



2006 Kansas Environmental  
Conference

August 22-24, 2006

Capitol Plaza Hotel

Maner Conference Center

Topeka, Kansas

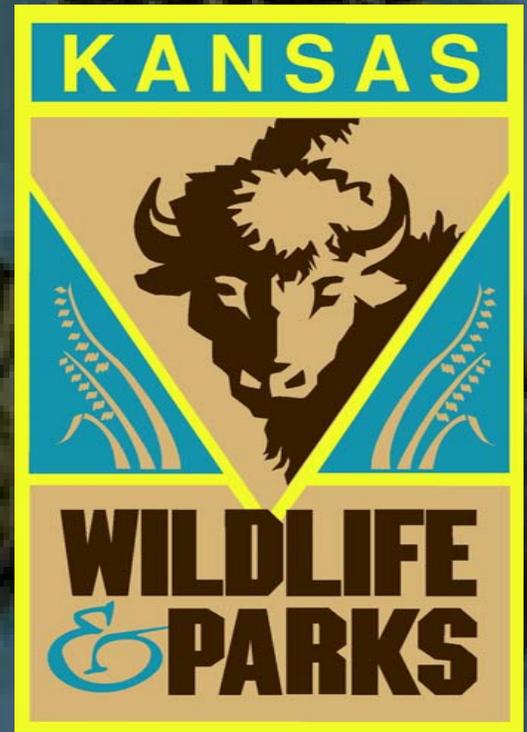
Zebra Mussel Presentation

By Tony Stahl, KDHE

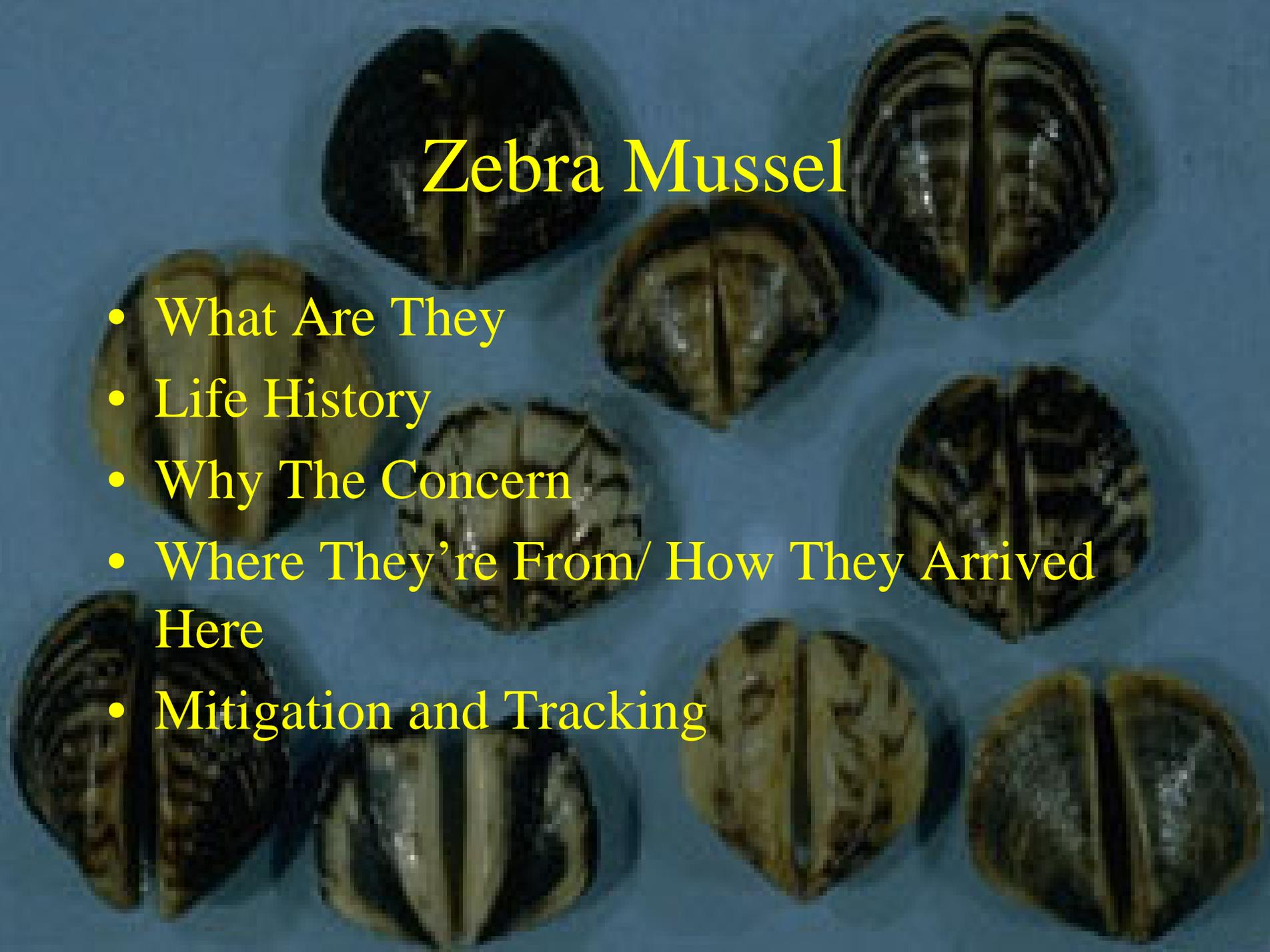
# Zebra Mussel

(Invasive Non-Native Mussel)

## Kansas



# Zebra Mussel



- What Are They
- Life History
- Why The Concern
- Where They're From/ How They Arrived Here
- Mitigation and Tracking

# Meet the Zebra Mussel

*Dreissena polymorpha* and *D. bugensis* (quagga mussel)

- Small invasive mussel with varying stripes
- Attaches to surfaces with byssal threads



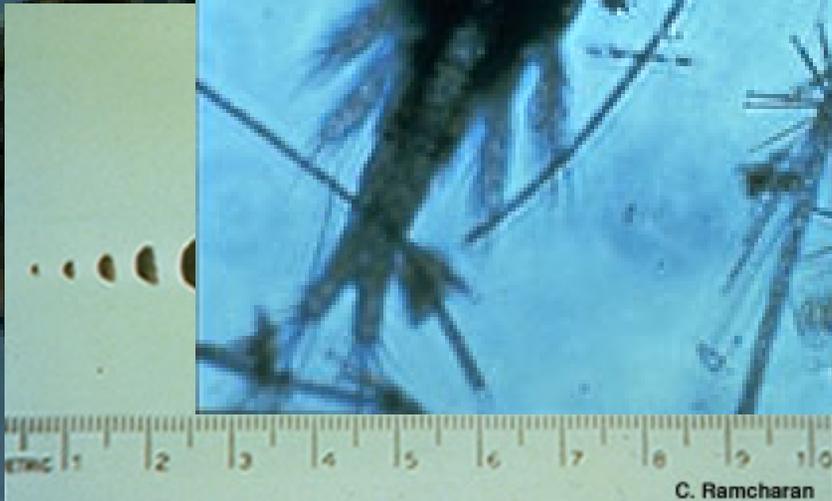
# Life Cycle Highlights

- Reproduction starts at 55<sup>o</sup> peaks about 78<sup>o</sup>
- Young-veligers-float in plankton up to 4 weeks
- Growth may be fast, as much as 0.5 mm a day
- Reach maturity about 8-9 mm and may reproduce in first year-adults grow 0.6-0.8 in/year
- Females may produce 100,000-1 million eggs a year
- Most live 1.5-2 years and may reach 2 inches
- Estimated only one to three percent survive to adulthood

