



pennsylvania
FISH AND BOAT COMMISSION



New Zealand Mudsnail (NZM)

Potamopyrgus antipodarum

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Cooperative Nursery Unit

- Life History/Introduction Pathways
- Distribution
- Impact
- Identification
- Prevention
- What will happen if NZM are present

- Native to New Zealand and the surrounding islands
- Inhabit freshwater streams, lakes, and rivers
 - Prefer water with a higher conductivity; Limestone streams, high amounts of dissolved minerals
 - Can also tolerate brackish water at salinities of 0-15 ppt
- Inhabit a variety of substrates not just mud
 - Silt, sand, concrete, and aquatic vegetation
- Tolerates water temperatures of 32°F-94°F

- Reproduce both sexually and asexually
 - NZM in North America are asexual genetically identical females
 - Produce approximately 230 live young per year
 - One female and her offspring can result in over 2.7 billion snails within 4 years
 - Reproduce in spring and summer
 - Newborn females already contain embryos
 - Reach sexual maturity around 4-6 months
- Capable of surviving out of water for up to 26 days

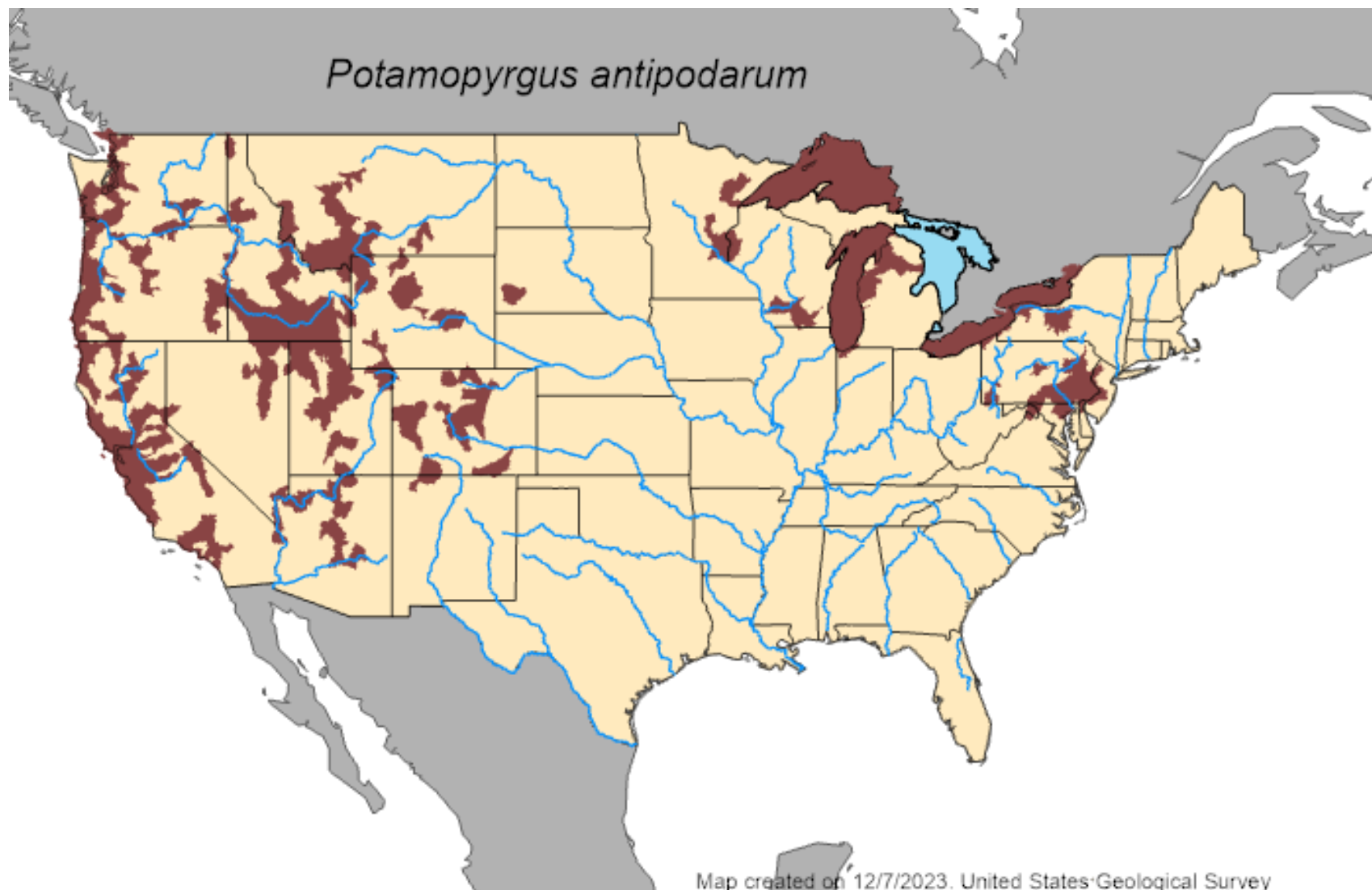
Introduction Pathways



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- Introduced to North America, Europe, and Australia
