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Quagga Mussels (Dressina bugensis)

Introduction

- Patrick Simmsgeiger
- President, Diversified Waterscapes
- Nationally Certified Lake Manager
- Four decades of lake management experience
- Pilot
- Surfing
- Fishing

NALMS NORTH AMERICAN LAKE MANAGEMENT SOCIETY | CERTIFIED LAKE MANAGER

DWI

Overview

- What are they?
- Why should we care?
- Why are they so successful?
- What is being done to stop them?

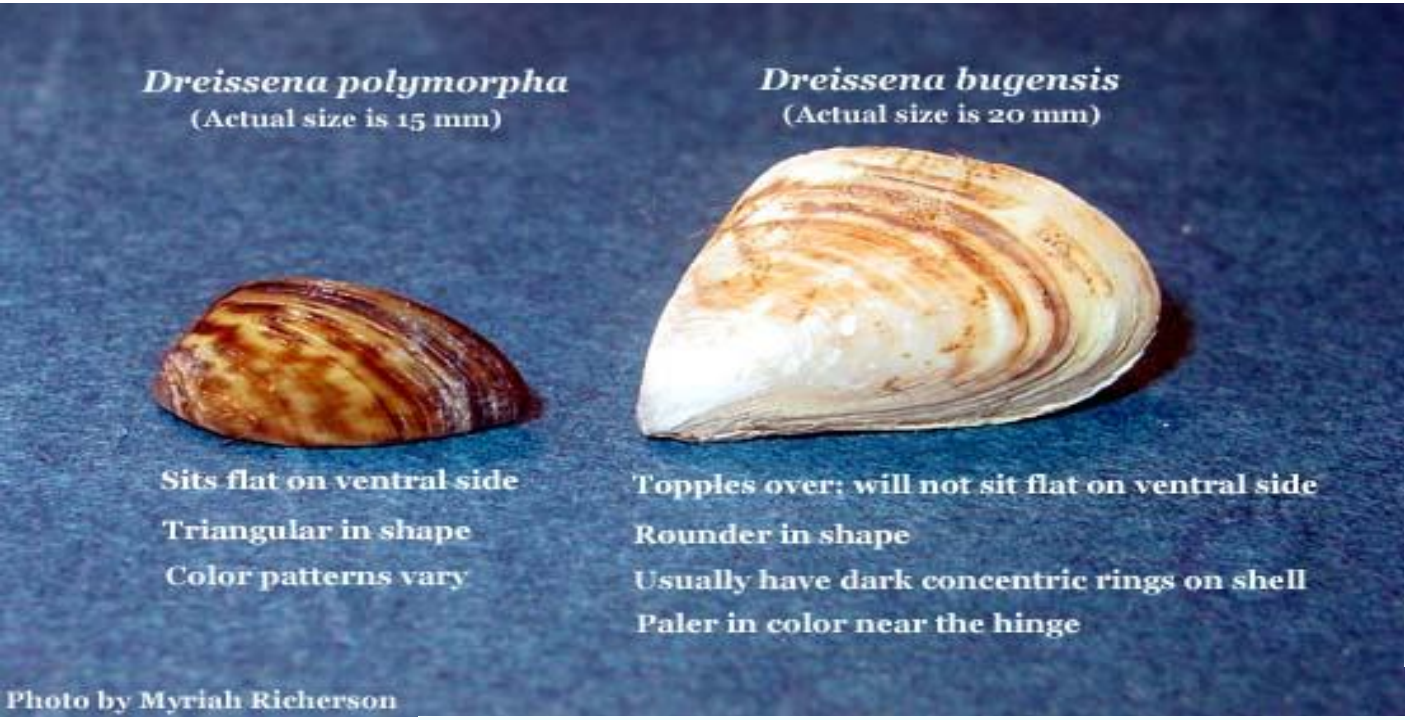
What Are They?

