer of invasive species. As such, the plan recognizes the importance of boat washing stations, disinfectant stations and the efforts of organizations that have been able to provide these services along with outreach and education at boating access sites throughout Michigan.

Furthermore, the plan supports the Clean Boats, Clean Waters program as an important opportunity for volunteers to help stop the dispersal of AIS across the state. The program is also recognized as a potential tool for reporting of new AIS sightings and monitoring of existing infestations. This type of information is critical for successful early detection and rapid response to newly discovered AIS in a body of water. Partnering with programs such as Clean Boats, Clean Waters to distribute information and educational resources about AIS and providing accessible information on boat washes and cleaning of recreational equipment to prevent AIS dispersal are stated as strategic actions within the plan.

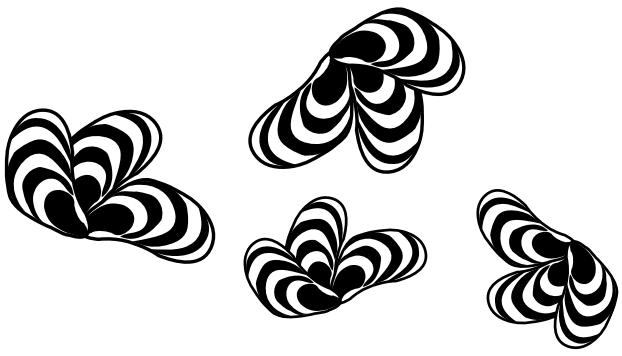
AQUATIC INVASIVE SPECIES LAWS

Federal Legislation

One important piece of national aquatic invasive species legislation is the National Invasive Species Act. A great deal of national and international focus has been placed on ballast water because of its implication in numerous aquatic invasive species introductions worldwide. The U.S. Coast Guard is responsible for regulating ballast water management. For information on regulations and links to specific ballast water programs, visit the Coast Guard Office of Operating and Environmental Standards website at http://homeport.uscg.mil/ballastwater.

Also important are the federal noxious weed regulations that define noxious weeds and establish rules restricting their movement. The Federal Noxious Weed list includes aquatic species such as Hydrilla, as well as a number of terrestrial species. Listed species cannot be moved into or through the United States without a permit. To view the complete list and associated regulations, visit the Animal and Plant Health Inspection Service website at http://plants.usda.gov/java/noxiousDriver.

The Lacey Act of 1990, later amended in 1998, prohibits importation of a list of designated species and other vertebrates, mollusks, and crustacea that are "injurious to human beings, to the interests of agriculture, horticulture, forestry, or to wildlife or the wildlife resources of the United States." The act declares importation or transportation of any live wildlife as injurious and prohibited, except as provided under the act. To view the act, visit www.fws.gov/le/pdffiles/Lacey.pdf.



Michigan Laws

In 2009, Michigan passed a law prohibiting a person from placing any boat, boating equipment, or boat trailer in Michigan waters with aquatic plant material attached. This includes all types of aquatic vegetation, not only invasive species (an exception is made for wild rice). Violation can result in a fine up to $100. The law also gives law enforcement officers the authority to order the removal of aquatic plants from boating equipment. The law can be found at www.legislature.mi.gov/documents/2009-2010/publicact/pdf/2009-PA-0091.pdf.

The Michigan Department of Natural Resources is responsible for law enforcement of plants and animals. The Department of Agriculture is responsible for enforcement related to insects. Michigan's rules of possession and penalties apply to those who intentionally or knowingly introduce a prohibited or restricted species. To view the description of penalties, visit www.legislature.mi.gov/documents/2005-2006/publicact/pdf/2005-PA-0076.pdf.

Michigan also has laws and rules pertaining to aquatic plant control. A permit from the Department of Environmental Quality is required for the application of chemicals to any plant that is growing in standing water at the time of the application. A permit is not required for the use of biological control such as Eurasian water-milfoil weevils.

A permit is generally not required from the MDEQ to control aquatic submerged vegetation in inland lakes by mechanical harvesting (i.e., cutting plants above the lake bottom with no soil disturbance). Inconsequential or insignificant ("de minimis") vegetation removal done by hand (e.g., hand pulling, raking or cutting a few plants) does not require a permit. Larger scale removal of plants may require a permit from the MDEQ's Water Resources Division (WRD). A use permit or authorization may be necessary from the Michigan Department of Natural Resources (MDNR) to use a state operated access site for this activity. In addition, cutting vegetation, including mechanical harvesting and mowing, on Great Lakes bottomlands requires a permit from the WRD. Disposal of harvested material within inland lakes, on Great Lakes bottomlands, or in wetlands is not allowed without prior written approval from the WRD.

Local Ordinances

Local ordinances may also exist. Contact your local municipality or government to find more information for your area.

Michigan Aquatic Invasive Species Laws

Michigan Public Acts 70–74 of 2005 define the following as prohibited and restricted aquatic fish and plant species and describe the rules of possession:

Prohibited and Restricted Species

"Prohibited fish species" means any of the following or the eggs thereof:

- Bighead carp *(Hypophthalmichthys nobilis)* or a hybrid or genetically engineered variant thereof.
- Bitterling *(Rhodeus sericeus)* or a hybrid or genetically engineered variant thereof.
- Black carp *(Mylopharyngodon piceus)* or a hybrid or genetically engineered variant thereof.
- Grass carp *(Ctenopharyngodon idellus)* or a hybrid or genetically engineered variant thereof.
- Ide *(Leuciscus idus)* or a hybrid or genetically engineered variant thereof.
- Japanese weatherfish *(Misgurnus anguillicaudatus)* or a hybrid or genetically engineered variant thereof.
- Rudd *(Scardinius erythrophthalamus)* or a hybrid or genetically engineered variant thereof.
- Silver carp *(Hypophthalmichthys molitrix)* or a hybrid or genetically engineered variant thereof.
- A fish of the snakehead family (family *Channidae*) or a genetically engineered variant thereof.
- Tench *(Tinca tinca)* or a hybrid or genetically engineered variant thereof.