 - Most likely introduced to Pennsylvania by fisherman
- Likely spread in the ballast water of trade ships to the western United States and Great Lakes
 - Present in all Great Lakes except Lake Huron
- Local spread attributed to fishing gear
 - Boots
 - Waders
 - Fishing Poles
 - Nets
 - Boats/Trailers

Distribution

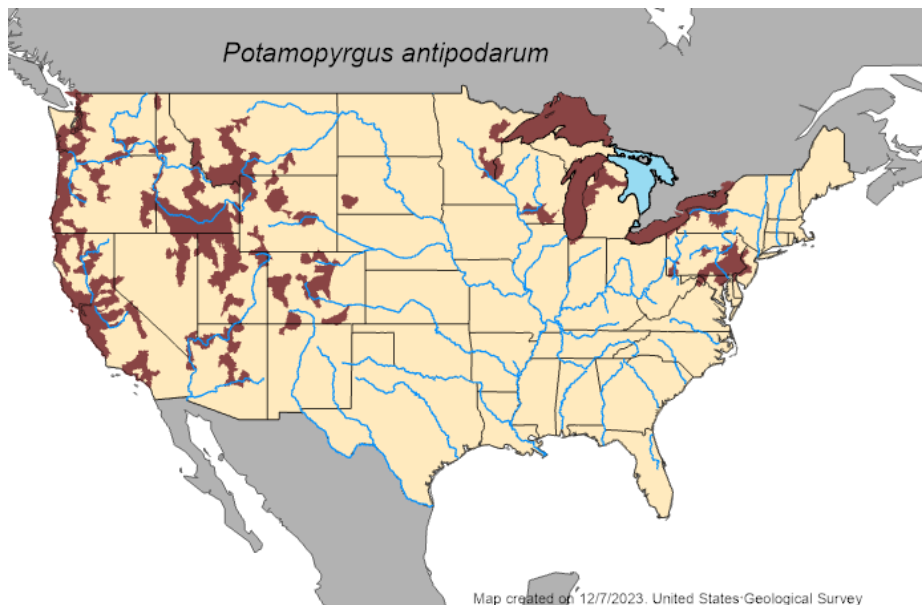


Distribution



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- First reported in Snake River, Idaho (1987)
- Present in 22 states



Distribution



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Distribution



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- First found in Spring Creek, Centre County Pennsylvania in 2010
- Benner Spring and Pleasant Gap SFH 2022
- Bellefonte and Fairview SFH 2023
- 8 Cooperative Nurseries
- 17 Pennsylvania counties

- Disrupt the base of the aquatic food web
 - Consume large amounts of phytoplankton
- Displace native snails and invertebrates that are more beneficial to birds and other aquatic life
 - Many birds and fish cannot digest NZM
 - Rainbow Trout fed unlimited mudsnails passed 54% through their digestive tract alive
 - Lost up to 0.48% of initial body weight each day
- Can block screens and clog pipes

