

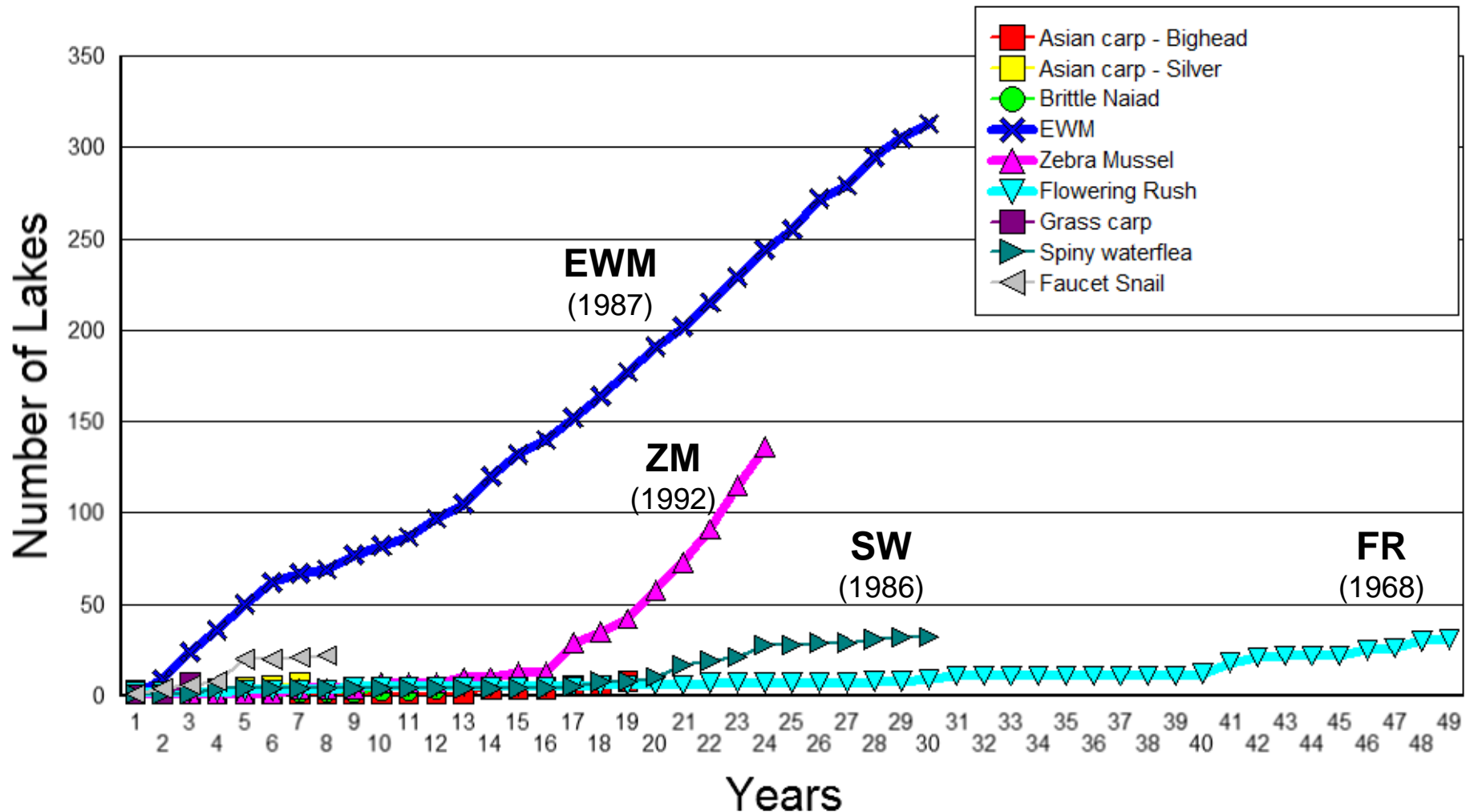
Case Studies of AIS Detection and Response

Upper Midwest Invasive Species Conference

**Steve McComas, Jo Stuckert, Connor McComas
Blue Water Science**

October, 2016

AIS Spread at Different Rates in MN



(CLP = 115 years, 800 lakes)

(source: MnDNR Sept 28, 2016)