"Prohibited aquatic plant species" means any of the following or fragments or seeds thereof:

- African oxygen weed *(Lagarosiphon major)* or a hybrid or genetically engineered variant thereof.
- Brazilian elodea *(Egeria densa)* or a hybrid or genetically engineered variant thereof.
- European frogbit *(Hydrocharis morsus-ranae)* or a hybrid or genetically engineered variant thereof.
- Giant hogweed *(Heracleum mantegazzianum)* or a hybrid or genetically engineered variant thereof.
- Giant salvinia *(Salvinia molesta, auriculata, biloba,* or *herzogii)* or a hybrid or genetically engineered variant thereof.
- Hydrilla *(Hydrilla verticillata)* or a hybrid or genetically engineered variant thereof.
- Japanese knotweed *(Fallopia japonica)* or a hybrid or genetically engineered variant thereof.
- Parrot's feather *(Myriophyllum aquaticum)* or a hybrid or genetically engineered variant thereof.
- Water chestnut *(Trapa natans)* or a hybrid or genetically engineered variant thereof.
- Yellow flag iris *(Iris pseudacorus)* or a hybrid or genetically engineered variant thereof.
- Yellow floating heart *(Nymphoides peltata)* or a hybrid or genetically engineered variant thereof.

"Restricted aquatic plant species" means any of the following or fragments or seeds thereof:

- Curly leaf pondweed *(Potamogeton crispus)* or a hybrid or genetically engineered variant thereof.
- Eurasian water-milfoil *(Myriophyllum spicatum)* or a hybrid or genetically engineered variant thereof.
- Flowering rush *(Butomus umbellatus)* or a hybrid or genetically engineered variant thereof.
- Phragmites or common reed *(Phragmites australis)* or a hybrid or genetically engineered variant thereof.
- Purple loosestrife *(Lythrum salicaria)* or a hybrid or genetically engineered variant thereof, except for cultivars developed and recognized to be sterile and approved by the director of agriculture under section 16a of the insect pest and plant disease act, 1931 PA 189, MCL 286.216a.

Rules of Possession

(1) A person shall not knowingly possess a live organism if the organism is a prohibited species or restricted species, except under one or more of the following circumstances:

(a) The person intends to present a specimen of the prohibited species or restricted species, for identification or similar purposes, to a person who is a certified applicator or registered applicator under part 83, to a public or private institution of higher education, or to the department or any other state, local, or federal agency with responsibility for the environment or natural resources.

(b) The person has been presented with a specimen of a prohibited species or restricted species for identification or similar purposes under subdivision (a).

(c) The person possesses the prohibited species or restricted species in conjunction with otherwise lawful activity to eradicate or control the prohibited species or restricted species.

(d) If the prohibited species or restricted species is not an insect species, the possession is pursuant to a permit issued for education or research purposes by the department under section 41306. If the prohibited species or restricted species is an insect species, the possession is pursuant to a permit issued for education or research purposes by the Department of Agriculture under section 41306 or by the United States Department of Agriculture.

(2) A person described in subsection (1)(b) or (c) shall notify the Department of Natural Resources, the Department of Agriculture, or the Department of Environmental Quality if the prohibited species or restricted species was found at a location where it was not previously known to be present.

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Section 4:
Where are invasive species?

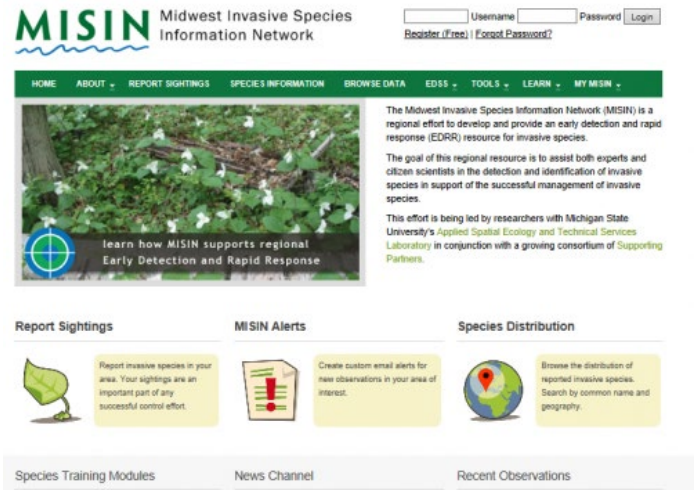
Tracking infestations of aquatic invasive species is an enormous undertaking, especially with limited financial resources. A few of Michigan's invasions have been documented by scientific research or government agencies, but most infestations are reported by informed, concerned volunteers.

ONLINE DATABASE OF INVASIVE SPECIES

The Midwest Invasive Species Information Network (MISIN) is a regional effort within the Great Lakes basin to develop and provide an early detection and rapid response resource for invasive species.

The goal of the program is to assist the public and experts in the detection and identification of invasive species. The Midwest Invasive Species Information Network is a Michigan State University program and receives support from the Michigan Department of Natural Resources, Michigan Natural Features Inventory, Michigan Department of Agriculture and Rural Development and Shedd Aquarium.

The MISIN webpage allows you to report invasive species in your area, create custom e-mail alerts, and browse the distribution of reported invasive species. You can try over 40 different MISIN E-learning species identification training modules which cover both terrestrial and aquatic invasive species.



CLEAN BOATS CLEAN WATERS

Section 5:

How can volunteers organize an Aquatic Invasive Species watercraft education program?

The Clean Boats, Clean Waters program is an opportunity for volunteers to assist in the management and control of invasive species. Through the Clean Boats, Clean Waters program volunteers are provided with the training materials necessary to conduct their own watercraft inspection demonstrations. Through online materials, volunteers are able to educate boaters on how and where invasive species are most likely to hitch a ride. By showing boaters how to perform boat and trailer checks and distributing informational material, volunteers can make a difference in helping prevent the spread of invasive species.

GETTING STARTED

Recreational boating can be a significant corridor for the spread of invasive species between bodies of water. This pathway is a concern because of the more than 900,000 registered boaters moving around Michigan's 11,000 inland lakes. Watercraft inspection demonstrations at boat landings are designed to increase public awareness about invasive species and to assist boaters in taking preventive steps to avoid further spreading of troublesome species.

