Guidelines for Preventing the Spread of Aquatic Invasive Species

U.S. FISH AND WILDLIFE SERVICE
Region 7
Anchorage, AK 99503

August 2018

Table of Contents

Disclaimer: The use of trade names of commercial products in this report does not constitute endorsement or recommendation for use by the federal government. The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the Service.

Why We Care

Sustaining Native Species, Economy & Culture

Invasive species are one of the greatest threats to native biodiversity and are a significant driver of species loss worldwide. Alaska is particularly vulnerable to the expansion of aquatic invasive species because of rapidly changing habitat suitability caused by shifting weather conditions, altered hydrologic regimes, and increasing development. Alaska's communities, cultures and economy rely on healthy aquatic resources. Aquatic invasive species (AIS) can have negative impacts on the aquatic resources that Alaska communities and businesses rely on for food, drinking water, and transportation.

Prevention is Possible and Inexpensive – Control Actions Takes Money Away from Other Priorities

Fortunately, freshwater AIS (e.g., *Elodea* spp. and Northern Pike) infestations are relatively few in Alaska. We can prevent further introductions and many eradication and containment efforts are manageable if started before infestations become extensive and well established and costly to manage.

Our Responsibilities

The Lacey Act authorizes the U.S. Fish and Wildlife Service (Service) to regulate the importation of species into the U.S. that may be injurious to the welfare and survival of fish and wildlife resources. The Nonindigenous Aquatic Nuisance Prevention and Control Act assigned the Service and other federal agencies responsibility to work with partners, in part, to prevent the introduction and dispersal of AIS in waters of the U.S. The Alaska National Interest Lands Conservation Act mandates the Service to maintain the natural diversity of fish and wildlife and their habitats on Service lands in Alaska, and to ensure necessary water quality. In addition, Executive Order 13112 directs Federal agencies to prevent the spread of invasive species in any work they authorize, fund, or carry out. To sustain the viability of Alaska's aquatic resources and achieve the goals of the mandates above, the Service must adopt protocols to minimize the risk of spreading AIS through field and management activities.

Field Leadership – Do Not be a Vector

The Fisheries and Ecological Services Program partnered with other Region 7 programs to develop these protocols to minimize the risk of spreading AIS during Service field activities. We do not want our fieldwork to be a vector for the introduction and spread of AIS in Alaska. The protocols herein are a compilation of guidelines provided primarily by the Aquatic Nuisance Species Task Force (ANSTF; November 2013), the Western Regional Panel of ANSTF (November 2012), and the Washington Department of Fish and Wildlife (November 2012).

The Service acting alone cannot stop the introduction and spread of AIS. However, the Service can set the standard for conducting field operations in a manner that prevents the introduction and spread of AIS. Our leadership on the issue of AIS, whether you are a manager or a field technician, is needed now more than ever. By working together to apply these guidelines to our field operations in Alaska, the Service can be a model for other agencies, organizations, and businesses.

All Region 7 Service personnel are encouraged to employ these protocols to the extent feasible. To

prevent the spread of AIS the basic steps of Clean, Drain (or Rinse) and Dry (described herein) should be implemented immediately. When working in a known infested water body (e.g., based on local knowledge, agency AIS websites, or other sources), basic decontamination techniques should be used prior to using clothing, equipment, and vehicles in another water body.

How to Use These Guidelines

Alaska has many natural and human vectors that could introduce AIS, including: boats, floatplanes, tourism, marine shipping and transport, wind, ocean currents, and warming climate. As such, even field work in the most remote, pristine part of Alaska could have AIS that has been introduced through anthropomorphic or natural vectors. This handbook will assist field staff to prevent the introduction and minimize the spread of AIS during our field operations and those that we fund. Furthermore, Region 7 does not yet have an extensive surveillance program for early detection of AIS, so our fieldwork and activities provide an important way for us to be on the lookout for invasive species.

This three-part document is comprised of the following:

I. Before you Go – This section has four general best management practices that all field staff could accomplish without difficulty and would help to prevent the introduction and spread of AIS.

II. Field Operations – This section describes the basic Clean, Drain (or Rinse), and Dry protocols for decontaminating gear before moving between fields sites.

III. Field Activity Specific Best Management Protocol Fact Sheets – This section provides activity specific best management protocols for prevention and decontamination efforts. The fact sheets are a reference tool for field crews to print the relative sheet(s) and bring to the field or have in their vehicles.

These guidelines were designed to be practical and doable, while recognizing the logistical challenges associated with fieldwork in Alaska. However, we encourage feedback on how to make it better. Please contact Aaron Martin, Regional Aquatic Invasive Species Coordinator (aaron_e_martin@fws.gov) if you have suggestions for improving the guidelines and if some of the best management protocols are not feasible in the location you are working or the type of work you are conducting. The guidelines will be updated in order to adapt to new information on AIS and feedback from the field.

Part I. Before You Go

Look at Species Watch List and Distribution Maps
Knowing what AIS to look for is essential to preventing their introduction, spread, and rapid response. There are currently only a few freshwater AIS known to be in Alaska (e.g., *Elodea* spp., Northern Pike [invasive to Southcentral, Alaska], Signal Crayfish, Reed Canary grass); however, the ranges of several other high-risk species are spreading closer to Alaska each year. Appendix A includes a watch list of potential AIS for Alaska including references for species identification and links to known AIS distributions in Alaska.

