

January 22, 2018

Wallace Dam Project (FERC No. 2413-124)

Georgia Power Response to FERC Additional Information Request (AIR) dated November 21, 2018

Ms. Kimberly D. Bose, Secretary
Federal Energy Regulatory Commission
888 First Street, N.E.
Washington, D.C. 20426

Dear Secretary Bose:

On behalf of Georgia Power Company, Southern Company is filing this letter to provide the response to FERC's Additional Information Request (AIR) dated November 21, 2018.

There are two components to this filing:

- 1) Cover Letter (Public)
- 2) Response to AIR with multiple file attachments (see table within AIR for listing)

Should you have any questions, please contact me at (404) 506-7219 or email me at cromara@southernco.com.

Sincerely,



Courtenay R. O'Mara, P.E.
Hydro Licensing & Compliance Supervisor

cro/lsm

cc: FERC/OEP – Allan Creamer
Kleinschmidt – Steve Layman, Ph.D.
Geosyntec – Cristin Krachon
Troutman Sanders – Hallie Meushaw

Attachment

**Georgia Power Response to
FERC Additional Information Request (AIR)
November 21, 2018
P-2413-124**

Response 1.

The data for the daily inflow statistics for Lake Oconee from 1997 through 2016 is presented in Attachment A as a spreadsheet titled Attachment A Oconee Inflow Data 1997 through 2016.xlsx. As explained in Exhibit B of the license application, a Federal Energy Regulatory Commission (FERC or the Commission) approved calculator uses flows measured at the upstream USGS Gage 02218300 Oconee River Near Penfield, Ga, and USGS Gage 02219000 Apalachee River Near Bostwick, Ga, to determine the daily flows available for generation at Wallace Dam Project (Wallace Dam Project or Project). Flows measured at these gages are added together and multiplied by a factor of 1.613 to account for additional drainage into Lake Oconee between the gages and the dam. The actual amount of water available for generation is less due to water withdrawals by local users and evaporation, but because water withdrawals are minimal, only evaporation is subtracted from the calculated inflow into the upper reservoir.

Response 2.

In Attachment B we have included new worksheets outlining the details for each requested enhancement. Each worksheet contains the figure from Exhibit E, describes the proposed enhancement, the temporary and permanently impacted areas affected by the construction of that enhancement and associated acreage. It also includes the proposed sedimentation best management practices (BMPs) to be used during the construction of each enhancement to minimize erosion and other effects of the construction.

Response 3.

Georgia Power received an update from the Georgia Environmental Protection Division's (Georgia EPD) Water Quality Standards Coordinator on December 10, 2018, regarding the status of water quality criteria revisions (Triennial Review). Georgia EPD submitted the 2016 Triennial Review package to U.S. Environmental Protection Agency (EPA) on December 6, 2018 and is awaiting approval of these rule changes. Georgia EPD indicated that it expects to be notified of the results of EPA's review in January 2019.

Response 4.

Georgia Power proposes to continue to operate the Wallace Dam Project to support the minimum flow requirements at the downstream Sinclair Project (FERC No. P-1951) during drought periods. On April 27, 2004, FERC issued to Georgia Power Company an Order

Approving Drought Contingency Plan for Lakes Oconee and Sinclair.¹ As detailed in the order, the order was issued after FERC authorized the City of Greensboro, Georgia, to increase its water withdrawal from Lake Oconee. A drought contingency plan for both Wallace Dam and the Sinclair Project, specifying the circumstances under which water withdrawals from Lake Oconee would be curtailed to protect downstream water uses and provide minimum flows during low flow periods, was required.² Since that time, the Wallace Dam Project has supplemented flows from Lake Oconee to release no less than 250 cfs from the Sinclair Project during the following time periods.

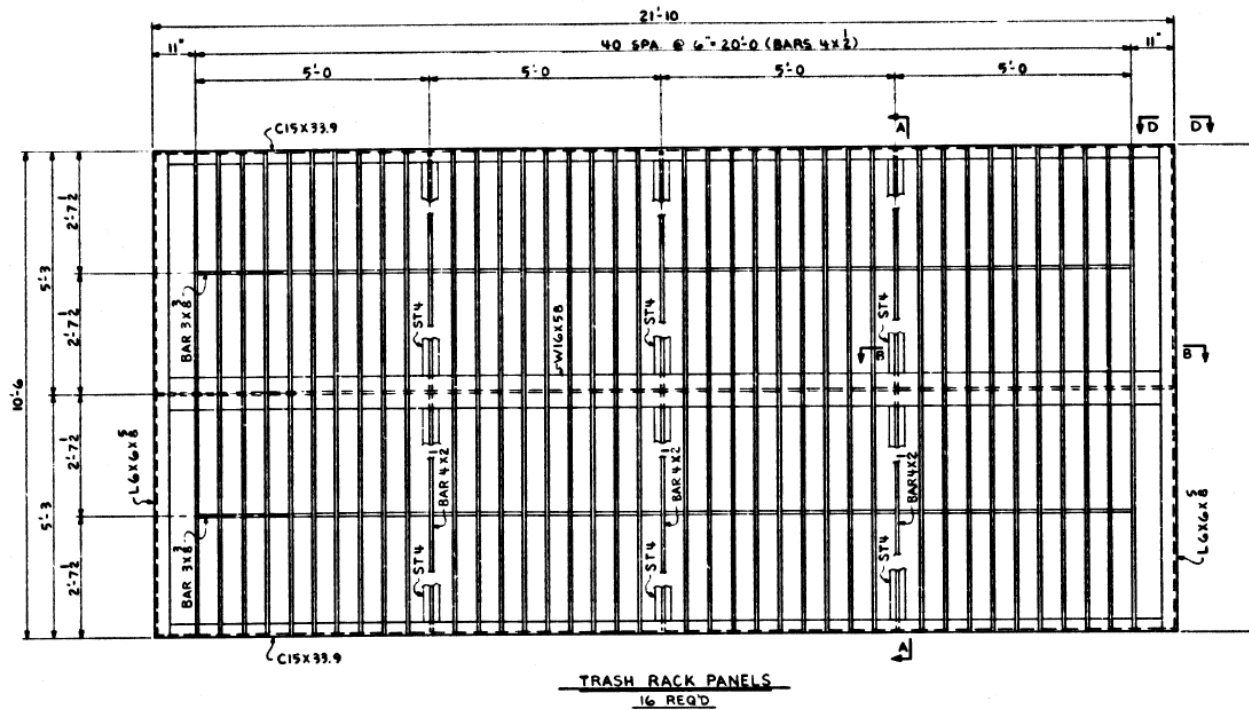
Year	Range of Occurrences	Number of occurrences when flow was supplemented (days)
2004	None	0
2005	None	0
2006	None	0
2007	6/23/2007 – 11/21/2007	108
2008	6/10/2008 – 10/8/2008	84
2009	6/30/2009 – 9/11/2009	49
2010	7/31/2010	1
2011	7/3/2011 – 11/3/2011	89
2012	5/26/2012 – 11/6/2012	126
2013	None	0
2014	8/16/2014 – 10/31/2014	21
2015	6/23/2015 – 8/17/2015	14
2016	6/25/2016 – 11/23/2016	69

