# *Didymosphenia geminata* What do we know? What do we need to know? What can we do?

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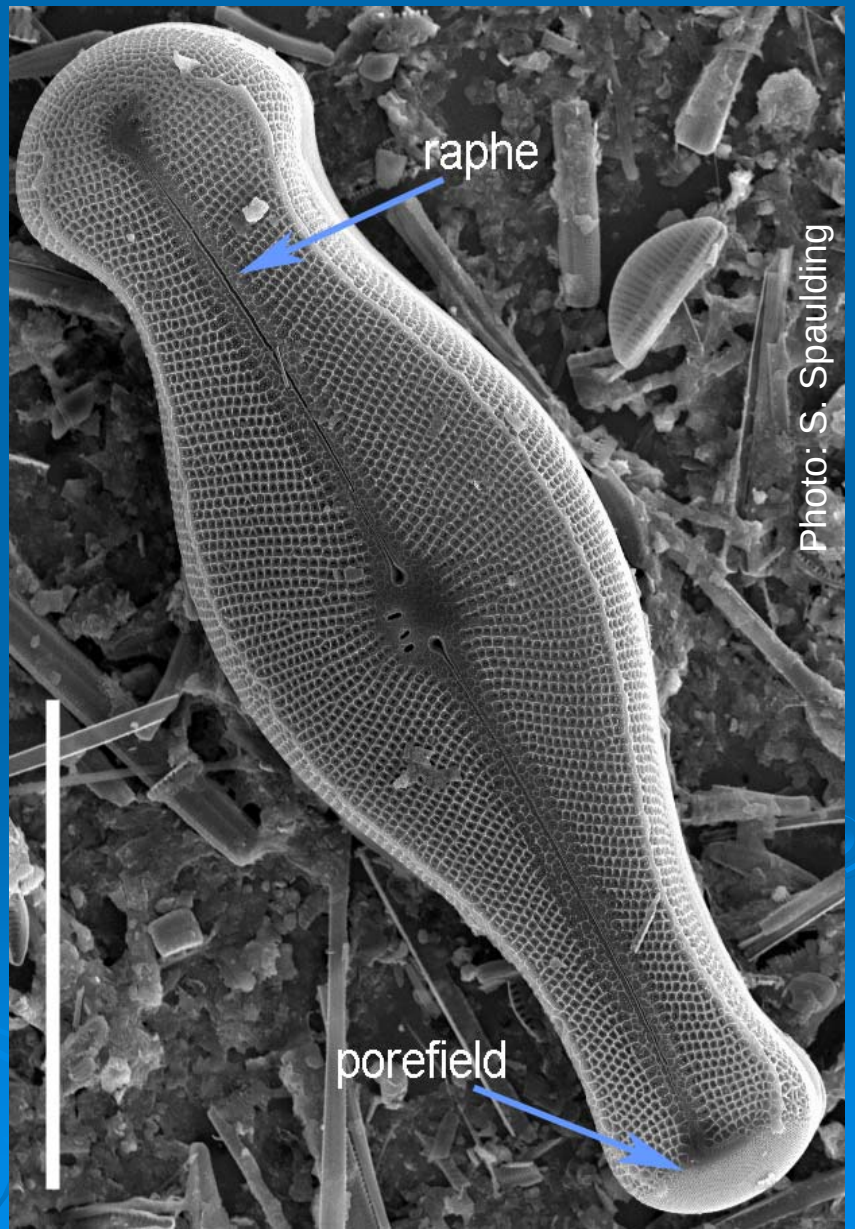
# *Didymosphenia geminata*