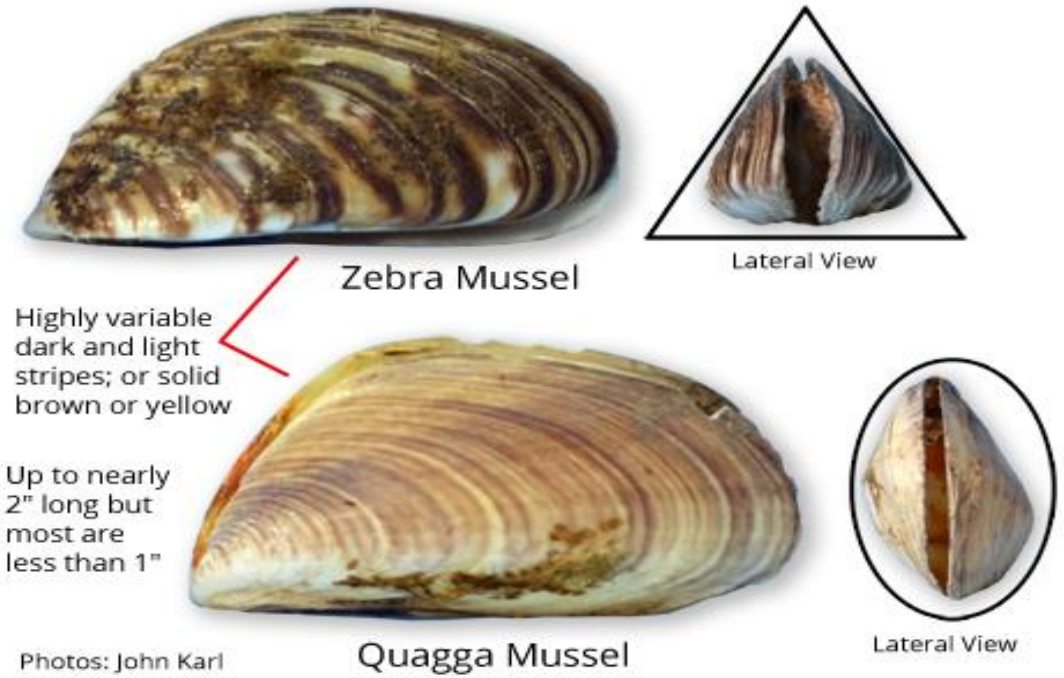
Quagga: Origins

- Native to the Dnieper River of Ukraine, did not spread outside native range until canal construction connected the Dnieper to the Black Sea

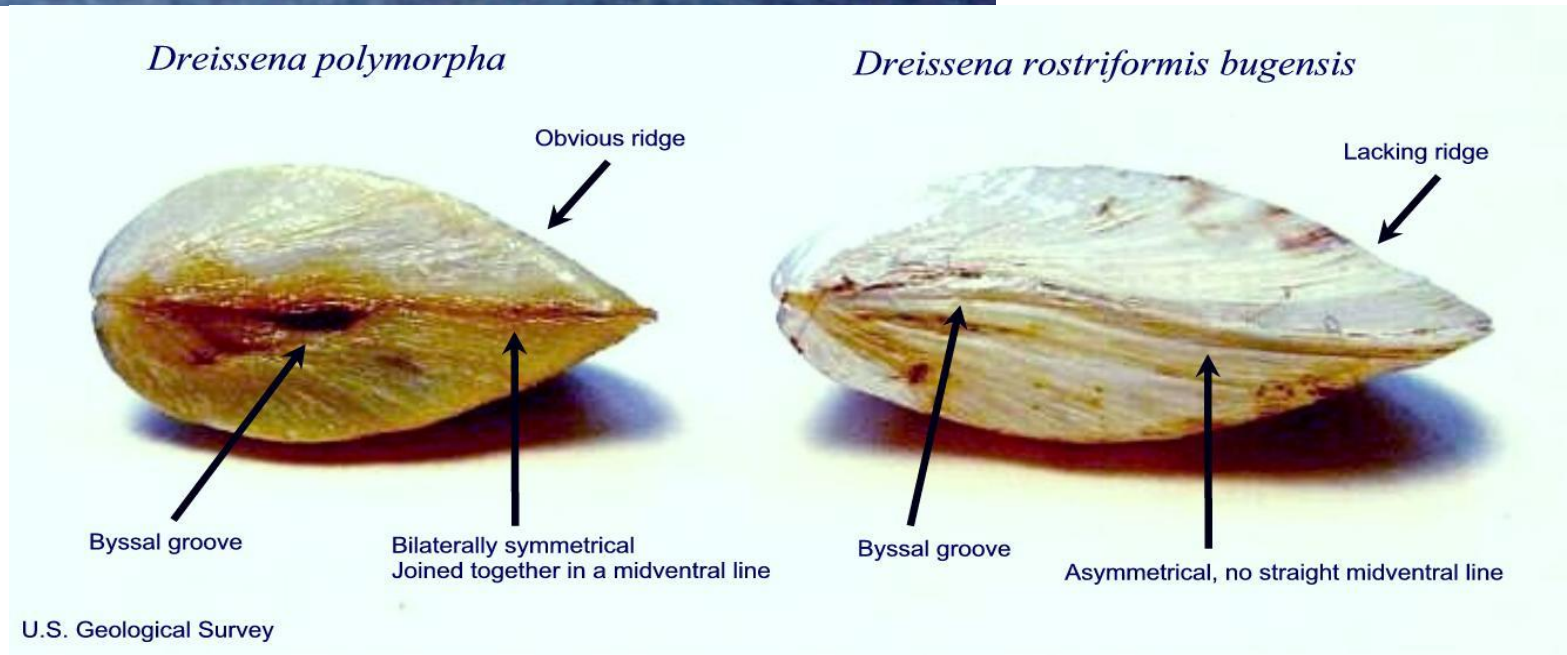
- Arrived in the Great Lakes around 1989 via ballast water held in cargo ships travelling between Europe and the Great Lakes