Contact the Service or State AIS Coordinators
To further improve awareness of AIS threats and distribution, please contact the Service's AIS coordinator, the State of Alaska Coordinators, or the local lead on AIS issues at a Service Fish and Wildlife Conservation Office or National Wildlife Refuge to discuss your fieldwork, where it is occurring and to get the latest information on known infestations and best practices. Contact information for key Service and State of Alaska AIS coordinators includes:

1. Aaron Martin: Service Regional AIS Coordinator (all AIS taxa)
   (907) 786-3510, aaron_e_martin@fws.gov
2. Tammy Davis: ADF&G Invasive Species Coordinator (vertebrates/invertebrates)
   (907) 465-6183, tammy.davis@alaska.gov
3. Dan Coleman: ADNR Invasive Weeds and Agricultural Pest Coordinator (plants)
   (907) 745-8721, daniel.coleman@alaska.gov

Know How to Report a Sighting
For invasive plant, fish, and animal sightings call the Alaska Invasive Species Hotline at 1-877-INVASIV (468-2748). Reports of invasive fish and animals in Alaska can also be submitted to http://www.adfg.alaska.gov/index.cfm?adfg=invasivespeciesreporter.main.

Mobile applications are also available that allow remote reporting of AIS. The preferred mobile platform for all aquatic taxa is U.S. Geological Survey's Nonindigenous Aquatic Species application (https://nas.er.usgs.gov/mobilesightingreport.aspx) which allows mobile devices to remotely report AIS descriptions and pictures, but does not have species identification capability. The Alaska Weeds ID (https://apps.bugwood.org/apps/alaska/) has an interactive key to identify plant species that allows accurate picture and location information to be reported. When possible, we encourage people to download these applications to their mobile work phones or tablets.

No Felt Soles - Wading Gear Ban
Footwear with felt or fibrous material on the soles can be a vector for transmitting AIS and pathogens because they are difficult to fully decontaminate. Consequently, the State of Alaska has banned the use of waders and boots with felt or fibrous soles while sport fishing in fresh waters of Alaska since January 2013. The Service requires that staff adhere to this regulation for all operations and to advise partners of the risk associated with this gear type.

Part II. Field Operations

The basic steps in decontamination for all types of gear and equipment in all situations are Clean, Drain (or Rinse), and Dry. There are two levels of decontamination protocols based on the risk level of spreading AIS. Level 1 "decontamination" protocols are less intensive and are designed to simply remove AIS. Level 2 decontamination protocols are for high risk situations and are designed to kill AIS, including quagga or zebra mussels and New Zealand mudsnails. Level 1 decontamination protocols must be conducted prior to starting Level 2 protocols to ensure the effectiveness of the Level 2 treatments. High-risk situations include areas in or adjacent to known aquatic infestations. There are currently no known aquatic infestations in Alaska requiring Level 2 decontamination, but the risk of spreading species such as *Elodea* spp. from a single plant fragment is high in areas with known infestations and requires a thorough Level 1 decontamination to prevent it from spreading. Although drying gear and equipment is highly recommended, desiccation alone is not always 100% effective for some aquatic plant species (Evans et. al 2011; Barnes et al. 2013).

Level 1 "Decontamination" Protocol

Prior to departing from a field site, clean off any attached sediment, organisms or debris from surface areas of personal equipment that had contact with the water, bottom substrate or wetted perimeter of the water body. You can use the local water source initially to help remove heavy deposits. Level 1 cleaning equipment consists of a sturdy bristle brush, a boot pick, and potable rinse water. Remove debris from all field equipment, vehicles, floatplanes, boats (including rudders, propellers, floorboards, etc.) or trailers. Thoroughly clean boots (especially ones with complex gripping soles that tend to gather material) and folds in clothing, waders, and packs. When decontaminating multi-piece gear, it is necessary to remove attachments and boots to allow for full cleaning coverage. Once all debris has been removed, rinse off equipment with potable rinse water. Rinse water can be kept in a 3-5 gallon water tank in your field vehicle (e.g., water cooler, pressurized tank sprayer, solar shower). After rinsing your personal equipment, drain or remove any water that may be in the bottom of watercraft back into the water body from which it came. Rinse or spray all surface areas with potable water. Dry everything for **5 days** or more, when possible, to allow for adequate desiccation to kill aquatic organisms. Part III of this document describes Level 1 cleaning and inspection protocols for field crews by gear and equipment type.

Dedicated field (e.g., nets, boats) and personal equipment (e.g., waders, boots) used in a single water body is the recommended approach that does not require cleaning or decontamination after each use if labeled and kept isolated from other equipment to avoid cross-contamination.

In the Field: If it is not feasible to complete the Level 1 procedures in the field, gear should be placed in a plastic bag or tote for transportation to a suitable decontamination station. A suitable decontamination area would include a level, high and dry area, away from a water source (e.g., stream, lake, wetland, or storm drain), and on a semi-permeable surface where water will seep into the ground without ponding.

