WESTERN REGIONAL PANEL
ON AQUATIC NUISANCE SPECIES

Step By Step Procedures for a Full Decontamination

A. DOCUMENT

1. A full decontamination is required once mussels are found (or suspect mussels or other AIS). You should first complete your inspection to determine the extent of the infestation. Be certain to fill out the Data Collector record completely and accurately. Be as detailed as you can and inspect every part of the boat.

2. Necessary information to be gathered for reporting & enforcement:

    - Date / time / location
    - Vessel registration / name
    - Name and contact information for the boat owner and the boat operator (if different)
    - Location where the boat became infested
    - Suspected species of AIS
    - Final destination

    Recommended information to be gathered:

    - Boating history (last 30 Days)
    - Name of inspector
    - Vessel type, make & model
    - Vessel size
    - Time in infested water
    - Time out of water
    - Level of infestation (estimated number, location, dead or alive)
    - Attached or not attached
    - Anticipated travel date / travel route / estimated time of arrival

3. Take digital photos before starting the decontamination. The recommended minimum photos include:
    - Registration number
    - Trailer/vehicle plate
    - Wide angle photo of the boat
    - Rear of the boat and boats with gimbals (inboard, inboard/ outboard, stern drives, etc.) get good photos of gimbal boots from several angles to document the before and after condition.
    - Locations of each attached mussel (both far away and close-up)

    - Change your camera setting to close-up mode (icon is a flower) and then take close-up photos.
    - If the specimen is a zebra or quagga mussel, try to get a good close-up photo of the byssal threads.
    - Ensure the suspect AIS is clearly visible before the samples are detached from the boat.
    - Place a common object such as a pencil or penny next to the specimen and photograph the combination to show the relative size of the specimen.
- Photograph areas of existing damage
  ***Note**: Start taking photos at the watercraft registration number and work your way around the boat to end at the same registration number. If available, take a video of the boat while you walk around it. Both video and photos are desired.*

4. Be sure to accurately complete the data record for the full decontamination and submit in the Data Collector,

Be sure to document specifically where the boat has launched, along with where it became infested and any waters it has launched in since infestation. If it is not known where it became infested, document all waters the boat visited in the last six months. Record as much information about the boat's history as possible.

B. REPORT

1. Report your suspected AIS discovery by following your program's internal procedure. Report should include the information and photographs detailed above to assist with making an informed decision on next steps.
   Note: To address the high biological risk of a highly encrusted or highly complex watercraft, quarantine and impoundment may be considered in addition to on-site decontamination. You may also want to consider sending the boat with an escort to a certified marine business for mechanical intervention. These actions may require the assistance of a law enforcement officer to order the quarantine or escort the watercraft to the dealer.
2. Communicate decontamination expectations and potential outcomes to boater based on direction received from the proper authority.

C. COLLECT

Collect several **samples** of the mussels or suspect AIS after reporting and if required. If possible, take photos of the sample collection being performed.

Check with your supervisor for the proper procedures for sample collection and where to send the sample for final identification. After the sample is removed, take photos of the infested area.

*Some enforcement scenarios may require specific collection procedures.

1. Collect a sample following your program's established procedures. Options include:
   - Preservation in alcohol: Only fill 50% of the vial with 70% ethanol or grain alcohol, **not rubbing alcohol.** Even trace amounts of chlorine from tap water, or "de-chlorinated" tap water can

completely destroy sample DNA. Collect as many specimens as will fit in the vial without it overflowing. It is acceptable to send more than one vial.

- Bag and freeze
- Dry mussel shells can be collected in a vial and do not require preservation.

2. Write the date, time, location, vessel registration, origin of infestation, and collector's information on the sample label. If there are numerous areas of attachment on the boat, take samples from each of those areas as well. Take photos of the collected sample with a completed label.

D. DECONTAMINATE

Decontaminate all parts of the watercraft that have come into contact with the water body by exposing them to hot water at the appropriate temperature and pressure to ensure the AIS are killed and removed.

WID stations should have a decontamination unit available. If you do not, and you know you have a mussel boat, call your Supervisor and/or the AIS Program Office for help and try not to allow that boat to leave without decontamination. If needed, ask a law enforcement officer (Wildlife Manager, Park Ranger, Sheriff, etc.) to escort the watercraft to a nearby WID station or to quarantine the vessel until a decontamination unit can be brought to you.

