

Sierra Nevada Network Lake Monitoring Protocol

SOP 7. Equipment Disinfection

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Revision History Log

Previous Version #	Revision Date	Author	Changes Made	Reason for Change	New Version #

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1. Introduction

Field personnel have the potential to introduce and spread parasites and non-native organisms. These include the introduction and spread of the New Zealand mudsnail (*Potamopyrgus antipodarum*), quagga mussels (*Dreissena rostriformis bugensis*), and chytrid fungus (*Batrachochytrium dendrobatidis*), which are of particular regional concern. Sierra Nevada Network (SIEN) recognizes the need to minimize introduction and transport as part of the lake monitoring protocol.

The Sierran yellow-legged frog is a species we are particularly focused on protecting as it is a candidate for listing as ‘endangered’ under the Federal Endangered Species Act. Recently, extremely rapid declines have been documented: for example, field research in Yosemite during 2005 revealed that 50% of revisited sites—previously extant during surveys conducted 2000–2002—are now extirpated. Recent research has shown that chytridiomycosis (*Batrachochytrium dendrobatidis*) is a proximate cause of yellow-legged frog mass mortality (Rachowicz et al. 2006).

Aquatic species can be transported on clothing and sampling equipment. To minimize this risk, SIEN requires the following general policies to be followed if logistically possible:

- Start fieldwork with sterilized equipment.
- If the information is known, start field work from the cleanest site and work toward the dirtiest or contaminated site.
- Start from the highest point in the drainage and work down.

We elected to use a chlorine bleach disinfection procedure. The alternative disinfectant is Quat-128®. Quat-128® is not used in this protocol because it is a source of nitrogen contamination. We recognize that chlorine bleach is a source of sodium and chloride ion contamination. However, disinfecting is a necessary step and, given our objectives, potential sodium and chloride contamination was the better of the two options.

2. Disinfection Procedure

To avoid moving diseases from site to site, you must disinfect your gear that has been in contact with water or animals before sampling the next waterbody. The only exception to this rule is when your next survey site is in the same area: directly connected or within 100 meters downstream of the site you just surveyed and connected to it by a stream. Between sites in the same area, all equipment should be rinsed of organic debris.

Equipment should be disinfected at the ‘new’ site. Do not disinfect after sampling a lake and then store the equipment with bleach on it in the packs. Long exposure to the bleach is hard on the equipment, not to mention it will get bleach on everything in your pack. When you arrive at the new site take cautions to not allow the ‘contaminated’ equipment to contact water until it has been disinfected.

Use the following equipment to disinfect between sampling locations:

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- Stiff scrub brush (if needed)
- Latex gloves
- Spray bottle
- 3 gallon collapsible bucket or dry bag
- Dry bleach (this should be in pre-measured, labeled packages for each sample site)

The following equipment should be cleaned and disinfected:

- Boots, shoes, waders, and sandals
- Float tubes/ boats
- Ropes, buoy
- Fins
- Dip nets
- Net poles
- Tarp
- Water sampling pump
- Cubie containers
- Any other equipment that contacts the water or frogs.

Chlorine bleach is used to disinfect. Granulated chlorine bleach is preferred because it is lighter and easier to transport than liquid bleach and unlike liquid bleach it does not lose its effectiveness within 2 weeks. Granulated chlorine bleach can be purchased at swimming supply stores.

Prior to going into the field, package and label the disinfectant.

1. Get labels and containers to package the dry bleach. Containers can be plastic storage bags, plastic bottles, etc. If using plastic storage bags, put all bags for the trip into one dry bag, stuff sack, or hard sided container that can protect the plastic storage bags from being punctured.
2. Measure 1 cup of 56% available dry chlorine bleach (to get a 2% bleach solution when added to a 60% full 3 gallon bucket of water in the field).
3. Place dry bleach in plastic storage bag.
4. Label plastic storage bag.
5. Label the puncture resistant bag (stuff sack, dry bag, or hard sided container).
6. Repeat to have individual pre-measured containers for each lake.

The first step in the field is to thoroughly clean equipment.

1. Remove all organic matter (mud, plants, algae, etc.). Particular attention should be given to the treads of boots, sandals, and waders. A stiff brush should be used if needed.
2. Ensure no water remains in any equipment by removing any residual water from all pumps, hoses, etc.
3. Dry as thoroughly as possible. When practical and appropriate, wipe dry.

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4. Let all equipment air-dry as long as possible.

After the equipment is thoroughly cleaned, use the following steps to disinfect.

1. For small equipment, such as dip nets and ropes:
 - a. Use a 2% solution of bleach.
 - b. Fill the 3 gallon collapsible bucket a little over half (60% full) with water at the new survey site.
 - c. Mix the pre-measured quantity of dry bleach into the water in the bucket.
 - d. Soak all items (that have been cleaned of mud, etc.) for 2 minutes.
 - e. If the solution becomes noticeably dirty, dispose of it and mix up a new batch.
 - f. After disinfecting your gear, rinse with water from the new survey site.
2. For large equipment that cannot be soaked, such as float tube, boat, and waders:
 - a. Use the 2% solution of bleach.
 - b. Fill spray bottle with solution.
 - c. Spray cleaned surfaces. If needed, use a sponge to make sure all surfaces get covered with the spray solution.
 - d. Let air dry.
 - e. Rinse thoroughly with water from the new survey site to remove all disinfectant to avoid sample contamination, and getting bleach on clothing, etc.
3. Dispose of bleach solution at least 100 meters from water.