



# USGS/University of Toledo Grass Carp Research in the Sandusky River - 2017 update

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# What We Know...

### **Spawning observed directly in 2015**

- 8 eggs over 5 dates during 3 separate high-flow events









# What We Know...

#### In the Sandusky River they probably spawn near Fremont



HEC-RAS-FluEgg → Probability distribution of spawning locations





# **Improving Sampling Methods**

#### - Increased to 5 sites sampled



Sampled surface andSmoot (1.7 m) depth

Sampled left and right sides of river at each site

- ~40-60 m apart
- Ensured inner and outer bends were sampled







# More Spawning in 2017...



May 2017 hydrograph very similar to 2015 Eggs captured on 3 consecutive days 5/30 – 6/1





# More eggs collected in 2017...



2015: 8 eggs captured on 5 dates
Surface nets only
Maximum 4 eggs captured in a net
Bongo net donated to the river that day





# More eggs collected in 2017...



May egg collection dwarfed by July event

Same sites sampled in same manner, etc. but thousands more eggs





# Context: Comparing 2017 to 2015 events

Density of eggs by day, site, depth:

Area of Bongo net =  $\pi r^2$  = ... = 0.196 m<sup>2</sup> 4 nets per depth = 0.785 m<sup>2</sup>

Water velocity estimated at sampling sites from HEC-RAS model within < 30 min of time sampled

Volume sampled:

Net area  $(m^2)$  \* Velocity (m/s) \* time fished (s) = Volume  $(m^3)$ 





### **Egg densities**



As high as 12 eggs per cubic meter during July 2017 event





# Context: Comparing 2017 to 2015 events

#### **Comparing only surface nets and identical sites:**

	1	2	3	4	5
6/18/2015	0	0	0.004	0	NA
6/29/2015	0	0	0	0.003	NA
7/13/2015	0.004	0	0	0	NA
7/14/2015	NS	NS		0.016	NA
5/30/2017	0.078	0.066	0.012	0.184	9
5/31/2017	0.546	2.316	0.018	0.049	0
6/1/2017	0	0	0	0	0
7/12/2017	1.299	2.209	1.468	1.689	0.062

#### ~90 times as many eggs in surface nets in 2017





# A second spawning tributary?

- "Prospect" sampled the Maumee on 13 July
  - 1 day after capturing thousands of eggs in the Sandusky
- 4 sites from mouth to ~18 km upstream





- Stage 24
- Investigating an existing HEC-RAS model for the Maumee to determine if it is suitable





# What did we learn from 2017?

Spawning occurred ~3 weeks earlier than in 2015
 Earlier than window postulated by Kočovský et al. (2012)

 Fish are in warmer than average waters
 Thermal thresholds are wrong (research ongoing)

...and at much lower peak flow than previously observed
 Peak mean daily Q was < half previous spawning events</li>

2015: peaked at 322-362 cms during June event 2017: peaked at 156 cms during May-June event

- Expands range of events to hindcast for potential recruitment





# What are we doing about it?

- Egg stage data to characterize duration of events
   To be presented at Midwest meeting
- Cooperative, multi-agency sampling effort for larvae
- DFO, USFWS, U Toledo/USGS, MIDNR sampled with light traps in Muddy Creek Bay
- Lots of larval fish captured, processing underway
- USGS project at CERC testing wavelength and intensity of light for capturing GC







# What are we doing about it?

- Maumee now to be sampled as Sandusky is: fixed index stations, deeper when possible, every potential event, etc.
- "Prospect" sample Portage, Vermilion, Cuyahoga, etc.
- Work with FWS on eDNA sampling
- Continue to seek the Holy Grail: larvae





Bongo sampling for grass carp eggs on the Sandusky River. Photo courtesy of Nicole King/University of Toledo



### What will this accomplish?

- Where, and when spawning occurs:

informs management options Where, when, how to target control efforts ODNR planned action – <u>John Navarro</u>

informs risk and strategic planning Structured Decision Making – <u>Seth Herbst</u>

**Prevention:** everything we learn about Grass Carp reproduction puts us ahead of Bighead Carp, Black Carp, and Silver Carp

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DFO:	Colm, Marson

**USGS Invasive Species Program Great Lakes Restoration Initiative** 



