DEPARTMENT OF NATURAL RESOURCES

Infested Waters & Waters of Special Concern

Division of Forestry Aircraft Operations Plan

03/06/2026

Contents

Purpose

This plan identifies **"Waters of Special Concern"** and provides direction to Division employees to assist in the protection of these valuable, historical and/or culturally significant resources.

This plan is further intended to provide guidance to Division personnel for the purpose of reducing the spread of invasive aquatic species while performing wildfire suppression aviation missions.

Click here for a current list of water bodies identified as **"INFESTED**". It is important to consult this list regularly as identified water bodies can change during a season. The Invasive Species Program personnel attempt to keep this list as up-to-date as possible.

Figure 1: Great Blue Heron Rookery (FWS photo)

Methods

To curb the spread and minimize the effects of invasive species, this plan emphasizes:

1. Lake Identification
2. Lake Avoidance
3. Information and Education
4. Improved Aircraft Scooping and Dipping Operating Procedures
5. Post Flight Operational Procedures
6. Restrictions/Limitations

Definitions

Waters of Special Concern: Include unique wildlife habitats, plant communities and waters of historical, cultural and/or ecological significance.

Nonnative Species: Species that have been introduced or moved by human activities to a location where they do not naturally occur are termed “exotic”, “nonnative”, “alien” and “non-indigenous”. Nonnative species are not necessarily harmful; in fact, the majorities have beneficial purposes.

Invasive Species: When nonnative species cause ecological or economic problems, they are termed “invasive” or “harmful exotic species”.

Infested Waters: Water identified by Minnesota Rule and/or Statute as being infested with specific aquatic invasive species.

Relevant Rules and Regulations

Infested Waters - Each year the DNR designates as “infested waters” any waters that contain populations of:

1. Eurasian Water Milfoil
2. Zebra Mussel
3. Ruffe
4. Round Goby
5. Spiny Water Flea
6. White Perch
7. Brazilian Elodea
8. Brittle Naiad
9. Flowering Rush
10. Faucet Snail
11. Big Head and Silver (Asian) Carp
12. New Zealand Mud Snail
13. Viral Hemorrhagic Septicemia (VHS)
14. Red Swamp Crayfish

An updated list of Infested Waters can be found here. For a full list of Prohibited Invasive Species visit their website.

Minnesota Rules, part 6216.0350 deals with the identification and designation of infested waters. Activities at infested waters are subject to Minnesota Rules parts 6216.0100 to 6216.0600, Minnesota Statutes, sections 84D.13 and other applicable laws. Special regulations apply to waters identified as “Infested”, including rules relating to the transportation of infested water.

6216.0500 Transportation and Appropriation of Water from Infested Waters

Subp 4. Diversion, appropriation and transportation of infested waters. Infested waters may not be transported on a public road or off property riparian to un-infested waters except: IN EMERGENCIES, SUCH AS FIRE EMERGENCIES.

Background

Invasive species can rapidly increase allowing them to disrupt native plant and animal communities and crowd out native species.

- Once established, invasive species rarely can be eliminated.
- Most invasive species introductions are the result of human activities and are often unintentional.
- Several invasive aquatic plants and animals have been introduced into the waters of Minnesota.

Therefore, procedures are necessary to reduce the spread of harmful exotic species by wildfire suppression aircraft.

Life Cycle/Traits

Invasive Species: Several invasive plants and animals have been worldwide agents of habitat alteration and degradation. Several aquatic invasive species are present in Minnesota.