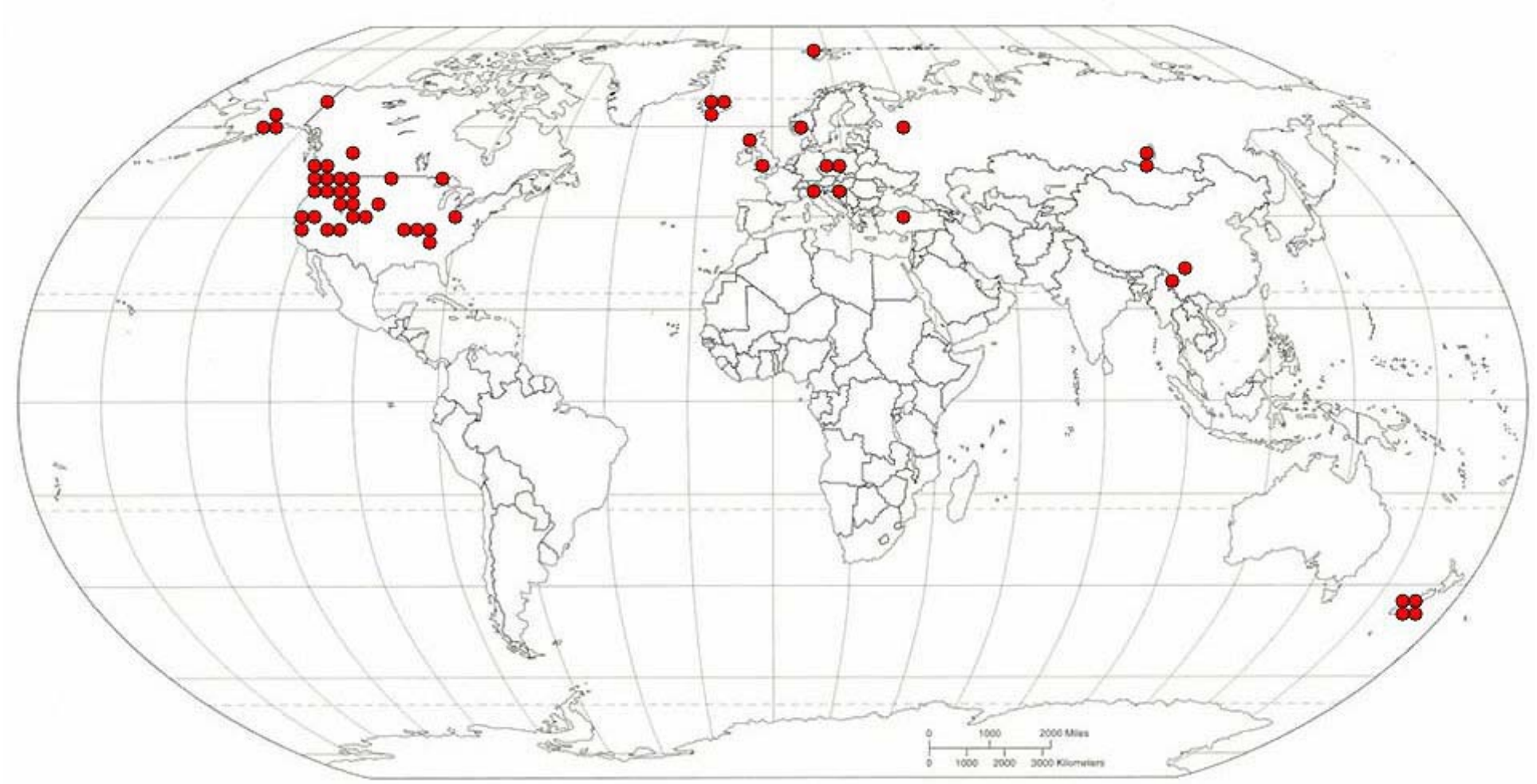
- Freshwater diatom
- Native to northern hemisphere
- Flourishes in nutrient poor environments
- Rare in algal assemblages



# Native Distribution

- First described from the Faroe Islands north of Scotland in 1899 but was widely observed prior to description.
  - reported as widespread in Scotland, Sweden and Finland between 1894-1896
  - Published records from Vancouver Island, BC in 1894-1896
  - Massive accumulations reported in Kanchou region of China in 1935

# Confirmed Presence of Didymo in 2007



# North America Distribution

- Historical reports of *D. geminata* in North America are sparse, voucher specimens are uncommon and it is not possible to state the historical range of this diatom with confidence
- Generally accepted as widespread in the Western States

# Current North American Distribution

Alaska
Arizona
Arkansas
California
Colorado
Idaho
Illinois
Kentucky
Maryland
Michigan
Minnesota
Montana
Nevada
New Hampshire
New York
North Dakota
Pennsylvania
South Dakota
Tennessee
Utah
Vermont
Virginia
Washington
West Virginia
Wyoming

*Didymosphenia* has been reported from many different states in recent years.

