IOWA DEPARTMENT OF NATURAL RESOURCES

Sport Fish Restoration Research Findings

Population Densities, Biomass, and Age-growth of Common Carp and Black Bullheads in Clear Lake and Ventura Marsh

Project Duration: 2003-2013
Location: Clear Lake (Cerro Gordo County)

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Clear Lake, the third largest natural lake in Iowa, is a very popular spot for many outdoor activities. Water quality has greatly declined in Clear Lake since the 1970's. A diagnostic study was started to determine the causes of the decline and make management recommendations to improve water quality in the lake. Overabundant populations of Common Carp and Black Bullhead were determined to be one factor that negatively impacted water quality in Clear Lake. This research evaluated changes in Common Carp and Black Bullhead population densities, biomass, and age-growth characteristics in Clear Lake following watershed improvements and fish removal practices.

Goals

- Estimate population densities and biomass of Common Carp and Black Bullheads in Clear Lake and evaluate efforts to reduce densities.
- Evaluate changes in population age structure and reproduction patterns of Common Carp and Black Bullheads in Clear Lake and Ventura Marsh and associate changes with densities.
- Determine population densities and biomasses of Common Carp and Black Bullheads that would allow a 3-fold increase in water transparency in Clear Lake.

Results

- Common Carp and Black Bullhead were removed from Ventura Marsh and water clarity initially increased as a result of decreased suspended sediment and phytoplankton biomass. Removal efforts only temporally reduced Common Carp and Black Bullhead biomass.
- Despite removal effort limitations, significant changes in the fish community were observed within Clear Lake. By 2008, Black Bullhead density and biomass decreased by 99%. Common Carp biomass fluctuated despite targeted removal efforts. Common Carp abundance decreased greatly as overall average size increased.
- Significant improvements in water quality were documented, but only a few of these improvements could be correlated to Common Carp or Black Bullhead density or biomass changes.
- Multiple changes occurred within Clear Lake during the study period. One change was the infestation of the invasive zebra mussel in 2005. Known as ecosystem engineers, zebra mussels alone can alter water quality parameters and benthic production. The Clear Lake Dredging Project began in 2008 and was completed in 2009. This dredging project removed 2.4 million cubic yards of sediment from the Little Lake.

Conclusions

The improvements in water quality observed cannot be completely understood due to the dynamic nature of the processes involved and the suite of management activities used. The interactions of Common Carp and Black Bullhead were at least partially responsible for water quality improvements. The infestation of zebra mussels and watershed and in lake (e.g. dredging) improvements may have contributed more to the improvements in water quality than that of fish population changes.