- Initially not recognized as separate species, thought to be more Zebra Mussels up until 1991


Dreissena polymorpha
(Actual size is 15 mm)
Dreissena bugensis
(Actual size is 20 mm)
Sits flat on ventral side
Triangular in shape
Color patterns vary
Topples over; will not sit flat on ventral side
Rounder in shape
Usually have dark concentric rings on shell
Paler in color near the hinge
Photo by Myriah Richerson


Zebra Mussel
Lateral View
Highly variable dark and light stripes; or solid brown or yellow
Up to nearly 2" long but most are less than 1"
Photos: John Karl
Quagga Mussel
Lateral View


ZEBRA MUSSEL
QUAGGA MUSSEL


Dreissena polymorpha
Obvious ridge
Byssal groove
Bilaterally symmetrical
Joined together in a midventral line
Dreissena rostriformis bugensis
Lacking ridge
Byssal groove
Asymmetrical, no straight midventral line
U.S. Geological Survey

Quagga: Where Are They Now?

- Now focused in: Great Lakes, Lake Mead, Southern California, Mississippi River – also scattered throughout Midwest

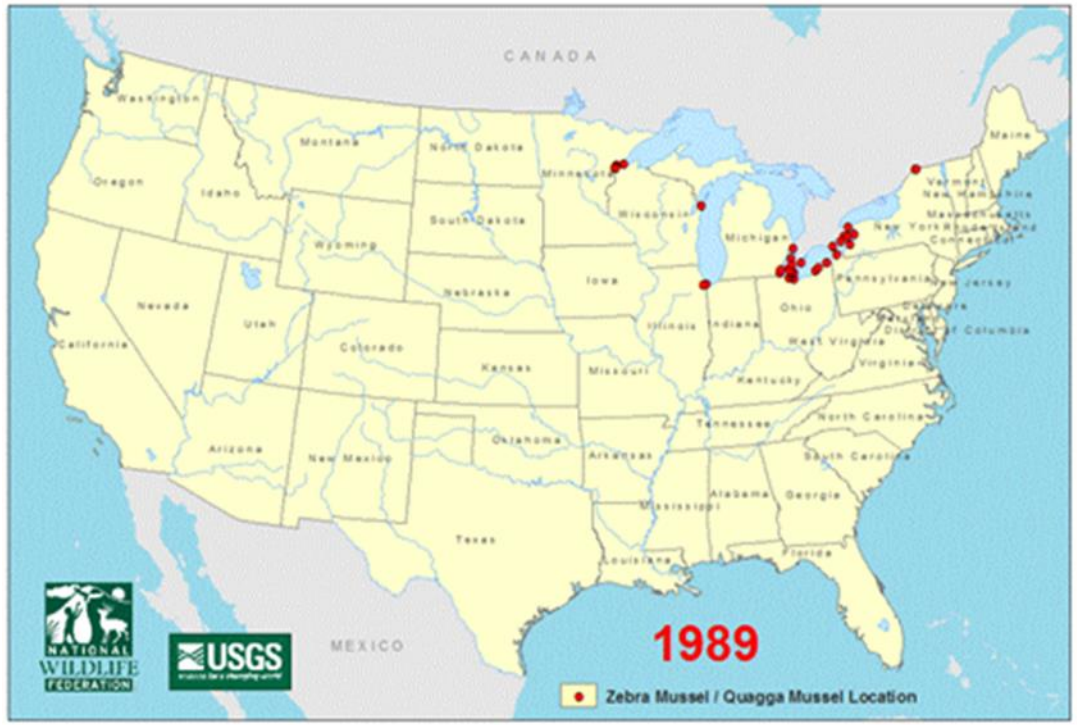
- Found in freshwater reservoirs, lakes, and rivers

