

# DRAFT

## Procedure to avoid transporting invasive species by seaplane

### Planning

When we plan a flight, we think of the departure point, destination, fuel required, aircraft weight, etc. The best way to avoid transporting invasive species is to think about the problem before the flight and incorporate available knowledge into our planning as a required additional procedure. For example, if we are departing from Lake Champlain after having lunch at Basin Harbor, Vermont, we will want to consider that we may be carrying zebra mussel larvae in any bilge water that leaked into the floats or hull of our airplane. We also would want to inspect the hull or floats (especially water rudders) for any fragments of plant material like Eurasian Milfoil.

When departing a lake that has heavy boat traffic for one nearby that has boat launches and motorized boat traffic, the odds are that both lakes have become somewhat homogenized due to boat transport between them, and we could make the flight after inspecting the hull and floats for any obvious weed, plant material, or mud. If the departure lake has a population of zebra or quagga mussels and we have been on such lake for a short time, the likelihood of mussel attachment is low. If we have been on such lake for more than a few hours, additional inspection and cleaning will be required.

Upcoming revisions to the Seaplane Pilots Association website and blog will provide invasive species resources, including links to federal, state or regional websites devoted to invasives and the locations of infestations of zebra mussels, quagga mussels, VHS, spiny water flea, Eurasian Milfoil and other invasives. We need a readily available tool to show us the locations of these invasives, and hopefully, over time, such a tool will be developed. In the meantime, we can avoid transport of invasives by checking the links on the SPA website, researching local knowledge and applying common sense to our planning.

Note: for a current map showing zebra and quagga mussel distribution, go to:  
<http://nas.er.usgs.gov/taxgroup/mollusks/zebramussel/>

### Observation

Eurasian milfoil is not easily identified by flying over a lake, and is often difficult for even a biologist to distinguish from native milfoil. Over-flying a lake to locate patches of aquatic plants is one of the best ways to avoid picking up pieces of plant material on the hull or floats. Most will not be invasive plants, but since it is difficult for us to know which is invasive and which is not, we can plan our landing runway and taxi path to shore from the air to avoid collecting fragments of any plants on the floats or hull on the way in or out.

Lakes without motorboats can mean a wilderness zone, wild forest, or private lake where motorboats are prohibited. Because boats and boat trailers are such an important pathway for transporting invasive species, such lakes often contain few or no invasives. If by observation a lake has no motorboats, one should assume that it is closed to motorized craft including seaplanes, unless local knowledge or research tells you otherwise.

### **Visual inspection**

Inspection of the hull or floats is our first procedure to verify that we are not transporting invasives. A visual inspection of the float or hull to remove any plant material, animals, mud or debris will help to ensure that we are not starting to taxi with invasive species attached. During taxi, patches of aquatic plant material should be missed to avoid catching fragments on water rudders or landing gear. If floating or subsurface vegetation is so thick that it cannot be avoided on the taxi out, then shut down mid-lake and re-inspect the floats and remove any plant fragments collected on the way out, especially at the water rudders. Raising and lowering the water rudders several times after departure will help insure that no plant fragments have been collected.

If we are on a body of water known to have quagga or zebra mussels and we are going to a lake or river that does not, we want to get in the water and hand wipe the entire float surface underwater feeling for any roughness to insure that we have no attached mussels. We will want to hand wipe that portion of the wheel wells and water rudders below the water line as well. Floats or hulls that have been overnight or days on waters with zebra or quagga mussel populations like the Great Lakes or Mississippi watersheds, may have zebra or quagga mussels attached, and the aircraft should be removed from the water and visually inspected. Such hulls or floats will need to be thoroughly cleaned of all mussels and have their interior and exterior treated with a disinfectant (such as a bleach solution) to insure that all mussel larvae have been killed before moving to another water body.

### **Disinfection**

Eggs, spores or larvae of invaders such as zebra mussels and spiny water flea are not easily seen by the naked eye, so we need a practical method to kill them when their presence is suspected. One cup of household bleach mixed into one gallon of water will yield a 6 % bleach solution, a concentration sufficient to kill the invasives we are concerned with in a short period of time. (It is important not to mix the solution until ready to apply, as the solution loses its potency over time).