Similar to inspection, it is critically important that you perform the full decontaminations in a standardized and repeatable fashion every single time. Use the acronym TIME to help you remember the order of a full decontamination.

Only certified individuals should operate decontamination units. Personal and public safety should always be top priority. Never allow a member of the public, volunteer, or an untrained employee to decontaminate a boat. Be sure to document all procedures used to decontaminate the boat, including photographs or videos of the decontamination being performed.

Once the inspector has documented, reported and collected specimens from the infested watercraft, it is ready to be decontaminated.

1. Before beginning decontamination, follow the boat owner into the boat. Work with the boater to prepare the interior compartments that need to be decontaminated.

    a. Remove all equipment from compartments that need to be decontaminated.
    b. Remove all additional water related equipment that will require decontamination.
    c. With help of the boat operator, identify the intake & discharge ports for the interior compartments.

2. Assess the number of shells and shell fragments and using a vacuum, broom, tape, or roller remove as much as possible prior to starting decontamination. Encourage boaters to assist with removing mussels to expedite the process.

3. Connect the wand to the trigger to the whip hose.

4. Put on all required personal protective equipment.

5. Start the decontamination unit following the standard operating procedures.

6. Start the water by engaging the trigger. Check the temperature of the water and adjust the temperature depending on the procedure being performed at that time.

*Remember the acronym **TIME** to guide you through the decontamination procedure. The goal is to decontaminate the entire raw water system from intake to discharge:*

7. **Through Hull Fittings**
   a. Flush all air vents and overflows associated with raw water systems with 120˚F hot water at low pressure for 130 seconds or until the water back flushes.
   b. Press the diffuser up against the opening of the through hull intake ports and decontaminate each port with 120˚F water under low pressure for 130 seconds or until the water back flushes. Have the owner activate any pumps that may be associated with the port.

   ** Some raw water systems cannot be passively flushed. Refer to Advanced Decontamination Manual for additional information on complex raw water systems such as evaporative coolers, generators, etc.

8. **Interior Compartments**
   Flush all of the interior compartments on the boat.

   <u>Sea Strainers</u>
   Sea strainers may be found on any raw water intake. Commonly found areas include generator, inboard engines, evaporative coolers, ballast systems, live wells, waterslides, washdown shower, etc.

   a. Have the boater remove the sea strainer without removing the contents.
   b. Rinse the strainer basket with 140˚F water to remove foreign material.
   c. Have the boater re-install the sea strainer filled with clean water where appropriate.

   *Ensure the O-ring is properly installed after the boater reinstalls the sea strainer.

   <u>Compartments</u>
   Flush the bilge area and pump, live or bait wells and other interior compartments with 120˚F water at low pressure. This includes soaking all anchors, ropes, chains, gear, life jackets, fenders, sea strainers, drift socks, and other equipment that has come into contact with the water with 120˚F water at low pressure.

   a. Reposition the hose and wand to the forward interior compartment and work from the front to the back of the boat using low pressure 120˚F water to decontaminate every compartment that has standing water or has equipment that has come into contact with the water body.
      - If the boat has an inboard/outboard or inboard engine have the boater raise the lid of the engine compartment and place the wand behind the engine to decontaminate this area.

b. If equipped with a discharge pump, fill the compartment until the pump is submerged. Make sure to keep the tip of the diffuser close to the sides of the compartment to prevent temperature loss. Have the boater turn on the discharge pump for the compartment and measure the temperature of the water at the through hull discharge port. Once the exit temperature has reached 120ºF continue to fill, allow the pump to run for 130 seconds, and then have the boater turn off the discharge pump.
c. Remove drain plugs and continue flushing until the exit temperature of the water maintains 120ºF for 130 seconds.
d. Allow the compartment to drain.
e. Soak all anchors, ropes, chains, gear, life jackets, fenders, sea strainers, drift socks, and other equipment that has come into contact with the water with 120˚F water for a minimum of 130 seconds at low pressure.

