DIDYMO INFESTATION IN MARYLAND, USA: A STATE AGENCY'S REACTIONS, RESPONSES, AND RESULTS



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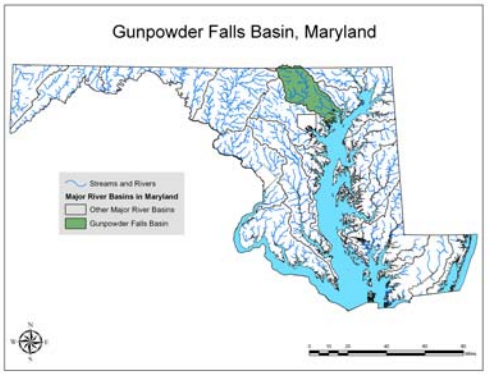
International *Didymosphenia geminata* Conference
March 12-13, 2013
Providence, Rhode Island, USA

FIRST REPORTS OF DIDYMO IN MARYLAND



- Spotted by Gunpowder Falls guide, Jason DuPont, late winter/early spring 2008
- Confirmed by MD/DNR biologists in April 2008

- Tailwater habitat below Prettyboy Reservoir, major drinking water supply
- 30 km of wild brown trout water within a half hour of downtown Baltimore

- Gunpowder falls basin is about 1200 km^2
- Borderline oligotrophic Mean TP = 0.02-0.04 mg/L, Mean TN = 2.5-2.9 mg/L (2007-2011)
- Anglers come from most states and several countries

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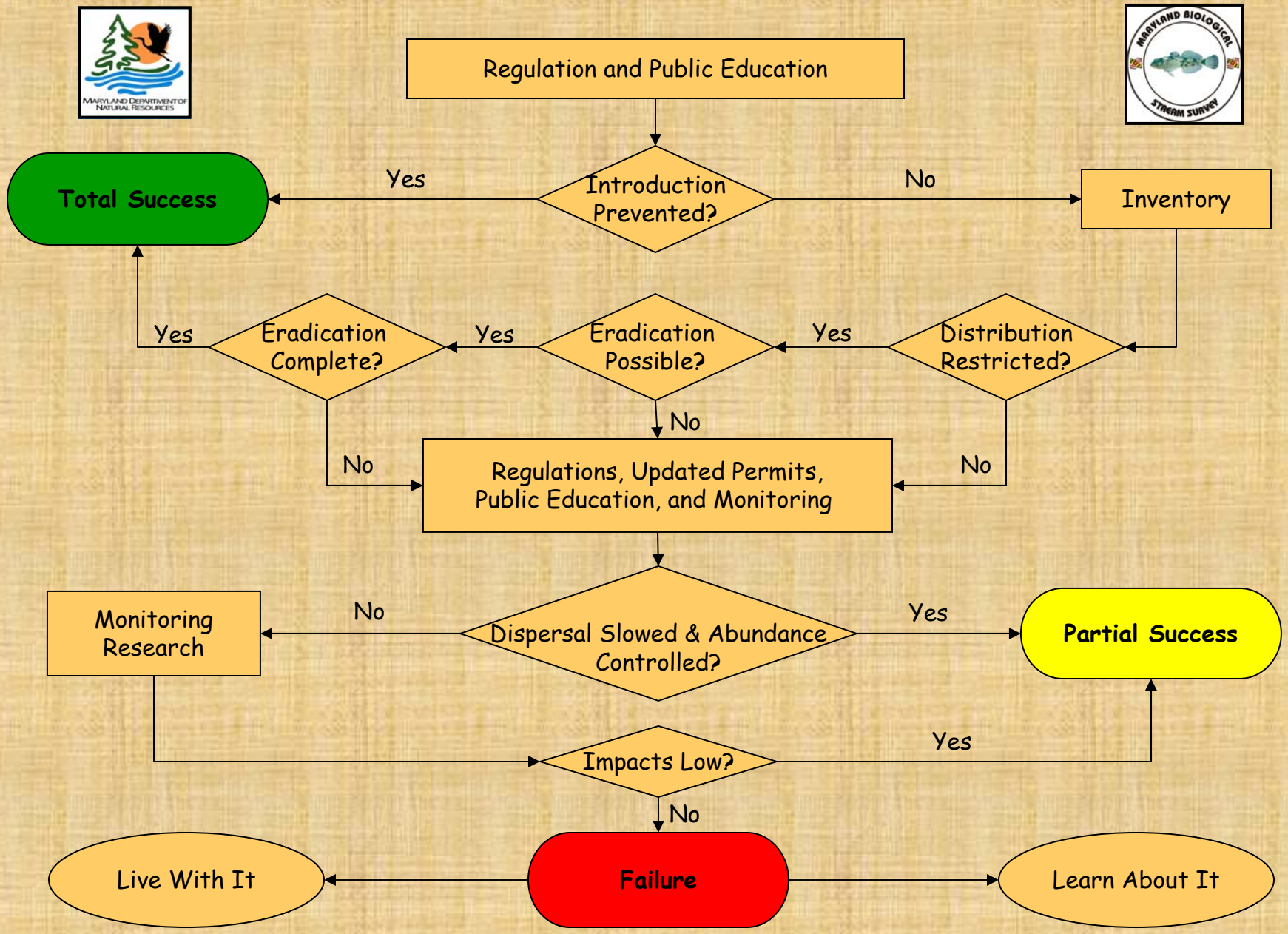
Options for Dealing with Non-Native Invasive Species