After reading this handbook, you will have all of the tools necessary to start your own volunteer watercraft inspection program in your community. Developing an effective program requires patience, time and an eye for organizing a working schedule.

A group that consists of a volunteer coordinator and a committee of several people is the best way to distribute the tasks equally and prevent volunteer burnout. When planning a volunteer watercraft program, consider these five Ws:

WHOM will you recruit for the watercraft education team?

Adult and youth volunteers can be recruited through lake association newsletters, local schools, 4-H or scouting groups. Many service organizations are looking for community-involvement opportunities. We recommend at least two people at the landing. Ideally, an adult works with a youth volunteer. Boaters are very cooperative when a young person is giving the message: "Clean Boats, Clean Waters, please."

WHAT are the duties of a watercraft educator?

Before you organize a team, decide what skills and tasks volunteers should have effective interaction with the public at boat landings. Generally, educators perform three duties:

1. Demonstrate how to visually check boats and recreational equipment for any hitchhiking plants or animals;
2. Demonstrate where and how to clean recreational equipment and other prevention steps boaters need to take every time they leave the water; and
3. Distribute educational materials to interested boaters, which are available through the Michigan Lake and Stream Association.

Additional duties may also include recording data on the Watercraft Information Report (see Section 6) or keeping track of supplies.

Here are some specific skills to consider:

A Clean Boats, Clean Waters volunteer is…

- Caring – wants people to enjoy water recreation and wants Michigan to be free of aquatic invasive species;
- Friendly – interested in meeting new people and helping them;
- Informed – understands the problems caused by aquatic invasive species;
- A good communicator – able to explain the problem and demonstrate inspection and cleaning techniques;
- Flexible – willing to volunteer on some weekends and holidays;
- Reliable – ready, willing and able to make and keep a commitment to the program during boating season;
- Accurate – able to record information for program organizers; and
- Physically able - healthy enough to inspect watercraft and trailers.

To identify the watercraft education team at a boat landing it is helpful if everyone is dressed in a similar fashion. Volunteers dressed similarly will give the appearance that they are part of a team. Clean Boats, Clean Waters T-shirts and logo stickers can be acquired by contacting the Michigan Lake and Stream Associations.

WHEN is the best time to volunteer at a boat landing?

When recruiting volunteers, be specific about the amount of time you want them to work. A volunteer is more likely to agree to a three-hour shift once or twice a month rather than an open invitation to volunteer all summer on weekends and holidays. Volunteers will readily step up if they know the expectations and how much time is realistically needed.

To get the most "bang for your buck," become acquainted with the activity on your lake and when the lake is the busiest. Are the weekends a flurry of activity from Friday night at 4 p.m. until 8 p.m. Sunday? Or is Saturday morning from 6 a.m. until 10 a.m. the active time at the landings? Usually, holiday weekends during the summer are the busiest times at launch sites. Anglers are up and on the lake by dawn and are out on opening day of fishing season. Recreational boaters usually use the lake in the afternoon, and sunny, warm days draw lots of people to the lake. Become aware of fishing tournaments and special lake events that draw many boats to the landings. Remember, the boat landing can often be the first place an aquatic invasive species enters the system.

WHERE will the watercraft inspection demonstrations take place?

It is important to find out who owns the boat landing before you begin to schedule work shifts for your volunteers. The landing may be owned and maintained by one of several entities: the federal, state, or township government, lake association, or a private business or individual. To check ownership, you might need to contact several organizations.

Department of Natural Resources (DNR)-owned and leased boat landings are identified on the DNR website at http://www.mcgi.state.mi.us/mrbis/mapbasic.aspx. County zoning offices, township and city halls are other potential sources.

You may need to obtain a permit for your event/activity if it is taking place at a state boat launch. The permit is "Event Application/Permit To Use State Land" and can be found on the Michigan DNR website. If you are thinking about installing signage or posting material, find out what the owner requires. If you have limited volunteer resources and many public landings, determine which landings receive the most boat traffic.

WHY is this volunteer program necessary?

Be prepared to answer this question. Often lake owners are frustrated with the public trust doctrine that mandates public use of all waters in Michigan. Lake owners feel it is unfair that they bear the brunt of the cost of managing aquatic invasive species. However, proactive steps in preventing an infestation are more cost-effective than waiting for an infestation to occur.

Many lake front property owners have been or are investing in control options at their own expense. Educating boaters can help prevent the reintroduction of invasive species such as Eurasian water-milfoil into a lake. Preventing aquatic invasive species is a better management option than the expensive alternatives. For example, treating Eurasian water-milfoil infestations with chemicals costs an average of $325 to $450 per acre per treatment. Eurasian water-milfoil can grow two inches per day and can fragment into hundreds of new plants within hours, so it would not take long for Eurasian water-milfoil to cover hundreds of acres. If this does not impress you, contact members of a lake organization struggling with invasive species. They can tell you firsthand the tremendous impact that one invasive species caused in their community. Remember, a little prevention is worth a lot of cure.

MATERIALS

Developing a Clean Boats, Clean Waters volunteer watercraft education program does not require a lot of money. By contacting the Michigan Lake and Stream Associations, you can learn about the various materials that can be used at your lake.

Available Materials

Clean Boats, Clean Waters T-shirts
Clean Boats, Clean Waters logo stickers
Watercraft checkpoint stickers
Watercraft checkpoint posters
... and more!

Helpful Materials to Have When at a Boat Launch:

You don't need a lot of supplies at a boat launch to educate boaters about aquatic invasive species. One item you may want to hand out is the Clean Boats, Clean Waters watercraft checkpoint sticker. It can serve as a reminder for boaters to clean, drain, and dry their equipment. The sticker can also serve as a guide for inspecting watercraft for invasive species.

Other materials that may be useful include fact sheets or identification guides to invasive species that are threatening in your area. Perhaps Eurasian water-milfoil is a pressing issue for your lake; consider printing a fact sheet or guide to handout to interested boaters.