# Life Cycle Highlights



C. Ramcharan



C. Ramcharan

# Four Primary Reasons to Care About Aquatic Exotics

1. Economics
2. Ecological
3. Health
4. Recreational



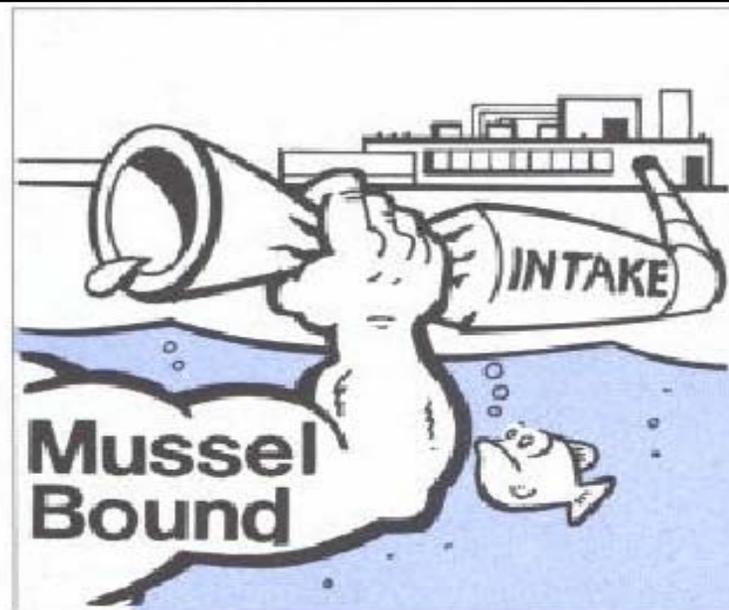
# Cost to Facilities

- Forms thick mats



# Cost to Facilities

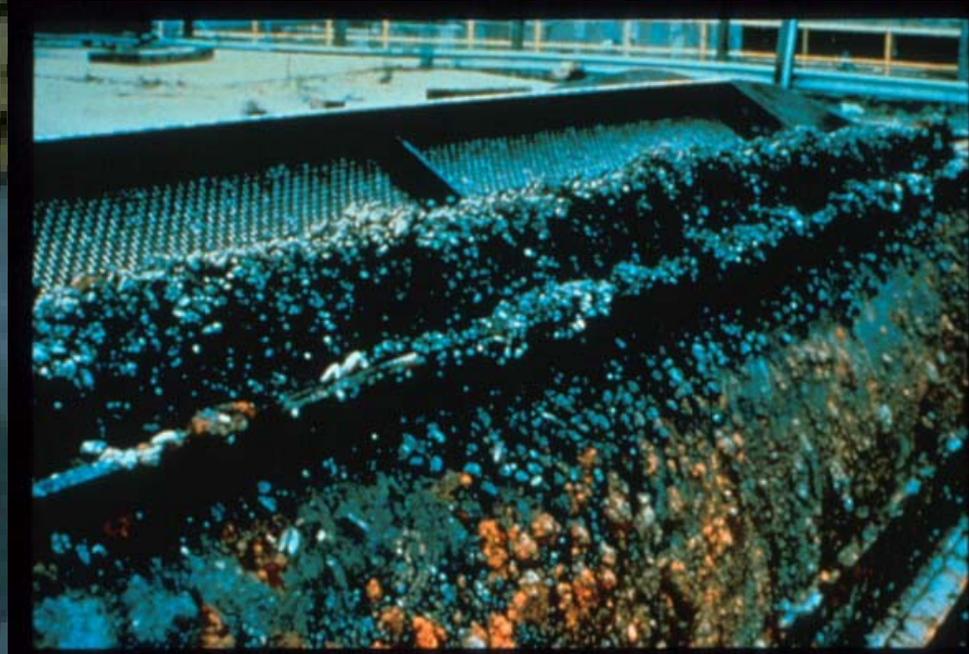
- Forms thick mats
- Fills intake pipes



Unclogging water intakes is costing million\$

# Cost to Facilities

- Forms thick mats
- Fills intake pipes
- Clogs trash screens



# Cost to Facilities

- Forms thick mats
- Fills intake pipes
- Clogs trash screens
- Encrusts docks, launch ramps, rocks, and anything else in the water



# Cost to Recreation

- Encrusts boats
- Clogs engines



# recreation



J.E. Marsden



# Ecological Damage

- No ecologically friendly way to eradicate
- Encrusts and kills any bottom animals (mussels, crayfish, ...)



Photograph by Edwin C. Mueller,  
Pennsylvania State University at Erie

Ontario Ministry of Natural Resources



Ontario Ministry of E

# Damage

way to eradicate  
bottom animals

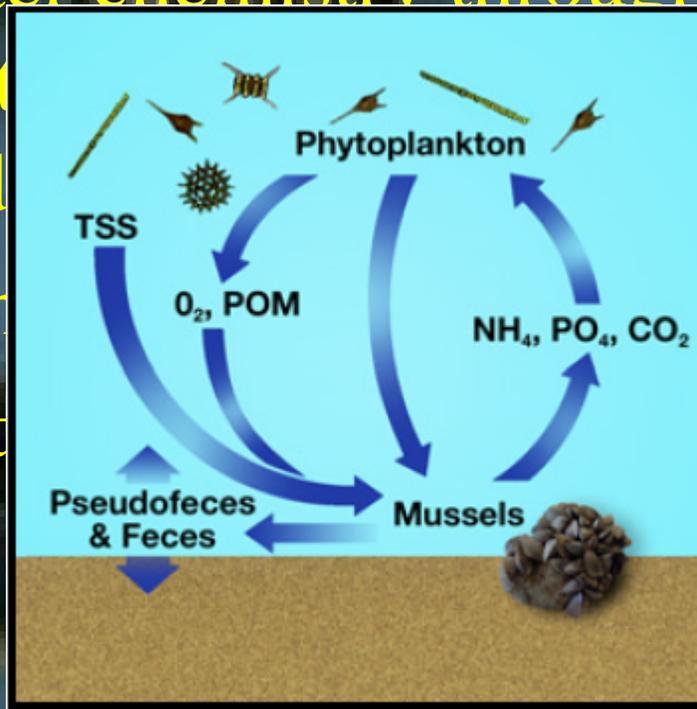
- Filters enormous amount of food, disrupting the food web
- No natural predators
- Accumulates toxins



D. Dennis

# Health Related Water Quality Impacts

- Improve water clarity (better to look at) as the result of filtering activity
- Alter water chemistry through the consumption of phytoplankton and the excretion of dissolved nutrients
- Contaminant removal
- Sedimentation



# Recreational Impairment

- Sport and Commercial Fishing Industry
- Improve Fishing - Fishing success may improve for awhile and bigger fish may be caught, but disruption of the food chain may eventually reduce the survival of young fish and limit the fishery.

# Recreational Impairment

- Boating, Swimming, Navigation, and Flood Control



# History of the Invasion

- From the Caspian and Black Seas
- Spread to Europe



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- Came



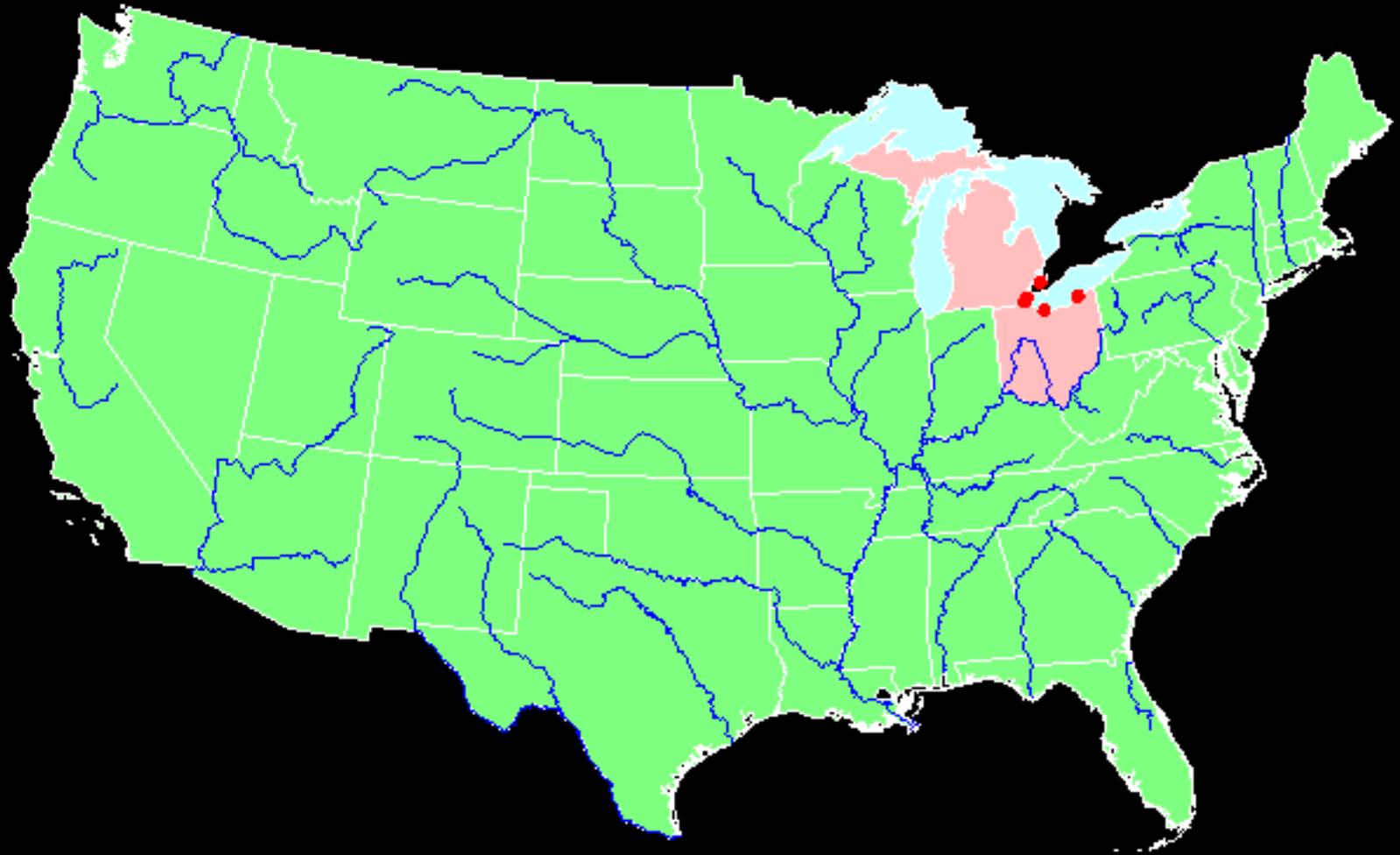
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- Came to America in ballast water
- Discovered in Lake St. Clair in 1988