MD/DNR REACTIONS + RESPONSES

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Invasive Algae Found In Maryland

Potentially Destructive Didymo found in Gunpowder Falls

Annapolis, Md. — The Maryland Department of Natural Resources (DNR) today announced that a new invasive, non-native algae has been found in Maryland for the first time. The algae, commonly known as Didymo, was found by anglers in Gunpowder Falls in Baltimore County. Didymo mats, also called "rock snot," look slimy, but feel like wet cotton or wool, and can be white, yellow or brown.

"This alga has the potential to disrupt ecosystems in waters it invades by choking out bottom-dwellers and removing food organisms for game fish and other aquatic species," said Don Cosden, Assistant Director of DNR's Fisheries Service. "When Didymo takes over, many species are impacted."

Although there is no human health risk associated with Didymo, DNR is developing an aggressive plan of attack to deal with this invader, and asks anglers and outdoor enthusiasts who enjoy Maryland's waters to use extra precautions when moving from one stream or lake to another. Once Didymo is established, it can cover and suffocate a stream bottom, and movement of a single cell can contaminate a new waterway.

Felt bottom boots and waders commonly used by anglers are the worst culprits in the spread of aquatic invaders. Anglers are strongly encouraged to replace these boots with non-porous materials. New boots made of a sticky rubber material are safer for the aquatic environment and are much easier to clean.

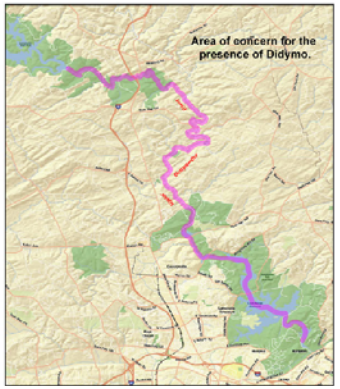
Anglers and other recreational users of Gunpowder Falls and surrounding waters are especially urged to make sure they don't contribute to the spread of Didymo or any other aquatic invasive species. The public is asked to clean anything that comes into contact with stream water by scrubbing away all dirt and debris before leaving a stream. At home, disinfect equipment by soaking in a 5% salt solution (1 lb/ 5 gal) for several minutes, or scrub well with dish detergent and rinse well. If disinfection is not possible, let equipment dry completely for at least 48 hours. Anglers may want to consider having two sets of equipment in order to move safely from one spot to another.

Didymo is an algal diatom that forms long stalks which combine to form heavy, thick mats that can smother a stream bottom. The stalks can persist for two or more months after the diatoms die, causing habitat damage for an extended period of time. Originally found in Scotland and extreme northern Europe and Asia, Didymo has been transported worldwide. Recently, the species has been found in the northeast and mid-Atlantic regions of the United States. In many cases, anglers have unknowingly transported the diatom on their fishing gear.

DNR urges anyone who observes Didymo to contact Don Cosden at 410-260-8287 as soon as possible.

For more information on Didymo and other invasive species, visit http://www.dnr.state.md.us/invasives/.

- Prepared four press releases, first on May 6, 2008



- Posted fact sheets (didymo biology, probable vectors, potential threats, decontamination methods) on DNR's website
- Publicized 2007 DNR policy on boots and equipment (no felt soles, decontamination between sampling sites)

- DNR crews use 2% Virkon solution

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MD/DNR REACTIONS + RESPONSES

PREVENT THE SPREAD OF DIDYMO

The invasive alga Didymo has been found in Maryland waters. It can destroy habitat for many other living things by covering the bottom with thick plant mats.

