

Rusty Crayfish Control

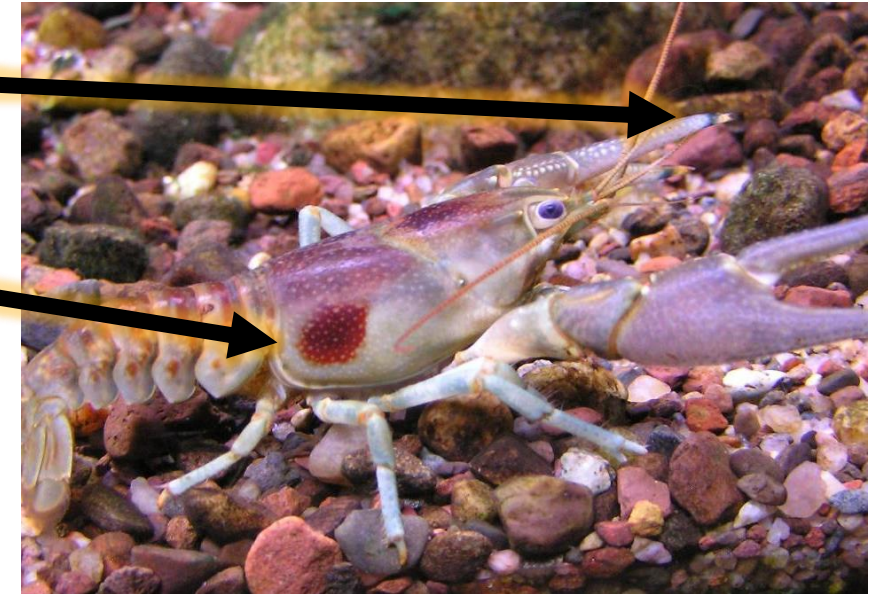
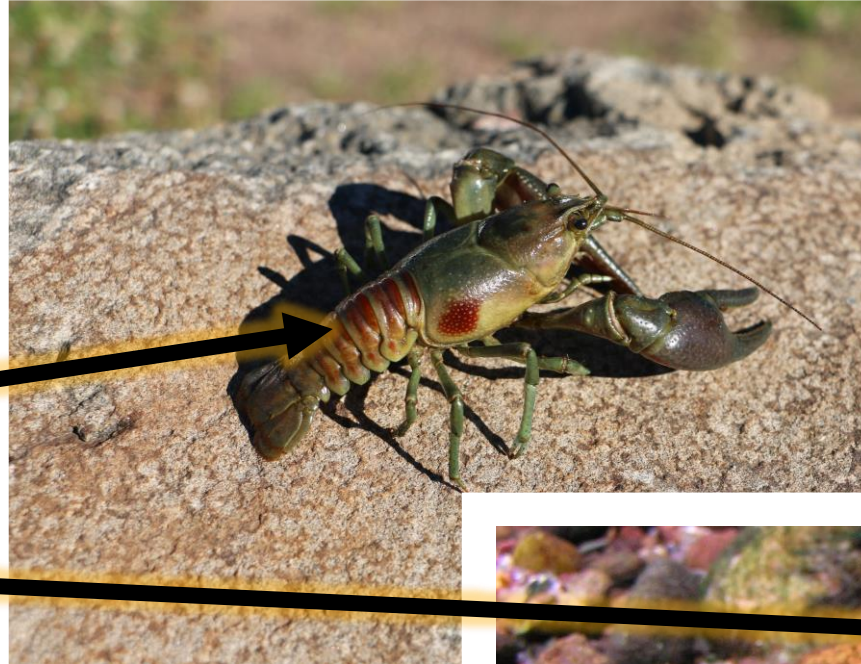
Derrick Passe, Lake County Soil & Water Conservation District (MN)

Great Lakes Commission Conference, Ann Arbor, MI



What are Rusty Crayfish?

1. Top forward edge of tail segments with rusty bands
2. Claw tips orange with black ring (claws close completely – no gap)
3. Rusty spot on sides



Native Crayfish in the Great Lakes Basin

Northern Clearwater
Calico
Virile

Orconectes propinquus



Orconectes immunis



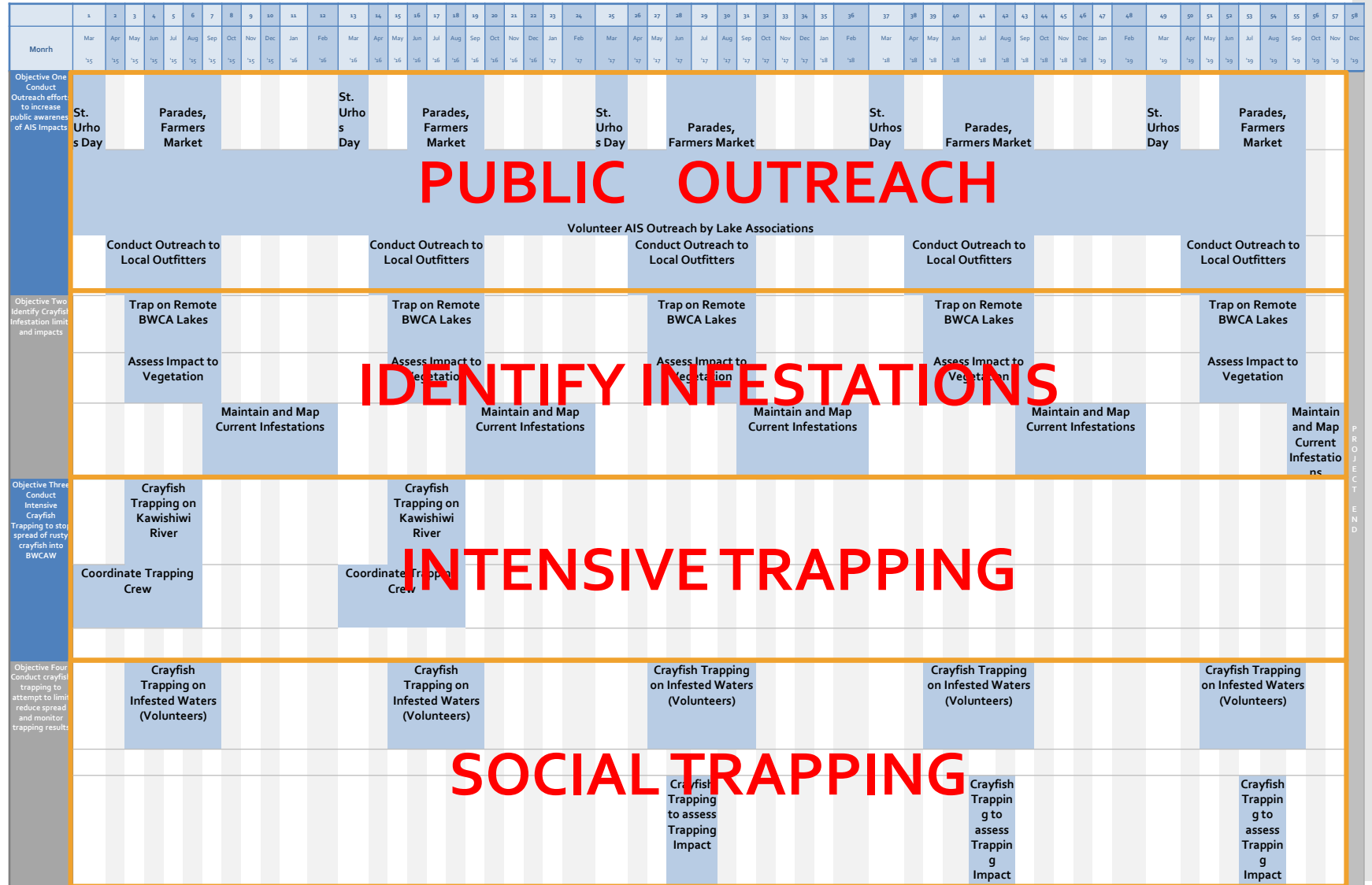
Orconectes virilis



Current Monitoring & Management



Initiative
Foundation
Grant: Arrest
the Spread of
Rusty (non-
native)
Crayfish



PUBLIC OUTREACH

Outreach:

Local festivals

Parades

Farmer's Market Crayfish Boils



AIS: Management through Prevention

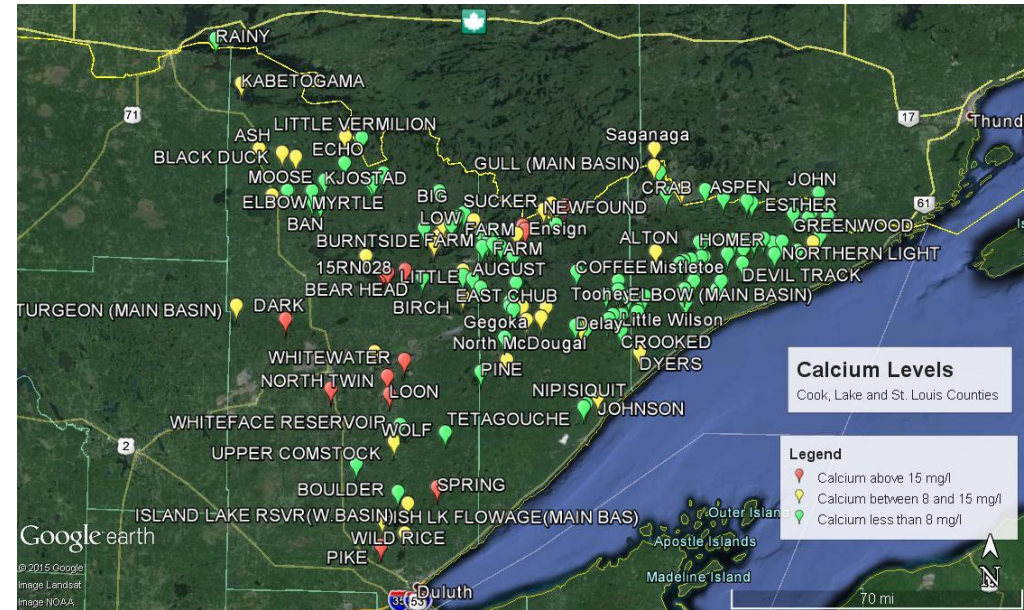
Education:

Youth camps
Trapping



Table S-1. Range of water column zebra mussel suitability criteria for lakes.

