Title: Larval fish assessment in Pool 19 in the Upper Mississippi River 2020

Prepared by: Dominique Turney, Emily Szott, Zack Witzel, Jim Lamer

Geographic Location:
Sampling was conducted in backwater habitats on Pools 17-19 of the Mississippi River from 2016-2020.

Participating Agencies:
Illinois Natural History Survey and Illinois Department of Natural Resources

Statement of Need:

At the leading edge of known bigheaded carp (silver and bighead) reproduction, it is critical to understand their success of recruitment. Identifying recruitment events can help future management efforts in the UMR by controlling the spread of invasive bigheaded carp in the low-density management zone. Based on collection of larvae and juveniles, determining the key environmental factors and time of the year that bigheaded carps spawn will help with removal efforts of adults in target areas.

Project Objectives:

1) 2016-2019: Use 30 larval light traps on a weekly basis in Pools 17, 18, and 19 backwaters to monitor for the presence of larval Asian carp during the time periods when water temperatures are between 18-30°C.
2) 2020: Use 9-12 larval light traps on a weekly basis in four small tributaries in lower Pool 19 to monitor for the presence of larval Asian carp during the time periods when water temperatures are between 18-30°C.

Project Highlights:

- There were 1,731 bigheaded carp collected in the 2016 field season from Pool 19 of the Mississippi River (Fig. 6).
- There was one bigheaded carp collected in the 2017 field season from Pool 19 of the Mississippi River (Fig. 6).
- There was one bigheaded carp collected in the 2018 field season from Pool 19 of the Mississippi River (Fig. 6).
- Projected completion of 2019 and 2020 sample identification is spring 2021.
- Throughout 2016–2018 sampling seasons, larvae collected peaked in June, and bigheaded carp larvae were primarily collected in the month of June.

Methods:

Between 2016-2020, 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 8-12 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 one-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 when available.

Results and Discussion:

2016 Results

A total of 391,054 larval fishes were collected in light traps representing a total of 10 different families from May to September of 2016. The highest percentage (76.9%) of larvae were from the family Cyprinidae followed by Centrarchidae (20.9%) and Clupeidae (1.07%). Most larvae (58.0%) were caught in Pool 17 of the Mississippi River with the next highest amount (21.9%) in Pool 18, followed by Pool 19 (20.1%). Larval abundances peaked in the month of June (Fig. 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 (Fig.2).

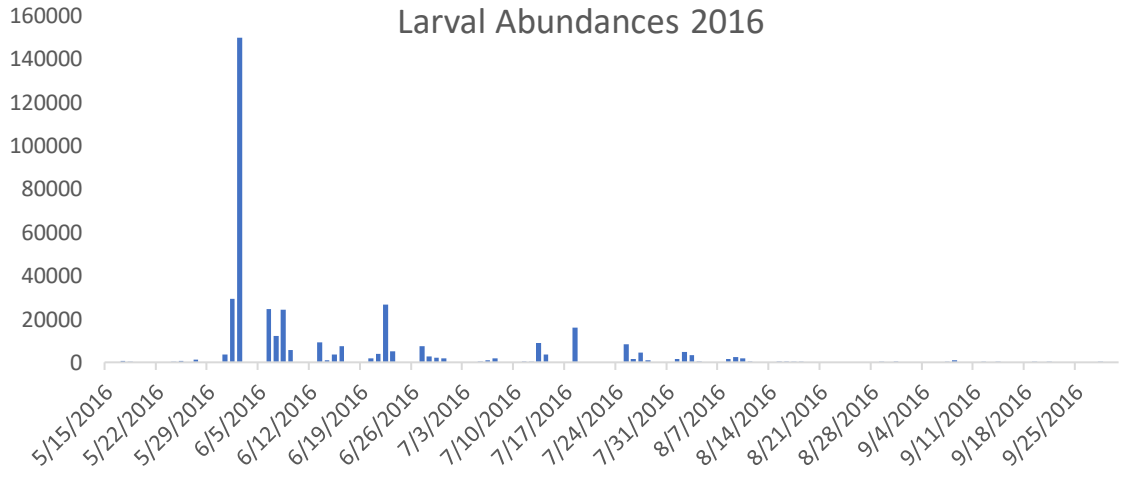

Figure 1: Larval abundances throughout the 2016 sampling season.