Some reports are from areas within historical range but there is an obvious spread to new waters in the east and south.

# New Populations Are Often Invasive

- New populations are increasingly causing problems
- Increased density and coverage
- Associated with tailwaters but all waters are susceptible

Photo: Biosecurity New Zealand

# Didymo in New Zealand

Photo: New Zealand Fish and Game

# The trouble with stalks……

- Secreted from apical porefield
- Polysaccharides and proteins
- Collectively forms thick mat
- Does not readily degrade
- Trap sediment

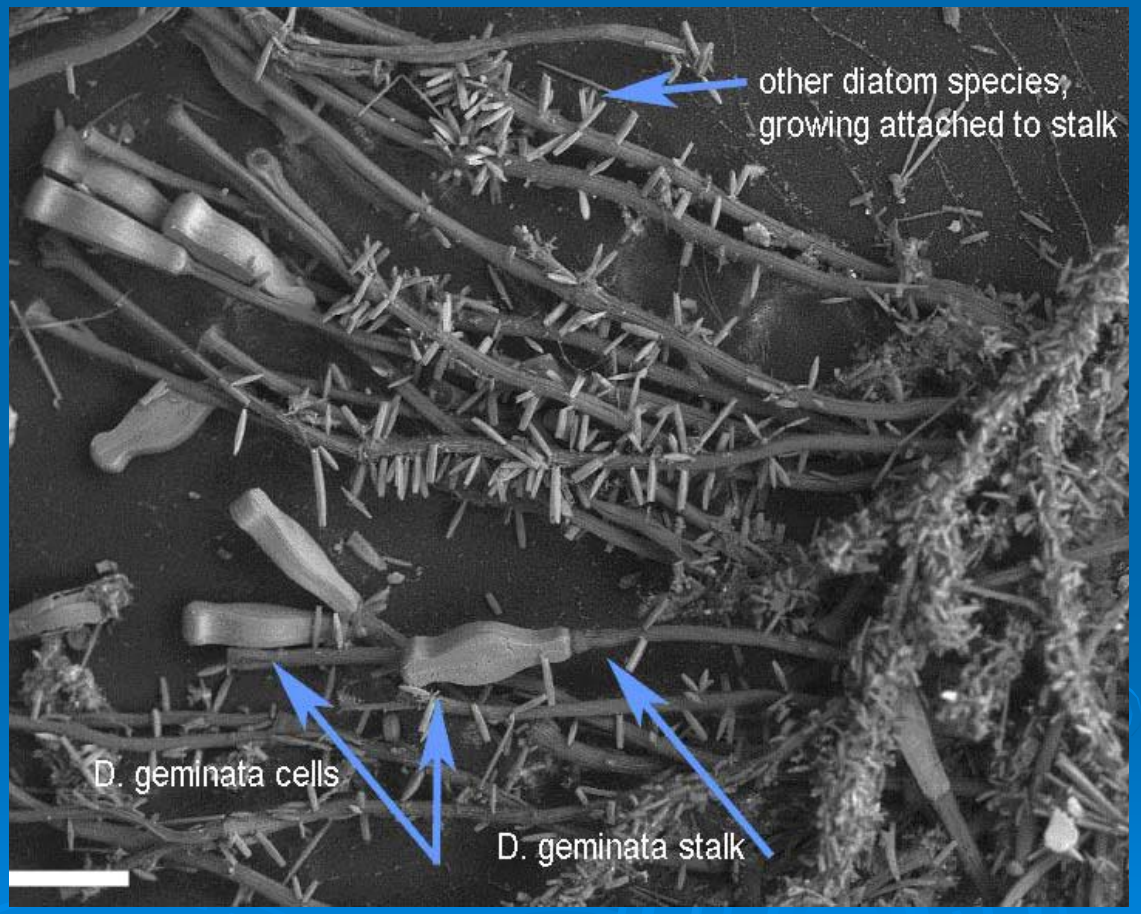



Photo: M. Gretz – Michigan Technology University

# What triggers nuisance blooms?

- Causes are unknown may be environmental or genetic
- Significant research being conducted in many parts of the world