To prevent its spread, when you leave the water, please remember to

CHECK, CLEAN AND DRY

CHECK: Everything that got wet and clean off all dirt and plant material and leave here

CLEAN: Follow these procedures for all but felt or fabric materials:
Use a cleaning station to soak all gear for one minute, or
Take home and clean with salt water (1 cup salt / gallon of water),
or, scrub with hot, soapy water (very hot tap water and dish detergent),
then soak at least one minute, rinse well

Felt waders are difficult to clean and disinfect. Disinfect for at least 40 minutes and rinse well. We recommend that you not use felt waders. Try new sticky bottom waders with studs or have a second set of waders to use.

DRY: Dry anything that comes in contact with water until bone dry. A minimum of five drying days recommended for felt waders.

Help preserve this area for future generations by taking these precautions today

For further information, contact MD Fisheries Service at www.dnr.maryland.gov , or call 1-877-620-8DNR x 8265 May 2008

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- Posted signs at major angler access areas

- Constructed + deployed wader wash stations (6 along Gunpowder in May-June 2008, 45 statewide now) – used saturated NaCl solution

WADER WASH

STOP

The invasive alga known as "Didymo" or "Rock Snot" is present in this section of the river!

Didymo blankets stream bottoms and smothers aquatic life. Help prevent the spread of Didymo by taking the following simple steps each time you enter…and especially when you *leave* the river.

Take 60 seconds now to protect your river:

1. Wash your waders in the salt water bath below. Soak felt soles thoroughly.
2. Use the brush to wet the upper parts.
3. 60 seconds of exposure kills Didymo!

Use the grab bar for safety

Use the brush to soak the upper waders. Salt water won't harm your waders.

Didymo is an algal diatom – a one-celled plant - that forms long stalks which combine to form heavy, thick mats that can smother a stream bottom. The stalks can persist for two or more months after the diatoms die, causing habitat damage for an extended period of time. Originally found in Scotland and extreme northern Europe and Asia, Didymo has been transported worldwide. Recently, the species has been found in the northeast and mid-Atlantic regions of the United States. In many cases, anglers have unknowingly transported the diatom on their fishing gear.

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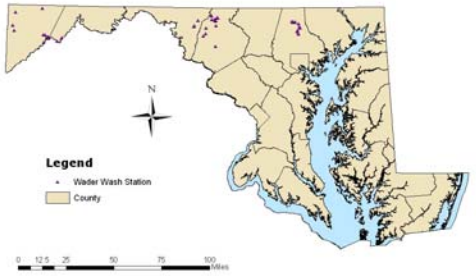
Maryland's Wader Wash Stations



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MD/DNR REACTIONS + RESPONSES

- Banned use of felt-soled boots statewide on March 22, 2011

Rock Snot (Didymo) - dnr.maryland.gov/invasives/didymo.pdf

Do your part to stop the spread of invasive species!

Before moving between streams or rivers:

- Scrub your gear to remove mud & plants.
- Dry your gear completely before going to another stream.
- Don't move water from one place to another.
- Don't transport live bait between streams.
- Dispose of fish and fish parts in the garbage; or burn it.
- Soak your gear in a 5% salt solution.

Felt can hold, preserve and transport harmful organisms such as didymo (rock snot) and whirling disease, which can be fatal to trout.

Didymo (rock snot) can destroy streambeds, foul fishing gear, and may damage fish populations.

Las suelas de fieltro son ilegales en aguas de Maryland

El fieltro puede retener, preservar y transportar organismos nocivos tales como el alga didymo (moco de roca) y la enfermedad del torneo, que pueden ser fatales para la trucha.

Didymo puede destruir arroyos, estropear los aparejos de pesca y dañar las poblaciones de peces.

http://dnr.maryland.gov/fisheries

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SPREAD THE WORD,
Not the Algae!

FELT-SOLES ARE ILLEGAL IN MARYLAND WATERS

Felt can hold, preserve and transport harmful organisms.

Didymo (rock snot) in particular can destroy streambeds, foul fishing gear, and may damage fish populations.

Whirling disease, which affects trout, can spread through felt soles.