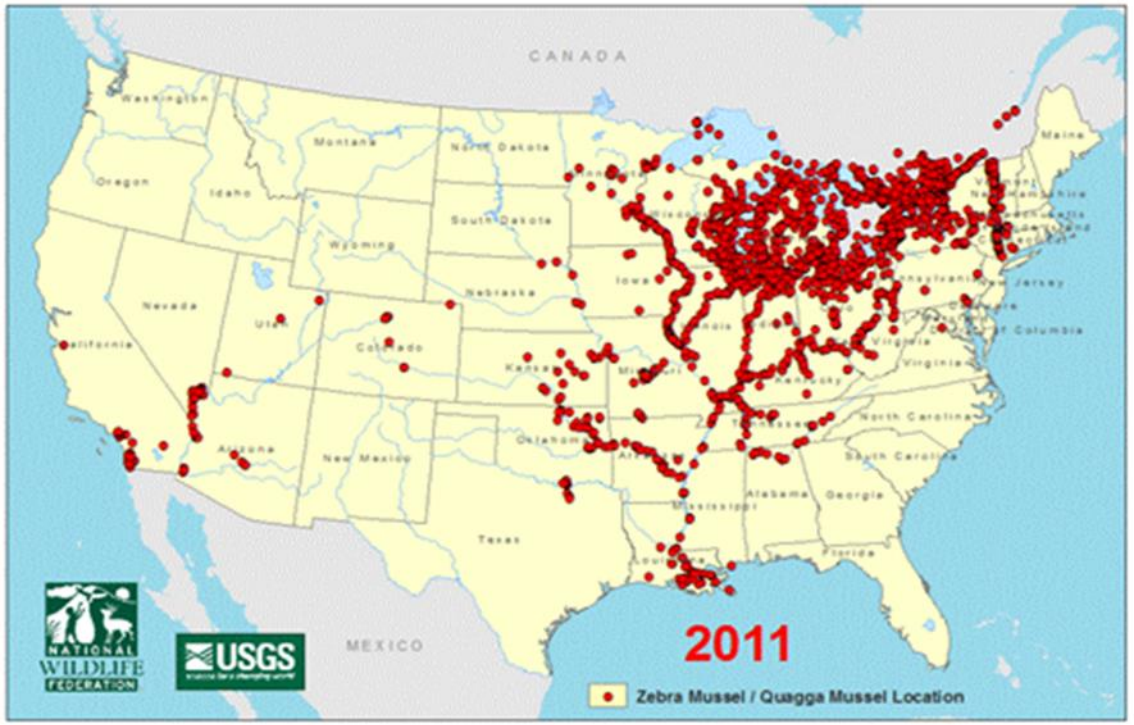
- Can live on practically any type of substrate in the water

- Quagga are outcompeting Zebra mussels: Withstand colder temperatures, greater depths, higher salinities

