





# Larval fish assessment in the Upper Mississippi River 2018

## 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 management 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. Delineate distribution and magnitude of Asian carp reproduction in the UMR.

## 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.
- Throughout 2016–2017 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 (500 $\mu$ m mesh, Wildlife Supply Company, Yulee, FL) and an ichthyoplankton push net (.5m diameter x 3m length, 500 $\mu$ m 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 (250 $\mu$ m, 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:

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### 2016 Results

A total of 332,575 larvae 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).

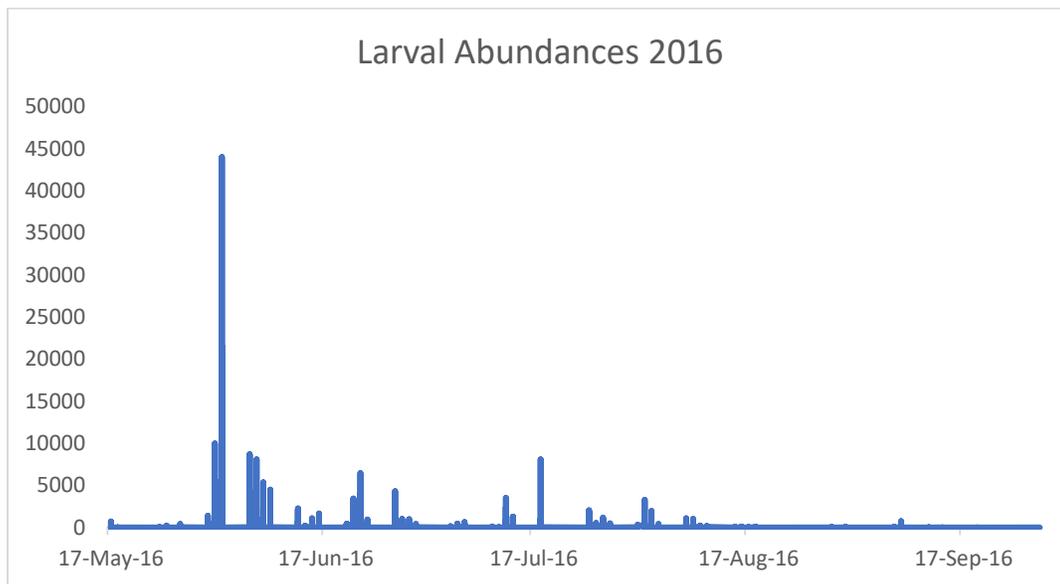


Figure 1: Larval abundances throughout the 2016 sampling season excluding Bigheaded carp.

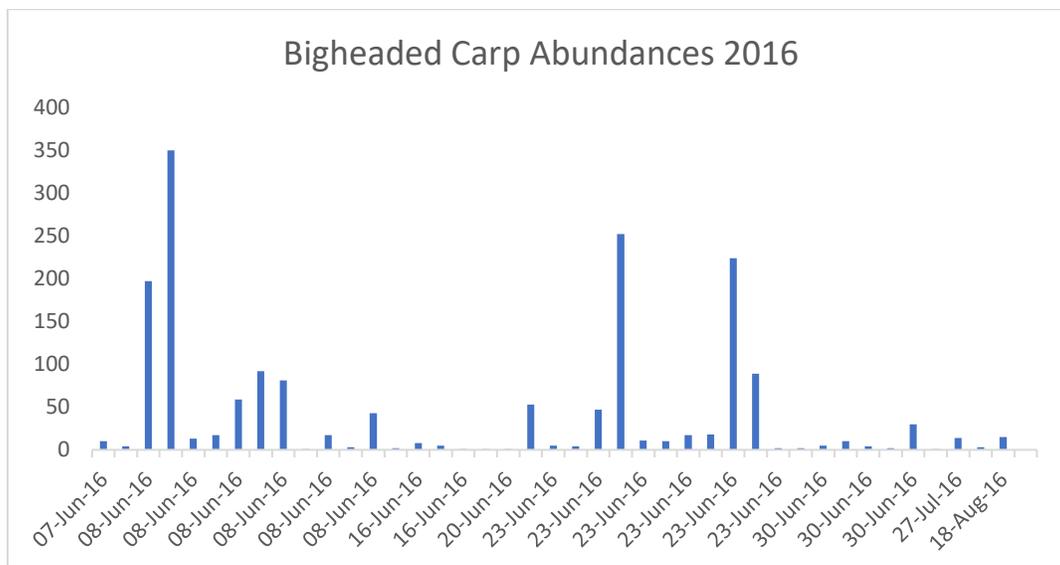


Figure 2: Larval Bigheaded carp abundances throughout the 2016 sampling season.



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## 2017 Results

Samples from the 2017 season are still being identified with approximately 60% of samples completed. A total of 61,805 larvae have been identified from 2017 sampling season representing 8 different families. 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.