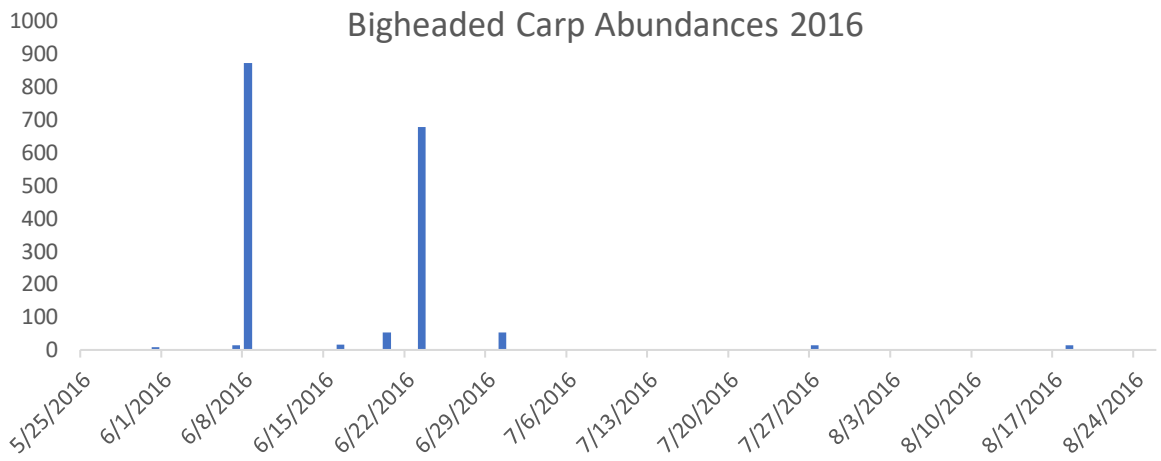

Figure 2: Larval bigheaded carp abundances throughout the 2016 sampling season.

2017 Results

A total of 413,192 larvae were identified from the 2017 sampling season representing 10 different families. The highest percentage (88.9%) of larvae were from the family Cyprinidae followed by Centrarchidae (9.76%) and Catostomidae (0.65%). Most larvae (67.0%) were caught in Pool 18 of the Mississippi River with the next highest amount (18.3%) in Pool 19, followed by Pool 17 (14.7%). Larval abundances peaked in the month of June (Figure 3). There was 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.

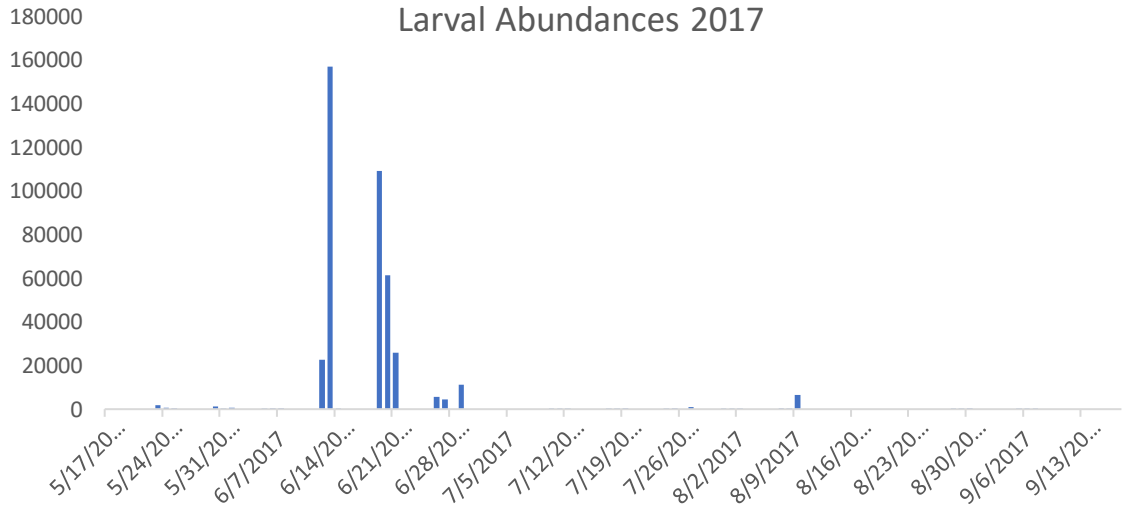

Figure 3: Larval abundances throughout the 2017 sampling season.