¹ 107 FERC ¶ 62,081 (2004).

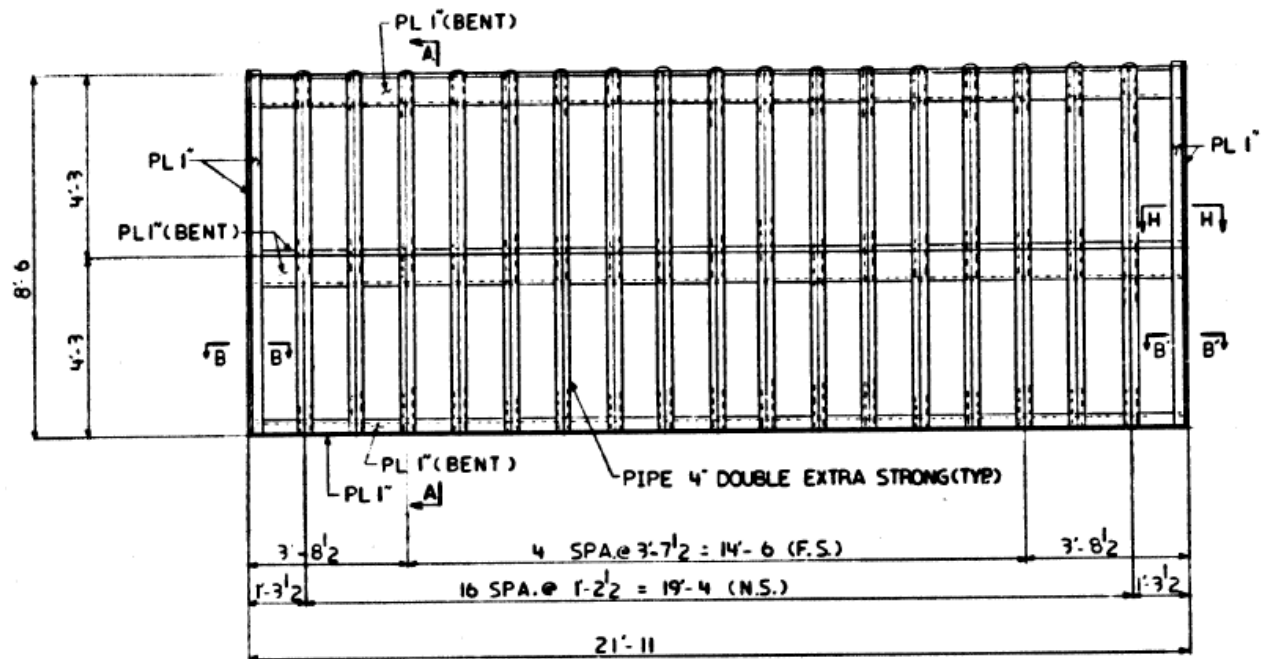
² 101 FERC ¶ 61,053 (2002).

Response 5.