Level 2 Decontamination Protocol

As stated previously, there are currently no known AIS infestations in Alaska requiring Level 2 decontamination. However, permanent and seasonal staff should follow these protocols if they

have used their gear outside of Alaska. If infestations of high risk species such as New Zealand mudsnails or Quagga or zebra mussels become established in Alaska, both Level 1 decontamination **and** more intensive Level 2 decontamination protocols would be required to prevent their spread. Thus, the following is provided in the event a high risk infestation occurs and there is a need for rapid response. It also highlights the importance of prevention.

Level 2 decontamination treatments are designed to kill/eradicate invasive species. The use of physical and chemical treatments for Level 2 decontamination is based on best available science and best professional judgment. Criteria for each treatment are applicable to gear or equipment types as noted.

When working in or near high-risk situations, field gear must be decontaminated every day (excluding gear used solely in one water body or sub-basin, which is a recommended approach for minimizing risk of transporting organisms). When decontaminating multi-piece gear, it is critical to remove attachments and boots to allow for full exposure to all potentially contaminated surfaces. Chemical agents or physical treatments must maintain contact with the entire surface for the duration of the treatment to be effective. Exposure times start when equipment is fully saturated or reaches appropriate temperatures. Safety glasses and waterproof gloves are required for all treatments except freezing.

Hot Water Treatment

Hot water treatments can be done by soaking gear or applying with a hot water pressure washer. Research indicates a hot water pressure washer capable of 140°F (60°C) with high pressure (2,500 psi) will kill most AIS. However, 140°F (60°C) and higher temperatures is not achievable using most hot water heaters that are for domestic uses, which are generally set at 120°F. Therefore, when 140°F (60°C) is unattainable through readily accessible means, use water that is as hot as possible to maximize decontamination efficacy. The following are the recommended methods for various materials:

- Hard non-porous surfaces require constant exposure at **a minimum of 140°F (60°C) (or as hot as possible) for a minimum of 15 seconds**. Note: 140°F (60°C) may not be critical until invasive mudsnails (e.g., New Zealand mudsnails) and dreissenid mussels (i.e., quagga and zebra mussels) are found in Alaska.

- Porous materials and gear with multiple folds/cavities require constant exposure at a minimum of 140°F (60°C) (or as hot as possible) for **a minimum of 5 minutes or at 120°F (49°C) for a minimum of 30 minutes.**

  CAUTION: These temperatures can burn exposed skin. Do not use this method for Gortex or other materials that cannot hold up to high temperatures.

Note: Cost to purchase a hot water pressure washer capable of 140°F (60°C) with high pressure (≥2,500 psi) is about $5,000 (e.g., a Hotsy Model HOT1065 costs $4,999-$5,395 in Anchorage).

Freezing Treatment

Expose gear to **14°F (-10°C) or colder for a minimum of 8 hours or 15°F to 32°F (-9°C to 0°C)**

for 24 hours. If gear has been used in marine or estuary situations, rinse thoroughly in fresh water before freezing (i.e., in a chest, portable, or other type of freezer).

Virkon® Aquatic Solution Treatment

Virkon® Aquatic is an EPA-registered, powerful broad-spectrum disinfectant that can be used for disinfecting boats, trailers, waders, nets, sampling equipment, and other gear when moving between water bodies. It is effective against many pathogens and invasive species. For details on what pathogens and species and use of this product, refer to the EPA registration at: https://www3.epa.gov/pesticides/chem_search/ppls/039967-00137-20180419.pdf (accessed Aug. 29, 2018). General product information can be found on the product label. Other information is available at: *https://www.syndel.com/virkon-aquatic-10-lb-tub-virkdlb0010-257.html* (accessed Aug. 29, 2018).

- Decontamination for pathogens (i.e., bacteria and viruses) requires soaking gear thoroughly with a minimum solution of 1% so that it is completely saturated for a minimum of 10 minutes.

- State programs (e.g., Washington, Wisconsin) use this product to decontaminate gear from other aquatic organisms such as New Zealand mudsnails and adult zebra/quagga mussels by soaking gear thoroughly with 2% solution so that it is completely saturated for a minimum of 20 minutes.

- In general, decontamination of equipment such as boats, trailers, live wells, bilges and pumps requires applying a 1-2% solution with a brush, mop, sponge, or pressure washer and left wet for a minimum of 20 to 30 minutes before rinsing.

- Rinse thoroughly in a contained area and dispose of rinse water according to the product label.

Mixing and use: Mix in a well-ventilated area, preferably outdoors. Protective gear including a splash apron, gloves and safety goggles must be used. The powder should be mixed with clean water according to the dilution instructions for a 1% or 2% solution. Do not apply the powder directly on the surface you are trying to disinfect. Mix the solution in a clean container of known volume. Measure the correct amount according to the dilution table (1 quart, 1 gallon, 10 gallons or 50 gallons). Refer to the Virkon® Aquatic label and Material Safety Data Sheets (MSDS) for further information. Virkon® Aquatic solutions can last up to 7 days or more and needs to be checked regularly. Test strips can be purchased to test your solution. The solution is not known to damage gear or equipment materials.

Note: Virkon® Aquatic is not registered to kill zebra mussel veligers (i.e., larva) nor invertebrates like spiny water flea. Therefore, this disinfectant should be used in conjunction with a hot water (>140º F) application.

This page intentionally left blank.