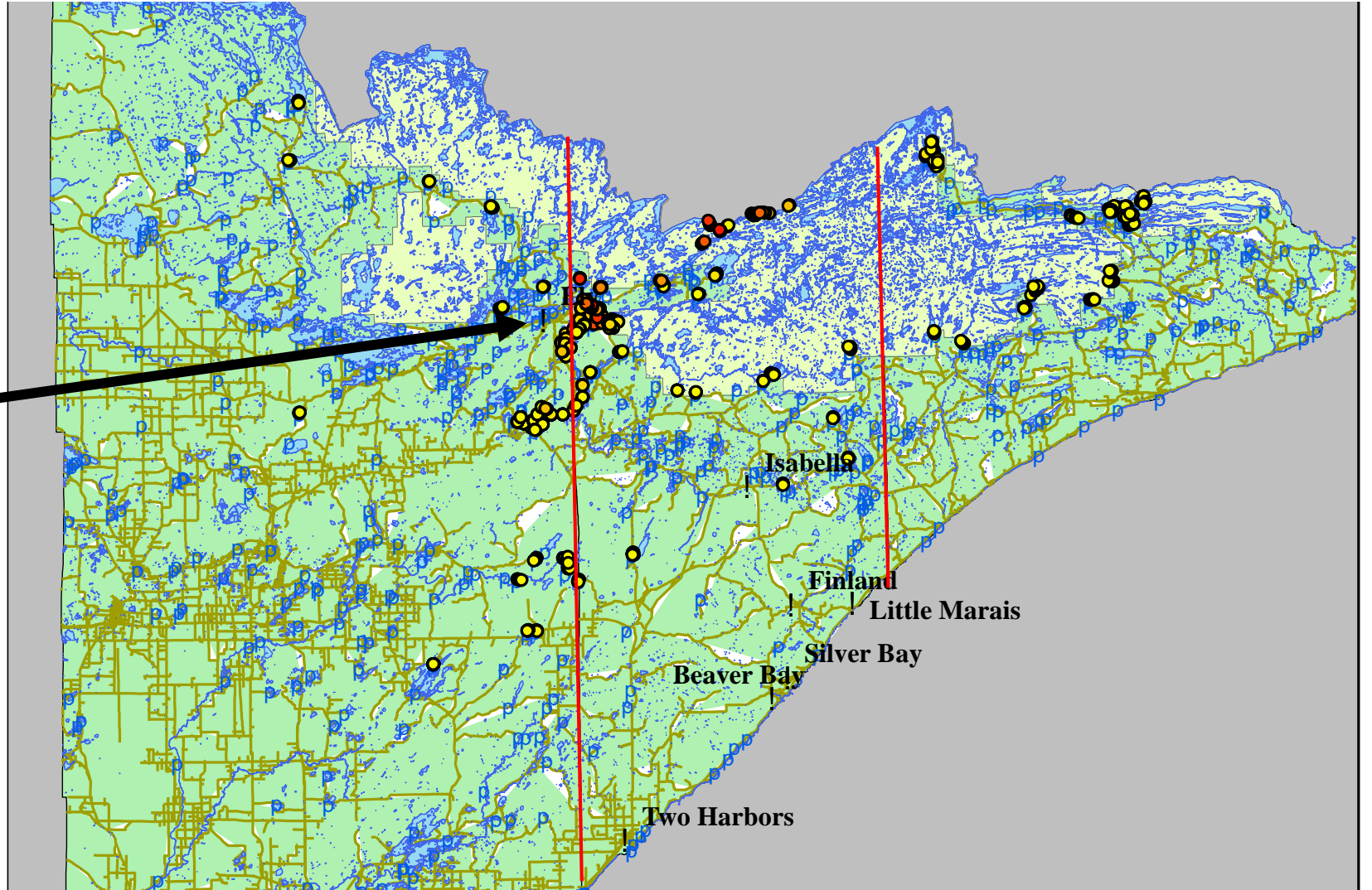
		Low Potential for Adult Survival	Low Potential for Larval Development	Moderate (survivable, but will not flourish)	High (favorable for optimal growth)
Calcium (mg/l)	Mackie and Claudi 2010	<8	8 - 15	15 - 30	>30
Dissolved oxygen (mg/l)	Mackie and Claudi 2010	<3	3 - 7	7 - 8	>8
Temperature (C)	Mackie and Claudi 2010	<10 or >32	26 - 32	10 - 20	20 - 26
pH	Mackie and Claudi 2010	<7.0 or >9.5	7.0 - 7.8 or 9.0 - 9.5	7.8 - 8.2 or 8.8 - 9.0	8.2 - 8.8
Potassium (mg/l)	(Bartell et al 2007)	>100	>50 (prevents settlement)	40 - 50	<40
Hardness (mg/l)	Mackie and Claudi 2010	<30	30 - 35	55 - 100	100 - 280
Alkalinity (as mg CaCO ₃ /l)	Mackie and Claudi 2010	<30	30 - 55	55 - 100	100 - 280
Conductivity (umhos)	Mackie and Claudi 2010	<30	30 - 60	60 - 110	>110
Secchi depth (m)	Mackie and Claudi 2010	<1 or >8	1 - 2 or 6 - 8	4 - 6	2 - 4
Chlorophyll a (ug/l)(food source)	Mackie and Claudi 2010	<2.5 or >25	2.0 - 2.5 or 20 - 25	8 - 20	2.5 - 8
Total phosphorus (ppb)	Mackie and Claudi 2010	<5 or >50	5 - 10 or 35 - 50	10 - 25	25 - 35



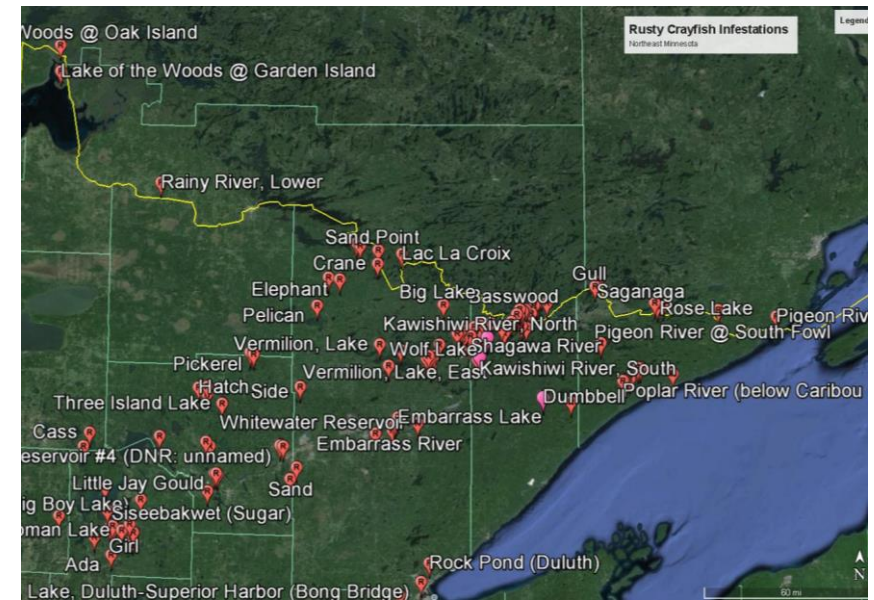
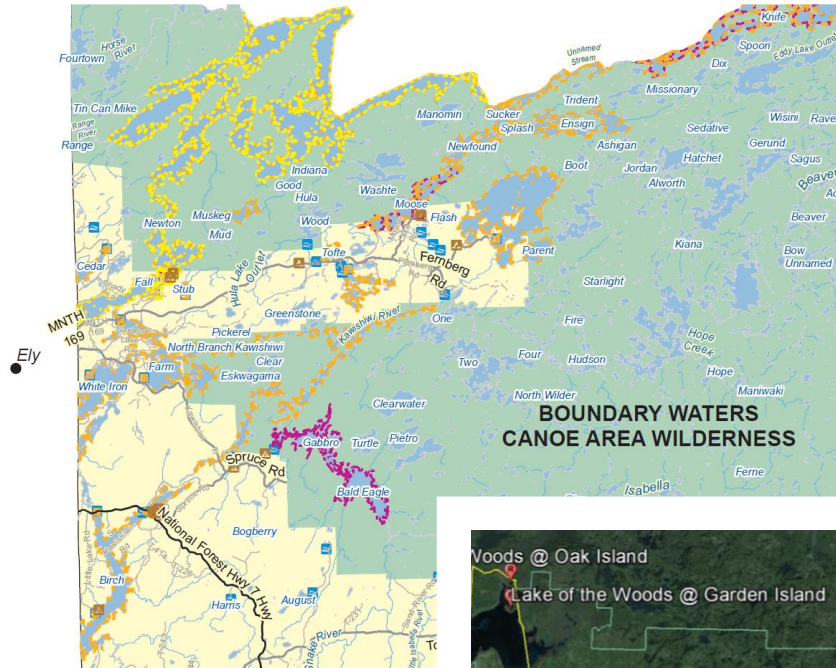
Identifying Infestations

Ely

Gateway to the
Boundary Waters
Canoe Area.



Rusty Crayfish Infested Lakes



Rusty Crayfish Trapping

- Intensive Trapping
- Volunteer/Social trapping
- Student trapping
- Staff trapping
- Trapping for events



