

Aquatic Invasive Species Detection, Identification and Decontamination

California Invasive Plant Council
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Leigh Johnson
Coastal Resources Advisor

Michelle Lande
Staff Research Associate

Sabrina Drill
Natural Resources Advisor
UC Cooperative Extension
Los Angeles (and Ventura)

Eloise Tavares
Invasive Species Program
Cal Dept of Fish & Wildlife

(858) 822-7802
ltjohnson@ucanr.edu

(858) 822-7741
mdlande@ucanr.edu

(626) 586-1975
sldrill@ucanr.edu

(562) 342-7155
invasives@dfg.ca.gov

Coastal Resources Website
<http://ucanr.org/sites/coast>

Invasive Species

Non-native to the ecosystem whose introduction ***causes*** ... economic or environmental ***harm*** (USDA NISIC)

- Small subset of **exotic** species are invasive
- Invasive weeds cost > **\$82 million** in California (Cal-IPC 2009)
 - Cost **~\$123 billion** in US in 1999
- Diseases, predators, competitors
- Damage crops, infrastructure, physical environment
- Lack natural predators or diseases
- Favored by other ecosystem/climate changes



Aquatic Invasive Species

- Front line of defense
- First alert and quick response
- Some widespread in CA, some large scale control programs



Aquatic Invasive Species

QUAGGA and ZEBRA MUSSELS

- Identification
 - 2 Ear-shaped shells
 - Solid light to dark brown or banded
 - Attach to surface by threads
- Impacts
 - Clog water infrastructure
 - Filter feeding robs food from others
- Detection
 - Look on ropes and shaded surfaces under structures
 - Feel for individual, irregularly spaced bumps that feel like sandpaper on smooth surfaces. Mussels don't rub off, but rotate around the point of attachment.
 - Be careful as larger shells could be sharp!



Michelle
Lande



Aquatic Invasive Species

Other, similar mussels:

- Pose threats
- Impacts in CA unknown

FALSE DARK MUSSEL



GOLDEN MUSSEL



Aquatic Invasive Species

Another similar species:

ASIAN CLAM

- Identification
 - Small, light or dark colored clam
 - Distinct ridges
 - Prominent hinge
 - No threads
- Impacts
 - Filter feeding robs food from others
 - Reproduces rapidly
 - Clogs water lines
- Detection
 - Likely to see dry shells if present



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http://thetimes-tribune.com/polopoly_fs/1.9904591/image/2204062185.jpg_gen/derivatives/landscape_490/2204062185.jpg

Aquatic Invasive Species

NEW ZEALAND MUDSNAIL

- Identification
 - Very small snail, 5-7 spirals
 - Grey, light/dark brown, black
- Impacts
 - A single animal can start new infestation
 - Out-competes natives for resources
 - Not a good nutritional food source for predators
 - Can pass through fishes undamaged
 - Survives out of water by sealing shell



Aquatic Invasive Species

APPLE SNAIL

- Identification
 - 5-6 spirals
 - Big light brown, rounded snail
 - Large oval opening
 - Bright pink egg masses
- Impacts
 - Feeds heavily on aquatic plants
 - Agricultural pest (rice)
 - Rapid reproduction
 - Out-competes native species



Aquatic Invasive Species



RED SWAMP CRAYFISH

- Identification
 - Juveniles grey, adults red
 - Shell and claws bumpy
 - Shell up to 5" long
 - 4 pairs walking legs, 1 pair claws
 - 5 pairs other appendages
- Impacts
 - Agricultural pest (rice)
 - Females burrow
 - Contribute to erosion



CHINESE MITTEN CRAB

- Identification
 - Only freshwater crab in North America
 - Claws hairy ("mittens")
 - Brown-orange, brown-green
 - Shell up to 3" long
 - Lives mostly in fresh, breeds in saltwater
- Impacts
 - Burrowing
 - Contributes to erosion and damage
 - Interfere with fishing and water delivery

Aquatic Invasive Species

AFRICAN CLAWED FROG

- Identification
 - Front feet 4 fingers (no webs)
 - Back feet webbed, 3 toes with claws
 - Flat body 2"- 5"+, small head
 - Only frog with claws
- Impacts
 - Eat, outcompete, spread disease to native species
 - Highly adaptable
 - Toxic skin
 - Claws, teeth → fierce predator



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BULLFROG

- Identification
 - 3.5"- 8" long, light to dark green
 - Back dark, spots/patterns
 - Belly yellow to cream
 - Very large tadpoles, 4+ inches
- Impacts
 - Widespread in CA
 - Eat, outcompete, spread disease to native species



Aquatic Invasive Species

STOP THE SPREAD!

