Using the DIDSON to Evaluate the Effectiveness of Different Fish Attractors in Turbid Reservoirs

Fish attractors have been widely used by fisheries managers in efforts to increase angler catch rates by increasing the concentration of fish at known locations. In the past, the North Carolina Wildlife Resources Commission (NCWRC) deployed fish attractors that were constructed from natural materials. However, by the mid-1990's, several North Carolina municipalities began limiting the placement of natural attractors in water supply reservoirs over concerns that decomposition of organic materials could degrade water quality. Consequently, NCWRC began incorporating fish attractors that were made entirely of synthetic material. However, the use of the synthetic attractors was done without any validation on how well they met management goals for creating fish habitat and concentrating fish for anglers. Therefore, the objective of this project was to evaluate the effectiveness of different types of fish attractors to concentrate fish in North Carolina Piedmont reservoirs. This project also wanted to evaluate the relative cost-benefits of these attractors by visually evaluating the durability of each structure.

Four different attractors were evaluated over the course of three years (2008-2011). Two of the attractors were designed by state agencies, one by the NCWRC and one by the Georgia Department of Natural Resources (GADNR), and were constructed using PVC pipe frames and either plastic barrels (NCWRC) or corrugated plastic pipes (GADNR). The third attractor was a commercially designed PVC product called the Porcupine® and the final attractor was a traditional bundle of evergreen trees. A unique aspect of this project was the use of sonar equipment to evaluate the ability of fish attractors to concentrate fish and to evaluate their durability. The sonar equipment used for this project was the DIDSON (Duel-Frequency Identification Sonar) which allowed us to capture dynamic images of fish activity occurring around each attractor (Figure 1). The DIDSON provided the means to conduct a noninvasive and quantitative evaluation of the attractors in turbid reservoirs.

Fish attractors were deployed in March of 2008 into four coves, two located at Lake Townsend in Greensboro, NC and two located at Lake Cammack in Burlington, NC. All coves contained each of the four different types of attractor and a control site devoid of any type of structure. Attractor sites were evaluated once per season each year. Fish abundance at each attractor was evaluated by taking instantaneous fish counts from videos obtained from four different views of the attractor and the control site. The counts from each view were averaged together to produce a total fish count for a particular attractor site. An ANOVA was performed using a randomized complete block design with repeated measurements to compare fish abundance among structures and the control site. Overall, we found that all attractors held significantly ($\alpha = 0.05$) more fish than the control area and that significantly more fish concentrated around the GADNR attractor as compared to the other attractors. A year-by-year analysis was also performed, and during years one and two, the only significant difference was between fish attractors and the control area. In year three, the GADNR structure held significantly more fish than the NCWRC and Porcupine® attractors, which held significant more

fish than the evergreen tree attractor, and all attractors held more fish than the control area. Independent hook-and-line sampling indicated that Bluegill *Lepomis macrochirus* and Black Crappie *Pomoxis nigromaculatus* were the most frequently captured species across structures. We also evaluated presence/absence of bait-fish schools by using binary logistic regression. Results indicated that relative to the control only the three synthetic attractors had significantly higher odds of having schools of bait fish present.

To evaluate the durability of the attractors, each type of attractor was deployed in a single cove and marked with a fish attractor buoy so anglers would target them. DIDSON images were taken of these attractors twice a year to evaluate structural breakdown. Observations illustrated that by the third year the evergreen tree attractor had substantial structural breakdown but all of the synthetic attractors retained their structural integrity. Therefore, attractor sites constructed from evergreen trees would need to be replaced within three years to maintain a fish attractor site. These results highlight the long-term advantages and cost-benefits of attractors constructed from synthetic materials over those made of natural materials.

The results of this project have been disseminated within the fisheries community through presentations given at annual meetings of the Parent Society AFS, Southern Division AFS, AFS Fisheries Administration Section, and the North Carolina Chapter AFS. At the 2012 North Carolina Chapter meeting, this project was awarded the W. Don Baker Memorial Award for Best Professional Presentation. Future plans to distribute the results of this project include submitting a manuscript to the North American Journal of Fisheries Management. The use of social media, such as facebook®, has allowed the results and benefits of this project to be conveyed beyond fisheries professionals. We hope these results excite both anglers and non-anglers alike by informing them of opportunities to increase their chances of catching fish by utilizing NCWRC fish attractors.

Fish attractors and their associated buoys are visible tools used to increase the awareness of constituents to the efforts made by NCWRC to increase angler catch rates. However, the ability of fish attractors to promote positive attitudes from the public toward the agency and increase recruitment and retention of anglers, depends on the ability of these attractors to concentrate fish and increase angler success. This study validates the effectiveness of fish attractors to concentrate fish and highlights the benefits of attractors constructed from synthetic material. As a result, this project has altered NCWRC's management strategy regarding fish attractors. Specifically, our efforts now focus on deploying structures that are constructed out of synthetic material because of their long-term benefits.

The Sport Fish Restoration program allowed this project to use progressive technology to help fisheries managers make long lasting and cost-effective decisions that will provide enhanced opportunities for anglers. This project has also fostered relationships with city municipalities by allowing the agency to show the benefits of using artificial attractors in their community fishing programs. Further, our results can be utilized by fisheries managers

throughout the nation to help them make informed decisions about enhancing their fisheries resources.

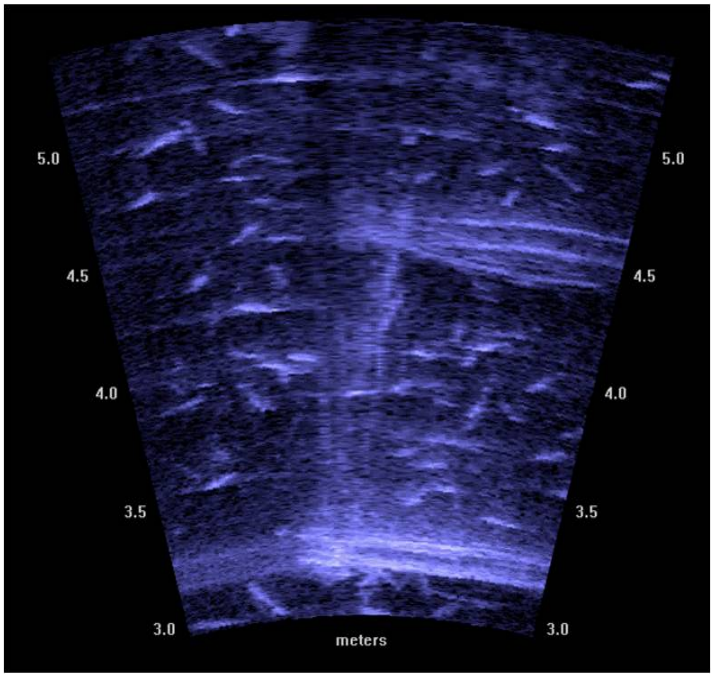

Figure 1. DIDSON image of the Georgia Department of Natural Resources fish attractor surrounded by fish.