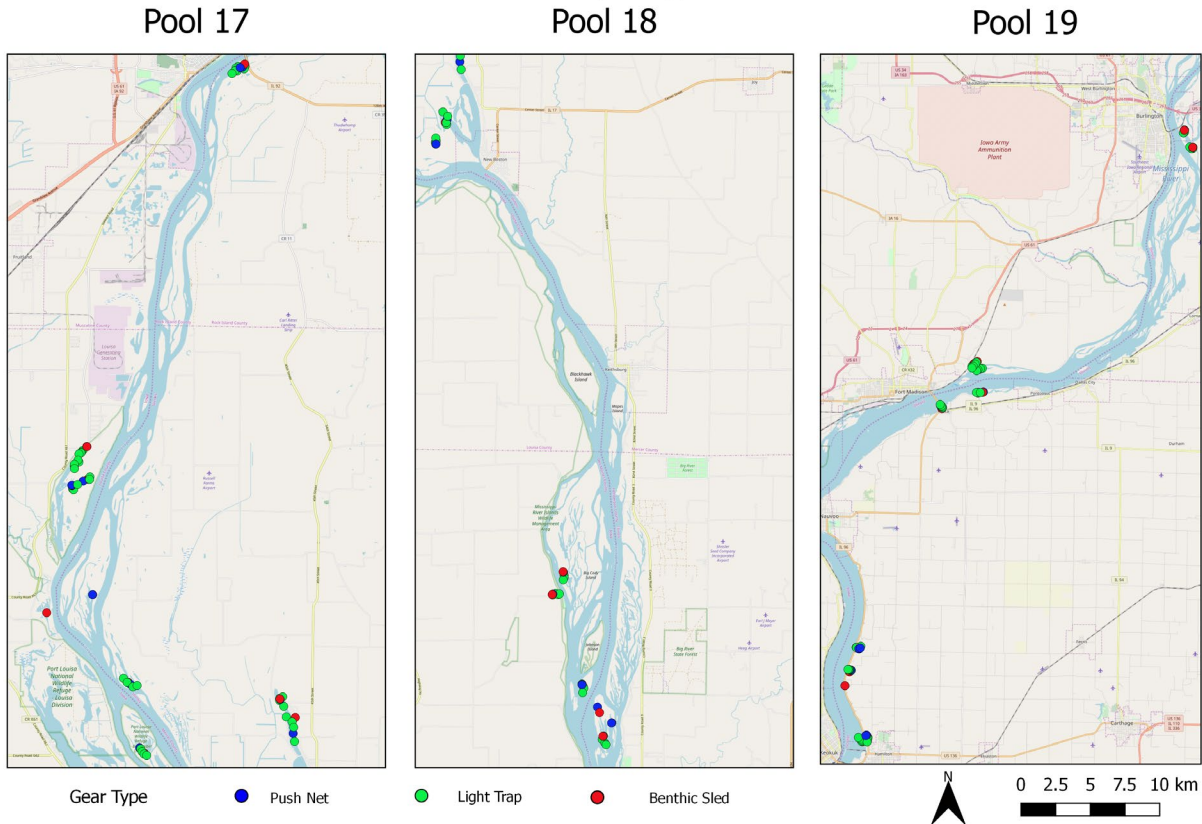# Larval fish assessment in the Upper Mississippi River
2019

Geographic Location:
Sampling was conducted in backwater habitats on Pools 17–19 of the Mississippi River.

2019 Larval Sampling Locations

Pool 17   Pool 18   Pool 19

Gear Type   ● Push Net   ● Light Trap   ● Benthic Sled

0 2.5 5 7.5 10 km

Participating Agencies:
Western Illinois University and Illinois Department of Natural Resources

Statement of Need:
      At the leading edge of known bigheaded (Silver and Bighead) carp reproduction, it is critical to understand their success of recruitment. Identifying years of recruitment and the size of each event can help future managemental efforts in the UMR in controlling the spread of invasive bigheaded carp in these lower density reaches. Determining the key environmental factors and time of the year that bigheaded carps spawn based on collection of larvae and juveniles will help with mass removal events of adults in target areas.

Project Objectives:
1) Determine location, frequency and timing of larval bigheaded carp presence upstream of Lock and Dam 19 in Pools 17, 18, and 19.
2) Determine which gear type is the most effective for determining the presence, abundance, and size structure of larval bigheaded carp

Larval fish assessment in the Upper Mississippi River
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Project Highlights:

- There were 1,731 bigheaded carp collected from Pool 19 of the Mississippi River during the 2016 sampling season.
- There was a single specimen collected in the 2017 field season in Pool 19.
- There have been 14 bigheaded carp collected from Pool 19 of the Mississippi River during 2018 so far.
- Throughout 2016–2018 sampling seasons, bigheaded carp larvae were primarily collected in the month of June.