Early Detection and Rapid Response

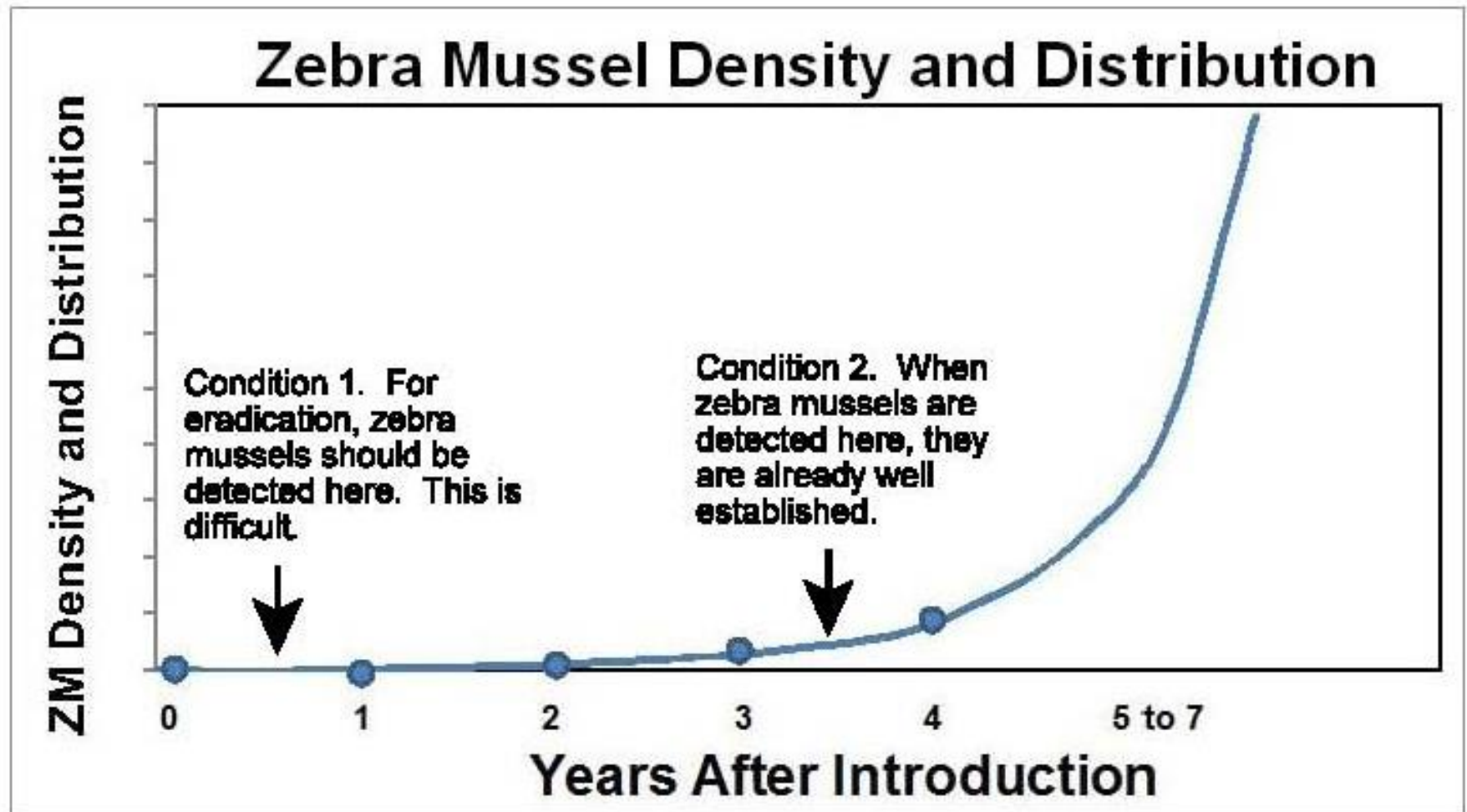
Detection Strategies

1. Static samplers (plate samplers)
2. Active searching
3. eDNA

Rapid Response

1. Pre-planning (suitability, materials, permits)
2. Rapid assessment (search, assess)
3. Rapid action (eradication or management)

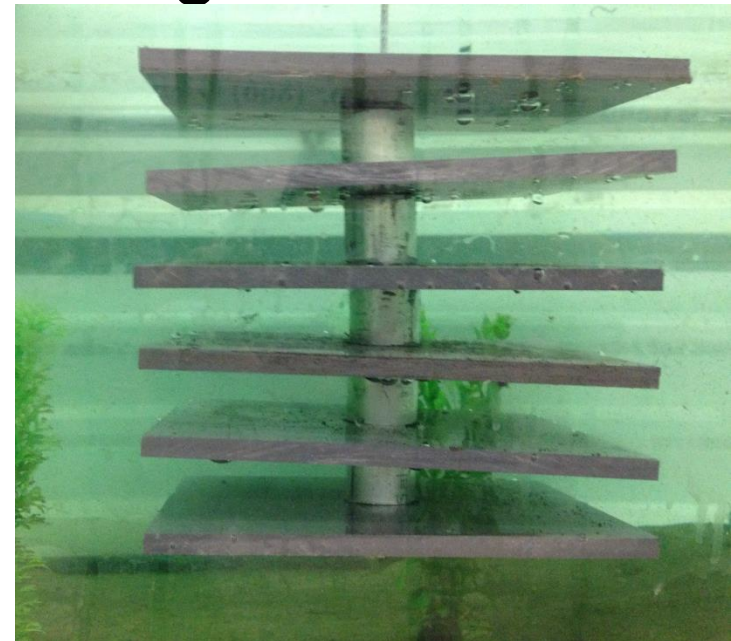
AIS Early Detection Challenge



AIS Detection Strategies:

Zebra Mussel examples:

- Static samplers – single object
- Active search – multiple strategies
(include volunteers)



What Level of Searching Is Needed for Early Detection?

- Is plate sampling enough?
- How many objects to examine?
- Monthly searching should be considered.

Example: Big Cormorant

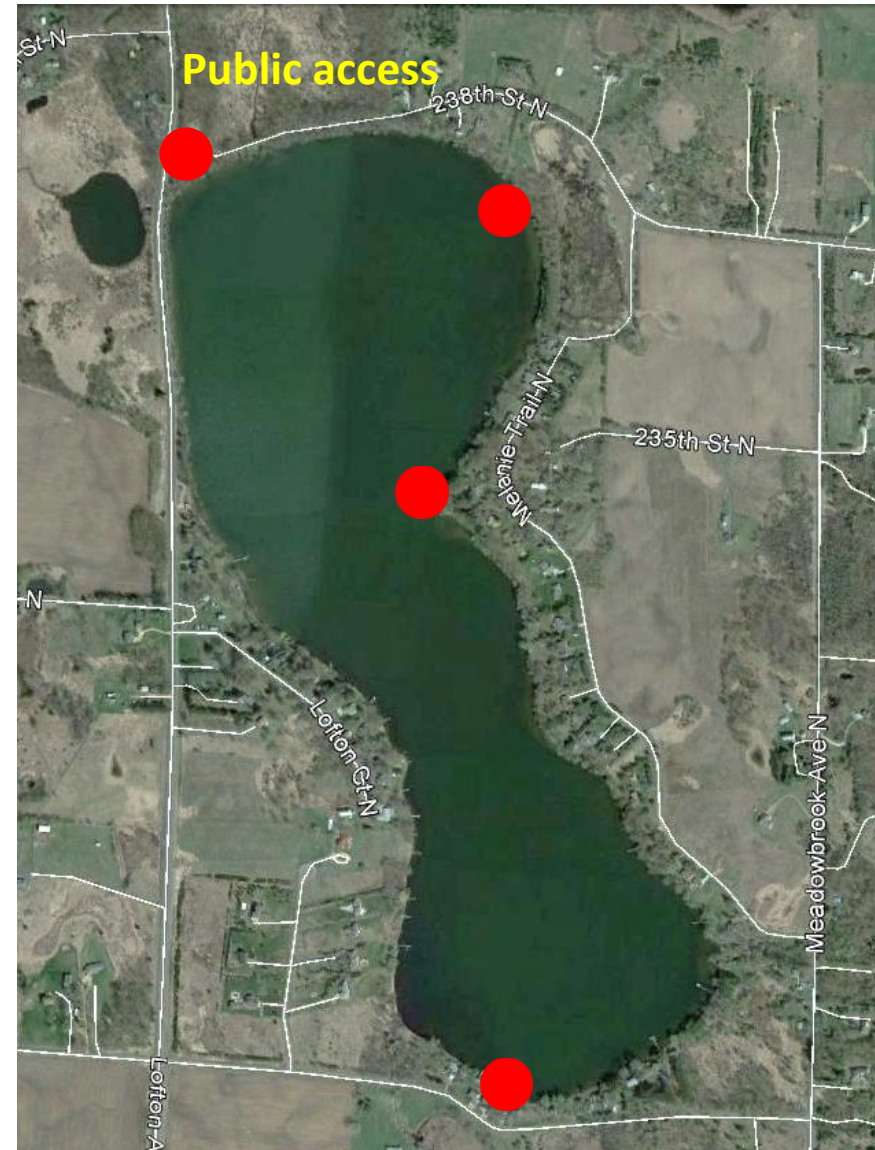
7,000 objects = 1 ZM

3.5 objects/minute = 30 hrs
of searching for 1 ZM



Search Strategies

- Look at high probability targets like lake access and drift points.
- Search patterns are parallel to shore in shallow water.
- Search efficiency test helps to put search results in perspective.



Search Efficiency Tests



- 0-60% of the objects recovered is typical range.
- 30% found is about average.

Early Detection Strategies

Ramsey County

12 lakes with public access monitored based on availability

- Plate samplers at public access
- Search survey at public access

Mpls Parks and Rec Board

5 lakes have full-time inspections

- Boat inspectors conduct weekly searches at public accesses
- Intensive search every 4 years

What Happens If AIS Are Found?

