

Responding to Invasive Animals in MI: Multifaceted Approach for Red Swamp Crayfish Response



Sara Creque Thomas

Seth Herbst, Brian M. Roth, Kelley Smith, Kim
Scribner, Daniel Hayes, Aaron Cupp, Jim
Stoeckel, Ann Alert

Great Lakes Panel on AIS, Nov 2018

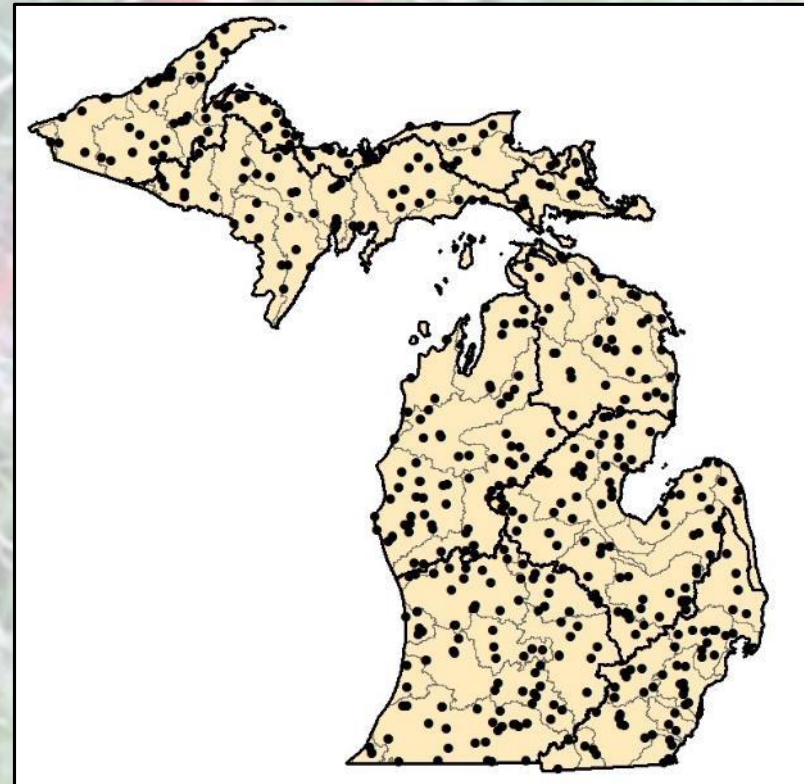


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Red Swamp Crayfish Timeline in MI

- 2013
 - July: Reports of red swamp crayfish carcasses at several locations on w. side of state
 - Popular fishing locations (Lake Macatawa)
 - Anglers using live crayfish from food markets
- 2014-2016
 - STATEWIDE survey of Michigan streams
 - >900 stream segments throughout Upper and Lower Peninsula. NO RSC collected.
 - Risk assessment of potential RSC pathways
 - Risks prominent in southern Michigan
- Listed as a prohibited species in 2015 to reduce risk



Red Swamp Crayfish Timeline in MI

- 2017
 - July 17: Reports of red swamp crayfish at Sunset Lake
 - Jul 19-22: Reports of RSC at several locations in SE Michigan
 - Late August: MSU response team started



Red Swamp Crayfish Response Plan

Goals:

- 1) Determine distribution of RSC
- 2) Implement and evaluate an early detection strategy
- 3) Determine the source of red swamp crayfish infestations
- 4) Collect baseline biological and physical information
- 5) Implement and evaluate control measures



1) Determine the Distributional Extent of RSC

- Trapping
- eDNA
- Visual inspection
- Outreach



Media Coverage

'Mini-lobsters' have Michigan on alert after invasive Louisiana crawfish found in waters

Advocate staff report AUG 3, 2017 - 12:16 PM (10)



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Tiny lobsters of doom: Why this invasive crayfish is bad news

By KATE WELLS · JUL 27, 2017

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This is the photo sent to Seth Herbst. "And as soon as I saw that photo, it was a clear as day that that was a red swamp crayfish," he sighed.

COURTESY SETH HERBST

Invasive crayfish reported in 2 bodies of water in Michigan

Hasan Dudar, Detroit Free Press Published 7:46 p.m. ET July 19, 2017 | Updated 8:05 p.m. ET July 19, 2017



Michigan faces a new invasive species, and they look like little lobsters. Wochit



(Photo: Brome McCreary, USGS)

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Some unwanted aquatic visitors are bringing a little Cajun flavor to lakes and ponds around Michigan this summer.

The Michigan Department of Natural Resources confirmed the presence of the invasive red swamp crayfish, also known as Louisiana crayfish, in Sunset Lake in Vicksburg on the state's west side and a retention pond off Haggerty Road in Novi.

