APPENDIX 12.B. ICHTHYOPLANKTON SAMPLING METHODS

Introduction/Background

There is currently little information on the potential effects of water withdrawals on the fish community of the St. Johns River with regard to impacts to fish eggs and newly hatched larvae (ichthyoplankton). Water withdrawals could potentially remove large numbers of ichthyoplankton from the river though entrainment which could potentially affect the reproductive success and recruitmentof important species groups (e.g. American shad, sunfishes, etc). To fill this data void we implemented an ichthyoplankton sampling program in 2008 and 2009 to provide baseline data to assess the potential withdrawal entrainment effects on ichthyoplankton of the St. Johns River.

Objectives

Objectives of this project were to collect data on species composition, abundance, and size structure of ichthyoplankton in the St Johns River near proposed water withdrawals sites. Abundance estimates are fundamental to developing quantitative predictions on potential ichthyoplankton loss due to withdrawals and ultimately to predicting potential withdrawal effects on future juvenile and adult abundance. Data on ichthyoplankton abundance are also useful for determining which intake locations might have the least entrainment potential and, for designing and operating intake structures to minimize ichthyoplankton loss.

Scope of Work

We collected ichthyoplankton for 21 months from February 2008 through September 2009 at four regional locations where withdrawals might occur. We sampled upstream and downstream of the State Road 44 Bridge near Deland , Florida, in the vicinity of Lake Monroe, at the State Road 50 Bridge west of Titusville, Florida, and within and immediately downstream, of Lake Poinsett near Cocoa, Florida (Figure 12.B-1). Six specific sites within the four regional locations were sampled. These sampling sites surrounded exact locations under consideration for intake structures at the time. Arranged upstream (south) to downstream (north), these sites were:

Lake Poinsett (Figure 12.B-2)

- Lake habitat (4 stations located throughout the lake), and
- Downstream riverine habitats (2 stations),

State Road 50 (Figure 12.B-3)

- Riverine habitats (5 stations),

State Road 46 (Figure 12.B-4)

- Riverine habitat between Lake Monroe and Lake Harney (6 stations),

Lake Monroe (Figure 12.B-5)

- Lake habitat (5 stations),

Yankee Lake (Figure 12.B-6)

- Riverine habitats downstream of Lake Monroe (5 stations),

State Road 44 (Figure 12.B-7)

- Riverine habitats (5 stations).

Sampling at all locations occurred every 3 to 6 days during the spring spawning season (Feb.-May) and every 7 to 12 days throughout the rest of the year (weather permitting). Equipment failures prevented some sampling. Sampling occurred primarily during daytime hours. However, to investigate possible diel variation in ichthyoplankton drift, concurrent nighttime sampling occurred at all Lake Monroe stations monthly. Daytime and nighttime sampling occurred within the same 24-hour period.

Ichthyoplankton was sampled with a 0.5 m diameter conical plankton net constructed of 505 micron Nitex mesh and equipped with Sea Gear model MF315 flowmeter to calculate volume of water filtered. The net was mounted on an aluminum epibenthic sled frame that could be towed along the bottom and raised to fish at different depths. The net was towed from an open outboard motor boat equipped with an aluminum towing frame and hand-winch. It was towed in an upstream direction at an approximate speed of 1.5 m sec^{-1} for 10 minutes, with 3 minutes at the bottom, mid-depth and near-surface. This ensured samples were depth-integrated. Towing times were adjusted to ensure that at least 50-100 m^3 of water are filtered for each sample. Two tows were made at each station. Tows were taken concurrently. Samples were preserved in 5% buffered formalin, except when detrital loading was very high. In that instance, formalin levels were increased to 10%.

Samples were processed in the lab at the Florida Institute of Technology.. In the laboratory, samples were sieved through 505 micron mesh to remove formalin and stored in 75% ethanol for sorting. All fish eggs and larvae were removed and stored in 75% ethanol prior to identification, enumeration and measurement. A Folsom plankton splitter was used when very high densities of eggs and larvae were encountered (>1000 eggs and larvae per sample), and if high detritus loads did not prevent accurate use of the splitter. If the plankton splitter was used, the sample was divided into halves, quarters, eighths, etc. until the subsamples had densities in the range of 100-200 eggs and larvae. A minimum of two subsamples were processed. If counts varied by more than 10% between the subsamples, an additional two subsamples were processed.

Fish eggs and larvae were identified to the lowest feasible taxonomic level. The developmental stage and length of these larvae was be recorded. If sample sizes were very large, haphazardly chosen subsamples of 25 fish per species were selected for measurement.

