Dreissena

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Byssal Threads

Byssal Threads

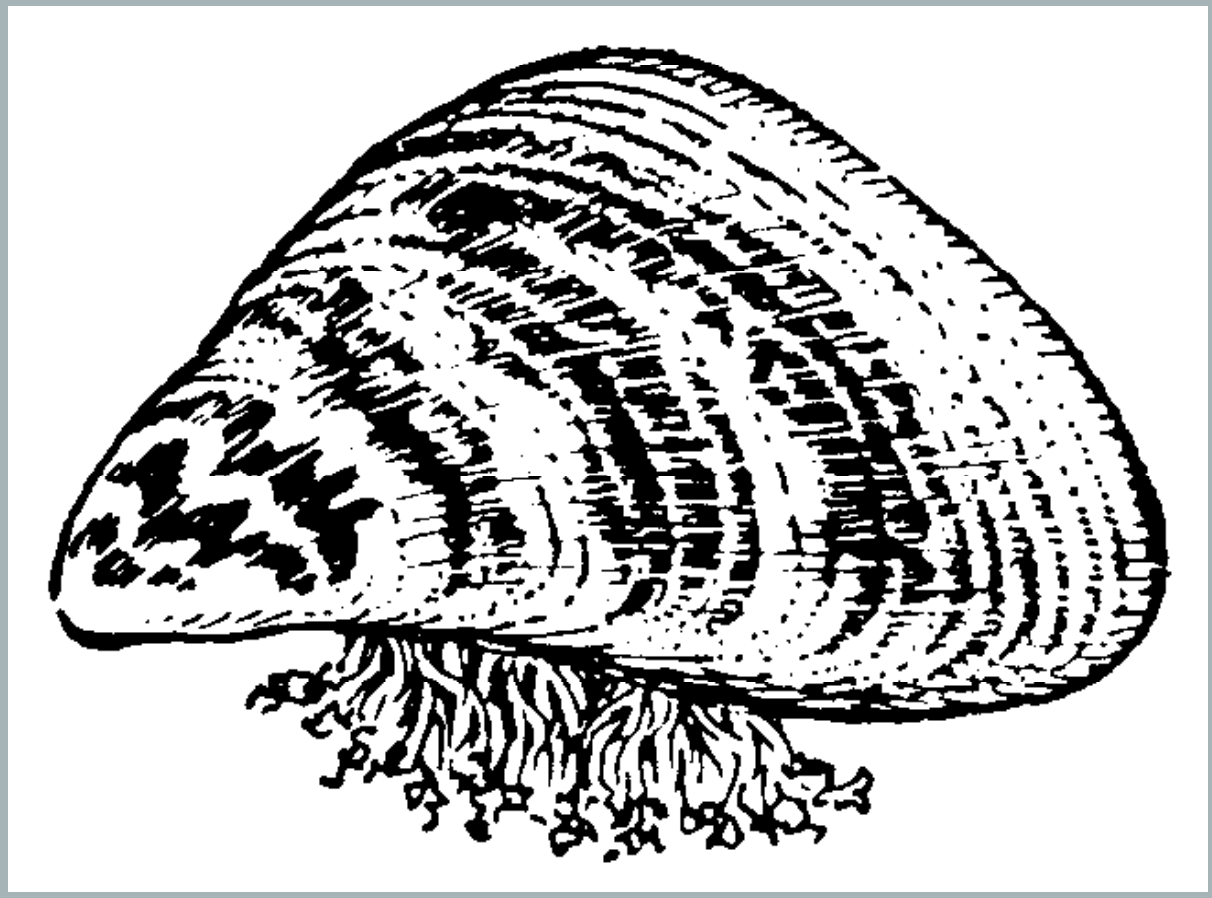
Inside Pipe

Recovered Concrete Block

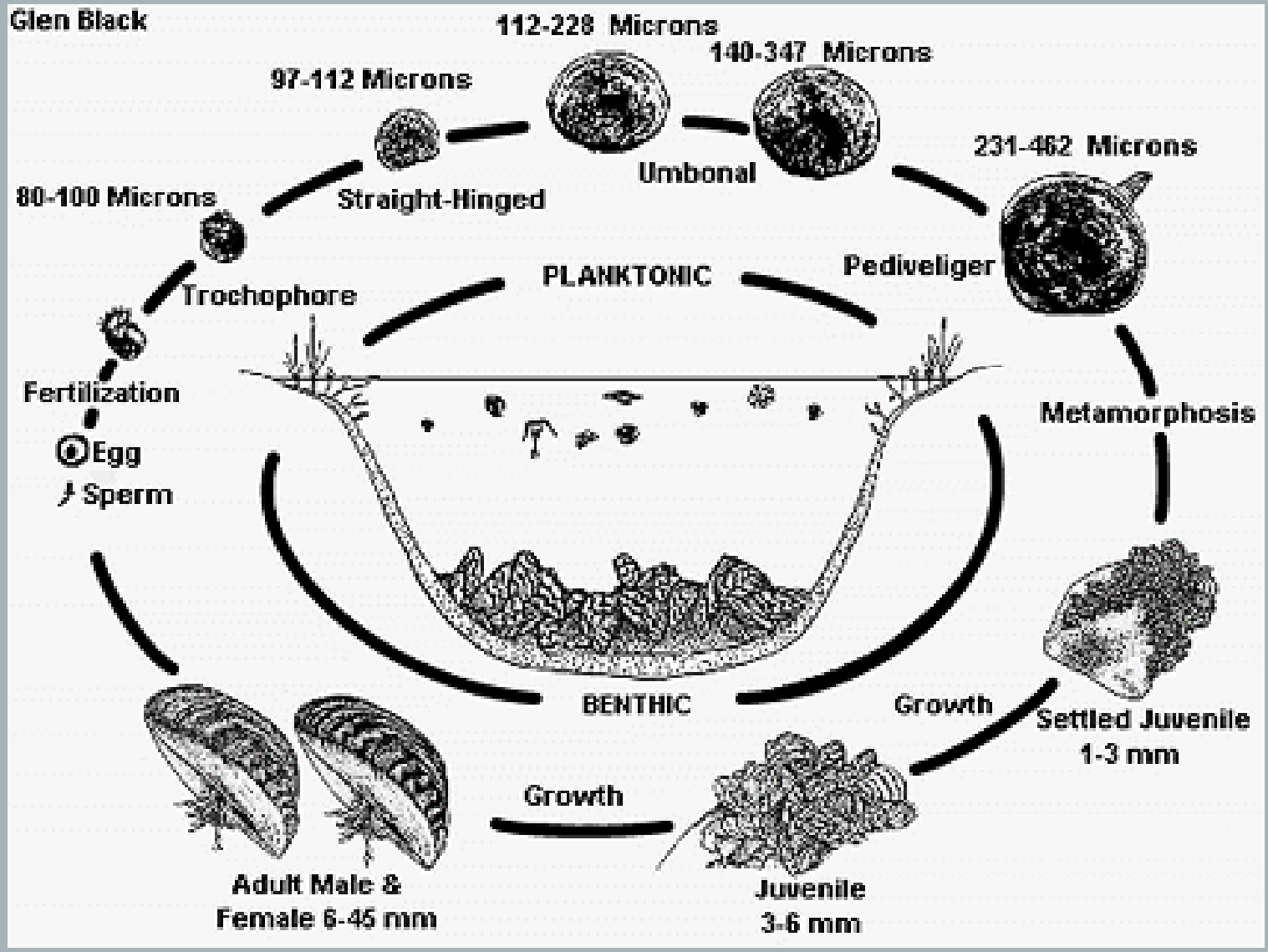
Recovered Car

Oologah Lake ~ Toy Watergun

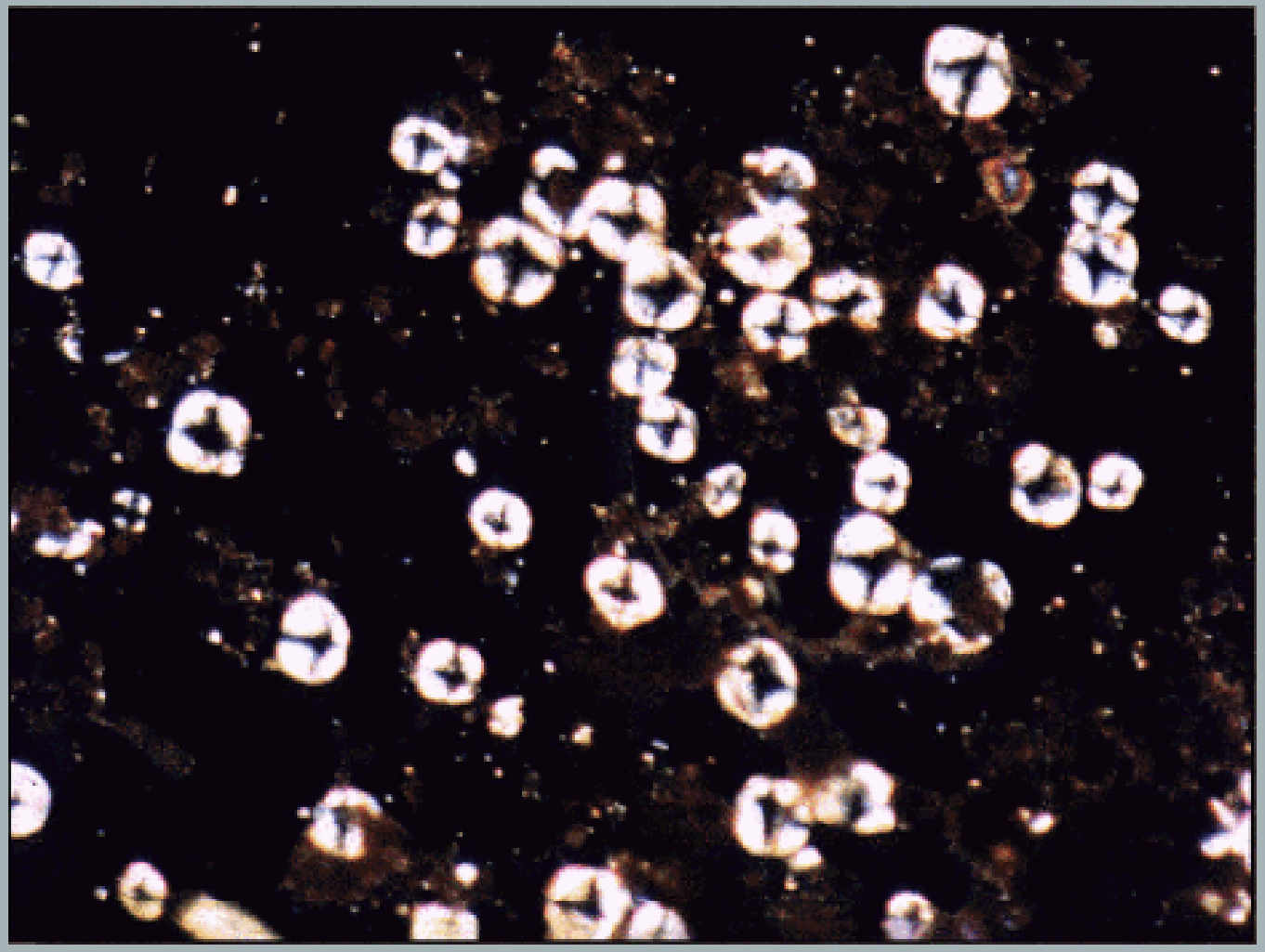
Basic Biology & Ecology



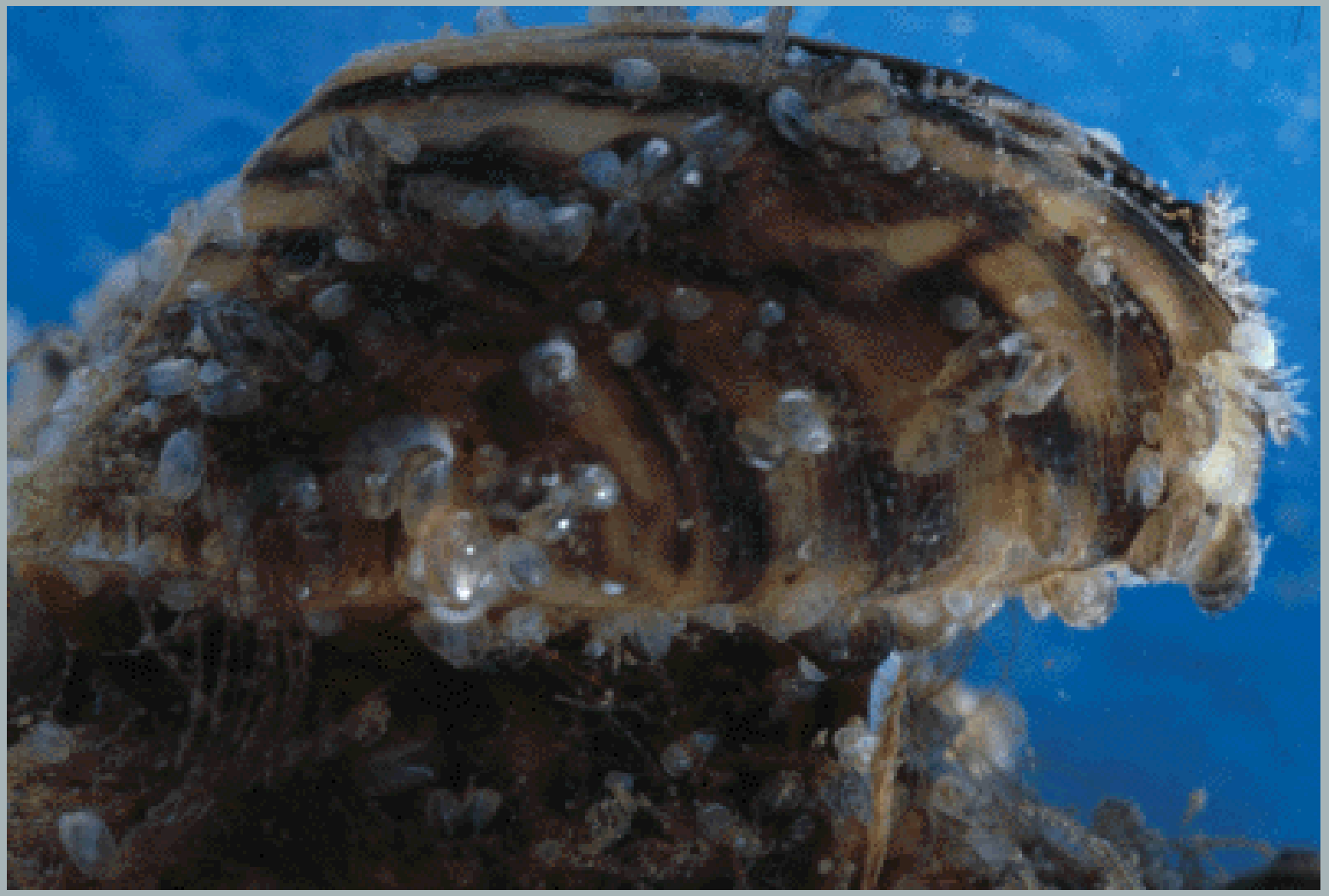
Zebra Mussel Life Cycle



Veliger Identification



Young Adults



Veliger Velum

Adult Siphons

Historically

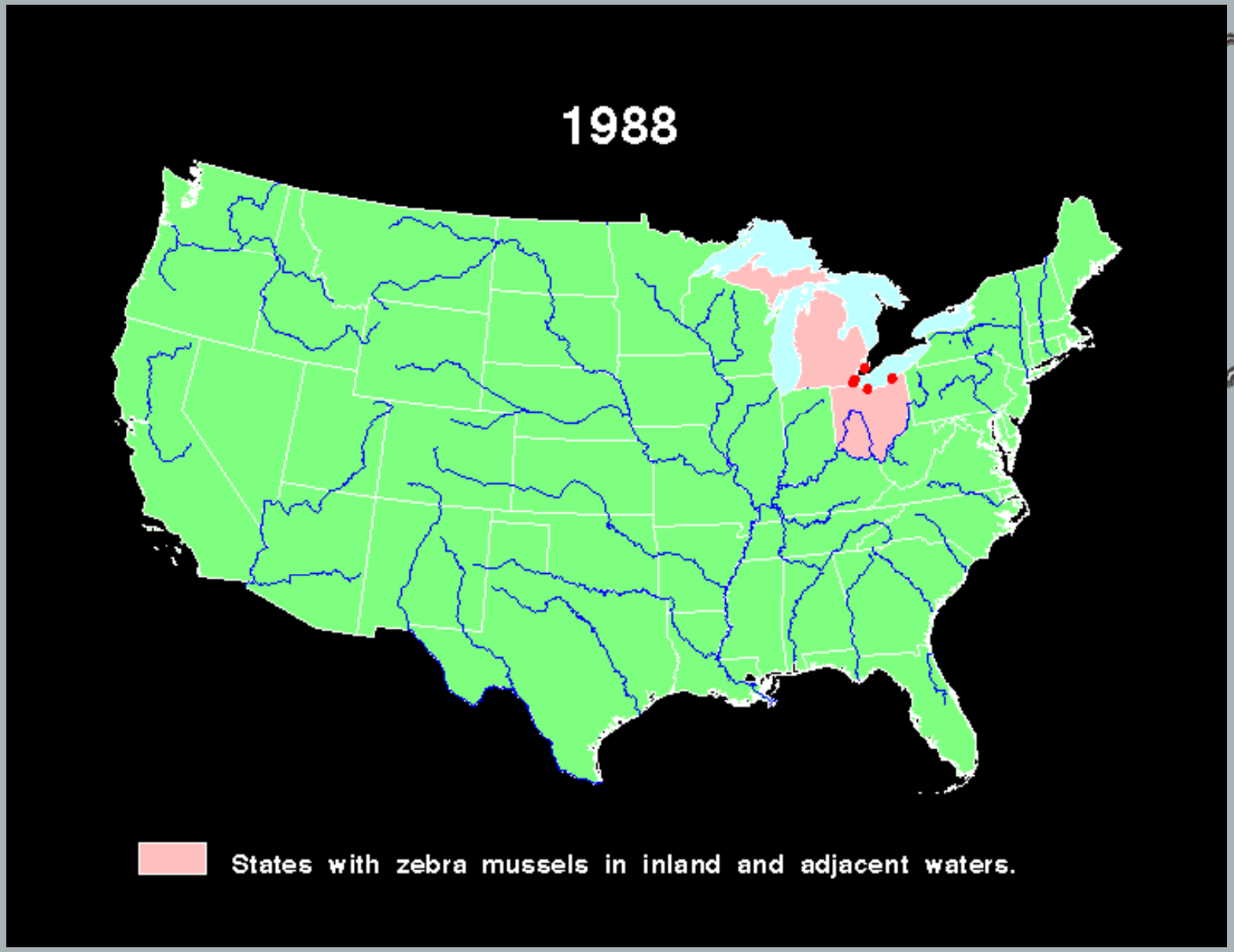
Cold-water species.

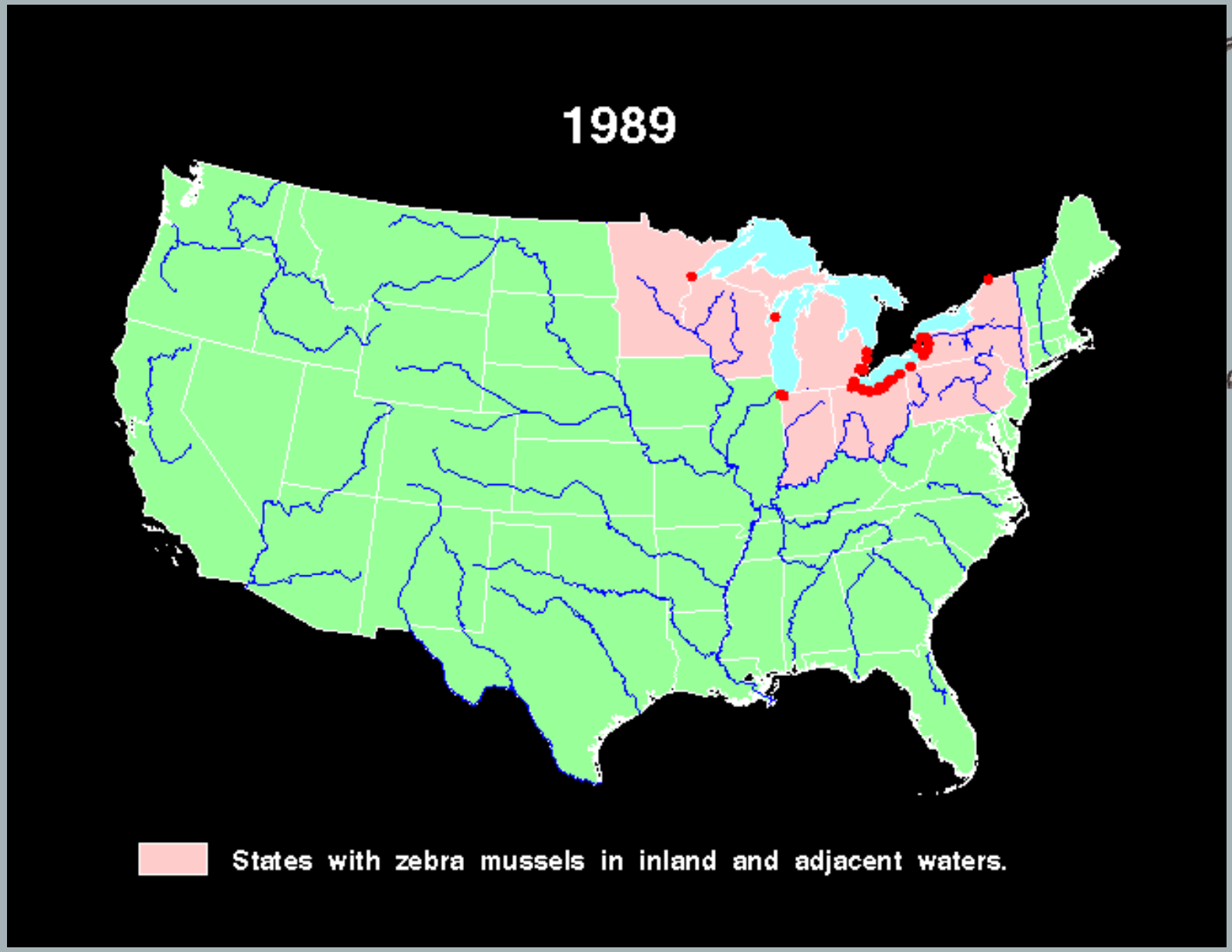
- *Spawn 1 or 2 times per season.*
- *Spawn from 54^{o} to 80^{o} F.*
- *Become stressed at 86^{o} F, die within a few weeks.*
- *Die within 5 hours at 90^{o} F.*
- *Grow @ 3mm/mo w/ @ 1 cm per year.*
- *Filter 1 liter of water per day.*