For more information go to:
http://www.dnr.state.md.us/fisheries/pdfs/felt_sole_faq.pdf

Angler Reactions

1. Denial
2. Anger
3. Bargaining
4. Depression
5. Acceptance

Agreement

Rebellion

- Warnings, not citations, through Dec 2012

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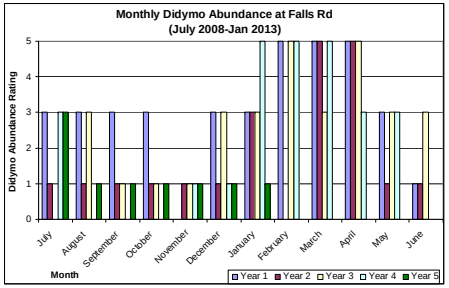
MD/DNR REACTIONS + RESPONSES

- Conducted surveys in didymo-infested streams (started in the Gunpowder in July 2008 – monthly)
  - Water temperature, velocity, turbidity, benthic macroinvertebrates
  - Visual didymo abundance (none, sparse, moderate, abundant)
  - Microscopic examination of substrate samples in lab
  - Substrate composition assessment
  - Discharge, water quality



- Screened 30+ streams for didymo cells using molecular methods

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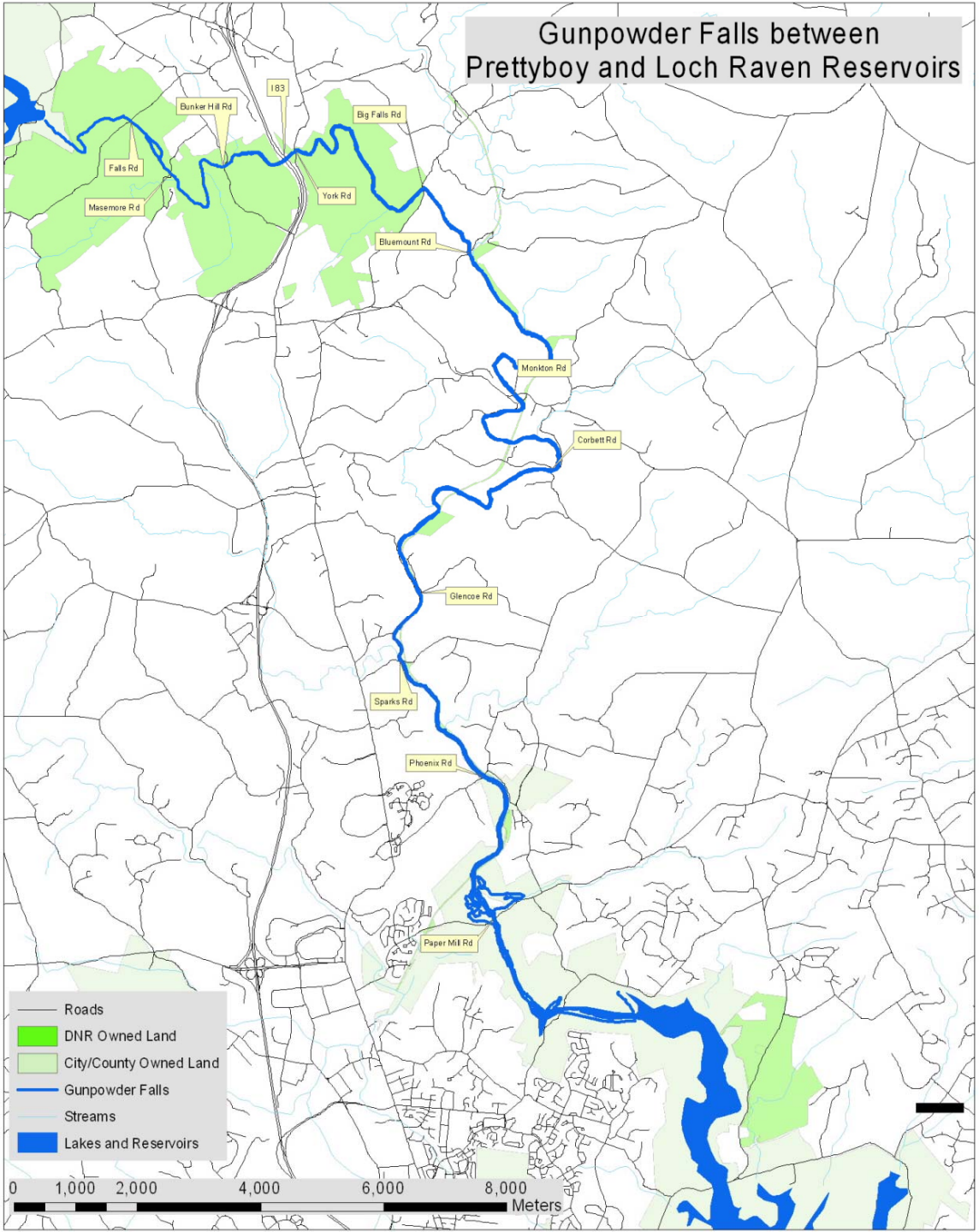