Rapid Response – 3 part plan

1. **Pre-planning** (growth suitability, materials, permits)
2. **Rapid assessment** (search, index)
3. **Rapid action** (eradication or management)

1. Rapid Response – Pre Planning

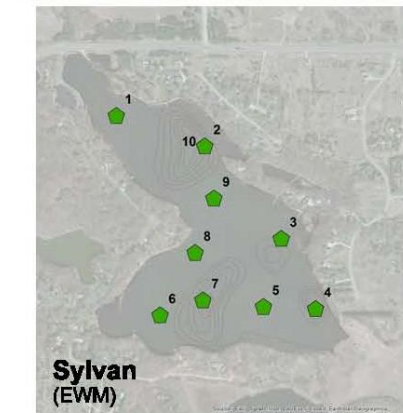
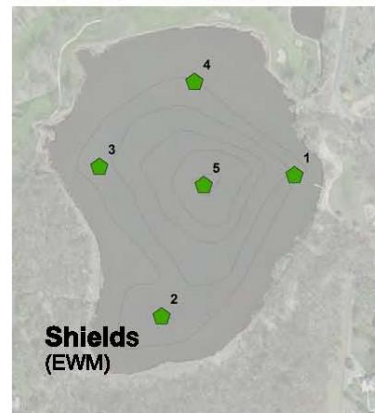
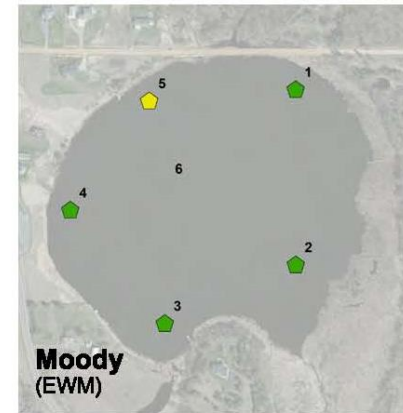
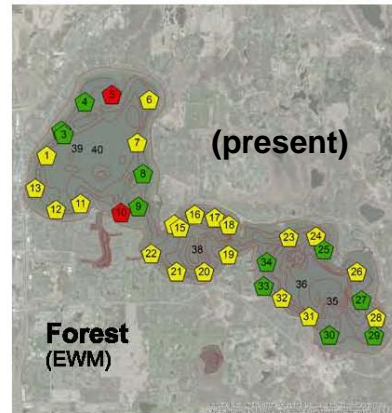
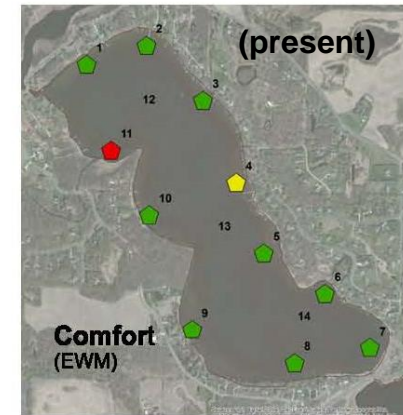
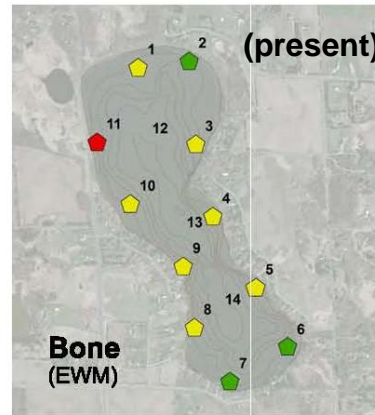
- **Suitability maps** – the kind of growth that is expected sets priorities
- **Materials for treatment** – containment barrier and applicator should be lined up
- **Permits**
- **Public relations and meetings**
- **Authorization** – can you block a public access if necessary?
- **Budget** - Is a treatment fund available (\$30,000 or more for zebra mussels)?

1. Pre-Planning

Eurasian Watermilfoil Suitability Criteria

- **Sediment nitrogen**
(>10 ppm by volume)
- **Organic matter**
(>20%)

(Comfort Lake/ Forest Lake Watershed District lakes)



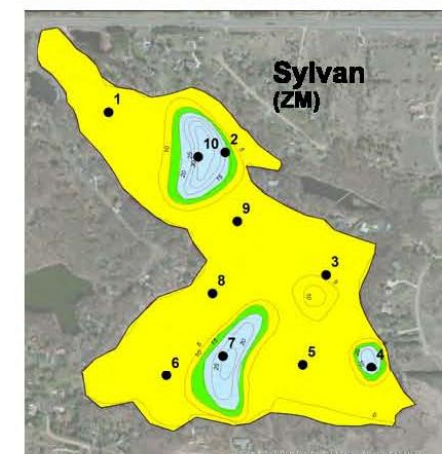
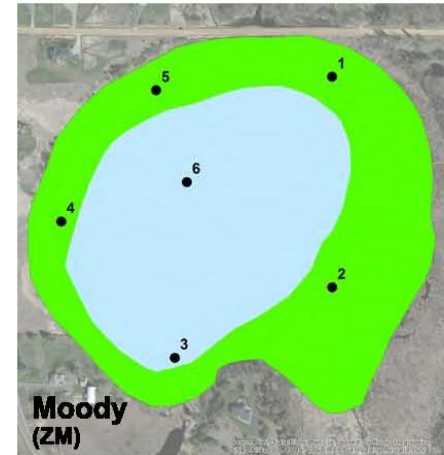
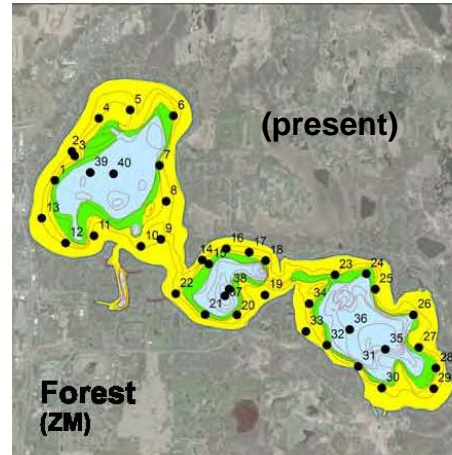
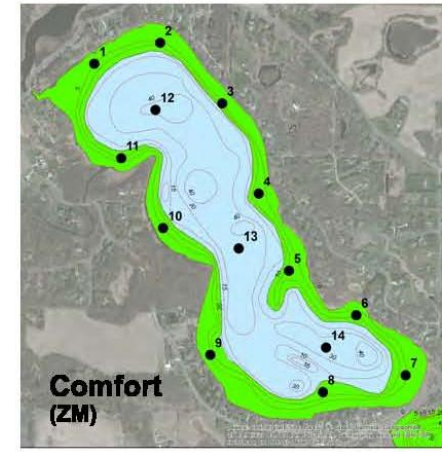
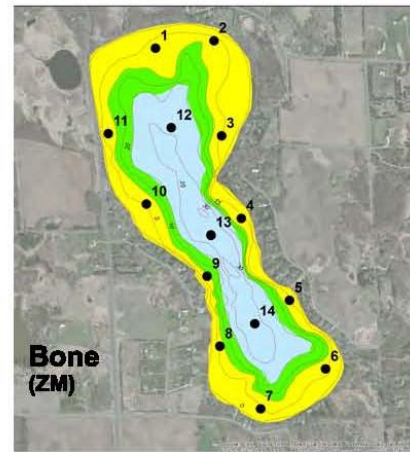
1. Pre-Planning