Zebra Mussel Environmental Tolerances

VARIABLES	HIGH	MODERATE	LOW	VERY LOW
Dissolved Oxygen (ppm)	8 – 10	6 – 8	4 – 6	<4
Water Temperature (C/F)	18/64 – 25/77	16/61 – 18/64 25/77 – 28/82	9/48 – 25/77 28/82 –30/86	<8/46 >30/86
Total Hardness (mg CaCO3/l)	90 – >125	45 – 90	25 – 45	<25
Calcium (ppm)	25 – 125	20 – 25	9 – 20	<9
pH	7.5 – 8.7	7.2 – 7.5 8.7 – 9.0	6.5 – 7.2	<6.5 >9.0
Salinity (ppt)	0 – 1	1 – 4	4 – 10	10 – 35
Conductivity (μ Siemens)	83 – >110	37 – 82	22 – 36	>22
Turbidity (secchi disk cm)	40 – 200	20 – 40	10 – 20 200 – 250	<10 >250
Water Velocity (m/sec)	0.1 – 1.0	.09 – 0.1 1.0 – 1.25	.075 - .09 1.25 – 1.5	<.075 >1.5

From European & North American Sources *C.O'Neill, NY Sea Grant, Mar 96*


1988
States with zebra mussels in inland and adjacent waters.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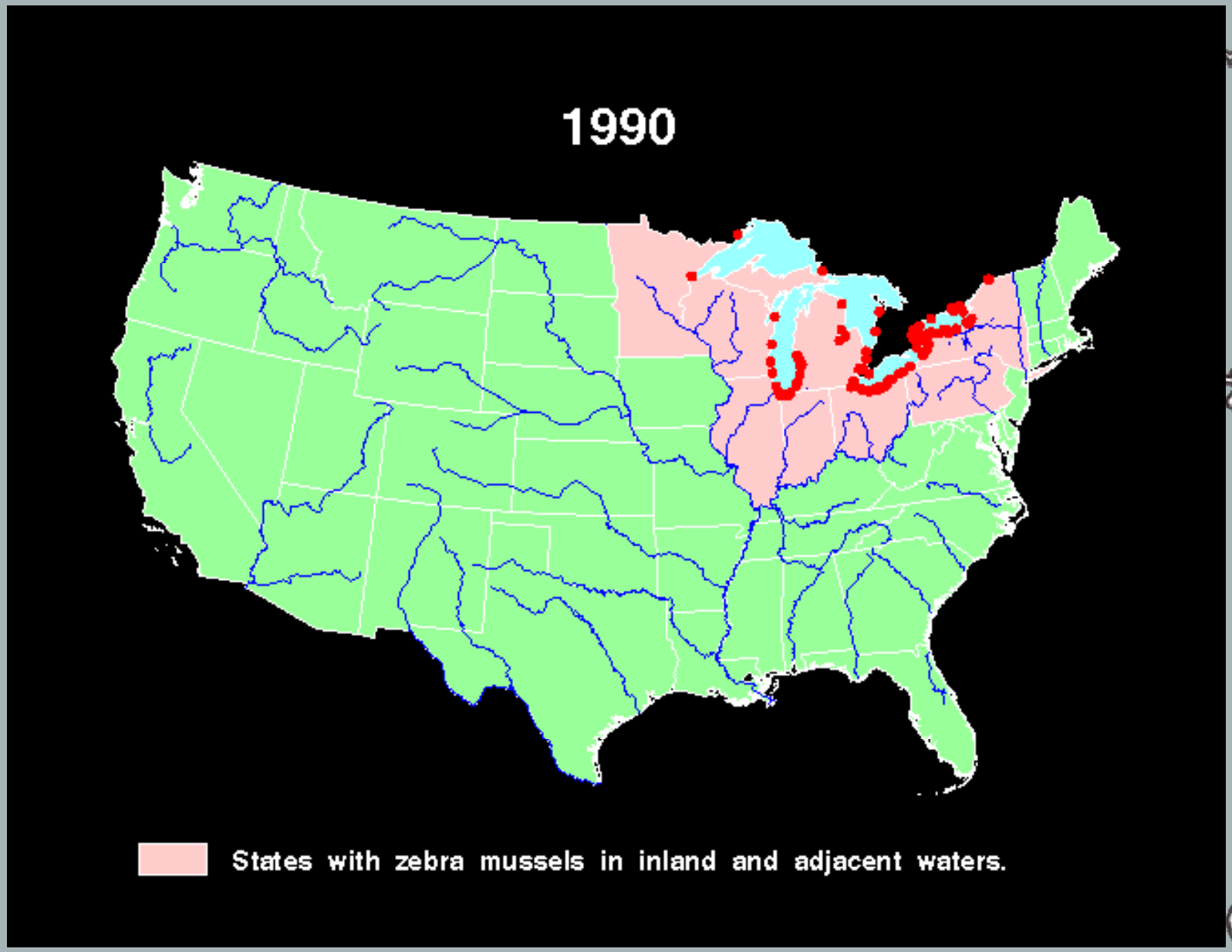
States with zebra mussels in inland and adjacent waters.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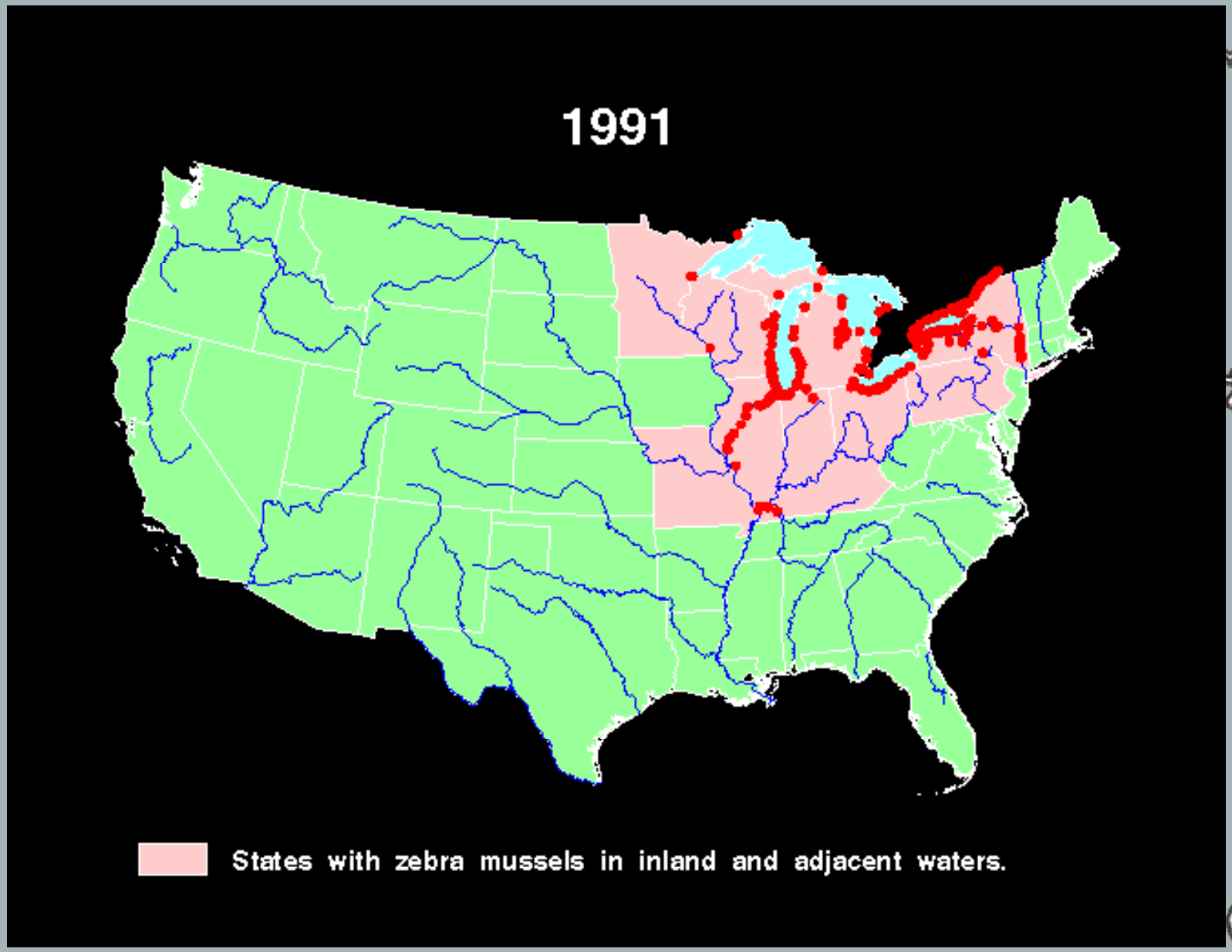
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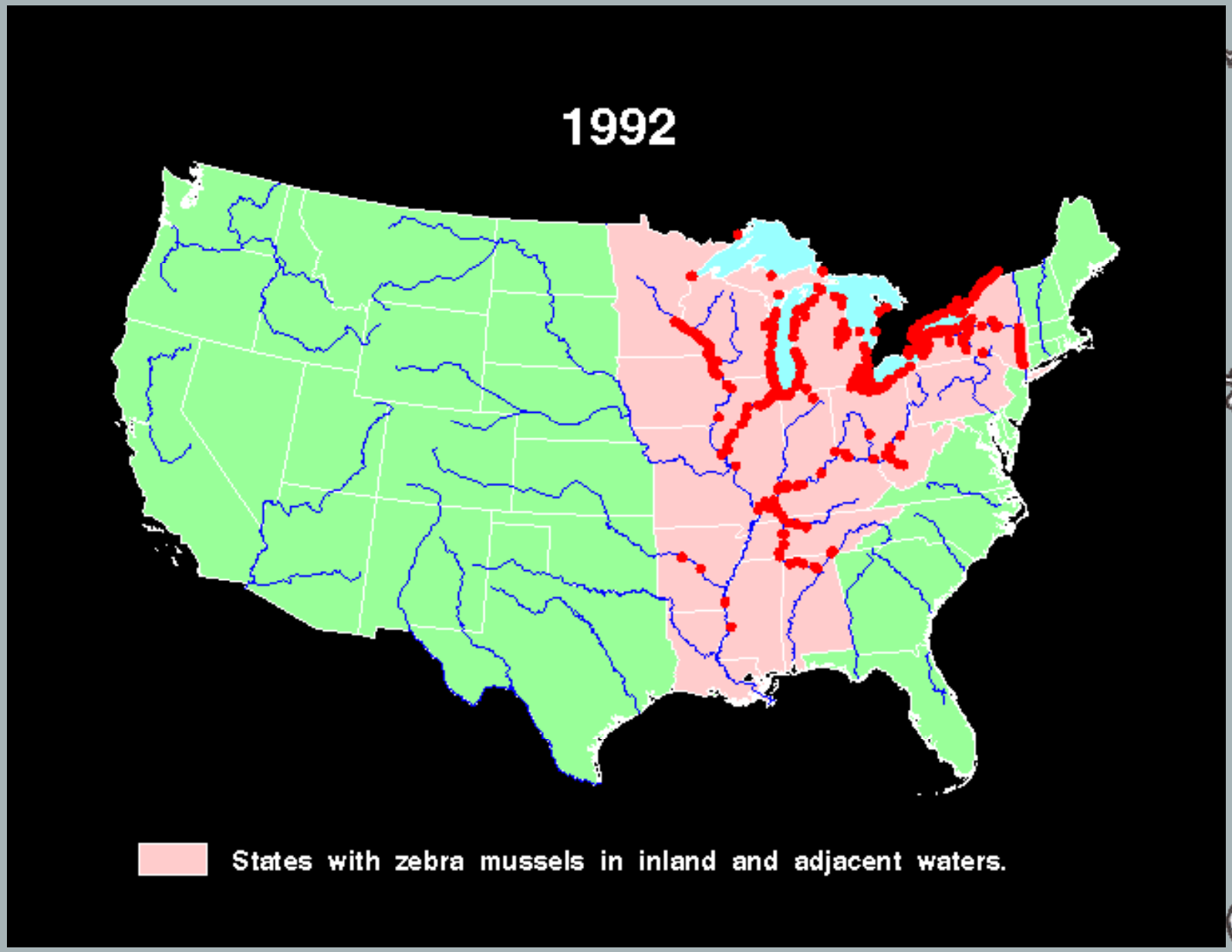
States with zebra mussels in inland and adjacent waters.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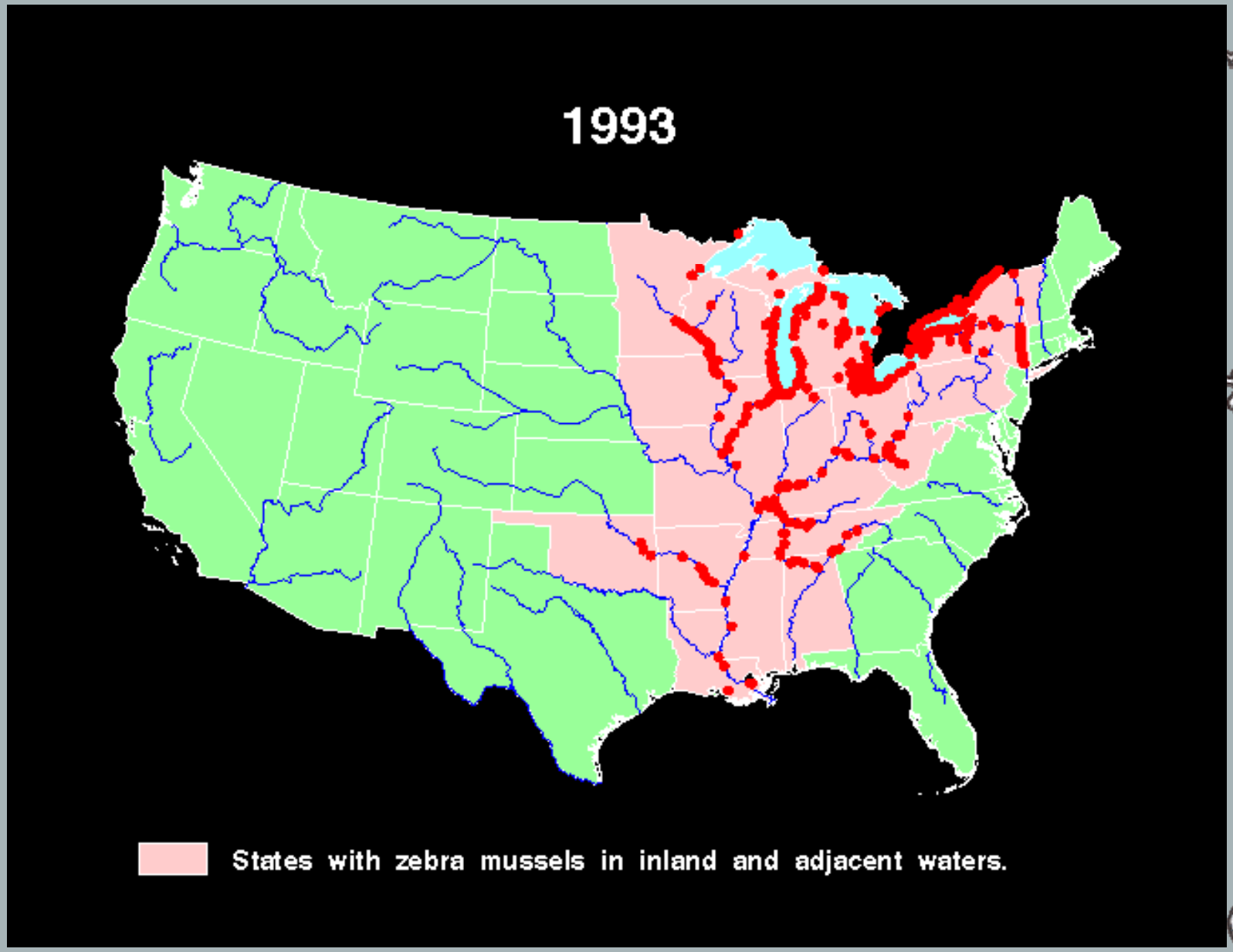
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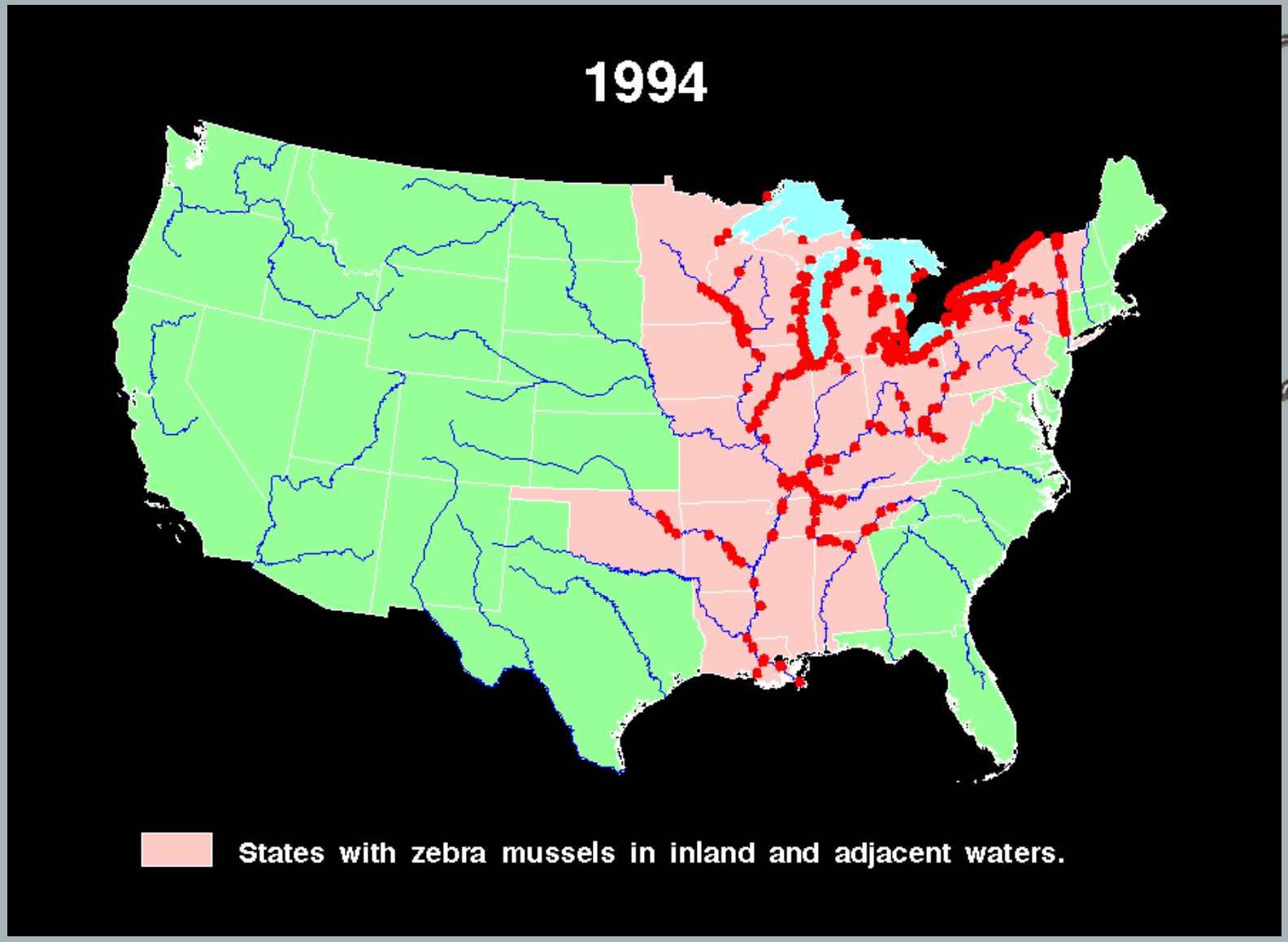
States with zebra mussels in inland and adjacent waters.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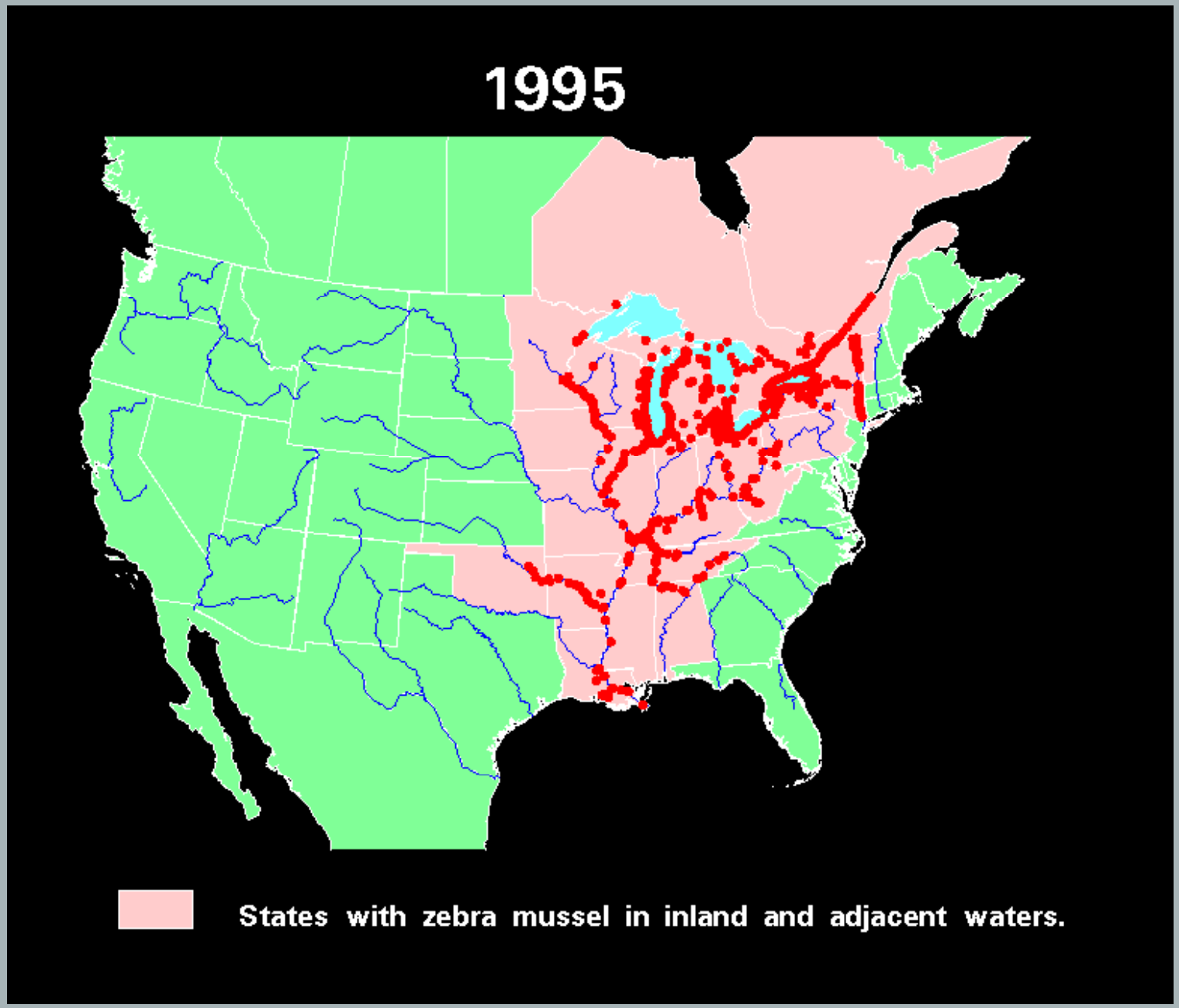
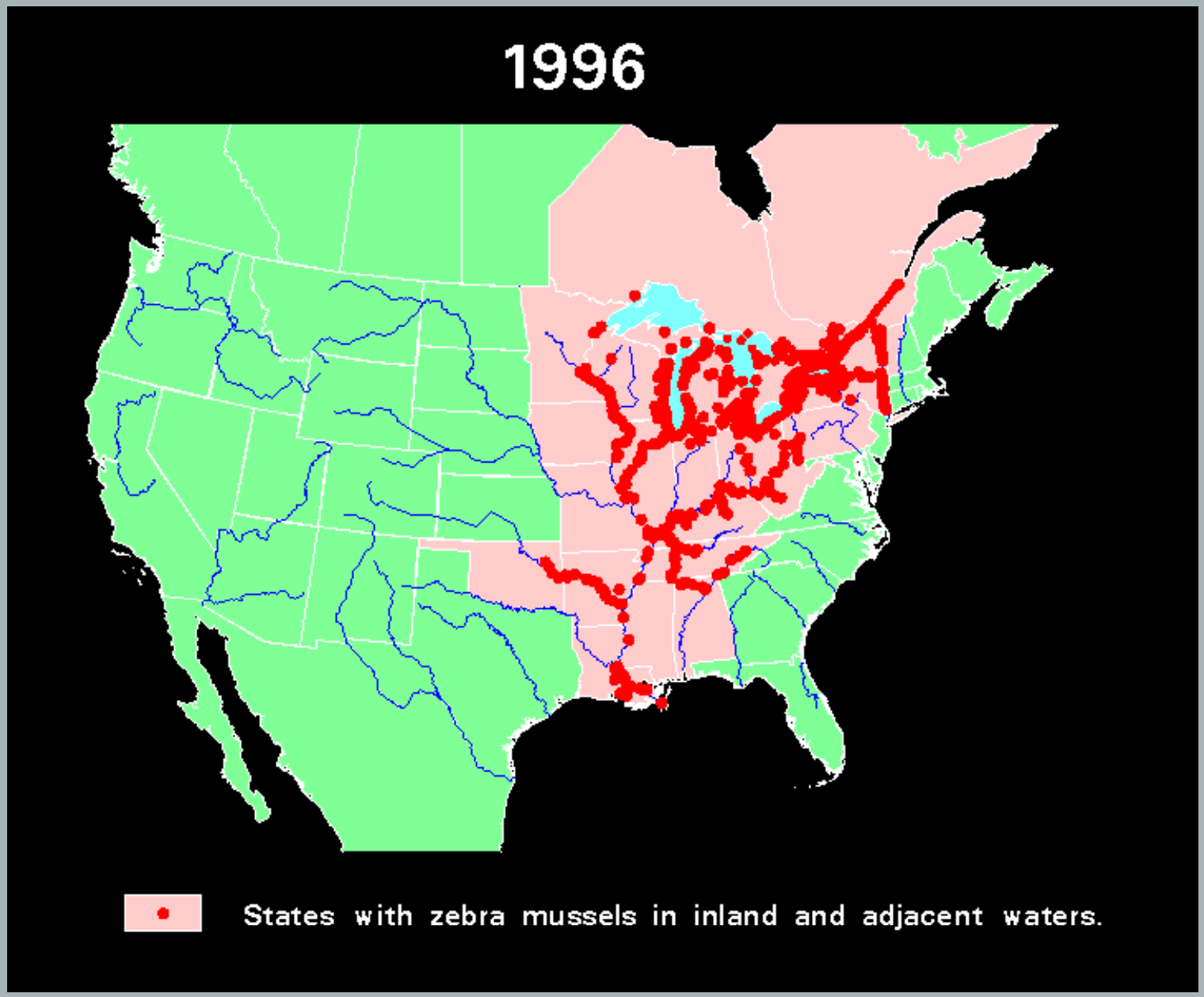
States with zebra mussels in inland and adjacent waters.


