



Environmental Analysis Program

Pomona College
Biogeochemistry Laboratory

SOP-F007

Field Decontamination Protocols

Standard Operating Procedure

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1. Purpose

This SOP describes standardized procedures for decontaminating field equipment between sampling sites and between field outings. Proper decontamination serves two purposes: (1) preventing cross-contamination of samples that would compromise analytical results, and (2) preventing the transfer of invasive species, pathogens, and nuisance organisms between water bodies and field sites (California Department of Fish and Wildlife, 2016; Hosea & Finlayson, 2005). These procedures apply to all equipment that contacts environmental media (water, soil, sediment, biological tissue) or that is transported between sites.

2. Scope

- **Applies to:** All reusable field sampling equipment, wading gear (boots, waders, nets), sampling instruments (sondes, meters), containers, and hand tools used at EA Program field sites
- **Does not apply to:** Disposable, single-use items (e.g., individually packaged sterile Colilert bottles, disposable filter cartridges); laboratory glassware cleaning (see [SOP-L101](#)); drone or camera equipment (wipe with dry cloth only unless visibly contaminated)
- **Location:** Performed at field sites (between-site decontamination) and in the lab (post-field cleaning in SGM 131–134)

3. Responsibilities

Role	Responsibility
PI / Field Lead	Ensure decontamination supplies are on the equipment checklist; verify compliance
Trained Personnel	Decontaminate equipment per this SOP before and after each site visit
New Students	Complete training before independent fieldwork

4. Definitions

- **2% bleach solution:** A dilute sodium hypochlorite solution prepared by adding 200 mL of household bleach (5–8% NaOCl) to 10 L of tap water; the standard decontamination solution for wading gear, nets, and hand tools in the EA Program; must be prepared fresh each field day as bleach degrades within hours (California Department of Fish and Wildlife, 2016).
- **Aquatic invasive species (AIS):** Non-native organisms introduced to a water body where they cause ecological or economic harm; common AIS of concern in Southern California include New Zealand mudsnail, quagga mussel, didymo, and chytrid fungus; transferred between water bodies on wet gear (California Department of Fish and Wildlife, 2016).
- **Chytrid fungus (*Batrachochytrium dendrobatidis*, Bd):** A waterborne pathogenic fungus lethal to many amphibian species; transmitted via contaminated water, soil, and equipment; killed by 2% bleach or thermal decontamination at 60 °C (Hosea & Finlayson, 2005).
- **Cross-contamination:** Transfer of analytes, biological material, or organisms from one sample or site to another via inadequately cleaned equipment; can invalidate analytical results and introduce invasive species.
- **Didymo (*Didymosphenia geminata*):** A freshwater diatom that forms dense mats on stream substrates; tolerates damp conditions for many hours; felt-soled wading boots are a primary vector; killed by 2% bleach or drying for at least 48 hours (California Department of Fish and Wildlife, 2016).
- **Equipment blank:** A sample of deionized water rinsed through decontaminated sampling equipment and collected as a QC sample; analyzed alongside field samples to verify that decontamination removes analytes below detection limits.
- **New Zealand mudsnail (*Potamopyrgus antipodarum*):** An invasive snail less than 5 mm long that survives transit on damp wading gear for up to 28 hours; a significant concern

in Southern California streams; killed by 2% bleach immersion for at least 10 minutes or thermal decontamination at 60 °C (Hosea & Finlayson, 2005).

- **Thermal decontamination:** Application of water at 60 °C to kill aquatic invasive species and pathogens; preferred over bleach for equipment sensitive to sodium hypochlorite (rubber gaskets, sensor membranes) (California Department of Fish and Wildlife, 2016; Hosea & Finlayson, 2005).

5. Safety and Hazards

Hazards

- **Chemical:** Dilute bleach (sodium hypochlorite) is a skin and eye irritant and can damage clothing. Handle with gloves and avoid splashing.
- **Physical:** Hot water (60 °C or above) used for thermal decontamination poses a scald risk. Use insulated containers and pour carefully.
- **Biological:** Equipment that has contacted contaminated water or soil may carry pathogens. Wear gloves during decontamination.

5.1. Required PPE

- ☐ Nitrile gloves
- ☐ Safety glasses (when using bleach solution)
- ☐ Lab coat or field clothing you are willing to bleach-stain

5.2. Emergency Procedures

For bleach splashes to skin or eyes, flush with clean water for at least 15 minutes. Refer to [SOP-F001 Field Safety](#) and [SOP-L003 Hazardous Materials Handling](#).

6. Equipment and Materials

6.1. Decontamination Supplies

Item	Notes
Household bleach (sodium hypochlorite, 5–8%)	For preparing 2% decon solution
Spray bottle (labeled “Decon – Bleach 2%”)	For applying solution in the field
Stiff-bristle scrub brush	For removing visible debris
Bucket (5-gallon, dedicated)	For soaking equipment
Deionized or distilled water	For final rinse of sampling equipment
Tap water (carboy or jug)	For initial rinse in the field
Paper towels or clean rags	For drying

Item	Notes
Garbage bags	For isolating contaminated gear during transport

6.2. Solution Preparation

Prepare a **2% bleach solution** by adding 200 mL of household bleach (5–8% sodium hypochlorite) to 10 L of tap water. Prepare fresh solution each field day; bleach degrades within hours (California Department of Fish and Wildlife, 2016).