Zebra Mussel Suitability Criteria

- **Calcium**
(>30 mg/l)
- **Chlorophyll**
($2-8$ $\mu\text{g/l}$)
- **Dissolved oxygen**
(>7 mg/l)

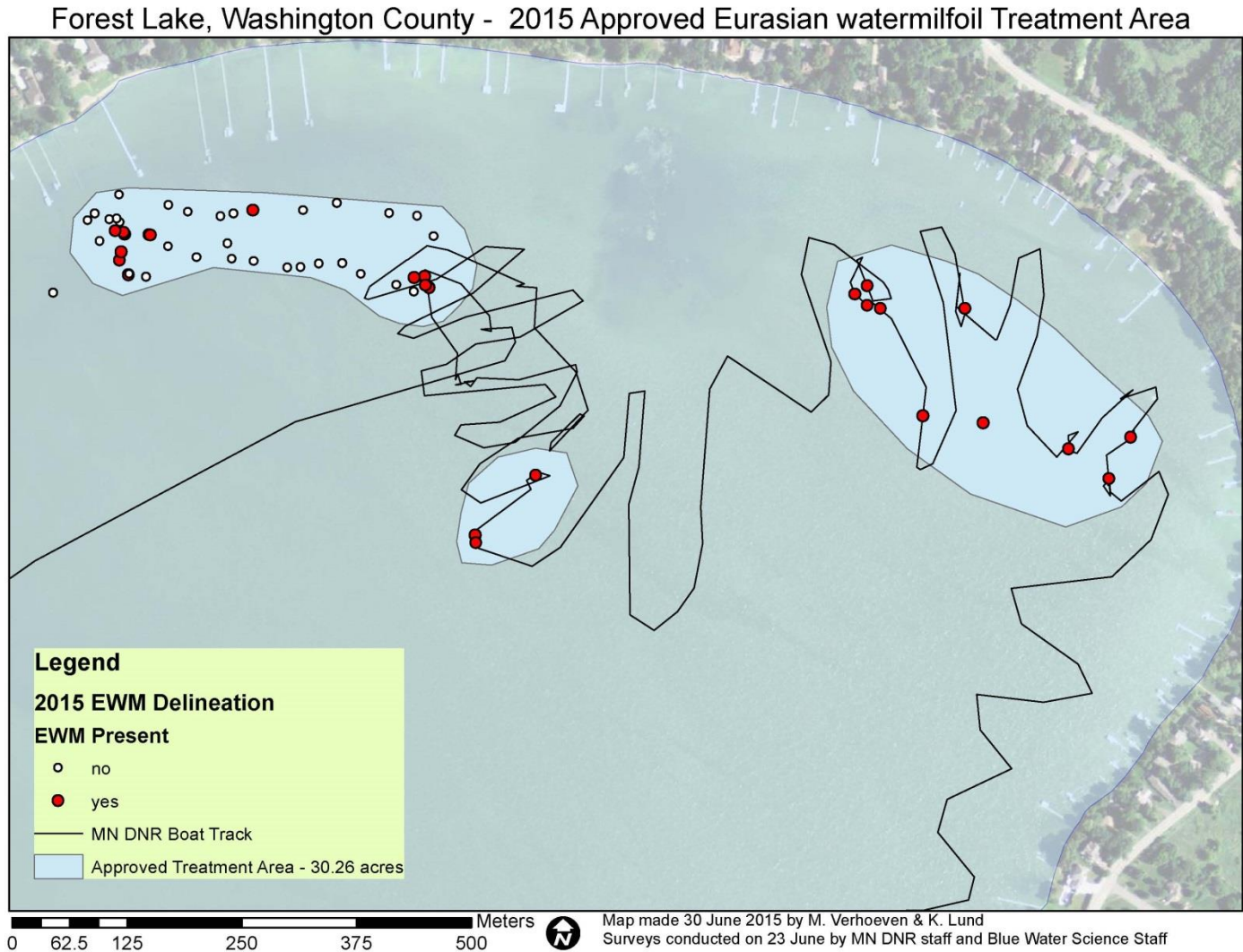
(Macki and Claudi, 2010)

(Comfort Lake/ Forest Lake Watershed District lakes)

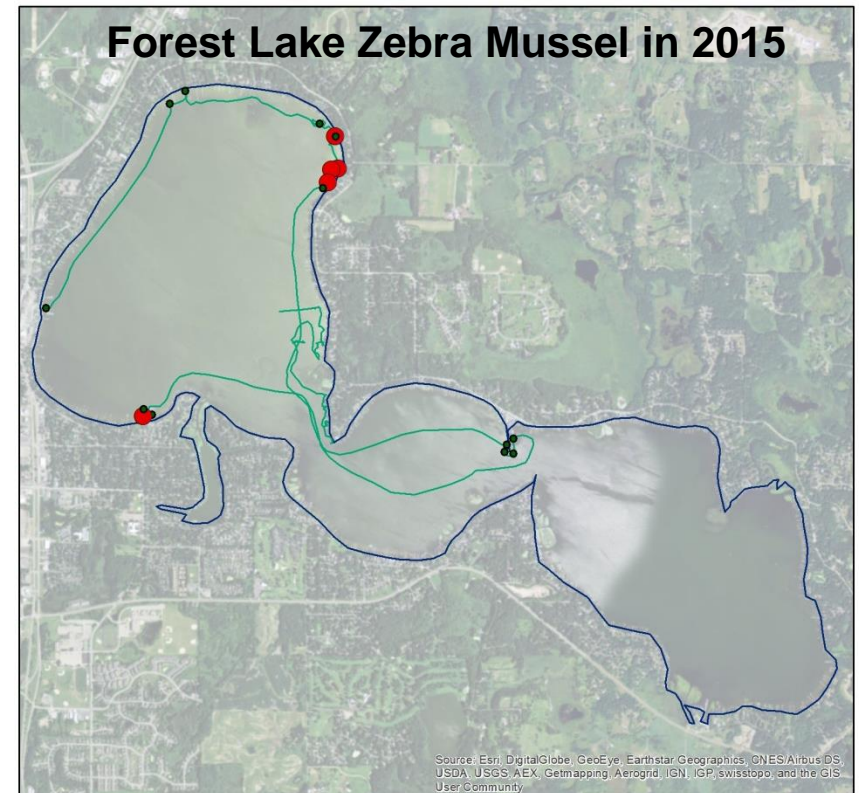
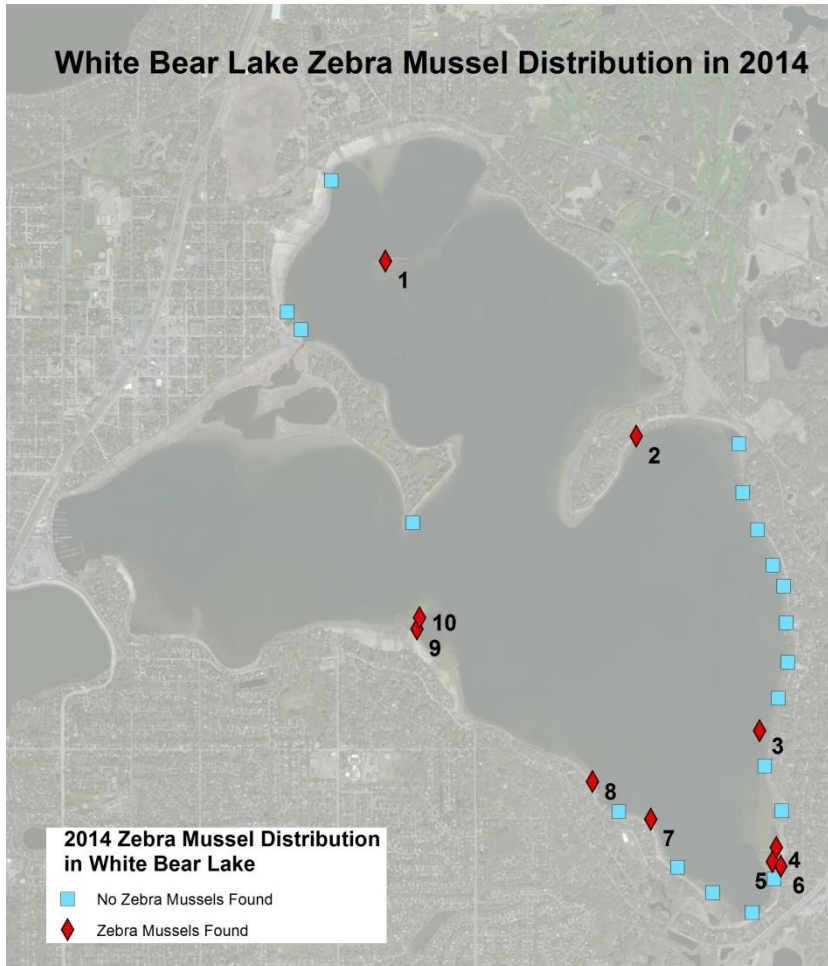