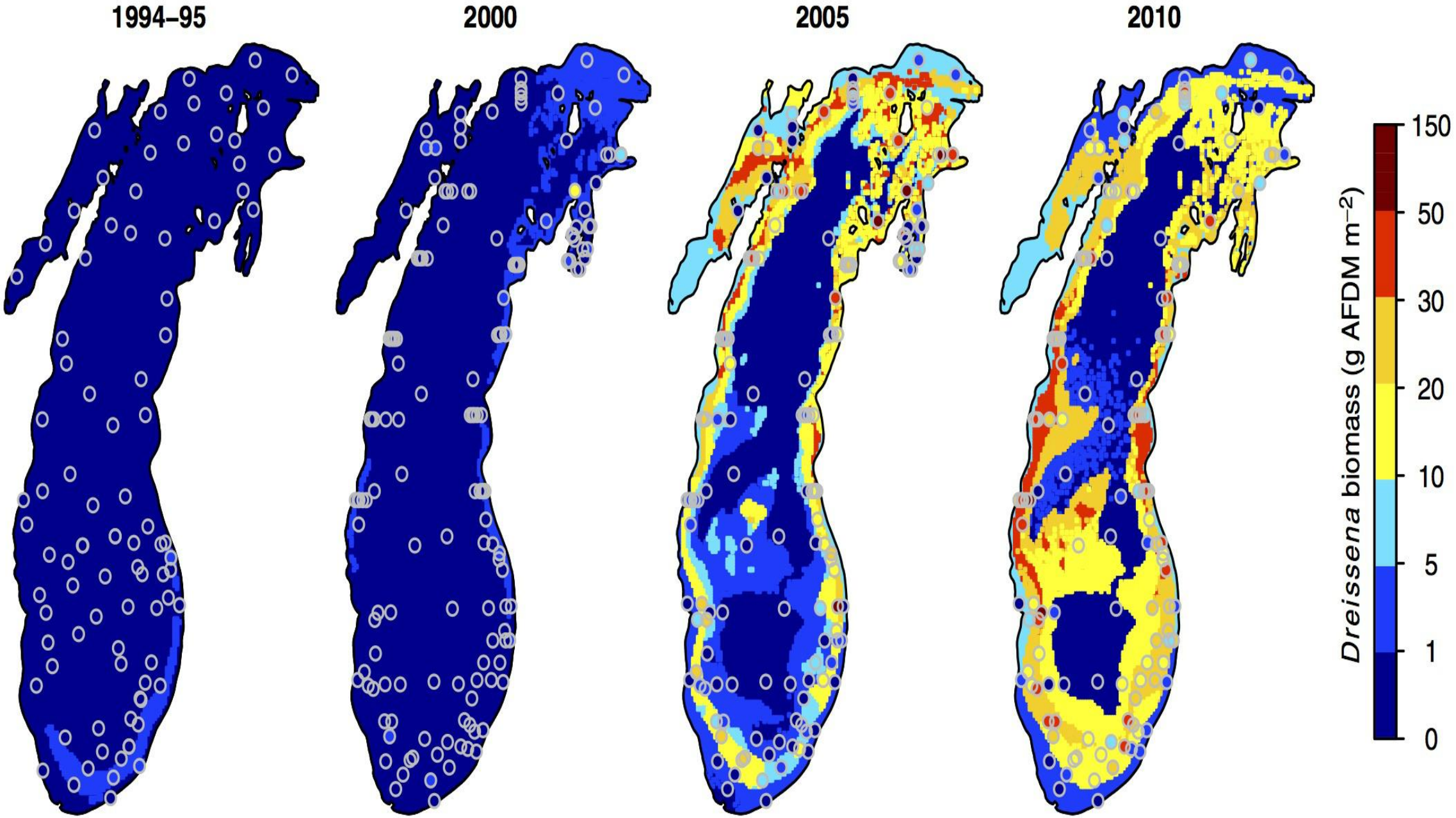
Humble Beginnings

Quagga Don’t Recognize State Lines





Increasing Quagga Biomass in Lake Michigan



Why Should We Care?

Damage Where it Matters

- Economic Impact
  - Boat Damage
  - Industrial Damage
- Ecological Impact
  - Habitat Loss
  - Species Loss

Economic Impact: Boats

- Quagga can attach themselves to practically any hard surface, on boats this primarily means: Hulls, Propellers, Anchors

- As a result boat checks are now required in affected areas, signage has to be posted to notify, workers mobilized

- Between 2007-2008 Border Protection

  Stations stopped 82,964 boats - only 104

  actually had confirmed Quagga (0.0013% of stopped boats)

  – Only 1 affected boat needs to make it through

Economic Impact: Industrial

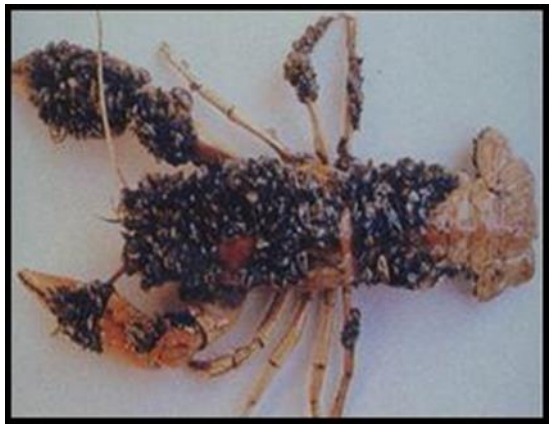
- It has been estimated mussel management costs the Great Lakes region around $500 million a year

