

# Preliminary Results of Gravel Augmentation Projects on the Oconee River, Georgia

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**Abstract:** The Oconee River gravel augmentation projects are closely associated with the discovery of the robust redhorse (*Moxostoma robustum*) in the Oconee River near Toombsboro, Georgia, in 1991. Originally described by the naturalist Edward Cope in 1869, the species had been lost to science for over 100 years. An artificial propagation program was initiated in 1993 that eventually led to the establishment of five stocked populations in Georgia and South Carolina and other wild populations were discovered in the Savannah River, Georgia/South Carolina, and the Pee Dee River, North Carolina. The Robust Redhorse Conservation Committee was established in 1995 to coordinate recovery activities throughout this three-state area. Since its discovery in 1991 most evidence suggests that the Oconee River robust redhorse population has declined, and one factor likely limiting successful reproduction is the abundance and quality of gravel spawning substrate. The amount and quality of gravel at the only documented spawning site on the Oconee River has declined, probably due to recent changes in channel morphology. The number of robust redhorse spawning at this site has declined as well, and recent telemetry data suggests that the site may have been largely abandoned. This area is located about 40 km below Milledgeville adjacent to the Avant Kaolin Mine. Phase 1 of the two-phase gravel augmentation project was designed primarily to improve the quality of spawning substrate at this site. The U. S. Fish and Wildlife Service provided funding for the project through the Southeast Aquatic Resources Partnership, and fisheries personnel from the Georgia Department of Natural Resources were responsible for planning and implementation. In October 2007, 68 t of gravel was deposited within the channel about 180 m above the existing spawning site. According to hydrologists consulted during the planning phase, the most effective method of augmenting this site is to allow natural flows to sort and distribute the additional gravel to the leading edge of the gravel bar where suitable depths and velocities exist. Monitoring of the project indicates that high flows will erode the gravel pile into the channel as planned and observations of tracer gravel at low summer flows may determine the rate of movement toward the target augmentation site. The addition of new high quality spawning habitat should result in greater reproductive success and improvements in the status of the robust redhorse. In Phase 2 of the gravel augmentation project we identified several sites that have characteristics of suitable spawning habitat but do not have the amount or quality of gravel necessary to attract spawning fish. Gravel will be loaded onto a barge using a portable conveyor and transported to these sites located 0.1 to 5 km from access points. The gravel will then be washed off the barge onto target areas using a high-pressure water pump. Special effort will be placed on contouring the gravel to develop characteristic spawning riffles documented at other locations. Three sizes of gravel will be mixed to replicate particle sizes described from other active spawning sites and deposited to depths of 15 to 25 cm. The largest Phase 2 gravel augmentation site is located just below the Central of Georgia railroad trestle west of Oconee, Georgia. A total of 725 to 900 t of gravel will be used at this site with the two remaining high priority sites requiring an additional several hundred metric tons. Initial efforts at augmentation with 63 t of gravel were encouraging, but our ability to access the sites to add the gravel depends on flow levels, and it is anticipated that several months will be required to complete the project. Electrofishing samples will be collected annually at each augmentation site during the April–May spawning season to evaluate utilization by robust redhorse and other species. Seasonal movements of radio-tagged robust redhorse will also be evaluated to help determine if the project is meeting the stated objective of providing additional, high quality spawning habitat.

Proc. Annu. Conf. Southeast. Assoc. Fish and Wildl. Agencies 63:204