Identification



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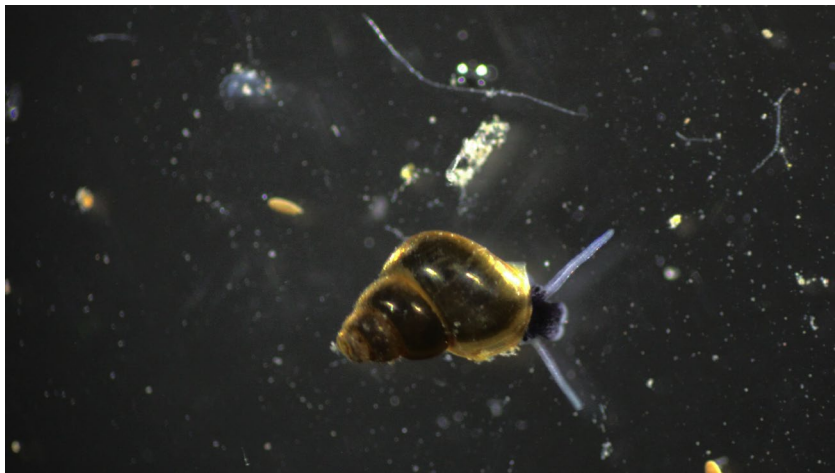
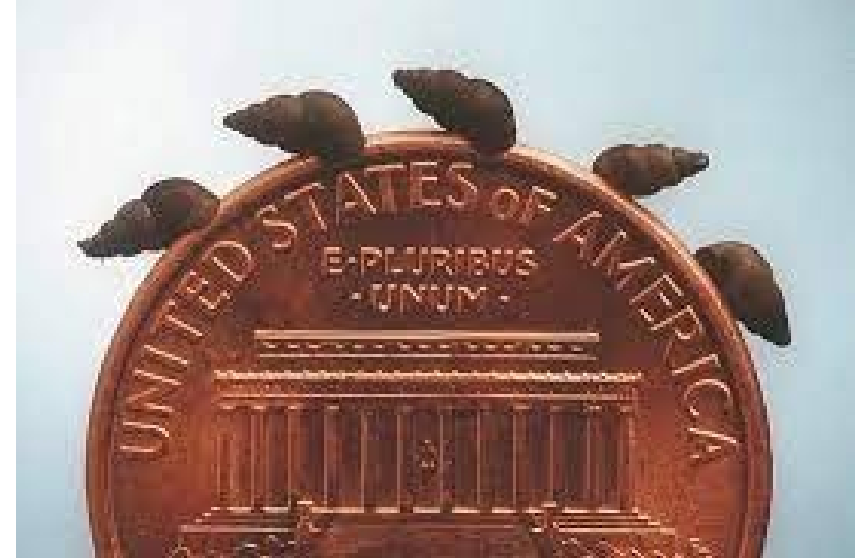
- Cone shaped 4-6 mm (1/4 inch) shell
- 5-8 whorls with deep grooves
- Right coiling shell
- Light colored operculum
- Black head with clear tentacles