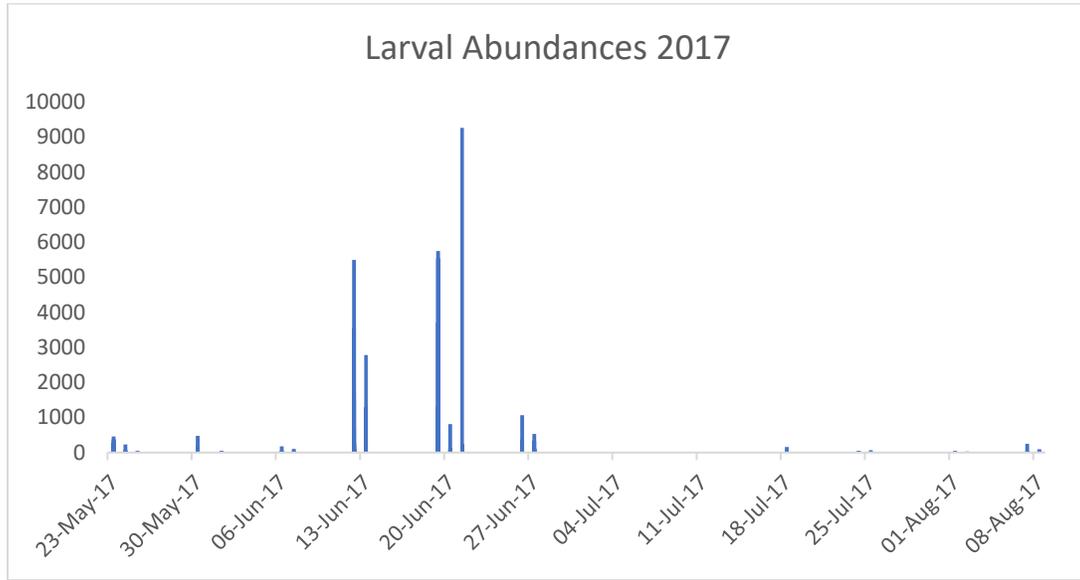


Figure 3: Larval abundances throughout the 2017 sampling season.

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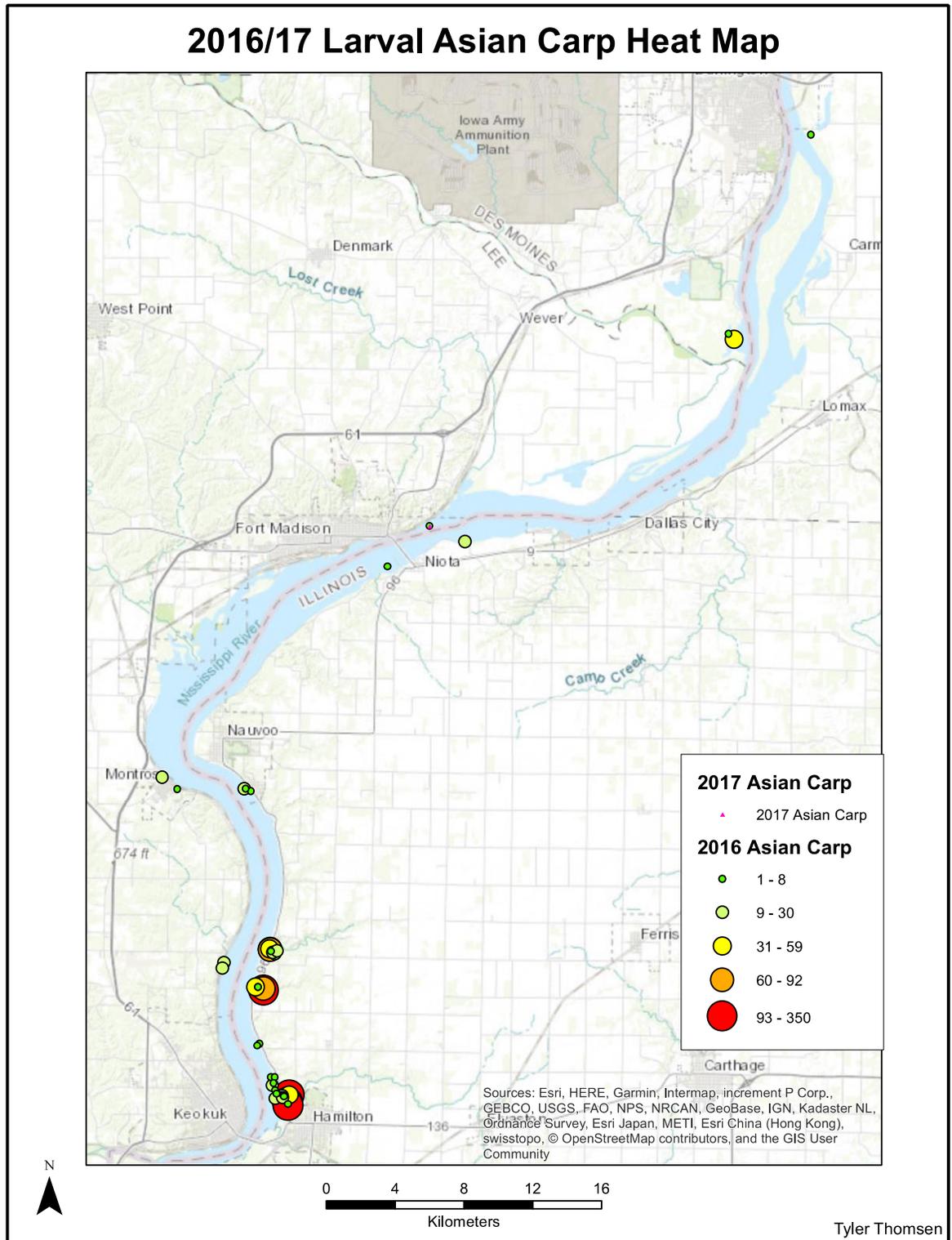


Figure 4: Areas of collected larval bigheaded carp nursery habitats throughout Pool 19 in 2016–2017.



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### 2018 Results

In 2018, sampling occurred May 13<sup>th</sup> through September 27<sup>th</sup> and a total of 439 samples were collected. There were 280 total light trap samples, 90 push net samples, and 69 benthic sled samples. Each gear type is broken down in table 1.

	Pool 17	Pool 18	Pool 19
Light Trap	72	89	199
Benthic Sled	19	21	29
Push Net	20	22	48

Table 1. The total number of samples from each gear type collected from each of the three pools.

### 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.