As sample processors were trained, approximately 20% of the samples were re-sorted by other processors. If the processor missed >10% of the fish eggs and larvae in more than 10% of their samples, their samples were re-sorted. After a month of satisfactory sorting, the check rate were reduced to 5% of the samples. Two people conducted larval identification. Larvae were identified using published descriptions of the species. A photographic atlas using specimens collected during this program was also created.

Figure 12.B-1. Areas of the St. Johns River sampled for ichthyoplankton.

Figure 12. B-2. Ichthyoplankton sampling sites in Lake Poinsett.

Figure 12.B-3. Ichthyoplankton sampling sites in the St. Johns River near State Road 50.

Figure 12.B-4. Ichthyoplankton sampling sites in the St. Johns River at State Road 46 upstream of Lake Monroe.

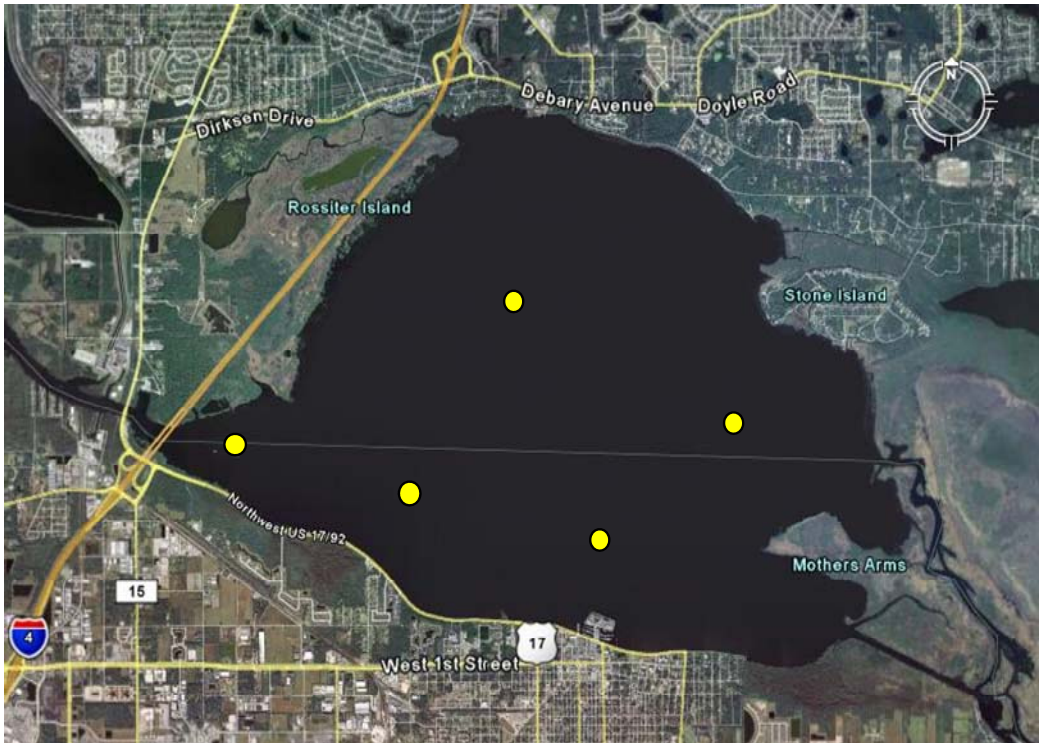

Figure 12.B-5. Ichthyoplankton sampling sites in Lake Monroe.