Two separate landowners reported the crayfish at Sunset Lake to the DNR on July 13,

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Distributional Extent

Red Crayfish Map Viewer

Esri World Geocoder



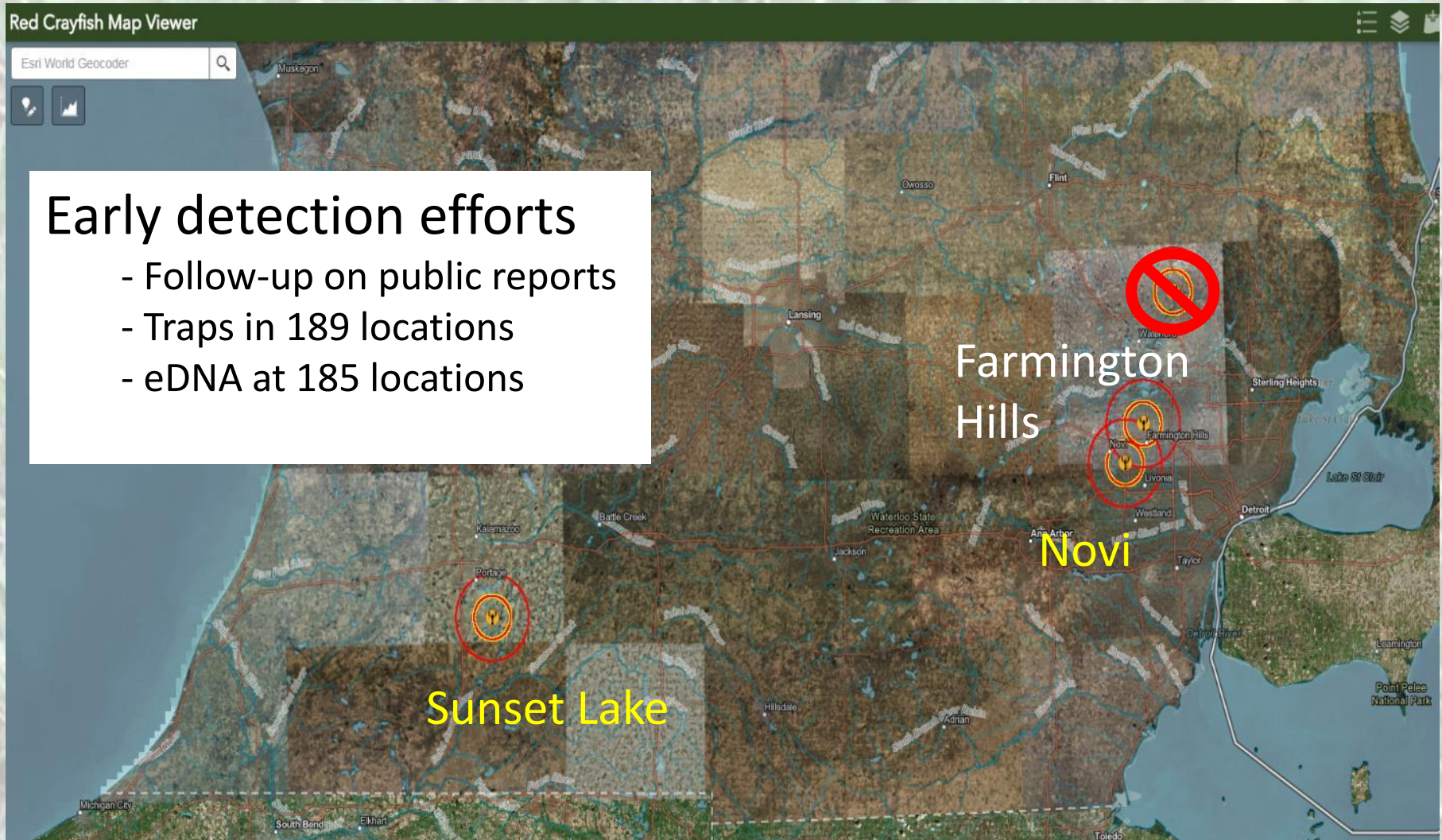
Early detection efforts

- Follow-up on public reports
- Traps in 189 locations
- eDNA at 185 locations

Sunset Lake

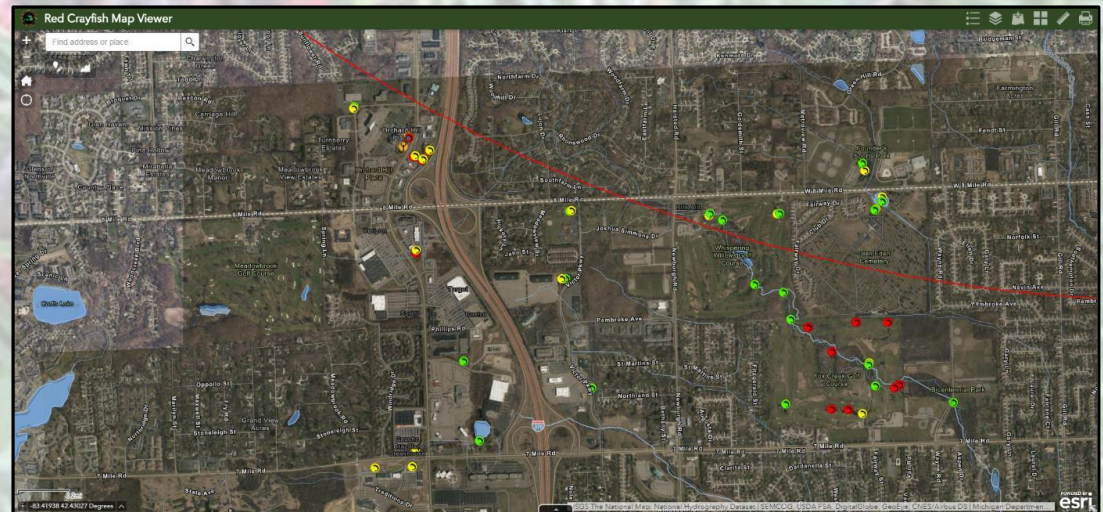
Farmington Hills

Novi



Distribution Challenges:

- Previous survey found no RSC in streams
- Infested waterbodies a mix of public and private ownership