2. Rapid Response Assessment: EWM

EWM: After initial detection, conduct a thorough search of the area.



2. Rapid Response Assessment: ZM



Forest Lake GPS Points July 3, 2015

- 0 Zebra Mussels Found
- 1 Zebra Mussel Found

Forest Lake, Washington County
Inventory Number: 820-159-00

Blue Water Science
Steve McComas
UTM NAD 1983

Rapid Response Assessment

Search Results for ZMs

	Objects Searched	Search Hours	Sites with ZMs	ZMs/objects
Green	1,200	13	6	1 per 86 rocks
John	8,500	31	12	1 per 121
Big Cormorant	21,000	86	3	1 per 7,000
White Bear (Washington Co)	2,400	20	10	1 per 240
Forest (Washington Co)	920	5	6	1 per 184
Independence – 1	1,500	8	2	1 per 83
Christmas – 1	23,000	125	1	1 per 5

(green shading = unsuccessful eradication)

Should an Eradication Attempt Occur?

Zebra Mussel Example:

- Compile an eradication index
- 10 criteria, total points = 1,000

ZM Eradication Index Criteria

- | 1. Public access inspection protocols. |
|--|
| 2. Early detection searches and frequencies. |
| 3. Rapid assessment: up to 30 hours. |
| 4. Number of ZM locations in lake. |
| 5. ZMs: mature or juveniles. |
| 6. Number of ZMs per object. |
| 7. Potential treatment setting in lake. |
| 8. Treatment area <10 ac? |
| 9. Potential for ZM re-introduction. |
| 10. Lake size (up to 300 ac). |

Eradication Index Scores and Actions

	Index Score	Action	Results
White Bear	280	No treatment	Management
Forest	305	No treatment	Management
Big Cormorant	410	No treatment	Management
Independence	300	Copper sulfate, KCl	Management
Christmas	740	Zequanox, KCl, CuSO4	Management

Conclusion: A high score is necessary to consider an eradication attempt.

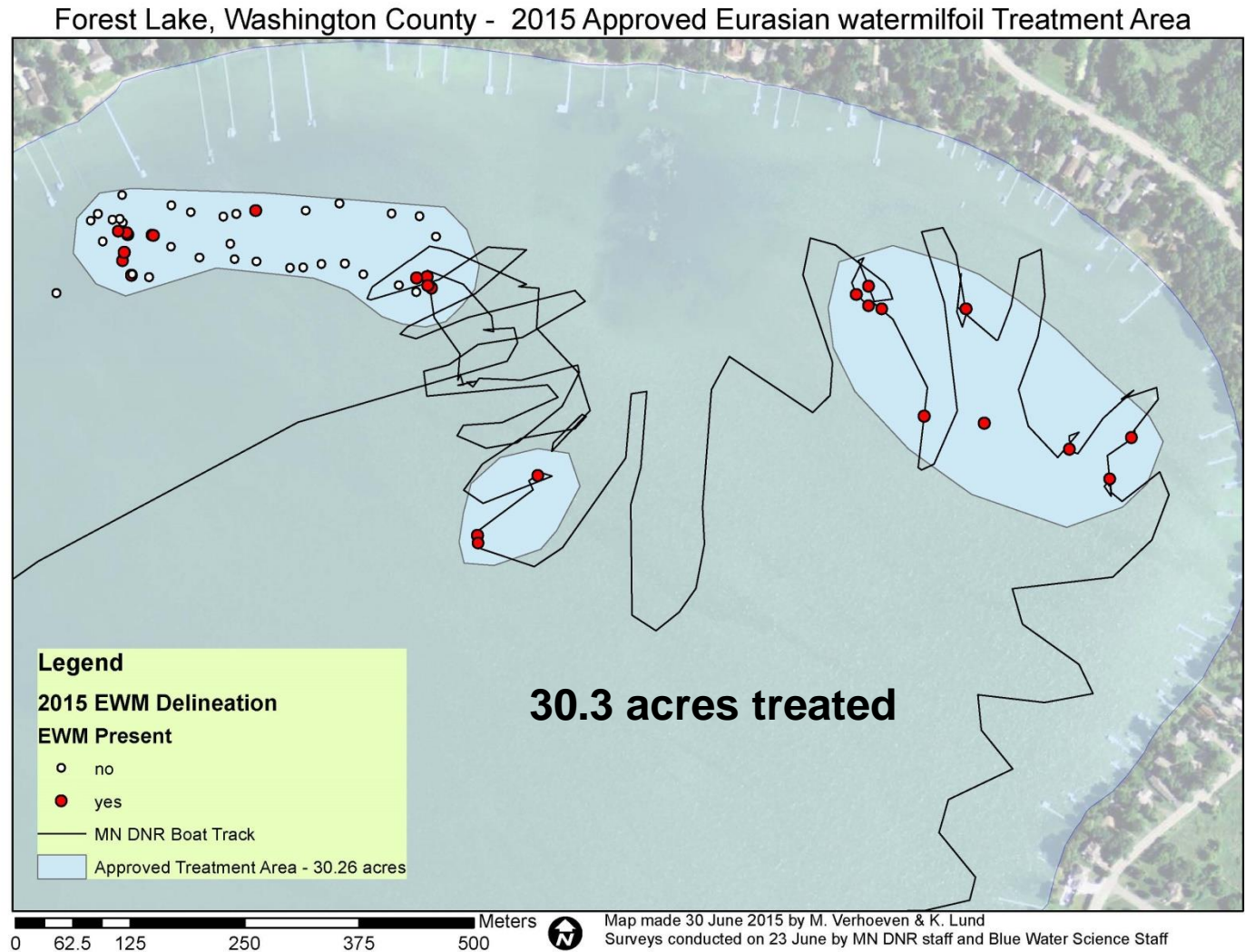
2. ZM Rapid Response Assessment – What did we learn