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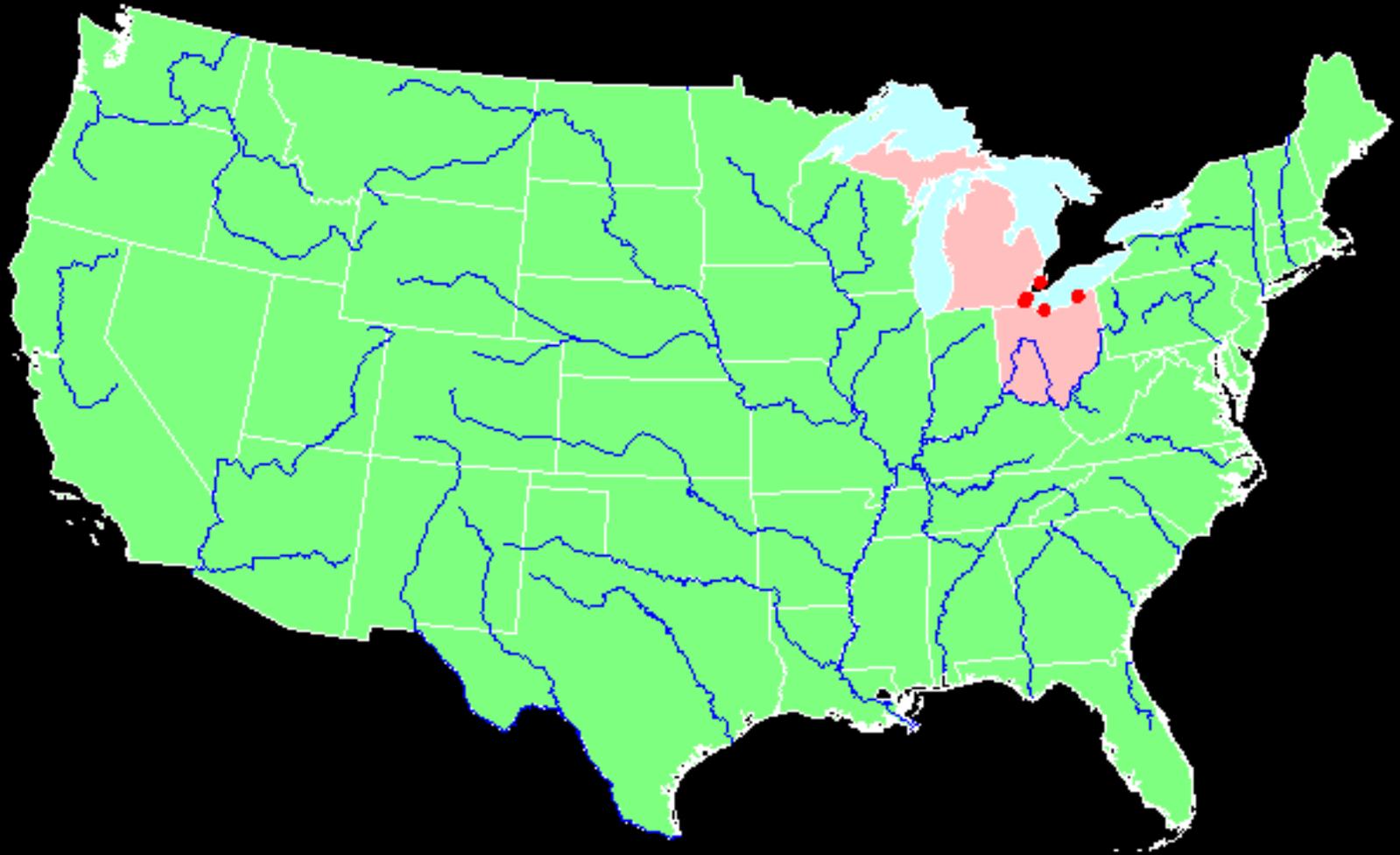
- From the Caspian and Black Seas
- Took over all of Europe
- Came to America in ballast water
- Discovered in Lake St. Clair in 1988
- Moved through the Great Lakes and 8 major rivers in the East

1988



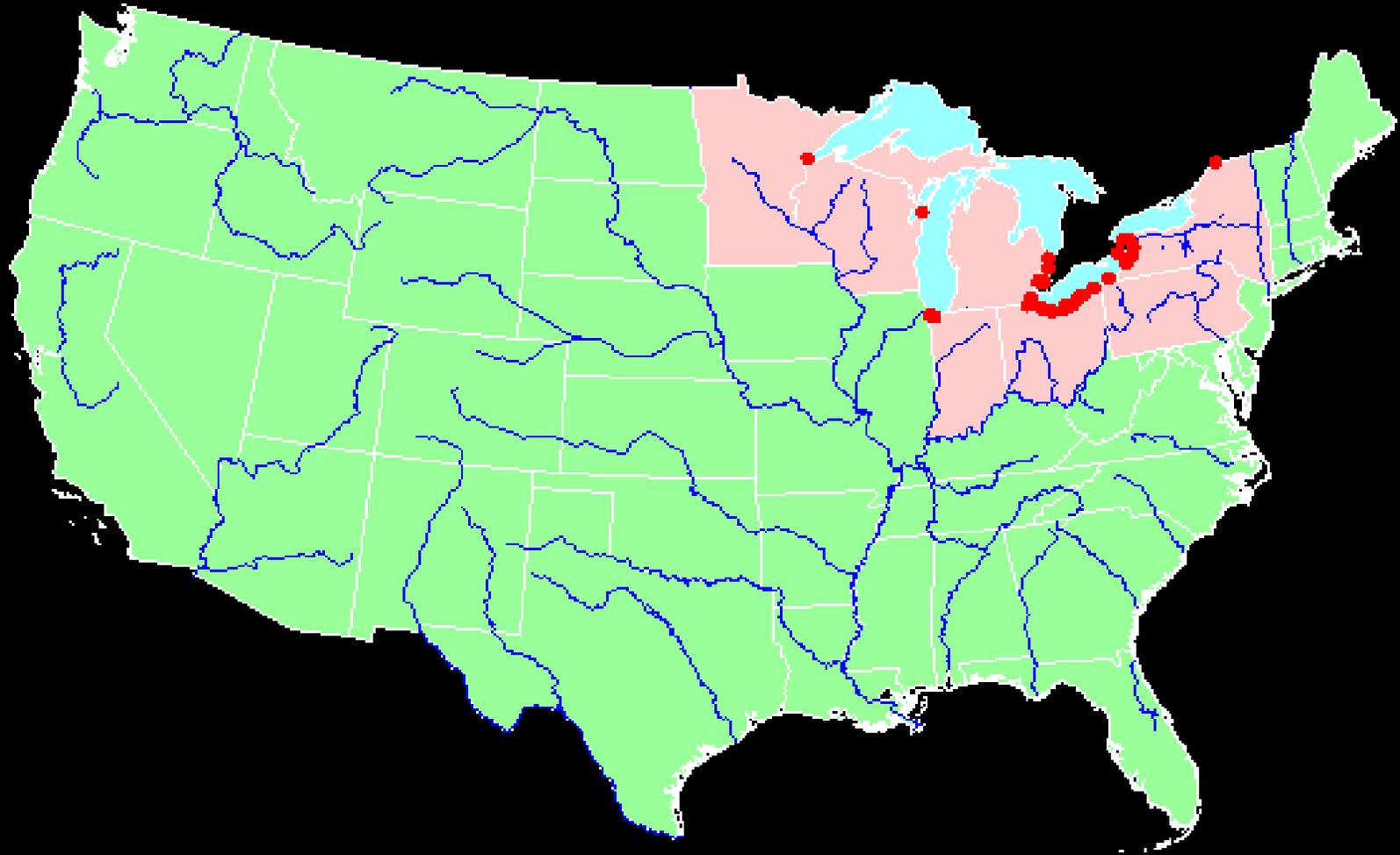
States with zebra mussels in inland and adjacent waters.