- So far, mostly in very small waterbodies. Have to be on the ground to determine sampling conditions
 - Satellite imagery helps, but not always



Findings: 1) distributional extent

- Three epicenters (Found in 35 waterbodies)
 - Sunset Lake
 - Novi
 - Farmington Hills
- SE MI: Most are small ponds
 - Golf courses
 - Hotels/restaurants
 - Private residences/apartments



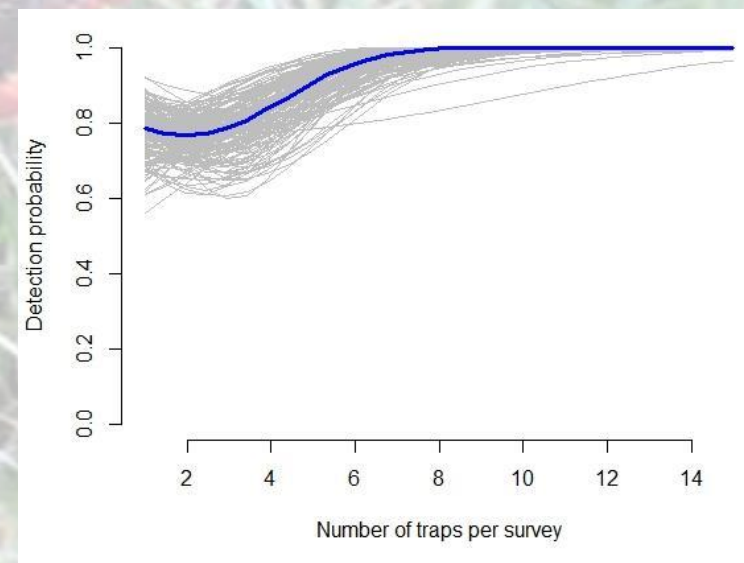
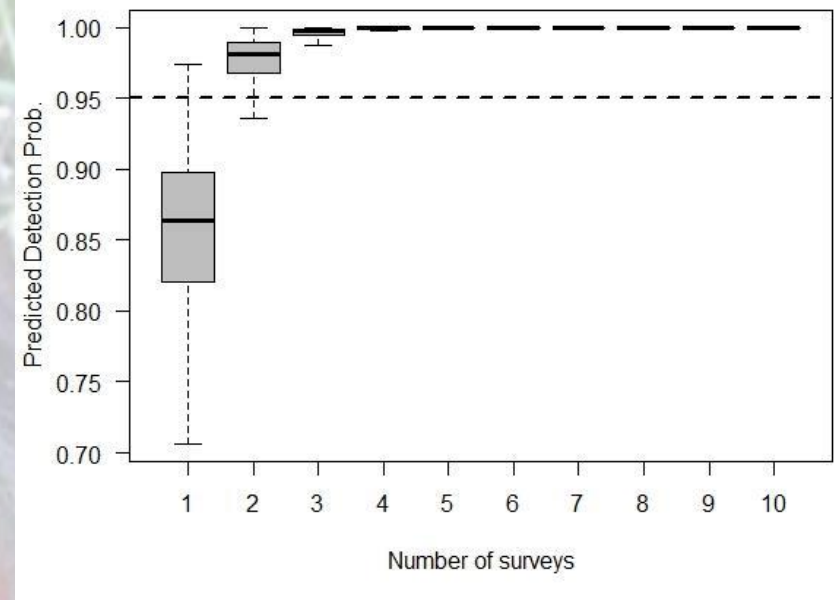
2) Implement & Evaluate Early Detection Strategy