Resist the temptation to overload boaters with information and handouts. It's best to start by handing out a little information and have additional material available if they want to learn more about a particular invasive species.

Other items to consider:

- Clipboard and pencil
- Copy of the boat landing script (see Section 5)
- Watercraft Information Report (see Section 6)
- Watercraft Check Points Illustration (see Section 5)
- Cell phone and local contact phone numbers for emergencies
- Digital camera

WATERCRAFT INSPECTION DEMONSTRATION TIPS

An effective volunteer watercraft team is prepared to raise boater awareness and to encourage and demonstrate the steps necessary to avoid spreading invasive species and damage to recreational equipment. On very rare occasions, you may be uncomfortable about a situation or person. **Always** back away from a potentially dangerous or violent situation. **Never** encourage confrontation, no matter how strongly you might feel about the subject. Remember, volunteers are not enforcers of rules and should never jeopardize their own safety. If you are suspicious of someone (for example, a loiterer or someone who is not intending to go boating), do not hesitate to leave the launch site. Do not put yourself or volunteers at risk. If you feel that a boat launch site is unsafe in any way, please notify the organization you are working for. Use the following DO and DON'T lists to prepare your boat landing message.

The DO List

- Dress your team in similar clothing or wear a Clean Boats, Clean Waters T-shirt or sticker. This message gives credibility to the program
- Always first introduce yourself and mention the organization you are working for and why you are at the landing.
- Approach boat owners only before they are on the ramp.
- Always ask if the boater would mind answering a few questions.
- Be polite and courteous to all boaters you encounter.
- Listen to a boater's concerns. Remember that you are encouraging boaters to become interested in invasive species.
- Make sure boaters know that they can make a difference!

The DON'T List

- Don't begin asking questions upon approaching boaters, because they might be confused about who you are and why they should give you their time.
- Don't delay boaters or cause a backup.
- Never preach to a boater; your mission is to educate, not alienate.

BOAT LANDING MESSAGE

Getting out and speaking to the public can be intimidating. Volunteers can feel a little anxious and nervous. The following prepared script will help volunteers practice and role-play before their first boater shows up at the landing. Practicing with other folks will give volunteers the confidence it takes to greet a boater. If volunteers really want to watch a "pro," they just need to ask a few kids to get involved. Are kids intimidated? Usually not!

The following prepared script is only one sample of the many methods of addressing boaters at landings and performing watercraft inspection demonstrations. Each volunteer should develop his or her own style and learn how to adapt in a variety of boat landing experiences. Approach boaters only before they are on the ramp. If you are interested in learning more about the amount and type of traffic on your lake you can use the Watercraft Information Report to record information (see Section 6). At times you may have only 30 seconds to talk to the boater; other times, long lines at landings may provide you with lots of time to talk.

No matter what style you use to approach boaters, any watercraft inspection demonstration process should include these points:

1. Tell them who you are, who you represent and why you are there.
2. Ask if they have a short time to answer some questions.
3. Collect information on the Watercraft Information Report form (if you are interested in learning more about the boat traffic on your lake)
4. Ask if they are familiar with Eurasian water-milfoil or zebra mussels or other species in your area. Briefly explain about these invasive species.
5. Ask if they will let you demonstrate how to inspect their boat and equipment
6. Talk while inspecting, and point out watercraft checkpoints. If they do not want to assist you in the inspection, continue to talk about invasive species as you inspect.
7. Give your final message, the prevention steps:
   - Inspect and remove any visible mud, plants, fish or animals before transporting equipment.
   - Drain water from equipment before transporting.
   - Dispose of unwanted bait in the trash, not in the water.
   - Spray, rinse or dry equipment to remove or kill invasive species.
8. If available give them a Clean Boats, Clean Waters Watercraft Checkpoint Sticker which can go on their boat winchpost
9. Thank them for their time and cooperation.

Sample Script

Introduce yourself:

Good Morning/Afternoon. I am from _____. We are working with state agencies and local groups to talk with boaters about invasive species and help them check their boats for Eurasian water-milfoil and zebra mussels. We are trying to keep harmful invasive species from spreading from lake to lake, often times invasive plants and animals are spread by watercraft. We also want to help boaters prevent damage that invasive species can cause to their recreational equipment. I have a few quick questions I would like to ask you, and then I would like to walk around your watercraft with you and point out a few places where these species can attach to boats and trailers.

If you are interested in recording the boat traffic on your lake you may find it useful to use the Watercraft Information Data Sheet in Section 7 and ask the following questions during your inspection:

1. What was the last body of water your boat was on? Print the name in the blank.
2. Did you use your boat during the past 5 days?
3. Have you ever heard of Eurasian water-milfoil, zebra mussels or other invasive species?

   If YES, check all categories from which they got information.

   ___ PSA ___ Publication

   ___ Newspaper/Media ___ Signs

   ___ Presentation or Display ___ Other

   If NO, explain that invasive plants and animals overtake the lake's ecological community and that state agencies are attempting to prevent their spread from lake to lake. Always explain to the boater that invasives are the reason that volunteers are out at the launches, trying to raise public awareness about how invasives spread and why they are detrimental to Michigan lakes and rivers.

4. Are you familiar with the problems caused by Eurasian water-milfoil?

   Eurasian water-milfoil grows in dense surface mats that shade out native plants, block fish movement, entangle boat motor propellers, and interfere with swimming and many other types of water recreation. Eurasian water-milfoil out-competes native vegetation needed by fish and wildlife. This underwater plant can grow very rapidly — up to 2 inches per day — and can reach lengths of 20 feet.

5. Are you familiar with the problems caused by invasive mussels?

   Zebra mussels compete with other aquatic organisms for food. They reduce the amount of plankton in the water that fish feed on; they kill native clams by colonizing on their shells; and they clog intake pipes at water utilities and industries. In addition, zebra mussels can attach in huge numbers to any hard surface, such as the bottom of your boat if it was moored in the lake and to piers and docks. They can also damage your boat's bilge and live well. They reproduce quickly — one female can produce up to 1 million eggs per summer.