- Damage comes from mussels blocking pipes and covering any submerged structure with incredibly dense populations

Ecological Impact: Habitat Loss

•One mussel can filter 1 litre H2O/per day – Filter out plankton, algae, sediment

•Make water uninhabitable by:
  - •decreasing dissolved oxygen levels
  - •decreasing pH levels
  - •bioaccumulating toxins



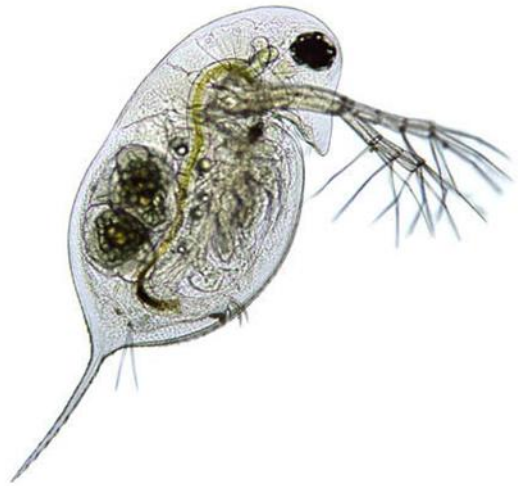
•Can use soft and hard substrate, removing space for many native species

•Have been found at densities approaching 7,800 mussels per meter^2

Ecological Impact: Species Loss

- Consume phyto/zooplankton at environmentally unsustainable levels, taking away the most vital food source for aquatic environments

- Quagga are bioaccumualtors: toxins ingested are found to be 300,000 times more concentrated than in the environment



- Attach to native mussels en masse, also filter out other species' veligers – Even outcompete and replace Zebra Mussels

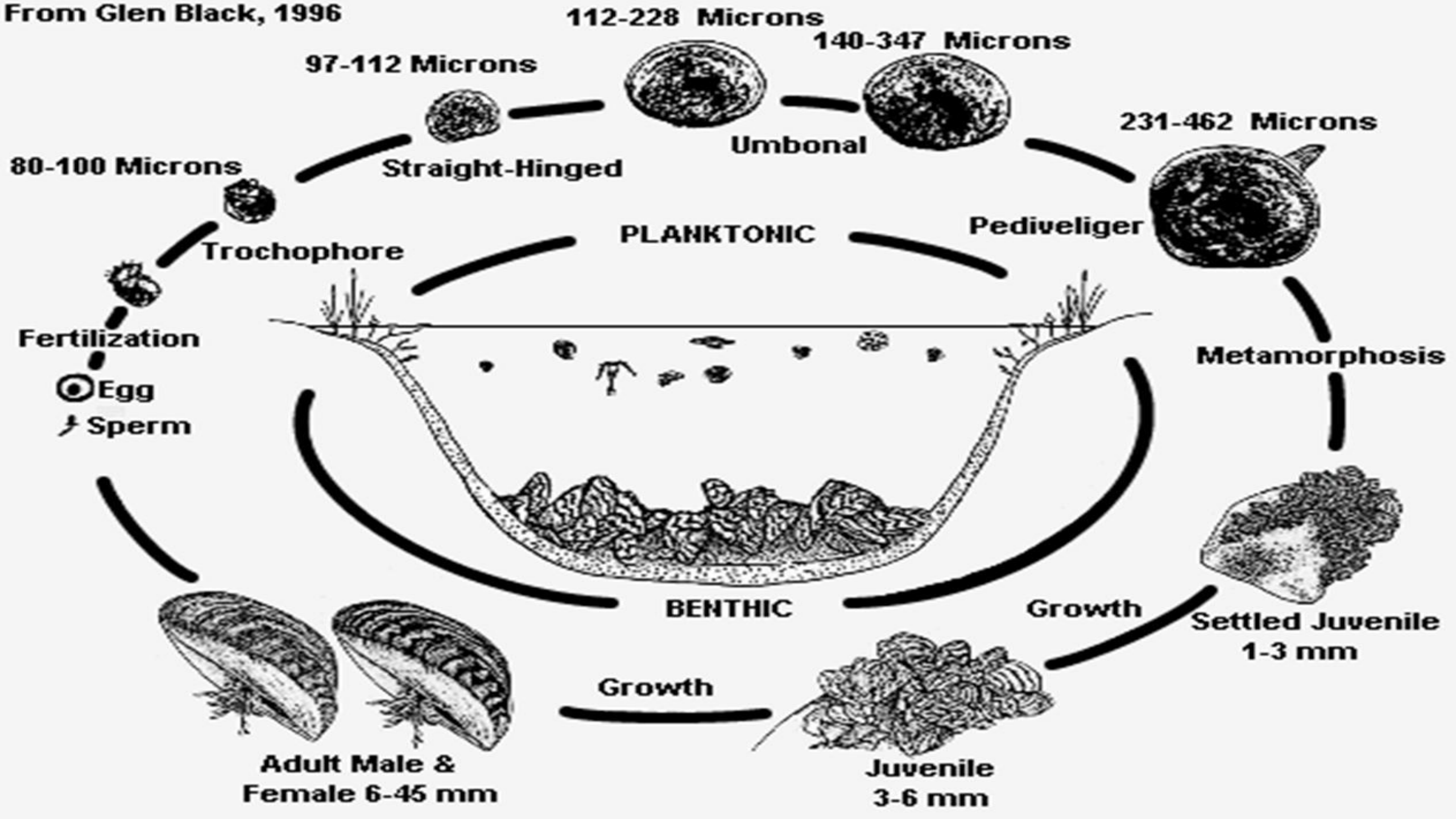
Why Are They So Successful?