1988



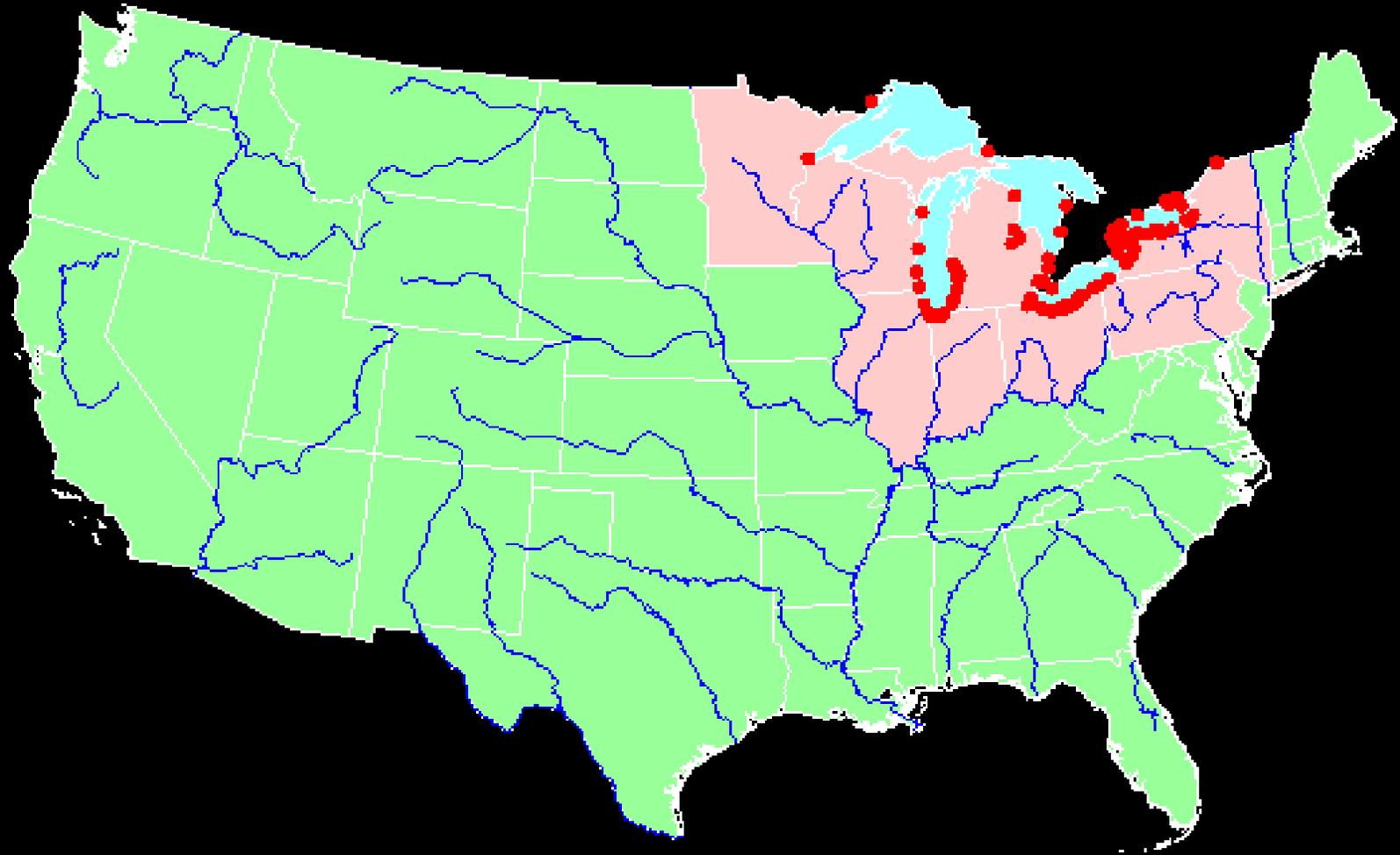
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1989