# How is it moved?

Photo: S. Spaulding EPA

- Multiple studies conclude anthropogenic actions are largely responsible
- New Zealand[1]
  - New incursions were all human related
  - Livestock and wildlife are vectors for spread within a drainage
- Vancouver Island[2]
  - "the pattern of didymo spread among rivers on Vancouver Island correlates with the activity of fishermen and the commercial introduction and widespread use of felt-soled waders in the late 1980s"

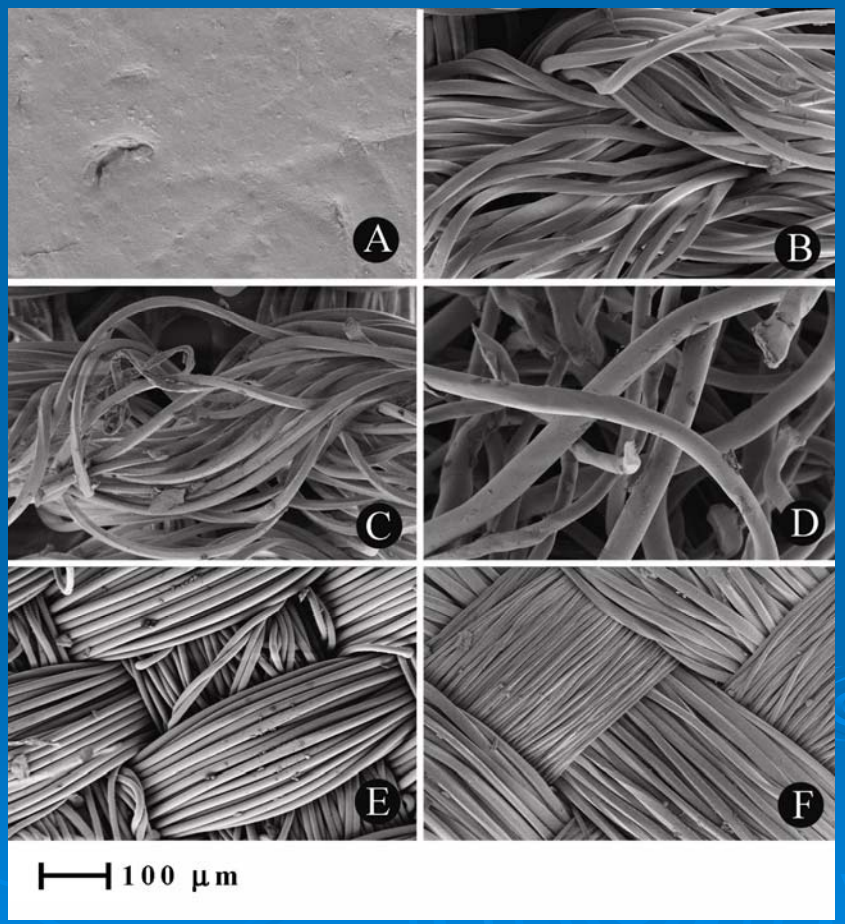
[1] *The arrival and spread of the bloom-forming, freshwater diatom, Didymosphenia geminata, in New Zealand*, Kilroy & Unwin, 2011
[2] *On the Boots of Fishermen: The History of Didymo Blooms on Vancouver Island, British Columbia*, Bothwell, 2009

# Is Felt Worse Than Other Materials?

- At the 2006 Didymo Symposium it was reported that “Fishing equipment, boot tops, neoprene waders, and felt-soles in particular, all provide a site where cells remain viable”
- *Myxospore Detection in Soil and Angler Movement in Southwestern Montana: Implications for Whirling Disease Transport* Kiza Gates, MSU Masters Thesis
- *Studies on the survivability of the invasive diatom Didymosphenia geminata under a range of environmental and chemical conditions* Kilroy ET AL. Biosecurity New Zealand