<u>Ballast Systems</u>

a. Request that the boater discharge all water from the ballast system.
b. Identify which ballast intakes go to which ballast tanks/bags prior to initiating decontamination.
c. The fake-a-lake must be placed securely against the bottom of the hull covering the intake port for the ballast tank/bag.
d. Start the water by engaging the trigger. Visually confirm the fake-a-lake did not shift.
e. Start the burner and have the boat operator turn on the corresponding intake ballast pump.
f. Fill up the ballast tank/bag using 120ºF.
   * It is recommended that ballast systems be filled completely where resources allow but a minimum of 25%. If there are no gauges, allow the tank to fill for a minimum of 3 minutes.
   Note: If the ballast pump is not taking up water when it is turned on, turn off the pump, release the trigger, and re-adjust the fake-a-lake. If this does not resolve the issue, consult with your supervisor.
g. Have the boat operator turn off the intake ballast pump. Release the trigger to stop the water flow. Allow the water to rest (marinate) for a minimum of 3 minutes.
h. Have the boat operator discharge the water. If the discharge water is 105ºF or greater this bag/tank is complete. Have the operator continue to run the discharge pump to drain the tank as much as possible. If conditions are not met drain bag/tank and repeat steps a - h.
i. Repeat this process for EACH ballast tank/bag. Ensure each tank/bag has been exposed to 120ºF water.

** Refer to Advanced Decontamination Manual for additional information on complex ballast systems.

9. **Motor or Engine**

***Some marine propulsion systems require specialized equipment & procedures to be decontaminated. Please consult with your supervisor if you are uncertain.*

<u>Outboard & Inboard/Outboard Engines</u>

a. Attach the muffs to the whip hose.

b. Make sure the motor/engine is completely lowered. Place the muffs so that all the intake openings are completely covered.
c. Start the water by engaging the trigger. Check to make sure the intake openings are still covered on both sides and that the muffs are tight.
d. Stand clear of the propeller and have the boat operator start the motor/engine in neutral.
Note: If operating in colder climates, consider allowing the engine to warm up by running water through prior to starting the burner.
Note: If the engine is not taking up water when it is turned on in neutral, turn off the boat engine, release the trigger, and re-adjust the muffs.
e. Start the burner and flush the engine until the water temperature maintains 140ºF for 10 seconds when measured by a thermometer at the discharge port(s).
f. Have the boat operator turn off the motor/engine.
g. Remove the muffs and allow the motor/engine to drain; have the boat operator raise the engine.

<u>Inboard</u>

a. Attach the fake-a-lake.
b. The fake-a-lake must be placed securely against the bottom of the hull covering the intake port.
c. Start the water by engaging the trigger. Visually confirm the fake-a-lake did not shift.
d. Stand clear of the propeller and have the boat operator start the engine in neutral.
Note: If operating in colder climates, allow the engine to warm up by running water through prior to starting the burner.
Note: If the engine is not taking up water when it is turned on in neutral, turn off the boat engine, release the trigger, and re-adjust the fake-a-lake.
e. Start the burner and flush the engine until the water temperature maintains 140ºF for 10 seconds when measured by a thermometer at the discharge port(s).
f. Have the boat operator turn off the engine.
g. Remove the fake-a-lake from under the boat.

<u>Jet Propulsion (PWC Style Systems)</u>

If a flushing port is present:

a. Attach the jet flushing adapter to the whip hose.
b. Attach the flushing adapter to the flush port.
Note: Some jet propulsion systems do not have a flushing port. Refer to Advanced Decontamination Manual for additional information on these systems.
Note: Some PWCs have a separate intercooler flushing port. If present, flush it separately with 140ºF water for 10 seconds when measured by a thermometer at the discharge port without turning on the engine.
c. Have the owner start the engine.
d. Within 10 seconds, start the water by engaging the trigger.
Note: If operating in colder climates, allow the engine to warm up by running water through prior to starting the burner.
e. Start the burner and flush the engine until the water temperature maintains 140ºF for 10 seconds when measured by a thermometer at the discharge port(s).

f. Turn off the water.
g. Have the operator rev the engine for a maximum of 10 seconds and then turn off the engine.
h. Remove the flushing adapter from the flush port.

