

## Interagency Guidelines for Greentree Reservoirs

March 17, 2020

The South Carolina Department of Natural Resources (SCDNR) has developed the Interagency Guidelines for Greentree Reservoirs with guidance from the U.S. Department of Agriculture Natural Resources Conservation Service; the U.S. Army Corps of Engineers, Charleston District; the U.S. Fish and Wildlife Service, Charleston Field Office; the National Marine Fisheries Service, Charleston Habitat Office; the U.S. Environmental Protection Agency; the South Carolina Department of Natural Resources; Clemson University's James C. Kennedy Waterfowl and Wetlands Conservation Center; and the South Carolina Department of Health and Environmental Control.

The SCDNR is the steward of the state's natural resources and is responsible for the protection and management of these resources for the use and enjoyment of the public. SCDNR, in carrying out its protection and management responsibilities, must balance its objectives and actions in order to most appropriately protect and sustain the natural resources of South Carolina.

Greentree reservoirs (GTR) provide seasonal habitat for migratory and resident waterfowl and other wildlife and opportunity for maintaining a stayed tradition in South Carolina's culture of waterfowl hunting. GTRs are managed forested wetland systems which provide seasonal wetlands to enhance foraging and resting habitat for a wide range of wetland dependent wildlife species. As with most other habitat manipulations, there are risks that other ecosystem functions, including habitat loss for non-targeted species, may be temporarily altered or interrupted, or the ecosystem integrity itself may be impaired. Besides the direct loss of wetlands from embankment construction, overly intensive GTR management can severely alter the long-term integrity of bottomland hardwood systems (Weller 1989, King 1994). By affecting seed dispersal mechanisms, germination, seedling survival, overstory mortality and windthrow susceptibility, GTRs can affect a long-term shift in vegetative composition.

However, in appropriate locations and circumstances and within appropriate design, construction and management constraints, direct impacts such as temporal shifts in wetland functions, long-term forest health and vigor, and seasonal habitat loss to non-targeted wildlife species can be minimized while providing enhanced habitat for a host of wildlife including waterfowl. In some cases, GTR strategies can also be effective restoration and management tools in areas where hydrology has been altered (King & Allen 1996). To balance the management of South Carolina natural resources with the protection of natural ecosystems, these guidelines have been developed for siting, construction and management.

**In order to fulfill the goals of this guidance, applications for GTRs should contain sufficient information to allow determinations relative to these criteria. They must contain a plan that addresses the elements listed below.**

- I. **Siting**
  - a. Suitable sites avoid areas where GTRs would adversely affect threatened or endangered species, bird rookeries, trout streams, and or waters designated as Outstanding Resource Waters (ORW) by the SC Department of Health and Environmental Control under Regulation 61-69. New embankments will not be considered in designated ORW areas.
  - b. Suitable GTR sites should require a minimum of embankment construction to accomplish water control. Favored sites contain natural grade controls or other existing embankments (e.g. roads, railroad grades, rice field dikes, etc.)
  - c. Site topography should be near flat with slope not to exceed 1% (one-foot rise per hundred-foot length).
  - d. Soils should have low permeability thereby allowing for proper water level maintenance.
  - e. The site should be dominated (50% or more) by a hard mast producing hardwood component (e.g., oaks) and should include trees currently producing adequate mast to provide forage for ducks and other species of wildlife.

- f. On a case-by-case basis, sites without appropriate percentages of mast producing hardwood species (50% or more) will be evaluated. On these sites a minimum of 40% of the site will need to be planted using bare-root seedling of mast producing tree species with a 70% survival rate of the density planted. The remainder of the site must be planted in a crop for waterfowl such as millet, chufa, sorghum, etc. or allowed to produce natural grasses and sedges (i.e. moist-soil plants).
- g. Areas subject to tidal influence and/or long periods of inundation, such as cypress/tupelo forests, are not suitable sites.
- h. Sites that require impoundment of perennial streams and primary river floodplains are not suitable.
- i. The site should be adequately sized to accomplish the project purpose and should facilitate a low ratio of dike fill to reservoir size (e.g., 1:50, not 1:5).
- j. Areas of heavy beaver activity are not recommended sites.