2018 Results

A total of 48,241 larvae were identified from 2018 sampling season representing 8 different families. The highest percentage (80.5%) of larvae were from the family Cyprinidae followed by Centrarchidae (17.4%) and Clupeidae (1.52%). Most larvae (42.1%) were caught in Pool 19 of the Mississippi River with the next highest amount (33.5%) in Pool 18, followed by Pool 17 (24.4%). Larval abundances peaked in June (Figure 4).There was only one bigheaded carp larva identified in 2018, found on September 13th, and captured using a light trap.

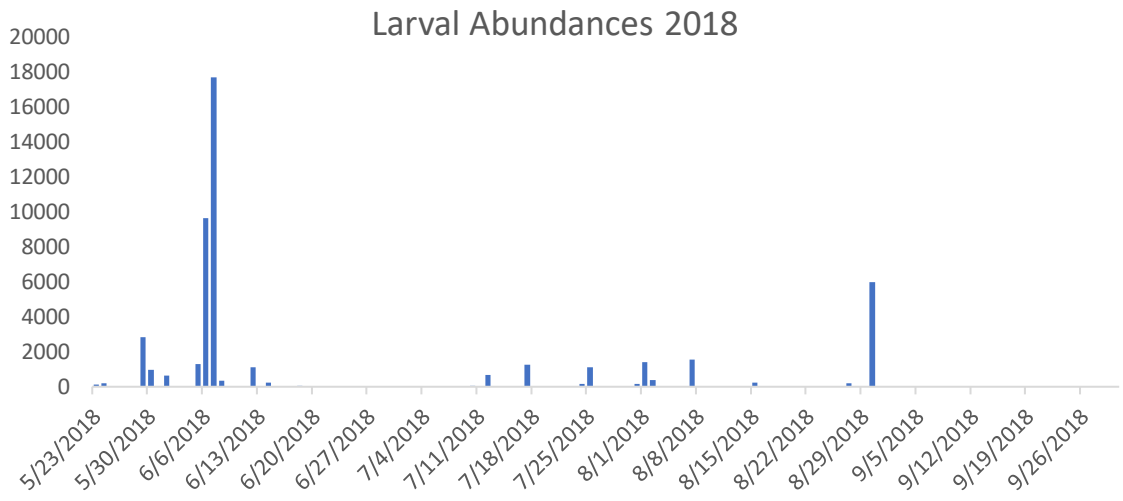

Figure 4. Larval abundances throughout the 2018 sampling season.

2019 Results

In 2019, sampling occurred from 06/10/2019 to 09/19/2019, and a total of 202 samples were collected. Total samples collected in 2019 were lower than previous years due to lower tempertatures, flooding, and storms throughout the season. Of the samples collected, 127 were light traps, 42 were push nets, and 33 were benthic sleds (Table 1). Samples from 2019 are still being processed, but 72 samples have been completed so far. Of these samples, zero Asian Carp have been observed.

Table 1. Number of each larval sampling gear type used in each pool of the Upper Mississippi River from 06/10/2019-09/19/2019.

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

2020 Results

In 2020, sampling occurred once a week from 06/08/2020 to 09/28/2020, and a total of 129 samples were collected. Only larval light traps were used in 2020 to sample four streams in Pool

19 of the Upper Mississippi River (Chaney Creek, Larry Creek, Waggoner Creek, Lamalees Creek; Fig. 5). So far in 2020, none of the samples have been sorted or identified. Instead, effort has been placed on identifying 2019 samples. Projected completion of 2019 and 2020 sample identification is spring 2021.

Figure 5. Larval sampling locations during 2020 using light traps in Pool 19 of the Upper Mississippi River.