We can visually inspect the hull or floats, looking for the places where there may be trapped water. We recommend carrying a hand sprayer (the kind without a wand) and bleach container in our float locker and mix one cup of bleach to one gallon of water in the hand sprayer. We can spray any area of trapped water on the floats paying particular attention to wheel wells, nose gear and float pump out cups. For the float or hull compartments that contained water during pump out, we open the access covers (if easy

to do so), estimate the amount of water in the compartment and add undiluted bleach at the rate of 1 cup to each gallon of water. For compartments that are not easy to access, we pour several cups or more of our 6% bleach solution into each compartment through the pump out cup. In both cases, let the bleach solution stand for at least 10 minutes before pumping out. We can leave the solution in the float compartments until the end of the flight, then pump the floats out while on land where the pumped water can evaporate, or if in the water, we can pump out the floats into a jerry can or other suitable container (to contain any splashes).

While bleach is quickly diluted and breaks down into water and salt, it is a disinfectant until it does so, so we want to minimize the amount of overspray and runoff from our cleaning that goes into the water. Wherever possible, inspection and cleaning should be accomplished out of the water. If we are going to a nearby airport for fuel before heading home or to the next lake, that will be the best location to carry out our inspection and cleaning. Find a flat spot on pavement or gravel where runoff will evaporate rather than run off into a wet drainage or water body.

Where available, very hot water is a suitable alternative to bleach, and can be used to treat floats and float compartments to kill invasive species. The water needs to be at least 140 degree F: where used in float compartments, the water must stay above 120 degrees F for at least 5 minutes.

### **Procedures for a “tiered approach” (based on risk) to the inspection and cleaning required to avoid transporting invasives.**

Think of invasives as part of every preflight plan the same way you would research runway lengths, fuel required, weight and balance, etc. Invasives are just one more planning item. Assess the level of “risk,” and plan your preparation accordingly, prior to departure.

#### **Level 1. Very Low Risk, perform every flight**

- a. If you are remaining on the same lake or river, perform the following as a precaution in case you have to land on a nearby water body.*
- b. If you are departing a lake or river with no known invasives or populations of zebra and quagga mussels, perform the following:*

For every departure from a lake or river, visually inspect the floats or hull and remove all plant fragments, animals, mud or other debris.

Pump out the hull or float compartments to remove water that will be transported somewhere else.

If floating plant materials are encountered during taxi, shut down in a clear area of the lake and remove any fragments. After take-off, cycle the water rudders several times

over the departure lake as a further precaution against collecting plant fragments.

**Level 2. Low Risk, but caution required.**

*If you are departing a lake or river in a wild forest or similar setting with no known invasives or populations of zebra and quagga mussels, and the lake or river is “pristine”, do not pump your bilge water overboard (in case the bilge water contains larvae of invasives from your previous destination water body) and instead, pump your bilge water into a jerry can or other container without splashing bilge water into the water body and dispose of it on shore in a place where the bilge water can evaporate and not runoff into the water body.*

Visually inspect the floats or hull and remove all plant fragments, animals, mud or other debris.

If floating plant materials are encountered during taxi, shut down in a clear area of the lake and remove any fragments. After take-off, cycle the water rudders several times over the departure lake as a further precaution against collecting plant fragments.

**Level 3. Moderate Risk, additional procedures required.**

*If you are departing a lake or river that is known to have invasives other than quagga or zebra mussels, do not pump your bilge water overboard (in case the bilge water contains larvae of invasives from your previous destination water body) and instead, pump your bilge water into a jerry can or other container without splashing bilge water into the water body and dispose of it on shore in a place where the bilge water can evaporate and not runoff into the water body.*

Visually inspect the floats or hull and remove all plant fragments, animals, mud or other debris.

Use your hand sprayer with a mix of one cup of bleach to one gallon of water to spray any area of trapped water on the floats paying particular attention to wheel wells, nose gear and float pump out cups. Let the bleach solution stand for at least 10 minutes. If dock lines have been in the water and are wet, spray the dock lines with the 6% bleach solution as well. 140 degree hot water is a suitable alternative to bleach if available.

If floating plant materials are encountered during taxi, shut down in a clear area of the lake and remove any fragments. After take-off, cycle the water rudders several times over the departure lake as a further precaution against collecting plant fragments.