## II. Construction

- a. Soil material for dike construction should be non-contaminated and come from an appropriate upland source outside of the reservoir area. Material should be clean earthen fill suitable for maintaining a steep slope.
- b. Dikes should not exceed a bottom width of 20 feet; however, smaller dikes are encouraged. The dike/dam/embankment should be constructed with a slope of 3:1 or greater to allow for safe operation of equipment (ATVs, tractors, mowers) and reduced preference as burrowing sites for aquatic mammals (beaver and muskrat). The top width of the dam should be a minimum of 4 ft with a maximum of 10 ft to allow for operation of various maintenance machinery.
- c. Dike height should be limited to a design that allows a maximum of one foot of free board. The depth of flooding should average between 4 and 12 inches and should not exceed 18 inches.
- d. Dikes should be located to minimize impacts to mature trees and should take advantage of existing high ground such as roads, river berms, railroad tracks, old dikes and/or other disturbance corridors.
- e. Water control structures (flash board risers) should be flush with the base level of the reservoir (the base level of the streambed when present) to allow for unimpeded passage of aquatic organisms and complete drawdown during the non-flooded seasons.
- f. Where appropriate, project design should include emergency spillways to prevent dike failure due to heavy rain or other flooding events.
- g. In areas subject to beaver activity, measures such as the installation of beaver pond levelers, fencing and/or emergency drainage systems are necessary to maintain control of water levels.
- h. Dike construction should occur during dry periods.
- i. Construction access impacts should be limited to the footprint of the dike.
- j. The following best management practices should be followed during construction.
  - i. Prior to the beginning of any construction activities, appropriate erosion control measures, such as silt fences, silt barriers or other suitable devices, will be placed between the construction area and affected waterways (wetlands); and maintained in a functioning capacity until the area is permanently stabilized upon project completion.
  - ii. In areas where silt barriers cannot be effectively employed, mulching, burlap, seeding or other suitable materials will be applied and maintained on all disturbed land surfaces to control erosion until the area can be permanently stabilized.
  - iii. All steps necessary will be taken to prevent oil, tar, trash, debris and other pollutants from entering adjacent wetlands and/or waterways.
  - iv. Once initiated, the project will be carried to completion in an expeditious manner in order to minimize the period of disturbance to the environment.
  - v. Upon completion, all disturbed areas will be promptly and permanently stabilized with 70% vegetative cover.

- vi. Construction activities will avoid to the greatest extent practicable, encroachment into any wetland areas not designated as fill for dike construction.

### III. Management

- a. Flooding shall not commence before November 1, when trees are entering the period of dormancy. Managers are encouraged to vary commencement every year the unit is flooded.
- b. To ensure that foods are available to dabbling ducks, GTRs should be gradually flooded (taking 10 days or more) to an average depth of 4-12 inches, with the maximum depth not to exceed 18 inches (excluding channels). With increasing depths from rain and flooding, water should be released to maintain the recommended depths between 4 and 18 inches. Lower water depths are more likely to have the area dry before trees break dormancy; thus, shallower water increases seedling survival and ensures forest regeneration. Additionally, invertebrate abundance decreases with increased water depths.
- c. Gradual drawdown (taking 10 days or more) shall begin early enough (generally in February) to ensure that most of the impoundment is totally dried to bed level by March 1, unless precluded by natural flooding. However, managers are encouraged to vary initiation date and rate of drawdown as well as vary target completion date before March 1.
- d. Water control structures shall remain open during time of drawdown and throughout the growing season to facilitate water, nutrient and/or organism exchanges.
- e. The reservoir shall not be flooded more than three consecutive years followed by at least one dry year with control structures completely open. This will result in reducing water stress that could be responsible for declines in growth and mast production, poor natural regeneration and/or mortality often associated with hydrological changes of the soil. Managers are encouraged to vary which year will be the dry year to allow for natural regeneration and support forest health. Regardless of the annual flooding plan, managers are encouraged to refrain from flooding the GTR the subsequent fall after a heavy masting event to promote germination and survival of new seedlings.
- f. Snags will be allowed to remain standing to provide habitat for cavity nesting species.
- g. No timbering or significant modification to existing wetland vegetation shall occur within the GTR, except those modifications specified in a management plan approved by regulatory and review agencies. Any forest manipulation within the GTR shall be conducted in accordance with a management plan approved by the regulatory and review agencies through the permitting process and shall be restricted to those activities that promote the growth of mast producing trees.

### Supporting Literature

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