

# Mitigating risk of invasive crayfish introductions and spread in the Great Lakes through standardized early detection protocols, site prioritizations, and training opportunities



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# The problem

- Invasive crayfishes represent a basin wide threat to Great Lakes ecosystems and human infrastructure
- The live trade represents a likely vector for future crayfish introductions (Smith et al. 2019, Larson and Olden 2008, DiStefano et al. 2009)
- Currently no compiled, basin-wide data on prevalence of crayfish in trade
  - Needed to prioritize early detection, monitoring, or response efforts
- Response efforts are costly
  - MI effort for Red Swamp Crayfish: ~\$400k per year.



## Specimen #1 Diagnosis

### Jar Label:

MN DNR Retail Assessment 2021
Site #30
Date of Purchase: 7/15/21
Collector: FCI
Store Label: "Red Brick Yabby"

Condition of Specimen: Specimen intact. Slight tint of isopropyl alcohol, indicating some leeching of exoskeletal pigment. Clouding of eyes. Exoskeleton darkened.

Examination Observations: Specimen is consistent with Parastacidae crayfish on basis of chelae morphology, rostrum structure, and telson structure. Blue banding present on dorsal and ventral margins of abdominal segments. Areola open and broad. Rostrum with three pairs of marginal rostral spines, terminating with a pointed acumen. Two apical spines terminating anteriorly of basal rostral carina. Gonopores on base of third pair of peripods, none present on 5<sup>th</sup> pair, indicating specimen is a female. Lateral margin of propodus darkened, along with tip of dactylus. Base of dactylus and mesial margin of chelae palms brown/brownish red. Three cervical spines on the cephalon/thoracic margin. Four distinct, raised carina along dorsal cephalon (two at mid-eye level, two at base of rostrum). Lateral carina poorly developed, terminating with spine. Telson lacking suture ridge traversing width.



# Project objectives

1. Identify introduction pathways and data gaps
2. Quantify the prevalence of invasive crayfishes in the retail aquarium trade
  - Especially in poorly or non-surveyed localities
3. Develop stakeholder relationships for educational outreach
  - Agencies, retail trade

# Partners are Basin-wide

- Invasive Crayfish Collaborative
- Michigan DNR
- Wisconsin DNR
- Minnesota DNR
- Ohio DNR
- MSU Extension 
- Gun Lake Tribe of Pottawatomi Indians
- University of Illinois Urbana-Champaign
- Illinois/Indiana Sea Grant
- Loyola University-Chicago
- Buffalo State University
- The Nature Conservancy



# Objective 1: Identify introduction pathways and data gaps

- Purpose: determine priority locations for early detection and monitoring
- Great Lakes wide
  - Identify pathways specific to each state and those shared among states
- Outputs: Updated compilation of literature and datasets of crayfish invasions and invasion pathways in the Great Lakes

# Objective 1 Progress

- Compiled >2000 articles from the primary literature
  - 27 contained relevant info on invasive crayfish pathways
- Results summarized
  
- Next steps:
  - Currently organizing core work team to analyze data and develop manuscript

## Objective 2: Prevalence of invasive crayfishes in the retail aquarium trade

- Purposes: Develop basin-wide database of prevalence, identify priority locations for future monitoring and outreach activities
- New surveys of retail outlets in eastern Basin (NY and PA) & Michigan and neighboring localities
- Leverage partnerships and ongoing studies to develop database
- Outputs:
  - Region-wide database of invasive crayfish prevalence in trade
  - Greater understanding of employee knowledge and attitudes



<https://aquariumbreeder.com/procambarus-clarkii-detailed-guide-care-diet-and-breeding/>

## Objective 2 progress:

- New surveys of retail outlets in eastern Basin (NY and PA) & Michigan and neighboring localities
- Visited 382 retail outlets in summer of 2022