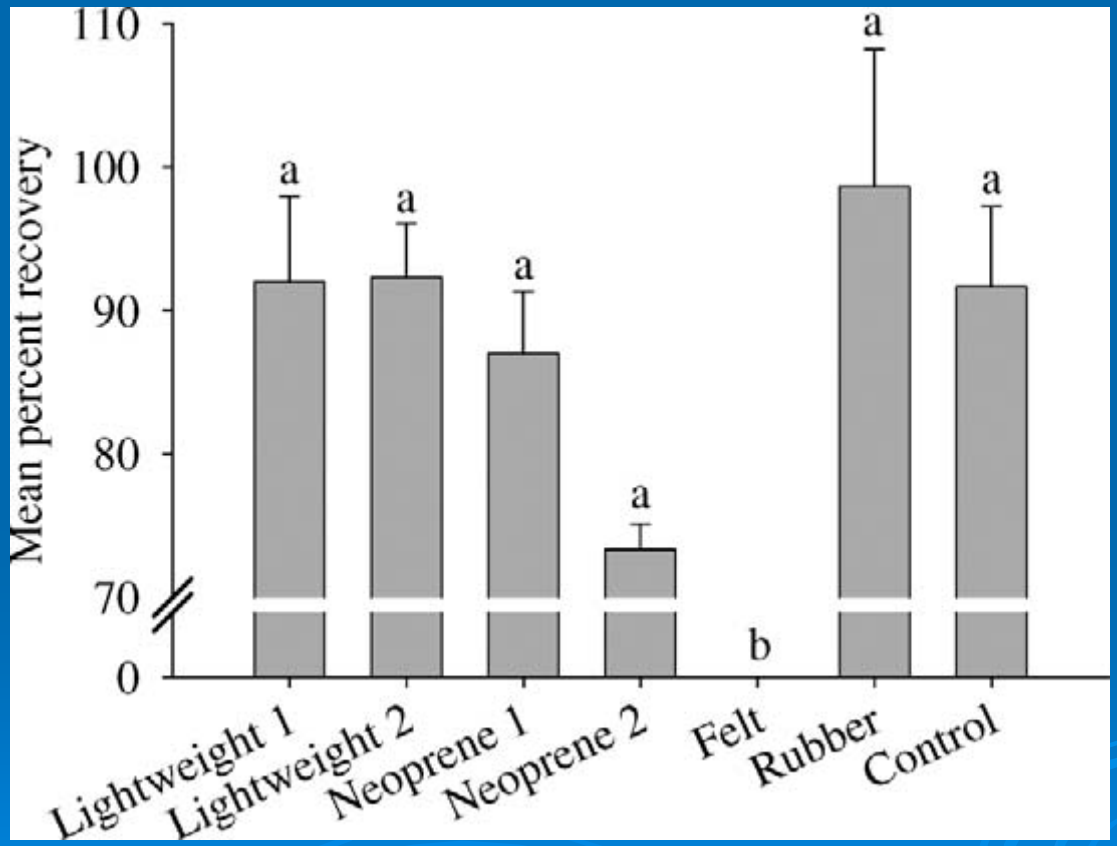
# Images of wading equipment material types at 200x magnification

- (A) rubber
- (B) neoprene 1
- (C) neoprene 2
- (D) felt
- (E) lightweight nylon 1
- (F) lightweight nylon 2




From Gates et al. 2008

# Myxospore Adherence to Wading Materials




From Gates et al. 2008

# New Zealand Didymo Adherence Study

## 5 Hours After Use

- Felt soled boots yielded 3,000x more viable cells than rubber
- Average of 11,000 cells on felt and 3.9 cells on rubber

## 36 Hours After Use

- Felt soled boots yielded and average of 290 live cells
- Rubber yielded 0

# Disinfection

- All materials except felt can be easily disinfected by soaking in an appropriate solution.
- Felt exhibits extreme resistance to disinfection.
  - Even after 20 minutes of soaking, the disinfectant does not fully penetrate the felt
  - Complete drying of felt soles is very difficult – soles can remain damp for weeks

# New Zealand Bans Felt

- National Ban on felt implemented 10/1/2008
- New Zealand had specific needs that they thought could only be addressed through a ban.
  - Concerned only about Didymo
  - Decontamination stations are a fundamental part of the Didymo effort
  - All wader parts except felt are easily disinfected for Didymo