Part III. Field Activity Specific Best Management Protocol Fact Sheets

Field Work Fact Sheet
for
Preventing the Spread of Aquatic Invasive Species

Know before you go. Field staff should be aware of infestations in their management areas before going into the field and implement the basic steps of Clean, Drain (or Rinse) and Dry. When working in a water body known or suspected to be infested with AIS (e.g., *Elodea*) use the following principles before using clothing, equipment, and vehicles in another water body.

- Use non-felt or non-fibrous soled boots to minimize the risk of spreading AIS. The best are one-piece systems with full rubber material and open cleat soles. The riskiest are multi-piece wading systems with porous or absorbent materials, detachable boots and removable insoles. Mud/gravel guards are recommended for all stocking-foot waders to minimize contamination on inside surfaces. Felt or fibrous material on the soles can be a vector for transmitting AIS and pathogens because they are difficult to fully decontaminate. The State of Alaska has banned the use of waders and boots with felt or fibrous soles while sport fishing in fresh waters of Alaska since January 2013. The Service requires that staff adhere to this regulation for all operations and to advise partners of the risk associated with this gear type.

- **Dedicated** equipment (e.g., nets) and clothing (e.g. boots, waders) used in a single water body does not need to be cleaned or decontaminated after each use if labeled and kept isolated from other equipment to avoid cross-contamination. However, when working in known or suspected infested water bodies, dedicated equipment must be decontaminated prior to use in another water body.

While in the field:
- Conduct work in less infested areas of a water body when possible.
- Minimize wading and running boats into sediment to avoid relocating AIS.
- Regularly inspect and rinse boat, personal gear, and sampling gear at the site.
- Never relocate live organisms from one water body into another.
- Use elliptical and bulb-shaped anchors to help avoid snagging aquatic material.

Before moving to another water body, do the following every time. No exceptions.

Clean ***Inspect*** and ***Clean Off*** plants, animals, and mud from clothing, equipment and vehicles including waders, footwear, ropes, anchors, minnow traps, dip nets, gill nets, downrigger cables, and field gear before leaving water access. Use the local water source initially to help remove heavy deposits.

- ***Scrub off*** any visible material on gear with a stiff brush. Remove attachments and boots to allow for full cleaning coverage.

Rinse off equipment with potable rinse water. Rinse water can be kept in a 3-5 gallon water tank.

Drain all water from watercraft, motor, bilge, bladder tanks, live well and portable bait containers before leaving water access. Replace with spring or dechlorinated tap water when keeping live bait or other organisms before leaving water access. Do not add other live fish to bait container until at the next site.

Dry field and personal equipment for ***5 days*** or more, when possible, before moving between water bodies. This allows for adequate desiccation to kill of living aquatic organisms.

Dispose of unwanted bait, fish parts, and packing materials, in the trash; do not dump them in the water or on land.

Note: When transporting potable water or complete drying of equipment is not possible, use liquid chlorine bleach to achieve a 20-ppm active ingredient solution or 30 ppm (if water is noticeably dirty or discolored). Mix in a 3-5 gallon bucket or collapsible container and wait 10 minutes to disinfect the rinse water before using. Rinse equipment as far away from the water body to avoid water body contamination and killing native aquatic organisms and dispose of disinfectant as indicated on the label. Wear eye protection, rain or wading gear, and gloves. Bleach solutions may degrade absorbent materials, so rinse any disinfected equipment with potable water after returning from the field. New bleach should be purchased for purposes of decontamination at the beginning of each field season to maintain disinfection properties.

If it is not feasible to conduct Level 1 decontamination in the field, gear should be placed in a plastic bag or tote for transportation to a suitable decontamination station. A suitable decontamination area would include a level, high and dry area, away from a water source (e.g., stream, lake, wetland, or storm drain), and on a semi-permeable surface where water will seep into the ground without ponding.

Nets - If field decontamination is not possible or effective, upon return to the office, or before deploying at another sampling location in a different water body, follow the decontamination guidelines for waders/boots above and either hang the nets to allow clear access to all parts, or soak it in a large tub that allows the solution to fully penetrate the material before starting minimum exposure time.

Note: Once you have completed a Level 1 decontamination on field gear, clean and rinse the brush as well. Do not bring a brush to an uninfested site once it has been used at an infested site.

Report AIS sightings:
Note the exact location; take a photo; if possible, record GPS coordinates, and call one of the local federal- or state-specific contacts listed below.

Aaron Martin (Service): (907)786-3510, aaron_e_martin@fws.gov
Tammy Davis (ADF&G, vertebrates/invertebrates): (907)465-6183, tammy.davis@alaska.gov
Dan Coleman (ADNR, plants): (907)745-8721, daniel.coleman@alaska.gov

Motor Boater, and Trailered Equipment Fact Sheet
for
Preventing the Spread of Aquatic Invasive Species

Know before you go. Field staff should be aware of infestations in their management areas before going into the field and implement the basic steps of Clean, Drain (or Rinse) and Dry. Boats that remain in a single infested body of water should be checked quarterly as described below to minimize hull fouling. When working in a water body known or suspected to be infested with AIS (e.g., *Elodea*) use the following principles before using boating and field equipment, as well as trailering vehicles in another water body.