- Current range of didymo growth from Prettyboy Dam to Phoenix Rd bridge (26 km)

- Seasonally-nuisance didymo blooms from Prettyboy Dam to Bluemount Rd. bridge (12 km)

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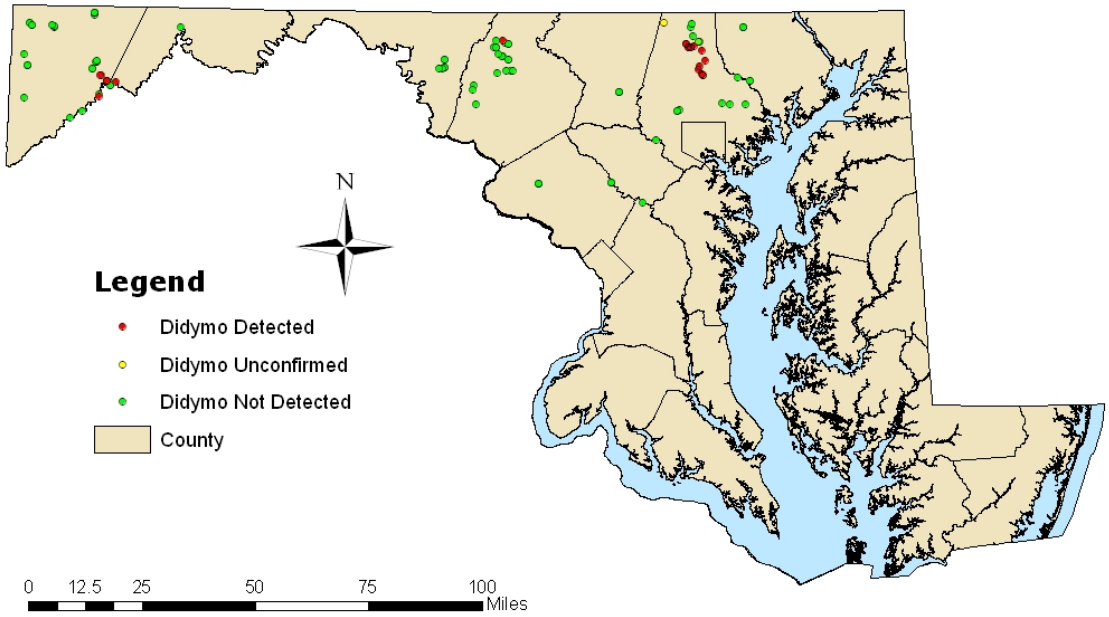
THE SEARCH FOR DIDYMO ACROSS MARYLAND



- Gunpowder Falls: April 2008
- Savage River: June 2009, November 2009
- North Branch Potomac River: August 2011, September 2012
- Big Hunting Creek: May 2012
- About 4% of wild trout stream miles are infested
- 4 of 6 tailwater trout areas are infested