- Many benefits to using traps
 - Inexpensive
 - Easy to deploy
 - Detection rates upwards of 100%
- Occupancy modeling
 - Can inform trapping protocols
- Evaluating eDNA detection probabilities



How Many Sampling Events? Traps?

- 3-4 events to maximize detectability
 - Two if we want to maximize spatial coverage
- 6-8 traps per sampling event
 - Likely depends on ecosystem size



Trapping totals

Area	# of traps	# of RSC	CPE (#/trap)
Sunset Lake	890	123	0.14
Sheraton (Novi) 2017 (7/17-11/3)	614	3750	6.1
Sheraton (Novi) 2018 (4/10-10/17)	1162	10365 <u>14,115</u>	8.9
Pear Ridge (FH) 2017	181	1473	8.1
Pear Ridge (FH) 2018	265	2488 <u>3,961</u>	9.4
Other SE MI*	3547	3764	0.9
All SE MI	5770	21,840	3.8

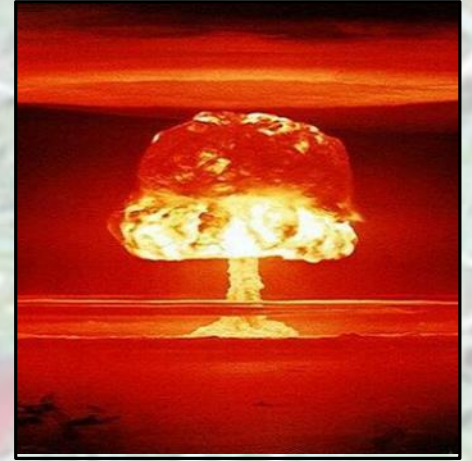
Can Trapping be Effective for Eradication?

- Probably not ☹️
- Detectability \neq vulnerability
- Most sites below 1-2 crayfish per trap
- Even with consistent trapping at most dense sites, CPE remains high
- Egged females in burrows



5) Implement and Evaluate Control Measures

- Control measures will be site-specific
- Require coordination of multiple institutions
 - MDNR, USGS, MSU, DEQ, CISMAs
 - Other researchers: USGS, Auburn
- Combination of:
 - Chemical control
 - Biological control
 - Trapping
 - Experimental treatments



Chemical Control Options (CO_2 & Cypermethrin)

- Working with USGS to obtain proper dosage and lethality data
 - Permitting!!
- Delivery –best way? Burrows?
- We will need permission at some locations
 - Private ponds/water retention
- We plan to work with owners/residents
 - Golf courses
 - Other waters of the State



Chemical control: CO2 Field trials

- Alternative control measures
 - Lab and pond studies: Carbon dioxide shown to be deterrent that causes crayfish to leave, making them easier to capture (A. Cupp, USGS; J. Stoeckel, Auburn University)
- Partnered with USGS and MSU to implement CO2 treatments in Novi