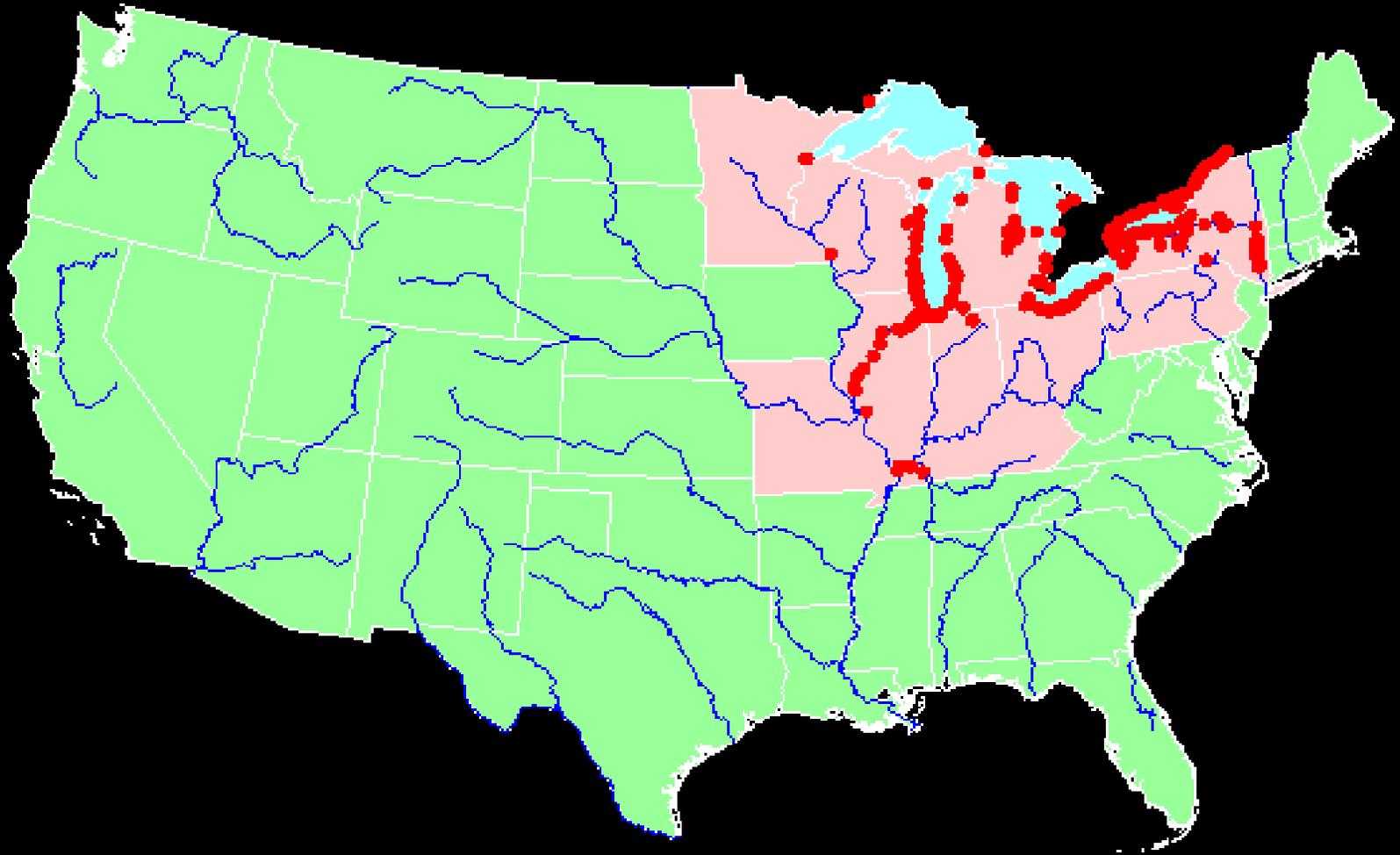
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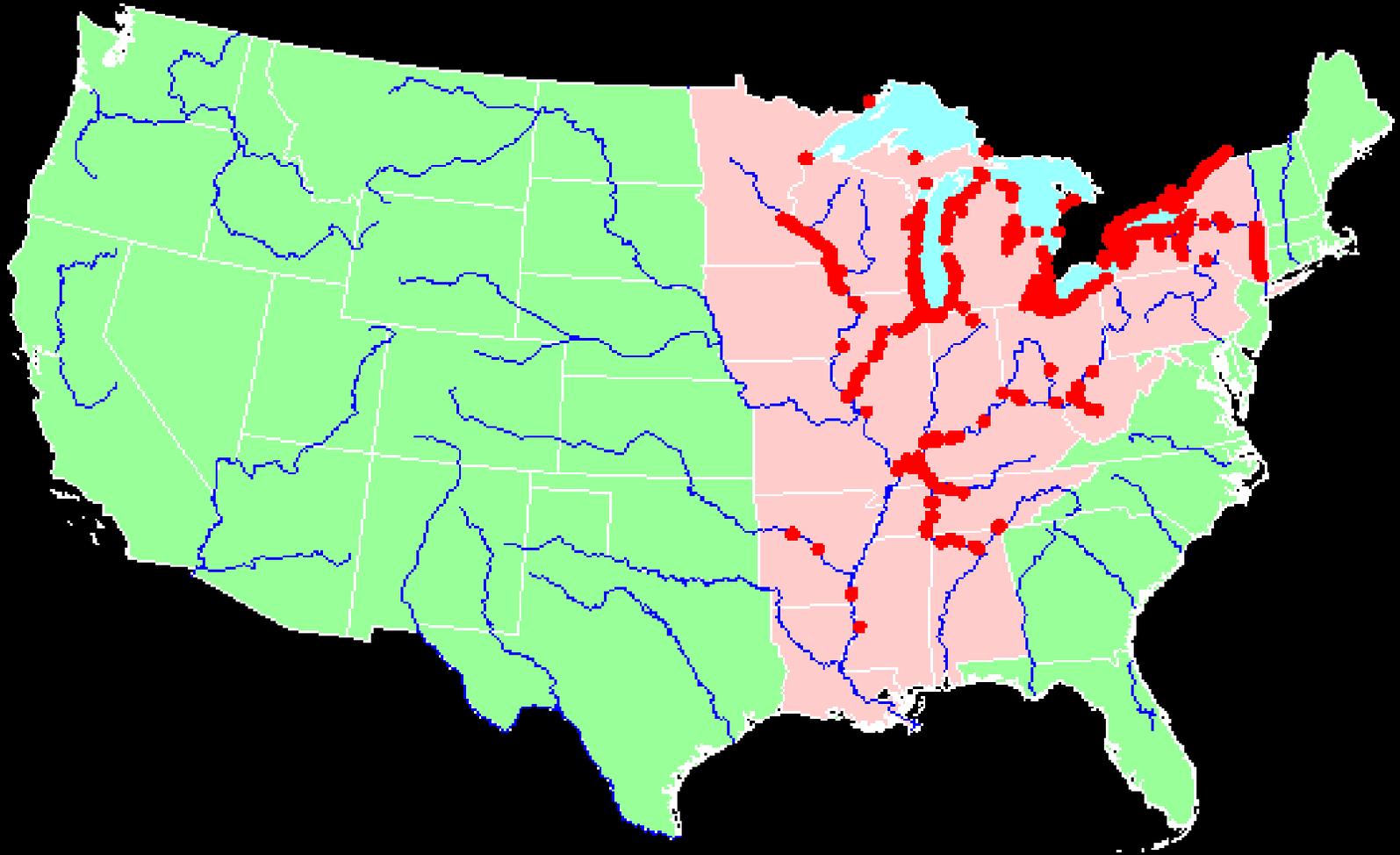
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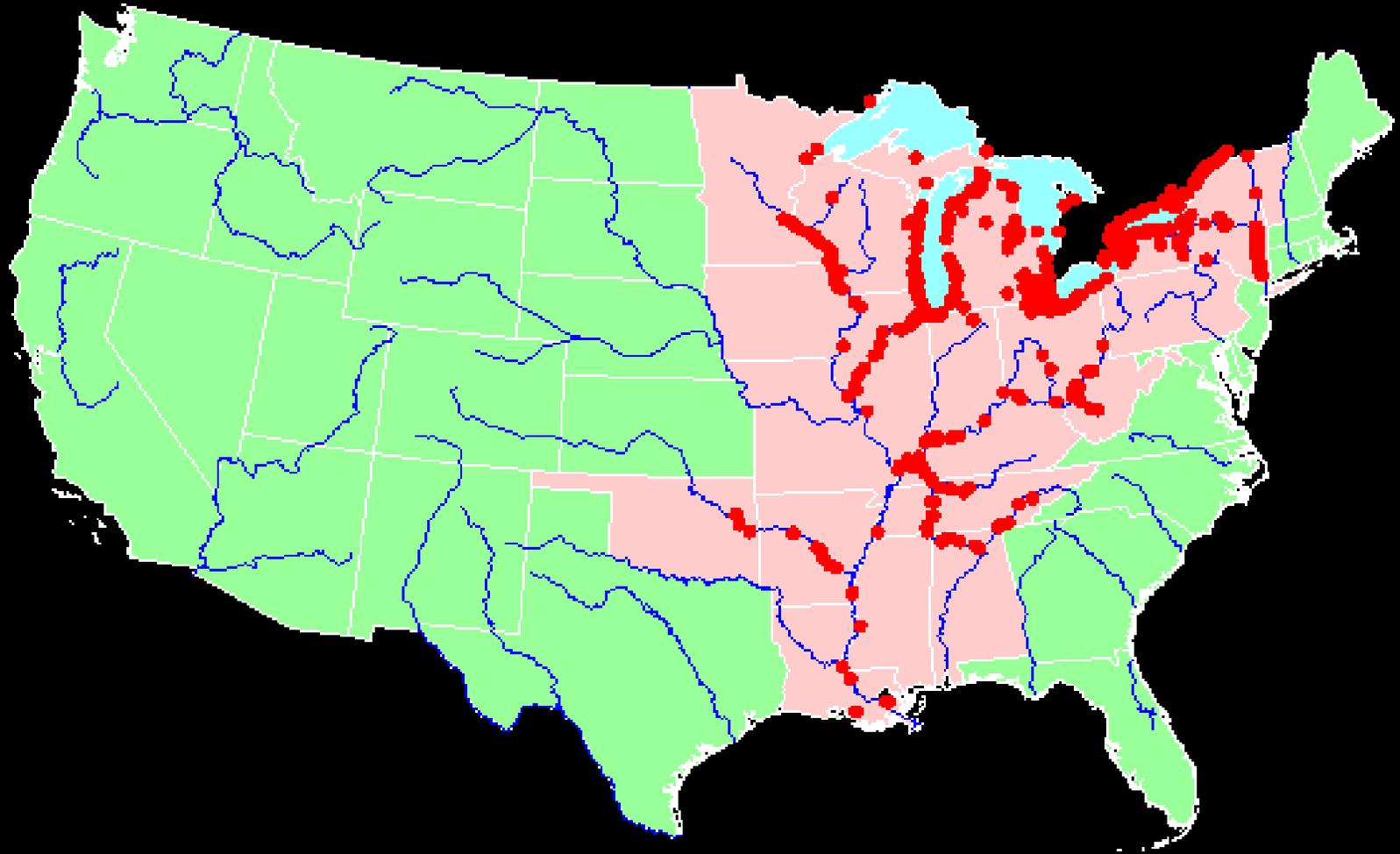
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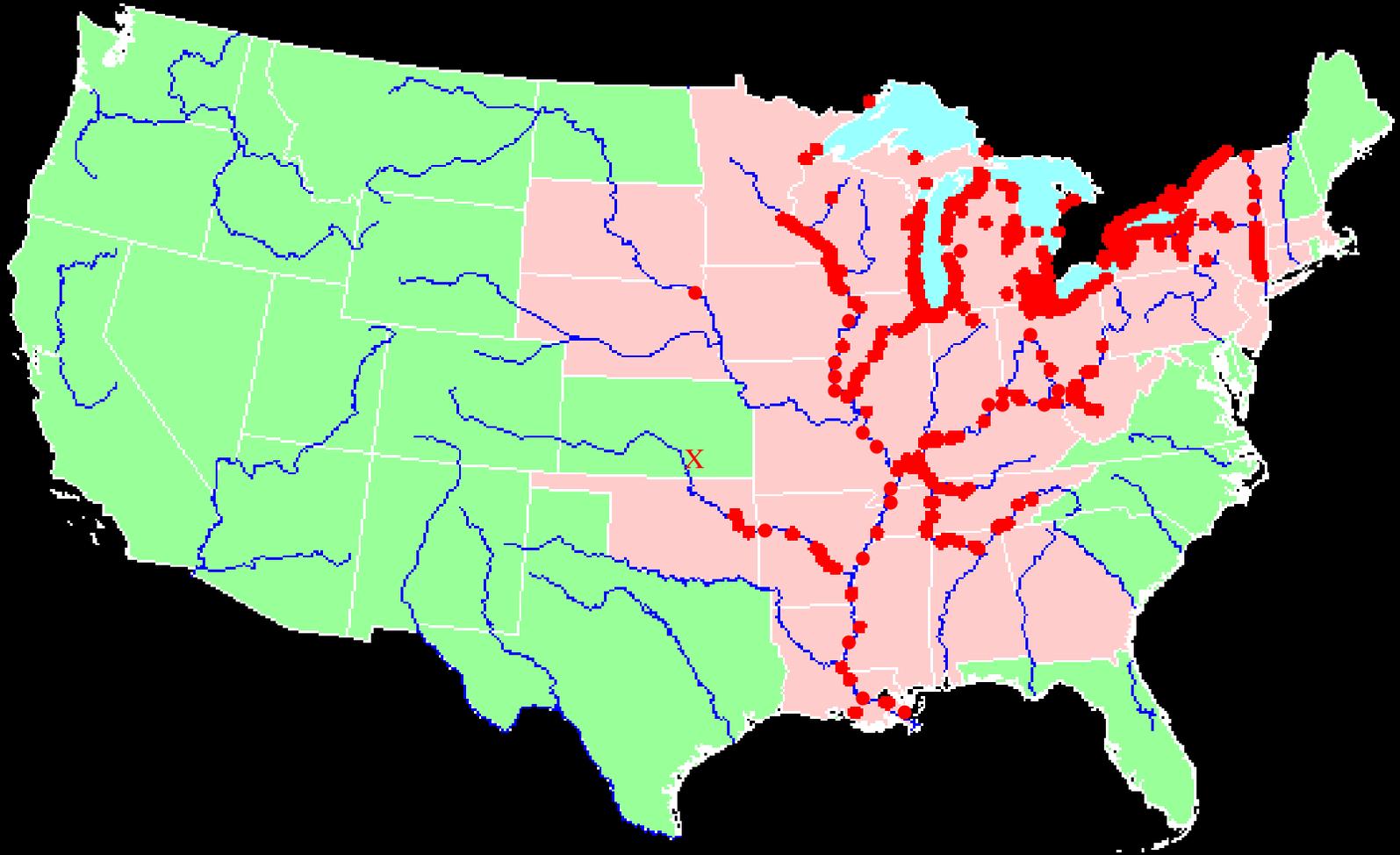
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1993