Trapping for events:
rusty crayfish boil
at Finland Farmer's
Market





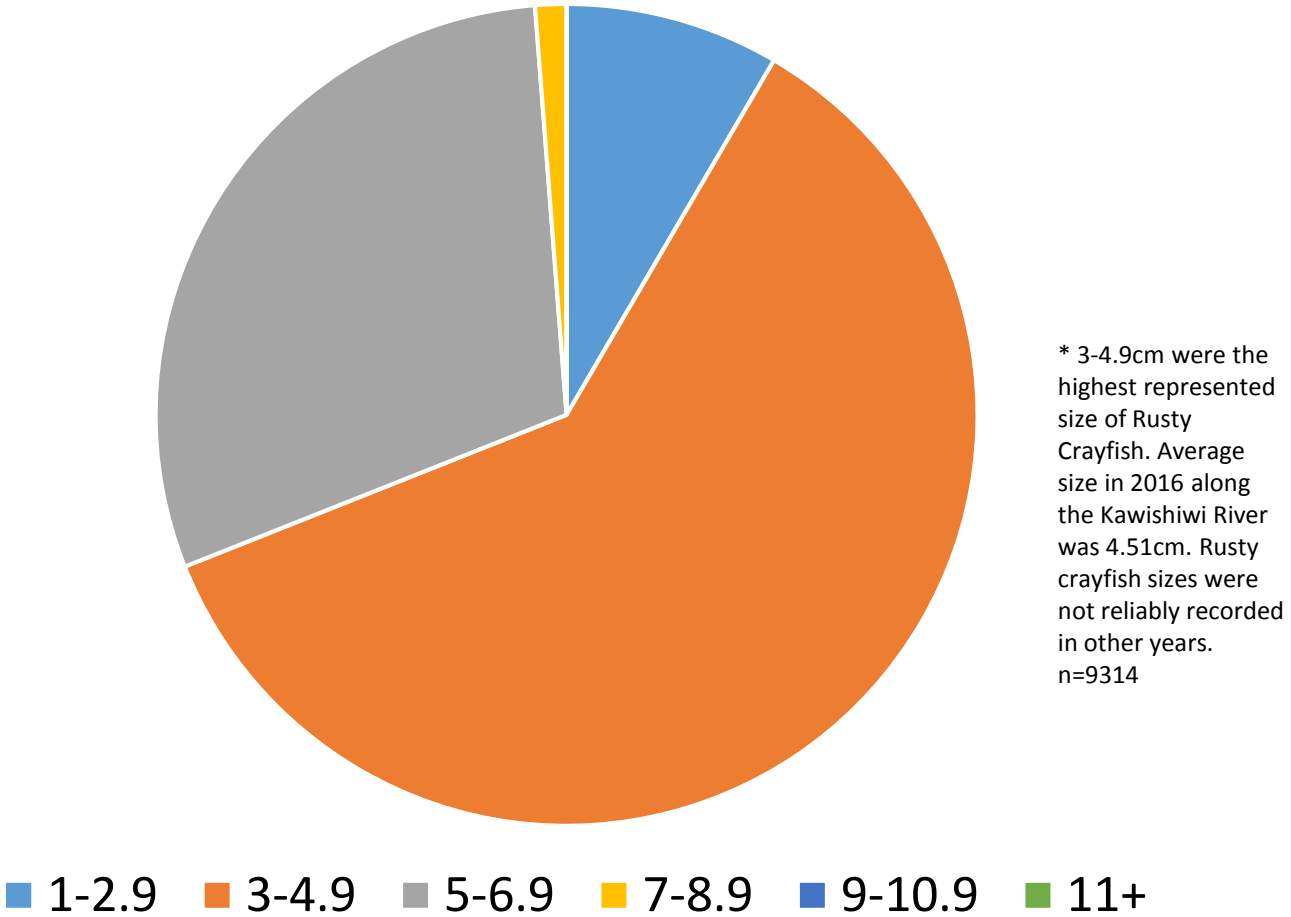
Intensive Trapping



Rusty Crayfish Trapping Results

From 2016 Kawishiwi River intensive trapping

Rusty Crayfish Size Distribution (cm) 2016 Kawishiwi River



Social Trapping

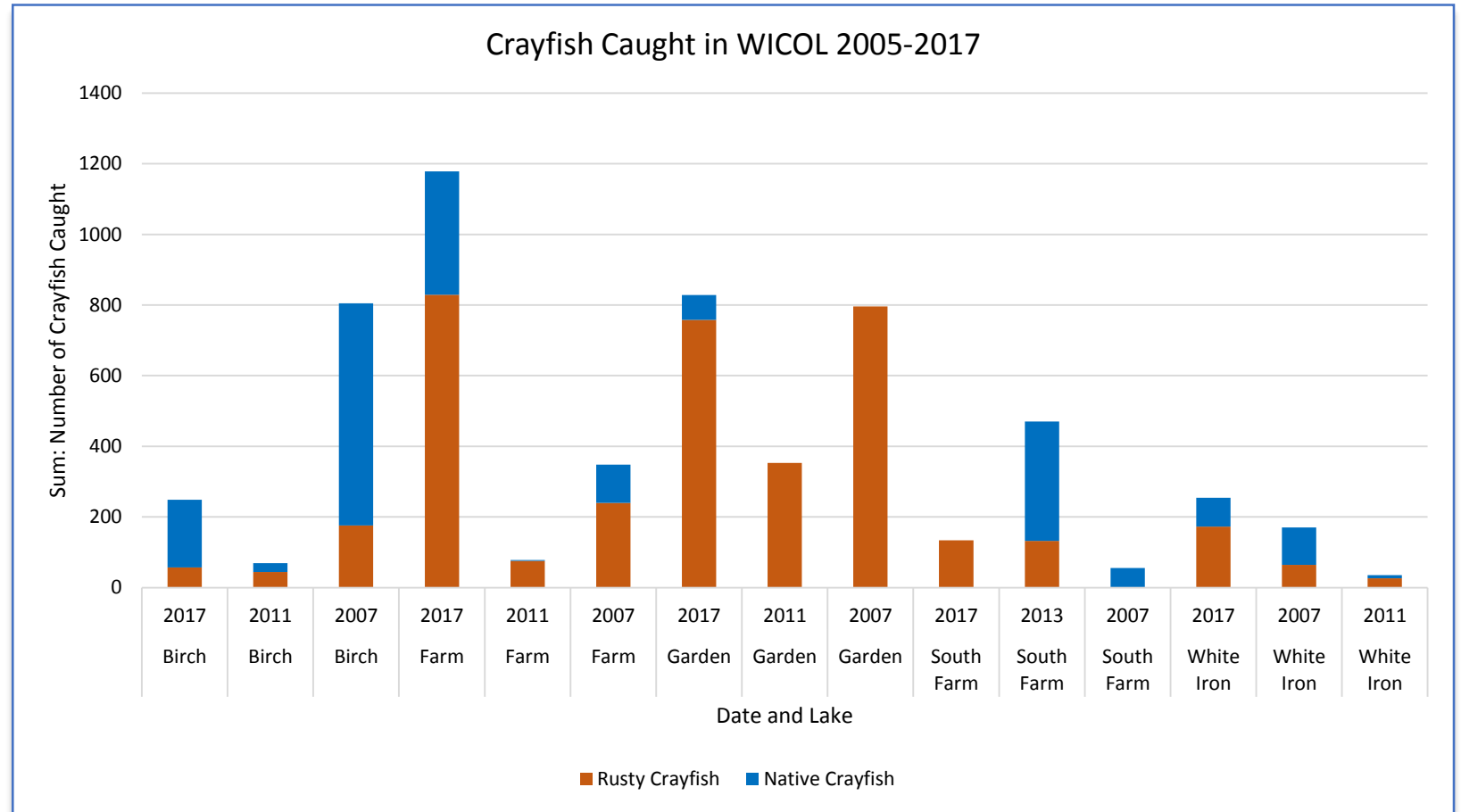
White Iron Chain of Lakes Lake Association

Recruit L. Association members to trap rusty crayfish on their property

CITIZENS TRAPPING RECORD					
13428 BEAR PAW TR ELY			36512643		
Please record the number of crayfish you trap at least once a week. This will enable us to track the results of our eradication efforts.					
At the end of the season MAIL this report to					
Lake County SWCD			These reports will also be shared with the USFS		
PO Box 14					
Two Harbors, MN 55616					
Dates		06/06/2013		to 09/23/2013	
Location NW CORNER FARM LAKE - MY DOCK					
N 47 54 02B W 091 44 148					
Lake FARM					
What is the status of the rice & weed beds near you?					
<input type="checkbox"/> Thicker than last year?					
<input checked="" type="checkbox"/> Thinner than last year? NONE REMAINING					
<input type="checkbox"/> Same as last year?					
DATE	Rusties	Other	Date	Rusties	Other
06/07	93		07/08	70	
06/08	58		07/09	179	
06/09	31		07/10	172	
06/10	33		07/11	169	
06/11	21		07/12	219	
06/13	32		07/13	172	
06/15	15		07/14	261	
06/17	4		07/15	301	
06/19	32		07/16	235	
06/22	20		07/17	206	
06/24	53		07/18	213	
06/26	58		07/19	153	
06/27	14		07/20	224	
06/28	158		07/21	138	
06/29	171		07/22	218	
06/30	48		07/23	345	
07/01	217		07/24	355	
07/02	228		07/25	336	
07/03	72		07/26	233	
07/04	216		07/27	275	
07/05	69		07/28	64	
07/06	100		07/29	23	
07/07	140		07/30	194	

Volunteer & Staff Trapping Results

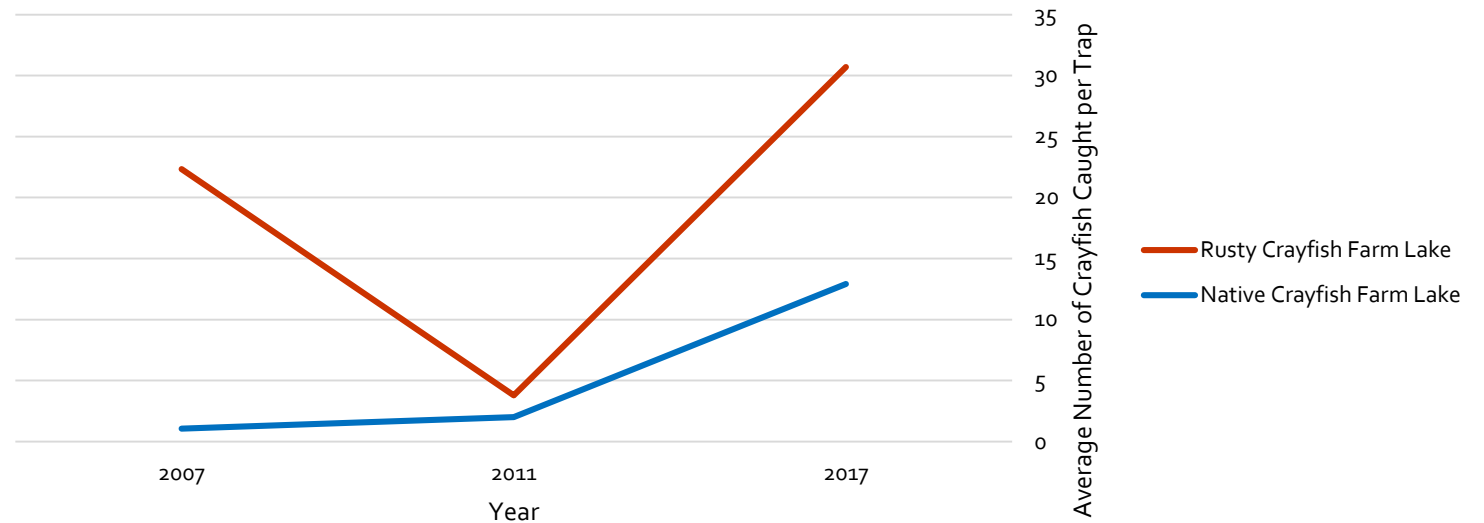
Garden is almost entirely rusty crayfish. Birch lake is holding native crayfish populations steady, which a higher proportion still native crayfish. Farm lake shows much higher catch rates for 2017.