For **thermal decontamination** (alternative to bleach), heat water to at least 60 °C. Preferred for equipment that may be damaged by bleach (e.g., rubber gaskets, certain sensor membranes) (Hosea & Finlayson, 2005).

7. Procedure

7.1. Between-Site Decontamination (Field)

Perform the following steps before moving to the next sampling site.

Wading gear (boots, waders, chest packs):

1. Remove from the water body and inspect for visible organisms (snails, plant fragments, mud).
2. Use the scrub brush and tap water to remove all visible debris, paying special attention to boot soles, lace eyelets, and wader seams.
3. Spray all surfaces with 2% bleach solution or immerse boot soles in the bleach bucket for at least one minute (California Department of Fish and Wildlife, 2016).
4. Rinse with tap water to remove bleach residue before entering the next water body.

Nets, sieves, and kick screens:

1. Remove all visible organisms and debris by hand and with the scrub brush.
2. Soak in 2% bleach solution for at least one minute, or pour hot water (60 °C) over all mesh surfaces (Hosea & Finlayson, 2005).
3. Rinse with tap water.

Sampling instruments (sondes, meters, tubing):

1. Rinse the sensor housing and cable with tap water.
2. Wipe external surfaces with a cloth dampened with DI water.
3. Do not immerse sensitive electronics in bleach. If the manufacturer recommends a specific decontamination procedure, follow it instead.

Hand tools (trowels, augers, calipers, measuring tapes):

1. Scrub off visible soil or sediment with tap water and the brush.
2. Spray with 2% bleach solution or rinse with DI water.
3. Dry with paper towels before packing.

7.2. Post-Field Decontamination (Laboratory)

Upon return to the lab, before storing equipment:

1. Unpack all field equipment in the designated cleaning area (SGM 134 sink or outdoor wash area).
2. Repeat the cleaning steps from §6.1, using DI water for the final rinse of any equipment that contacts samples.
3. Allow all equipment to air-dry completely before storing. Incompletely dried equipment promotes mold and bacterial growth.
4. Inspect nets and mesh for tears; report damage to the lab manager.
5. Return all equipment to designated storage locations per [SOP-L007](#).

7.3. Invasive Species of Concern

The following organisms are of particular concern in Southern California watersheds (California Department of Fish and Wildlife, 2016; Hosea & Finlayson, 2005):

Organism	Concern
New Zealand mudsnail (<i>Potamopyrgus antipodarum</i>)	< 5 mm; survives on wet gear up to 28 hours
Quagga/zebra mussel (<i>Dreissena</i> spp.)	Veligers invisible to the naked eye
Didymo (<i>Didymosphenia geminata</i>)	Algal cells survive on damp felt soles
Chytrid fungus (<i>Batrachochytrium dendrobatidis</i>)	Lethal to amphibians; transmitted via water and mud
Invasive aquatic plants (e.g., <i>Arundo donax</i> fragments)	Fragments root easily at new sites

! Important

If sampling in a watershed known to harbor New Zealand mudsnails or quagga mussels, use thermal decontamination (60 °C) rather than bleach, as hot water is more reliably lethal to these organisms (Hosea & Finlayson, 2005). Allow gear to dry completely (at least 48 hours) before using it at another site.

8. Quality Control

- The field lead verifies that decontamination supplies are packed before departure (include on the [SOP-F002 Field Equipment Checklist](#)).
- At the start of each semester, inspect decontamination supplies (bleach expiration, brush condition, spray bottle function) and replace as needed.
- For chemical sampling, submit one equipment blank per sampling event: rinse decontaminated equipment with DI water and collect the rinse as a sample. Analyze alongside field samples to verify that decontamination removes analytes below detection limits.

9. References

- California Department of Fish and Wildlife (2016)
- Hosea & Finlayson (2005)

California Department of Fish and Wildlife. (2016). *Aquatic invasive species decontamination protocol*. California Department of Fish; Wildlife. <https://wildlife.ca.gov/Conservation/Invasives/Aquatic>

Hosea, R. C., & Finlayson, B. (2005). *Controlling the spread of New Zealand mudsnails on wading gear* (Administrative Report 2005-02). California Department of Fish; Game, Office of Spill Prevention; Response.

10. Related SOPs

SOP	Title	Relationship
F001	Field Safety	Required prerequisite
F002	Field Equipment Checklist	Decon supplies on checklist
F304	Stream Physical Habitat	References invasive species prevention
F610	Macroinvertebrate Sampling	Gear decon between streams
L101	Glassware Cleaning	Lab-side cleaning protocols

11. Training Record

Before performing field decontamination independently, personnel must:

1. Read this SOP in full
2. Demonstrate proper preparation of 2% bleach solution
3. Demonstrate between-site decontamination of wading gear and sampling equipment during a supervised field visit
4. Be signed off by the PI or field lead