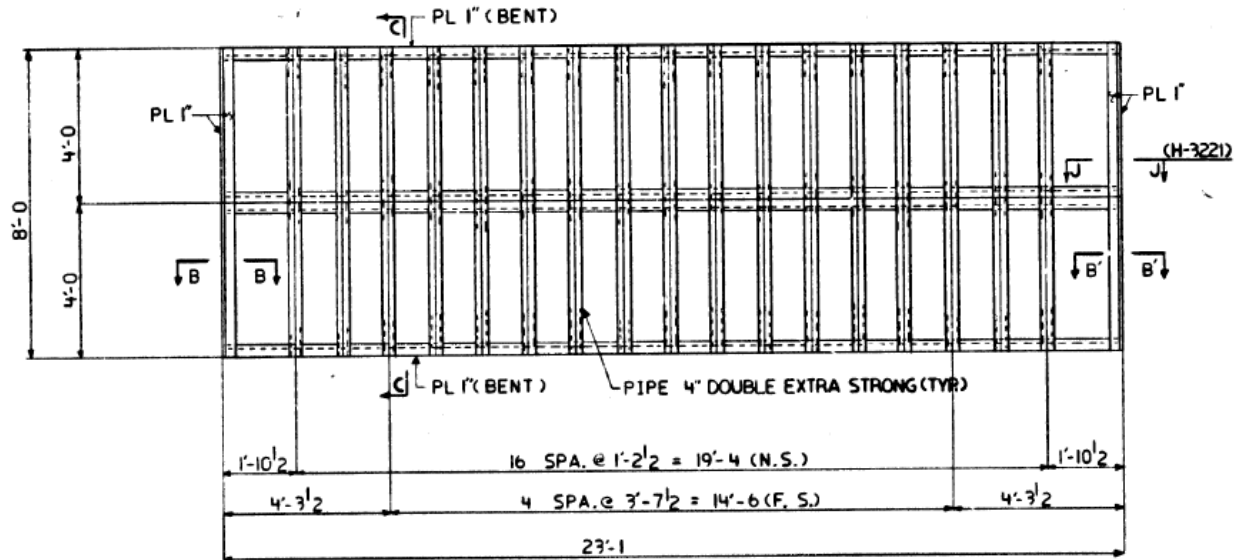
The Wallace Dam Project has 2 conventional units and 4 pumpback units. The overall dimensions for the conventional unit trash racks, units 3 and 4, are 10 feet - 6 inches x 21 feet - 10 inches per screen. Each unit contains 2 bays with 4 screens stacked horizontally for a total of 8 screens per unit. The horizontal bars are 3/8 inches wide and are spaced at 2 feet - 7.5 inches on center for 10 feet - 6 inches. The vertical bars are 0.5 inches wide and are spaced at 6 inches on center for 20 feet with a space of 11 inches on each end. This spacing allows for 5.5 inches clear spacing between bars. Below is a detail for the trash rack for units 3 and 4.



The overall dimensions for the pumpback unit trash racks, units 1, 2, 5, and 6, are 8 feet - 6 inches x 21 feet - 11 inches per screen. Each unit contains 2 bays with 5 screens stacked horizontally for a total of 10 screens per unit. Each unit contains 10 screens. The horizontal bars are 1 inch wide and spaced 4 feet - 3 inches on center for 8 feet - 6 inches. The vertical bars are spaced at 1 foot - 2.5 inches on center for 16 spaces with a space of 1 foot - 3.5 inches on each end. The spaces are divided by 4 inch double extra strong pipe. This spacing allows for 10.5 inches clear spacing between bars. Below is a detail for the trash rack for units 1, 2, 5, and 6.



The overall dimensions of the downstream draft tube trash racks are 8 feet x 23 feet -1 inches per screen. Each unit contains 3 bays with 3 screens stacked horizontally for a total of 9 screens per unit. The horizontal plates are 1 inch wide and spaced 4 feet on center for 8 feet. The vertical bars are spaced at 1 foot – 2.5 inches on center for 16 spaces with a space of 1 foot -10 inches on each end. The spaces are divided by 4 inch double extra strong pipe. This spacing allows for 10.5 inches clear spacing between bars. Below is a detail for the draft tube trash racks for units 1, 2, 5, and 6.



The approach velocity is determined by the maximum flow divided by the overall trash rack area. The maximum approach velocity was calculated by dividing the maximum flow per unit by the area of the trash rack.

Unit	Max Flow Intake(cfs)	Area (sq. ft)	Velocity (fps)	Max Flow Draft Tube (cfs)	Area (sq. ft)	Velocity (fps)
1	7960	1863	4.3	6500	1662	3.9
2	7960	1863	4.3	6500	1662	3.9
3	8250	1834	4.5			
4	8250	1834	4.5			
5	7960	1863	4.3	6500	1662	3.9
6	7960	1863	4.3	6500	1662	3.9

Response 6.

Item a: Standard BMPs will be observed at all areas where needed during vegetation removal and construction, and replacement landscaping trees and shrubs will be native species when practical.

New facilities will be designed to avoid sensitive areas. Where necessary, boardwalks and bridges will be used to control foot traffic. There are no proposed changes to existing vegetation management.

Georgia Power's Transmission Line Vegetation Management Program is described in our Appendix B AIR response dated June 18, 2015, specifically on page 10 (Response 10) and on page 24. Stream banks and saturated wetlands are protected from heavy equipment to avoid rutting, compaction, and erosion, and only approved herbicides are used in aquatic settings. Wetlands and stream crossings comprise about 15 acres within the project ROW. Forested boundaries are side-trimmed about every 10 years to prevent encroachment and remove trees that appear likely to fall into the ROW.

No habitat for sensitive species has been identified within the project ROW. Rock outcrops, which can provide habitat for rare plants, were mentioned as a possible concern because they occur on the surrounding landscape. However, no rock outcrops have been identified on or adjacent to the project ROW.

Bachman's sparrows need open pine habitat and were detected in the vicinity of the ROW. However, the ROW does not provide habitat for this species. Approximately 4000 ft of project ROW passes through or is adjacent to forest land (1400 ft of pine forest) within the project boundary. Another 2800 ft of project ROW is adjacent to non-project forest land (2000 ft pine forest) owned by Georgia Power. Potential Bachman's sparrow habitat exists within these pine forests primarily between the final thinning and the regeneration harvest. Potential Bachman's sparrow habitat also exists along the project ROW on non-Georgia Power land.

Item b: List of recommended plantings at the Georgia Power-managed areas mentioned in item (a) above.