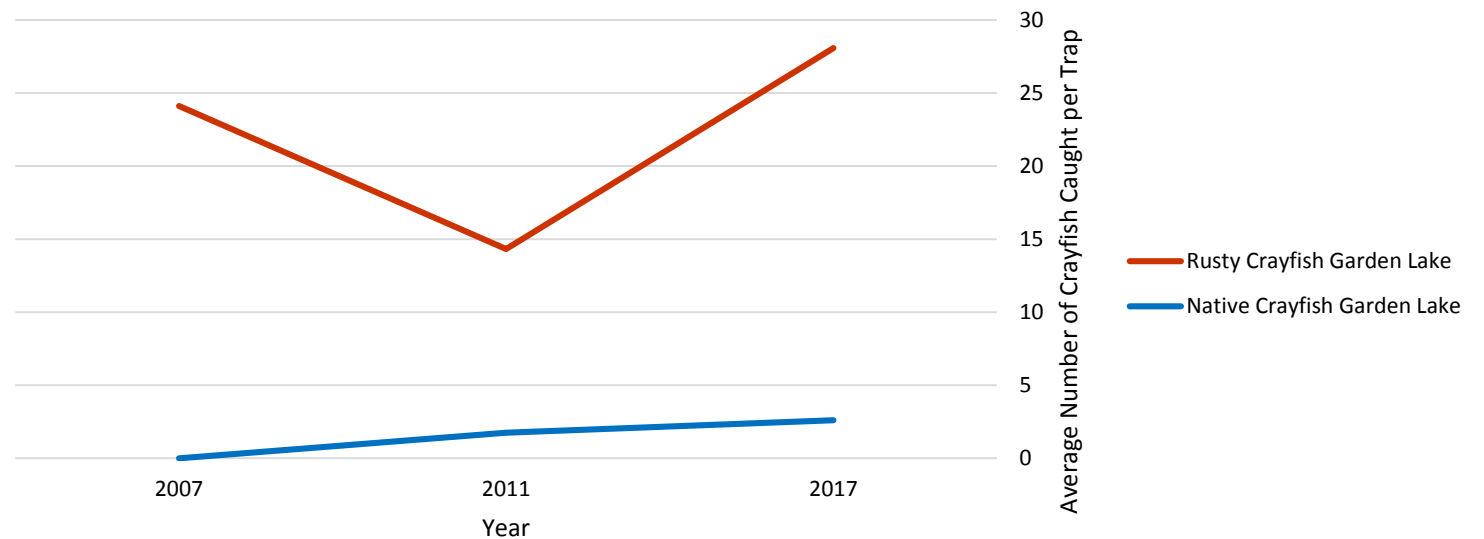
Volunteer & Staff Trapping Results

2011 bait for catching was beef tallow. This data shows an increase in crayfish caught using sucker fish as bait. Native crayfish catches are still lower than rusty crayfish catches in each lake and rising on average by 2017.

Rusty Crayfish Average Catch, Farm Lake 2005-2017

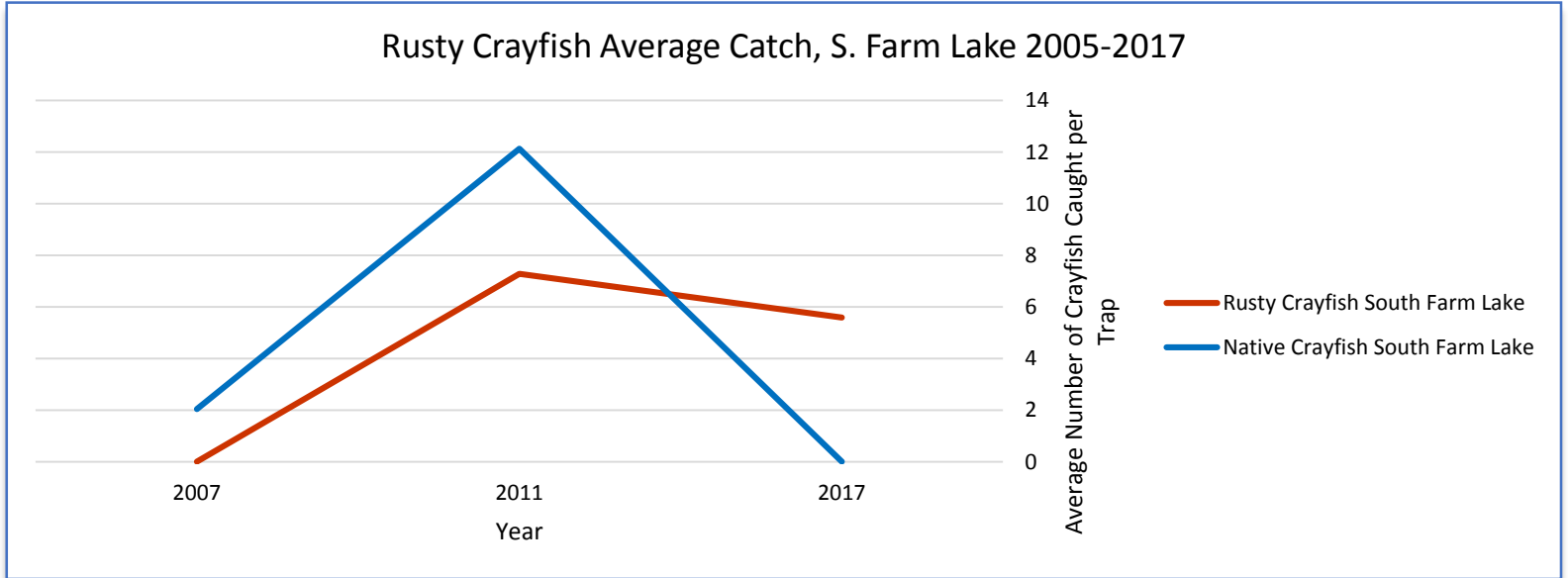
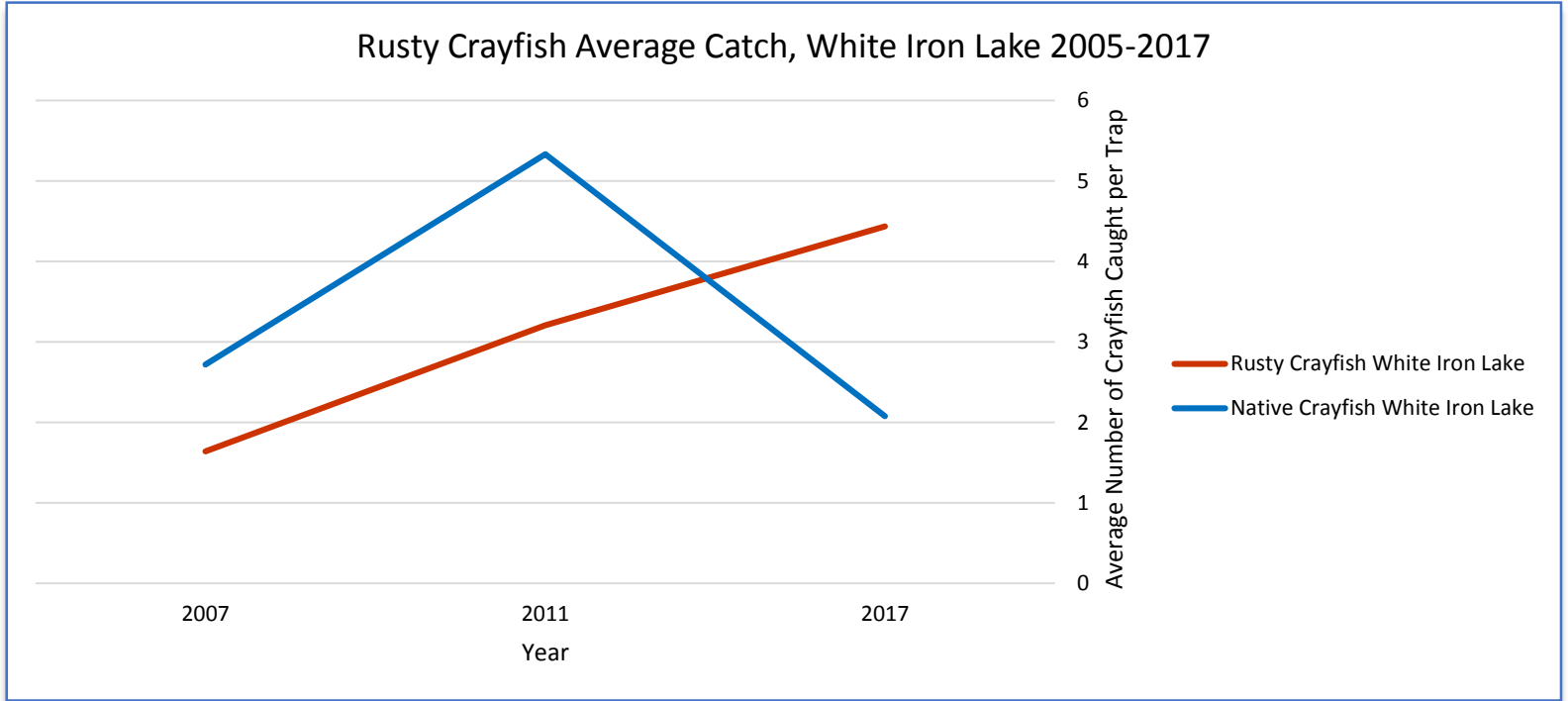


Rusty Crayfish Average Catch, Garden Lake 2005-2017



Volunteer & Staff Trapping Results

White Iron has seen a noticeable decline in average catch of native species since 2007 (the last catch date). Rusty crayfish average catch per trap has increased. South Farm has seen a similar trend. This is the trend we would expect with an invasive species. *O. virilis* is the most commonly caught native species in White Iron.



Trapping Rusty Crayfish:
Lessons in Conservation?

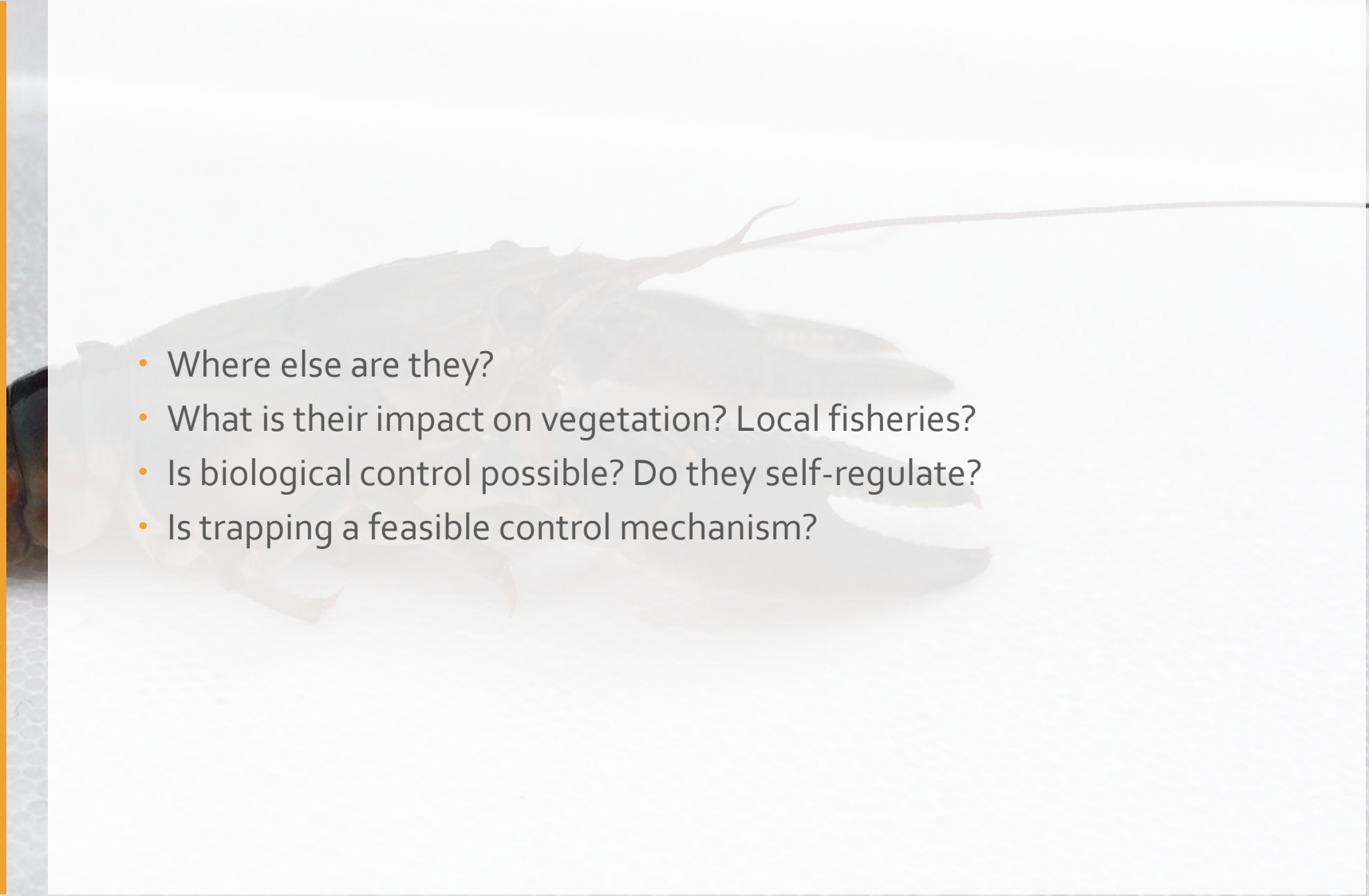
What's the best
bang for your buck?
Awareness