6. Perform a watercraft check (using checkpoint illustration):

   If you would walk around your boat with me, I can show you some areas to look for invasive hitchhikers.

   Make sure you talk aloud as you inspect; it helps reinforce the Clean Boats, Clean Waters behavior. Talk to boaters about inspecting and cleaning their watercraft and about draining the water from their boat — such as the bilge, bait buckets and live wells — before they leave the access.

   Water is another way invasives can move from lake to lake so it is always a good idea to drain your water. Vegetation can be found on motor boats, the motor/prop, anchors, bunks, rollers, the trailer axle, lights/wiring; for jet skis, it can be found in the intake grate and propeller; and for sailboats, it can be found in the centerboards. Check your anchor and anchor line to see if any plants are clinging to it.

   Some aquatic invasives, such as zebra mussels, are also found on the motor/prop, on the sides and bottom of boat below the waterline, on the anchor, and clinging to vegetation. It is a good idea to drain water from the motor, live well, bait well, bait bucket, bilge, and transom wells. Always inspect the hull and sides of your boat for aquatic invasives; if it feels gritty or sandy, it may be that new zebra mussels are attached.

   An extra precaution that you can take to eliminate other aquatic invasives is to wash your boat with warm tap water or take your boat through a car wash (Manual self-service facility, **NOT** automatic) or dry your boat and equipment in the sun for five days before entering another lake.

   Leave boaters with a final message: Clean Boats, Clean Waters.

Please make it a habit to:

- Inspect and remove any visible mud, plants, fish or animals before transporting equipment.
- Drain water from your equipment (boat, motor, trailer, live wells) before transporting.
- Dispose of unwanted bait in the trash, not in the water.
- Spray, rinse or dry equipment to remove or kill invasive species.

If available give boaters a Clean Boats, Clean Waters sticker and help them place it on the handle side of the trailer winch post. Remind boaters to follow the precautions listed on the sticker every time they leave a body of water. Be sure to thank the boater for their time and cooperation.

POTENTIAL SCENARIOS AND QUESTIONS

"Why are you out here wasting resources when the plant is going to come anyway?"

Even the most educated people will ask this question. Just be prepared mentally for such viewpoints and think about why you are out there and what you will say in reply. Expect the unexpected. Here are some suggested responses:

Even if we cannot keep the plants out completely, we can prevent a lot of widespread damage. Prevention also gives us time to adopt new control methods as they are developed in the future. The longer we keep invasives out of a lake, the longer we put off the enormous costs of management and property devaluation.

If lakefront property owners are investing thousands of dollars or more for control, boater education can help keep invasive plants and animals from being re-introduced into the lake.

"Aren't all plants bad anyway?"

It is important to clear up this misconception! This is what you can say:

Native plants are lifelines for an aquatic ecosystem, providing the basis for all life within it. The problem lies with invasive (non-native) plants that have no natural inhibitors and therefore out-compete native plants, lowering the water body's aquatic diversity.

"I don't have time for this... I know all about it already!"

This remark is fairly common. If boaters do not wish to hear from you, you must respect their rights and let them be. In such a situation, the suggested action would be to wish them a nice day.

"Why did it take Michigan so long to do something about invasive species?"

There is no good answer to this question. Here is how you can respond:

In the past, environmental problems have often become established and have sometimes reached a crisis before we did anything about them. In this case, we have learned and are trying to take action before these species spread to more of our sensitive environments. Instead of focusing on what could have been done, we are trying to focus energies on the present and future. We have also become aware of species, such as Hydrilla and Asian carp that could invade Michigan waterways and be very damaging to the ecology and economy of our state. We're trying to prevent their introduction and avoid those costs.

OH NO, YOU FOUND SOMETHING!

Aquatic invasive species can hide in the most mysterious places, and even the most diligent volunteer may not detect a hitchhiker. Catching the invasive on a watercraft before it enters a lake is the most effective means of preventing the spread of non-native species. The following information provides you with specific instructions on how to collect a sample from a watercraft during the inspection process.

Submitting a sample from a watercraft inspection:

If you think you have found an invasive species on a watercraft, request a sample from the owner and follow the procedures. Recommend that the boater take the boat to a car wash (**NOT** automatic) and have the watercraft washed down before it is launched.

Take a sample if:

- You think you have found an invasive species on a boat entering a body of water not known to be infested with that species and would like to have it positively identified.

Steps to follow:

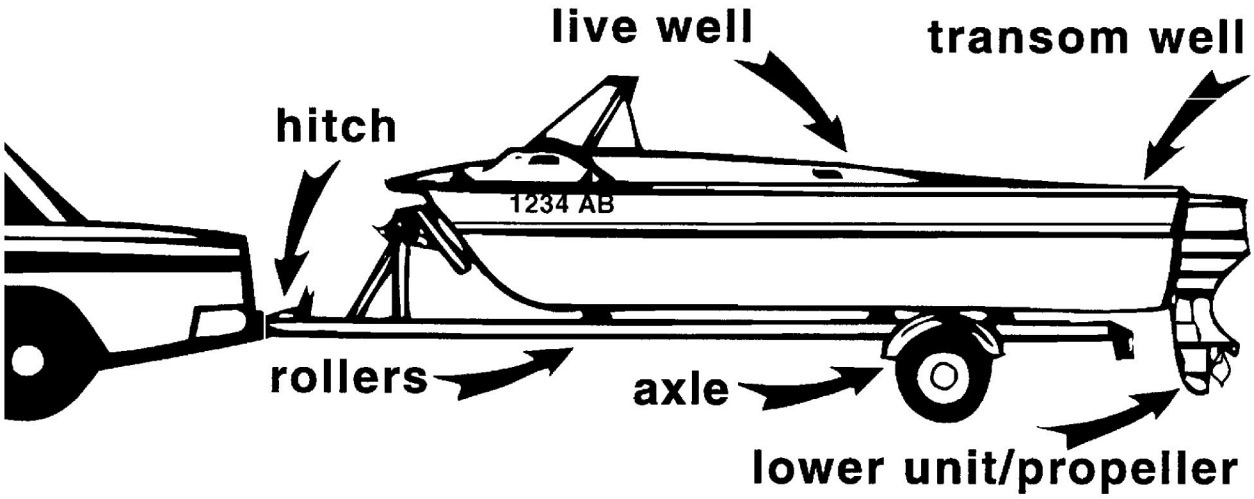
- Put the sample in a plastic bag and keep it in a cool place (a cooler in your car or refrigerator at home).
- Contact the Michigan Lake and Stream Assocations for identification assistance. See Section 2 of this handbook for contact information.
- Use a permanent marker and record the following information on the plastic bag:
  a. Date
  b. Body of water
  c. Description of the specific location on the lake where the specimen was found to assist in any follow-up work.