- **Dedicated** equipment including boats and trailers used in a single water body does not need to be cleaned or decontaminated after each use if labeled and kept isolated from other equipment to avoid cross-contamination. The Service requires that staff not use felt or fibrous material on the soles of footwear and to advise partners of the risk associated with this gear type.

While in the field:

- Conduct work in less infested areas of a water body when possible.
- Minimize wading and running boats into sediment to avoid relocating AIS.
- Reduce the amount of plants, sediment, or organisms that are removed from the water into boats or onto the trailer.
- Regularly inspect and clean gear while at the site.
- Use of elliptical and bulb-shaped anchors helps avoid snagging aquatic materials.

Before moving boats, ATVs and other trailered equipment to another water body, do the following every time. No exceptions.

Clean ***Inspect*** and ***clean off*** visible aquatic plants, animals (e.g., mussels, snails), and mud from watercraft, motor, trailer, anchors, rope and equipment before leaving water access. Field equipment that comes into contact with a water body should also be decontaminated. Use the local water source initially to help remove heavy deposits. A hand mirror or mirror with telescoping handle and flashlight are helpful tools see into hard to reach areas. A suitable decontamination area would include the water body that you came from; or a level, high and dry area, away from a water source (e.g., stream, lake, wetland, or storm drain), and on a semi-permeable surface where water will seep into the ground without ponding.

- ***Scrub*** hull using a stiff brush.

- ***Rinse*** watercraft, trailer, and equipment with high-pressure hot water, when possible; if not available use potable water. Use a hot water pressure washer to apply constant exposure at a minimum of 140°F (60°C) (or as hot as possible) for a minimum of 15 seconds on hard/non-porous surfaces. Make sure you wash out raw water storage areas, get behind and under trim tabs, engine mounts, raw water intake ports, and prop shaft.

- ***Flush*** motor according to owner's manual with potable water for Level 1 decontamination.
  - For Level 2 decontamination: Flush engine cooling system with fresh tap water at 140°F (60°C) (or as hot as possible) for a minimum of 5 minutes, or at ambient temperature for 10 minutes if hot water is not available.

- *Jet Boat and Personal Watercraft (PWC) users should also:*
  - ***Inspect*** and ***clean off*** visible aquatic plants, animals, and mud from hull, trailer, intake grate and steering nozzle, etc.
  - ***Run*** engine 5-10 seconds to blow out excess water and vegetation from internal drive *before leaving water access*.

- **Cross-Rinsing Not Allowed**. Taking a boat from a marine environment into a freshwater environment or from a freshwater to a marine environment without decontaminating does not meet decontamination requirements.

Drain all water from watercraft, motor, bilge, bladder tanks, live well, and portable bait containers at the boat ramp before leaving water access. Replace with spring or dechlorinated tap water when keeping live bait or other organisms before leaving water access. Do not add other live fish to bait container until at the next site.

Dry everything for ***5 days*** or more, when possible, when moving between water bodies.

Note: When transporting potable water or complete drying of equipment is not possible, use liquid chlorine bleach to achieve a 20-ppm active ingredient solution or 30 ppm (if water is noticeably dirty or discolored). Mix in a 3-5 gallon bucket or collapsible container and wait 10 minutes to disinfect the rinse water before using. Rinse equipment as far away from the water body to avoid water body contamination and killing native aquatic organisms and dispose of disinfectant as indicated on the label. Wear eye protection, rain or wading gear, and gloves. Bleach solutions may degrade absorbent materials, so rinse any disinfected equipment with potable water after returning from the field. New bleach should be purchased for purposes of decontamination at the beginning of each field season to maintain disinfection properties.

Note: Once you have completed a Level 1 decontamination on your boat or other trailered equipment, clean and rinse the brush as well. Do not bring a brush to an uninfested site once it has been used at an infested site.

Report AIS sightings:
Note the exact location; take a photo; if possible, record GPS coordinates and place specimens in a sealed plastic bag (if not a quarantined [prohibited] species in Alaska, e.g., *Elodea* spp.); and call one of the local federal- or state-specific contacts listed below.

Aaron Martin (Service): (907)786-3510, aaron_e_martin@fws.gov
Tammy Davis (ADF&G, vertebrates/invertebrates): (907)465-6183, tammy.davis@alaska.gov
Dan Coleman (ADNR, plants): (907)745-8721, daniel.coleman@alaska.gov

Non-Motorized Boater Fact Sheet
for
Preventing the Spread of Aquatic Invasive Species

Know before you go. Field staff should be aware of infestations in their management areas before going into the field and implement the basic steps of Clean, Drain (or Rinse) and Dry. Non-motorized boats that remain in a single infested body of water should be checked quarterly as described below to minimize hull fouling. When working in a water body known or suspected to be infested with AIS (e.g., *Elodea*) use the following principles before using boating and field equipment in another water body.

- **Dedicated** equipment including non-motorized boats and trailers used in a single water body does not need to be cleaned or decontaminated after each use if labeled and kept isolated from other equipment to avoid cross-contamination. The Service requires that staff does not use felt or fibrous material on the soles of footwear and to advise partners of the risk associated with this gear type. The Service requires that staff not use felt or fibrous material on the soles of footwear and to advise partners of the risk associated with this gear type.