1995
States with zebra mussel in inland and adjacent waters.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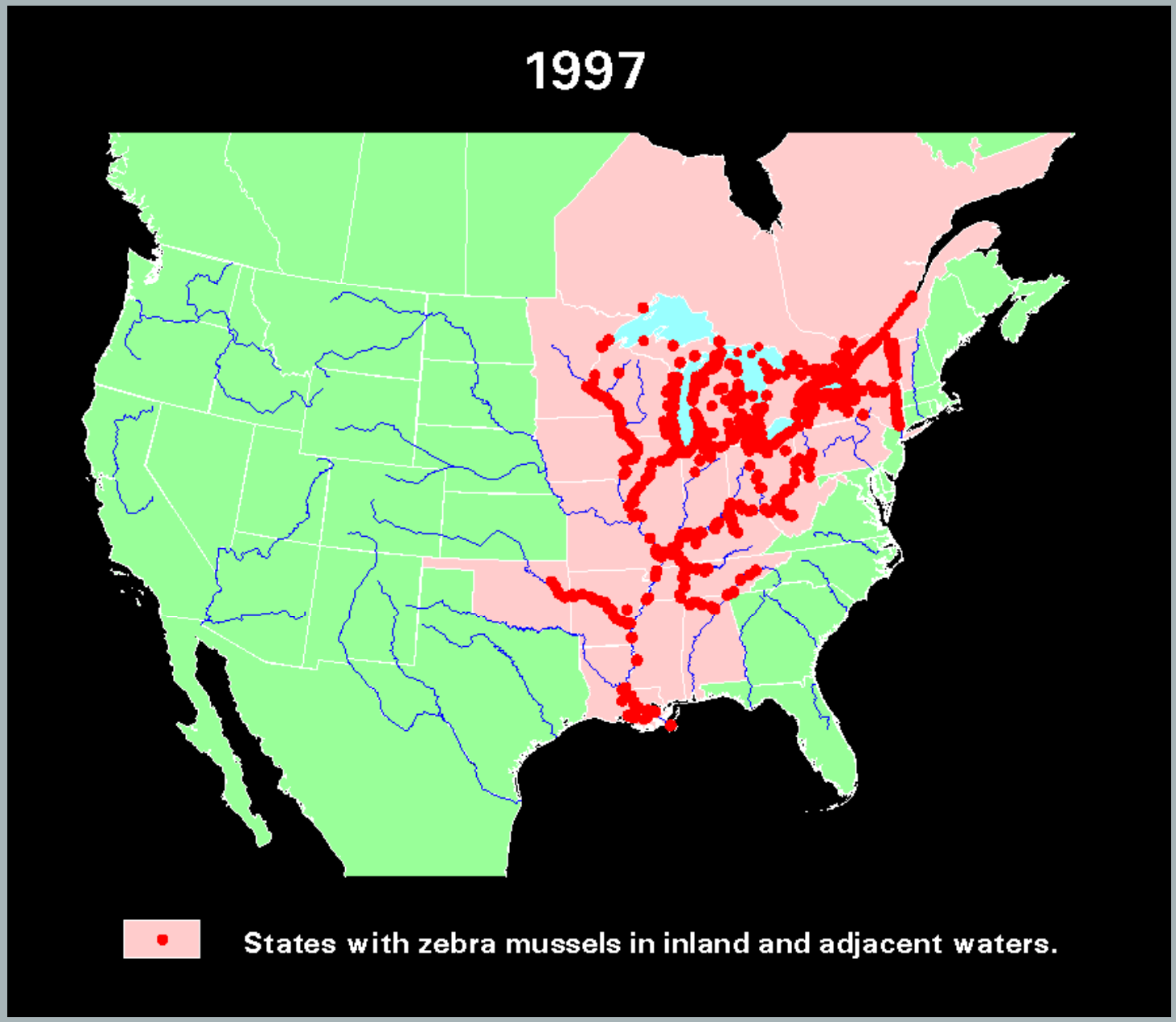
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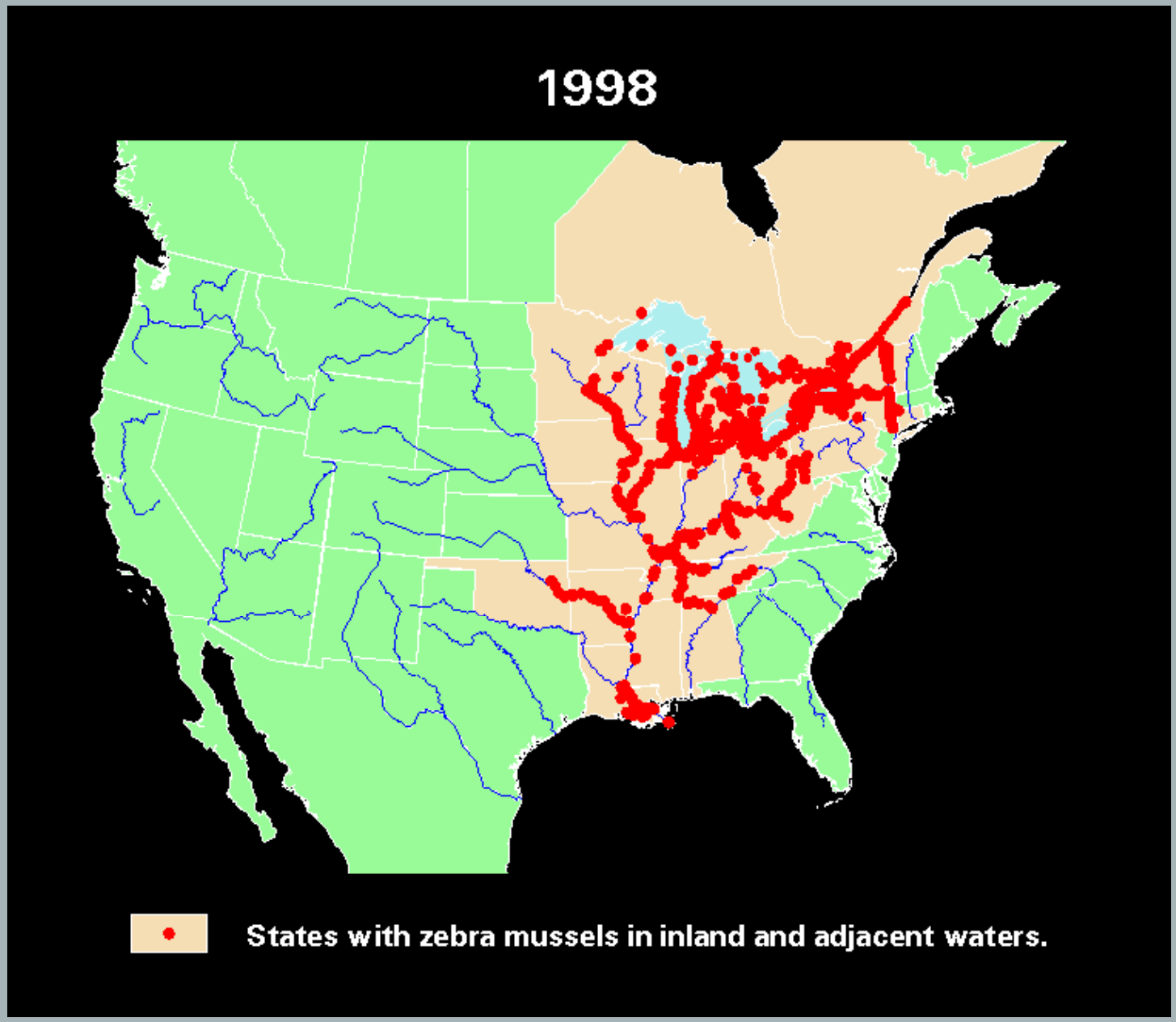
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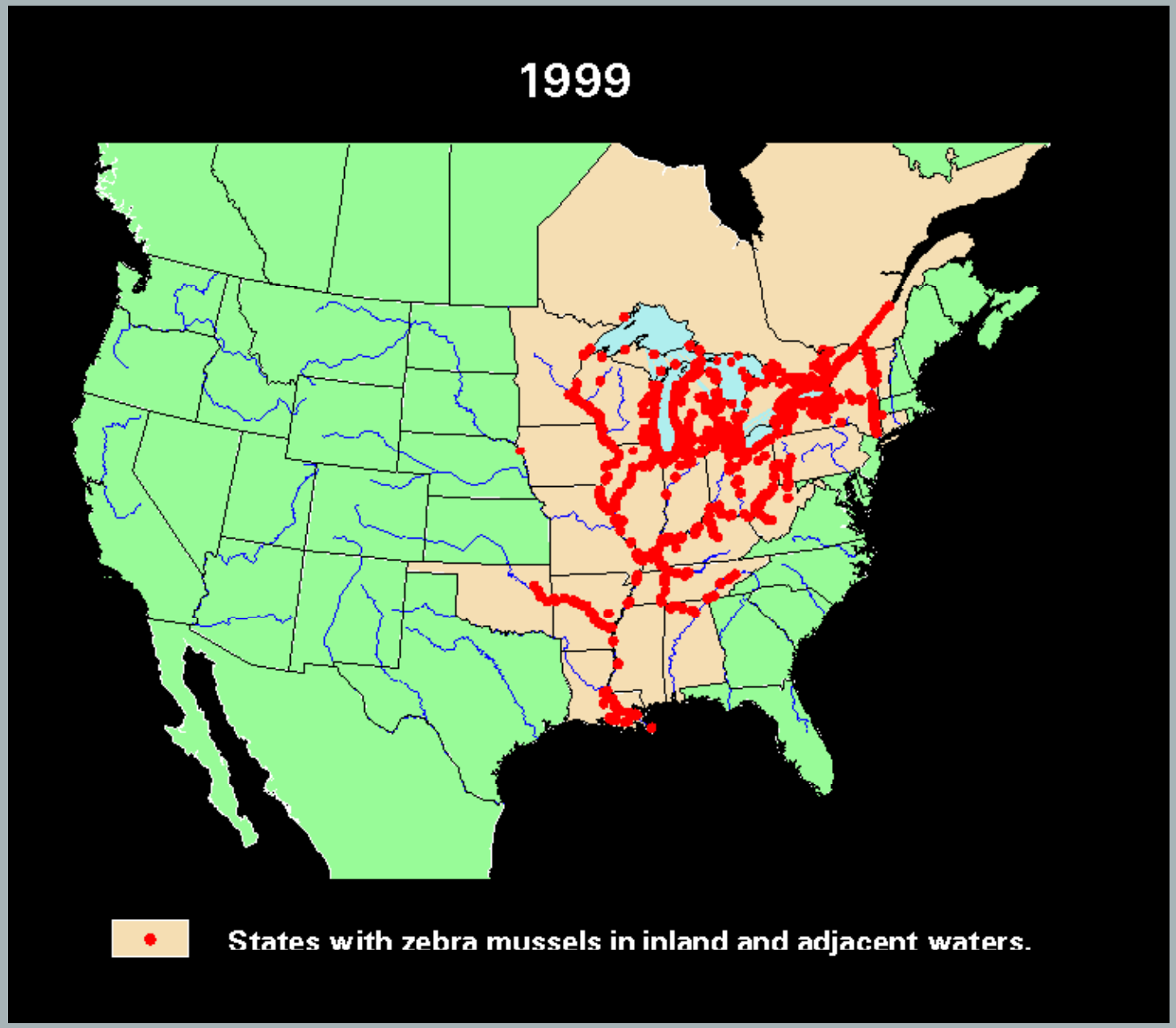
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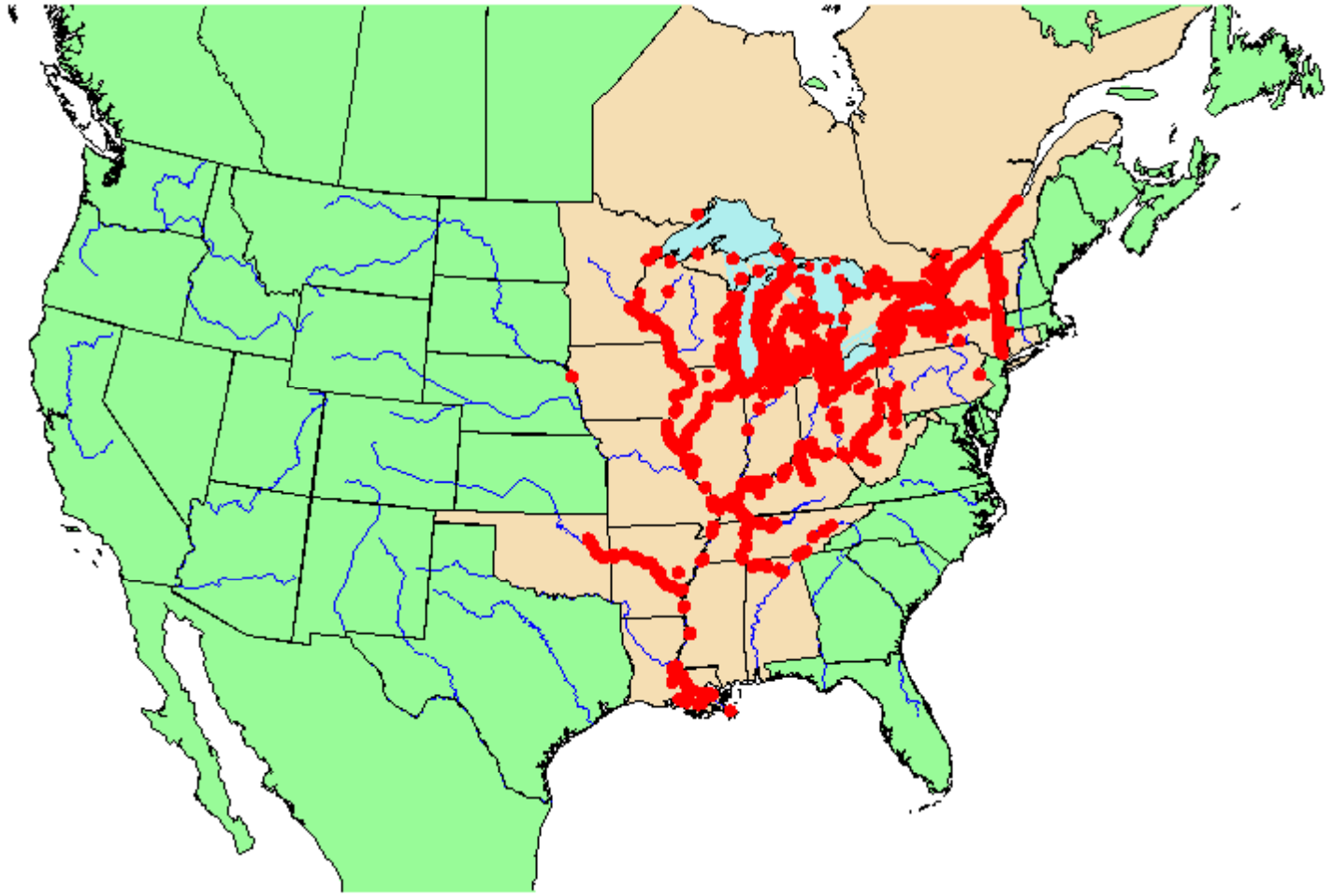
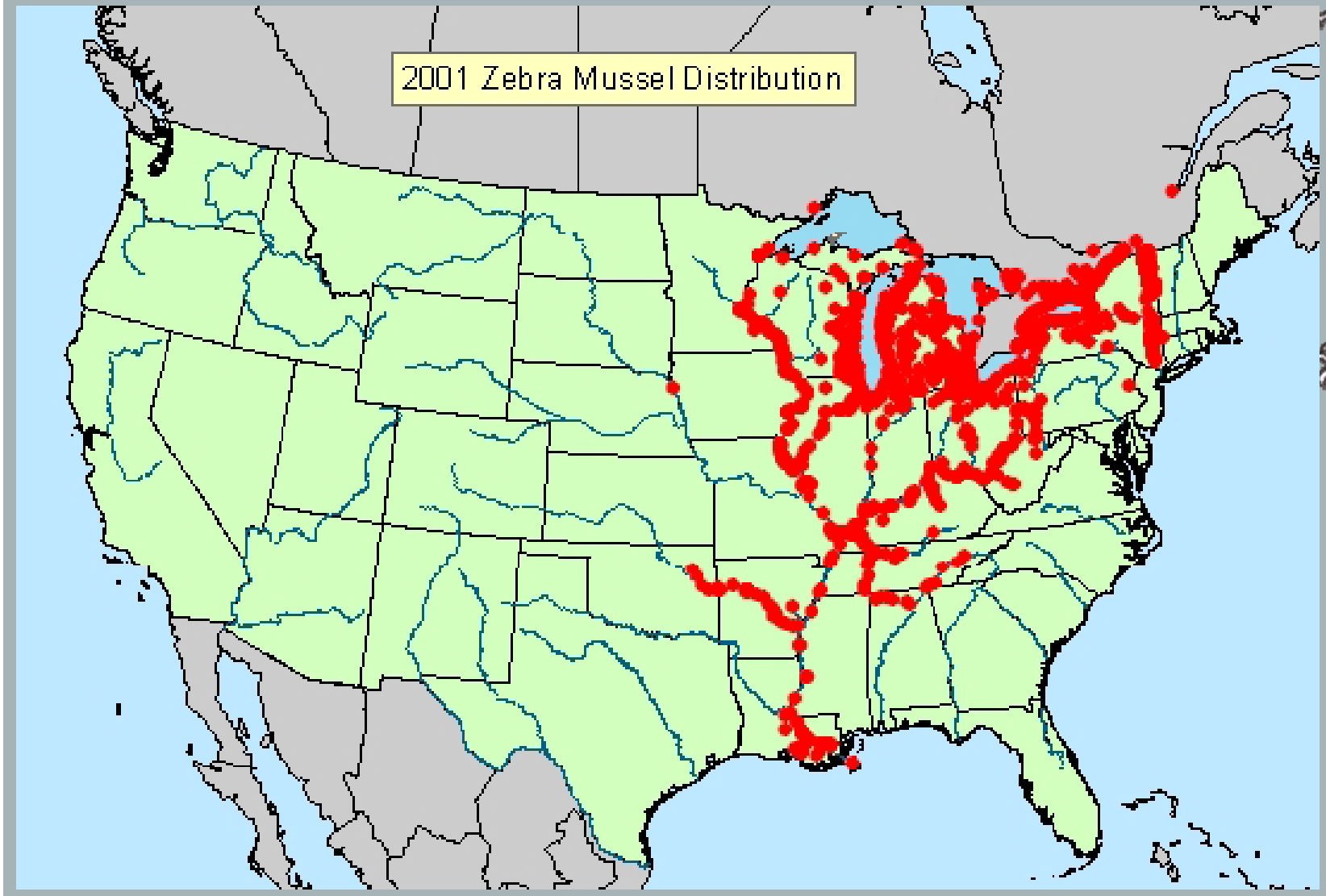
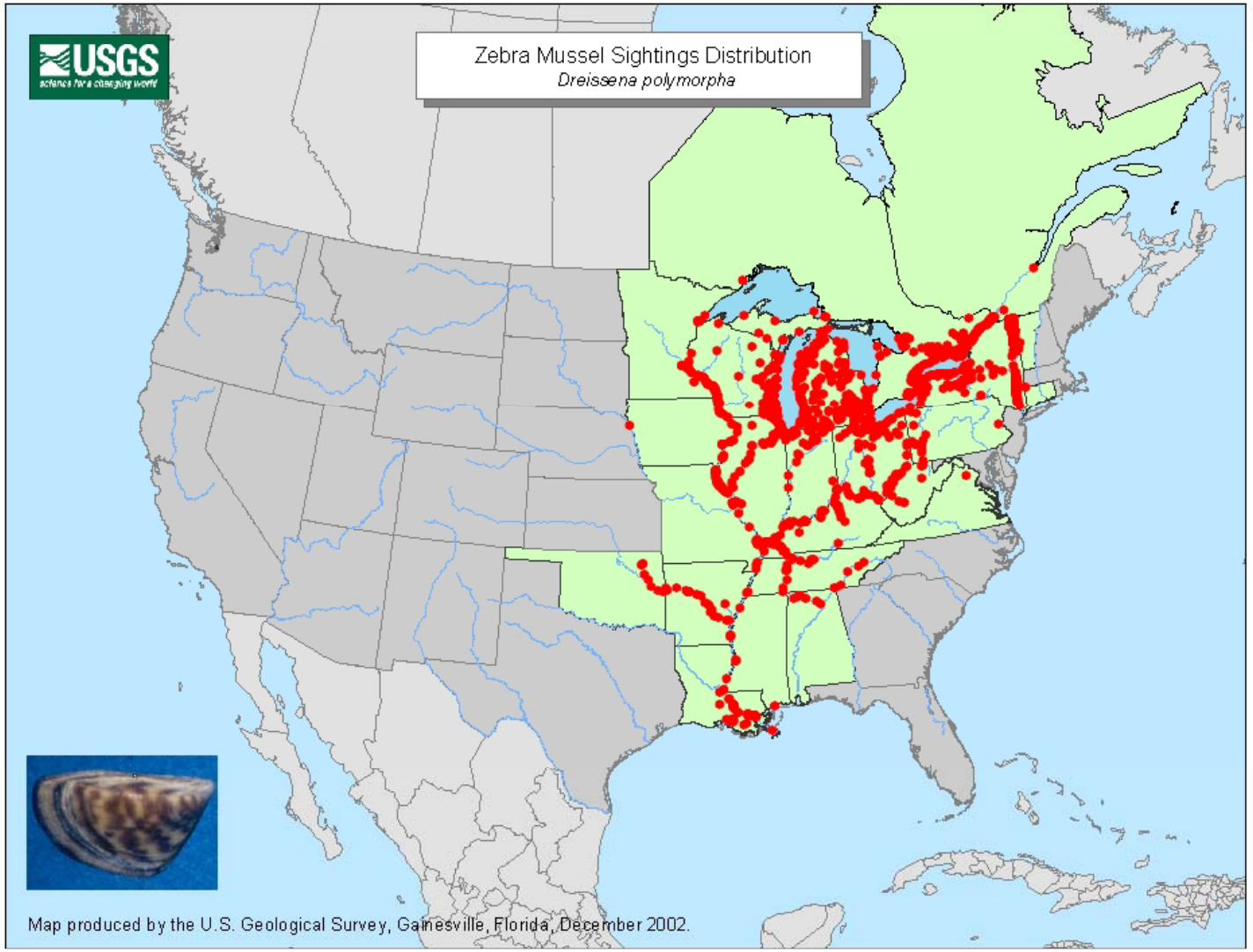
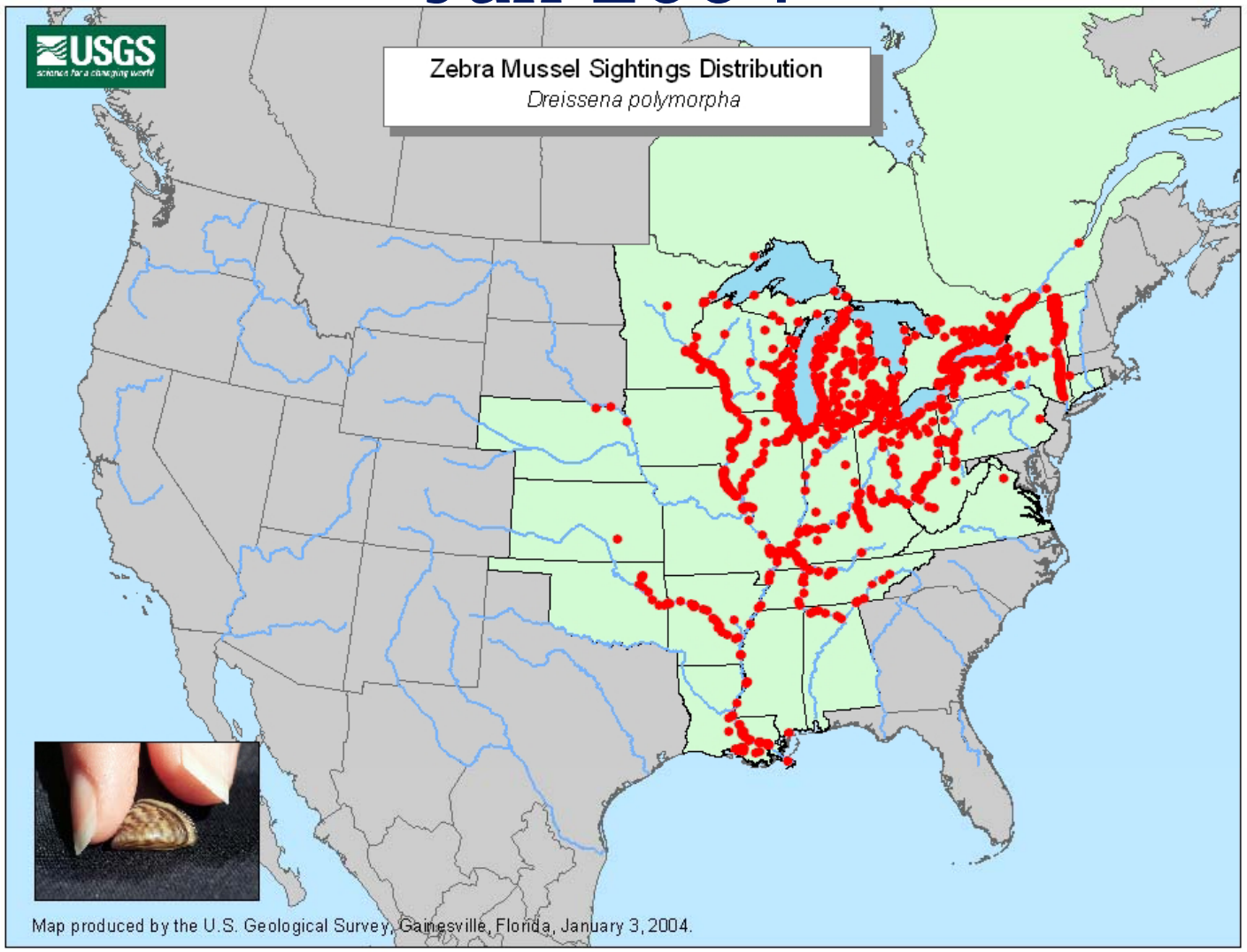