Reproductive Capability

- 1 mature female Quagga can produce up to 1 million eggs per year

- Over 99% die in veliger (larval) phase: However, 99% of 1 million veligers still leaves 10,000 making it to sexual maturity

- Veligers develop in days, drift on currents for 3-4 weeks until they find substrate to attach byssal threads


From Glen Black, 1996
112-228 Microns
140-347 Microns
97-112 Microns
Umbonal
231-462 Microns
80-100 Microns
Straight-Hinged
Pediveliger
PLANKTONIC
Trochophore
Fertilization
Egg
Sperm
Metamorphosis
BENTHIC
Growth
Settled Juvenile
1-3 mm
Growth
Adult Male &
Female 6-45 mm
Juvenile
3-6 mm

Reproductive Capability

- Quagga are dioecious (individuals are male or female), and produce sperm & eggs in the millions

- Can spawn within a wider temperature range than Zebra Mussels

- Can spawn all year if temperatures are within range

Human Factor

- People transport mussels around through commercial shipping and recreational boating

- Can survive up to a week out of water, depending on temperature/humidity

- Found on or in places like: hulls, livewells, bait buckets, propellors, anchors

What Is Being Done To Stop Them?

Agents of Prevention

- Federal, state, NGO, and civilian groups are enacting programs to deter spread, and catch Quagga out of the water
  - USFWS, UACE
  - State DNR, DWR
  - 100th Meridian Initiative

- This problem transcends jurisdictions, state lines, and national borders - requires serious cooperation and effective communication


J1458

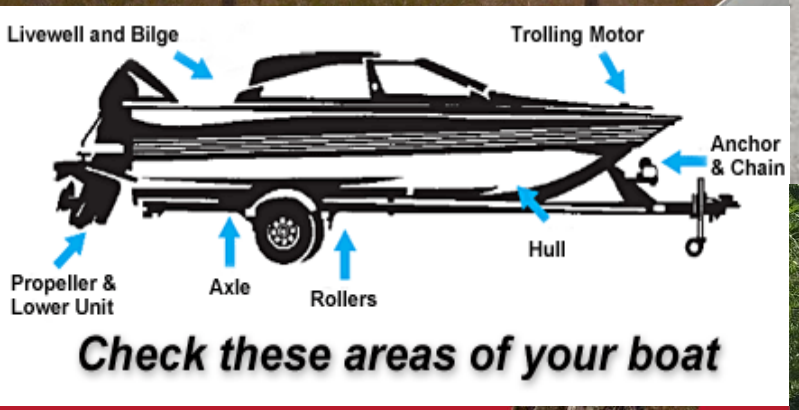

Restrain Your Pet
K-9 On Duty
Checking for
Aquatic Invasive Species

General Approaches

- Checkpoints: To inspect trailered boats before they enter the water
- Education: How Mussels spread and how to check for them
- Action plans: To prepare agencies for potential future mussel infestations
- Research: To better understand Mussels, and how to handle them more effectively
- Monitoring: To establish where populations are, and where they might spread to