1. **Eurasian Water Millfoil** was first found in Minnesota in 1987, when it was found in Lake Minnetonka. Within three years, Eurasian water milfoil had spread to 22 water bodies and by 1992 was found in 60 bodies of water. In 2005, Eurasian water milfoil was known to occur in 177 lakes, rivers, streams and ponds in 30 counties around Minnesota. The rapid spread is likely due to inadvertent transport by boaters; however, some lakes appear to have been infested by natural means (downstream transport or waterfowl). The plant can interfere with water recreation such as boating, fishing, and swimming. The plant's floating canopy can also crowd out important native water plants. A single segment of stem and leaves can take root and form a new colony.
2. **Spiny Water Flea** was discovered in Lake Superior in the late 1980s, and shortly after that was found in Fish and Island lakes, near Duluth. Spiny water flea has also been confirmed in several northeastern Minnesota lakes. With the connections among many lakes in this area, it is very likely that the spread to other lakes may occur (or have already occurred) through natural movement.
3. **Round Goby** can spawn several times per year. They grow to about 10 inches, are aggressive and compete with native bottom dwellers like sculpins and log perch. They are expected to be harmful to Great Lakes and inland fisheries.
4. **Ruffe** was introduced to the Duluth Harbor around 1985 and is spreading to other rivers and bays around Lake Superior. Ruffe have shown explosive population growth and have had harmful impacts on native species and functions of aquatic ecosystems. In the St. Louis River near Duluth, populations of yellow Perch, emerald shiners, and other forage fish caught in survey trawls have declined dramatically as numbers of ruffe have increased.
5. **White Perch** invaded the Great Lakes through the Erie and Welland canals. They are prolific competitors of native fish species. White Perch have the potential to cause decline in Minnesota walleye populations.
6. **Zebra Mussels** have spread to parts of all the Great Lakes and the Mississippi River and are now showing up in inland lakes. They are tolerant of a wide range of environmental conditions. Zebra mussels clog water systems of power plants and water treatment facilities, as well as irrigation systems. They have severely reduced and eliminated native mussel species.

7. **Brazilian Elodea** is a common aquarium plant sold at most pet stores. It was found in Powderhorn Lake (Hennepin County), the likely cause of its existence in the lake is improper disposal. (Note this lake is in the downtown area, Gold Fish and Koi have also been found in the lake.)
8. **Flowering Rush** is actively expanding. It competes with native shore land vegetation. It is a Eurasian plant that is sold commercially for use in garden pools. It is now illegal to buy, sell, or possess the plant.
9. **Brittle Naiad** (also called slender, spiny, or bushy naiad) is a highly invasive, submersed annual aquatic plant introduced into the United States from Europe. It has established from Ontario west to Illinois and southward to Florida. And currently in Lac Lavon (Dakota County).
10. **Faucet Snail** was first noted in Lake Michigan in the late 1800s and has spread from there. As of 1992, Lake Superior is not considered infested, however the Mississippi headwaters including Lake Winnibigoshish and Mississippi Pool 7 (SE MN) are infested. Adult faucet snails are about 0.5 inches in size. They are commonly found in ponds, shallow lakes, and canals attached to rocks, clay, and aquatic plants. However, faucet snails have been found at depths up to 5 meters. Faucet snails compete with native mollusks for nutrients, decreasing native populations in infested waters. They also carry a parasite (fluke) which is fatal to waterfowl when ingested.
11. **Big Head and Silver (Asian) Carp** were introduced into the southern United States to clean fish ponds in aquaculture environments. They escaped into open waters through flooding and other means. They can weigh up to 110 pounds for Big Head and 60 pounds for Silver. Juveniles are difficult to identify because they resemble other native baitfish, so they could be spread through the use or release of live bait. They typically feed at or near the water's surface. Silvers frequently jump when disturbed by boats.
12. **New Zealand Mud Snail** is tiny and reproduces asexually. They were accidentally introduced with imported trout to Idaho in the 1980's and the Great Lakes through ship ballast water. They can have very high population densities and outcompete other species that are important forage for native fish. They provide little nutrition to the fish.
13. **Viral Hemorrhagic Septicemia (VHS)** is a very serious viral disease of fresh and saltwater fish. At low infections the fish may show no symptoms and at higher rates they may have hemorrhages on their body surface and internal organs. Sick fish will often be listless and swim in circles and frequently observed at the surface of the water.
14. **Red Swamp Crayfish** can quickly dominate lakes, ponds, rivers and wetlands. They feed heavily on plants, snails, fish, and amphibians, aggressively competing with native crayfish and other species for food and habitat. They can lead to declines in native crayfish and can carry crayfish fungus plague. Eradicating red swamp crayfish is nearly impossible because they often dig deep burrows into banks of lakes and rivers.

Species Spread Reduction Procedures

For **All** Infested Waters Regardless of Species:

Lake Identification: DNR "Notice of Waters Identified and Designated as Infested Waters" is available to DNR Forestry aviation personnel on their website.