USGS
science for a changing world
November 2000
States with zebra mussels in inland and adjacent waters.


2001 Zebra Mussel Distribution

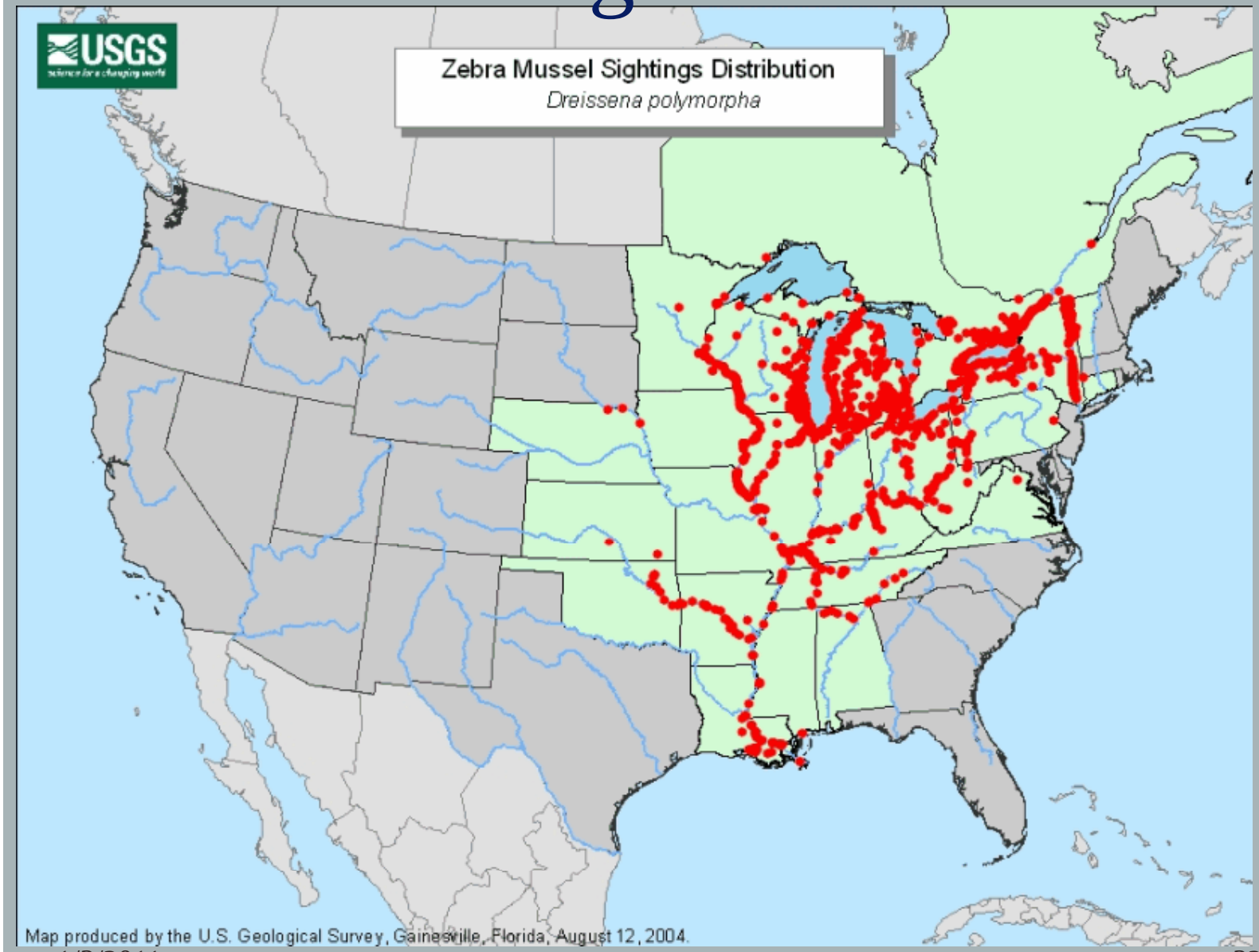
2002


USGS
science for a changing world
Zebra Mussel Sightings Distribution
Dreissena polymorpha
Map produced by the U.S. Geological Survey, Gainesville, Florida, December 2002.

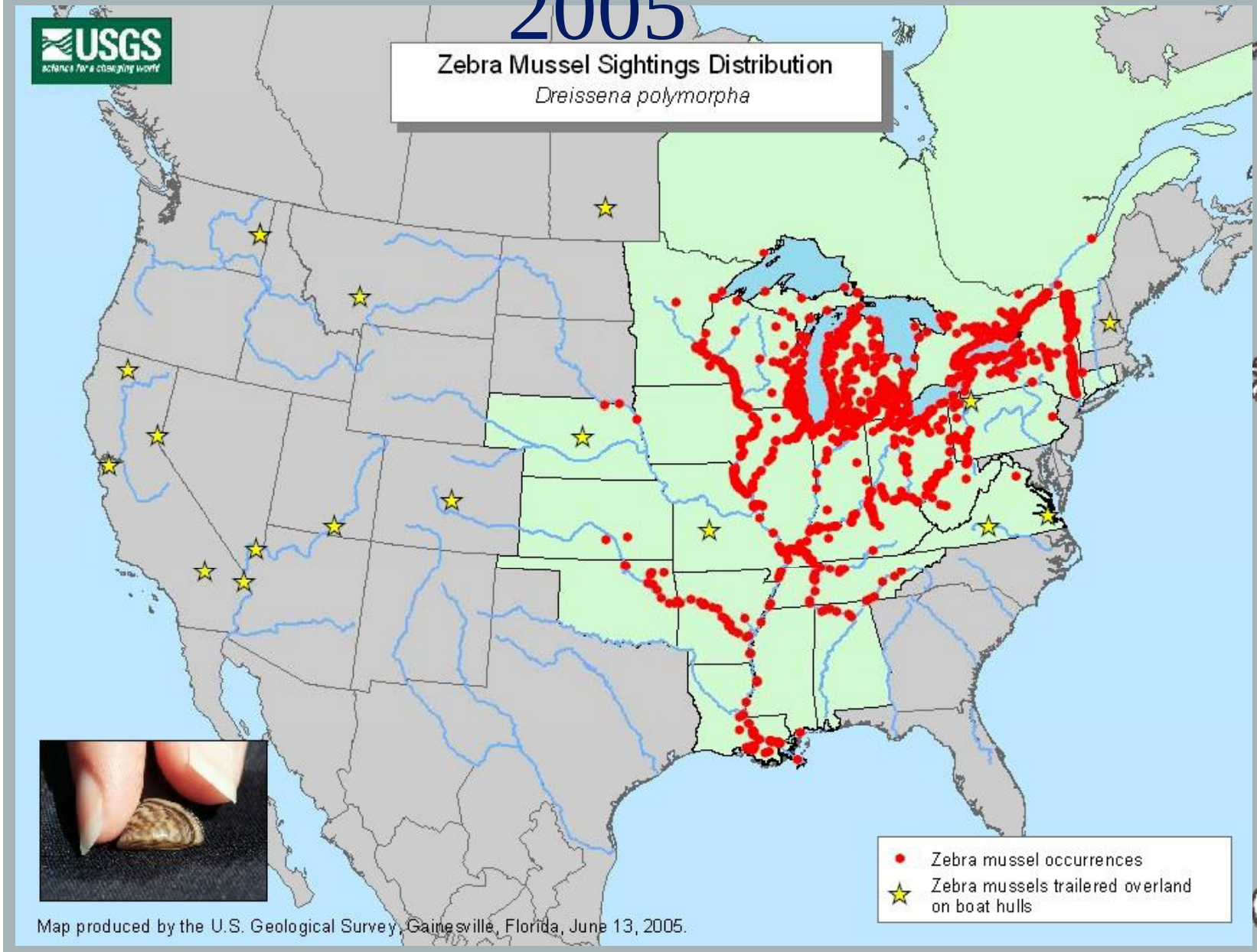
Jan 2004

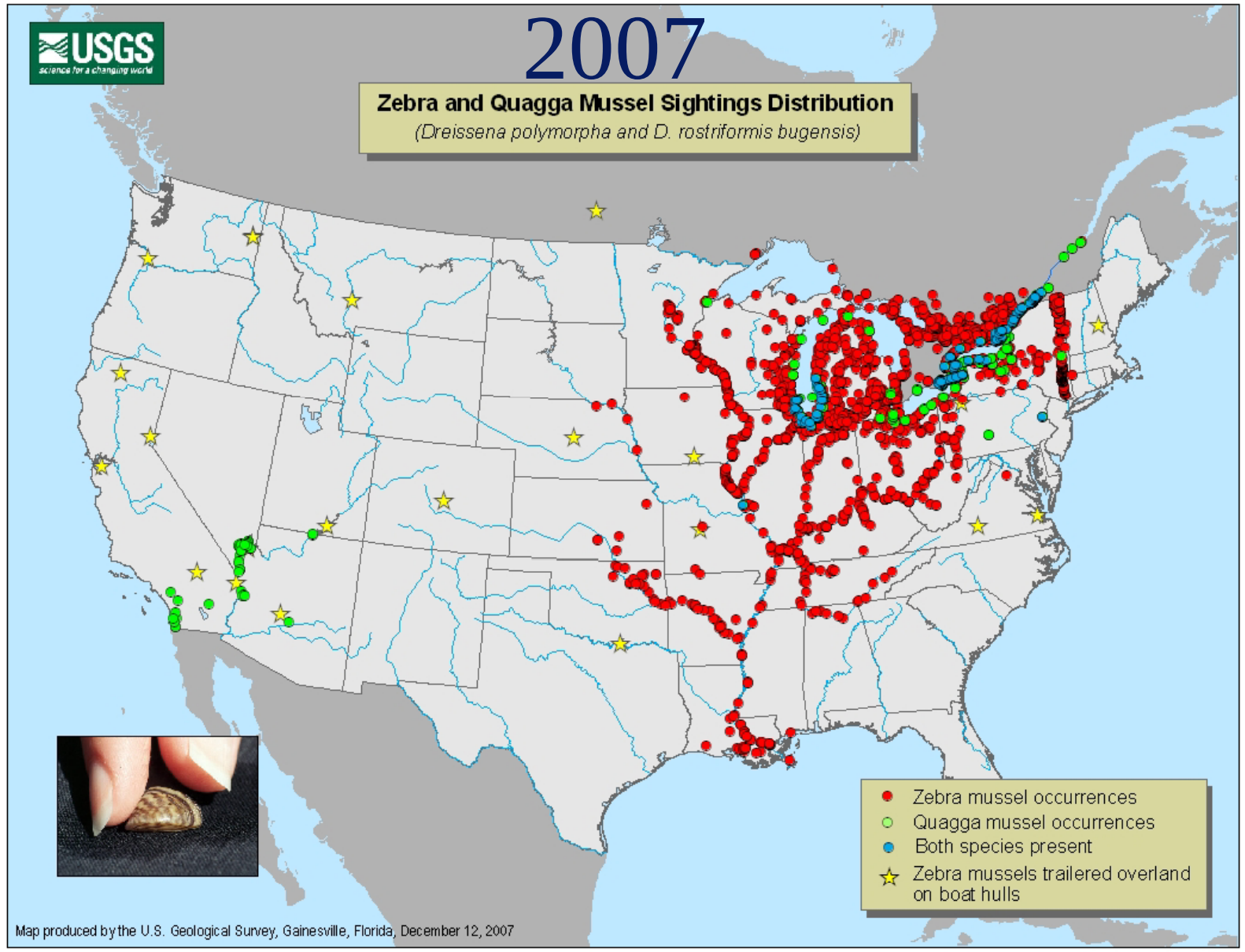

USGS
Zebra Mussel Sightings Distribution
Dreissena polymorpha
Map produced by the U.S. Geological Survey, Gainesville, Florida, January 3, 2004.