ROCK SNOT/DIDYMO

- Identification
 - Microscopic algae in **cool** streams and rivers
 - Brown, tan or whitish mats
 - Looks slimy, feels like wet cotton/wool
- Impacts
 - Dense mats smother and foul stream beds
 - Safety issue for anglers, waders
 - Moving to **warmer** conditions

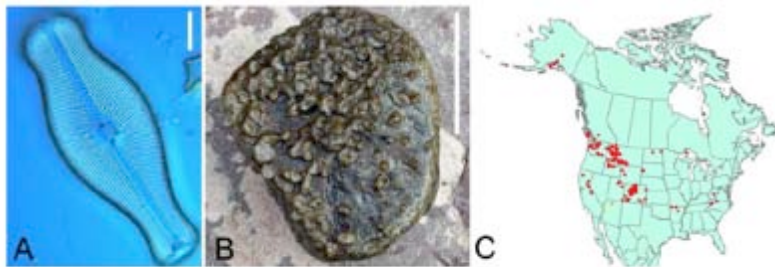


FIGURE 1. A. Image of *D. geminata* cell under the light microscope. Scale bar is equal to 10 microns. B. Cobble from stream showing typical growth habit. Scale bar is approximately 10 cm. C. Map showing the confirmed distribution records of *D. geminata* in North America.

US EPA , 2007

Yosemite National Park

Invasive Species: Didymo a.k.a. "Rock Snot"

What is Didymo? How Can I Identify It?

Didymo (*Didymosira geminata*) is a type of invasive alga that attaches to plants, rocks, and other hard substrates in rivers and streams. Also called "rock snot" due to its slimy appearance, Didymo can produce thick mats that cover stream beds—smothering swimming, fishing, and other water activities underneath. People, including hikers, are thought to be the main way that Didymo is being spread from one place to another. Recreational equipment, including clothing, can become contaminated and encourage the spread of Didymo if not cleaned properly before being used in another body of water.

Didymo is native to North America but has recently occurred in cool, low-altitude waters here for the first time, and it has expanded its ecological niche to include a wide range of water temperatures and nutrient levels. In early stages, Didymo forms small fuzzy colonies and a thick brown foam on rocks. As it grows, it can form thick dense layers like clumps. In advanced stages, it forms long increasing filamentous ropes, several centimeters long between two white stream rocks, and fragments that disintegrate, appearing similar to clumps of brown paper. Didymo can look similar to a sponge gill with very little paper streaming down the river. Although it looks clear, it feels like wet wool or cotton.

Why is Park Staff Concerned about Didymo?

Didymo has been documented at several locations along the Tioga River, including locations in Yosemite National Park below the O'Shaughnessy Dam. Park managers are concerned that Didymo could become established in other park waters, potentially altering the natural ecosystem. The Tioga River has been documented in the park, but managers have been documenting at several streams located on the eastern boundary of the park.

Didymo has extraordinary capacity to impact river and stream ecosystems. It attaches to submerged substrates so effectively by forming a mat that is resistant to degradation by bacteria and fungi. Under anoxic stream conditions, it produces numerous extracellular acids that attach to rocks and plants. With these acids, it can break down rocks. As the rocks fragment, the broken parts float past the stream and can be washed into the lake.

Yosemite National Park has been known to cover several miles of waterways, making it nearly impossible to eradicate once it's established. The mats, which can be over 8 inches thick, are capable of completely covering the substrate, smothering the stream bottom, smothering native plants, animals, and methods causing extensive damage to the ecosystem. Didymo can also give up gases and other components of water systems, blocking water flow.

What Can I Do to Help Prevent the Spread of Didymo?

Follow these guidelines to help prevent the spread. These activities are especially important if you have been in waters where Didymo or other invasive species are known to exist.

Before moving to a new location in a different body of water:

- CHECK your clothing, shoes, waders, gear, and all items that have been in the water for mud and plant debris. REMOVE the material and leave on site. Toss all wet items from your gear. At home, DISINFECT your gear using one of these three methods:
 - 1) Wash gear with hot water and Clorox of the following:
 - 1 cup detergent per gallon water
 - 1 cup bleach per gallon water
 - 1 cup salt per 1-4 gallon water
 - 2) Boiling with one of the solutions: 100°C (212°F) for 10 minutes, then rinse in cold water completely dry and 48 hours.
 - 3) Soak for 10 minutes in 10% bleach solution, then rinse in cold water completely dry and 48 hours.

Use the guidelines above the checking and ensuring all items are clean completely dry at least 48 hours before gear for use in other waters.

For more information, visit our website, including contact and sticky notes.

If found, please report it. Write a brief description of what (photo of the report) found and the GPS coordinates. Stop and report it.