Rusty
Crayfish
are...
Survey at Ely
Blueberry
Festival 2015



Additional Questions

- 
- Where else are they?
 - What is their impact on vegetation? Local fisheries?
 - Is biological control possible? Do they self-regulate?
 - Is trapping a feasible control mechanism?

Additional Questions: Hybrid Rusty Crayfish?

University of Michigan (E. Lansing) currently running e-DNA analyses on crayfish samples from Birch, Farm, White Iron and Dumbbell Lakes.

Dumbbell Lake Rusty Crayfish



South Farm Lake Rusty Crayfish



Contact Information

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Credits

Emily Nelson, Lake County SWCD

Craig Roessler, Crayfish ID Guide

Sonja Smerud, Lake County SWCD

Paul Trygstad, Lake County SWCD

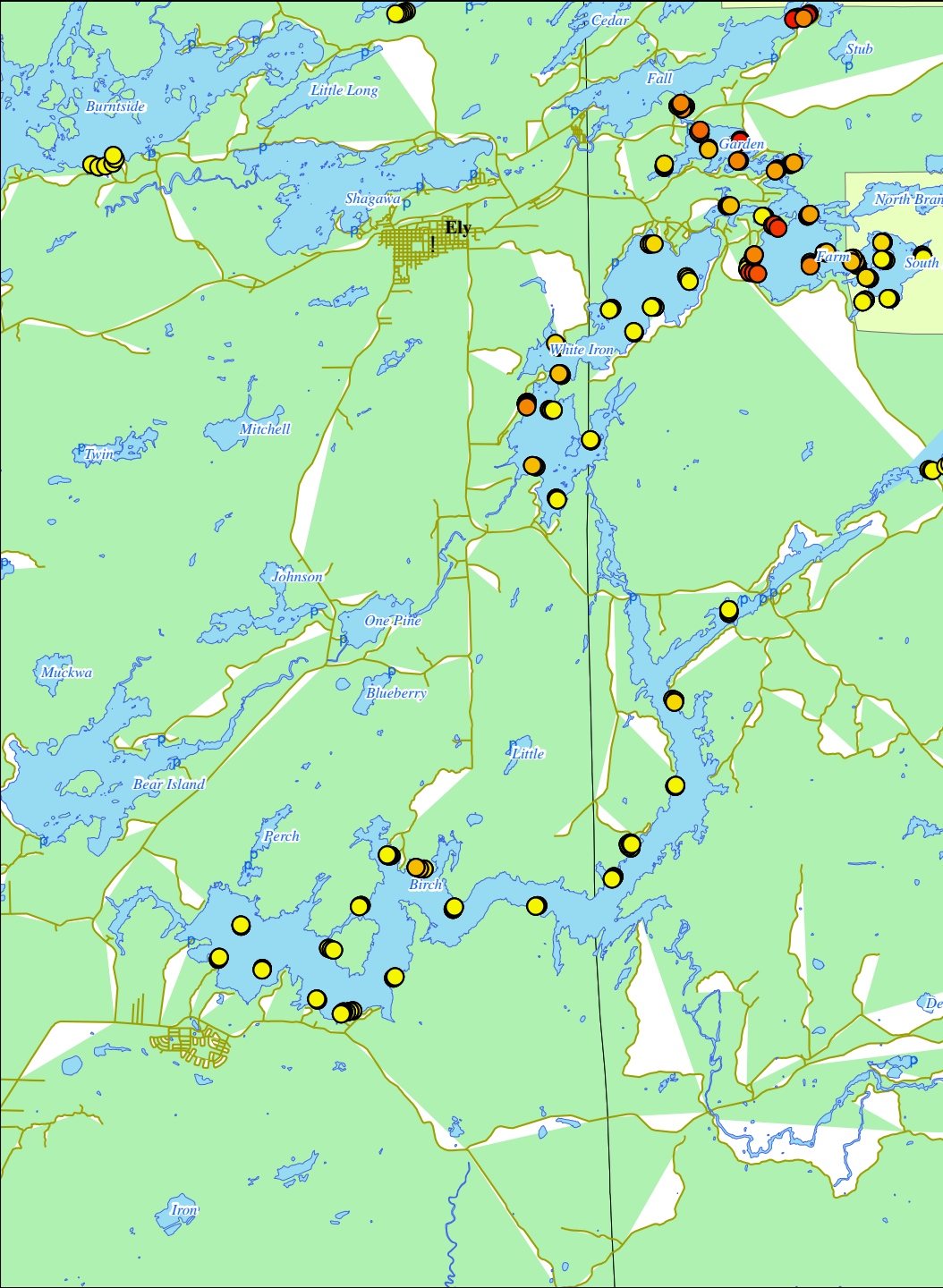
Partners: MNDNR, MNSeaGrant, 1854 Treaty Authority, Initiative Foundation, Clean Water Land & Legacy Amendment, USFS, White Iron Chain of Lakes Association



Thank you!

And eat up! Questions?

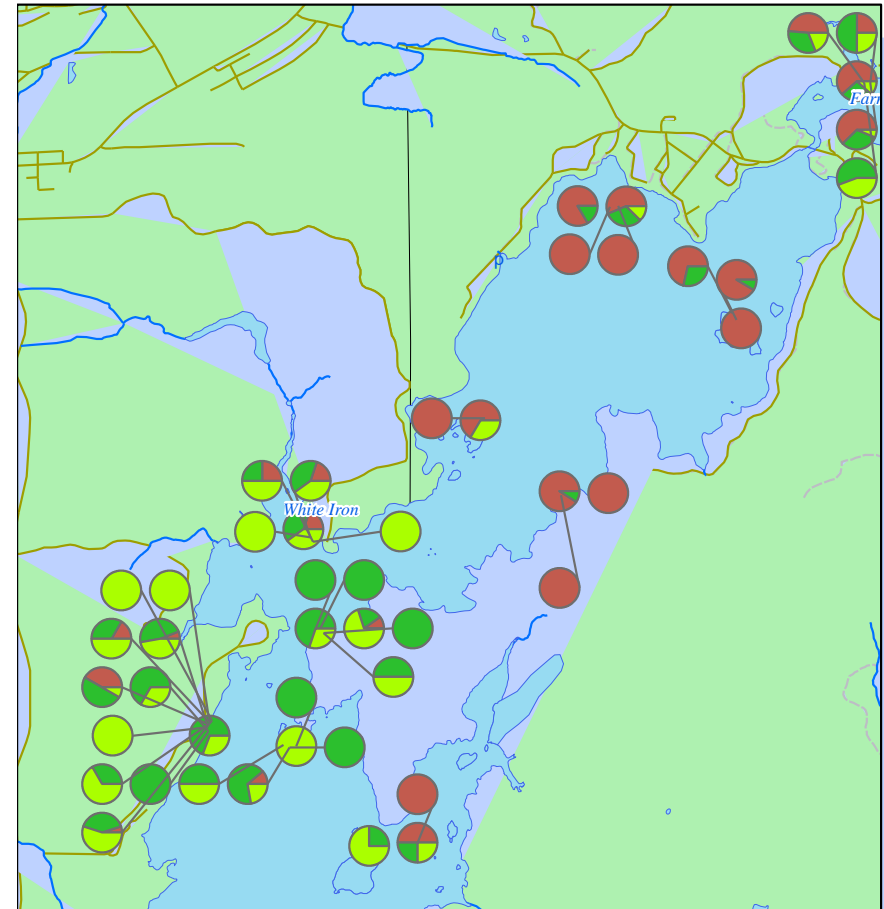
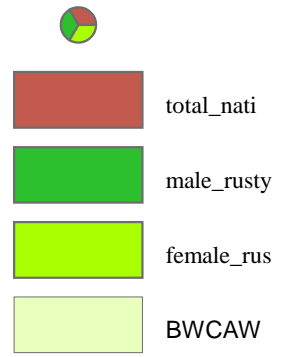