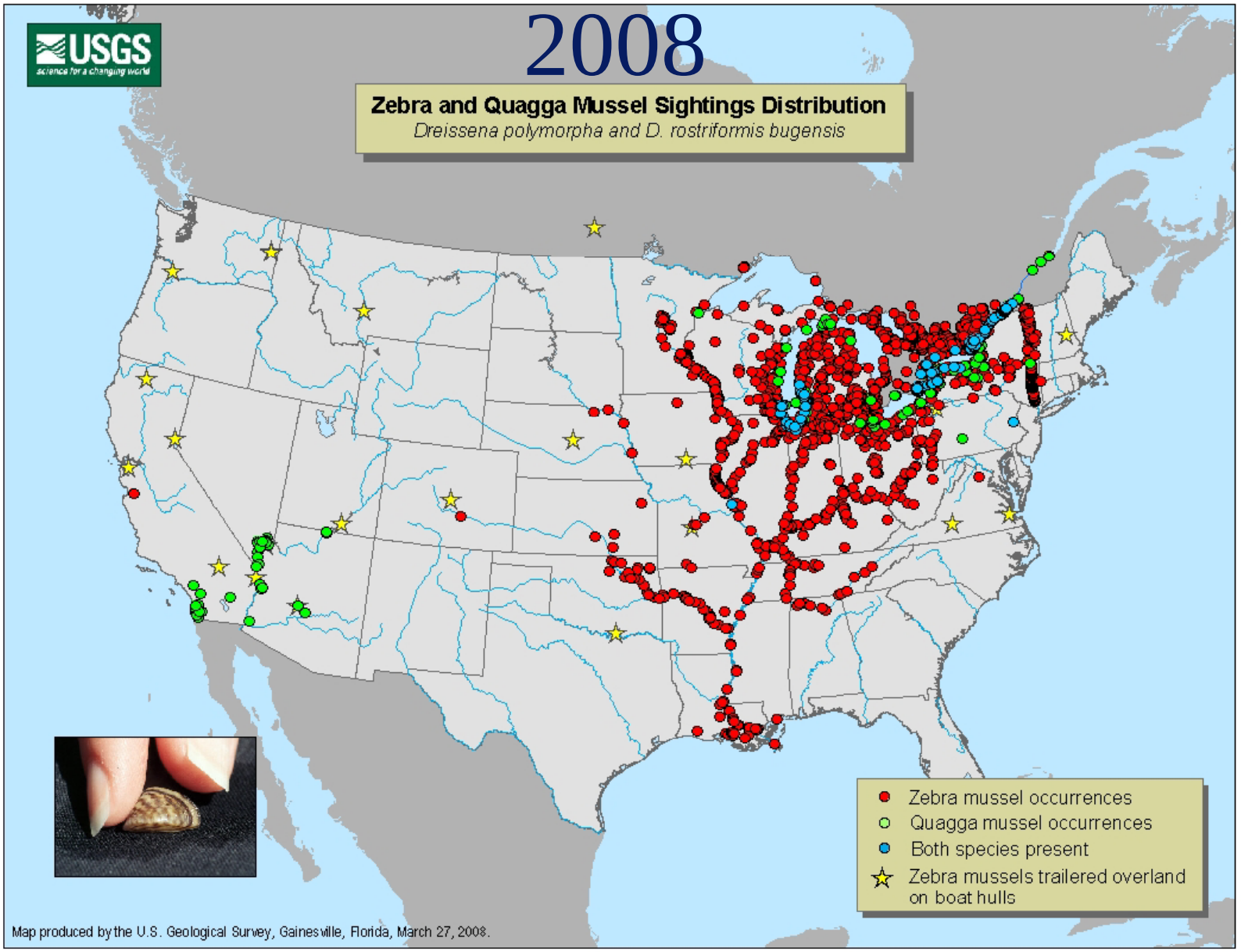
Aug 2004


USGS
Zebra Mussel Sightings Distribution
Dreissena polymorpha
Map produced by the U.S. Geological Survey, Gainesville, Florida, August 12, 2004.

2005


USGS
science for a changing world
Zebra Mussel Sightings Distribution
Dreissena polymorpha
Zebra mussel occurrences
Zebra mussels trailered overland on boat hulls
Map produced by the U.S. Geological Survey, Gainesville, Florida, June 13, 2005.


2007
Zebra and Quagga Mussel Sightings Distribution
(Dreissena polymorpha and D. rostriformis bugensis)
Zebra mussel occurrences
Quagga mussel occurrences
Both species present
Zebra mussels trailered overland on boat hulls
Map produced by the U.S. Geological Survey, Gainesville, Florida, December 12, 2007


2008
USGS
science for a changing world
Zebra and Quagga Mussel Sightings Distribution
Dreissena polymorpha and D. rostriformis bugensis
Zebra mussel occurrences
Quagga mussel occurrences
Both species present
Zebra mussels trailered overland on boat hulls
Map produced by the U.S. Geological Survey, Gainesville, Florida, March 27, 2008.

Questions?

For more in depth details:

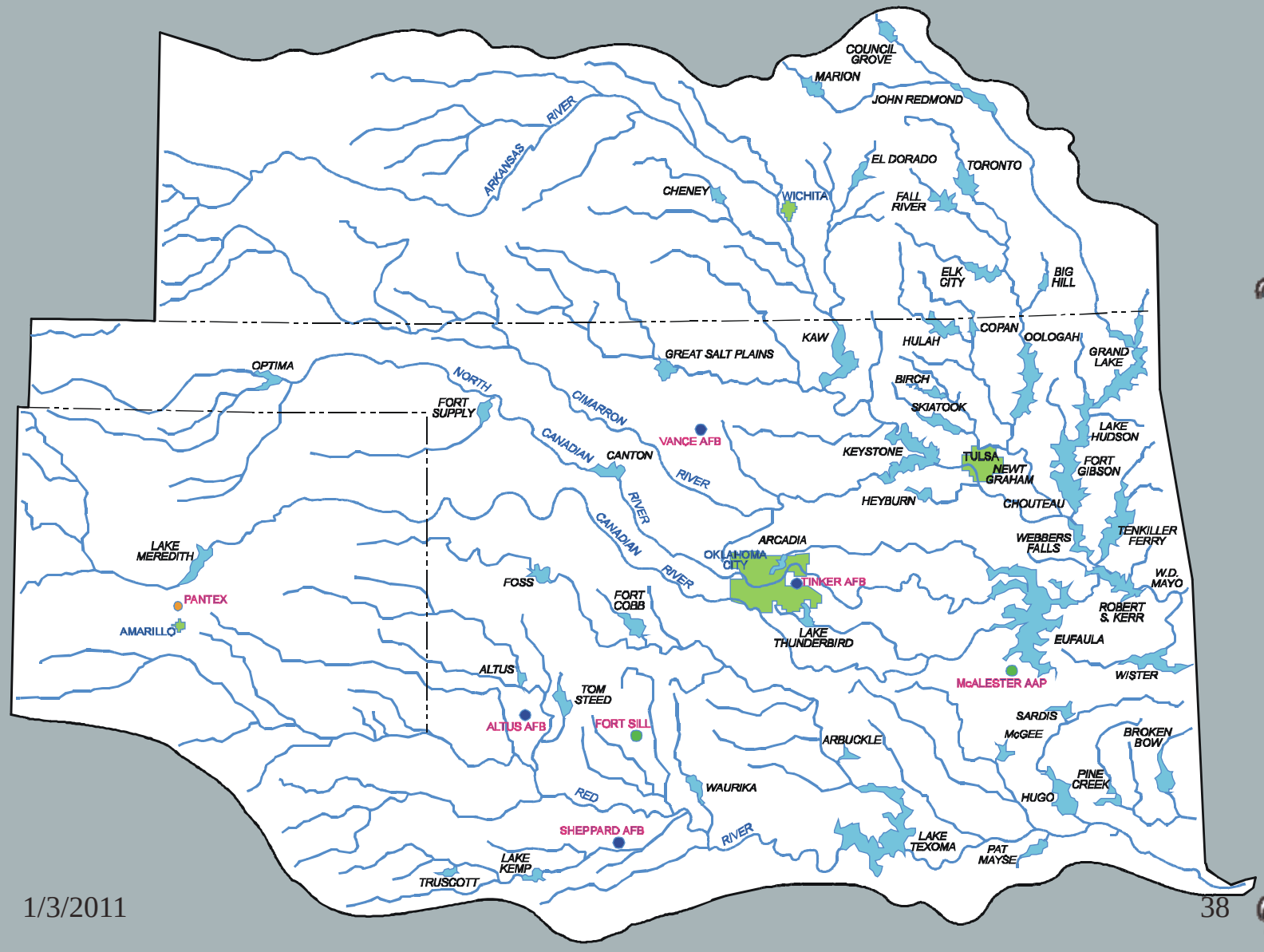
http://el.erdc.usace.army.mil/zebra/zmis

http://nas.usgs.gov/zebra.mussel

Quick Break?

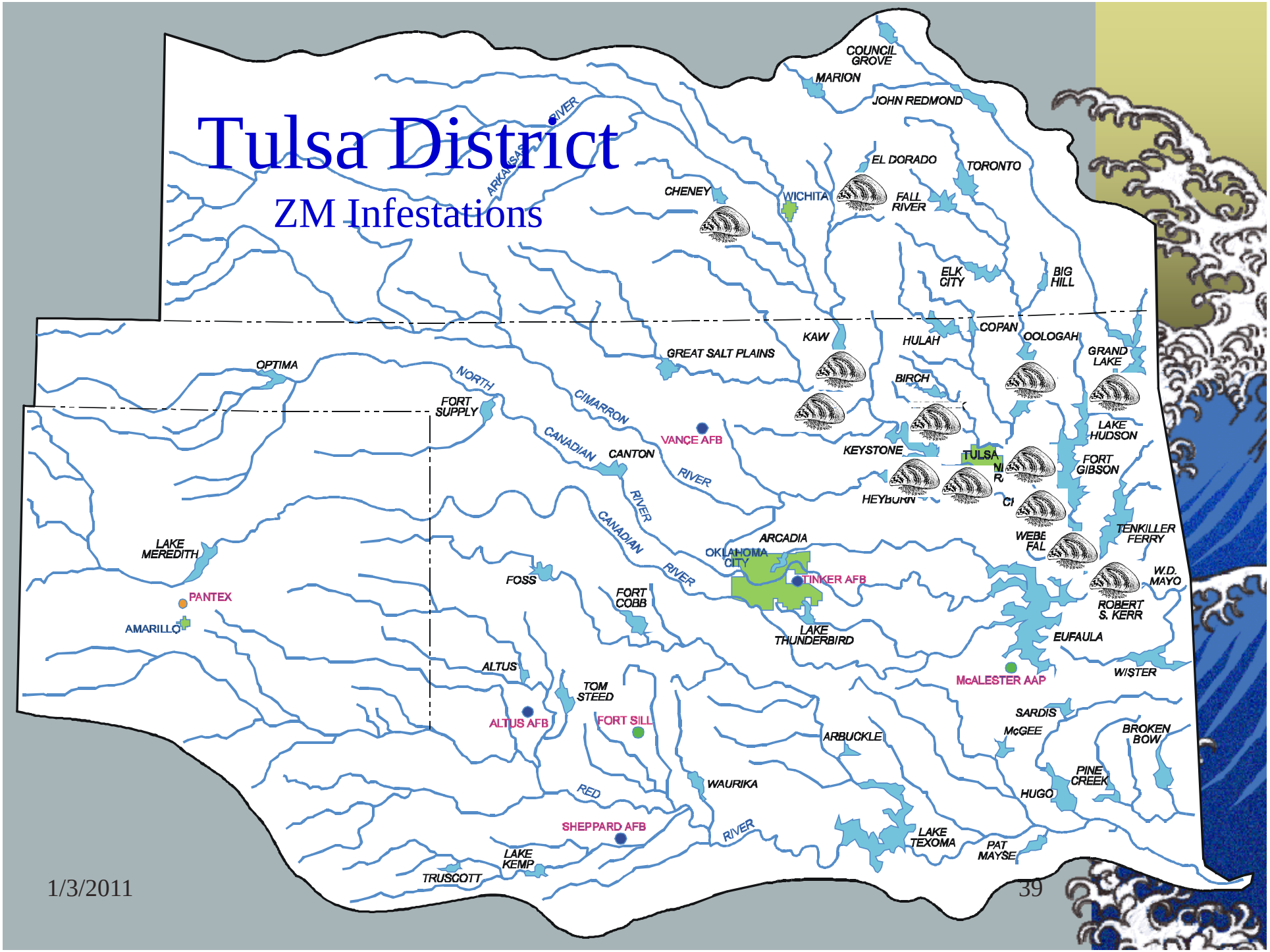
~ 10 minutes ~

SWT Warm Water Experiences



Tulsa District

ZM Infestations



Tulsa District Infestation History

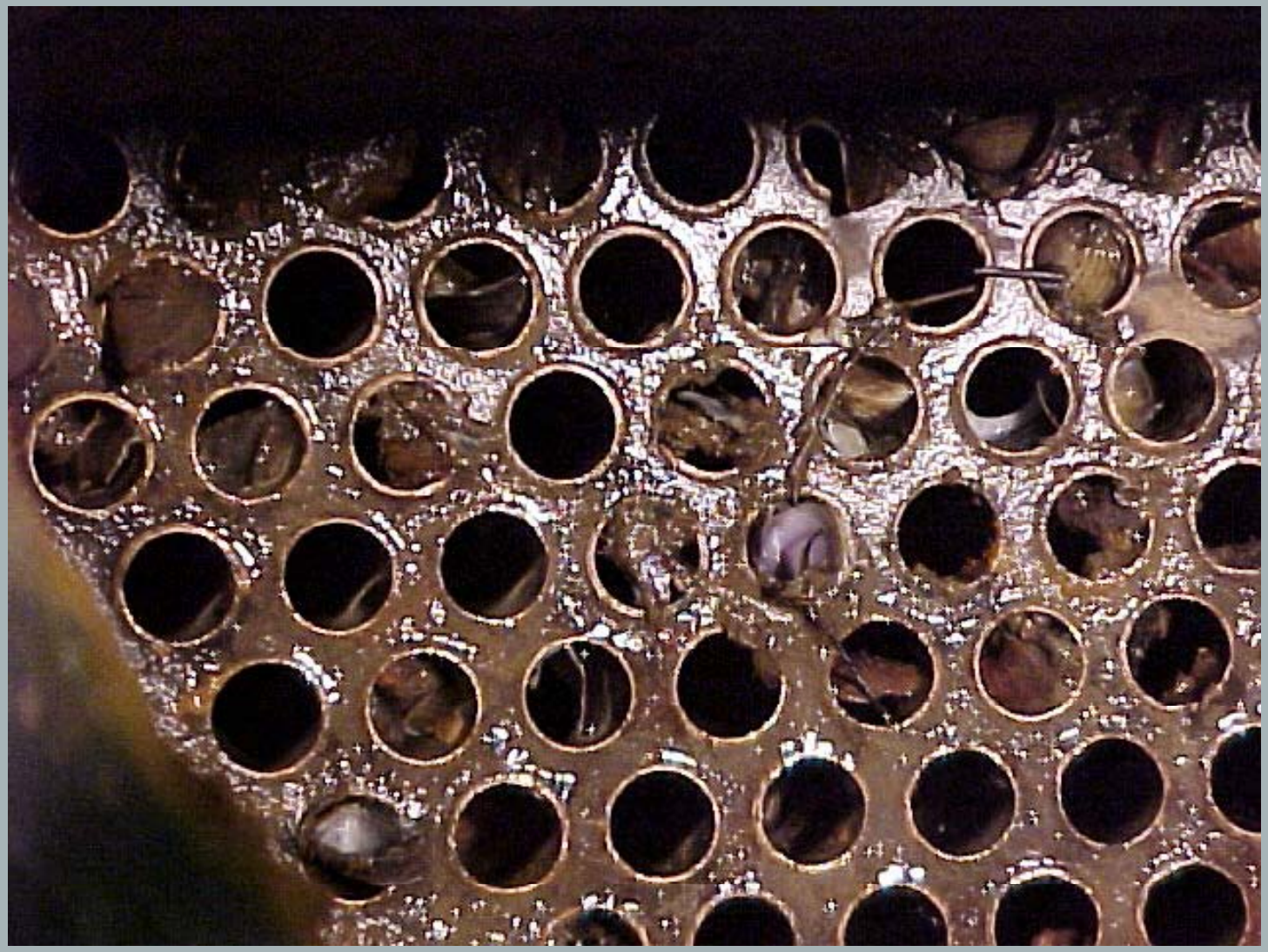
1. *Jan 1993 ~ W.D. Mayo, R.S. Kerr, and Webbers Falls locks (Ark River)*
2. *June 1993 ~ Chouteau Lock (Verdigris River)*
3. *Jan 1994 ~ Newt Graham Lock (Verdigris River)*
4. *June 2003 ~ Oologah Lake (Verdigris River)*
5. *June 2003 ~ Lynn Lane Lake (Tulsa Water Supply)*
6. *& A.B. Jewell Lake (Tulsa Water Supply)*
7. *Aug 2003 ~ El Dorado Lake, KS (Walnut River)*
8. *July 2004 ~ Kaw Lake (Arkansas River)*
9. *Aug 2004 ~ Cheney Lake, KS (one veliger)(Witchita Water Supply)*
10. *Oct 2005 ~ Keystone Lake (Arkansas & Cimarron Rivers)*
11. *May 2006 ~ OG&E Sooner Lake (water supply)*
12. *June 2006 ~ Skiatook Lake (Hominy Creek)(only one on RWD intake at dam)*
13. *June 2006 ~ Zink Lake in Tulsa (Arkansas River)*
14. *July 2006 ~ Grand Lake (Grand/Neosho River)(none found since)*
15. *& GRDA Chouteau Powerplant (water supply)*
16. *Oct 2006 ~ Lake Texoma (ZM on boat at Highport Marina)*
17. *Mar 2007 ~ Lake Texoma (QM shells on boat at Eisenhower Yacht Club)*
18. *Aug 2007 ~ Skiatook Lake (found 13 more)*

Northeastern State University Study

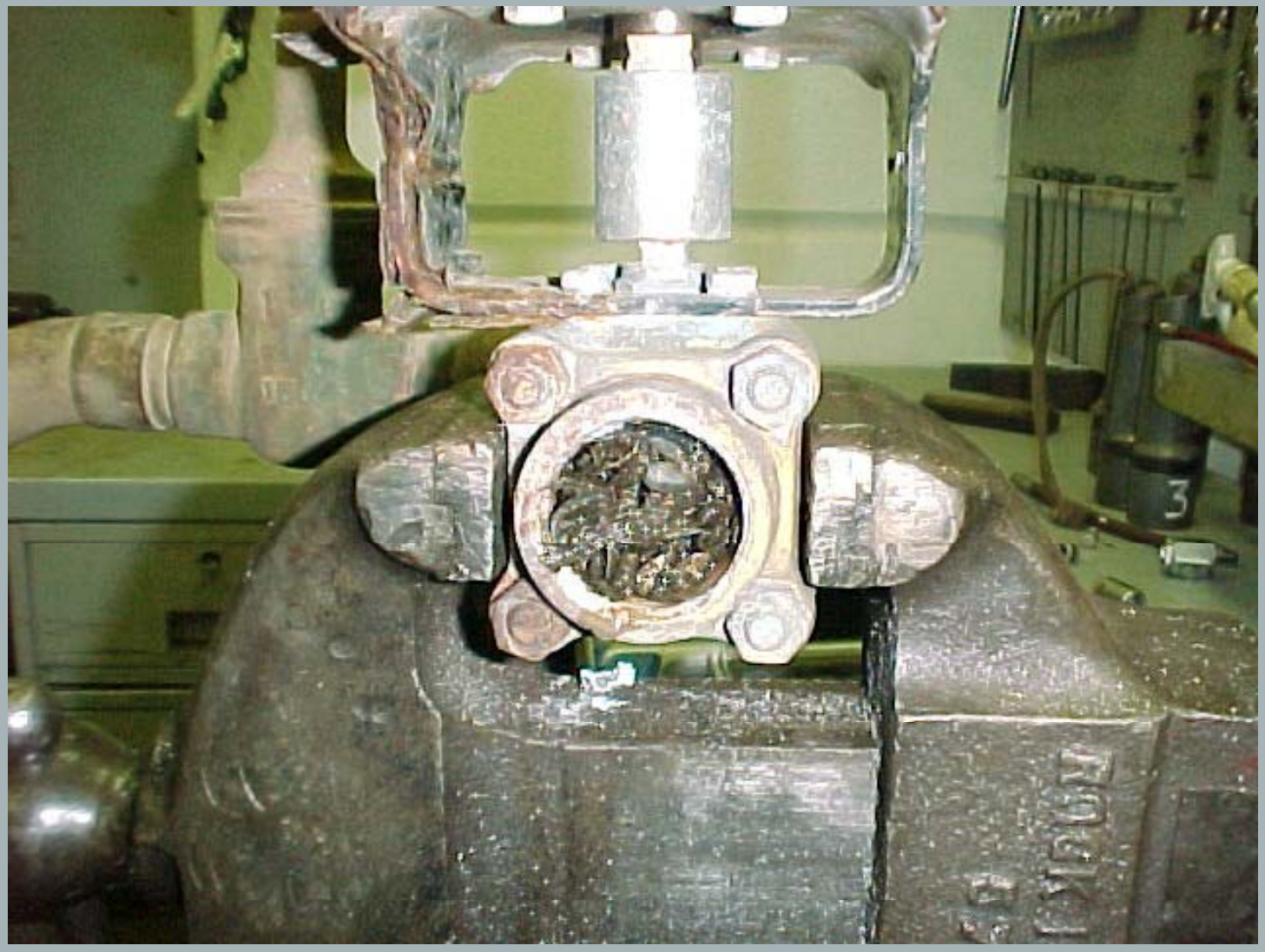
McClellan/Kerr Navigation System ~ 1995

- *Late summer growth rates are slower that early summer at all sites.*
- *Water chemistry differences at sites may account for growth rate differences.*
- *The ranges for conductivity and calcium should support moderate to good growth at all sites.*
- *High temperature is probably limiting late summer growth at all sites.*
- *Early summer grow rates in Chouteau are slower, probably because of low pH.*
- *Early growth rates are much faster than cold waters.*
  - *Chouteau ~ 0.41mm/week*
  - *Webbers Falls ~ 1.19mm/week*
  - *R.S. Kerr ~ 1.03mm/week*