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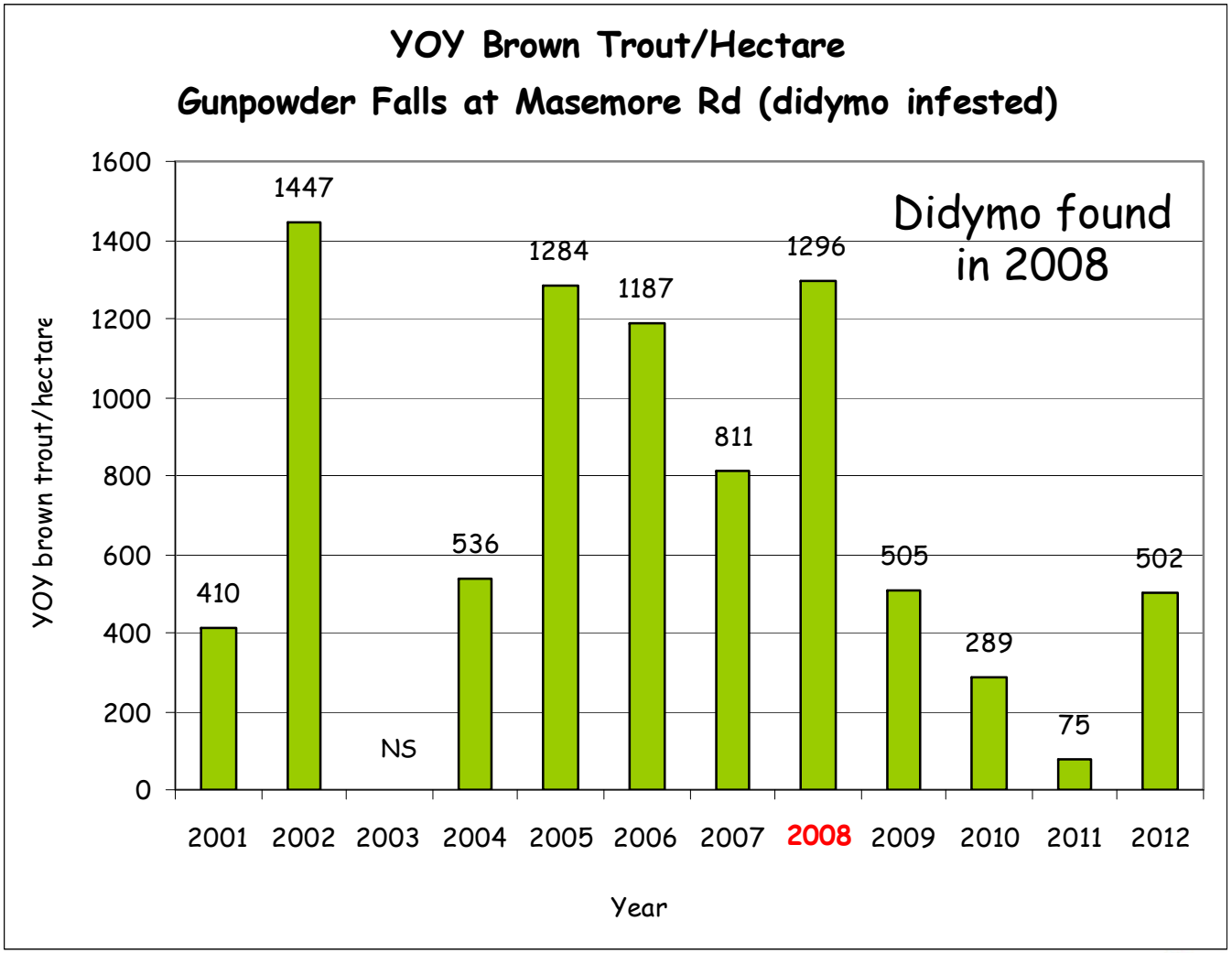
ANY EVIDENCE OF ECONOMIC OR ECOLOGICAL IMPACTS?