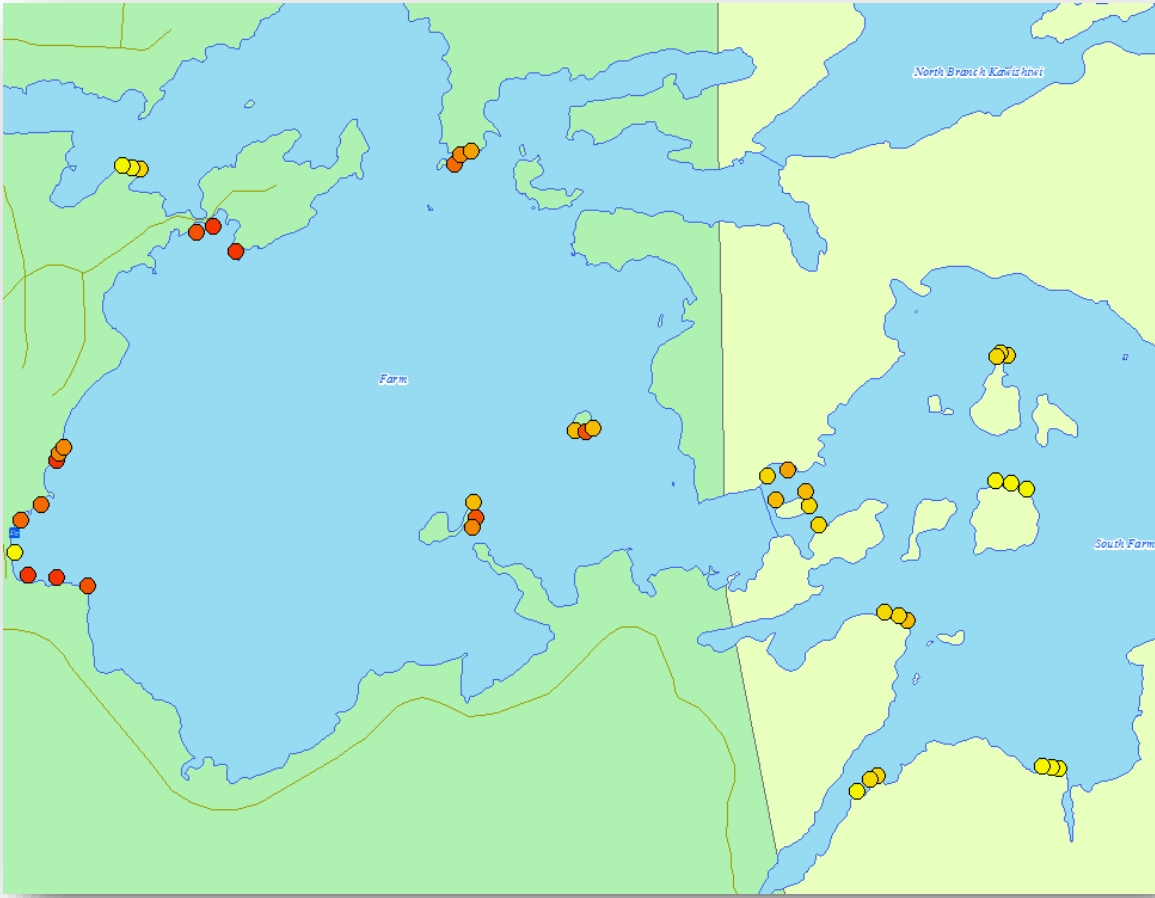


Rusty Crayfish Distribution

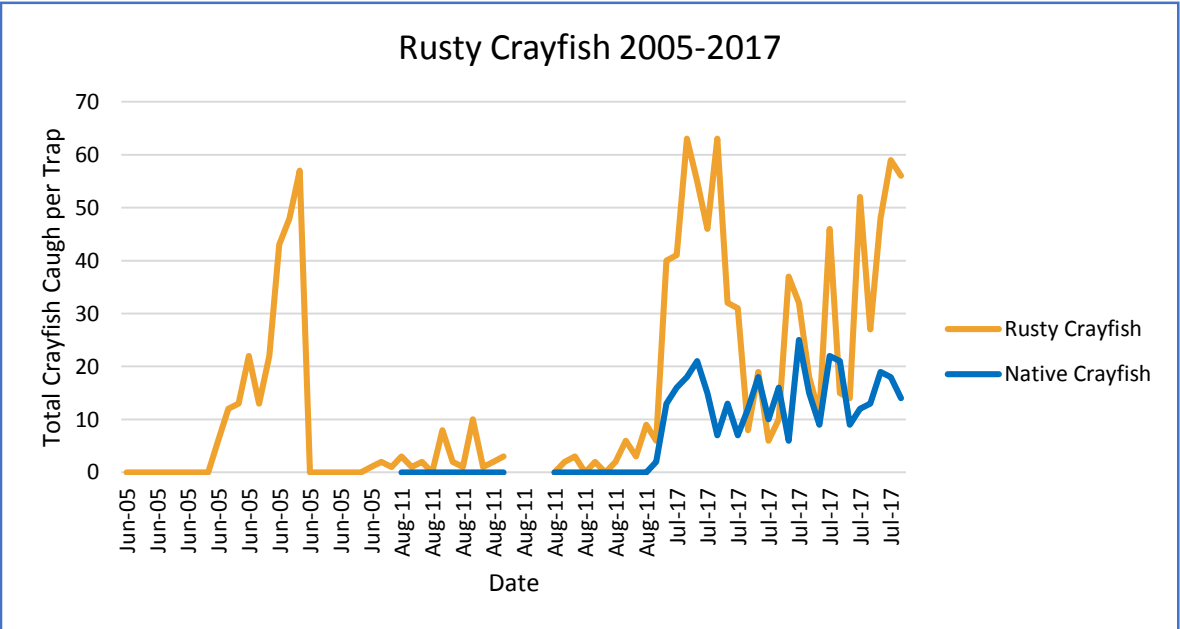
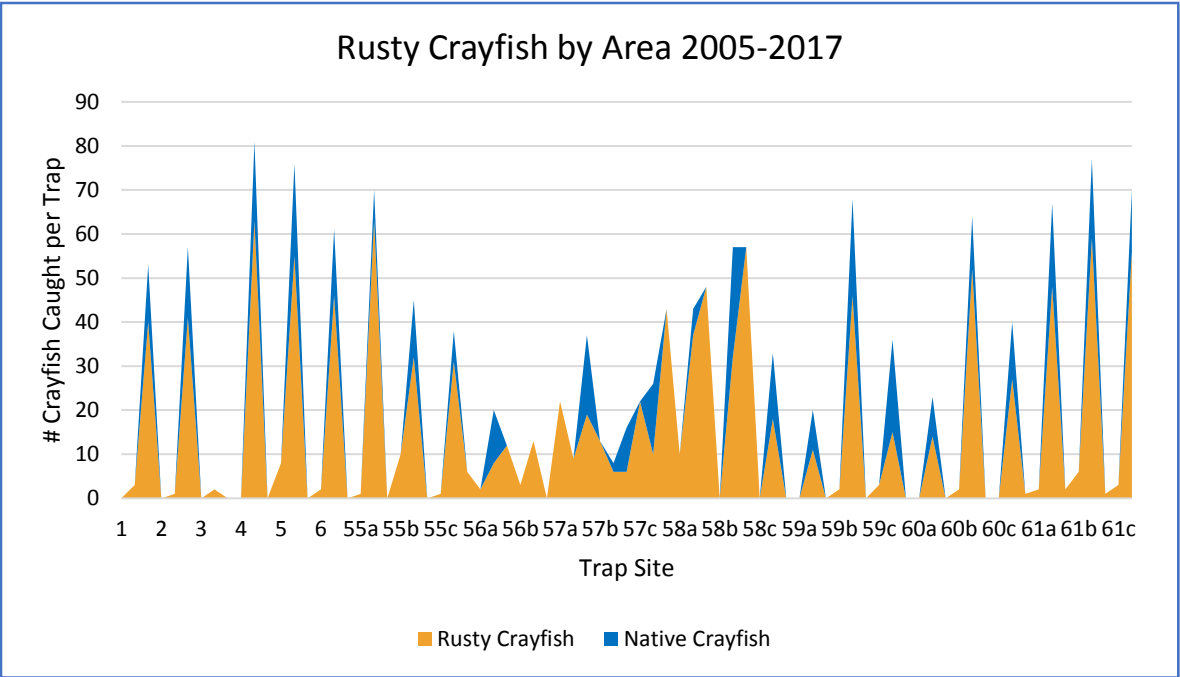
- 0 - 3
- 4 - 9
- 10 - 16
- 17 - 24
- 25 - 32
- 33 - 41
- 42 - 52
- 53 - 64
- 65 - 84
- 85 - 115