Yosemite@nps.gov

Be warned on a video created by the New Zealand Game and Fish Commission. Fish and game in and around—up and over Tioga in the Tioga River area.

www.nps.gov/yose/learn/education/education.htm

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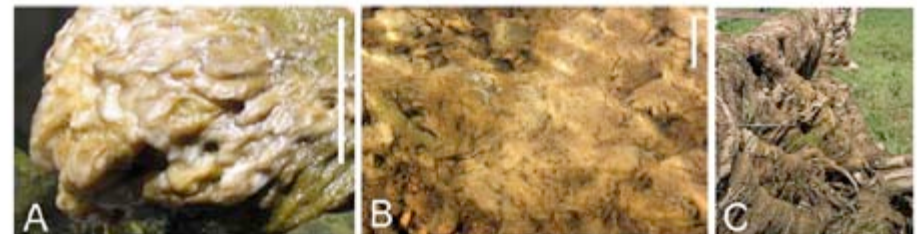


FIGURE 2. A. Stream cobble covered with *D. geminata* and stalks 5 cm thick. Scale bar equal to approximately 10 cm. B. Streambed covered with *D. geminata*. Note that rocks and cobbles are hardly visible. Scale bar equal to approx. 10 cm. C. Dried stalks on docks. (Images by Erica Shelby, Arkansas Department of Environmental Quality).

US EPA , 2007

Aquatic Invasive Species

HYDRILLA & BRAZILIAN EGERIA

Hydrilla



- Identification
 - Submerged
 - Long stems
 - Single white flowers
 - Leaves, smooth, narrow, have teeth on edges
 - Egeria bigger, leafier
- Impacts
 - Out-compete other plants
 - Can infest from pieces
 - Dense mats:
 - Reduce water flow
 - Block sunlight for other plants
 - Interfere with recreation, irrigation, utilities, water supply
 - Eradicated in Lake Murray

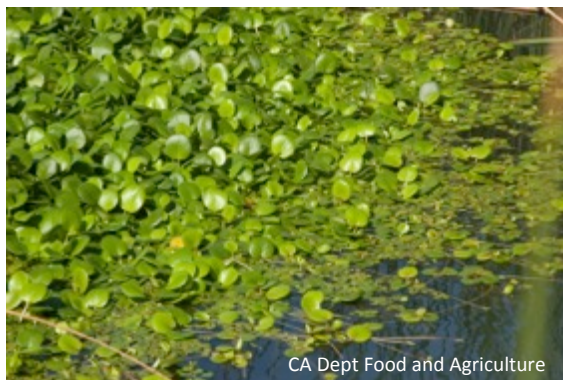
Brazilian Egeria



Aquatic Invasive Species

SPONGEPLANT

- Identification
 - Mats float or root in mud
 - When blooming → single white flowers at water surface
 - Leaves smooth, round
 - Leaves with “spongy” patch on underside
- Impacts
 - Dense mats cover open water areas
 - Reduce habitat for fish and wildlife
 - Block sunlight for other plants
 - Interferes with navigation, recreation
 - Interferes with water flow, pumping and delivery



Aquatic Invasive Species

GIANT SALVINIA

- Impacts
 - Form dense, floating mats
 - Reduce habitat for fish & wildlife
 - Block sunlight for other plants
 - Interfere with navigation, recreation
 - Interfere with water flow, pumping, delivery
- Identification
 - Floating mats
 - No flowers (fern)
 - Leaves oval and may be folded
 - White “eggbeater” hairs on leaves



Decontamination BMPs

1. Freezing
2. Scrubbing
3. Drying
4. Hot water soak
5. Water pressure
6. TRACK Contaminated/Decontaminate Equipment
7. Plan site visits from uninfested to infested waters





Decontamination BMPs



1. FREEZING

- Inspect gear onsite. Remove mud/sand, plant/animal remnants
- Contain in bag or container onsite for transport to freezer offsite
- Freeze at 32° F for minimum of 8 hours
- Scrub frozen AIS and debris from gear while containing in plastic bag or container
- Reseal bag or container with any remaining, frozen AIS inside, and throw in trash



Decontamination BMPs

2. SCRUBBING

- Inspect gear onsite. Remove mud/sand, plant/animal remnants
- Wear gloves and eye protection
- Scrub with stiff-bristled brush
- Preferably with warm water
- Preferably onsite
- If not onsite, contain gear in bags/containers for scrubbing offsite, scrub in bags to remove and retain any AIS and debris, seal bags and dispose in trash



✓ **CLEAN**
✓ **DRAIN**
✓ **DRY**

Before you transport your boat or equipment

Decontamination BMPs

3. DRYING

- Inspect gear onsite, and remove any mud/sand, plant/animal remnants
- If not drying onsite, contain gear for transport
- Allow gear, equipment, clothes and footwear to dry thoroughly
- Preferably in direct sunlight
- Dry times vary depending on conditions: anywhere from 5-30 days
- Clothing and some footwear may need to be put into clothes dryer on high for 30 minutes
- Collect and retain any AIS and debris, seal in bag and throw in trash

✓ **CLEAN**
✓ **DRAIN**
✓ **DRY**

Before you transport your boat or equipment