1. Dispatch briefings - Pilots will be briefed on known lake locations.
2. GIS data - Utilization of various GIS databases.

3. GPS use - Waypoints can be programmed into GPSs made available to aviation personnel. Updated iPad maps are created annually.
4. Dispatcher data - Dispatch facilities typically have access to infested lake data.
5. Communication - Increased coordination and communication between ground personnel, dispatch personnel, air attacks, pilots, and helitack crews relating to known infested waters is encouraged.
6. Lake Avoidance / Lake selection - Efforts should be made to avoid scooping and dipping in identified infested waters.

Information and Education

1. Awareness - Increased awareness of Waters of Special Concern and Invasive Species threats.
2. Procedures - Plan procedures reviewed periodically at Helitack, Air Attack, SEAT Manager and tanker base training sessions and workshops.
3. Dispatcher briefings - Operating plan briefed with local dispatchers.
4. Pilot briefings - Pertinent information included in pilot briefings.
5. De-briefings - Issues addressed via post fire de-briefings.
6. Planning - Development, update and periodic review of this operating plan.
7. Spread education - Improving our knowledge on how to stop the spread of invasive exotics.
8. Peer support - Educating each other on lakes, species, threats and spread prevention.

Restrictions/Limitations

Infested Waters will **not** be utilized for training, demonstrations, or proficiency drops.

IMPORTANT – WHEN THE USE OF ALTERNATIVE SITES WOULD RESULT IN A SIGNIFICANT INCREASED THREAT TO LIFE OR PROPERTY, USE OF INFESTED WATER IS PERMISSIBLE. WHEN INFESTED WATERS ARE UTILIZED FOR FIRE EMERGENCIES, THE FOLLOWING PRECAUTIONS SHOULD BE FOLLOWED:

Modified Scooping /Dipping and Dropping Procedures - INFESTED LAKES:

1. Deeper Water - Depths greater than 15 feet should be used when feasible.
2. Aerial View – Pilots should look for areas that do not contain vegetation.
3. Over flights- Pilots should make efforts to avoid flying over waters that are not infested.
4. Dropping - Pilots should avoid dropping infested water in non-infested lakes or other waterways.

Once an aircraft has utilized Infested Water, the following procedures should be followed:

1. Visual inspections - Pilots should not utilize non-infested water until the aircraft has landed and a visual inspection of the bucket (helicopter), or the tank system and probes (scooper) and aircraft has been completed.
2. Drying or Rinsing - Buckets, tanks, probes, aircraft etc. should be allowed to dry in the sun. To expedite usability of the aircraft pressure rinsing maybe necessary. If this method is used, hot water pressure washer systems are available to MN DNR bases. **The recommended temperature for rinsing is 140° F or**

higher. Temperatures listed below in "Species Specific Procedures" are effective for that species. Currently the highest minimum is 140° F.

3. Contract helicopters should have a spare bucket, either company owned or the state may provide operators of type III helicopters a spare bucket. If the primary bucket is exposed to infested waters this bucket should not be used to pick water from another waterway until it is properly cleaned /dried. The spare bucket should be used if the helicopter is dispatched to another fire and the primary bucket has not been properly cleaned /dried.

*NOTE – The only exception would be a new fire, (in a new location that threatened life, property or significant resources) not allowing time for the aircraft to return to its base for inspection and treatment.

Species Specific Procedures

Eurasian Water Milfoil, Brazilian Elodea, Brittle Naiad

Environmental conditions which may help reduce the risk of spread:

1. These three plants root in the bottoms of lakes.
2. Plants usually are limited to the littoral zone (15 foot depth or less).
3. Plants are evergreen, though the stands thin and remaining stems drop down towards the bottom of the lake in the fall.
4. Plants are often not full grown in our spring fire season.
5. Fragments of plants may be present at any time, though the numbers of fragments in the water column may be lower in fall than during summer.

Additional Procedures:

1. Vegetation removal – Removal of vegetation from the bucket and/or aircraft may be required.
2. Disposal – Proper disposal of vegetation removed from the aircraft or buckets may be required. Vegetation disposal should be on dry ground where there is no chance of the vegetation getting into any body of water.