- No evidence of effects on brown trout reproduction

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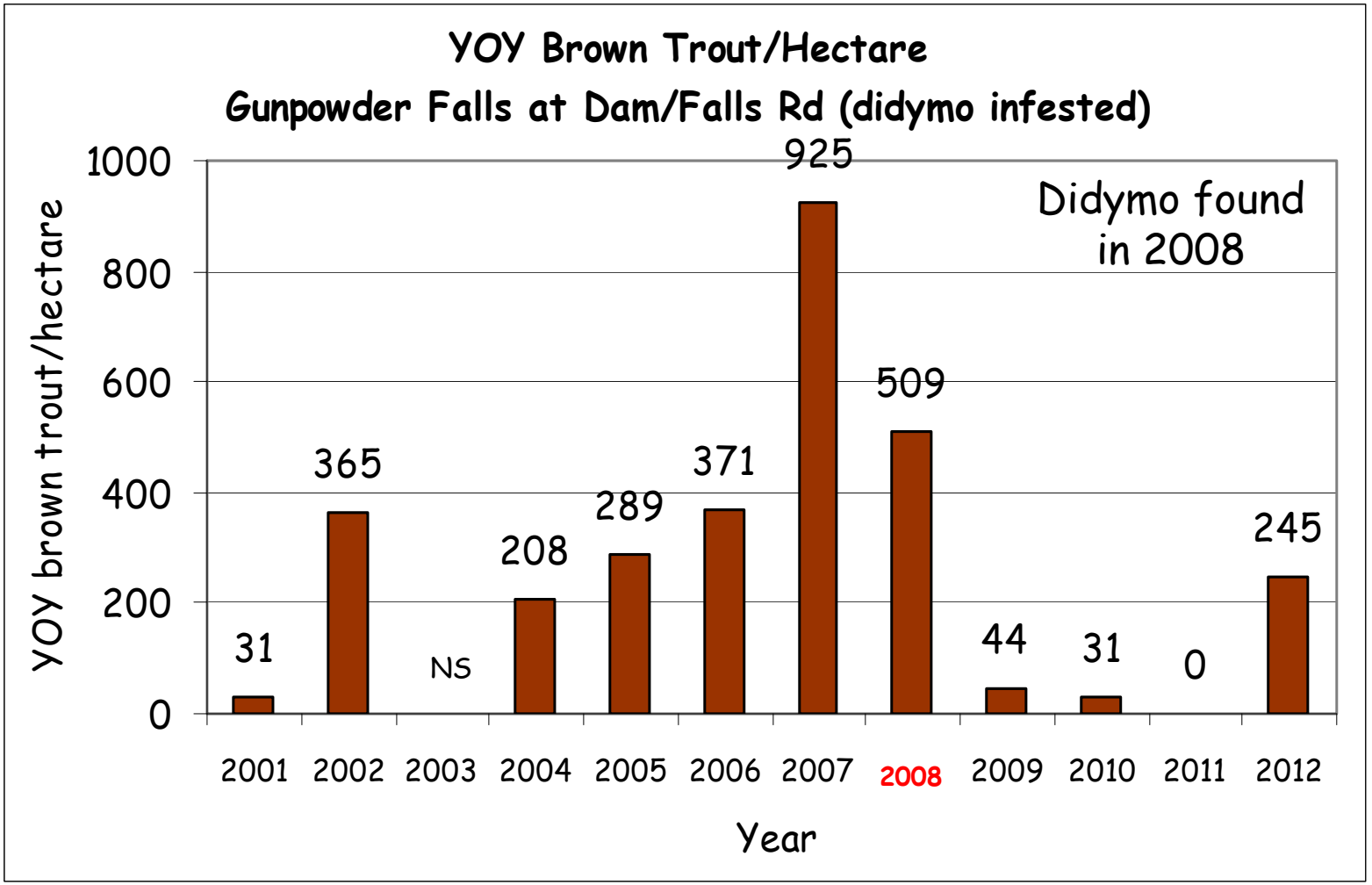