Robert S. Kerr ~ 1 May 02

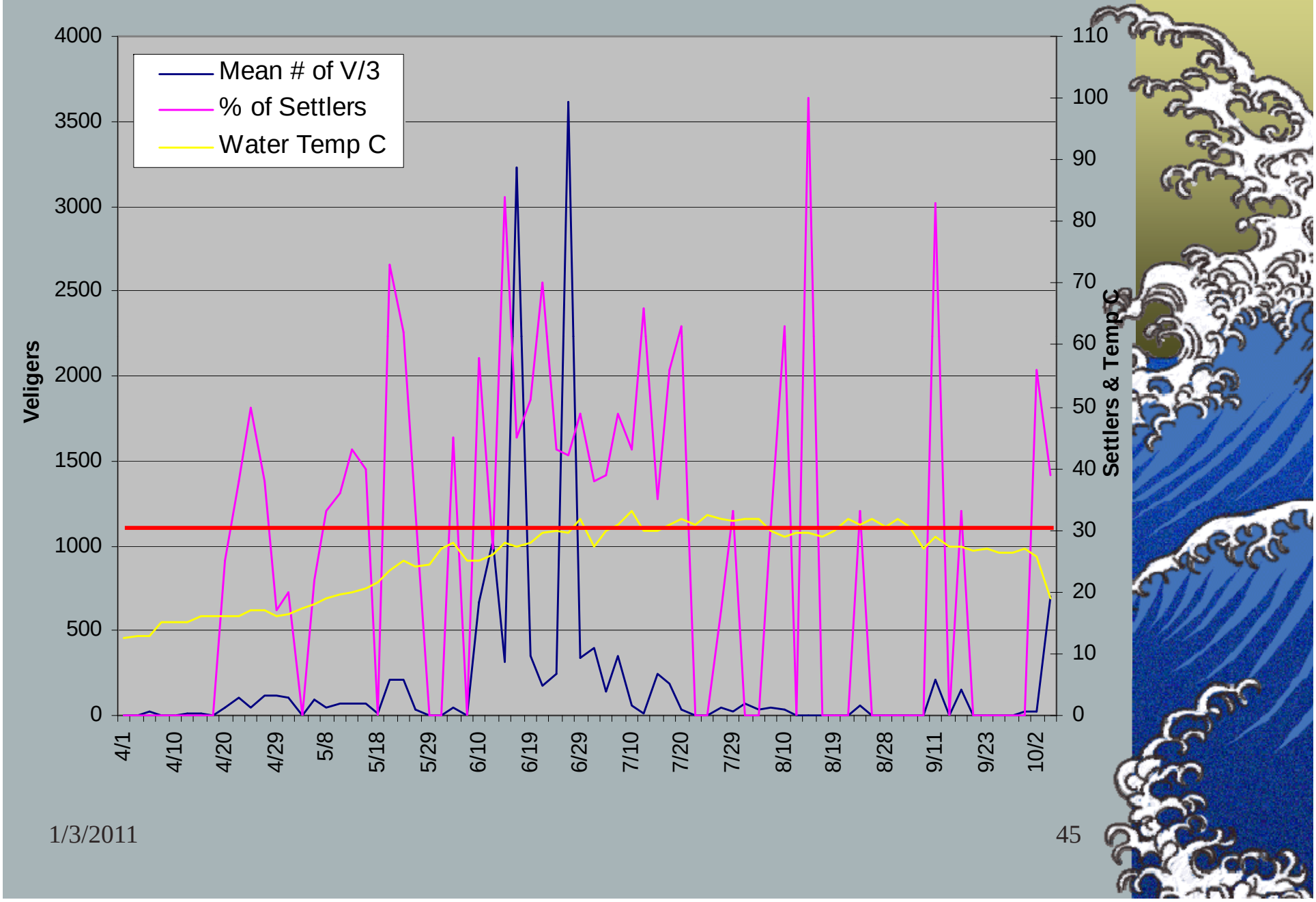


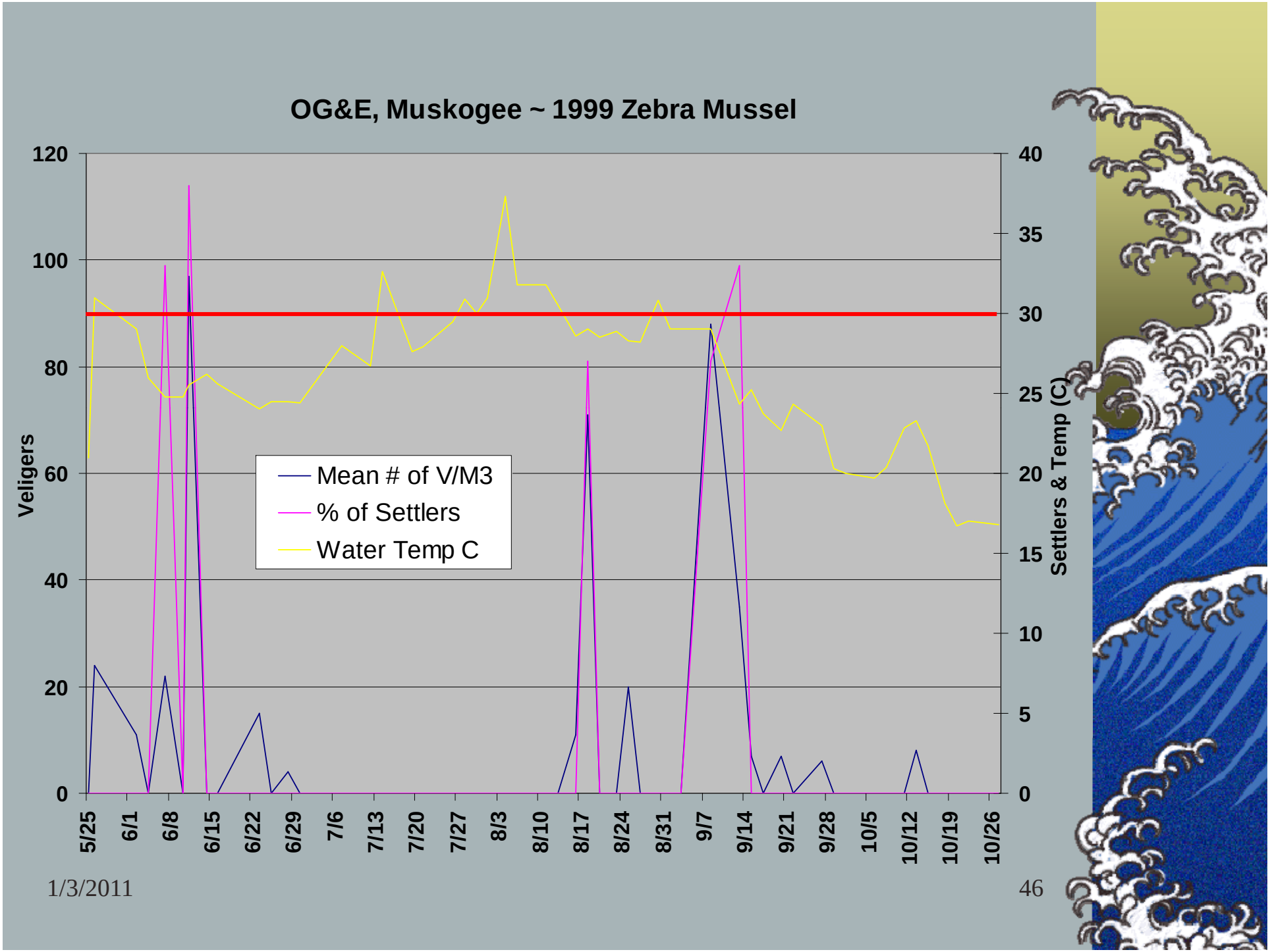
Webbers Falls #2 Strainer ~ 18 Aug 06



Webbers Falls #2 Strainer ~ 18 Aug 06

OG&E, Muskogee ~ 1998 Zebra Mussels




OG&E, Muskogee ~ 1999 Zebra Mussel
Veligers
Settlers & Temp (C)
120
100
80
60
40
20
0
40
35
30
25
20
15
10
5
0
Mean # of V/M3
% of Settlers
Water Temp C
5/25
6/1
6/8
6/15
6/22
6/29
7/6
7/13
7/20
7/27
8/3
8/10
8/17
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8/31
9/7
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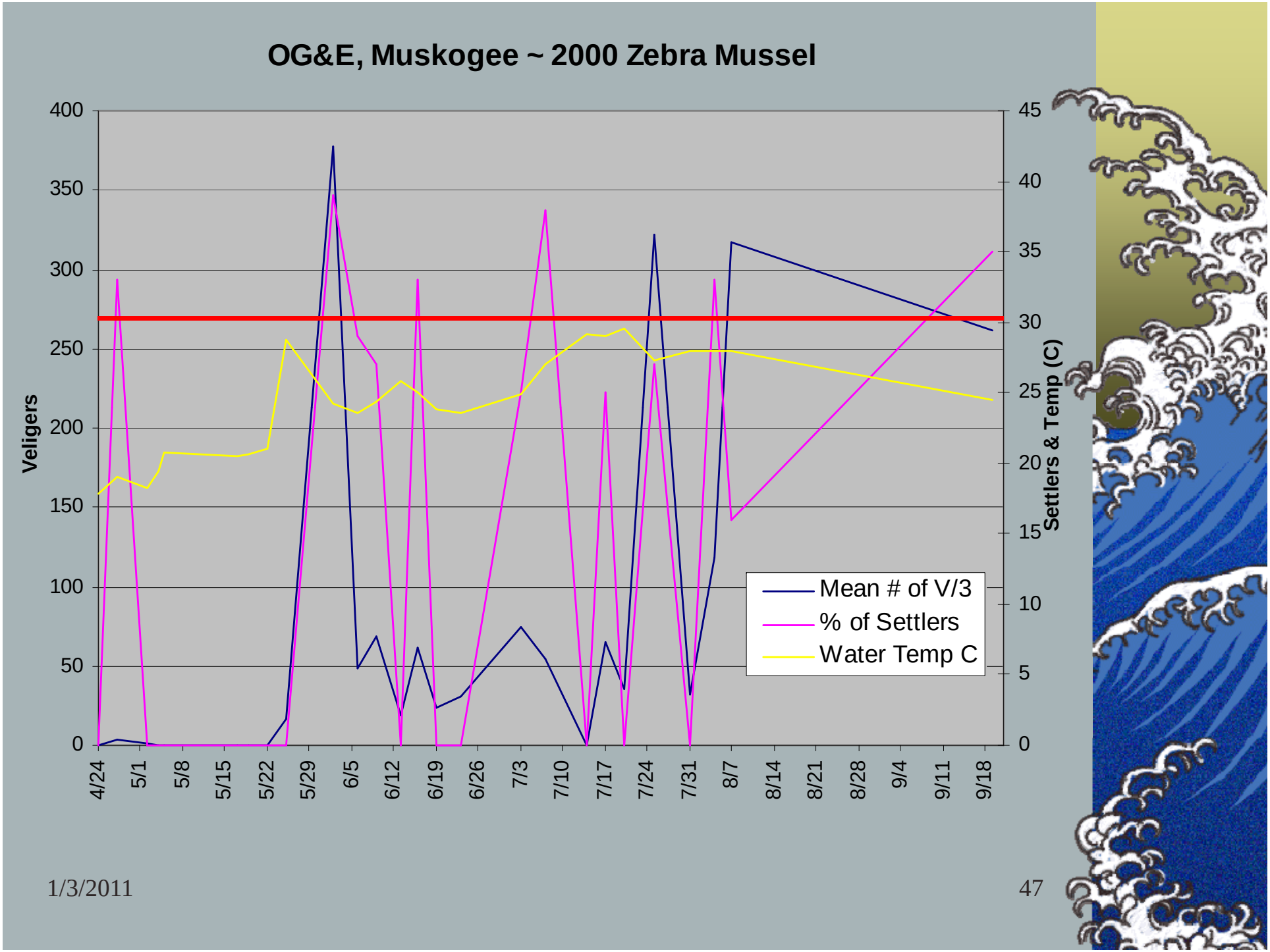
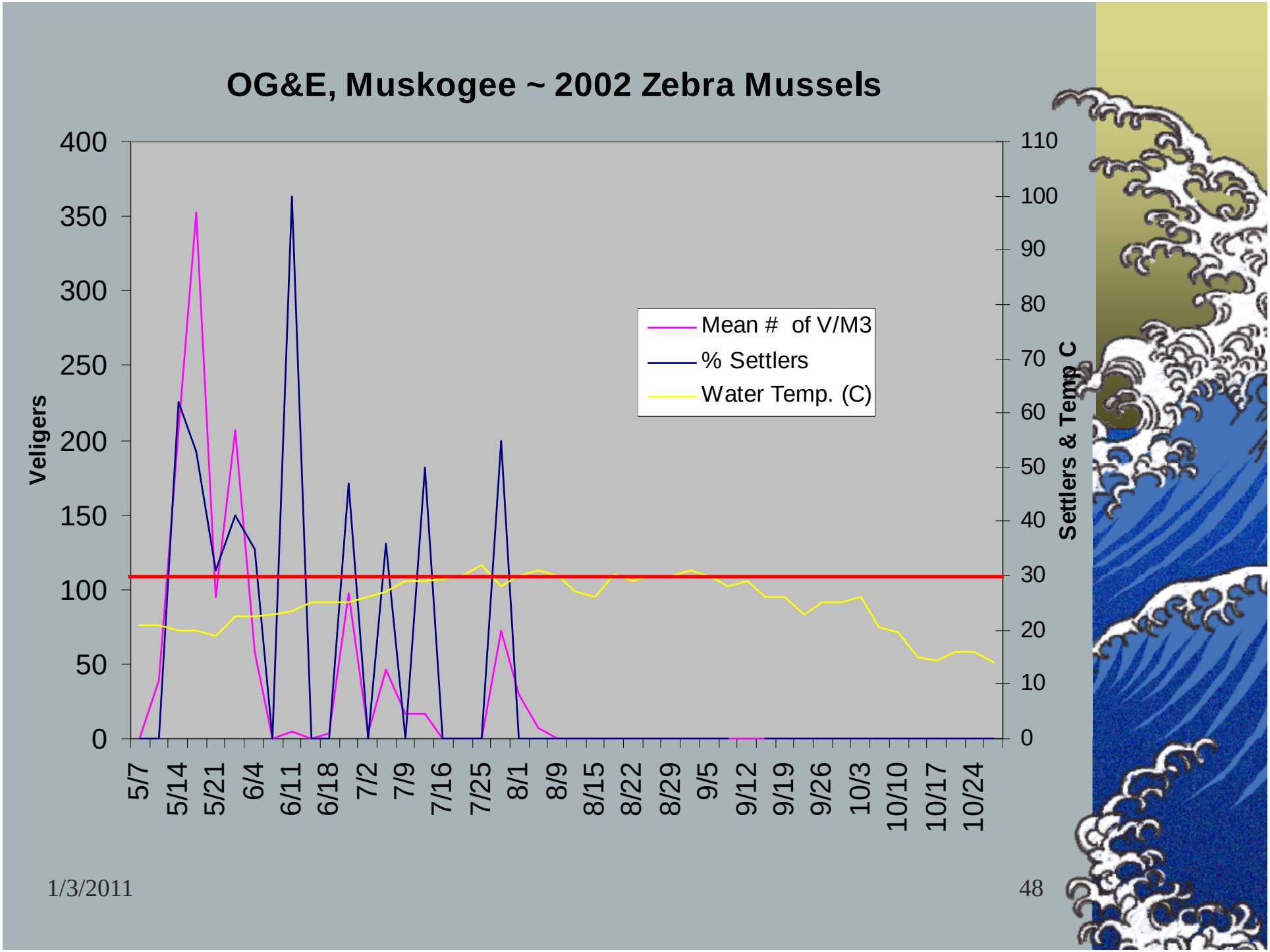
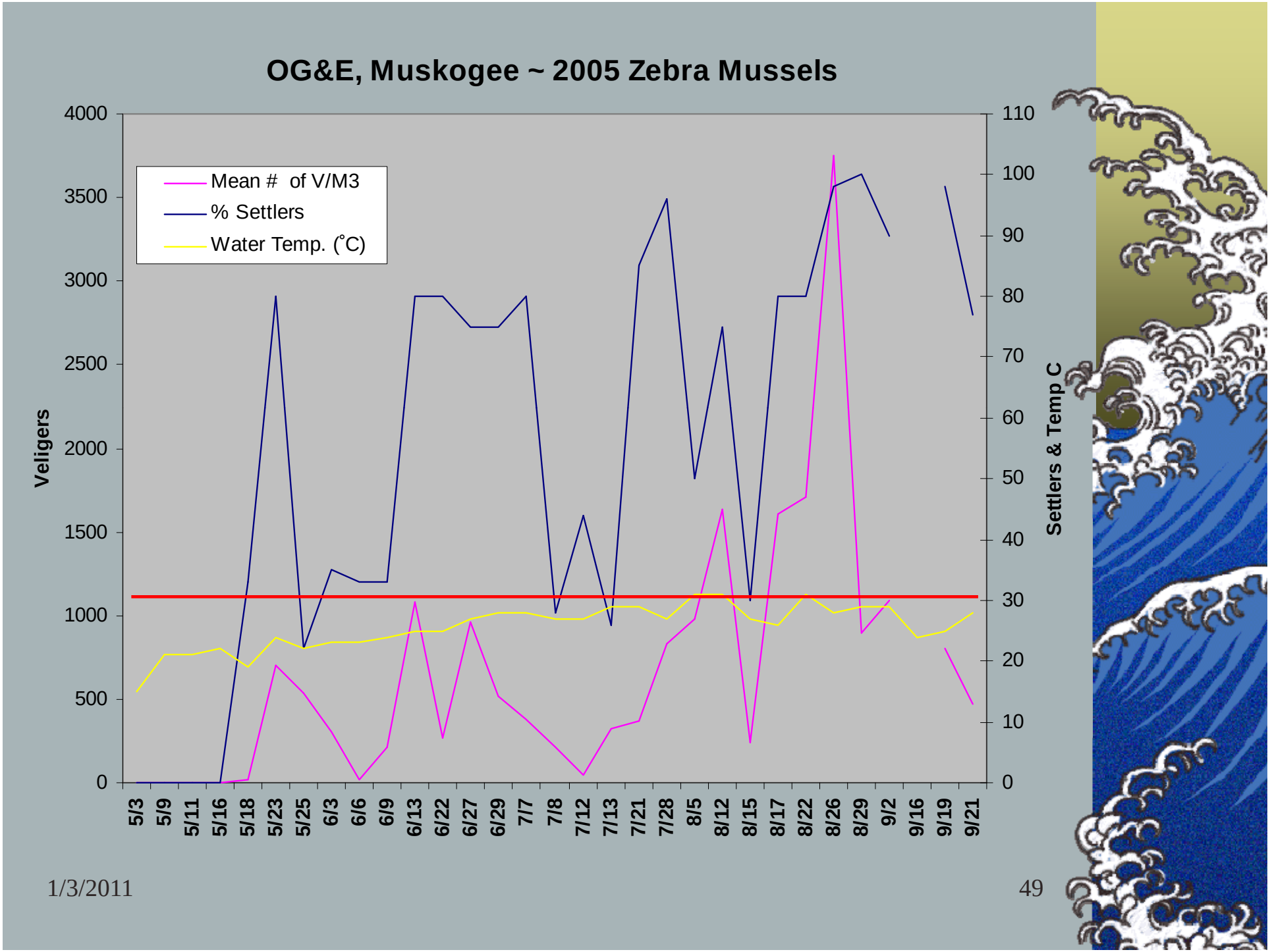
9/21
9/28
10/5
10/12
10/19
10/26


OG&E, Muskogee ~ 2000 Zebra Mussel
Veligers
Settlers & Temp (C)
400
350
300
250
200
150
100
50
0
45
40
35
30
25
20
15
10
5
0
4/24
5/1
5/8
5/15
5/22
5/29
6/5
6/12
6/19
6/26
7/3
7/10
7/17
7/24
7/31
8/7
8/14
8/21
8/28
9/4
9/11
9/18
Mean # of V/3
% of Settlers
Water Temp C


OG&E, Muskogee ~ 2002 Zebra Mussels
Veligers
Settlers & Temp C
400
350
300
250
200
150
100
50
0
110
100
90
80
70
60
50
40
30
20
10
0
Mean # of V/M3
% Settlers
Water Temp. (C)
5/7
5/14
5/21
6/4
6/11
6/18
7/2
7/9
7/16
7/25
8/1
8/9
8/15
8/22
8/29
9/5
9/12
9/19
9/26
10/3
10/10
10/17
10/24