## Objective 2 progress:

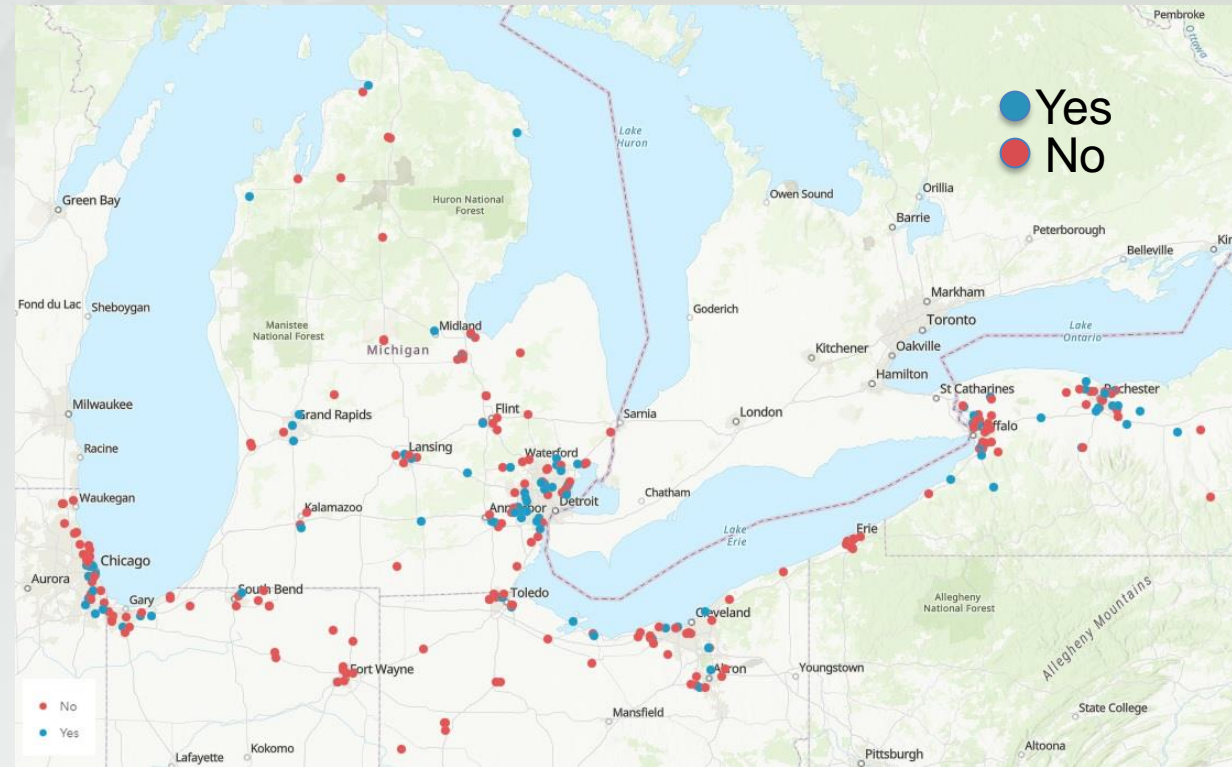


- Survey covered localities within the GL Basin only (except CHI area).
- Independent and 'Box' stores.

State	Visited	Surveys
MI	125	103
OH	59	51
IN	37	33
IL	43	35
PA	7	7
NY	111	64
<b>TOTAL</b>	<b>382</b>	<b>293</b>