Medium to Large Trees:

- American Beech / *Fagus grandifolia*
- American Holly / *Ilex opaca*
- American Yellowwood / *Cladrastis kentukea*
- Bald Cypress / *Taxodium distichum*
- Black Gum or Tupelo / *Nyssa sylvatica*
- Black Walnut / *Juglans nigra*
- Chestnut Oak / *Quercus prinus*
- Eastern Hemlock / *Tsuga canadensis*
- Eastern Red Cedar / *Juniperus virginiana*
- Green Ash / *Fraxinus pennsylvanica*

- Hickory Species / *Carya*
- Laurel Oak / *Quercus hemisphaerica*
- Live Oak / *Quercus virginiana*
- Loblolly Pine / *Pinus taeda*
- Longleaf Pine / *Pinus palustris*
- Northern Red Oak / *Quercus rubra*
- Palmetto Palm or Cabbage Palm / *Sabal palmetto*
- Post Oak / *Quercus stellata*
- Red Maple / *Acer rubrum*
- River Birch / *Betula nigra*
- Scarlet Oak / *Quercus coccinea*
- Shortleaf Pine / *Pinus echinata*
- Shumard Oak / *Quercus shumardii*
- Slash Pine / *Pinus elliottii*
- Southern Magnolia / *Magnolia grandiflora*
- Southern Red Oak / *Quercus falcata*
- Spruce Pine / *Pinus glabra*
- Sugar Maple / *Acer saccharum*
- Sugarberry / *Celtis laevigata*
- Swamp Chestnut Oak or Basket Oak / *Quercus michauxii*
- Sweetgum / *Liquidambar styraciflua*
- Sycamore / *Platanus occidentalis*
- Tulip Poplar or Yellow Poplar / *Liriodendron tulipifera*
- Virginia Pine / *Pinus virginiana*
- Water Oak / *Quercus nigra*
- Willow Oak / *Quercus phellos*
- White Ash / *Fraxinus americana*
- White Oak / *Quercus alba*
- White Pine / *Pinus strobus*
- Yellow Buckeye / *Aesculus flava*

Small Trees:

- American Hornbeam / *Carpinus caroliniana*
- Big-Leaf Magnolia / *Magnolia macrophylla*
- Bigleaf Snowbell / *Styrax grandifolius*
- Buckthorn Bully / *Frangula caroliniana*
- Carolina Buckthorn / *Sideroxylon lycioides* (Syn. *Bumelia lycioides*)
- Carolina Silverbell / *Halesia tetraptera*
- Cherry Laurel / *Prunus caroliniana*
- Downy Serviceberry / *Amelanchier arborea*
- Eastern Hophornbeam / *Ostrya virginiana*
- Eastern Redbud / *Cercis canadensis*
- Florida or Southern Sugar Maple / *Acer barbatum*
- Flowering Dogwood / *Cornus florida*

- Fringetree or Grancy-Greybeard / *Chionanthus virginicus*
- Georgia Oak / *Quercus georgiana*
- Loblolly Bay / *Gordonia lasianthus*
- Mayhaw / *Crataegus aestivalis*
- Narrow-Leaf Crabapple / *Malus angustifolia*
- Ogeechee Lime, Ogeechee Tupelo / *Nyssa Ogeche*
- Parsley Hawthorn / *Crataegus marshallii*
- Possumhaw / *Ilex decidua*
- Red Bay / *Persea borbonia*
- Sassafras / *Sassafras albidum*
- Sourwood / *Oxydendrum arboreum*
- Turkey Oak / *Quercus laevis*
- Two-Winged Silverbell / *Halesia diptera*
- Washington Hawthorn / *Crataegus phaenopyrum*
- Wild Olive, Devilwood / *Osmanthus americanus*
- Yaupon Holly / *Ilex vomitoria*

Shrubs:

- Adam's Needle, Beargrass, Spanish Bayonet, Threadleaf Yucca / *Yucca filamentosa*
- American Beautyberry / *Callicarpa americana*
- American Bladdernut / *Staphylea trifolia*
- American Snowbell / *Styrax americanus*
- Arrowwood Viburnum / *Viburnum dentatum*
- Black Titi, Buckwheat Tree / *Cliftonia monophylla*
- Blackhaw Viburnum / *Viburnum prunifolium*
- Bottlebrush Buckeye / *Aesculus parviflora*
- Button Bush / *Cephalanthus occidentalis*
- Common Witchhazel / *Hamamelis virginiana*
- Darrow's Blueberry, Glaucous Blueberry / *Vaccinium darrowii*
- Deerberry / *Vaccinium stamineum*
- Devil's Walkingstick / *Aralia spinosa*
- Drooping Leucothoe / *Leucothoe fontanesiana*
- Dwarf Fothergilla / *Fothergilla gardenii*
- Dwarf Palmetto / *Sabal minor*
- Fetterbush, Pipestem / *Agarista populifolia*
- Fetterbush / *Lyonia lucida*
- Sparkleberry / *Vaccinium arboreum*
- Florida Anise-Tree / *Illicium floridanum*
- Gallberry, Inkberry / *Ilex glabra*
- Georgia Basil / *Clinopodium georgianum*
- Groundsel Bush / *Baccharis halimifolia*
- Hillside Blueberry, Blue Ridge Blueberry / *Vaccinium pallidum*
- Honeycup / *Zenobia pulverulenta*
- Hoptree, Wafer-Ash / *Ptelea trifoliata*