Remember if you find "something," don't give up; there are a variety of control and management options to address invasive species on your lake. Early detection is the key to controlling the situation!

CLEAN BOATS CLEAN WATERS

WATERCRAFT CHECK POINTS

Below is a list of the most common locations aquatic invasive species may hitch a ride on watercraft. Use this document as a guide when you are inspecting watercraft and talking to boaters.



- ☐ Anchor
- ☐ Axle
- ☐ Bait bucket
- ☐ Bunks
- ☐ Bow line
- ☐ Fishing line
- ☐ Floor
- ☐ Hull
- ☐ Intake pipe
- ☐ Ladder
- ☐ Landing net
- ☐ License plate
- ☐ Motor
- ☐ Wheels
- ☐ Live well
- ☐ Lights/wiring
- ☐ Rollers
- ☐ Prop
- ☐ Spare tire
- ☐ Tackle
- ☐ Tow rope
- ☐ Trailer
- ☐ Transducer
- ☐ Transom well

CLEAN IT. DRAIN IT. DRY IT.

CLEAN BOATS
CLEAN **WATERS**

Section 6:
How can volunteers share their information?

KEEPING RECORDS

It may be in your best interest to learn more about the boat traffic on your lake and where boaters are coming from and if they are aware of challenges your lake is currently facing with invasive species. It may also be helpful to keep records if your lake is interested in installing a boat wash station. Having records of the boat traffic on your lake may help if you are seeking funding.

The Clean Boats, Clean Waters program offers the following data sheet if you are interested in recording watercraft on your lake. The data sheet addresses the following questions:

- What state the visiting vehicle is from
- What type of recreational watercraft is being used
- What body of water the boat was on last and when
- Whether the boater has taken prevention steps
- Whether the boater allows inspection
- Whether plants or animals are on the boat entering or leaving the water body
- Whether the boater has prior knowledge of invasive species
- How many people listened to the message

This information is for your purpose only.

What are the advantages of keeping records about volunteer watercraft inspection education programs?

1. Collecting data helps the team discover traveling patterns of boaters who visit the lake.
2. The data could also be useful for local ordinance reviews that pertain to the boat landing or water body use.
3. By recording consistent information, your program can gain valuable insight about the public's knowledge of invasive species in your area and the traveling patterns of people visiting your lake. Having this information could help justify the need for more strict regulations on your lake.

See: Watercraft Information Report Form on next page

Working with the Watercraft Information Report Form

The report on the next page is an example of a straightforward tracking system which could be used on your lake. If your lake is interested in keeping your own personal records, the following guidelines are designed to assist you in collecting and recording helpful information (see next page for the example form).

- The "Prior Knowledge" section allows you to indicate where boaters previously obtained information about aquatic invasives (if they have never heard about them, you don't have to check anything).
- In the "Prevent AIS" column, check whether or not the boater says they have taken preventive actions, such as power washing or drying the boat.
- In the "Inspect Today" column, check whether or not the boater allows you to inspect the watercraft.
- In the "AIS Found" section, write "Y" if the boat or trailer has weeds hanging off it as the boaters are coming in or going out. Also note whether invasive animals are present and write "Y" if they are. Write "N" if no weeds or invasive animals were found on inspection. Record this information before you ask them to remove plants or animals. This information will help show whether boaters are removing vegetation before coming to new waters.
- The "# Contacts" entry does not necessarily equal the number of people on the boat. Count only the people who actually listened to you. Also, you can use this section if you talk to people at the landing, anglers for example, who aren't boating. You won't have boat information from them, but you can still count them as contacts.

Best of luck in your watercraft inspection education program, and remember to make sure boaters know that they can make a difference!

CLEAN BOATS CLEAN WATERS

Watercraft Information Report

Notice: Information requested on this form will be used to track and evaluate public awareness and education efforts for watercraft inspection. Personal information, including names of staff or volunteers, is not intended to be used for other purposes but may be made avaliable to requesters.

PLEASE PRINT

Volunteer Name:	Waterbody Name:	Date:
Landing Location:	County:	City/Twp/ Village:

Time	Watercraft Information										Boater Information												
	State	Personal	Pontoon	Fishing	Pleasure/Ski	Sailboat	Kayak/Canoe	Other	Last Used		Source of Prior AIS Knowledge						Prevent AIS		Inspect Today		AIS Found		# Contacts
									Date	Location	PSA	News	Display	Pub	Sign	Other	Y	N	Y	N	Y	N	
am pm																							
am pm																							
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Total																							

Comments/Notes:

Question Boaters Ask (use back of this page):

CLEAN BOATS
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Section 7:
How can volunteers take care of boat landings?

BOAT LANDING INVENTORY

The Clean Boats, Clean Waters program offers an excellent opportunity for volunteers to help care for boating access sites. Among the contributions volunteers can make are:

- Inventory the site
- Report to the owner on its status
- Post a sign about invasive species
- Display information about invasive species

Use the information in this section to guide you in those activities.