- No evidence of effects on brown trout reproduction

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ANY EVIDENCE OF ECONOMIC OR ECOLOGICAL IMPACTS?

What are the anglers saying?

- "The good news is that the river [Gunpowder Falls] is intact, we have not lost any measurable insect hatches and the wild fish are getting along fine."
  - » Theaux Le Gardeur, Gunpowder RiverKeeper (Jan. 2013)




- "From a non-scientific standpoint, in late winter and early spring, when it [didymo] blooms, it's only a nuisance when nymph fishing subsurfaces."
  - » Jeff Lewatoski, Gunpowder fishing guide (Jan. 2013)



- Seasonal nuisance, not yet invasive?

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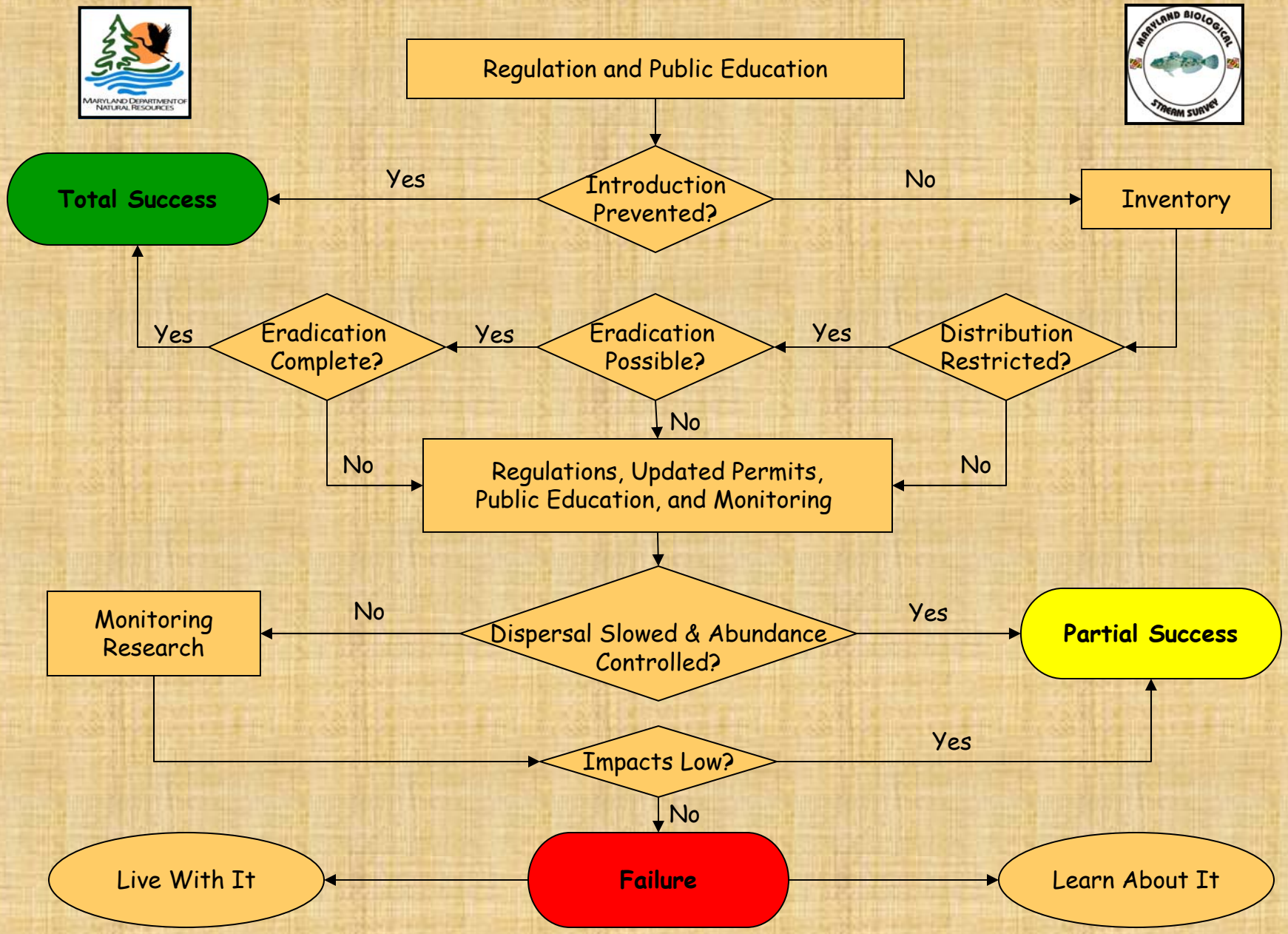
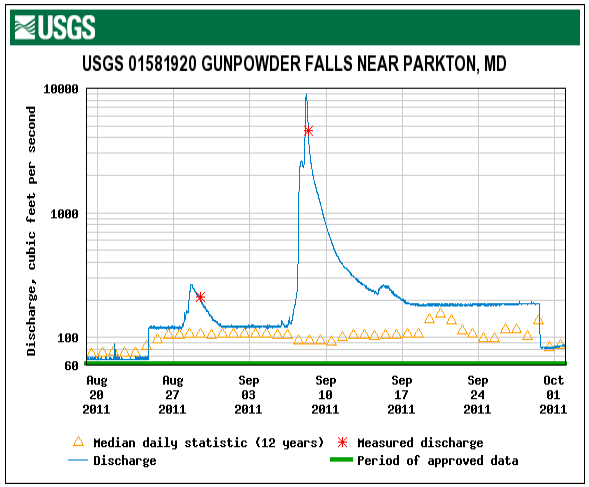
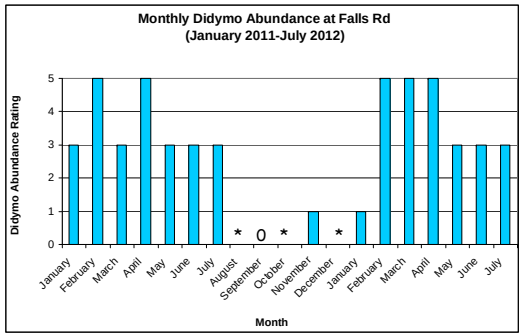
Options for Dealing with Non-Native Invasive Species



MANAGEMENT OPTIONS?

Q. Can we manipulate water releases to generate scouring flows, increase stream bed disturbance, or raise stream temperatures to depress didymo blooms?





- Hurricane Irene and Tropical Storm Lee in late Aug. – early Sep. 2011 gave us a test
- Near record flows in the Gunpowder
- Didymo growth decreased after flood, but rebounded in 4-5 months

A. Perhaps, but maybe not at the necessary flows and pulse frequencies.

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SOME QUESTIONS TO BE ANSWERED

- Is didymo non-indigenous in Maryland?
- What factors explain the current distribution of didymo in Maryland?
- What role, if any, do kayakers, canoeists, and tubers play in the transport of live didymo cells?
- What percentage of anglers regularly use the wader wash stations?
- Is didymo causing ecological impacts in Maryland, or is it just a seasonal nuisance for anglers?
- Can we reduce didymo blooms to acceptable levels by increasing river flows?
- Will didymo infest non-tailwater trout streams in Maryland?