Spiny Water Flea

Environmental conditions which may help reduce the risk of spread:

1. Deeper Water – Spiny Water Fleas prefer deeper cooler lakes and normally stay down near the thermocline during the day.
2. Desiccation (drying) resistance – Spiny Fleas and Zebra Mussel veligers die when completely dried. Drying time should be 24 hours when feasible.
3. Temperature vulnerable – Hot water (the hotter the better) should be used to kill both Zebra Mussel veligers and Spiny Water Fleas. Water as hot as or hotter than 100°F, typically kills instantly, as well as killing adult Zebra Mussels.

Zebra Mussels

Environmental conditions which may help reduce the risk of spread:

1. Lower in the water column – Zebra Mussel adults are attached to solid objects in the lake, such as rocks, logs, wood, aquatic plants and or man-made objects - they are not free swimming or floating in the water column.
2. Deeper water advantages – Skimming and dipping in deeper areas of the lake reduces the chances of picking up adult Zebra Mussels.
3. Seasonal advantages – Zebra Mussel larvae (veligers) are not generally present in early spring or late fall (our typical spring and fall fire seasons). This invasive needs sustained water temperatures above 55°F to reproduce. Once the water warms, expect that any infested waters may have veligers present at any time, until the water temperatures drop again in later fall.
4. Mooring odds – Unless aircraft are moored for several hours, Zebra Mussels are very unlikely to attach. Newly attached Zebra Mussels will be very small – almost invisible.

Additional Procedures – Once an aircraft has utilized infested water, the following precautions should be followed:

1. Draining – Drain all aircraft, buckets, tanks, probes, etc., of all water. Ensure that any drainage does not flow into surface waters
2. Rinsing – If a Zebra Mussel or Spiny Flea infested lake has been utilized, the aircraft should return to base (noting exception above), and potentially contaminated buckets, tanks and/or aircraft should be rinsed with water of 104°F (or greater if possible) utilizing a high-pressure sprayer. Sun drying is also encouraged (24 hours if feasible).
3. Removal – Remove any material, aquatic vegetation, debris from lake water, etc.) from buckets, tanks, probes, aircraft, etc.
4. Mooring restrictions – Precautions should be taken to avoid mooring aircraft in infested waters. The aircraft should not be encouraged to land, fuel or remain moored on the water.
5. Scrubbing – Should an aircraft remain moored for more than two hours in a Zebra Mussel infested lake, that portion of the aircraft that made contact with the water while moored should be scrubbed while still in the water, or if on a dock use a hot-water pressure washer to spray the surface left in contact with the water.

Round Goby/White Perch/Ruffe/Asian Carp

Environmental conditions which may help reduce the risk of spread:

1. Fish make up this group of invasive species. They are swimmers, not free floaters. Fish have a tendency to avoid surface disturbance.
2. They are generally bottom feeders and dwellers. The exception is the Asian Carp, who may feed at or near the surface.
3. Young of the year of this group associate with the bottom for shelter and food.
4. Using these fish as bait or transferring bait is the most likely cause of spread.

5. Temperature vulnerable – when exposed to temperature ranges greater than 10°F, this group will die relatively easily.
6. The larval stage of this group tends to be deep during the day and closer to the surface during the night. (The larval stage of this group has the potential to, although not common, be present within the mid to upper levels of the water column for short periods of time between mid-May and mid-July).

Additional Procedures – Once an aircraft has utilized infested water, the following precautions should be followed:

1. Time lapse – The pilot should not utilize non-infested water until the bucket, tanks and or aircraft have been free of water for at least 15 minutes. The only exception would be a new fire (in a new location that was immediately threatening life, property or significant resources) not allowing adequate time to kill Round Goby, White Perch, Ruffe, or Asian Carp.
2. Draining – Drain all aircraft buckets, tanks, probes, etc., of all suspicious material.
3. Removal – Remove suspicious material from buckets, tanks, probes, aircraft, etc.
4. Rinsing – If a Round Goby, White Perch, Ruffe, or Asian Carp infested water body has been utilized, the aircraft should return to base (noting exception above) and potentially contaminated buckets, tanks and/or aircraft should be rinsed with water of 104°F (or greater if possible) utilizing a high-pressure sprayer. Sun drying is also encouraged.