Conduct an inventory of information about the landing(s) you plan to use. PLEASE PRINT

Water Body Name: _____

Boat Landing Location (Road, Street, Drive): _____

_____

County: _____

Township, City, Village: _____

Boat Landing Owner: _____

Ramp Type:

__ Concrete Slab
__ Concrete Plank
__ Other _____
__ Asphalt
__ Gravel
__ Dirt

Parking Lot Type:

__ Concrete
__ Asphalt
__ Gravel
__ Dirt
__ Other

Number of Parking Spaces: ____ Disability Spaces: _____

Type of Information Display:

__ Kiosk
__ Information Center (glass-enclosed)
__ Other
__ None

Place to leave brochures? ___ Yes ___ No

Is an Aquatic Invasive Species sign posted and visible from the landing?

__ Green and white
__ Brown and white
__ Other

Sign's distance from the landing: _____
Overall facility condition: _____

After you have inventoried the site, decide which efforts are most needed at that location, and discuss them with the landing's owner. You should always get permission before making any changes at the landing site.

How can we share the findings from our inventory?

Contact the landing's owner and ask for some time to explain the Clean Boats, Clean Waters program and get the necessary permission to use the launch site for your team's work. At that time, you can also discuss your findings and any ideas you have for improvements/changes.

Boat Landing Ownership and Maintenance

Whoever owns or operates a boat landing is responsible for its maintenance.

How can I find out who owns the boat landing?

It is important to know who owns the landing and who to contact. Ownership of boat landings can be determined through a variety of methods. Plat maps are one useful source, as are searches at the register of deeds office for the county in which the landing is located. Department of Natural Resources (DNR)–owned and leased boat landings are identified on the DNR website – http://www.mcgi.state.mi.us/MRBIS/mapbasic.aspx

How are state, county, village, or city parks regulated?

State-owned parks with boat landings are regulated under Public Act 451 of 1994. County, village, and cities that own parks with boat landings usually operate such parks and boat landings under local ordinances or have agreements with the State of Michigan for operational standards (such as Grant-in-Aid or Michigan Natural Resources Trust Fund).

Boat Landing Sign

Michigan has developed this sign reminding boaters to wash their equipment after each use due to invasive species. If you would like invasive species signage for your launch, contact the Michigan Department of Environmental Quality Aquatic Invasive Species Coordinator. Section 2 provides contact information.

Displaying and Distributing Information

If the landing has a message board or kiosk, volunteers may be able to display and/or distribute information about invasive species and contact numbers to use if a questionable plant or animal is found. The boat landing may be the first opportunity for volunteers to educate boaters. The Clean Boats, Clean Waters team cannot be there for every boater, but volunteers can often offer educational information at any time. There are Clean Boats, Clean Waters posters available through the Michigan Lake and Stream Associations.

Launch Regulations

The Michigan Department of Natural Resources (DNR) encourages free boat launching as part of its responsibility for public access to the state's waters. However, a reasonable launch fee may be charged under authority of Public Act 451 of 1994 for the purpose of operating and maintaining a boat access site owned or operated by DNR and other access providers. Excessive, unjustified, or unreasonable boat launching fees restrict or prohibit public boating access and use of navigable waters in the state.

What is the public trust doctrine?

The Michigan Constitution establishes a state-administered public trust for navigable waters of the state. Under the public trust doctrine, the state holds the water of navigable bodies of water in trust for all its citizens and has an obligation to protect public rights in navigable waters.

What is the relationship of the public trust doctrine to local regulations?

The public trust doctrine plays a substantial role in any decision relating to the public's access to and use of public waterways. The doctrine provides that the government holds all navigable waters in trust for the benefit of, and unrestricted use by, the public as a whole. This doctrine essentially creates a property right for the public as a whole in the waterways within a state. Access and use of waters may be restricted only under the police powers of the state for the protection and conservation of the public health, safety, and welfare, including environmental conservation and recreational purposes. Any regulation of the use of waterways must be reasonable in respect to the public interest being protected.

Local government units may not enact any ordinance or regulation that in any manner excludes any boat from the free use of the waters of this state or that pertains to the use, operation, or equipment of boats or that governs any activity regulated by the Michigan Waterways Commission.

CLEAN BOATS
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Section 8:
Aquatic Invasive Species Information

AQUATIC INVASIVE SPECIES INFORMATION

Aquatic invasive species are making their way to Michigan through a number of pathways. Species originating from Europe, Asia or other continents are commonly transported via ballast water from ocean going ships. Also, many exotic species are commonly found in household aquariums and backyard ponds and are accidentally introduced to Michigan lakes and streams. Asian Carp were originally contained in aquaculture operations, but were accidentally released during flooding and pond failures. Lastly, sport fishing can be a source of invasive species. Anglers may travel to and throughout Michigan and dump their unused bait in the water or use gear which may contain plant fragments, eggs, or seeds of invasive species unknowingly.

What aquatic invasive species are of greatest concern?

Below is information regarding the most threatening invasive species found near or within Michigan waterways.

❑ **Eurasian Water-milfoil:** One of the most widespread and problematic invasive plants in Michigan inland lakes. Eurasian water-milfoil out competes native plants and forms a dense mat at the water surface, greatly reducing the fishing and recreational use of the lake.

Identification: Feathery in appearance, with long stems that branch as they grow to the water surface. Four leaves are arranged in a whorl around the stem, each leaf finely divided into 12-20 leaflets along the central axis. Similar in appearance to Michigan's native milfoil, however native milfoil has 12 or fewer pairs of leaflets along the central axis.
Reproduction: Vegetative fragmentation (occurs when plant breaks apart and each piece forms a new root system, ultimately becoming a new plant). Also produces a flower above the water surface and produces a seed, but its most common form of reproduction is through fragmentation.
Prevention: Spreads rapidly to other lakes by attaching to boats and trailers. Prevention is possible by washing boating equipment and gear after leaving a body of water or allowing equipment to dry for 5 days.

❑ **Starry Stonewort:** Highly invasive macro-algae, native to Europe where it is considered an endangered species. First positively identified in a Michigan inland lake in 2006 and by 2011 it was found in 119 water bodies in 31 counties. It forms dense mats up to 10 feet thick on the lake bottom, out competing native plants and impeding access to fish spawning habitat.