# Felt in the US

- September 2008 - Trout Unlimited calls for the elimination of felt by 2011
- September 2008 - Simms Fishing Products announces elimination of felt soles for all products by 2010
- 2010 - all wader companies offer waders/boots without felt
- July 2011 - Simms announces reintroduction of felt for 2012

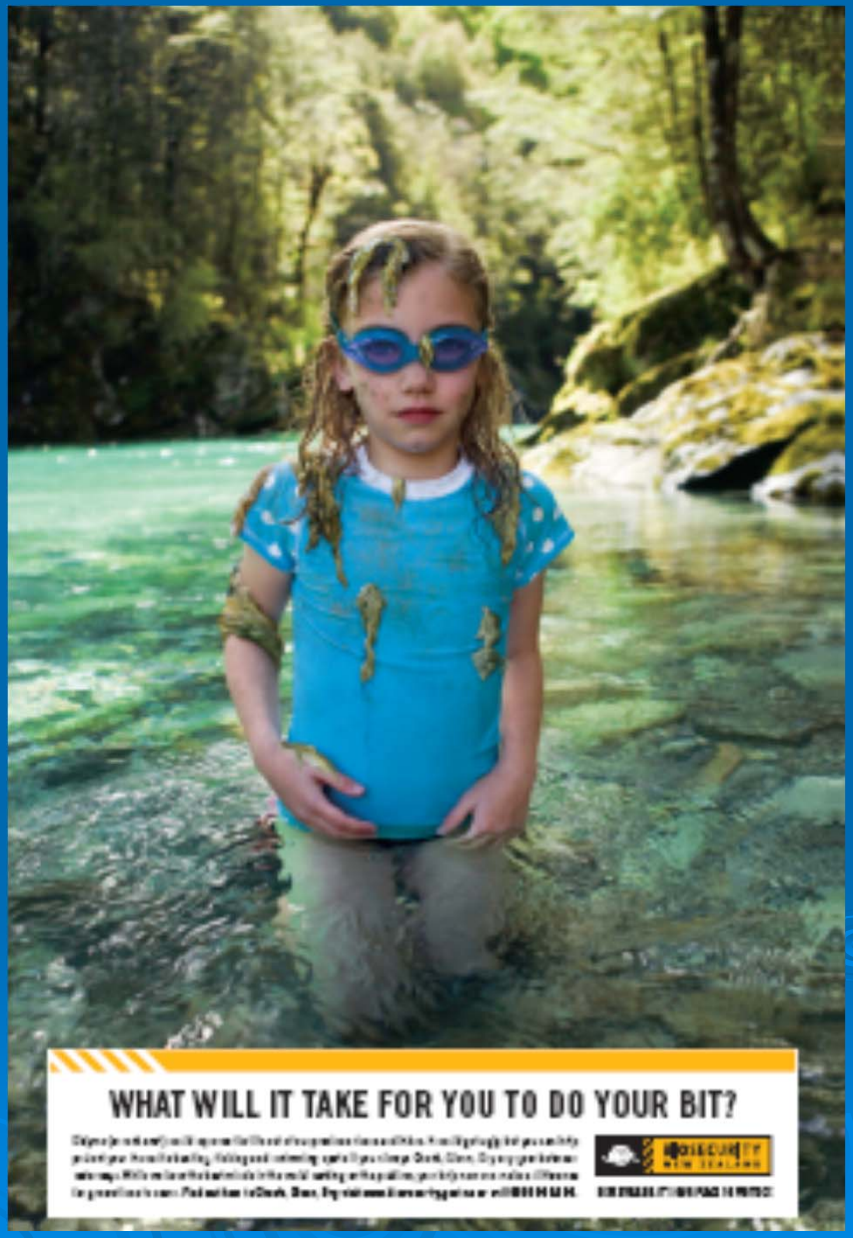
# US Felt Bans

- Maryland – statewide ban effective 3/21/2011
- Vermont – statewide ban effective 4/1/2011
- Alaska – statewide ban on use for recreational fishing effective 1/1/2012
- Missouri – ban on use in trout waters 3/1/2012