Flowering Rush

Environmental conditions which may help reduce the risk of spread:

1. Flowering Rush roots in the bottoms of lakes.
2. Plants usually are limited to the littoral zone (15 foot depth or less).
3. Usually the plant is emerged from the water and may grow from 1-4 feet tall. Occasionally the plant may be submerged in deeper water.
4. Plants reproduce by seed or from vegetative root spread.
5. Plants are often not mature during our spring fire season.

Additional Procedures:

1. Vegetation removal – Removal of all vegetation from the bucket and/ or aircraft may be required.
2. Disposal – Proper disposal of any vegetation removed from the aircraft or buckets may be required. Vegetation disposal should be on dry ground where there is no chance of the vegetation getting into any body of water.

Faucet Snail/New Zealand Mud Snail

Environmental conditions which may help reduce the risk of spread:

1. Faucet Snails are generally found attached to rocks and clay.
2. Egg laying occurs from May – July when water temperature is over 68˚F.

Additional Procedures:

1. Visual inspections – remove adult and immature snails. Remove all rocks, mud, aquatic plants, and other debris as the snails are usually found on such substrates.
2. Rinsing –Pressure washing equipment at 122˚F for 1 minute effectively kills Faucet Snails.

Viral Hemorrhagic Septicemia (VHS)

Environmental conditions which may help reduce the risk of spread:

1. Currently the only known location of VHS is in Lake Superior around the shores of Michigan and eastern Wisconsin.
2. VHS primarily spreads with the migration of fish. It is highly unlikely "Water Scooping Aircraft" will pick up any infected fish because fish have a tendency to move away from disturbances and the fill ports have screens on them to guard against such cases.

Additional Procedures:

1. Vegetation removal – Removal of vegetation from the bucket and/or aircraft may be required.
2. Disposal – Proper disposal of vegetation removed from the aircraft or buckets may be required. Vegetation disposal should be on dry ground where there is no chance of the vegetation getting into any body of water.
3. Rinsing – Pressure washing equipment at 140˚F effectively kills VHS.

Red Swamp Crayfish

Environmental conditions which may help reduce the risk of spread:

1. Currently, two specimens have been found in Tilde Lake in Clay County.
2. Crayfish are a good example of a prohibited invasive species that some online retailers ship to unsuspecting teachers for classroom aquariums or to people hosting 'crawfish boils'.

Additional Procedures:

1. Removal – remove all crayfish from equipment.
2. Rinsing – rinse with hot water by pressure washing equipment at 140˚F.

Specific Special Concern Waters

General Retardant Restrictions – Retardant drops should not be within 300 feet of a body of water or stream unless life and/or property are directly threatened.

Waters of Special Concern have typically held ecological, historical, and/or cultural significance for various peoples within the State of Minnesota. Efforts are continuing to identify Waters of Special Concern issues. Specific guidelines for some Waters of Special Concern are listed below:

Peltier Lake and Pig's Eye Lake Heron Rookeries

The heron rookery on the island in Peltier Lake of Anoka County has been described as a "significant natural resource for the entire seven county metro area". This island is the second largest multi-species nesting site for herons and egrets in the DNR's Central Region. The Peltier Heronry, which numbered more than 1100 nesting pairs at its largest, has had some unexplained failed nesting seasons in the last few years. One possibility known to cause heronry abandonment is disturbance due to human activity.

Pig's Island Heron Rookery – This metropolitan site, named after the city of St. Paul's famous settler Pierre "Pig's Eye" Parrant, is notable for being one of the largest nesting sites for colonial waterbirds within the state. Species that nest in the rookery include great blue heron, great egret, black-crowned night-heron, double-crested cormorants, and yellow crowned night heron. This is one of the four places in the state where yellow-crowned night herons are known to nest. Bald eagles also nest in the immediate vicinity and may often be seen roosting in trees on the island.