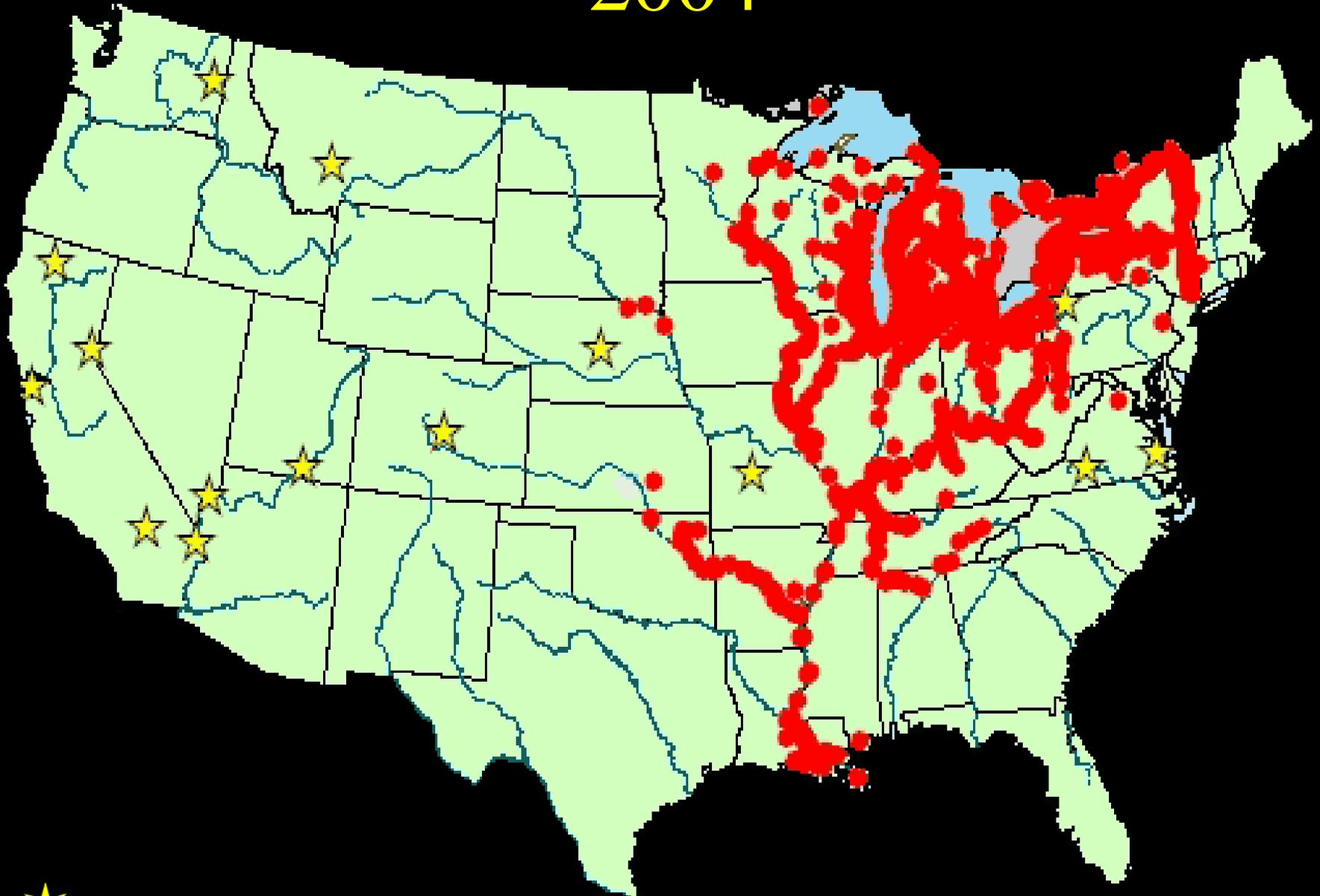
 States with zebra mussels in inland and adjacent waters.

2003



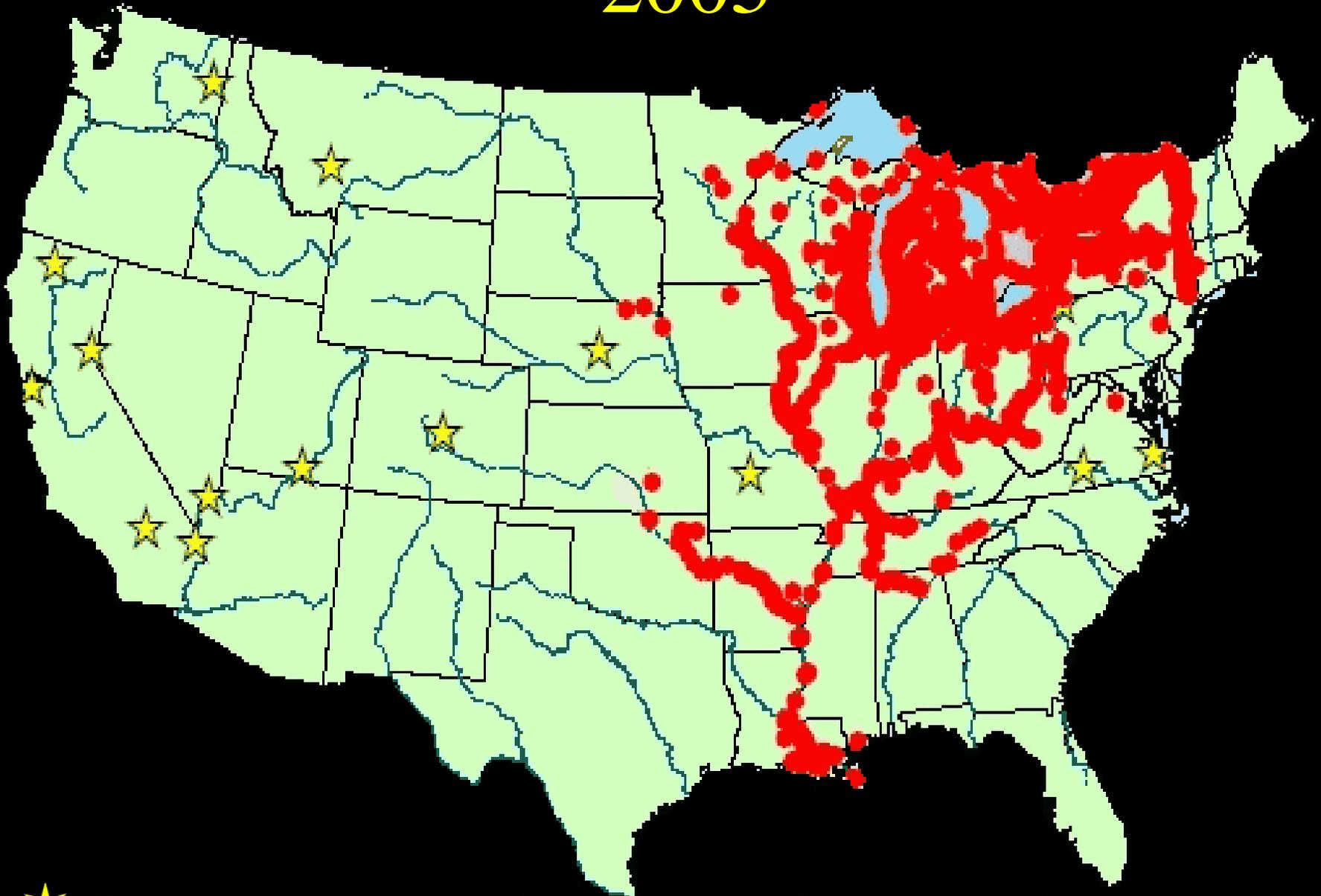
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2004