All US felt restrictions are tracked at
http://www.stopans.org/Felt_Bans.htm

# Felt Bans Are Not Enough

- Since all parts of the boot can transport Didymo it is vital that proper cleaning is also promoted
- Didymo is easily killed and disinfection stations can greatly help to reduce spread
- Always reinforce the message that cleaning is important

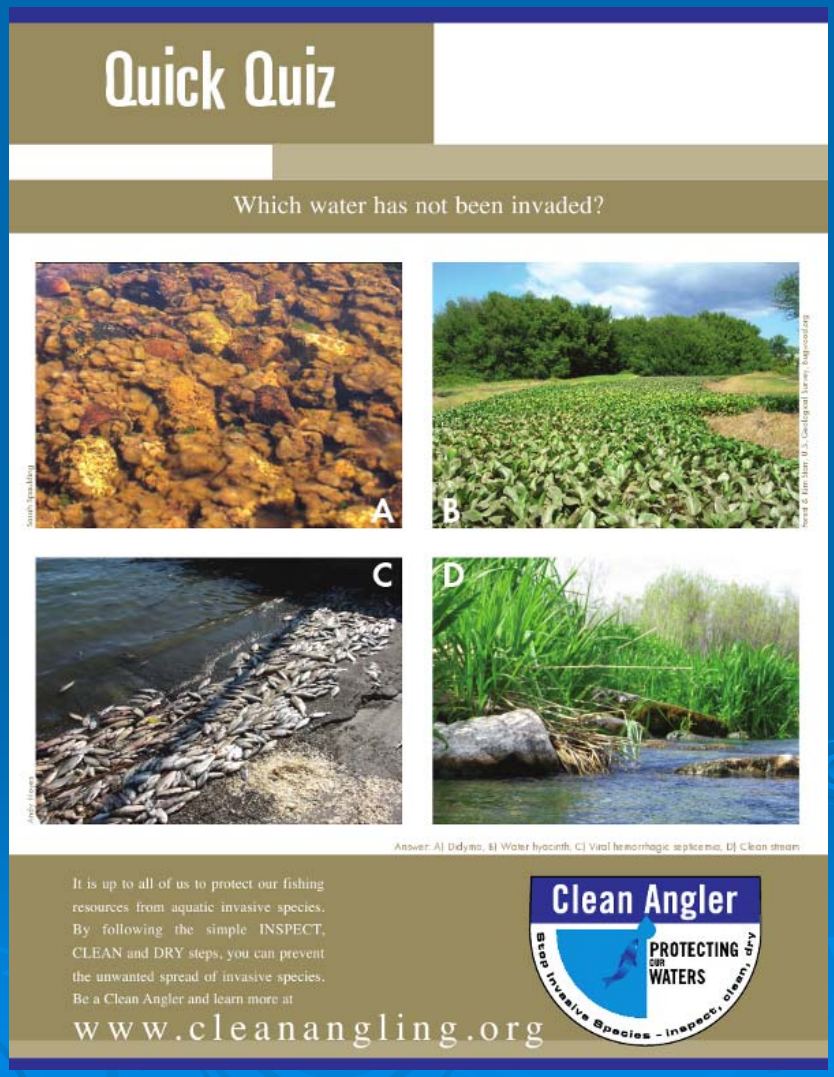

Images from Biosecurity New Zealand


interislander
Check your boat for Didymo
BIOSECURITY

# Clean Angling Coalition

- An effort of businesses, organizations, agencies and individuals to encourage habitual gear cleaning in all anglers
- Incorporates the Clean Angling Pledge
- Only focus is on promoting cleaning

www.cleanangling.org



# Clean Angling Pledge

Join the fight against invasives

I pledge to

## Inspect, Clean and Dry

my equipment to the best of my ability after every on water use.


- Personal statement of support
- Simple, cheap and easy – no chemicals or equipment
- Will help to develop a community of activist anglers

www.cleanangling.org

# Successful Outreach

- Keep it simple
- Make it practical
- Provide “ownership”
- Seek peer-to-peer opportunities
- Develop “tailored” messages
- Repeat, repeat, repeat

# Learn More

- www.stopans.org – “about ANS”
- Clean Angling News
- 2012 International Didymo Conference

- Leah Elwell – leah@stopans.org
- Bob Wiltshire – bob@stopans.org