- Need to be fortuitous (lucky) to find an introduction early
- 2 or more sites will make an eradication success unlikely
- Need a high ZM index score to take action
- Eradication index can be used for other AIS

3. Rapid Response Action - EWM

EWM:
Aggressive
control:
July 2015

(eradication
was not the
objective)



EWM Rapid Response Action: Sept 2015

- Not eradication.
- Temporary containment.
- Long-term control.



(Forest Lake, MN)

- No Eurasian Watermilfoil

Sites Sampled September 18, 2015

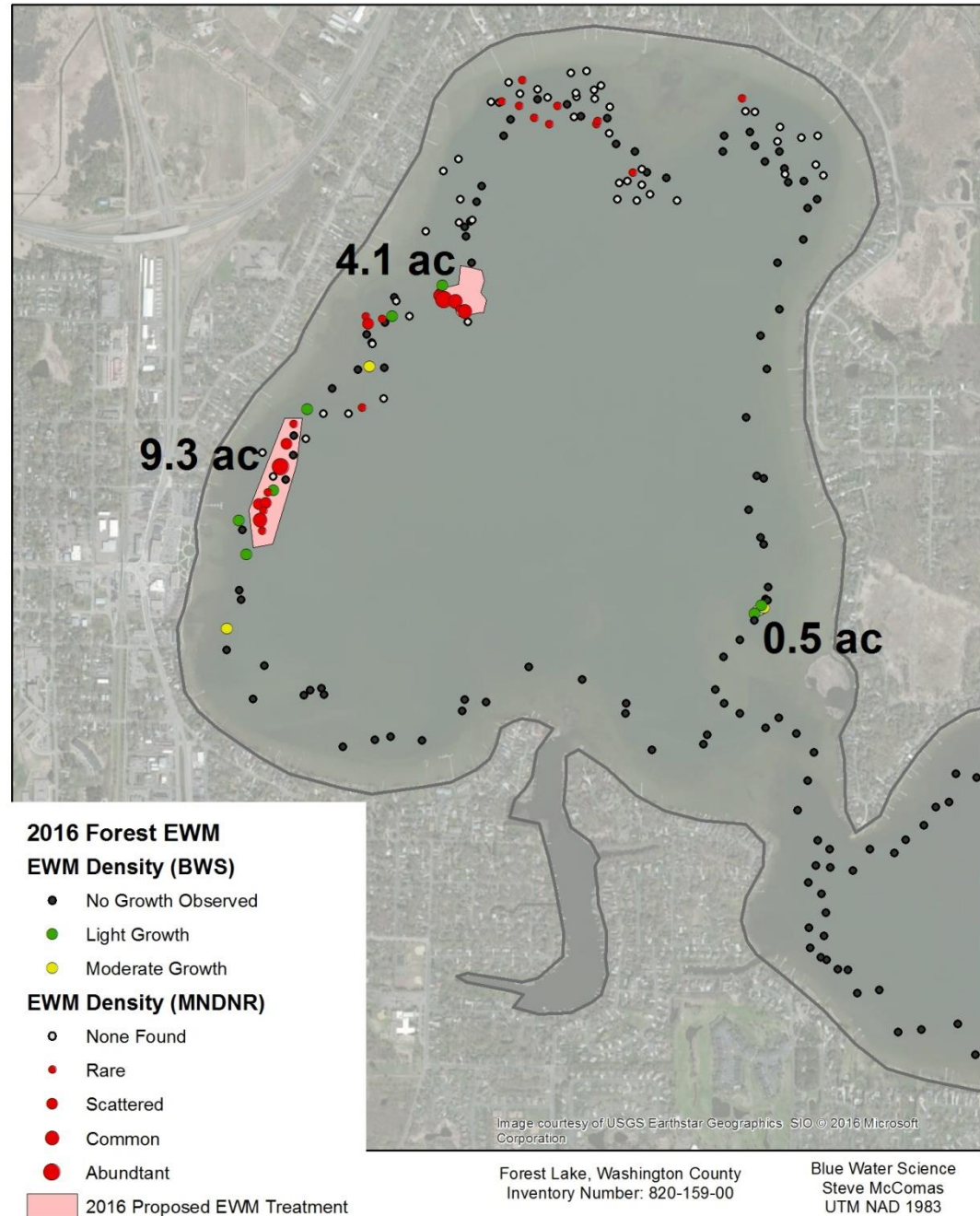
Forest Lake, Washington County
Inventory Number: 820-159-00

Blue Water Science
Steve McComas
UTM NAD 1983

EWM Long Term Control: June 2016

- No heavy growth observed.

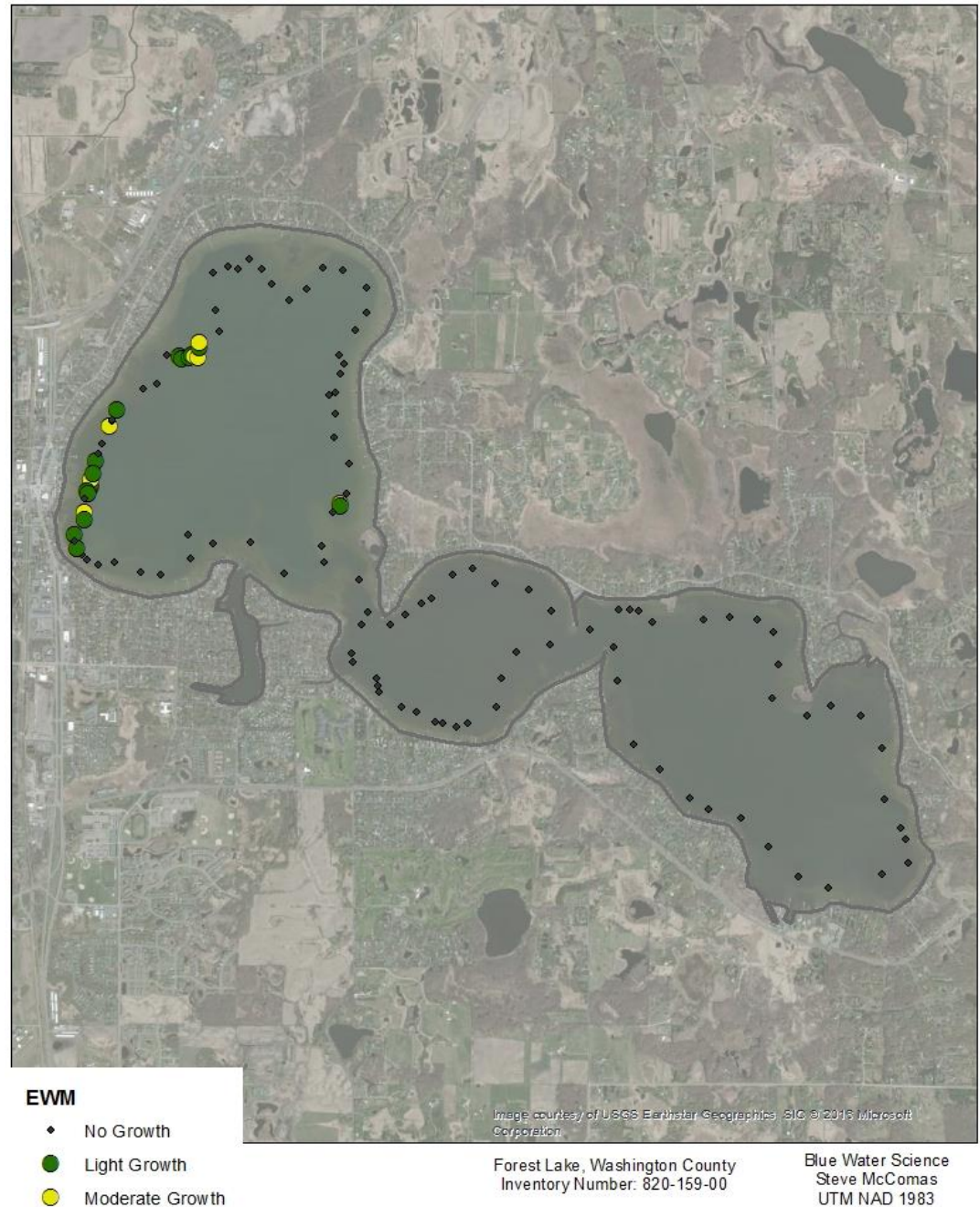
(Forest Lake, MN)