In an effort to help avoid human disturbance, the Division of Forestry has been asked to avoid using Peltier Lake and Pig's Eye Lake during the nesting season as an aircraft water scooping or dipping source. As a result of that request, we should:

1. Avoid the use of both lakes from March 15 to July 15 each year.
2. Avoid the use of both lakes due to their "Infested Waters" status.
3. Reserve the option of utilizing Peltier or Pig's Eye Lake when there is an immediate threat to life or property and when use of a different lake would likely increase the loss of life or property.
4. Follow Infested Water Procedures if either lake is utilized.

Fond du Lac Tribal Lands

The Fond du Lac Band of Lake Superior Chippewa have serious tribal concerns regarding the introduction of aquatic invasive species to Reservation waters, particularly the wild rice lakes.

The tribe has requested that helicopter crews avoid the use of the following rice lakes:

1. Perch Lake
2. Rice Portage Lake
3. Jaskari Lake
4. Miller (Mud) Lake
5. Deadfish Lake

*Note – other small water bodies, such as beaver ponds and ephemeral pools, in proximity to these productive wild rice lakes **would be** suitable sources of water for local fire suppression efforts.

As requested, DNR Forestry fire aviation crews and dispatchers should be provided with updated data and operating procedures and should encourage scrupulous aviation cleaning protocols as identified in this plan.

The Division of Forestry shares with the Fond du Lac Band, the goal of minimizing the risk of introducing aquatic invasive species to all waters in the State.

Bois Forte Band of Chippewa Tribal Lands (Nett Lake)

The Bois Forte Band of Chippewa has designated the **Nett Lake** water body sacred and **"off limits"** to water scooping and or dipping. Only the Bois Forte Commissioner of Natural Resources or his designee can grant exceptions. Such authorization shall be routed through the Reservation Forester/FMO.

It should be noted that the restriction of scooping and dipping applies to the Nett Lake water body, including a 1 ½ mile portion of the Lost River tributary near the northeast portion of the lake. Other nearby sources of water are permissible to dip or scoop out of, including the river out flow.

There are no further restrictions relating to foam or retardant as it relates to dropping suppressants on tribal lands within Bois Forte, provided they are applied following common interagency standards and guidelines.

Red Lake Band of Chippewa Tribal Lands

The Red Lake Band of Chippewa has designated all of **Lower Red Lake** and that portion of **Upper Red Lake that lies within the reservation** boundaries as **"off limits"** to water scooping for State of Minnesota jurisdiction fires, unless approved by Red Lake Tribal Authorities.

To gain approval to dip or scoop water from tribal waters the aircraft manager, airtanker base, or dispatch must contact Red Lake Dispatch (5-O).

Superior National Forest

On National Forest Lands retardant may be ordered and used per existing policy. Incident commander needs no further authorization.

Voyageurs National Park

Due to extensive water resources in the park, the following special restrictions will apply with regard to aerially applied retardant and foam use:

Retardant – No retardant drops within 400 feet of open water

Foam (aerial delivery) – Aerial delivery of foam requires park superintendent approval on a case-by-case basis. When approved, the following guidelines apply:

1. Foam concentrate will only be injected into the holding tank after the water pick-up operation has been completed.
2. Drops from Beaver, T2 & T3 helicopters – no drops within 200 feet of open water.
3. Drops from Scoopers, heavy air tanker or heavy helicopter – no drops within 400 feet of open water.

Itasca State Park (Elk and Deming Lakes)

Itasca State Park has asked that we not scoop or dip out of either Elk or Deming Lakes. Scientific equipment, which may not be visible from the air by pilots of firefighting aircraft, exists in both lakes.

Elk Lake is a larger lake south of Lake Itasca. It is easily seen on most maps and GPS. Deming Lake is a much smaller lake not suitable for water scooping aircraft. Deming Lake is along the “South Entrance Road” (the second lake along the road from the south), it is circular in shape and not labeled on most maps.

Helicopters stationed adjacent to State/International boundaries

Contract helicopters should have a spare bucket, either company owned or the state may provide operators of type III helicopters a spare bucket. If the primary bucket is exposed to infested waters this bucket should not be used to pick water from another waterway until it is properly cleaned/dried. The spare bucket should be used if the helicopter is dispatched to another fire and the primary bucket has not been properly cleaned /dried.