Methods:

Larval fish sampling was completed using three different gear types (benthic sled sampler, Ichthyoplankton push net, and larval light trap). During daylight hours, a benthic sled (500μm mesh, Wildlife Supply Company, Yulee, FL) and an ichthyoplankton push net (.5m diameter x 3m length, 500μm mesh, Wildlife Supply Company, Yulee, FL) were towed or pushed from the boat at a speed of 1.5m/s for a period of five minutes. To determine the total volume sampled, a calibrated mechanical flow meter was attached to the mouth of each net. To avoid debris from entering the benthic sled from the motor, the sled was towed in a semicircle pattern. Due to the heterogeneity (woody debris, vegetation, and uneven depths) of backwater areas, deployment locations were determined based on proximity to shore and amount of structure. The sequence in which each gear type was used was selected randomly using a coin flip as to avoid biases. At the completion of each tow, samples were rinsed into sample jars, labeled with site information, and preserved with 95% ethanol.

A total of 8 Quadrafoil larval light traps (250μm, Aquatic Research Instruments) that utilize green chemical light sticks were deployed approximately an hour after sunset and were fished for at least an hour three times a week. Deployment locations for each trap were selected based on proximity to shoreline, structure, and other traps. Traps were collected, and the sample filtered with the catch pan at the bottom of each trap and placed into a sample jar with a tag describing site information. Samples were preserved using 95% ethanol. Water quality measures such as dissolved oxygen, specific conductivity, conductivity, and temperature were taken using a YSI in conjunction with both nets and light traps. Turbidity was measured at sampling locations using a secchi disk during the day and a portable turbidity meter at night.

Results and Discussion:

2016 Results

A total of 332,575 larval fishes were collected in light traps representing a total of 10 different families from May to September of 2016. The highest percentage (81.1%) of larvae were from the family Cyprinidae followed by Centrarchidae (16.3%) and Clupeidae (1.2%). Most larvae (59%) were caught in pool 17 of the Mississippi river with the next highest amount (21%) in pool 19, followed by pool 18 (20%). Larval abundances peaked in the month of June (Figure 1). A total of 1,731 bigheaded carp were detected in the 2016 sampling season. Detections of bigheaded carp larvae all occurred in pool 19, and peak abundances occurred in the month of June (Figure 2).
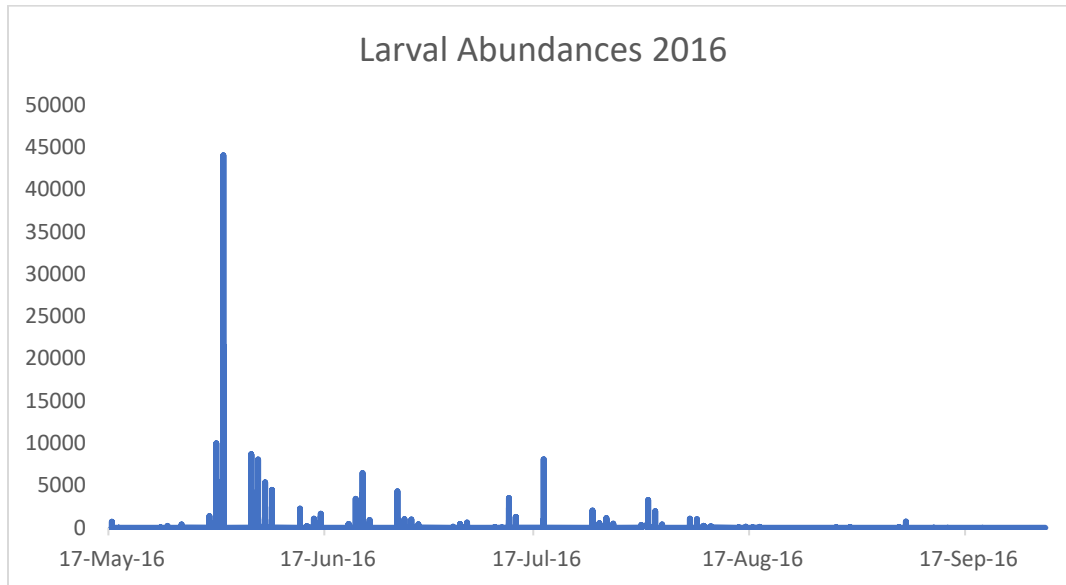
Figure 1: Larval abundances throughout the 2016 sampling season excluding Bigheaded carp.
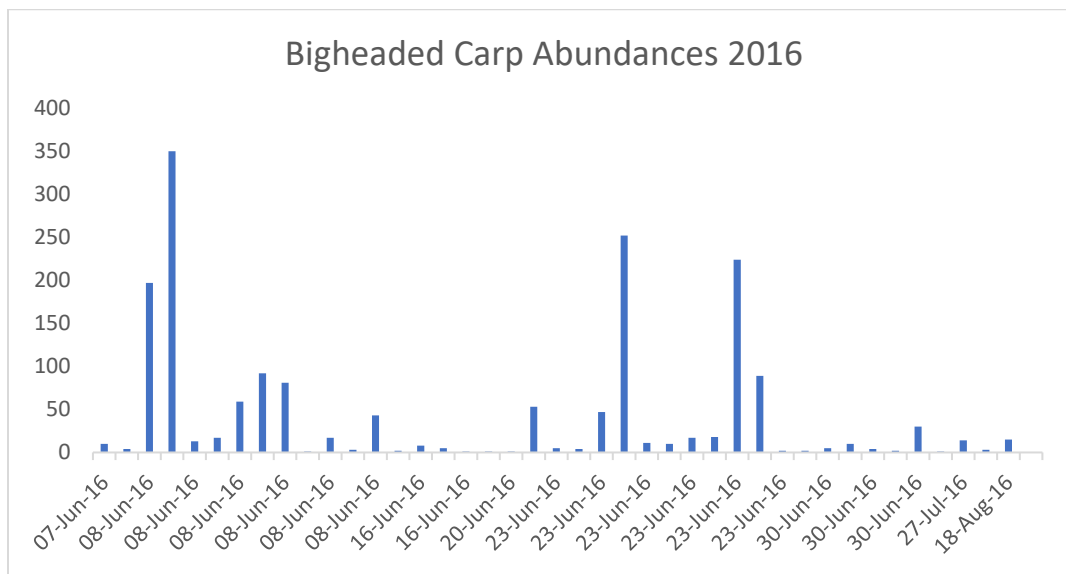