Identification: Similar to Michigan's native *Chara*, it has whorls of thin leaf-like branches around the stem. However, unlike *Chara*, it produces a very small, white, star shaped reproductive structure called a bulbil. The "stars" are connected by a long and translucent stem and are most easily seen in late July and August, but can be found at anytime.
Reproduction: Small and white "stars" serve as the reproductive structures which can remain viable for several years.
Prevention: Spreads rapidly to other lakes by attaching to boats and trailers. Prevention is possible by washing boating equipment and gear after leaving a body of water or allowing equipment to dry for 5 days.

❑ **European Frog-bit:** Floating aquatic plant resembling a miniature water lily with white flowers. Usually found in slow moving or standing water, such as ponds, canals, ditches, and sheltered bodies of water. Grows on the top of the water surface forming a thick mat, preventing light penetration to submerged aquatic plants. Greatly impacts movement of waterfowl, fish, and boats.

Identification: Resembles a miniature water lily, the size of a quarter. Leaves are kidney shaped and spongy underneath and a white three petal flower blooms mid-summer.
Reproduction: Turions (overwintering or dormant vegetative buds) are the most common form of reproduction, however frog-bit also produces seeds and has underwater stem-like extensions called stolons or runners, which assist in reproduction.
Prevention: Risk of introduction to inland lakes can be greatly diminished by washing boating equipment and trailers after leaving a body of water or allowing equipment to dry for 5 days. Also sometimes used in the aquarium or pond trade as an ornamental plant.

❑ **Fanwort (*Cabomba*):** Submersed aquatic plant native to North America and possibly southern Michigan. Commonly found in aquariums. Fanwort is an issue due to its rapid growth and dominance in water bodies.

Identification: Submersed plant with leaves that are opposite along stem and finely divided. A small, white flower appears mid-summer on the water's surface.
Reproduction: Fragmentation is the most common form of reproduction.
Prevention: Spreads to inland lakes by becoming attached to boating equipment and gear. Be sure to wash boating equipment after leaving a body of water or dry equipment for 5 days. This is also a common aquarium plant, and can be accidentally introduced. Be sure to never dump fish aquarium plants or fish near a water body.

❑ **Zebra/Quagga Mussels:** Small fresh-water mollusks (relatives of clams and oysters) rapidly change water bodies by "filter feeding," consuming phytoplankton and algae in the water column. Invasive mussels greatly increase water clarity, allowing sunlight to penetrate deeper, enabling increased growth of algae. Negatively impacts water quality, recreation, and fishing. Zebra mussels attach to native clams, and any other hard surfaces in the water. Quagga mussels do not require a surface to attach to, and are capable of growing at greater depths than zebra mussels.

Identification: Zebra mussels get their name from a striped pattern on their shell. The shells of zebra mussels are D-shaped and grow to a maximum size of 2 inches. Quagga mussels are slightly larger than zebra mussels and are more pale in coloration near their hinges. When placed on a flat surface, zebra mussels will lay flat on their ventral side, quagga mussels will topple over.
Reproduction: Zebra and quagga mussels are prolific breeders, contributing to their spread and abundance throughout Michigan and North America. Both mussels reproduce with external fertilization, occurring twice a year. A fully mature female mussel is capable of producing up to one million eggs per year!
Prevention: Originally arrived in North America from ocean going ships via ballast water, they are now commonly transported on boating equipment and gear. Tiny larval mussels feel like sandpaper on the hull of a boat. Prevention is possible by washing boating equipment after leaving a body of water, or allowing equipment to dry for 5 days.

❑ **Hydrilla:** Submersed plant native to much of Asia, found in the southern United States and causing serious economic and recreational impacts. Not currently found in Michigan, however was discovered in northern Indiana. Hydrilla is capable of growing an inch per day with stems that reach 30 feet in length.

Identification: Looks similar to Michigan's native waterweed, however there are 4-7 (commonly 5) leaves at each node around stem. Michigan's native waterweed only has 3 leaves per node. Leaf edge and vein have small teeth. Size of leaves is less than ¾ inch.
Reproduction: By seeds, turions that form at the base of leaves, tubers or stem fragmentation.
Prevention: Spreads rapidly to other lakes by hitching on boats and trailers. Prevention is possible through washing boating equipment and gear after leaving a body of water.

❑ **Asian Carp:** Seven carps native to Asia have been introduced to the United State, the term 'Asian Carp' refers to the four carp most recently introduced: bighead carp, black carp, grass carp and silver carp. Asian Carp consume up to 20% of their body weight per day in plankton and can be over 100 pounds. They have no natural predators in North America and are of great concern due to their large diet.

Identification: One of the most recognizable features are the small eyes which set low on the face, below the midline of the body and almost parallel with the mouth. Juveniles have a keel (ridge on the underbelly) that is very prominent.
Reproduction: An Asian Carp can produce half a million eggs when it spawns.
Prevention: Know what fish species are being used for as bait and never discard bait into waterbodies. Never use wild-caught baitfish in waters other than where they came from. Drain live wells and bilge tanks prior to leaving a body of water.

TO LEARN MORE ABOUT AQUATIC INVASIVE SPECIES VISIT:

Michigan Lake and Stream Associations, Inc.
www.mymlsa.org/aquatic-invasive-species

Michigan Department of Environemental Quality
www.mi.gov/aquaticinvasives

Michigan Department of Natural Resources
www.mi.gov/invasivespecies

Michigan Sea Grant
www.miseagrant.umich.edu/ais

Great Lakes Information Network (GLIN)
www.great-lakes.net

Midwest Invasive Species Information Network
www.misin.msu.edu

Publication
Wolfson, L. and J. Herbert. 2013. A Michigan Boater's Guide To Selected Invastive Aquatic Plants. Michigan State University Extension Bulletin E-3189.

Aquatic Nuisance Species Task Force (ANSTF)
www.anstaskforce.gov

Protect Your Waters and Stop Aquatic Hitchhikers
www.protectyourwaters.net

USDA National Invasive Species Information Center, Aquatic Species
www.invasivespeciesinfo.gov/aquatics

US EPA
http://www.epa.gov/glnpo/invasive/