EWM Long Term Control: Sept 2016

- No heavy growth observed.

(Forest Lake, MN)



3. Rapid Response Actions - ZM

Three products that are known to kill zebra mussels

1. Zequanox (dead bacteria)(expensive)
2. Potash (KCl)(not registered)
3. EarthTec (CuSO₄)(good candidate)

(Tarps have also been used.)

ZM Eradication: EarthTec (CuSO₄) (Product Is Registered)

J01153-002
 CUSTOMER P.O. #:

PLEASE SIGN AND RETURN TO PREPARED DELAYS IN YOUR ORDER.
 Renée SPEED-FAUX 1-316-945-0076

10.75"

Molluscicide for Control of Quagga and Zebra Mussels

ACTIVE INGREDIENT

Copper Sulfate Pentahydrate* (CAS No. 7786-99-0) 19.8%

OTHER INGREDIENTS 80.2%

Total 100.0%

*Metallic Copper ~ .5%

EPA REGISTRATION NO. 64962-1

EPA ESTABLISHMENT NO. 64962-NE-001

NET CONTENTS: TWO HUNDRED SEVENTY FIVE (275) U.S. GALLONS

THIS PRODUCT WEIGHS 9.18 LB. PER GALLON • 1.188 kg/L.

LOT NO.

Manufactured by: Earth Science Laboratories, Inc. • 1132 St. David, Suite 1 • Bensenville, IL 60015 • Phone: (800) 257-8783 • www.earthsciencelaboratory.com

KEEP OUT OF REACH OF CHILDREN

WARNING - AVISO

If you do not understand this label, first someone to explain to you the meaning of the pictographs, because a pictograph can be as significant as written details.)

FIRST AID

IF IN EYES: Flush with clean water and gently wash with the 20 minutes. Remove contact lenses, if present, after first 15 minutes, then continue flushing. Get a physician contact number for advice.

IF SWALLOWED: Call a poison control center or doctor immediately for treatment advice. Have person sip glass of water. Call a poison control center or doctor if you feel you may have swallowed the product, or if you get sick.

IF ON SKIN OR CLOTHING: Take off contaminated clothing. Wash thoroughly with plenty of soap and water for 15 to 20 minutes. Get medical attention if irritation or rash develops. Get a physician contact number for advice.

NOTE: For Pesticidal Products containing any combination of the acid or alkali groups. Do not use this product on fish or shellfish or any other aquatic life, or on any other aquatic life, or on any other aquatic life.

SEE ADDITIONAL PESTICIDE/PESTICIDE STATEMENTS BELOW

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

HAZARD

Causes irritation to respiratory tract, eyes, throat, and skin. Irritation of skin may occur if the product is in contact with the skin for an extended period of time. Avoid contact with the eyes, nose, mouth, and skin. Avoid contact with the eyes, nose, mouth, and skin. Avoid contact with the eyes, nose, mouth, and skin.

ENVIRONMENTAL HAZARD

The product is a hazard to fish and aquatic invertebrates. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used.

Do not use this product on fish or aquatic invertebrates. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used.

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PERSONAL PROTECTIVE EQUIPMENT

Wear Protective Equipment (PPE)

Wear protective equipment and the following Personal Protective Equipment (PPE):
 • Long-sleeved shirt and long pants
 • Shoes and socks
 • Chemical-resistant gloves
 • Chemical-resistant eye protection
 • Chemical-resistant face protection

USE SAFETY RECOMMENDATIONS

• Do not use this product on fish or aquatic invertebrates. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used.

DIRECTIONS FOR USE

To a solution of water and 10% of the product in water. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used.

USE INFORMATION

Use this product on fish or aquatic invertebrates. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used.

APPROXIMATE EQUIPMENT USE

Use this product on fish or aquatic invertebrates. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used.

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CONTAINER HANDLING

Containers with this product have a 1-gallon fill volume. Do not use this product on fish or aquatic invertebrates. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used. Avoid contact with the product or the water in which it is used.

Do



3. Rapid Response Action Summary

Eradication

- Contact authorities that an eradication is going to occur
- Permit updated
- Set barriers and apply CuSO_4
- Monitor
- Cost \$10,000-\$30,000 per site