OG&E, Muskogee ~ 2005 Zebra Mussels
Mean # of V/M3
% Settlers
Water Temp. (˚C)
Veligers
Settlers & Temp C
4000
3500
3000
2500
2000
1500
1000
500
0
110
100
90
80
70
60
50
40
30
20
10
0
5/3
5/9
5/11
5/16
5/18
5/23
5/25
6/3
6/6
6/9
6/13
6/22
6/27
6/29
7/7
7/8
7/12
7/13
7/21
7/28
8/5
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8/22
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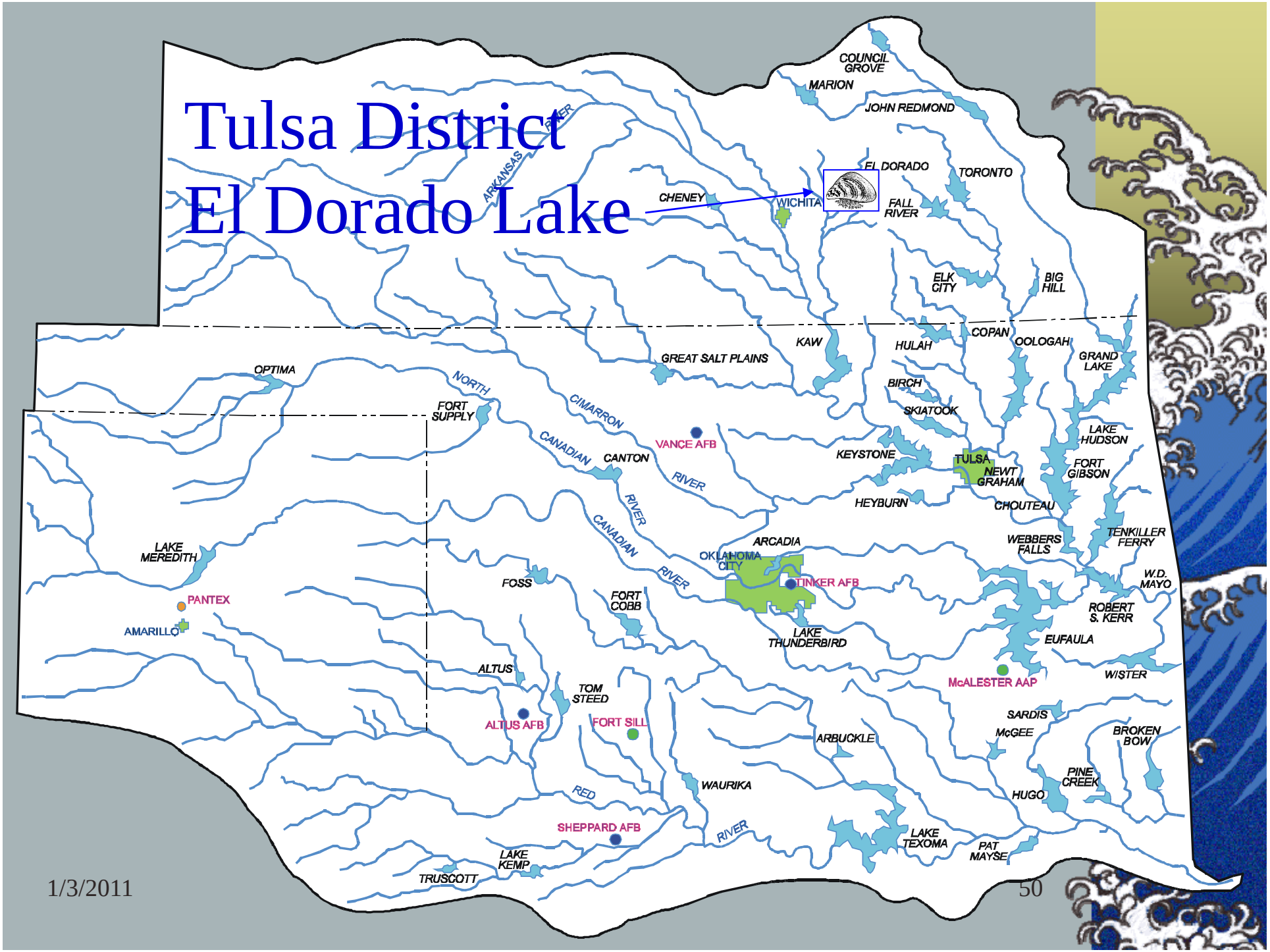
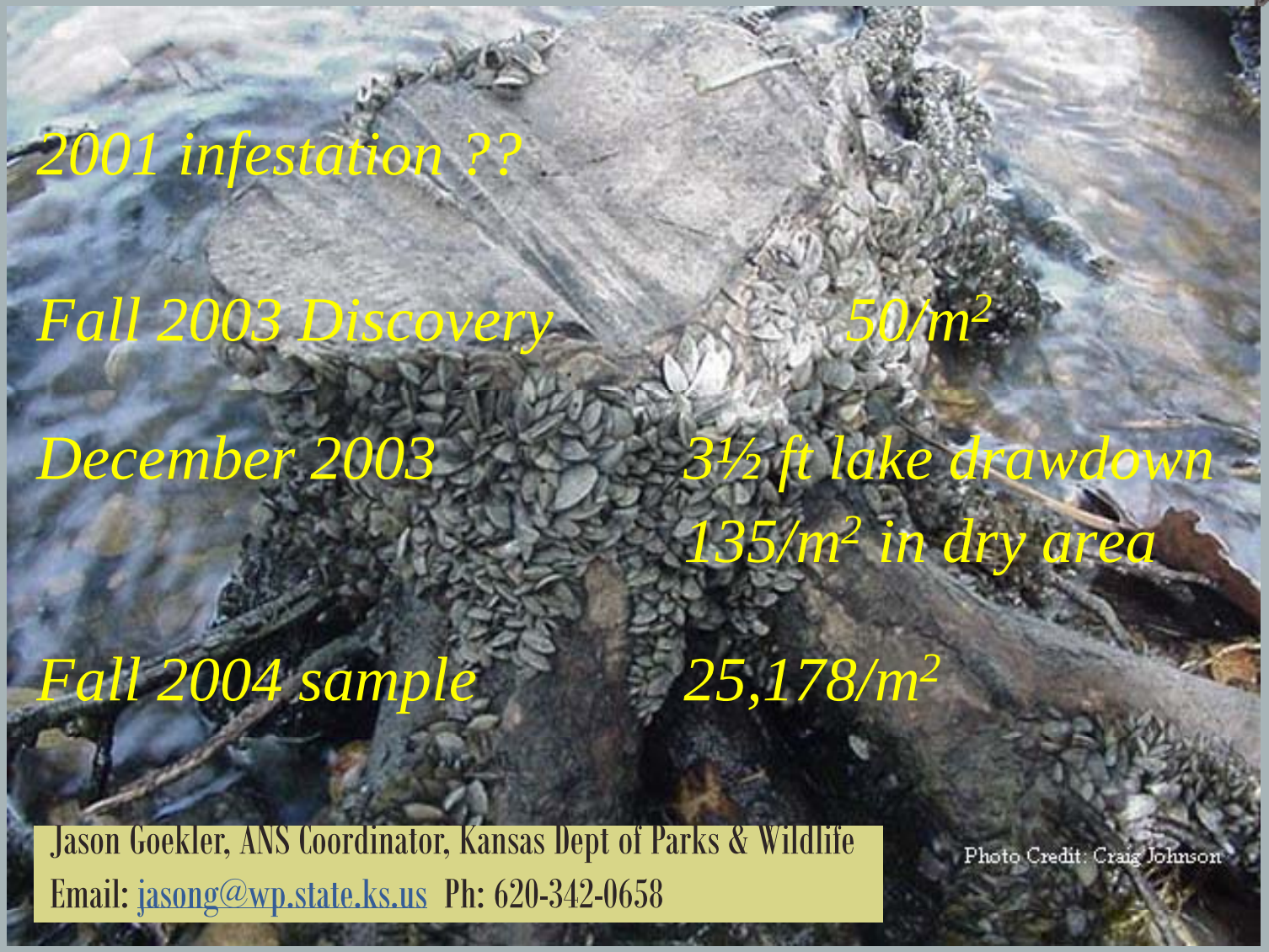
9/2
9/16
9/19
9/21

Tulsa District
El Dorado Lake



El Dorado Timeline



2001 infestation ??

Fall 2003 Discovery *50/m²*

December 2003 *3½ ft lake drawdown*
135/m² in dry area

Fall 2004 sample *25,178/m²*

Jason Goekler, ANS Coordinator, Kansas Dept of Parks & Wildlife
Email: jasong@wp.state.ks.us Ph: 620-342-0658

Photo Credit: Craig Johnson

El Dorado Lake ~ 2003 Drawdown

"Reality"

They like warm water!

- *Continuously spawning all summer.*
- *Some spawning in water over 89^{o} F for 2-3 months.*
- *Surviving in water over 90^{o} F for several weeks.*
- *Can grow 1.19-1.25mm/week = 1cm in @ 2 months.*
- *Since Zebra Mussels are as genetically diverse as cockroaches, will they morph?*

Therefore!

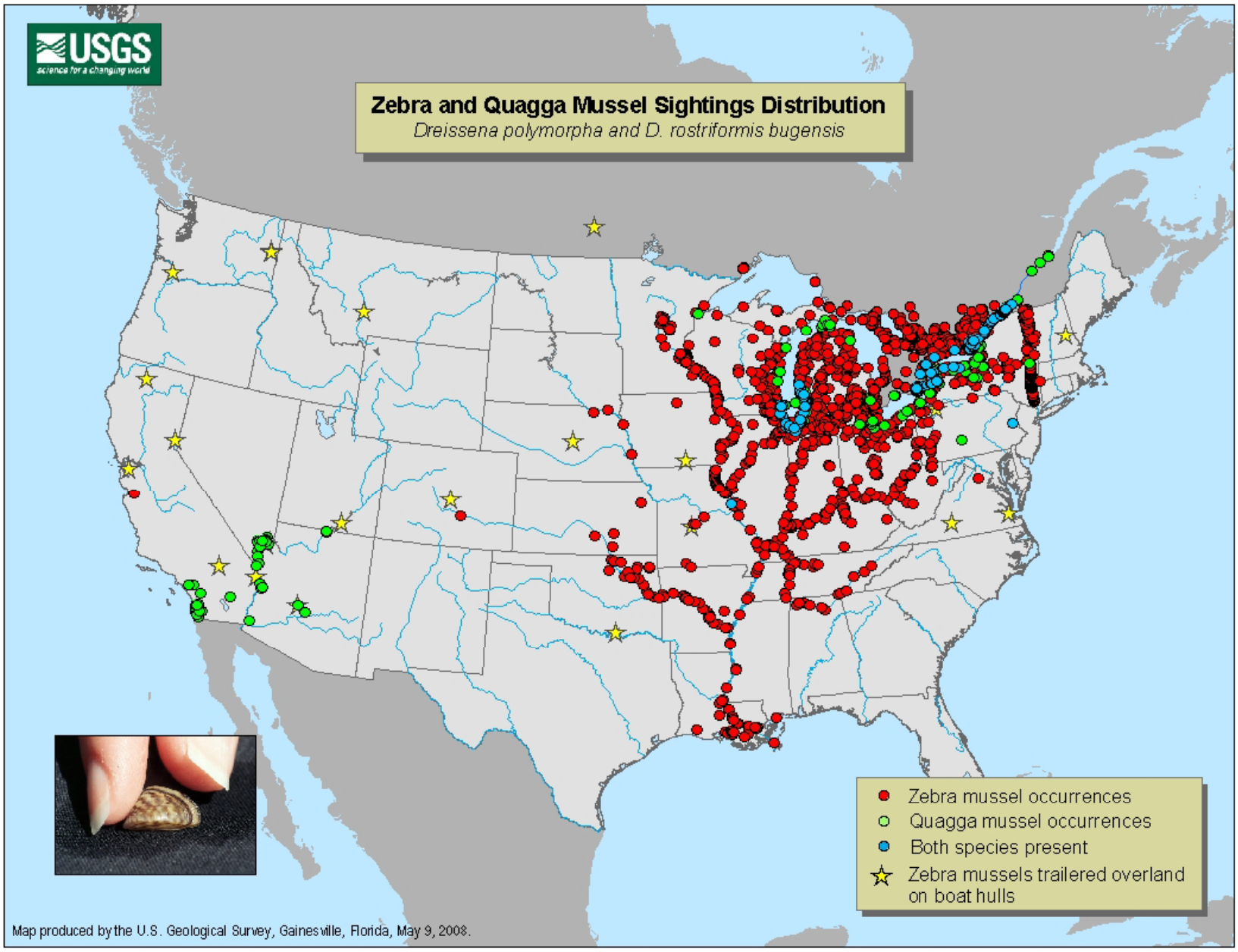
- *They will likely continue to be a nuisance and O&M expense for all water users.*
- *They apparently are more tolerant to the warm water environments than thought.*
- *Survivors could produce more tolerant offspring.*
- *Populations could increase again with more tolerant individuals.*
- *The warm water offspring could infest and survive better in the inland southwestern lakes.*

Tulsa District Program

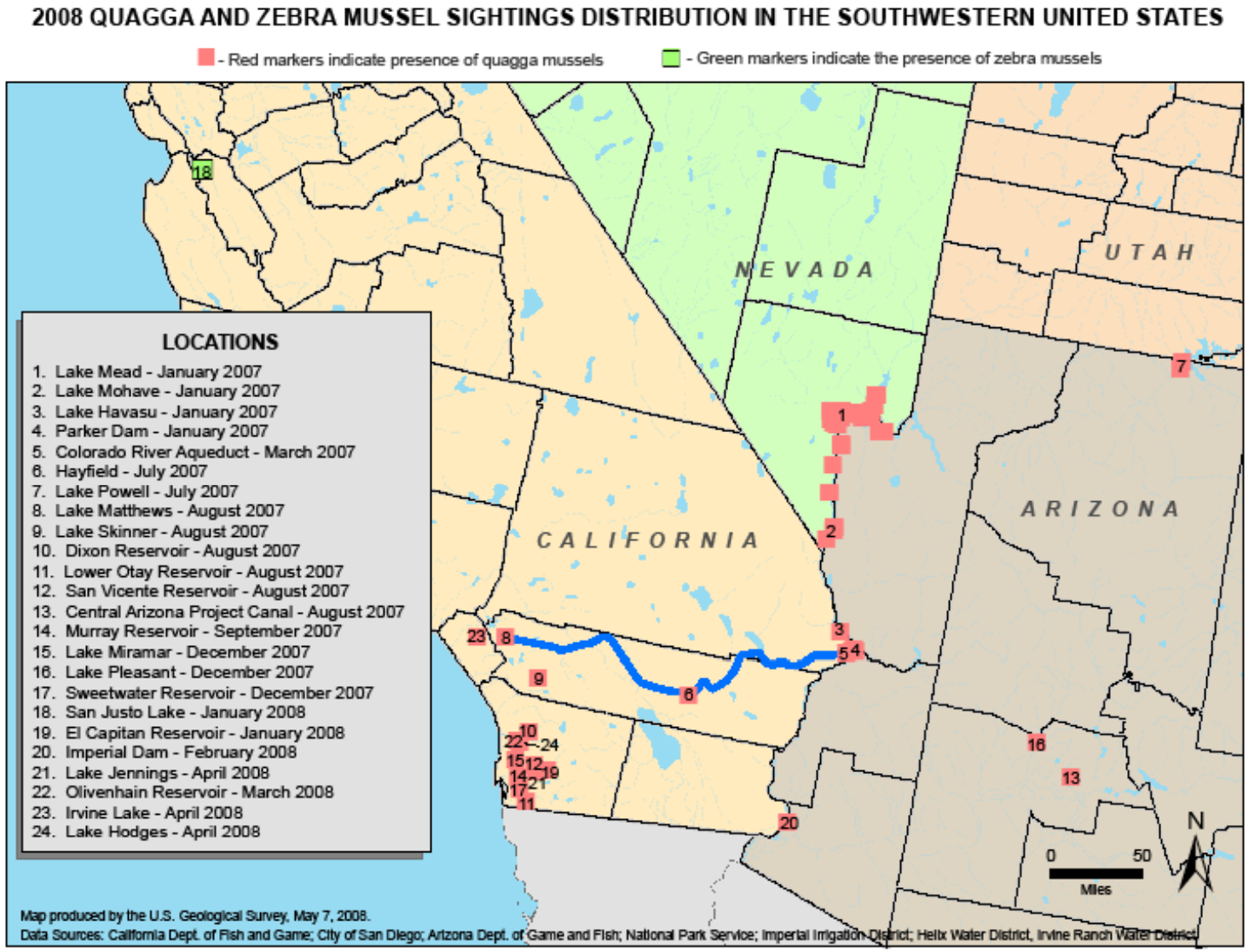
- *Continue to provide I&E and PR about Zebra Mussels, and other invasive species.*
- *Continue to monitor densities & reproduction.*
- *Continue to monitor lakes for new infestations.*
- *Continue to support studies (biology, adaptation, water quality, monitoring, controls, etc.)*
- *Work with other Federal, state, and local interests.*
- *Continue to keep current with technology for controls.*
- ***Be prepared for adverse impacts to facilities.***

Questions?

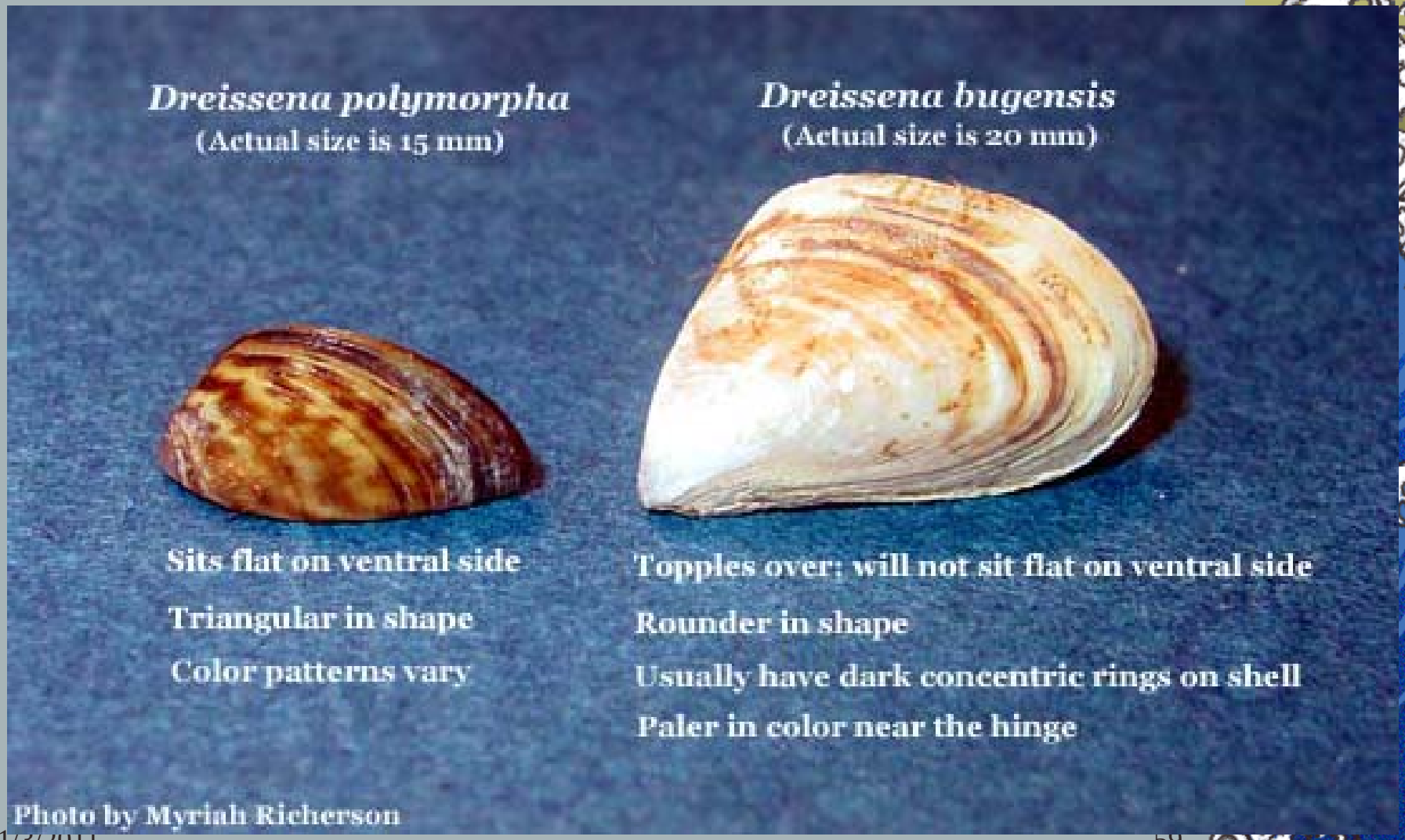
Zebra vs. Quagga



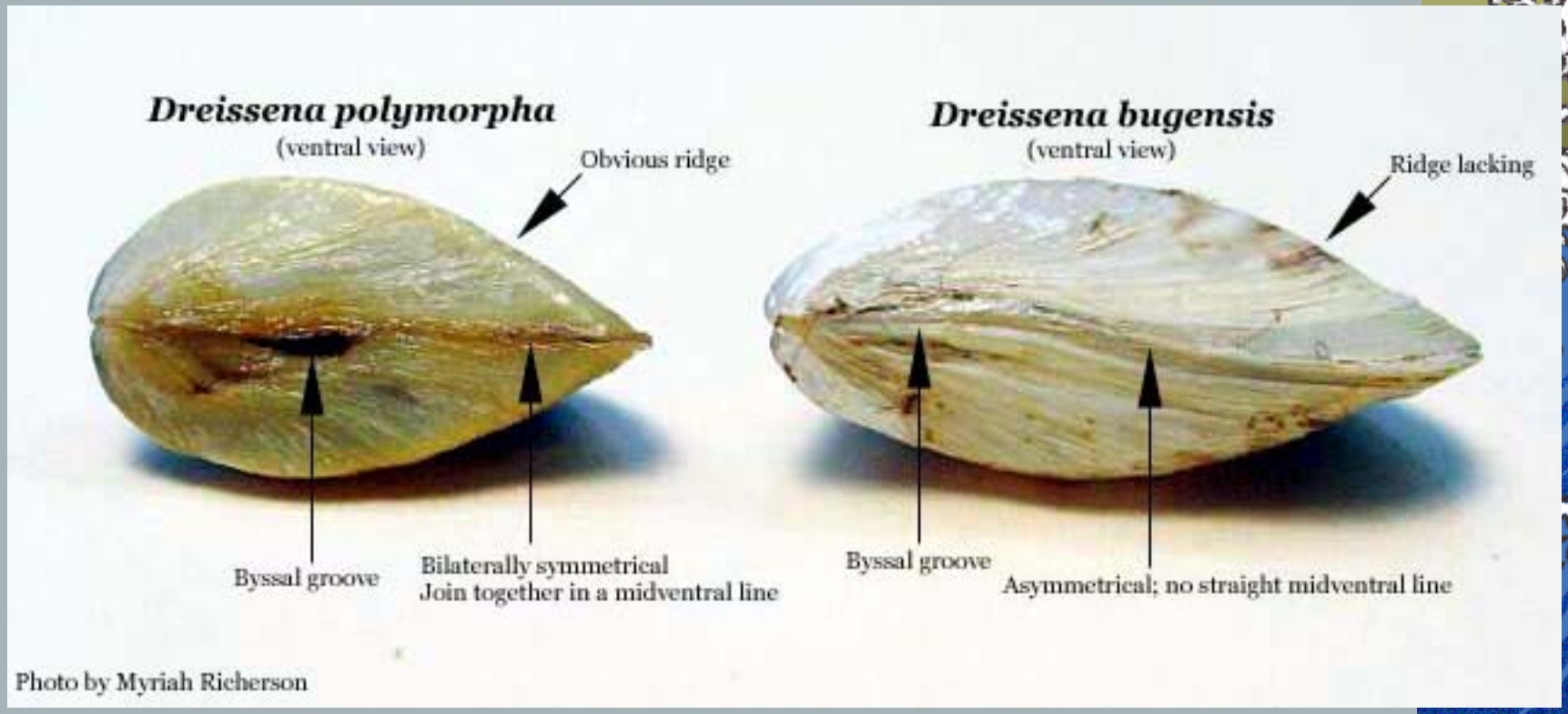
SW Quagga Range



Physical Differences



Physical Differences



QM Biological Differences

- *Thrive in both warm and cold water.*
- *More tolerant of deeper water. Have been found at 540'.*
- *Feed year-round.*
- *Colonize on finer substrate (sand, clay, etc.)*
  - *anything but soft mud.*
- *Excrete more phosphorus than Zebra Mussels, therefore >BOD.*
  - *May be the reason there are "dead-zones" in Lake Erie.*

Questions?

Comments from the Southwest?

Quick Break

~ 10 minutes ~

Impacts

Impacts

Mission ~ hydropower, water supply, navigation, E/T, F&W, flood control, recreation (facilities & customers)

Control costs ~ implementation & annual O&M, corrosion, permits, NEPA, disposal, etc.