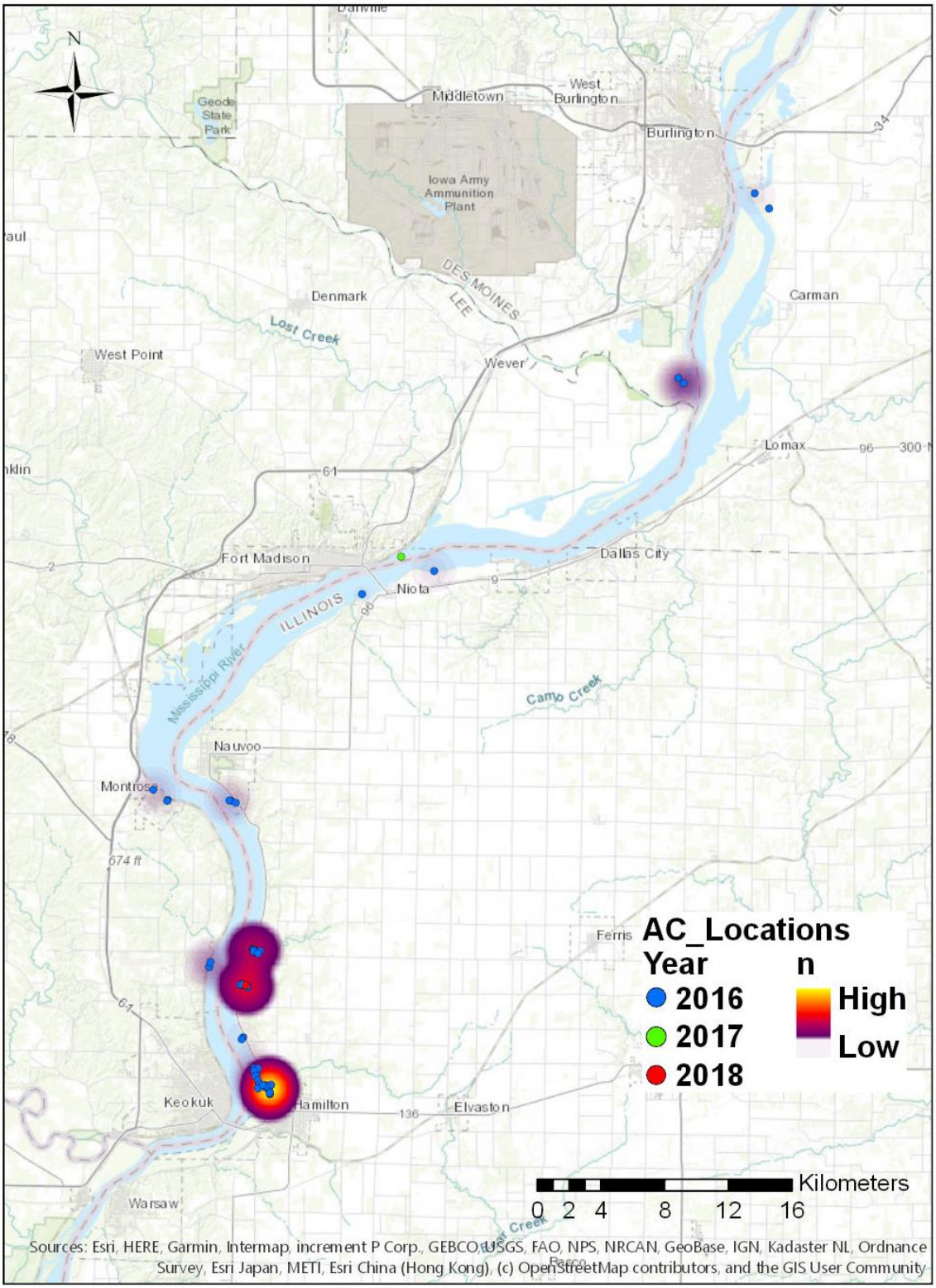

Figure 6. Occurences of larval bigheaded carp collected using larval light traps from 2016-2018 in Pool 19 of the Upper Mississippi River.

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.