Anti-fouling Paints and Boat Bottom Maintenance

3.2 Checking for and Disinfecting for Aquatic Invasive Species: Best Management Practices

Aquatic invasive species have the potential to harm:
- native biodiversity
- ecosystem functioning
- economic development
- fisheries production
- water availability to residents and commercial operations
- aquatic transport routes
- irrigation canals
- public and industrial water supply pipelines
- water quality
- property values

Pathways of Aquatic Invasive Species
- Attachment to:
  - watercraft (greatest vectors via transport and introduction of aquatic invasive species)
  - trailers
  - motors
  - fishing gear
- Transport by:
  - Water ballast
  - Bilge
  - Other water containing devices

Miscellaneous but important sources of introduction and spread:
- Dumping out unwanted live bait (can itself become invasive)
- Tangled in fishing lines and downrigger cables
- Sticking to soles of waders
- Clinging to rudders or pontoons
- Stuck to water ski gear
- Sea planes should be carefully checked too!!!
- Trapped in mud on a dog's paws

NOTE: Just ONE organism or even a piece of a plant is enough to start an invasion.

NOTE: CLEAN, DRY, DRAIN equipment!

NOTE: The space between the hull and trailer pads is often particularly important to inspect because invasive vegetation material gets trapped, squished between, where it is hard to see at a casual glance.

Primary travel concerns for invasive aquatic weeds:
- Through canal ways
- Over land on boats and trailers

NOTE: With mandatory boat inspection, introduction of new invasives drops to insignificant levels

Most Aquatic Invasive Species have the following things in common:
- disrupt ecosystems
- damage local economies dependent on recreation
- likely to be introduced to other water ways
- degrade water quality
- outcompete natives

The most likely exotic plants and wildlife to be attached to vessels and trailers:
- Hydrilla
- Water hyacinth
- Zebra mussels

Best Management Practices at Boat Launches Before Leaving

- Before leaving the vicinity of where you last used your boat, you need to:
  - drain live wells
  - drain bilge water
  - drain transom wells
- After leaving the water:
  - Inspect boat and boat accessories
  - Dispose of found plants and animals in upland garbage bin
  - Empty bait buckets ON LAND, NEVER IN WATER
  - NEVER dip bait or minnow buckets or nets into a lake if the bucket contains water from another lake!!!
  - NEVER dump live fish or other organisms from one body of water into another
  - Upon return home use a HOT water wash for:
    - boat
    - tackle
    - down riggers
    - trailer
  - Flush water through motor, cooling system and other parts of the boat that normally get wet.
  - If possible, let everything dry for 5 days in hot sun BEFORE using the boat in another body of water.
  - Discard anything you find in an upland waste receptacle or in an invasive species disposal station.

- Do NOT wash or release material into waterbody.

NOTE: Invasive mussels are hard to get rid of so steam them first at a temperature of 140 degrees F, then remove with a brush and pressure washer.

CLEAN, DRAIN, DRY protocol should be followed carefully for the following:
- fishing boats
- houseboats
- cabin cruisers
- ski boats
- sailboats
- row boats
- trailers
- personal watercraft (jet skis)
- canoes
- kayaks
- paddle boards
- inflatables
- scuba gear
- inner tubes
- white water rafts
- oars and paddles

NOTE: Do not forget to drain ballast tanks of jet skis or wakeboards if they have them.

DRY: Prior to moving into another water body, make sure boats, trailers, equipment are dry.

Drying times vary, and depend on:
- Equipment type
- Air temperature
- Relative humidity

Outside of the boat dries quickly; areas that may take longer include:
- Bilge
- Live wells
- Other parts of the boat not in the sun or lacking good air circulation: these will take more time

Need a MINIMUM or 5-7 days of drying time under warm, dry environmental conditions

DISINFECT: Anything that came into contact with water that CANNOT be fully dried before reuse must be disinfected.

Best Management Practices for Trailer Hygiene

Trailer Hygiene: Check trailer parts for mud, plants, animals, debris, including:
- Bunks
- Axles
- Rollers
- Lights
- Transducers
- License plate
- Motor props

NOTE: If your boat has been used in a water body known to have zebra mussels, run your hand along the hull. If it feels like sandpaper, you probably have zebra mussels attached.

Inspect all gear used during trip, including:
- fishing gear
- anchor lines

NOTE: Again, check all wheels and all equipment for MUD. This can easily conceal invasive organisms.

Actions to prevent introduction of Exotics

Do NOT chop vegetation with propellers. This can spread bits of aquatic invasive plants.