NOTICE
DON'T MOVE A MUSSEL!
CLEAN, DRAIN AND DRY
YOUR EQUIPMENT


WATERCRAFT
INSPECTION


Livewell and Bilge
Trolling Motor
Anchor & Chain
Hull
Propeller & Lower Unit
Axle
Rollers
Check these areas of your boat


clean
drain
dry
STOP INVASIVE MUSSELS
SLOCountyWater.org


RECLAMATION
Managing Water in the West
STOP Aquatic Hitchhikers!
Clean
Drain
Dry
Inspect


INSPECTION STATION
ALL WATERCRAFT
MUST REPORT


DON'T MOVE A MUSSEL
Lakes Havasu, Mead, Mohave, Pleasant and the Lower Colorado River are infected with quagga mussels.
These pests damage boats, fisheries, recreation areas and water systems!
Before launching in this or any other body of water, please:
Before leaving this lake, please:
Visit www.azgfd.gov/mussels for more information.


STOP AQUATIC
HITCHHIKERS!™
Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net


DON'T MOVE A MUSSEL!
neinvasives.com
Nebraska Invasive Species Program
Clean, drain and dry your watercraft!


CLEAN DRAIN DRY

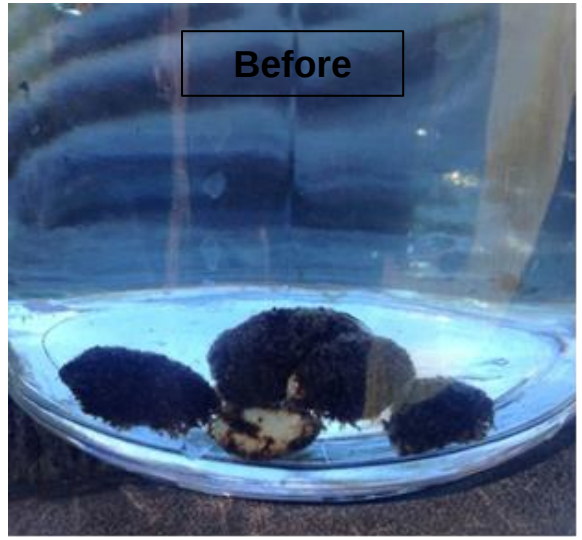
Quagga Treatment

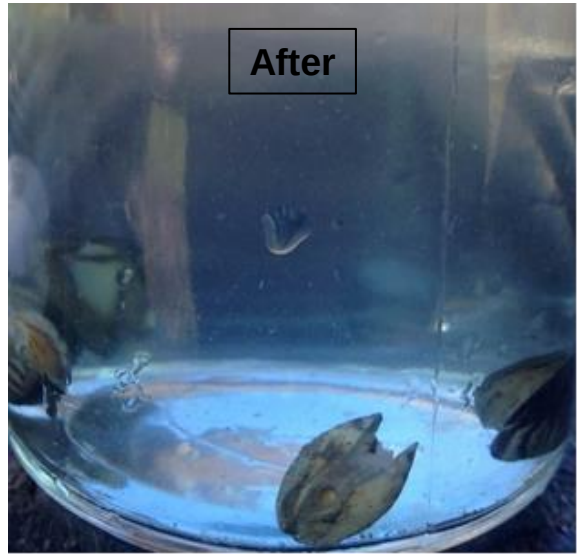
- Small lake in residential area with Quagga found on homeowner docks
- Silt curtain used to cordon off docks from greater lake, allowing for focused treatment
- F-30 applied at 2 ppm metallic copper to 36,000 gallons around docks

Quagga Treatment: Results

- F-30 Treatment dosage successfully killed all Quagga

- Treatment area and greater lake tested for free copper, none found outside treatment area after 48 hours





Conclusion

- Quagga Mussels are a potentially bigger threat than Zebra Mussels, so they deserve a bigger response

- Quagga will try to spread to wherever they are carried, it is up to us to stop them

- The keys to fighting Quagga are:
  - Scientific Research
  - Cross-agency cooperation
  - Efficient communication with recreational boaters

Questions?

THANK YOU FOR YOUR TIME!

Feel free to contact us:

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