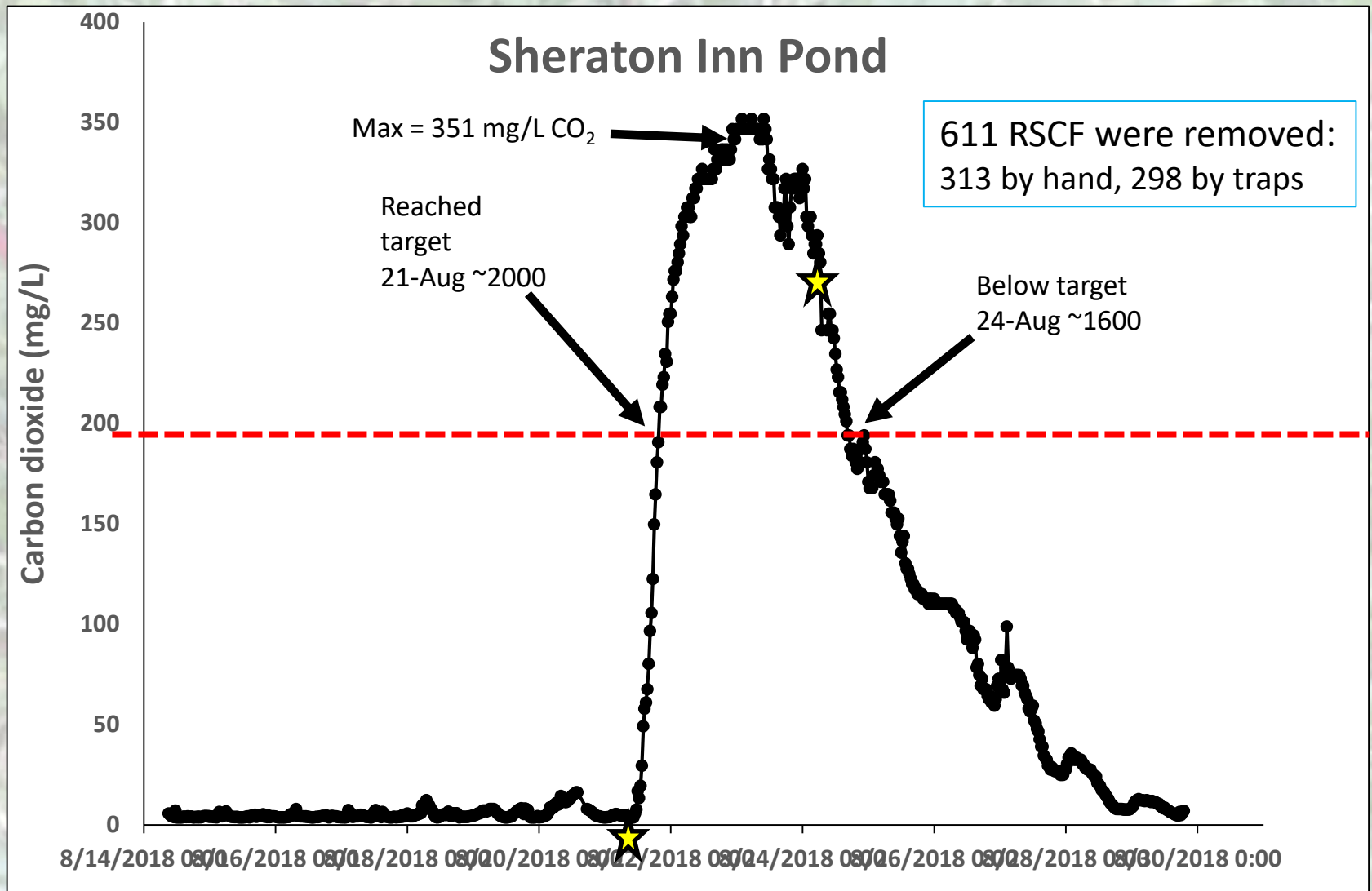


CO₂ Treatments

- Treatment pond - Sheraton Inn Pond (~660,000 gal or 2.5M L)
- Untreated control ponds - Fox Creek golf course
- Holiday Inn ponds flooded and not treated
- Data collection
 - On-land and in-water RSC catch data (MI DNR, MSU)
 - Water and air quality (USGS)
- 25 liquid CO₂ dewars delivered to Sheraton pond by Airgas Inc.
 - Cost \$5405