Impacts

- *Ecosystem ~ food chain, fishery, algae, heavy metal accumulations, water clarity*
- *Safety ~ cuts, fire system*

Est. Economic Impacts

- *Seagrant ~ $500 M to $1 B per year*
- *USFWS ~ $5 B per year*
- *ANS TF ~ $30 M per year on Great Lakes*

Lake Michigan

- *2000 ~ 899/m^2 w/ 98.3% Zebra Mussel*
- *2005 ~ 7,790/m^2 w/ 97.7% Quagga Mussel*
- *Water clarity ~ went from 15' to 75'*
- *½ lb. fish per 600-700 lb. of Quagga's*
- *Diporeia ~ 1,836m^2 to 293m^2 in 5 years*
- *7-yr old Whitefish wt. ~ went from >7 lb. to 1.6 lb.*

Cleveland, OH ‘88-07

- *Raw water screens collapsed*
- *2.5 mo. shutdown*
- *Installed automatic flushing screens*
- *$??? Installation & $50,000/yr O&M*
- *Divers scrape intake twice/yr*
- *Vacuum shore shafts annually*
- *110,000 lbs. from 11-14 Feb 07*
- *40 cu yd dumpster full every 2 days*
- *Unmanned pump station had to be manned*

Questions?

Controls


THIS SAYS YOU SERVE FRESH OKLA CLAM CHOWDER!
I DIDN'T THINK THERE WERE ANY CLAMS IN OKLA!
THERE AREN'T... WE USE ZEBRA MUSSELS!
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Some Controls

- *Chemicals*
- *Biocides*
- *Molluskicides*

Chemical Biocide/Molluscicide	Waller et al. 1993	Claudi and Mackie 1994	EPRI 1993	McMahon et al. 1994
I. Oxidizing Biocides				
Chlorine		X	X	X
Chlorine dioxide		X		X
Chloramine		X		X
Bromine		X		
Ozone		X	X	X
Sodium hypochlorite		X		
Hydrogen peroxide		X	X	
Potassium permanganate	X	X		X
II. Nonoxidizing Biocides/Molluscicides				
Ammonium nitrate		X		
Potassium salts	X	X		X
Clamtrol CT-1	X	X	X	X
Clamtrol CT-4	X			
Calgon H130 M	X	X	X	X
Bulab 6002	X	X	X	X
Bulab 6009	X			X
Baluscide				X
Macrotrol 7326			X	X
Mexel 432*				
Actibrom 1338	X	X	X	
TFM				
III. Metallic Molluscicides				
Copper sulfate	X			X
Potassium chloride	X	X		X
Potassium hydroxide				X
Copper ions				X
Silver ions				X

Some Controls

- *Heat*
- *Freezing*

Some Controls

- *Toxic Metals (copper, zinc, bronze, lead, gold, etc)*
- *Surface Coatings*

Some Controls

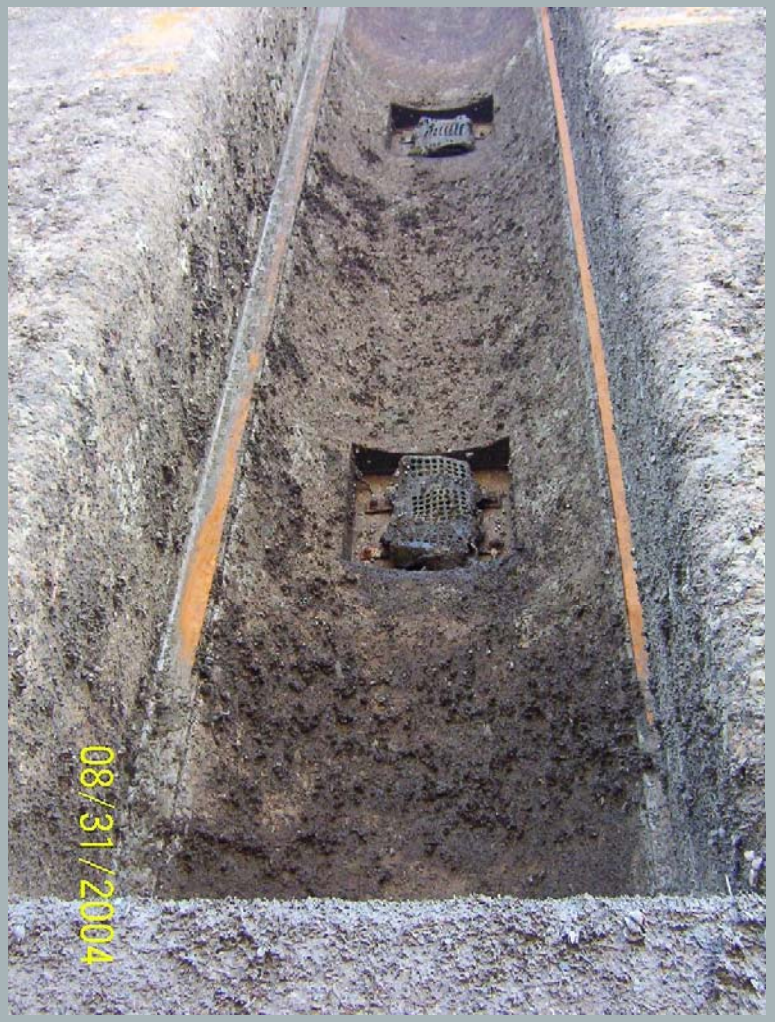
- *Physical Removal*
- *Carbon dioxide pellets*

Some Controls

- *Filters*
- *Water Speed (over 6.6cfs)*

Some Controls

- *Electrical Barriers*
- *Cathodic Barriers*



LSD 16 Mooring Bit Slot

Some Controls

- *Ozone*
- *UV Light*
- *Acoustics*

Questions?

I & E

- *Prevention is #1 Priority*
  - *Know your pathways*
  - *Control pathways*
  - *Develop PR plan*
  - *Partnerships*
  - *Develop I&E materials*
  - *HAACP*
  - *Budget ASAP!*
  - *Assess high risk locations*

OKZMTF

U.S. ARMY CORPS OF ENGINEERS
- Everett Laney - Biologist

US. BUREAU OF RECLAMATION
- Jeff Tompkins - Natural Resource Specialist

U.S. FISH AND WILDLIFE SERVICE
- Bob Pitman - Region 2 AIS Coordinator
- David Britton - Region 2, Asst AIS Coordinator
- Brent Bristow - Tishomingo Hatchery

OKLAHOMA BIOLOGICAL SURVEY
- Caryn Vaughn - Heritage Biologist

OKLAHOMA CONSERVATION COMMISSION
- Cheryl Cheadle – Blue Thumbs Coordinator

OKLAHOMA COOPERATIVE EXTENSION SERVICE
- Marley Beem - Area Extension Aquaculture Specialist

OKLAHOMA DEPT OF ENVIRONMENTAL QUALITY
- Randy Parham

OKLAHOMA DEPT OF WILDLIFE CONSERVATION
- Jeff Boxrucker & Ashley Foster

OKLAHOMA WATER RESOURCES BOARD
- Chuck Potts - Environmental Program Specialist

OKLAHOMA STATE UNIVERSITY
- Joe Bidwell & Chad Boeckman- Dept of Zoology

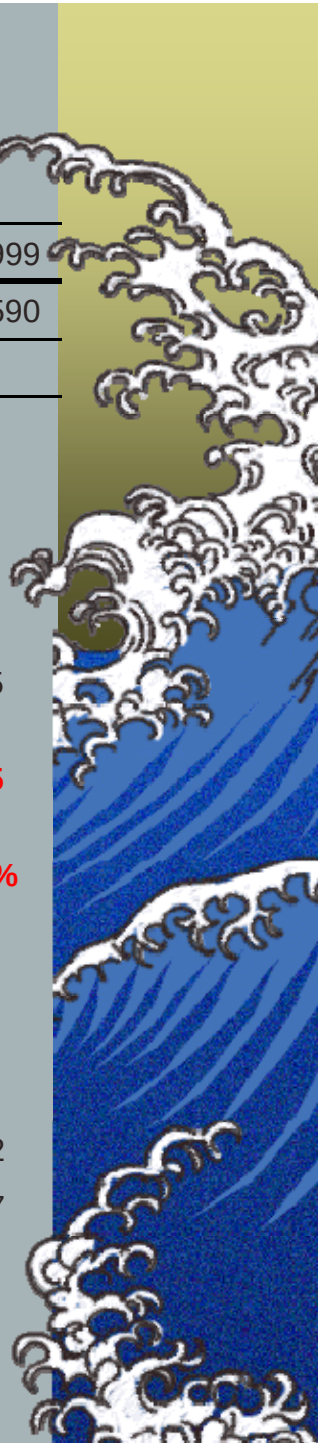
NORTHEASTERN STATE UNIVERSITY
- Jim Schooley - College of Math and Science

LANGSTON UNIVERSITY
- George Luker & Conrad Kleinholz

GRAND RIVER DAM AUTHORITY
- Darrell Townsend & Sam Ziara

SWT Visitors ~ 98 & 99

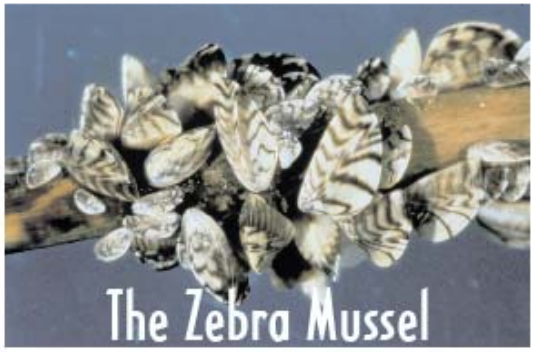
	Ft. Gibson		Skiatook		Kaw		Oologah		Eufaula		Tenkiller	
	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999	1998	1999
Opportunities	62	69	34	69	71	123	130	163	338	383	792	1590
98 + 99	**131**		**103**		**194**		**293**		**721**		**2382**	
Total Other States	27	28	26	27	35	35	38	39	41	41	35	35
Infested States	**15**	**14**	**13**	**13**	**15**	**15**	**16**	**16**	**16**	**16**	**16**	**15**
% of Infested States	**56%**	**50%**	**50%**	**48%**	**43%**	**43%**	**42%**	**41%**	**39%**	**39%**	**46%**	**43%**
1998 Visitors	2,892,770		558,190		700,309		1,259,319		2,518,344		1,215,872	
1999 Visitors	2,416,651		585,843		UNKNOWN		1,258,023		2,127,130		1,149,237	



STOP AQUATIC HITCHHIKERS!™

Prevent the transport of nuisance species.
Clean all recreational equipment.
www.ProtectYourWaters.net

Zap The Zebra!



When you leave a body of water:

- Inspect and remove any visible mud, plants, fish or animals before transporting equipment.
- Eliminate water from equipment before transporting.
- Clean and dry anything that comes into contact with water (boats, trailers, equipment, clothing, etc.).
- Never release plants, fish or animals into a body of water unless they came out of that body of water.

If You See A Zebra Mussel Please Call

1-800-437-2744

CRIME WITNESS
1-800-437-2744

To Stop The Spread of Zebra Mussels

STOP AQUATIC HITCHHIKERS!™

Prevent the transport of nuisance species.
Clean all recreational equipment.

www.ProtectYourWaters.net

Your Logo Here

When you leave a body of water:

- Remove any visible mud, plants, fish or animals before transporting equipment.
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PYW 8/31/02

BOATERS HELP . . .

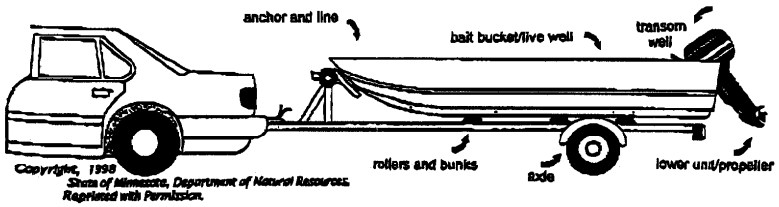
Prevent the Spread of Zebra Mussels

TO PREVENT DAMAGE TO YOUR BOAT OR TRANSPORTATION TO NON-INVESTED WATER, PLEASE FOLLOW THESE GUIDELINES.

1. Drain the bilge water, live wells, and bait buckets. Live bait should not be transported to uninfested waters.
2. Inspect the boat and trailer for attached Zebra Mussels.
3. Scrape off any Zebra Mussels.
4. Dry boat and trailer for 1 week before entering another waterway.

OR

1. Wash boat parts and trailer with 140 degree F water, a 10% chlorine and water solution, or a hot saltwater solution. Do not wash at ramp.
2. Finish with a clean water rinse.



FOR MORE INFORMATION CONTACT:

U.S. Army Corps of Engineers:

Oologah Lake Office	918-443-2250
Tulsa District Office	918-669-7411 or7366

Oklahoma Department of Wildlife Conservation:

N.E. Regional Office	918-683-1031
Headquarters, Oklahoma City	918-521-3721

Zebra Mussel Alert

The barnacle-like zebra mussel poses a multibillion-dollar threat to industrial and public drinking water supplies and may become a costly nuisance to shippers, boaters, commercial fishermen, anglers and beachgoers as well—far more costly in human terms than all previous Great Lakes invaders combined.

Public assistance in reporting zebra mussel sightings at new locations is essential to help prevent its spread to other inland lakes and rivers!

How to Identify It

▶ Zebra mussels look like small clams with a yellowish or brownish "D"-shaped shell, usually with alternating dark- and light-colored stripes (hence the name "zebra").

▶ They can be up to two inches long, but most are under an inch. Zebra mussels usually grow in clusters containing numerous individuals (see photo) and are generally found in shallow (6–30 feet), algae-rich water.

▶ Zebra mussels are the ONLY freshwater mollusc that can firmly attach itself to solid objects—submerged rocks, dock pilings, boat hulls, water intake pipes, etc.

What to Do

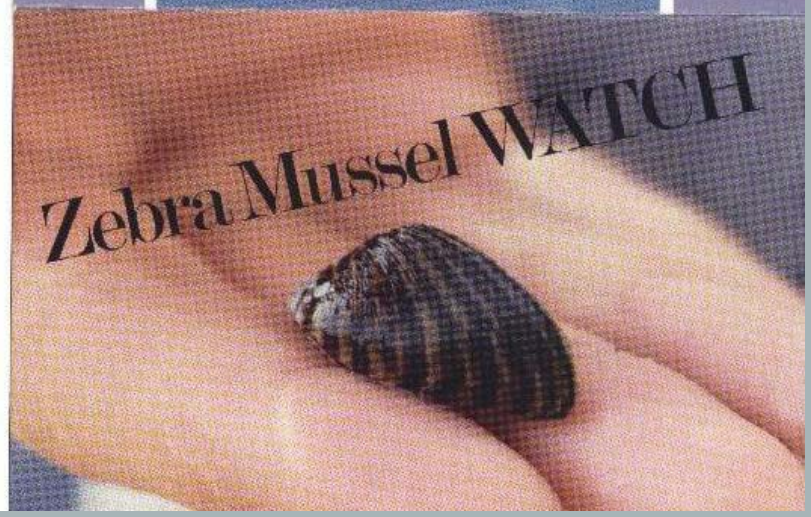
▶ Note the date and precise location where the mussel or its shell(s) were found;

▶ Take the mussel with you (several, if possible) and store in rubbing alcohol (in any case, DON'T throw it back in the water), and

▶ CONTACT: U.S. Army Corps of Engineers (Tulsa, 918/669-7411), or Oklahoma Department of Wildlife Conservation (Fisheries, 405/521-3721). These offices coordinate information with members of the Oklahoma Zebra Mussel Task Force.

The Great Lakes Sea Grant Network

Zebra Mussel Cluster



NOTICE TO ALL LAKE WATER USERS

Zebra Mussels have become established in Oklahoma. They have only been found in the Arkansas and Verdigris Rivers on the Kerr-McClellan Navigation System. First sighted in January of 1992, they are now prevalent throughout the navigation system.

Most Zebra Mussels are thumbnail size, but they can grow up to 2 inches long and are usually found in water down to 30 feet deep. They have an elongated, "D" shaped, somewhat pointed, thin shell with a zebralike pattern of stripes. Unlike native mussels that burrow in sand and gravel, Zebra Mussels spend their adult lives attached to hard objects under water such as; rocks, metal, wood, fiberglass, styrofoam, PVC, plastic, concrete, aquatic plants, shells of native mussels, and crayfish. They can cluster together in colonies of hundreds of thousands per square meter. *They are the only fresh water mussel that attaches itself to solid objects.*

In addition to potentially altering the native ecological system, Zebra Mussels can also disrupt water withdrawal operations by clogging water intake pipes. This has caused problems with some lakeshore municipalities and industries, power plants, farms and irrigation systems.

Zebra Mussels can affect recreation activities as well. They can accumulate and grow in water intakes of both inboard and outboard boat motors, causing engines to overheat. Boats should not be left in infested water for extended periods of time. With regular use, engine heat will keep them from colonizing inside most engine parts. They attach quickly to boat hulls and can affect boat handling capability, reduce fuel efficiency, and slow speed. Young Zebra Mussels are about .02 inch long. If a boat hull feels grainy or gritty, it could be covered with small Zebra Mussels. The microscopic larvae can be unknowingly transported in bilges, engine cooling systems, minnow buckets, live wells, and anywhere else water is trapped. If you frequent Zebra Mussel infested waterways take precautions to prevent transporting them to uninfested waterways.

If they get introduced into your lake the establishment of significant populations will likely take 3 or 4 years. Once they become established you will have to learn to live with them. Please help keep this pest out of your lake. If you find a Zebra Mussel please collect it and contact your nearest Corps of Engineers or Oklahoma Department of Wildlife Conservation representative.

BOATERS' ADVISORY

THESE WATERS ARE INFESTED WITH ZEBRA MUSSELS

Zebra Mussels vary from 1/8 to 2 inches long and have a yellow-brown shell with alternating color bands. This mussel is prolific and can form colonies of thousands on your boat hull or any submerged hard surface

TO PREVENT DAMAGE TO YOUR BOAT OR TRANSPORTATION TO NON INFESTED WATER, PLEASE FOLLOW THESE GUIDELINES.

- Drain the bilge water, live wells, and bait buckets.
- Inspect the boat and trailer for attached Zebra Mussels.
- Scrape off any Zebra Mussels.
- Dry boat and trailer for 1 week before entering another waterway.

▽ OR ▽

- Wash boat parts and trailer with 140F water, a 10% chlorine and water solution, or a hot saltwater solution. Do not wash at ramp. Finish with a clean water rinse.

FOR MORE INFORMATION CONTACT:

U.S. Army Corps of Engineers:

Tulsa District Office	918-669-7411 or 7410
Kaw Lake	580-762-5611
Keystone Lake	918-865-2621
Oologah Lake Office	918-443-2250
Webbers Fall Lake Office	918-489-5541
El Dorado Lake Office	316-321-9974

Oklahoma Department of Wildlife Conservation:

N.E. Regional Office	918-683-1031
Headquarters, Oklahoma City	405-325-7288 or 7248

Kansas Department of Wildlife and Parks 620-342-0658

BOATERS' ADVISORY

ARE YOU CARRYING ZEBRA MUSSELS?

If you have had your boat in a lake that has Zebra Mussels in the past 7-10 days you may still be carrying live Zebra Mussels with you.

Zebra Mussels vary from 1/8 to 2 inches long and have a striped yellow-brown shell. This mussel is prolific and their eggs and larvae can live for days out of the water on wet surfaces of your boat or trailer.

TO PREVENT DAMAGE TO YOUR BOAT OR TRANSPORTATION TO NON-INFESTED WATER, PLEASE FOLLOW THESE GUIDELINES WHEN LEAVING INFESTED WATER.

- Drain the bilge water, live wells, and bait buckets.
- Inspect the boat and trailer for attached Zebra Mussels.
- Scrape off any Zebra Mussels.
- Dry boat and trailer for 1 week before entering another waterway.

▽ OR ▽

- Wash boat parts and trailer with 140°F water, a 10% chlorine and water solution, a hot saltwater solution, or a high-pressure sprayer. Most commercial carwash facilities will suffice. Do not wash your boat and trailer at the boat ramp.

IF YOU FIND ZEBRA MUSSELS IN A LAKE, OR WOULD LIKE FURTHER INFORMATION CONTACT:

U.S. Army Corps of Engineers:

- Tulsa District Office 918-669-7411
- Public Affairs 918-669-7371

Oklahoma Department of Wildlife Conservation:

- NE Regional Office 918-683-1031
- Headquarters, Oklahoma City 405-521-3721

Suggested Web Sites

- *http://corplakes.usace.army.mil*
- *http://www.aquaticinvaders.org*
- *http://100thmeridian.org*
- *http://answest.fws.gov*
- *http://nas.er.usgs.gov/zebramussel*
- *http://www.seagrant.noaa.gov*
- *http://el.erdc.usac.army.mil/zebra*
- *http://www:protectyourwaters.net*
- *"Or just search for **zebra mussel or quagga mussel**".*

Other Invasives

Check Federal and State Invasive Species Lists for additional non-native species.

http://www.aphis.usda.gov/ppq/weeds/weedlist2006.pdf

http://www.invasivespeciesinfo.gov/laws/statelaws.shtml

Invasive Species Leadership Team

- *CECW-CO Memo dtd 31 Mar 06, Subject: Invasive Species Leadership Team*

- *Purposes;*
  - *Provide direction to ongoing research programs.*
  - *Represent the USACE on regional invasive species councils.*
  - *Provide recommendations to HQUSACE on priorities for action.*

- *We've had 4 meetings.*
  - *Writing a National Invasive Species Policy.*
  - *Will update Regulations to reflect Policy.*
  - *Minutes can be seen on the Gateway website;*
    http://corpslakes.usace.army.mil/employees/minutes

ISLT

Everett Laney – Chair	*CESWT-PE-E*
Martin Curran	*CENAE-CO-MR*
Mark Cornish	*CEMVR-PM-A*
Jim Galloway	*CELRE-PL-P*
Michael Saucier	*CEMVN-OD-T*
Ondrea Hummel	*CESPA-PM-LE*
Thomas Lichte	*CEPOD-RBT*
Michael Loesch	*CELRD-PDS-O*
Lonnie Mettler	*CENWW-OD-T*
Don Morgan	*CESAM-OP-AC*
Phil Turner	*CESPD-PDS-O*
Rebecca Weiss	*CENWD-PDD*
John Wright	*CENAD-PDS*
Bill Zattau	*CESAJ-CO-OA*