At boat ramps, to prevent accidental spread of invasives, always give an extra check to:
- bilges: empty them
- live wells: empty them
- trailers: check between boat and trailer pads
- dry things out as much as possible to get rid of larvae and spores
- dispose of waste in properly sealed containers
- remove ALL plant fragments or animals from:
- trailers
  - propellers
  - bait wells
  - fishing tackle
  - dive gear
  - other equipment
- When plant fragments or animals are found, place them in upland facility waste receptacles.
- Bait must NOT be released into the water if it was not originally from that body of water. Place in upland waste receptacle

NOTE: Flush sea strainers and raw water cooling systems BEFORE LAUNCHING boats that have been trailered or moored in other states or nations.

How do I know if a water body that I boat on has invasive species?
- Check DEC boating aquatic invasive species websites https://www.dec.ny.gov/animals/50121.html
- Do a GOOGLE search for “NYS DEC aquatic invasive species”

Boat Launch Traffic
- Most launches experience waves of activity
- Busiest on weekends and holidays
- Other busy times
  - Anglers: early in the morning
  - Recreational boaters: late in the morning, early in the afternoon
  - Steady with boats exiting the water: evenings
  - Special event days such as fishing tournaments: all day and into the evening

NOTE: Make sure area for removal of aquatic hitch hikers, draining and removal, does NOT have runoff returning into the water.

- You will want a semipermeable dirt or gravel surface far enough from water so there is no drain back to the water body

Best Management Practices for Disinfection

What is one most effective thing I can do to limit transfer of aquatic invasive species after I have been out on the water?

- Drying is the most effective way to ensure all invasives that have accumulated on the boat or gear are dead prior to use in a new water body.
  - Drying times vary according to the time of year and weather conditions.
    - During hot, dry conditions, most items dry completely in 5-7 days.
    - During cooler, more humid conditions it may take 30 days of more to dry equipment completely.
    - If you are not sure boats or equipment have had sufficient time to dry, disinfect with hot water with a temperature greater than 140 degrees F, or with steam.

NOTE!!: Many invasive clam and mussel species can detect other disinfecting agents and tightly close their shells to avoid them! They cannot, however, avoid and protect themselves from high temperatures.

- A temperature of at least 140 degrees F must be obtained for AT LEAST TEN SECONDS to ensure all invasives are dead.
  - Household steam cleaners can perform this task and are generally less than 100 dollars. They are great for bilges, live wells, and confined spaces

NOTE: DO NOT STEAM DECALS; STEAM CAN DAMAGE THEM.

EXCEPTIONS (for use on dry land under specific circumstances)

Bleach (NaOCl) as a Disinfectant

- Bleach is corrosive but if whirling disease in fish in the salmon family is an issue, use a 10% bleach solution.
  - 13 ounces of household bleach to one gallon of water.
- Regular disinfection: soak or spray equipment with a 2% bleach solution.
  - 3 ounces of bleach to one gallon of water for at least one minute.
- If cleaning water holding areas or boats previously used in zebra or quagga mussel areas, need contact time for bleach solution of TEN minutes.

Potassium Chloride (KCl) as a Disinfectant

- Very effective for boats and equipment used in zebra or quagga mussel infested waters.
- Not corrosive
- Use a 200 PPM solution: 1 teaspoon KCL salt to 2 gallons of water
  - VERY GOOD for cleaning zebra and quagga mussels from engine cooling systems or other corrosion prone areas

Other Cleaning Agents for Whirling Disease

- Quaternary Ammonium Compounds from Veterinary or Laboratory Supply Companies
- Or use household cleaners with quaternary ammonium compounds at full strength
- Soak for a minimum of ten minutes

NOTE: for any of these EXCEPTION cleaning suggestions, dispose of rinsate or other materials AWAY from surface waters.

NOTE: Invasive mussels are hard to get rid of so steam them first at a temperature of 140 degrees F, then remove with a brush and pressure washer.

DISINFECT: Anything that came into contact with water that CANNOT be fully dried before reuse must be disinfected.

- Hot water (140 degrees F) is an effective disinfection method for ALL aquatic invasive species and fish diseases
  - Soak all equipment in water that is at least 140 degrees F for THIRTY SECONDS.

Disinfection Techniques for Fishing and Boating Equipment

If boating and fishing equipment cannot be dried before use in another waterbody it MUST be disinfected.