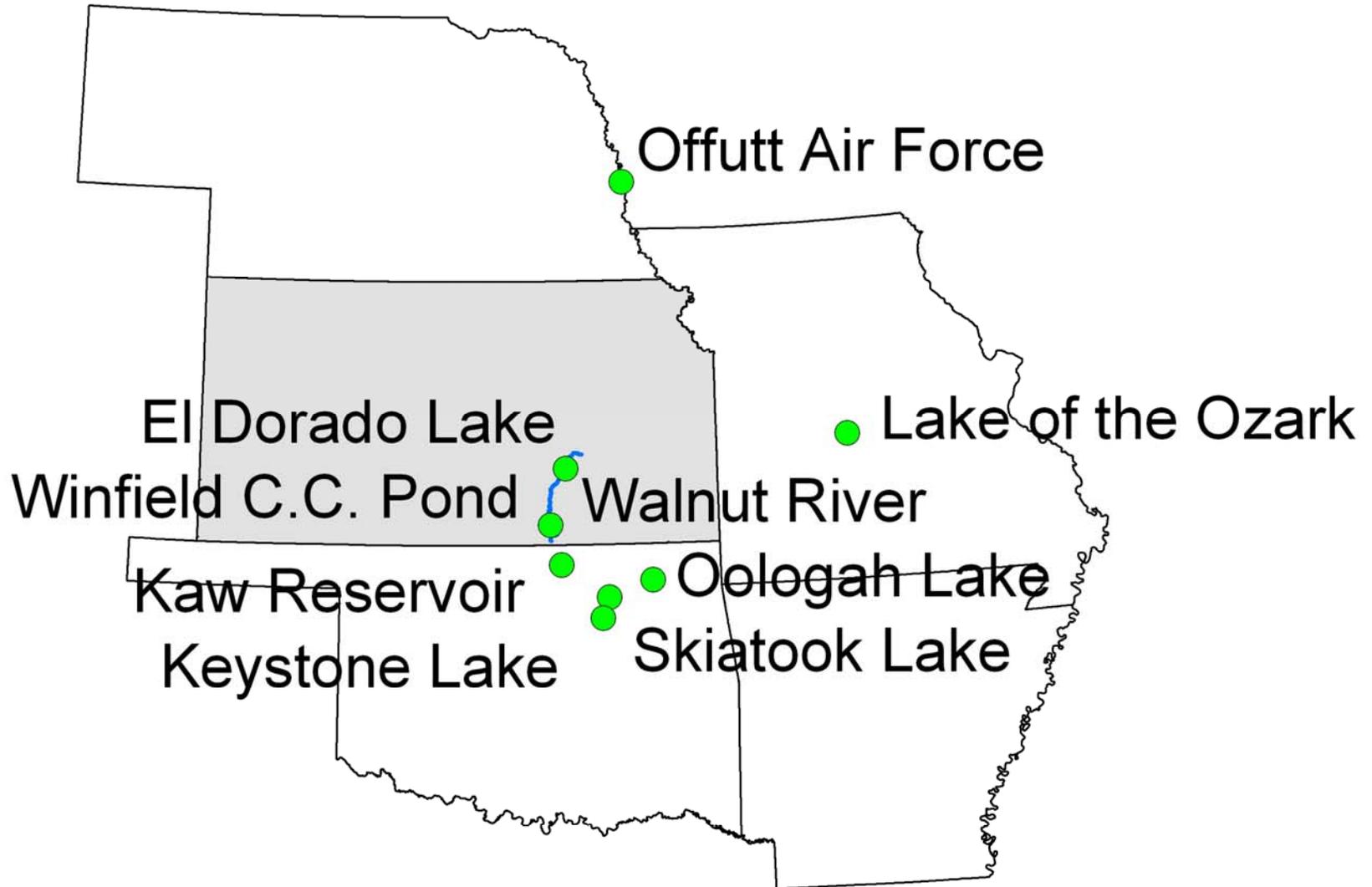
★ Yellow stars represent the discovery of the overland transport of zebra mussels on trailered boats

2005



★ Yellow stars represent the discovery of the overland transport of zebra mussels on trailered boats

# Recent Midwest Region Additions



# How Did They Spread So Quickly?

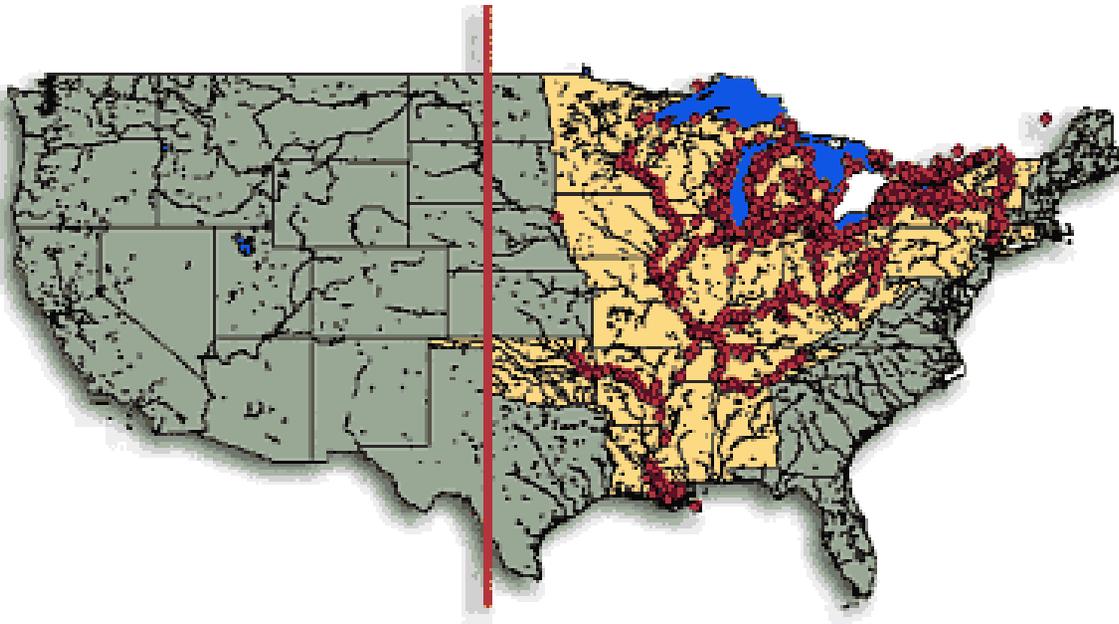


Barge Traffic

Boating and Fishing



## 2000 Zebra Mussel Distribution



● ■ confirmed zebra mussel sightings from 1988 to 2000

the

• 10

- forum for multi-agency cooperation
- Stop the spread of Aquatic Nuisance Species to West at the 100th Meridian



KANSAS AQUATIC NUISANCE SPECIES MANAGEMENT PLAN



State of Kansas  
Kathleen Sebelius, Governor

Kansas Department of Wildlife & Parks  
J. Michael Hayden, Secretary

Prepared by:  
Jason Goeckler  
Aquatic Nuisance Species Coordinator  
1830 Merchant St.-P.O. Box 1525  
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(620) 342-0658



*Kathleen Sebelius*

Approved by Kathleen Sebelius, Governor

04/26/09

Date

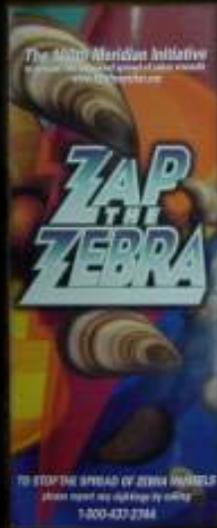
Wh

as?