- Horse-Sugar, Sweetleaf / *Symplocos tinctoria*
- Littlehip Hawthorn / *Crataegus spathulata*
- Mapleleaf Viburnum / *Viburnum acerifolium*
- Mayberry / *Vaccinium elliotii*
- Mountain Laurel / *Kalmia latifolia*
- Mountain Stewartia / *Stewartia ovata*
- Needle Palm / *Rhapidophyllum hystrix*
- Oakleaf Hydrangea / *Hydrangea quercifolia*
- Painted Buckeye / *Aesculus sylvatica*
- Pinckneya, Feverbark / *Pinckneya bracteata*
- Rabbiteye Blueberry Cultivars / *Vaccinium virgatum*
- Red Basil, Scarlet Calamint / *Clinopodium coccinea*
- Red Buckeye / *Aesculus pavia*
- Red Titi, Swamp Cyrilla / *Cyrilla racemiflora*
- Rhododendron & Deciduous Azalea Species
- Rhododendron, Evergreen Species
- Rusty Blackhaw / *Viburnum rufidulum*
- Saw Palmetto / *Serenoa repens*
- Small Anise-Tree, Yellow Anise-Tree / *Illicium parviflorum*
- Southern Highbush Blueberry / *Vaccinium corymbosum*
- Southern Wax Myrtle / *Morella cerifera*
- Spice-Bush / *Lindera benzoin*
- Strawberry-Bush / *Euonymus americanus*
- Summersweet Clethra / *Clethra alnifolia*
- Swamp-Haw / *Viburnum nudum*
- Sweetshrub / *Calycanthus floridus*
- Virginia Sweetspire / *Itea virginica*
- Winged Sumac / *Rhus copallina*
- Winterberry / *Ilex verticillata*
- Yellow-Root / *Xanthorhiza simplicissima*

Item c: The requested manuals are presented as attachments:

Forest Management Plan for the Wallace Dam Project	Attachment C
Georgia Forest Commission, Georgia's Best Management Practices for Forestry	Attachment D

Item d: Please refer to the documents submitted under Item c.

The Silvicultural BMP's most frequently used in and around the Wallace Dam Project:

- Planning silvicultural activities using maps and reconnaissance to identify water courses and potentially sensitive sites. These would include perennial and intermittent streams,

ephemeral areas, lakes, ponds, wetlands, steep slopes, highly erosive or hydric soils, active gully systems, etc.

- Determining and designating Streamside Management Zones (SMZs) to protect water quality. The width of the SMZ will vary with stream size category and slope of adjacent land area. For perennial streams, leave minimum 50 square feet of basal area or 50% canopy cover. For intermittent streams, leave minimum 25 feet of basal area or 25% canopy cover. Roads, log loading decks, and firebreaks are kept outside SMZs to the extent possible.
- Minimizing stream crossings. When necessary, BMPs are used to properly install temporary or permanent crossings with minimal disturbance.
- Maintaining 100' lake shoreline buffer with limited harvesting; no harvesting within 25' of shoreline.
- Designing and installing firebreaks, roads and loading areas to protect water quality. Broad-based dips and water turnouts are used to minimize erosion of roads and firebreaks. Seeding with wildlife-friendly species is utilized to protect the bare soil of disturbed areas where necessary.
- Protecting Cultural Resource Sites. These sites are flagged, mapped, and their location communicated to personnel working in the vicinity.

Item e: A registered forester oversees all forest management activities at the Project, including inventory, installation of roads and erosion control measures, timber marking, timber harvest, prescribed burning, site preparation burning, and stand regeneration. This includes any clearing of merchantable trees for major construction projects. Minor tree/shrub removal is typically handled by a professional landscaping crew

Loggers conducting timber harvest activities at the Project are typically credentialed under the Master Timber Harvester Program. This is a voluntary logger education program offered by the Harley Langdale, Jr. Center for Forest Business at the University of Georgia and the Georgia Sustainable Forestry Initiative® (SFI®) Implementation Committee, in cooperation with the Georgia Forestry Commission, Georgia Department of Natural Resources, Georgia Department of Public Safety, and the Southeastern Wood Producers Association. While voluntary, most forest products companies require that their timber producers be certified under the program.

Item f: Impacted trees at proposed construction areas generally consist of natural second-growth mixed loblolly pine and hardwood 30-40 years of age, the same as occurs over much of the surrounding landscape. No Oglethorpe oak nor any other species of special conservation interest are known or suspected to occur.

Item g: There are no time of year restrictions on removal of trees or other vegetation. However, if an active bird nest is encountered during vegetation management we make every effort to avoid or minimize disturbance.

Response 7.

No other stabilization structures or material other than riprap will be used for proposed shoreline stabilization at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge. BMPs will be in place and maintained as needed until vegetation is established.

Response 8.

Lighting will be improved at all recreation sites by replacing existing lighting with low density light emitting diode (LED) lighting to reduce energy costs and minimize maintenance. No shields will be installed. New low-density LED lighting will be installed at Jerry's Highway 44 to enhance public safety.

Response 9.

Within the footprint of the proposed system the operation of the proposed liquid oxygen facility will produce a constant low noise level of around 50 – 60 decibels. Outside the footprint the noise level will be less. It is anticipated that the system will run continuously during summer months to enhance dissolved oxygen levels during the summer critical period. A loud noise is produced if the system releases pressure when the pressure in the liquid oxygen tanks builds up; however, it is not anticipated that pressure relief will be required for the Project system because during the months that the system is operating it will be operating continuously.

The refilling of the oxygen tanks does not increase the noise level above the 50-60 decibels. The refilling process takes approximately one hour. The loudest noise associated with the refilling process is the noise generated by the tanker trucks delivering the liquid oxygen. For a worst case scenario of a non-hydraulic trailer, the average noise level directly next to the pump motor is 95 decibels. Additionally, the site will be designed to enable trucks to fill the tanks pull straight through the site without having to reverse. If a backup beeper is required, the decibel level may temporarily increase to 110 decibels.

According to the *Aeration Assessment for Conceptual Alternatives to Enhance Dissolved Oxygen in the Wallace Dam Tailrace* prepared for Georgia Power and submitted to FERC in October 2017 as part of the Aeration Methods Study Report, the maximum estimated amount of liquid oxygen required for 2016 is 1470 tons. Each truck can hold 23 tons of liquid oxygen. The maximum estimated number of refills required annually is approximately 64 trucks annually.