Figure 2: Larval Bigheaded carp abundances throughout the 2016 sampling season.

2017 Results

      A total of 416,739 larvae have been identified from 2017 sampling season representing 10 different families. The highest percentage (88.2%) of larvae were from the family Cyprinidae followed by Centrarchidae (9.6%) and Catostomidae (.65%). Most larvae (66.5%) were caught in pool 18 of the Mississippi river with the next highest amount (18.8%) in pool 19, followed by pool 17 (14.2%). Larval abundances peaked in the month of June (Figure 1). There has been only one detection of a Bigheaded carp larvae for 2017. This detection occurred in pool 19 near Fort Madison, IA during the month of June.
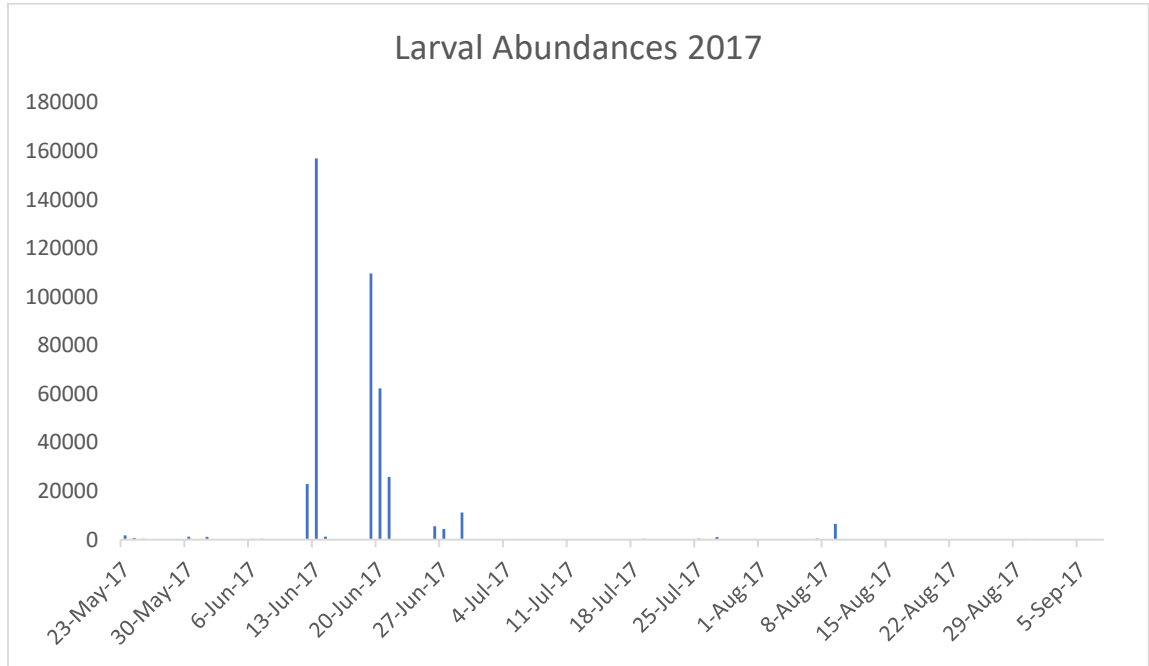
Larval Abundances 2017

Figure 3: Larval abundances throughout the 2017 sampling season.