- Techniques vary with types of equipment and diseases of concern.
- Be particularly aware of areas that are tough to dry and may harbor invasive species:
  - bilge areas
  - live wells
  - bait wells
- Techniques include:
  - Hot Water Disinfection:
    - Effective for ALL aquatic invasive species and fish diseases
    - many invasive clam and mussel species can shut their shells against other disinfecting agents but cannot avoid hot water
    - Soak all equipment in hot water for at least 30 seconds
    - most hot tap water is only 120-130 so water will need additional heating
    - Use an inexpensive candy thermometer to check temperature
    - Household steamers may also be used for disinfection by exposing equipment to steam for 30 seconds

NOTE: Hot water can delaminate Gore-tex fabric and damage other sensitive clothing.

NOTE: Carwash hot water is also probably not hot enough for proper disinfection.

NOTE: Hot water and steam can damage decals.

Bleach Disinfection
- Caustic so use extreme care
- Soak or spray equipment at least one minute with a 2% bleach solution
  - 3 ounces of household bleach mixed with one gallon of water
- If whirling disease of fish in the salmon family is suspected, use a 10% bleach solution
  - 13 ounces of bleach mixed with one gallon of water

Potassium Chloride Disinfection
- Particularly effective cleaner for boats that have been in waters with Zebra or Quagga mussels
- Not corrosive
- 200 ppm solution recommended
  - One teaspoon of dry potassium chloride (KCl) in two gallons of water

Disinfection by Flushing

If you can't disinfect your boat and gear in any other way prior to re-launch, thoroughly flush it, including:
- bilge
- all water holding compartments

Use pressurized water if possible (flush with buckets if no other choice).
- Be sure the water used for flushing purposes does not drain to the new body of water you will be launching into or into any other potential source of spread, like a storm drain.

NOTE: For wading anglers, felt soled waders and wading shoes are an IMPORTANT MEANS OF SPREAD for Didymo and whirling disease.

Felt soled footgear is almost IMPOSSIBLE to disinfect!
- Use rubber or studded soles that will give you similar traction.
- These are much easier to disinfect.
- These are less like to transport aquatic invasive species.

Alternatives when drying or hot water wash is not possible: take the following steps to protect against transporting aquatic invasives after using your boat:
- Dip equipment in 100% table vinegar for 20 minutes prior to rinsing.
- Wash in 1% salt solution (2/3 cup of salt to 5 gallons of water).
  - Leave without rinsing for 24 hours
- Wet with bleach solution (1 ounce of bleach to 1 gallon of water
  - Leave for 10 minutes before rinsing
- Wet with water as hot as you can get and boat soap, or Lysol.
  - Leave for 10 minutes before rinsing

More Best BAIT Management Practices

- NEVER dump bait buckets or release live bait.
  - Unless bait was obtained on site, dispose of it in a suitable upland trash container (preferably one where birds cannot dip in and carry it out over the water anyway).
- NEVER release caught fish, other animals, plants, and other miscellaneous creatures into water bodies unless they were caught in these same bodies.
- Dump bait bucket water:
  - back where it came from or
  - on land where it will not run back into the nearby water body
- NEVER dip bait or minnow buckets into a lake if bucket contains water from another lake!!!
- MAKE SURE TO CLEAN THE BUCKETS TOO WITH HOT WATER!
- NEVER dump live fish or other organisms from one body of water into another.

How boats are cleaned and how often is also very important.
Use the following methods to fully decontaminate:
- clean the outside of watercraft and trailer for TEN seconds with:
  - high pressure (2,500 PSI)
  - hot water (140 degrees F)
  - flush inside of the motor and all compartments for TWO minutes with hot water (140 degrees F)
    - compartments include:
      - bilge
      - live wells
      - bait buckets
      - ballast
  - soak fishing gear and equipment in hot water (140 degrees F) for TWO minutes

NOTE: Plants and animals from aquariums should be disposed of in the garbage, NOT in water bodies

NOTE: Report infestations to the DEC by emailing photos and location information to:
- isinfo@dec.ny.gov
- https://www.nyimapinvasives.org/

EXTENSION EDUCATION CENTER
423 GRIFFING AVENUE, SUITE 100 | RIVERHEAD, NEW YORK 11901-3071 | 631-727-7850 | CCESUFFOLK.ORG

Prepared by: Tamson Yeh (2022-10)
Funding provided by the Environmental Protection Fund as administered by the New York State Department of Environmental Conservation. Any opinions, findings, and/or interpretations of data contained herein are the responsibility of the author(s) and do not necessarily represent the opinions, interpretations, or policy of Rochester Institute of Technology and its NYS Pollution Prevention Institute or the State.

Sea Grant New York | NYSP2I New York State Pollution Prevention Institute | Cornell Cooperative Extension Suffolk County