Response 10.

Item a: A copy of Georgia Power's Avian Protection Plan is attached as Attachment E.

Item b: Georgia Power does not collect data on avian species at the Wallace Project; Georgia DNR monitors bald eagles on Lake Oconee.

Item c: Several osprey nesting platforms have been placed on Lake Oconee and are being utilized by osprey pairs. Additional osprey pairs use power delivery structures for nesting.

Response 11.

Georgia Power will periodically monitor recreational use at the Project recreation facilities based on campground registration and parking fee collection at its day use areas, as well as staff observations and institutional knowledge. Recreation staff will review this information every six years to determine the need for any changes in recreation facilities. If such a need is identified, Georgia Power will work with the Commission and WRD to develop and implement a plan to address that need. Additionally, Georgia Power will consult with WRD and the Commission every 12 years to evaluate recreation needs and the adequacy of the recreation plan in meeting those needs. If necessary, we will update the plan to include any changes agreed upon during consultation.

Response 12.

The plans have been combined into one recreation plan titled Proposed Recreation and Land Use Plan and included as Attachment F.

Response 13.

The maps are included as Attachment G.

Response 14.

In order to improve aesthetic appearance and minimize maintenance at Project recreation sites, new aluminum docks will replace existing docks in their current locations. All docks will be barrier free and be of a floating type that will allow the docks to become more accessible during low water periods.

Response 15.

Lawrence Shoals is adjacent to the Rock Hawk Effigy and Trails System which can be accessed through various trails within the park. The trails which access the Rock Hawk Effigy and Trails System are listed below and are shown on the figure titled Rock Hawk Effigy and Trails in Attachment H.

Trail Name	Trail length within Lawrence Shoals Park
McLean's Loop	0.75 miles
Hawk's Head Connector	0.80 miles
Campground Connector	0.20 miles
Gate House Trail	0.20 miles

Response 16.

The requested shape files are listed in the table below. Concurrently, the files are being efiled with this response as Attachment I. These files have been zipped and are titled Wallace_GIS-1.zip, Wallace_GIS-2.zip, and Wallace_GIS-3.zip.

[illegible]

e	Habitat/land cover	Figures 4-56 of Terrestrial Resources Study Report	Habitat_Types_Land_Cover.shp
f	Non-native invasive plants	Figures 57-64 of Terrestrial Resources Study Report	Invasive_species.shp
g	DNR Species Occurrence	Figure 4 of RTE Study Report	GDNR_Species.shp
h	RTE Species observations	Figures 5-15 of RTE Study Report	Species_Observations.shp Bachmans_Sparrow_Potential_Habitat.shp Bald_Eagle_Potential_Habitat.shp Pool_Sprite_Potential_Habitat.shp
i	Restoration islands	Figure B-1 of July 27, 2015 AIR response. Figure generated by putting a circle around the aerial photograph of the island. A GIS layer does not exist for this feature.	Proposed_Island_Restoration.shp
j	Waterfowl ponds	Figure 6 of Exhibit E.	Waterfowl_ponds.shp
k	Fish Structures	Figure B-2 of July 27, 2015 AIR response.	Fish_Habitat.shp
l	Submerged timber and Timber management	Figure E-4 of Exhibit E Figure B-3 of July 27, 2015 AIR response	Oconee_Delineated_Timber_stands.shp Timber_Project.shp timberWMA.shp timber_OconeeWMA.shp
m	Public lands	Figure 2 of RTE Study Report Figures 2-4 of Exh E	StateManagedLands.shp NatlLands.shp
n	Forest Service recreation amenities	Georgia Power does not have a GIS layer containing Forest Service recreational amenities inside the project boundary. Individual features at the recreation sites were not digitized into the original AutoCAD drawing used to develop the Exhibit G maps, but were identified in the original LIDAR imagery. Georgia Power can if necessary provide shapefiles of the individual recreation features picked up by the LIDAR by manually tracing over the LIDAR imagery.	Not available at this time.

List of Attachments

Attachment A	Oconee Inflow Data 1997 through 2016.xlsx
Attachment B	Response 2 Figures
Attachment C	Forest Management Plan for the Wallace Dam Project
Attachment D	Georgia Forestry Commission, Georgia's Best Management Practices for Forestry
Attachment E	Georgia Power's Avian Protection Program
Attachment F	Proposed Recreation and Land Use Plan
Attachment G	USFS Recreation Areas
Attachment H	Rock Hawk Effigy and Trails Figure
Attachment I	Response 16 Shape Files