Identification



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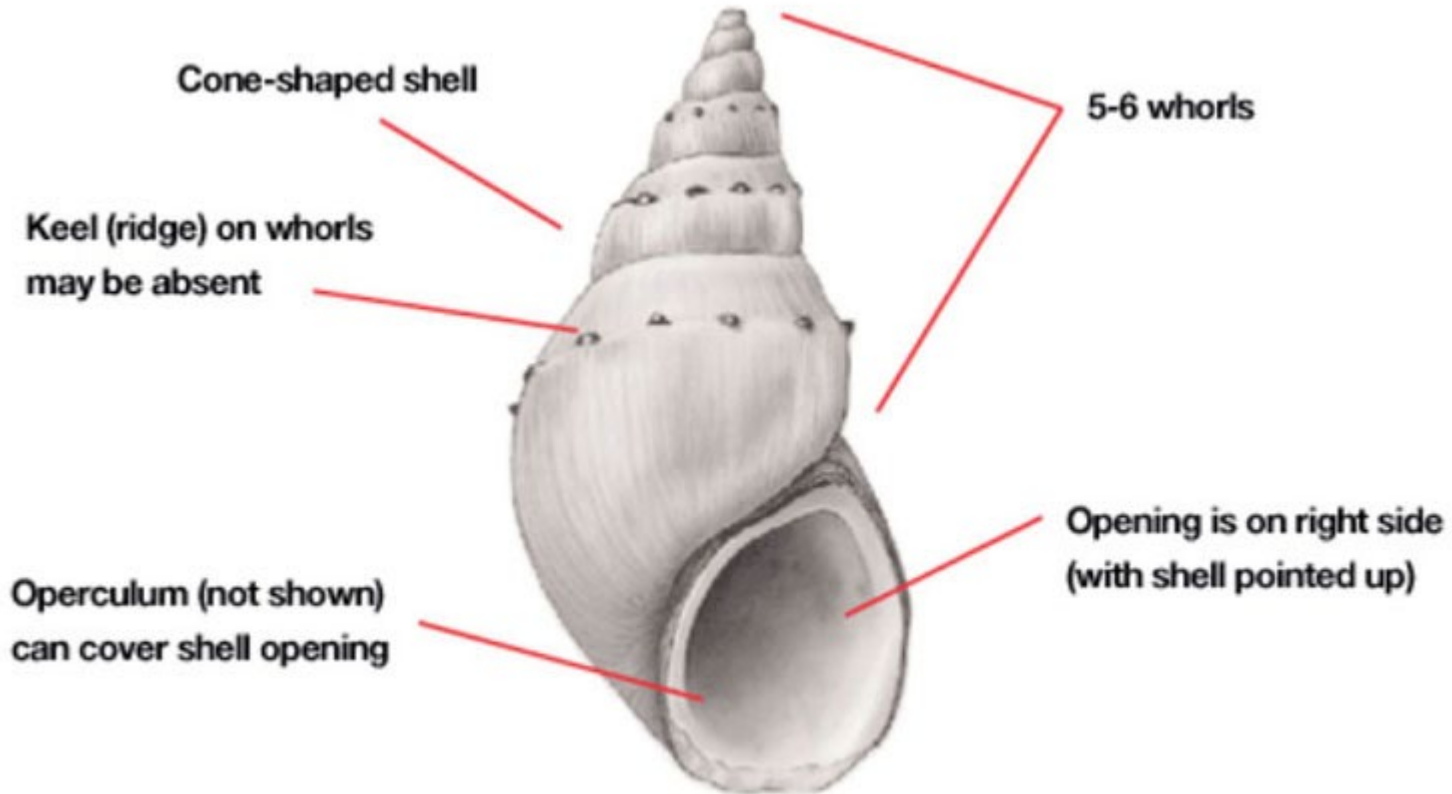


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Identification



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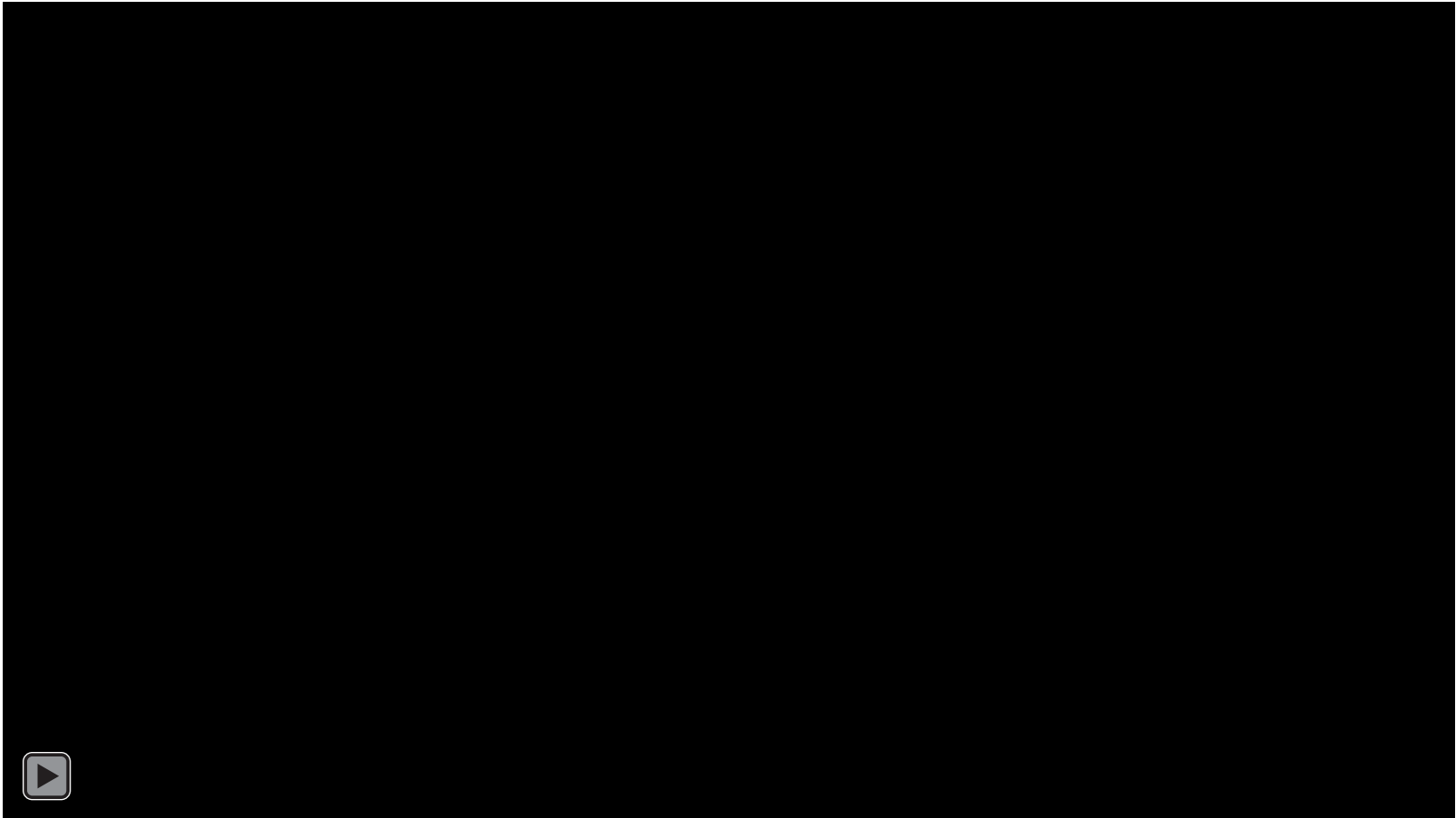