-- or --

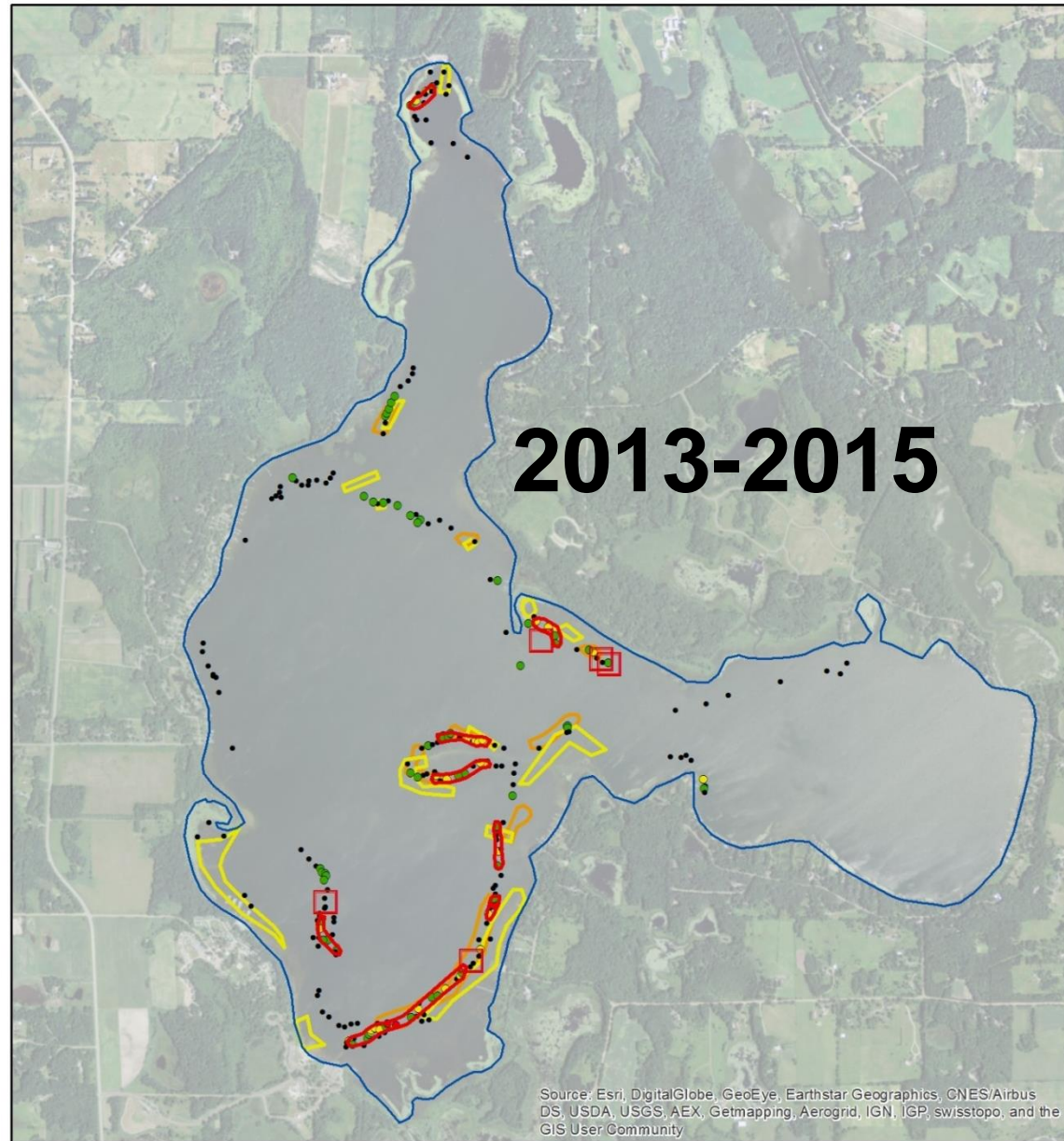
Contain/Control

- Long term small-scale control
- Monitor
- Cost of management is variable: water quality and AIS distribution and density

Big Marine EWM Control

2, 4-D or
Triclopyr

*Two treatments
within 12 hours*



Control/Management Actions for Zebra Mussels

(small scale projects)



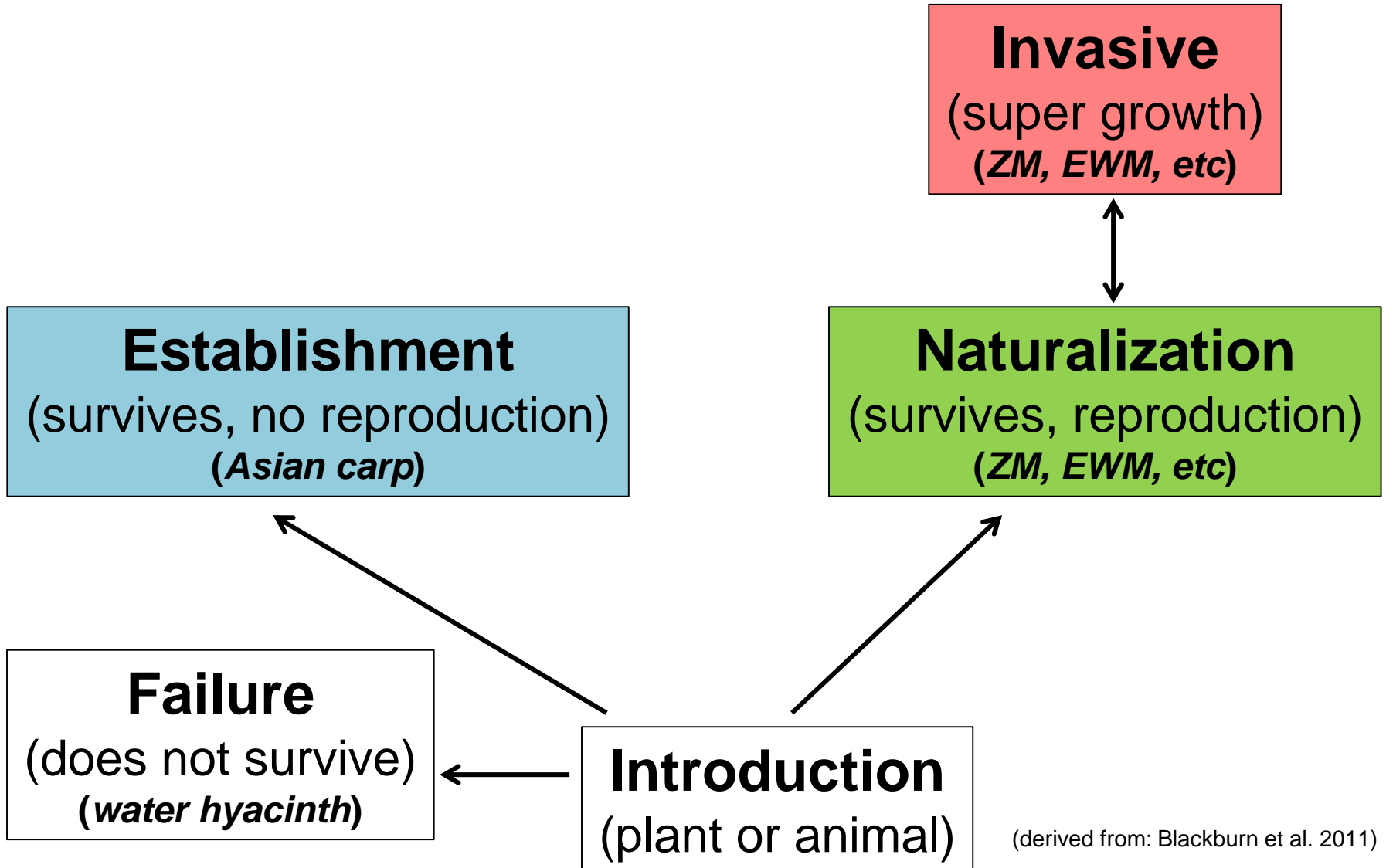


Zebra Mussel Grabber





AIS Growth Possibilities



White Lilies



Summary

AIS Program Components

- Prevention
- Detection
- Response (*pre-planning, assessment, action*)
- Management

Applies to a variety of AIS