**Level 4. High Risk, maximum precaution required.**

***a.** If the water body you are departing has quagga or zebra mussels and your destination is to a different water body perform the following:*

Taxi out on of the water on a ramp, or get in the water and hand wipe the submerged surfaces of the floats or hull including wheel wells and water rudders to check for (and

remove) any roughness indicating attachment of adult or larval mussels.

Visually inspect the floats or hull and remove all plant fragments, animals, mud or other debris.

Fill your hand sprayer with a mix of one cup of bleach to one gallon of water and spray any area of trapped water on the floats paying particular attention to wheel wells, nose gear and float pump out cups. For the float or hull compartments that contained water during pump out, open the access covers (if easy to do so), estimate the amount of water in the compartment and add undiluted bleach at the rate of 1 cup to each gallon of water in the compartment. For compartments that are not easy to access, pour several cups or more of the 6% bleach solution into each compartment through the pump out cup. Let the bleach solution stand for at least 10 minutes. The solution in the float compartments can remain until the floats can be pumped on land where the water can evaporate, or if on water, where we can pump the floats into a jerry can (to contain any splashes). 140 degree hot water is a suitable alternative to bleach if available.

If dock lines have been in the water and are wet, spray the dock lines with the 6% bleach solution as well.

If floating plant materials are encountered during taxi, shut down in a clear area of the lake and remove any fragments. After take-off, cycle the water rudders several times over the departure lake as a further precaution against collecting plant fragments.

Wherever possible, fly to a land airport (amphibian aircraft) to perform the inspection and cleaning outlined above. Spray the 6% bleach solution onto all exterior surfaces of the floats, and treat the interior float compartments with the bleach solution for at least 10 minutes in the manner described above. Pump out or drain the float compartments onto pavement or gravel where the fluids can evaporate and not run into a drainage system to a nearby water body. Make the commitment to not pump out the floats while on the destination water body.

***b. If the destination is to a different water body and such water body is known to be “pristine” or free of invasives,*** fly to a land airport (if we are an amphibian) and perform the inspection and cleaning outlined above. Spray the 6% bleach solution onto all exterior surfaces of the floats, and treat the interior float compartments with the bleach solution for at least 10 minutes in the manner described above. Pump out or drain the float compartments onto pavement or gravel where the fluids can evaporate and not run into a drainage system to a nearby water body. Make the commitment to not pump out our floats while on the destination water body.

If you are on straight floats, or a land airport is not available for an amphibian, either do not make the flight to the pristine lake given the risk of transporting invasives, or, if the flight is important, perform all the inspections and cleaning in Levels 4a above, plus the following: Spray the exterior of the floats a second time with our 6% bleach solution. Load the float compartments with an appropriate quantity of the 6% bleach solution, and

leave it in place for the flight to the destination lake, and make the commitment not to pump out the floats while on the destination water body. Only pump out your floats when you return to the departure lake, or into a jerry can or other container that will retain any splashing. All such bilge water must be carried from the aircraft and allowed to evaporate on a flat open surface that will not drain back into the watershed.

### **Corrosion Proofing**

All float compartments treated with bleach will have some residual salt from the breakdown of the bleach, and those compartments should be pretreated annually with ACF50, Boeshield, LPS3 or similar corrosion proofing product to avoid any corrosion. The ACF50 or similar should be applied in sufficient quantity to fill skin laps and coat steel fasteners and fittings.

### **Future cleaning variations**

A common bacterium that attacks quagga and zebra mussels (eggs, larva and adults) may be used in the future, in lieu of bleach, when mussels are the only invasive threat needing to be controlled. A revision of this procedure will be made when such bacteria becomes commercially available and is known to be stable when stored at the temperature range seaplanes experience.

### **Video self-certification course**

After the above procedure is appropriately vetted and we have broad consensus that the procedures will work as intended, a video will be made of the procedures in actual use, following the “tiered” approach above (steps 1-4), ratcheting up the inspection and treatment to match the risk. The video will include a review and exam, which if successfully passed, will lead to self-certification and printing of a certificate evidencing successful completion. It is hoped that agencies and jurisdictions will gradually recognize this procedure as making seaplanes a very low risk vector for invasives.

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