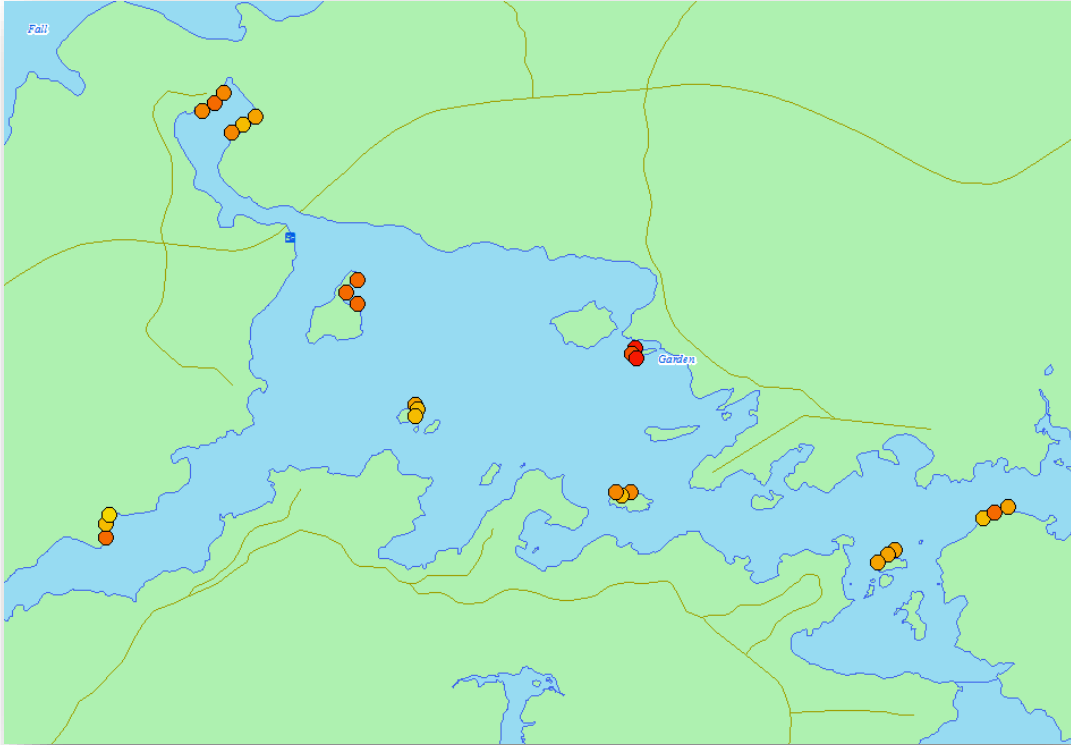
Crayfish Distribution Legend



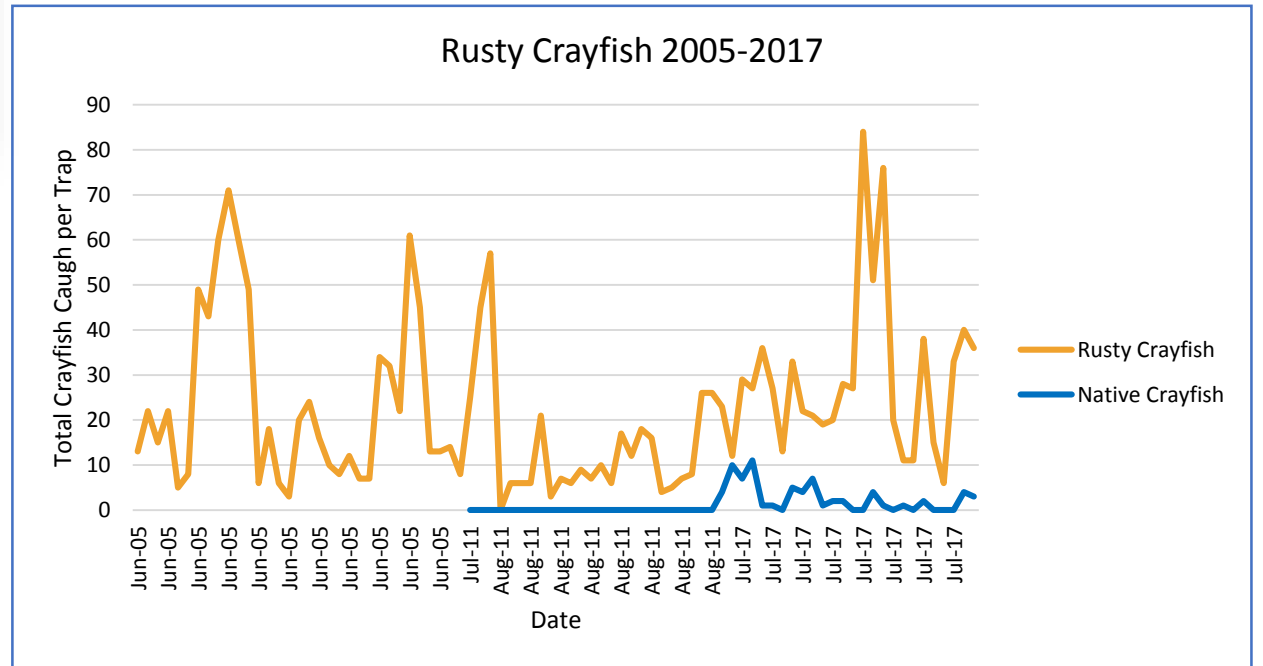
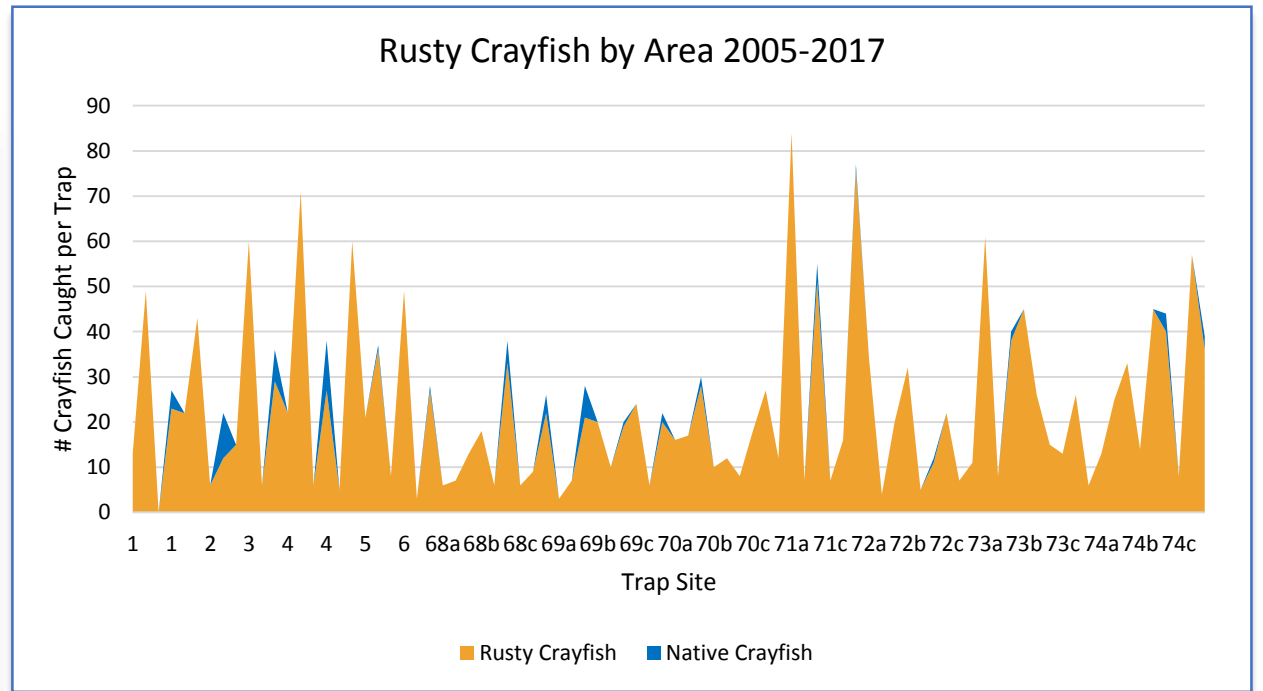


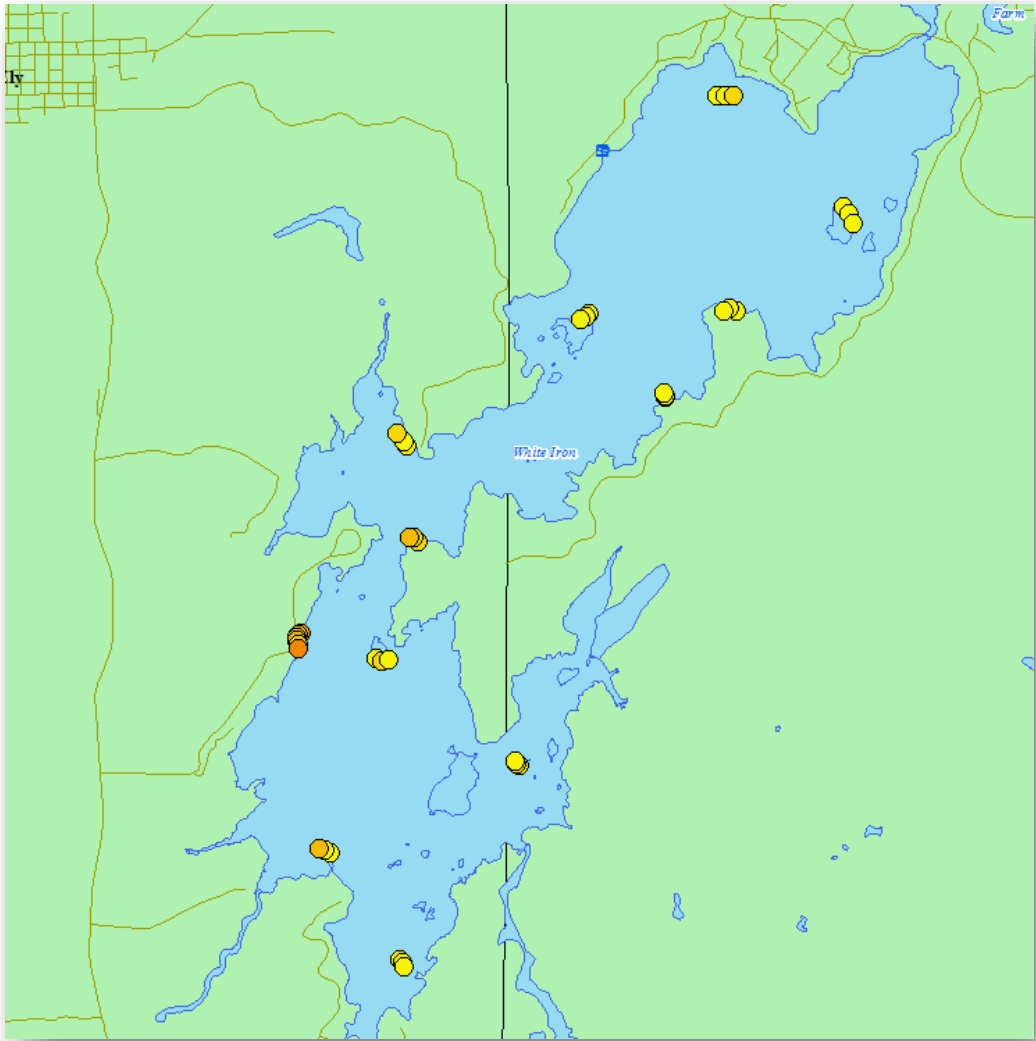
Farm Lake: Consistent rise in the rusty crayfish population at each trap location over time.



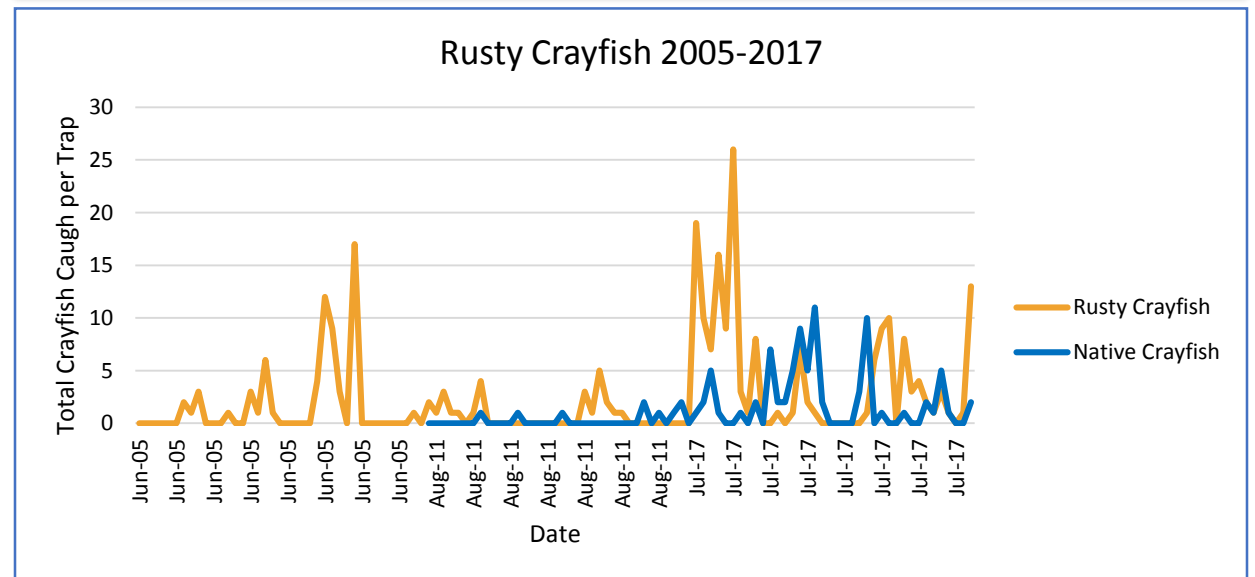
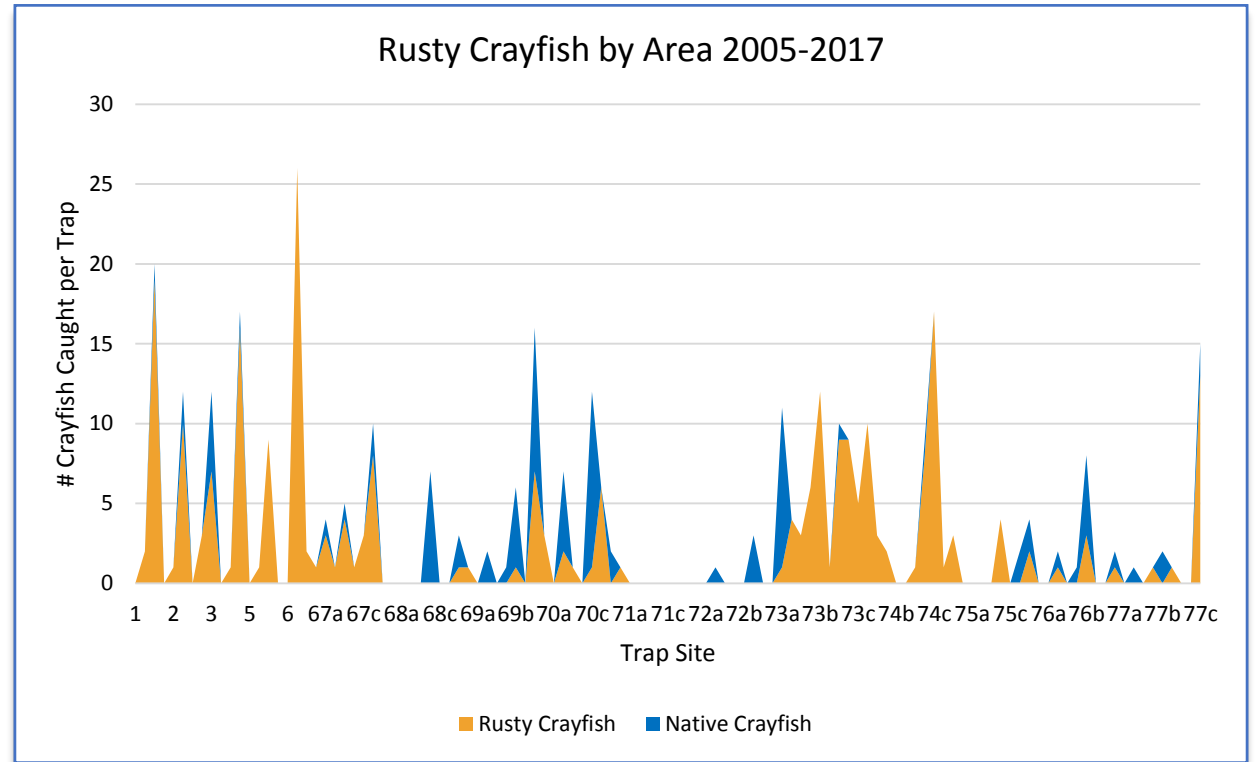