While in the field:

- Conduct work in less infested areas of a water body when possible.
- Minimize wading and running boats into sediment to avoid relocating AIS.
- Reduce the amount of plants, sediment, or organisms that are removed from the water into boats or on sampling gear.
- Regularly inspect and clean gear while at the site.
- Never dump live organisms from one water body into another.
- Use of elliptical and bulb-shaped anchors helps avoid snagging aquatic materials.

Before moving to another water body, do the following every time. No exceptions.

Clean ***Inspect*** and ***clean off*** any visible aquatic plants, animals (e.g., mussels, snails), and mud from watercraft (canoes, rafts, kayaks, rowboats, paddleboats, inflatables), gear, paddles, floats, ropes, anchors, dip nets, and trailer before leaving water access. Use the local water source initially to help remove heavy deposits. A hand mirror or mirror with telescoping handle and flashlight are helpful tools see into hard to reach areas.

- ***Scrub*** hull using a stiff brush.

- ***Rinse*** watercraft, trailer and equipment with high-pressure hot water, when possible; if not available use potable water. When Level 2 decontamination is indicated, use a hand operated pressure wand to wash the boat and trailer inside (deck or internal areas that get contaminated with aquatic debris) and outside using the following guidelines:

    - Hard non-porous surfaces: constant exposure for **a minimum of 140°F (60°C) (or as hot as possible) for a minimum of 15 seconds**. Note: 140°F (60°C) may not be

critical until invasive mudsnails (e.g., New Zealand mudsnails) and dreissenid mussels (i.e., quagga and zebra mussels) are found in Alaska.

- Porous materials and gear with multiple folds/cavities: constant exposure at a minimum of 140°F (60°C) (or as hot as possible) for **a minimum of 5 minutes or at 120°F (49°C) for a minimum of 30 minutes.**

- **Cross-Rinsing Not Allowed**. Taking a boat from a marine environment into a freshwater environment or from a freshwater to a marine environment without decontaminating does not meet decontamination requirements.

Drain all water from watercraft, sponges, bailers, bilges and water containing devices at the boat ramp before leaving water access.

Dry everything ***5 days*** or more, when possible, when moving between water bodies. Completely dry inflatables and other recreational watercraft before storing. Wear quick-dry footwear or bring a second pair of footwear with when portaging between water bodies.

Note: When transporting potable water or complete drying of equipment is not possible, use liquid chlorine bleach to achieve a 20-ppm active ingredient solution or 30 ppm (if water is noticeably dirty or discolored). Mix in a 3-5 gallon bucket or collapsible container and wait 10 minutes to disinfect the rinse water before using. Rinse equipment as far away from the water body to avoid water body contamination and killing native aquatic organisms and dispose of disinfectant as indicated on the label. Wear eye protection, rain or wading gear, and gloves. Bleach solutions may degrade absorbent materials, so rinse any disinfected equipment with potable water after returning from the field. New bleach should be purchased for purposes of decontamination at the beginning of each field season to maintain disinfection properties.

If it is not feasible to conduct Level 1 decontamination in the field, gear should be placed in a plastic bag or tote for transportation to a suitable decontamination station. A suitable decontamination area would include a level high and dry area, away from a water source (e.g., stream, lake, wetland, or storm drain), and on a semi-permeable surface where water will seep into the ground without ponding.

Note: Once you have completed a Level 1 decontamination on field gear, clean and rinse the brush as well. Do not bring a brush to an uninfested site once it has been used at an infested site.

Report AIS sightings:
Note the exact location; take a photo; if possible, record GPS coordinates and place specimens in a sealed plastic bag (if not a quarantined [prohibited] species in Alaska, e.g., *Elodea* spp.); and call one of the local federal- or state-specific contacts listed below.

Aaron Martin (Service): (907)786-3510, aaron_e_martin@fws.gov
Tammy Davis (ADF&G, vertebrates/invertebrates): (907)465-6183, tammy.davis@alaska.gov
Dan Coleman (ADNR, plants): (907)745-8721, daniel.coleman@alaska.gov

Scuba Divers and Snorkeler Fact Sheet
for
Preventing the Spread of Aquatic Invasive Species

Know before you go. Field staff should be aware of infestations in their management areas before going into the field and implement the basic steps of Clean, Drain (or Rinse) and Dry. When working in a water body known or suspected to be infested with AIS (e.g., *Elodea*) use the following principles before using scuba or snorkeling equipment and associated field equipment in another water body.

- The Service requires that staff not use felt or fibrous material on the soles of footwear and to advise partners of the risk associated with this gear type.
- **Dedicated** equipment and clothing used in a single water body does not need to be cleaned or decontaminated after each use if labeled and kept isolated from other equipment to avoid cross-contamination. However, when working in known or suspected infested water bodies, dedicated equipment should and must be decontaminated prior to use in another water body.

While in the field:

- Conduct work in less infested areas of a water body when possible.
- Minimize suspending AIS.
- Reduce the amount of plants, sediment, or organisms that are removed from the water.
- Regularly inspect and clean gear while at the site.
- Never dump live organisms from one water body into another.

Before moving to another water body, do the following every time. No exceptions.