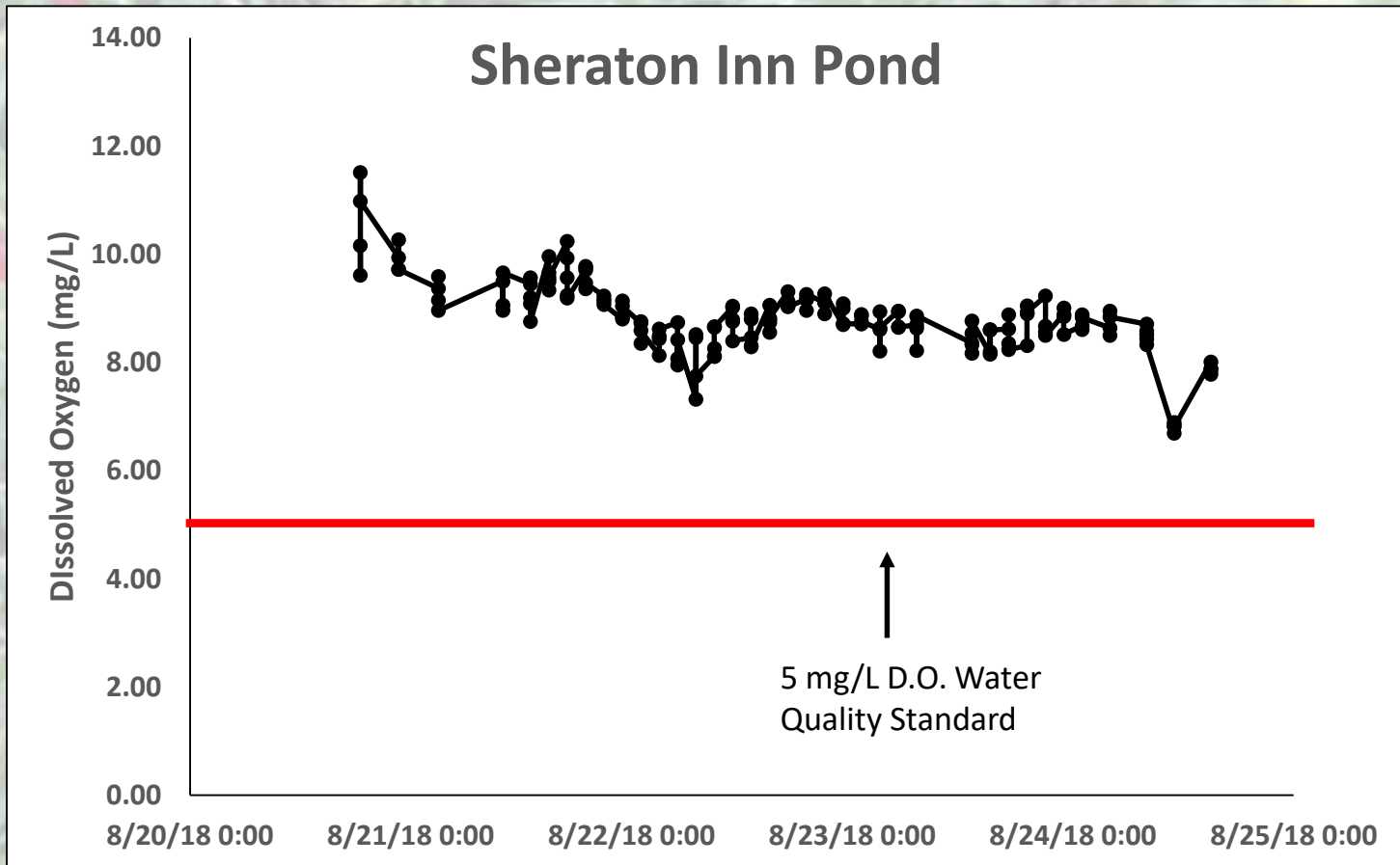


Chemical control: CO₂ Field trials



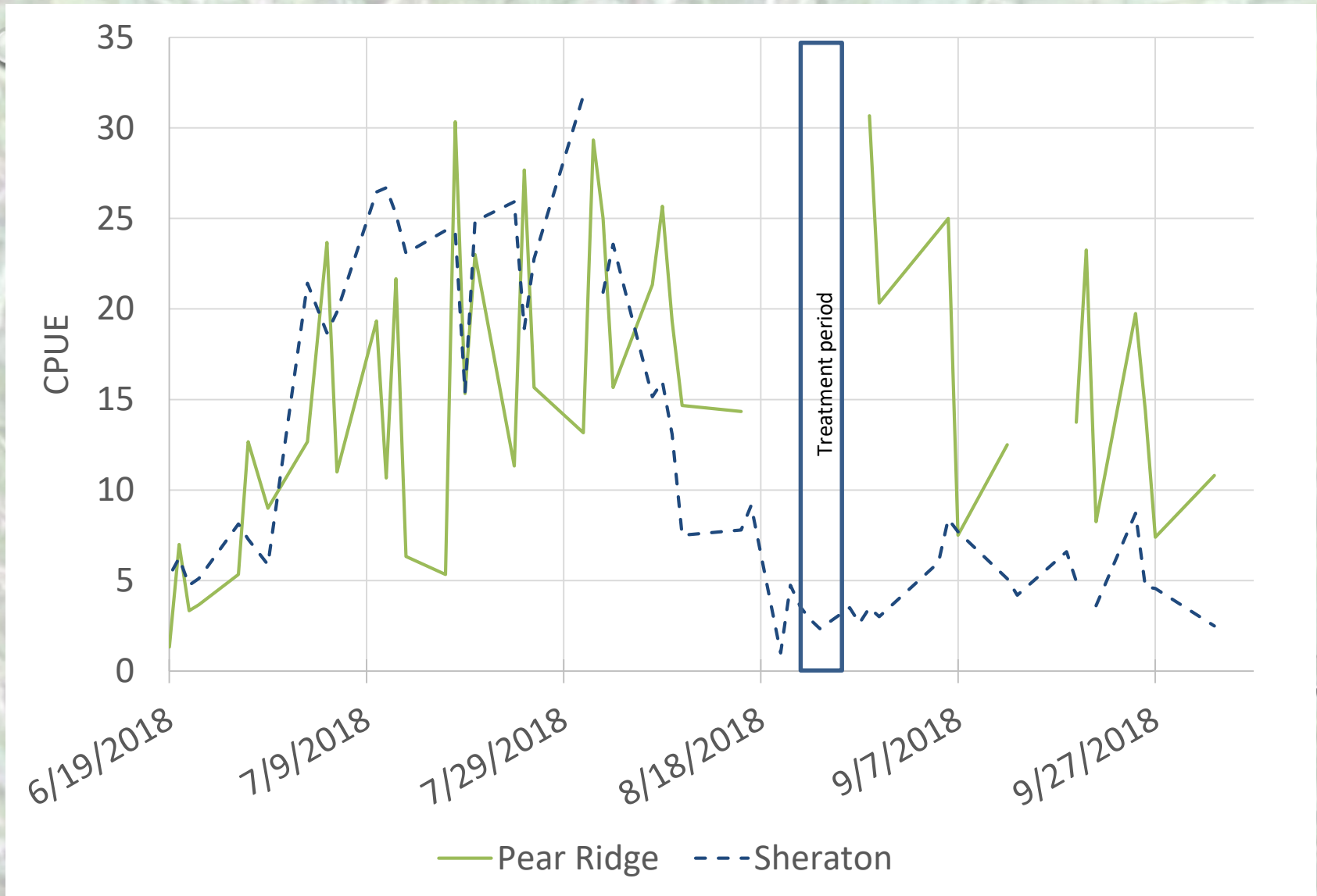
We reached CO₂ target by end of 1st day.