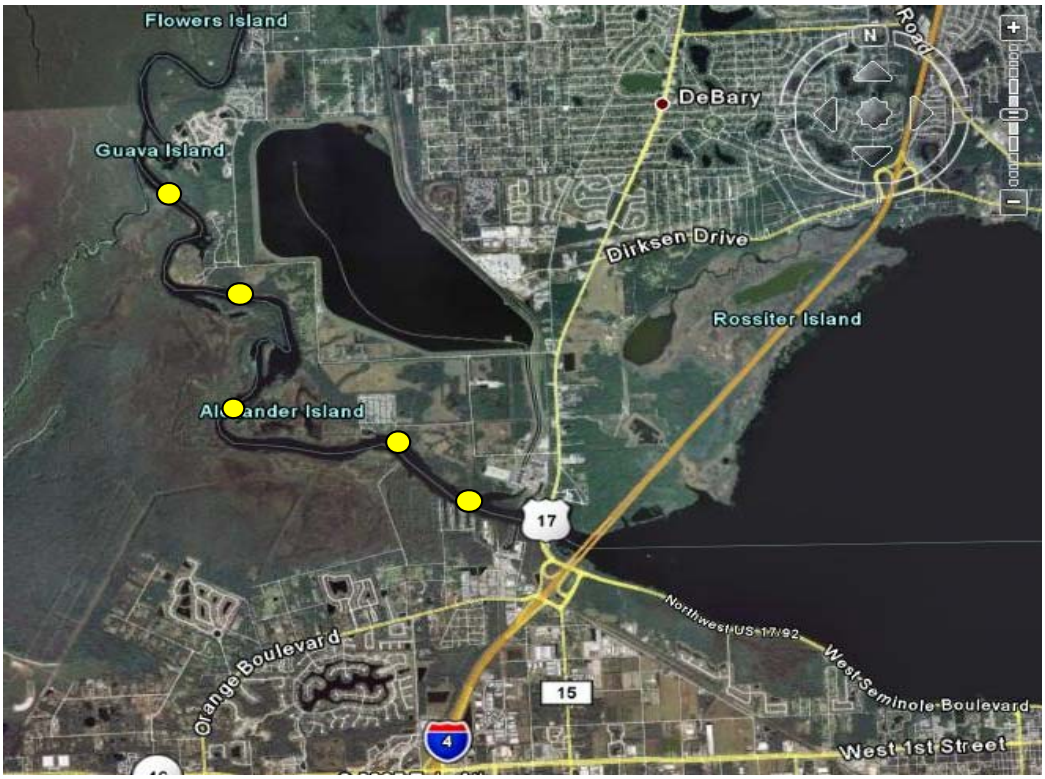

Figure 12.B-6. Ichthyoplankton sampling sites in the St. Johns River downstream of Lake Monroe (Yankee Lake).

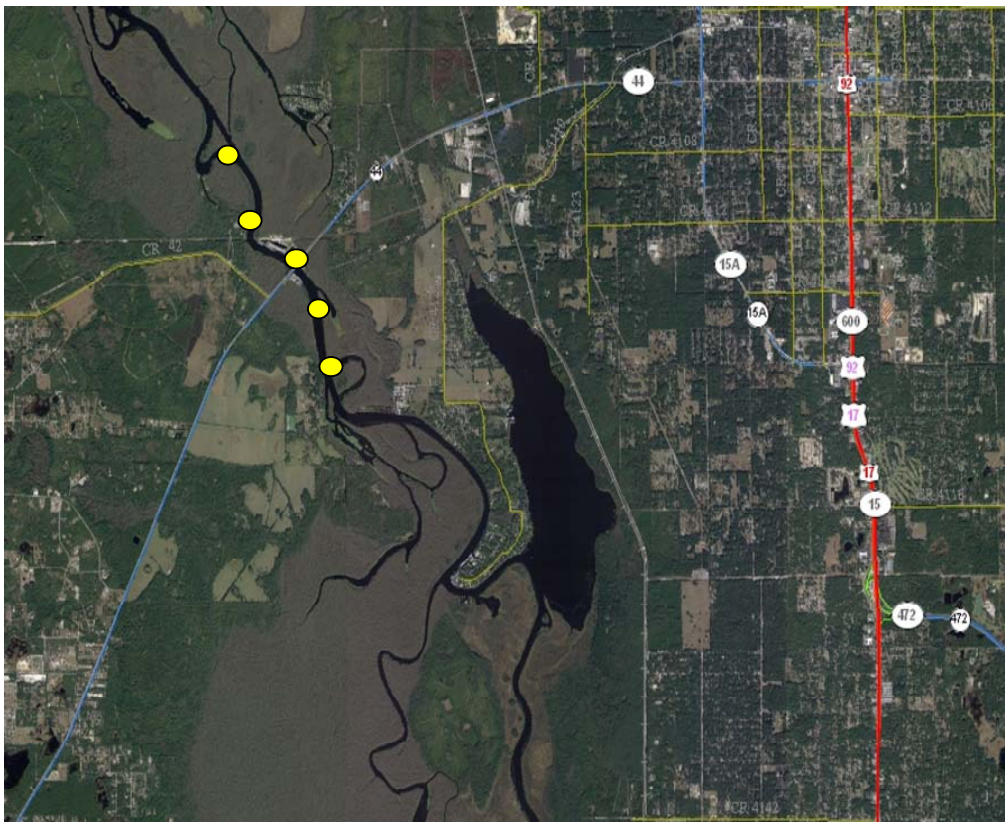

Figure 12.B-7. Stations sampled for ichthyoplankton and hydrographic parameters in the St. Johns River near State Road 44.