Clean ***Inspect*** and ***clean off*** visible plants, animals (e.g., mussels, snails) and mud from wetsuit, dry suit, mask, snorkel, fins, buoyancy compensator (BC) device, regulator, cylinder, weight belt, watercraft, motor, and trailer before leaving water access. You can use the local water source initially to help remove heavy deposits. Rinse water can be kept in a 3 or 5 gallon water tank in your field vehicle

- ***Soak*** gear used in saltwater dives in 5% dishwashing liquid solution (1 cup/gallon), or gear used in freshwater dives in 3.5% salt solution, (½ cup/gallon) for 30 minutes.

- ***Rinse*** inside and outside of gear with hot water, when possible; if not available use potable water.

Drain all water from the BC, regulator, cylinder boot, watercraft, motor, and any water containing devices before leaving water access.

Dry everything ***5 days*** or more, when possible, when moving between water body.

Note: When transporting potable water or complete drying of equipment is not possible, use liquid chlorine bleach to achieve a 20-ppm active ingredient solution or 30 ppm (if water is noticeably dirty or discolored). Mix in a 3-5 gallon bucket or collapsible container and wait 10 minutes to disinfect the rinse water before using. Rinse equipment as far away from the water body to avoid water body contamination and killing native aquatic organisms and dispose of disinfectant as indicated on the label. Wear eye protection, rain or wading gear, and gloves. Bleach solutions may degrade absorbent materials, so rinse any disinfected equipment with potable water after returning from the field. New bleach should be purchased for purposes of decontamination at the beginning of each field season to maintain disinfection properties.

If it is not feasible to conduct Level 1 decontamination in the field, gear should be placed in a plastic bag or tote for transportation to a suitable decontamination station. A suitable decontamination area would include a level high and dry area, away from a water source (e.g., stream, lake, wetland, or storm drain), and on a semi-permeable surface where water will seep into the ground without ponding.

Note: Once you have completed a Level 1 decontamination on field gear, clean and rinse the brush as well. Do not bring a brush to an uninfested site once it has been used at an infested site.

Report AIS sightings:
Note the exact location; take a photo; if possible, record GPS coordinates and place specimens in a sealed plastic bag (if not a quarantined [prohibited] species in Alaska, e.g., *Elodea* spp.); and call one of the local federal- or state-specific contacts listed below.

Aaron Martin (Service): (907)786-3510, aaron_e_martin@fws.gov
Tammy Davis (ADF&G, vertebrates/invertebrates): (907)465-6183, tammy.davis@alaska.gov
Dan Coleman (ADNR, plants): (907)745-8721, daniel.coleman@alaska.gov

Floatplane Operator Fact Sheet
for
Preventing the Spread of Aquatic Invasive Species

Know before you go. Field staff should be aware of infestations in their management areas before going into the field and implement the basic steps of Clean, Drain (or Rinse) and Dry. When working in a water body known or suspected to be infested with AIS (e.g., *Elodea*) use the following principles before using floatplanes and field equipment in another water body.

While in the field:

- The Service requires that staff not use felt or fibrous material on the soles of footwear and to advise partners of the risk associated with this gear type.
- Conduct work and land in less infested areas of a water body when possible.
- Minimize wading and running pontoons into sediment to avoid relocating AIS.
- Reduce the amount of plants, sediment, or organisms that are removed from the water into or onto pontoons or on sampling gear.
- Regularly inspect and clean gear while working at the site.

Before take-off to another water body, do the following every time. No exceptions.

Clean ***Inspect*** thoroughly and ***clean off*** any visible aquatic plants, animals (e.g., mussels, snails), and mud attached to, or inside of, the pontoons, cross members, steps, transom, rudders, chine, wheel wells, mooring ropes, wires, and cables. You can use the local water source initially to help remove heavy deposits. A hand mirror or mirror with telescoping handle and flashlight are important tools to help see into otherwise hard to reach areas.

- ***Scrub off*** any floats with a stiff brush.

- ***Rinse*** landing gear with high-pressure hot water, when possible; if not available use potable water.

- ***Pump*** water from floats back into the source water body *before take-off*.

    - *At water take-off,* avoid taxiing through aquatic plants or taxi to deeper water, when possible, raise and lower water rudders several times to clear off plants.

    - *After water take-off,* raise and lower water rudders several times to dislodge aquatic plant fragments while flying over the waters you left or over land. If aquatic plants remain visible on aircraft, return to same water body and clean them off.

- **Cross-Rinsing Not Allowed**. Taking a floatplane from a marine environment into a freshwater environment or from a freshwater to a marine environment without decontaminating does not meet decontamination requirements.

Dry everything ***5 days*** or more, when possible, when moving between waters.

- ***Runway land*** (if so equipped) or haul out and clean aircraft previously used in known invasive species infested waters as soon as possible after arrival at the destination.

- Store aircraft on land where and when possible. Hot summer temperatures and flights during dry weather will help kill AIS that may be on floats.

Note: When transporting potable water or complete drying of equipment is not possible, use liquid chlorine bleach to achieve a 20-ppm active ingredient solution or 30 ppm (if water is noticeably dirty or discolored). Mix in a 3-5 gallon bucket or collapsible container and wait 10 minutes to disinfect the rinse water before using. Rinse equipment as far away from the water body to avoid water body contamination and killing native aquatic organisms and dispose of disinfectant as indicated on the label. Wear eye protection, rain or wading gear, and gloves. Bleach solutions may degrade absorbent materials, so rinse any disinfected equipment with potable water after returning from the field. New bleach should be purchased for purposes of decontamination at the beginning of each field season to maintain disinfection properties.