Dissolved oxygen

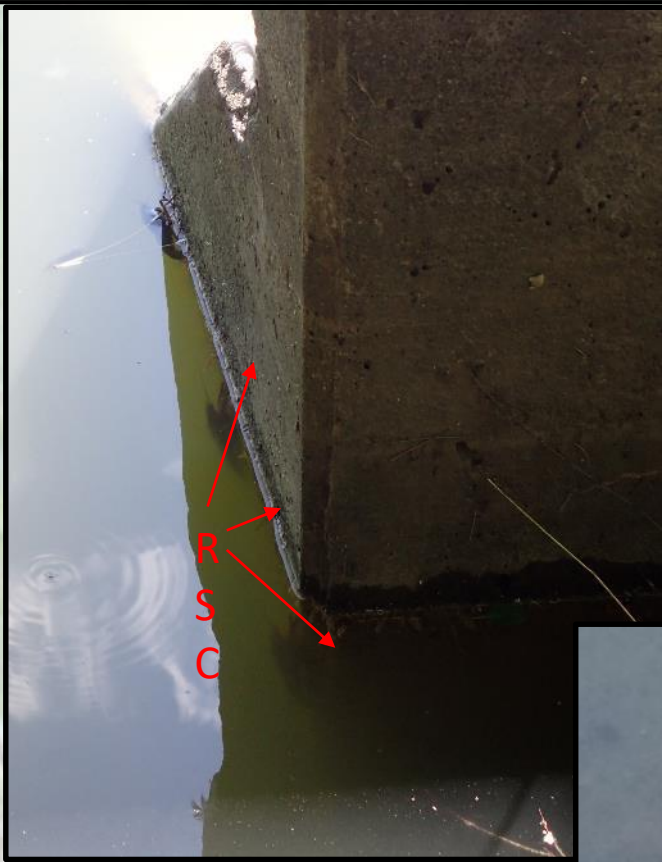


pH never went below 6

Trap CPE before & after CO₂ Field trials



Response to CO₂ trials



RSC hung out at water/air interface



Some RSC were narcotized



RSC seemed to be attracted to the culverts/freshwater

Response to CO₂ trials

By hand catches
(gigging), highest in
after dark time
periods



Chemical control (USGS)

- Cypermethrin shows promise in early lab trails
 - Particularly at warmer temperatures (summer treatments would be ideal) A. Allert, USGS
- Cypermethrin not approved for aquatic use!!
 - Extremely toxic, but low persistence in water
- Questions still remain on how to target RSC in burrows

Other Control Options

- Sound
 - Higher frequencies attract crayfish
- Barriers
 - Landscape fabric or deer fencing around infested ponds
- Automated trapping systems
 - Continual removal
- Biological -Evaluate effectiveness of predators
 - Bluegill, largemouth bass, green sunfish, channel catfish