ATTACHMENT A

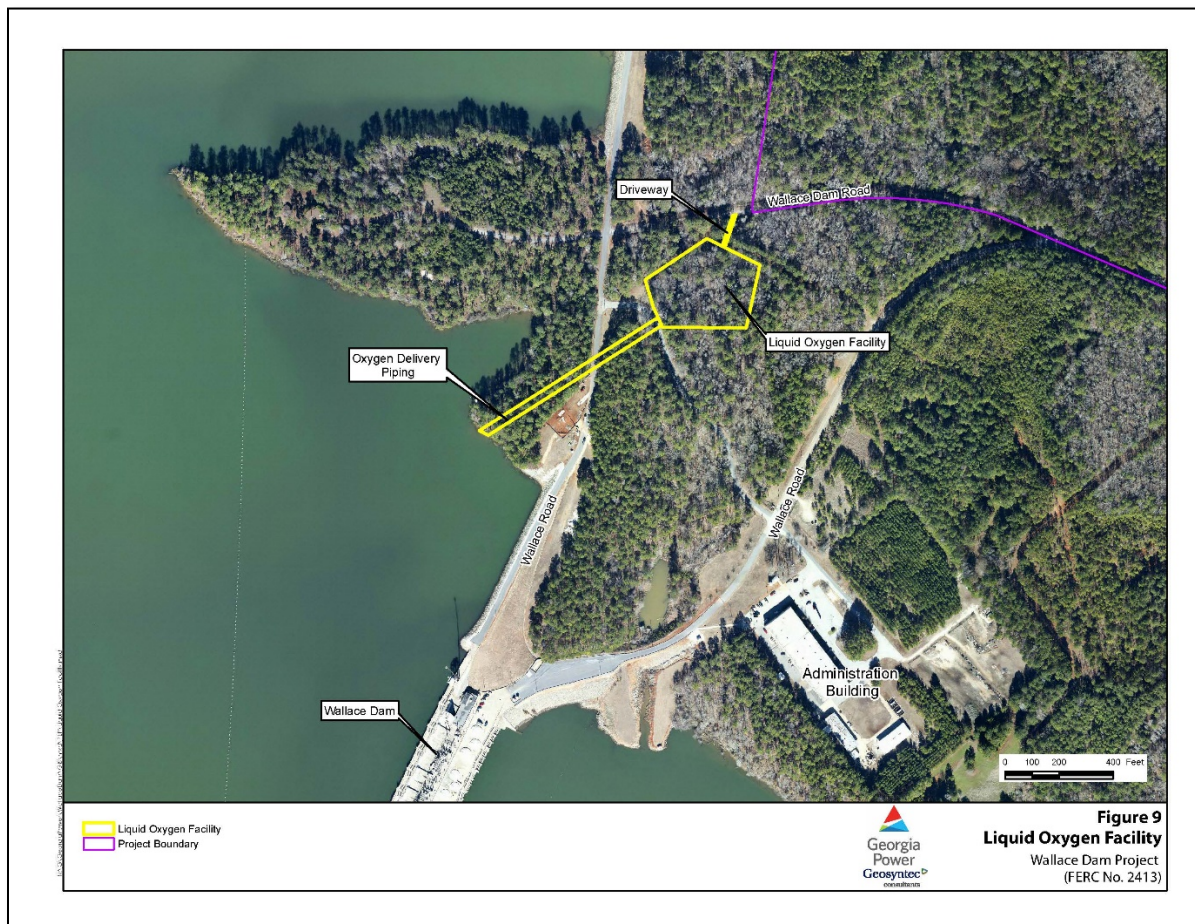
Oconee Inflow Data 1997 through 2016.xlsx
Spreadsheet Attached with Efiling