Note: Once you have completed a Level 1 decontamination on field gear, clean and rinse the brush as well. Do not bring a brush to an uninfested site once it has been used at an infested site.

Report AIS **sightings**:
Note the exact location; take a photo; if possible, record GPS coordinates and place specimens in a sealed plastic bag (if not a quarantined [prohibited] species in Alaska, e.g., *Elodea* spp.); and call one of the local federal- or state-specific contacts listed below.

Aaron Martin (Service): (907)786-3510, aaron_e_martin@fws.gov
Tammy Davis (ADF&G, vertebrates/invertebrates): (907)465-6183, tammy.davis@alaska.gov
Dan Coleman (ADNR, plants): (907)745-8721, daniel.coleman@alaska.gov

Acknowledgments

Maintaining the wildness of Alaska depends on a community of dedicated people from all sectors of the Service and our partners. As such, the Service identified invasive species as one of the Alaska Region's Strategic Issues in 2017. Strategic issues such as this are focus areas of regional importance where, across programs, there is an agreed on sense of urgency and recognition that enhanced focus and cooperation would increase the chance of success in minimizing the impact of the threat. This document represents a key action item necessary to institutionalizing a pro-active approach to minimizing the threat of introduction and spread of AIS. While the Fisheries and Ecological Services Program was the lead in developing the document, its realization is a product of significant cross-programmatic efforts. We wish to recognize and thank the following individuals who contributed to the development of this guideline document:

Mike Buntjer, Regional Fish and Wildlife Biologist, Fisheries and Ecological Services Program, Regional Office, Anchorage, Alaska

Aaron Martin, Regional Aquatic Invasive Species Coordinator, Fisheries and Ecological Services Program, Regional Office, Anchorage, Alaska

David Wigglesworth, Deputy Assistant Regional Director, Fisheries and Ecological Services Program, Regional Office, Anchorage, Alaska

Jeffrey Anderson, Project Leader, Kenai Fish and Wildlife Conservation Office, Soldotna, Alaska

Delia Vargas Kretsinger, Wildlife Biologist, Yukon Flats National Wildlife Refuge, Fairbanks, Alaska

John Morton, Supervisory Fish and Wildlife Biologist, Kenai National Wildlife Refuge, Soldotna, Alaska

Inez Lawson, Student Intern, National Wildlife Refuge Program, Portland, Oregon

Matt Keyse, Supervisory Fisheries Biologist, Fairbanks Fish and Wildlife Conservation Office, Fairbanks, Alaska

Heather Wilson, Wildlife Biologist – Pilot, Migratory Bird Management Program, Anchorage, Alaska

Appendix

Appendix A. Aquatic invasive species watch list for Region 7, U.S. Fish and Wildlife Service, Alaska (as of May 2018). Note: this is not an exhaustive list of all potential aquatic invasive species in Alaska.

Species	Presence in Alaska	Environment	Habitat Type
Northern Pike - outside of native range (*Esox lucius*)	Present	Freshwater	Lakes and rivers
Common Waterweed (*Elodea* spp.)	Present	Freshwater	Lakes and rivers
Signal Crayfish (*Pacifastacus leniusculus*)	Present	Freshwater	Lakes and rivers
Dreissenid Mussels (i.e., Quagga and Zebra mussels)	Unknown	Freshwater	Lakes and rivers
New Zealand Mudsnail (*Potamopyrgus antipodarum*)	Unknown	Freshwater	Lakes and rivers
Yellow perch (*Perca flavescens*)	Unknown	Freshwater	Lakes and rivers
Reed Canarygrass (*Phalaris arundinacea*)	Present	Freshwater	Riparian
Bullfrog (*Lithobates catesbeianus*)	Present	Freshwater	Riparian
Atlantic Salmon (*Salmo salar*)	Present	Freshwater	Rivers
Purple Loosestrife (*Lythrum salicaria*)	Present	Freshwater	Riparian
Cordgrass (*Spartina* - four species)	Unknown	Estuarine	Riparian
Eurasian Watermilfoil (*Myriophyllum spicatum*)	Unknown	Freshwater	Lakes and rivers
Brazilian Waterweed (*Egeria densa*)	Unknown	Freshwater	Lakes and rivers
Hydrilla (*Hydrilla verticillata*)	Unknown	Freshwater	Lakes and rivers
Parrotfeather (*Myriophyllum aquaticum*)	Unknown	Freshwater	Lakes and rivers
Common Reed (*Phragmites*)	Unknown	Freshwater	Riparian
Asian Carp (Cyprinids)	Unknown	Freshwater	Lakes and rivers
European Green Crab (*Carcinus maenas*)	Unknown	Estuarine	Estuarine
Japanese Kelp (*Undaria pinnatifida*)	Unknown	Estuarine	Estuarine
Marine Vomit (*Didemnum vexillum*)	Present	Estuarine	Estuarine

Note: species identification and known aquatic invasive species distribution information can be found at: https://www.fws.gov/fisheries/ANS/species_erss_reports.html. For information on quarantined (prohibited) species in Alaska see http://plants.alaska.gov/invasives/pdf/ExteriorQuarantineofAquaticInvasiveWeeds.pdf