2018 Results

Identification of 2018 samples is approximately 85% complete. A total of 143,341 larvae have been identified from 2018 sampling season representing 8 different families. There has been a total of 14 bigheaded carp larvae identified from 2018 thus far. Thirteen of the fourteen individuals were found on June 18th and the other indivdual was found on September 13th. All Bigheaded carp larvae were captured using a light trap.

2019 Results

In 2019, sampling occurred June 10th through September 19th and a total of 202 samples were collected. Total samples collected in 2019 were lower than previous years due to lower tempertures, flooding, and storms throughout the season. Of the samples collected 127 were light traps, 42 were push nets, and 33 were push nets. Each gear type is broken down in table 1.

	Pool 17	Pool 18	Pool 19
Light Trap	40	32	55
Benthic Sled	10	10	13
Push Net	11	10	21

Larval Bigheaded Carp Occurences

Year   ● 2016   ● 2017   ● 2018

0   2.5   5   7.5   10 km
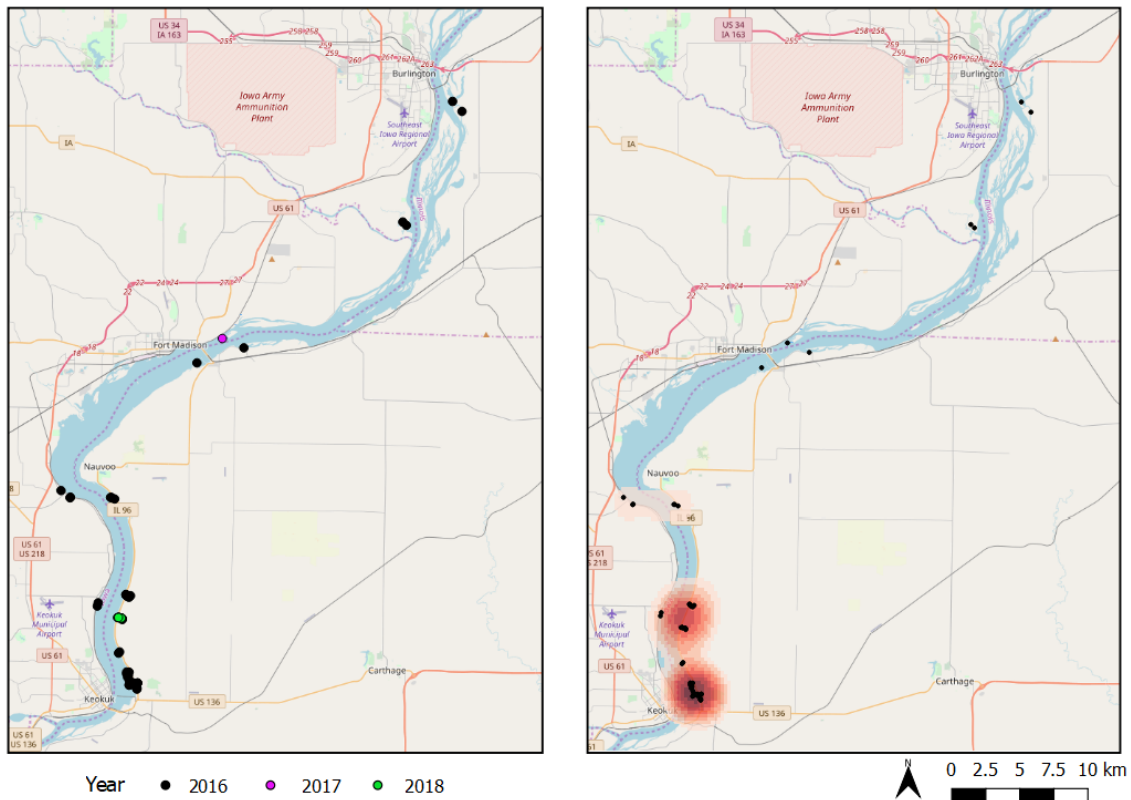
Recommendation:

Continuous larval sampling can identify potential nursery environments for bigheaded carp, as well as any future recruitment events within Pools 17–19 in the Mississippi River. Larval identification determines what native fish families are reproducing yearly and establishes their recruitment success to the larval stage. Sampling allows for managers to diagnose if bigheaded carps are reproducing yearly and to what size their recruitment potential is at the northern forefront of their reproductive range in the Mississippi River.