Figure 2: Prairie Grassland of Minnesota

MN DNR Infested Water Aircraft Operating Plan

Species spread reduction procedures:

1. Maintain current infested waters map
2. Brief pilots on known infested lake locations
3. Communicate existence of infested waters to operators (e.g. pilots, ATGS)
4. Follow flow-chart below:

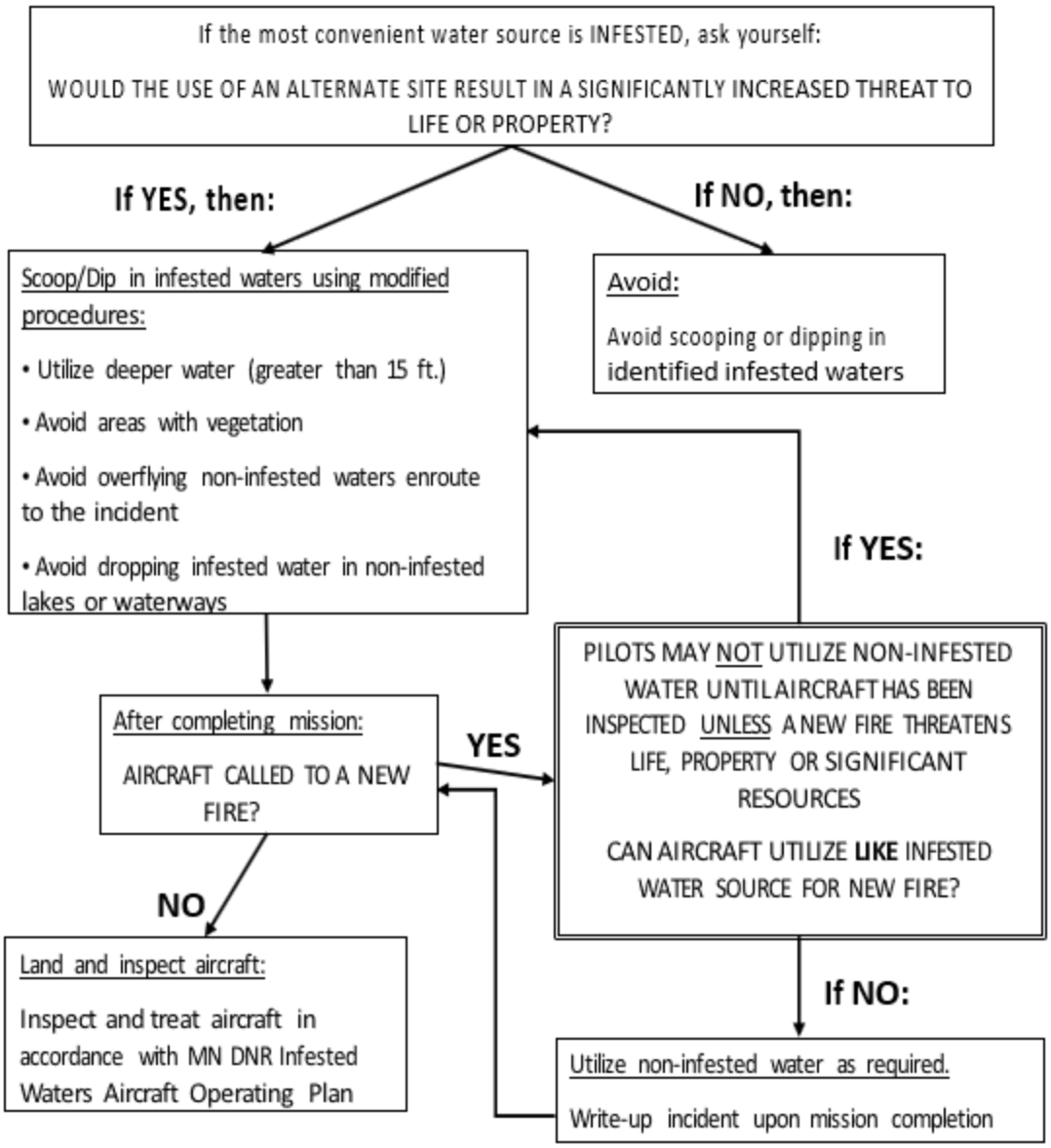

Figure 3: MN DNR Infested Water Aircraft Operating Plan Flowchart.