** *Yamaha & other jet propulsion systems require specialized equipment & procedures to be decontaminated. Please Refer to Advanced Decontamination Manual.*

10. **Exterior**

For Watercraft & Equipment without Attached Mussels

a. Attach the diffuser to the whip hose and start the burner.
b. Soak the trailer & hull below the waterline with 140ºF water starting at the bow and working methodically to ensure all areas are exposed to 140ºF water for 10 seconds.
   - On an inboard engine, the strut bearing and the rudder port prop, prop shaft, and prop shaft support must be decontaminated with 140˚F water under low pressure for a minimum of 10 seconds.
   - Strakes and chines should be filled with 140˚F water under low pressure until water is exiting the far end at 140˚F for a minimum of 10 seconds.
   - On sailboats, ensure retractable keels and centerboard boxes are decontaminated with 140˚F water under low pressure for a minimum of 130 seconds.
   - On trailers, be sure to decontaminate bunks, rollers, the openings of the tubular frames, wheels and wheel wells.
c. The gimbal area of the inboard/ outboard engine must be soaked for a minimum of 130 seconds (it is important to do both a top flush and a side flush to ensure 100% mortality) with 140˚F water.
d. Consider a final high-pressure rinse if deemed necessary.

For Watercraft & Equipment with Attached Mussels

a. Attach the diffuser to the whip hose and start the burner.
b. Soak the trailer & hull below the waterline with 140ºF water starting at the bow and working methodically to ensure all areas are exposed to 140ºF water for 10 seconds.
   - On an inboard engine, the strut bearing, rudder port, prop, prop shaft, and prop shaft support must be decontaminated with 140˚F water under low pressure for a minimum of 10 seconds.
   - Strakes and chines should be filled with 140˚F water under low pressure until water is exiting the far end at 140˚F for a minimum of 10 seconds.
   - On sailboats, ensure retractable keels and centerboard boxes are decontaminated with 140˚F water under low pressure for a minimum of 130 seconds.
   - On trailers, be sure to decontaminate bunks, rollers, the openings of the tubular frames, wheels and wheel wells.
   - Depending on the level of infestation, spray the infected areas with high pressure to remove any attached mussels.
c. The gimbal area of the inboard/ outboard engine must be soaked for a minimum of 130 seconds (it is important to do both a top flush and a side flush to ensure 100% mortality) with 140˚F water.

d. Connect the 40˚ nozzle with the quick connect to the end of the wand so you can use high pressure spray to remove the mussels using 140˚F water.
e. Keep the wand at a 45˚ angle and work methodically in one direction. Do not use the wand to "scrub" the hull. Keep the tip of the wand approximately 6-12 inches away from the hull and trailer as you move around the boat.

Note: Water temperature decreases approximately 15 to 20˚ per foot of distance when sprayed from a power nozzle.

WARNING: ONLY use low pressure on all carpeted areas, decals, electrical connections, gimbal area on the inboard/outboard engine, interior compartments, transducers, and depth sounders and their wiring.

f. Turn off the decontamination unit when you have completed decontaminating all components. Turn the burner off first, run water through the boiler and then turn off the decontamination unit. Follow the standard operating procedures for shutting down your decontamination unit.
g. Following full decontamination, give the boat some time to fully drain.
h. Conduct a final thorough inspection of the vessel. Be sure to check all areas that were previously noted as infested prior to inspection. Also check all other areas of the boat to be sure that there are no mussels (dead or alive) remaining on the vessel. Be as accurate as possible when checking the numerous areas of the boat. If staff allows, it is preferable that the second inspection following decontamination is done by someone other than the person who did the initial inspection and decontamination.
    - If there's any evidence that mussels or other AIS remain- perform a second targeted decontamination on the areas found to have AIS.
i. Photograph the watercraft after decontamination in the same fashion and same locations as you photographed the boat before the decontamination.
j. Ensure all documentation has been completed before the boat departs including any required next steps.
k. For exiting watercraft, apply a seal and give the boater a properly filled out receipt. Be sure to fill out all decontamination procedures that were and were not performed on the seal receipt.
l. Communicate any additional requirements to the boater.
m. Remind the boater to clean, drain, and dry. Leave all water drain plugs & sea strainers out during overland transport.
n. Send a Watercraft Movement Notice using the Data Collector if the boat is not being launched at the station where it was decontaminated, and the destination is known.
o. Follow your agency’s procedure for documentation submission.
p. Follow your agency’s procedure for sample submission.