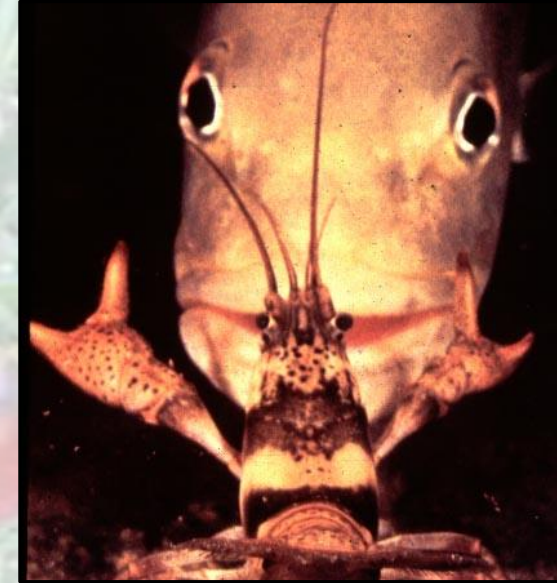
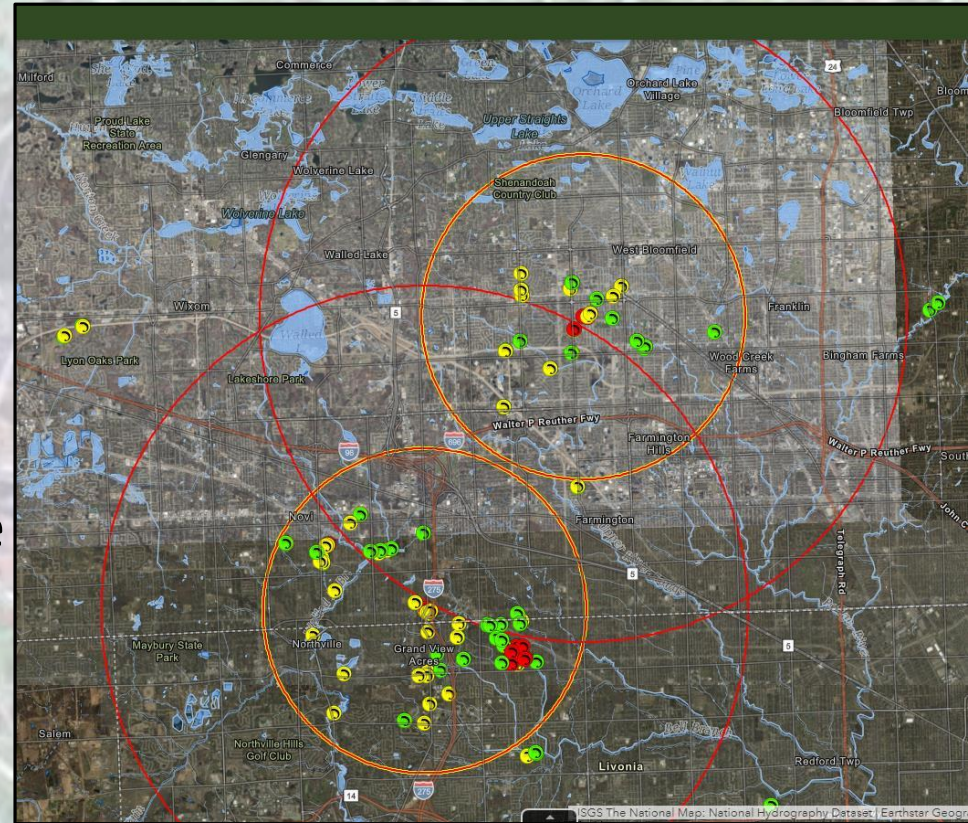


Photo credit: Roy Stein



Lessons Learned

- Response is underway
 - Adaptive approach
- Trapping is a valuable tool
 - For detection of invasions
 - Probably not for eradication
- Time is of the essence
 - All three epicenters are close to major Great Lakes tributaries
 - Oakland County has 337 lakes > 10 acres



Next Steps

- Continued implementation of Michigan's response plan
- Collaborate with crayfish and AIS control experts to evaluate and implement effective controls
 - USGS, USFWS, MSU, Auburn, others
- Additional field treatments in 2019



Thank you!!!

- Great Lakes Restoration Initiative
- Samantha Strandmark, Cole Hazeltine, Matt Huber - MSU
- MDNR, Waterford & Plainwell Field Offices
- Michigan DEQ
- Barry, Calhoun and Kalamazoo CISMA
- Sheraton, Holiday Inn, Fox Creek Management, City of Novi Public Works





Questions?

Seth Herbst

Herbsts1@michigan.gov

or

Sara Thomas

thomass35@michigan.gov