Credit: U.S. Geological Survey

Identification



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- Most effective method of control is through prevention
 - Avoid contact with NZM positive waters if possible
 - Visibly inspect all gear
 - Electric barriers if adjacent to NZM positive water
 - Raceway enclosures, bird netting, lids
 - Separate equipment for different water sources, species, pens, etc.
- Freeze equipment for a minimum of 6 hours

- Soak equipment in in hot water (120°F-140°F) for 5 minutes
 - Snails can withstand temperatures up to 110°F
- Soak in Virkon[®] Aquatic Solution (2%) for at least 20 minutes

- Soak equipment in a 1:1 solution of Formula 409[®] Cleaner Degreaser Disinfectant and water for 5 minutes
 - Thoroughly rinse equipment with clean water after treatment

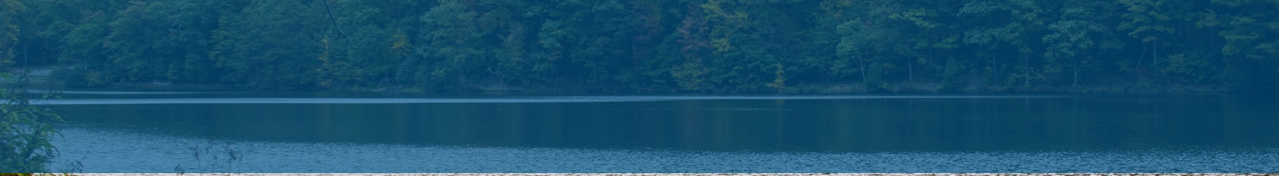


- Complete disinfection of facility
 - Peroxide/hot water pressure wash/weed torches
- Secure water source
 - Drilled one well deeper plus one new well
- Quarantine zone
 - Purge/gut content analysis
- Risk assessment for all stockings
- Extremely expensive, time consuming, physically difficult

- Yearly nursery inspections for presence of NZM
 - Inspect from upstream to downstream starting at the water source
 - Search for at least 20 person minutes
 - If NZM are detected, halt fish transfers in and out of nursery immediately
- Follow PFBC NZM response plan
 - Use nets/buckets provided by the co-op
 - Visually inspect gear
 - Disinfect with Virkon[®] solution
 - Bag and freeze gear as necessary



- Assess an alternate water source
- Establish a quarantine zone if possible
- Assess stocking locations
 - Internal risk assessment



**DID I FIND A NEW ZEALAND
MUD SNAIL?**



1
2
3
4
5
6

CONE SHAPED WITH
5-6 WHORLS

~ 1/8 INCH LONG
(ABOUT THE SIZE OF
A GRAIN OF RICE)

RIGHT-HANDED
(OPENING IS ON THE
RIGHT SIDE WHEN
THE POINT IS UP)

Questions?