[http://www.kdwp.state.ks.us/news/fishing/aquatic\\_nuisance\\_species/ks\\_nuisance\\_species\\_plan](http://www.kdwp.state.ks.us/news/fishing/aquatic_nuisance_species/ks_nuisance_species_plan)

# Promotion of Public Education

- Informative pamphlets



## ATTENTION BOATERS

ZEBRA MUSSELS HAVE BEEN FOUND IN THIS LAKE

PLEASE TAKE THE FOLLOWING PRECAUTIONS WHEN LEAVING THIS AREA

REMOVE ANY VEGETATION FROM BOAT AND TRAILER

CLEAN ANY MUD ON ANCHORS

DRAIN BILGE AND LIVEWELLS, DO NOT TRANSPORT WATER TO OTHER LAKES

BLOW WATER FROM JET DRIVES ON JET SKIS

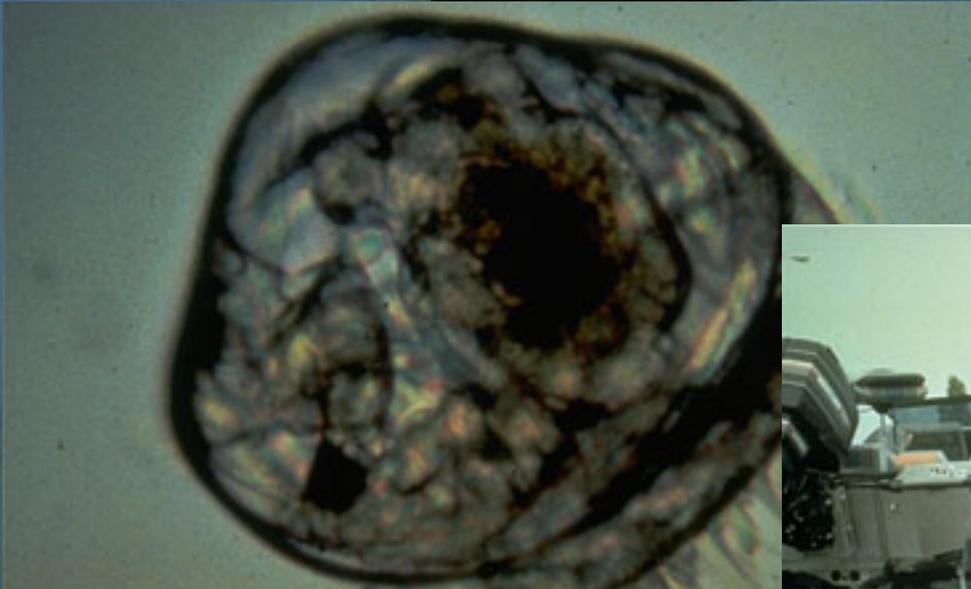
LET BOAT DRY FOR 5 DAYS BEFORE LAUNCHING IN OTHER LAKES, OR POWER WASH WITH HOT SOAPY WATER

DISPOSE OF ALL BAIT, DO NOT PLACE UNUSED BAIT IN LAKE

DO NOT TRANSPORT ZEBRA MUSSELS FROM THIS LAKE



Procedure



L. Johnson



C. Ramcharan

oling system  
diately if you find

# Some Methods Investigated to Help Control Zebra Mussels

- Chemical molluscicides:
  - Oxidizing (chlorine, chlorine dioxide) and Non-oxidizing
- Manual removal (pigging, high pressure wash)
- Dewatering/Desiccation
- Thermal
- Acoustical vibration
- Electrical current
- Filters, Screens
- Coatings: Toxic (copper, zinc) and Non-toxic (silicone-based)
- Toxic constructed piping (copper, brass, galvanized metals)
- Carbon dioxide injection
- Ultraviolet light
- Flushing

# Unsuccessful Mitigation Strategy Tried in Kansas December 2003 Lake Drawdown Freezing and Desiccation



# Successful Mitigation Strategy in Millbrook Quarry Virginia



12-acre, 93 ft deep

174,000 gallons of potassium chloride solution

Target concentration: 100 mg/L (2X minimum needed to kill)

# Permitting, Regulations, and Law Considerations

1. Develop and draft a contingency plan before a potential future infestation
2. This will allow KDHE permitting staff to review, address permitting questions regarding regulations and law considerations, and research the effect of the controlling agent (e.g., chemical application) on the environment and verify it is understood and documented

# Regulations and Laws Considerations

- Application of the state of Kansas Water Quality Standards
- National Pollutant Discharge Elimination System (NPDES)
- Endangered Species Act (ESA Section 7)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- National Environmental Policy Act (NEPA)
- Physical Removal
- Cost/benefit

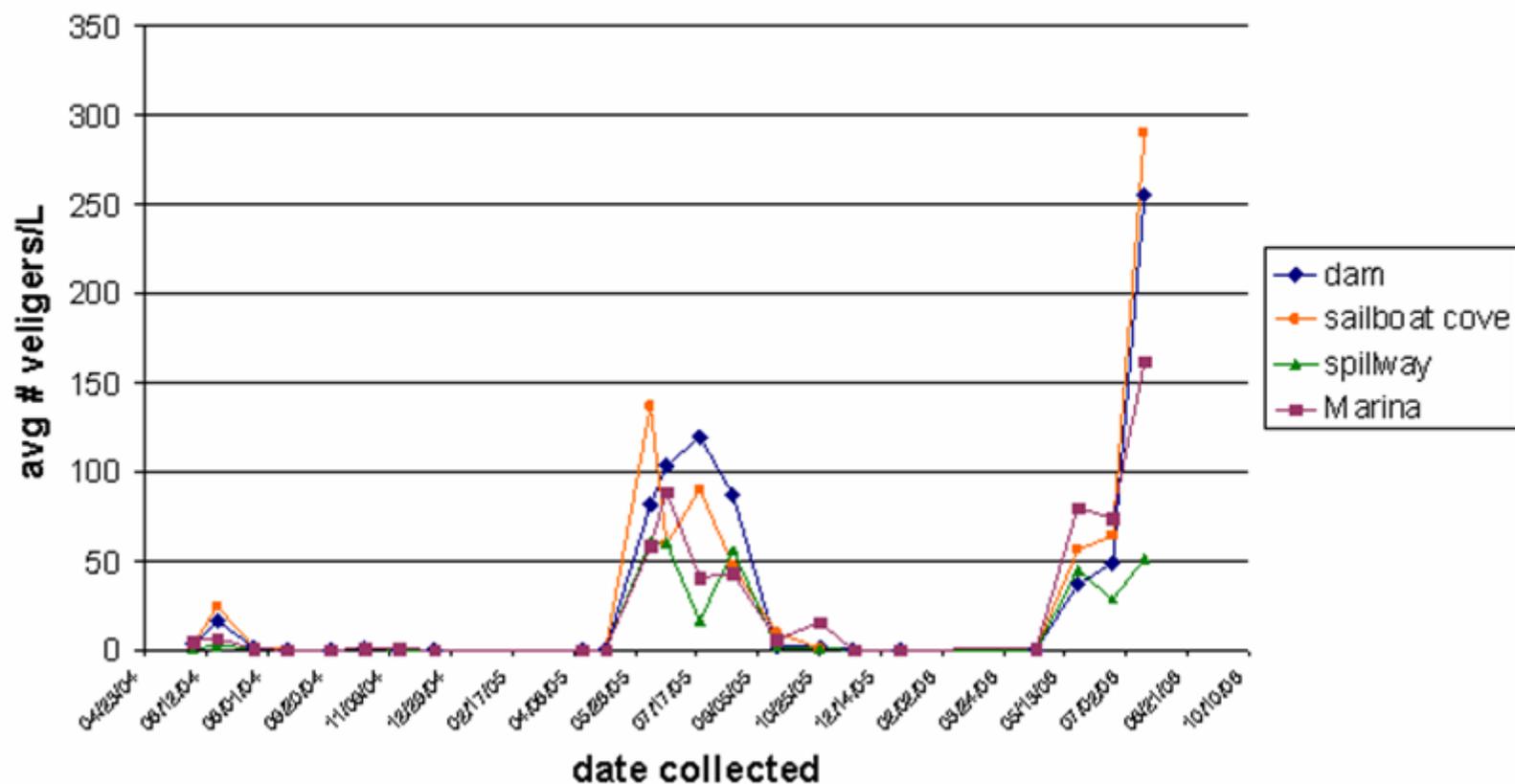
# KDWP Tracking



PSU Center for Lakes and Reservoirs

# El Dorado Reservoir Zebra Mussel Veliger Sampling Sites Sept. 3, 2003

## Veliger densities in Eldorado Lake



# KDHE Tracking



# Walnut River near Gordon, Kansas



# Walnut River near Gordon, Kansas



# Zebra Mussel Byssal Threads

## Walnut River near Gordon, Kansas



# For more information

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- Tony Stahl
  - 785-296-5578
  - [Tstahl@kdhe.state.ks.us](mailto:Tstahl@kdhe.state.ks.us)
- Web Resources
  - [www.kdwp.state.ks.us](http://www.kdwp.state.ks.us)
  - <http://el.erdc.usace.army.mil/zebra/zmis/>

**WANTED**

**ZEBRA MUSSELS**

**DEAD**



# Acknowledgements

- Tom Mosher, Aquatic Research, Kansas Department of Wildlife and Parks
- Jason Goeckler, Aquatic Nuisance Species Coordinator, Kansas Department of Wildlife and Parks
- Mike Butler, Data Management, Kansas Department of Health and Environment