Garden Lake: Already a high rusty crayfish population, which has stayed high. Slight rusty crayfish increase in certain trap locations in 2017.



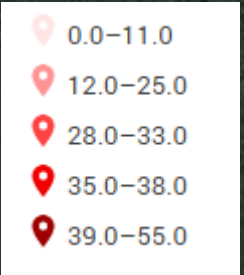


White Iron: Increase in Rusty Crayfish populations as of 2017, especially in traps 1-6. Native species have remained strong at Trap Sites #68, 69, 70 (S. Shore White Iron).



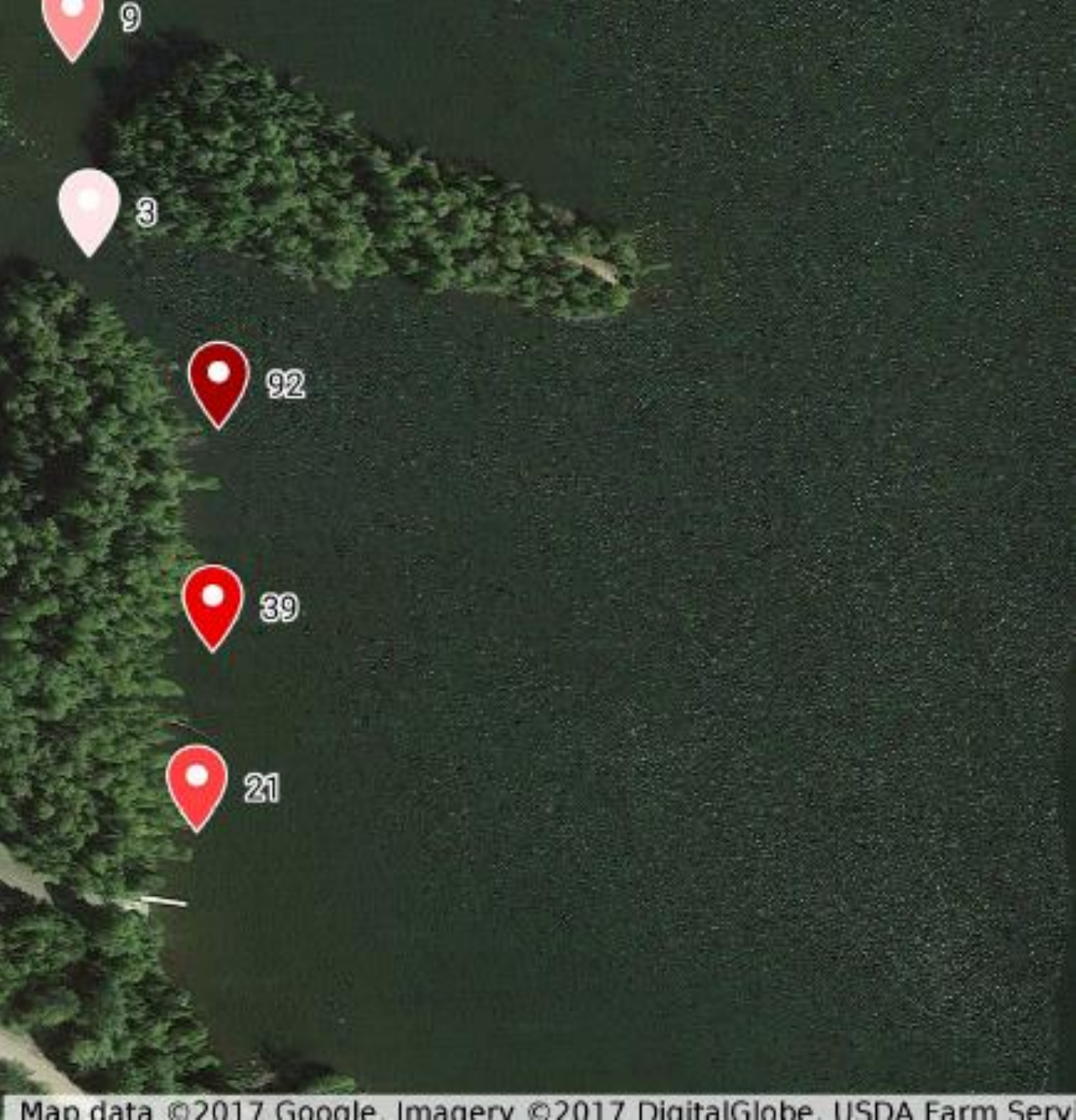
Dumbbell Lake 2005: Rusty Crayfish Total Catch

Wanless Rd

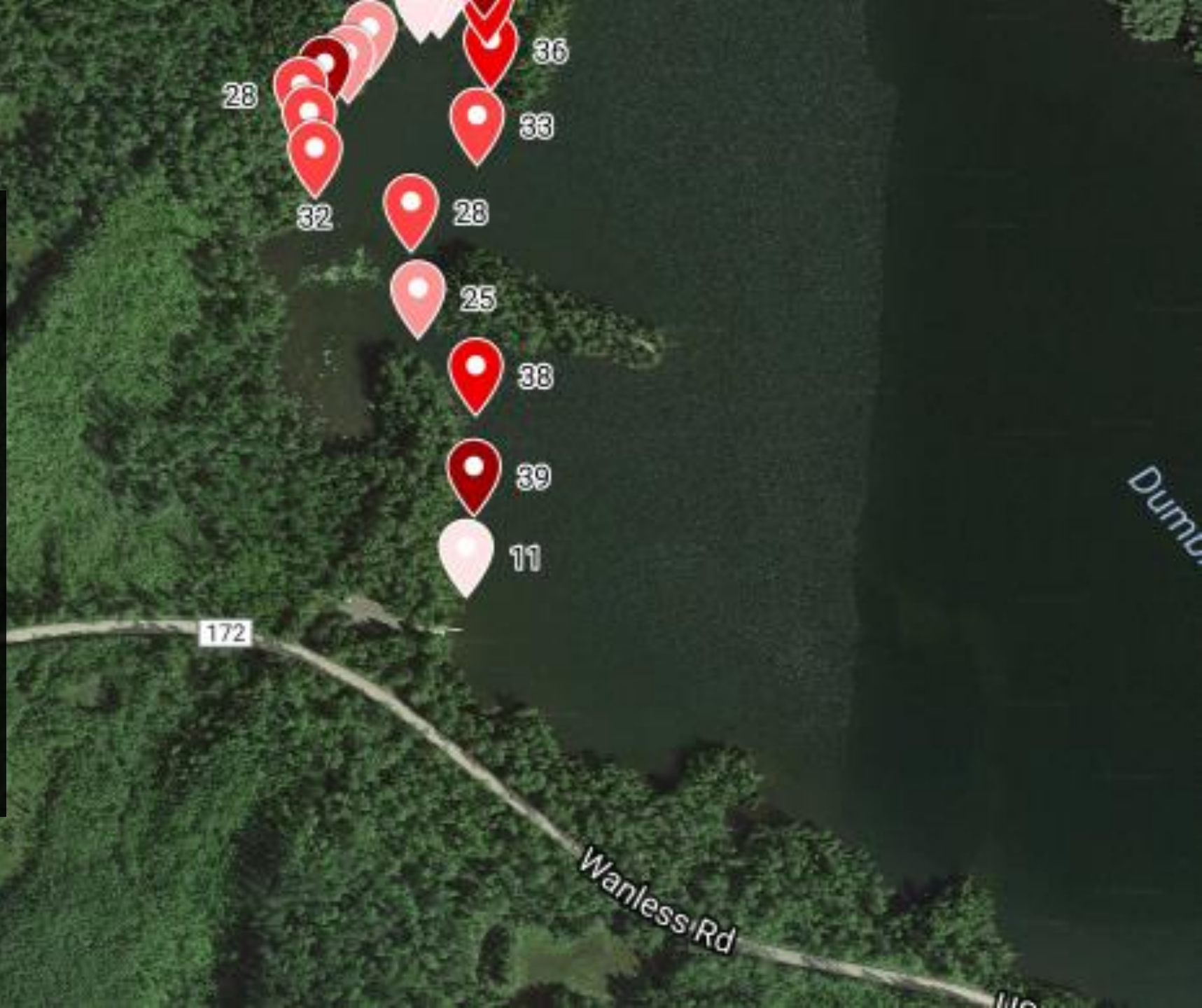


Dumbbell Lake 2011: Rusty Crayfish Total Catch

Wanless Rd



Dumbbell Lake 2015: Rusty Crayfish Total Catch



Dumbbell Lake 2017: Rusty Crayfish Total Catch