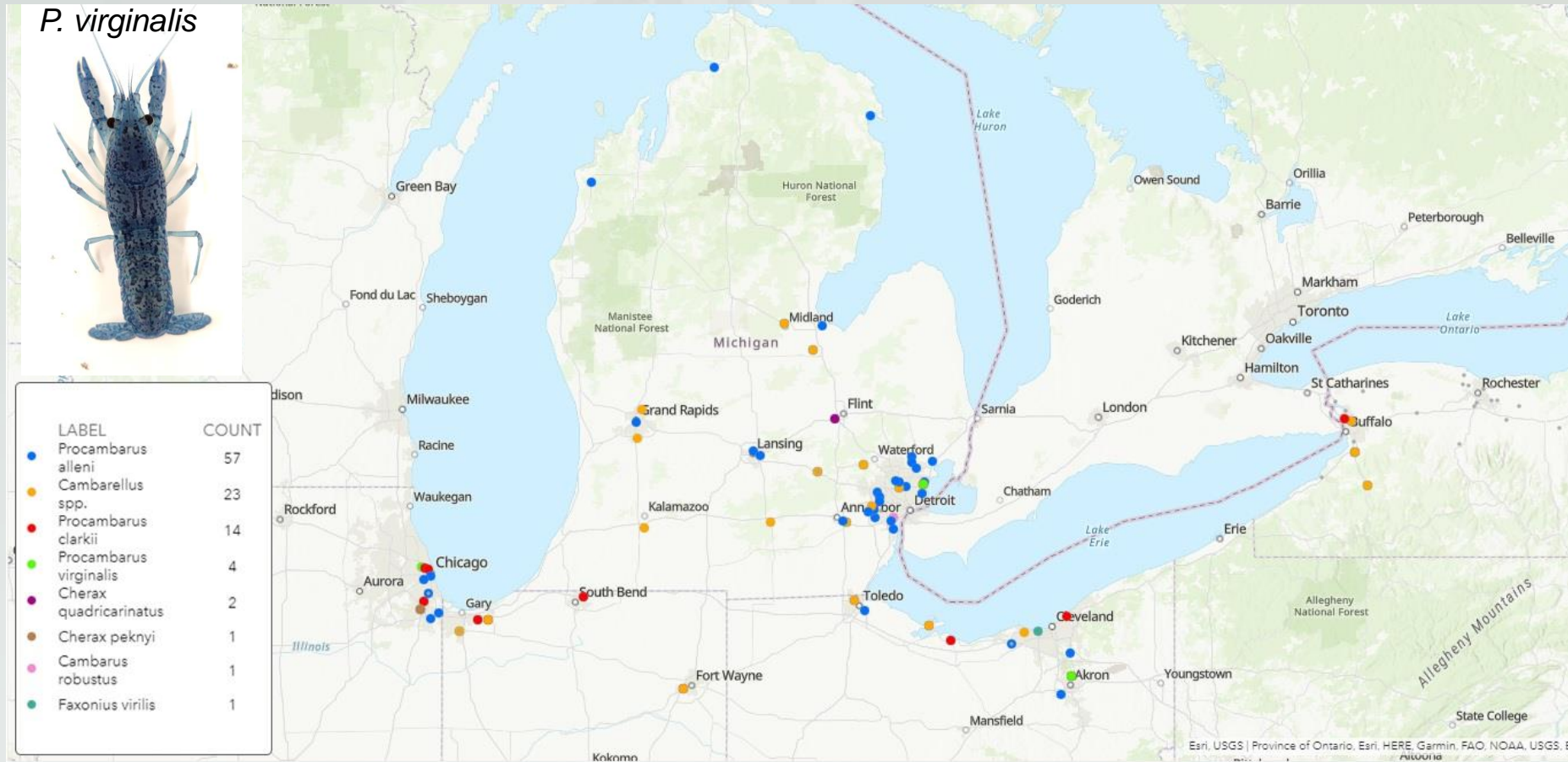
# Results: Where were crayfish found?

State	# of Stores w/ Crayfish:	% of Stores
MI	41	40
OH	11	22
IN	5	15
IL	10	29
PA	0	0
NY	23	36
<b>TOTAL</b>	<b>90</b>	<b>31</b>



# Results: What species were found?

- Found a total of eight different species





*P. clarkii*



*P. virginialis*

## Next steps

- Objective 1
  - Collate and analyze existing datasets on invasion pathways
  - Manuscript development
- Objective 2
  - Gather and integrate data from previous surveys in Wisconsin and Minnesota
  - Quantify knowledge and attitude responses
  - Analysis

# Next steps

- Objective 3
  - Use knowledge and attitude responses to prioritize outreach topics
  - Meet to discuss potential outreach products for retail trade and agencies



*Cherax quadricarinatus*

Questions?