ATTACHMENT B

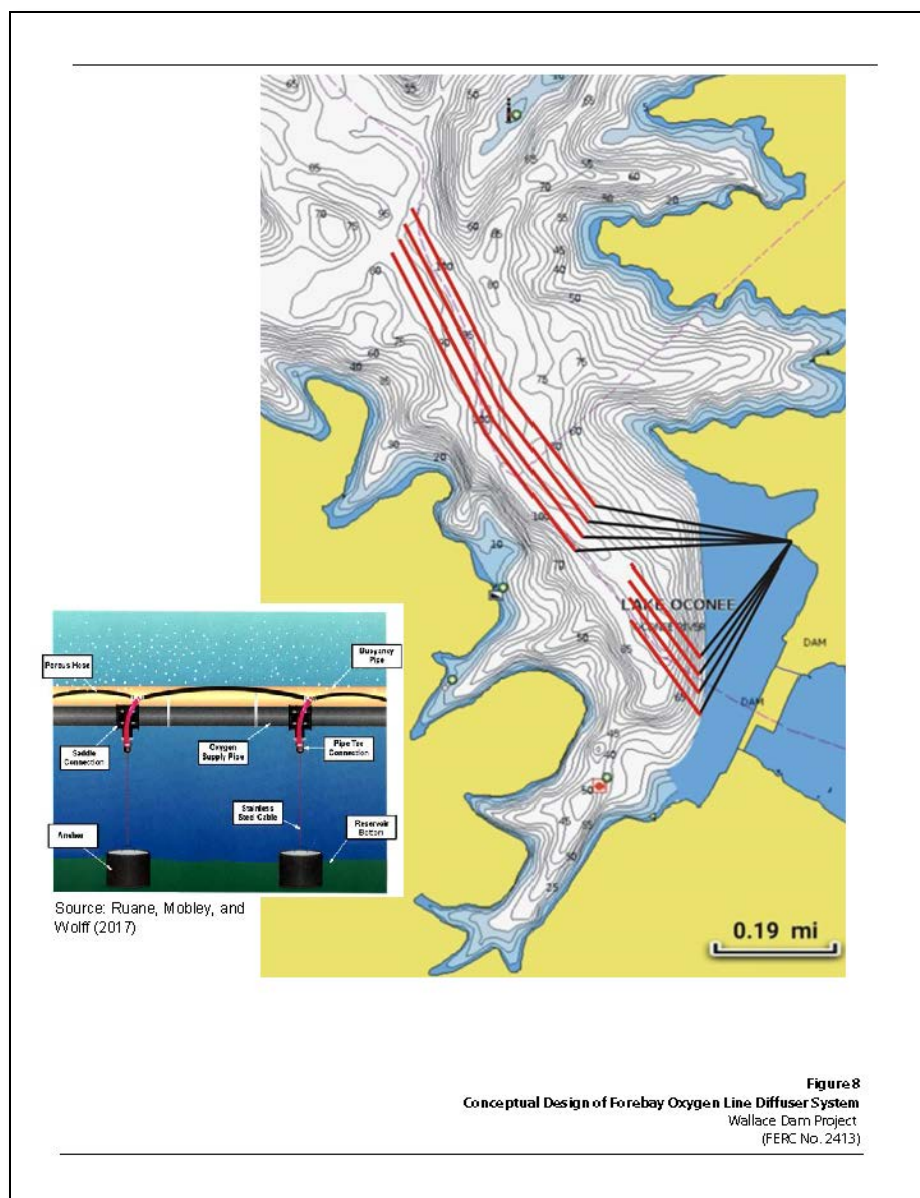
Response 2 Figures

Attachment B – Response to AIR

Facility:	Liquid Oxygen Facility
Description of Proposed Enhancement	Install proposed forebay oxygen line diffuser system in Lake Oconee would require the construction of an onshore liquid oxygen facility (Ruane et al., 2017). Georgia Power proposes to construct the facility at the location shown in Figure 9. The facility would include a driveway, liquid oxygen tanks, a vaporizer system, oxygen flow control valves, and piping leading to the reservoir. The liquid oxygen facility would be approximately 3 acres in total area on the northeast side of Wallace Dam in Hancock County.
Area in Acres of the Liquid Oxygen Facility	3 acres
Total Area of Land Temporarily Disturbed:	3 acres
Total Area of Land Permanently Modified:	3 acres
Description of BMPs	<ul style="list-style-type: none"> • 2,000 linear feet of silt fence • 5 construction entrances • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding.



Facility:	Forebay Oxygen Line Diffuser System
Description of Proposed Enhancement	Install and operate a forebay oxygen line diffuser system in Lake Oconee to enhance summer dissolved oxygen (DO) concentrations in the tailrace area.
Footprint Area in Acres of the forebay oxygen diffuser system:	65
Total Area of Land Temporarily Disturbed:	None
Total Area of Land Permanently Modified:	65
Description of BMPs	The forebay oxygen line diffuser system will be deployed to its permanent location via barge. The forebay oxygen line diffuser system will be floated into place and sit on the top of the lake bed anchored by weights. The anchoring system will not penetrate the lake bed. When the system settles into its permanent location the lakebed may incur a momentary disturbance.



Facility:	Jerry's Highway 44 Proposed Recreation Site: Installation of new Barrier Free Pier and new Gravel Parking Lot
Description of Proposed Enhancement	Increase bank fishing access on Lake Oconee by providing a new bank fishing access development at Jerry's Highway (Hwy) 44 to include a barrier-free pier and gravel parking.
Area in Acres for Parking Lot	0.11
Area in Acres for Pier Installation	0.02
Total Area of Land Temporarily Disturbed:	0.14
Total Area of Land Permanently Modified:	0.13
Description of BMPs	<ul style="list-style-type: none"> • improve existing, informal access road as a construction entrance • install 150 LF double row silt fence for grading activities necessary for the parking area • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding



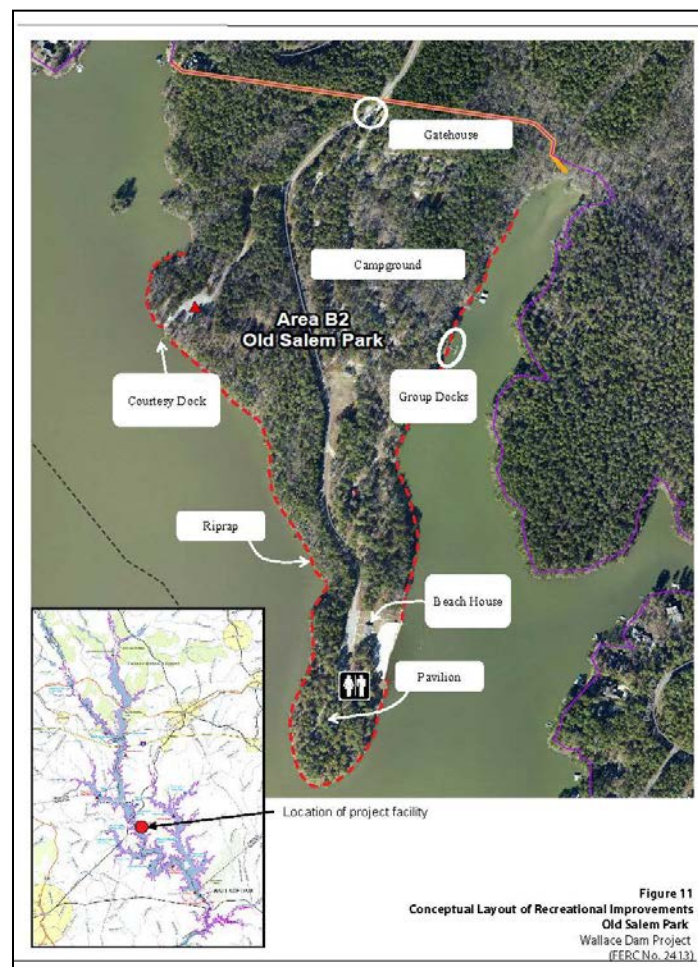
Figure 17
Conceptual Layout of Recreational Improvements
Jerry's Hwy 44
 Wallace Dam Project
 (FERC No. 2413)

Facility:	Area C-5 Proposed Recreation Site
Description of Proposed Enhancement	Increase bank fishing access on Lake Oconee by providing a new bank fishing access development at the Area C-5 tract to include a barrier-free pier and gravel parking.
Area in Acres for Parking Lot	0.46
Area in Acres for Walkway	0.04
Area in Acres for Pier Installation	0.03
Total Area of Land Temporarily Disturbed:	0.08
Total Area of Land Permanently Modified:	0.54
Description of BMPs	<ul style="list-style-type: none"> • improve existing access point with the installation of a construction entrance • install 300 LF double row silt fence in parking area • trees in the proposed walkway area will be topped and root balls will remain to limit soil disturbance near the shoreline • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding

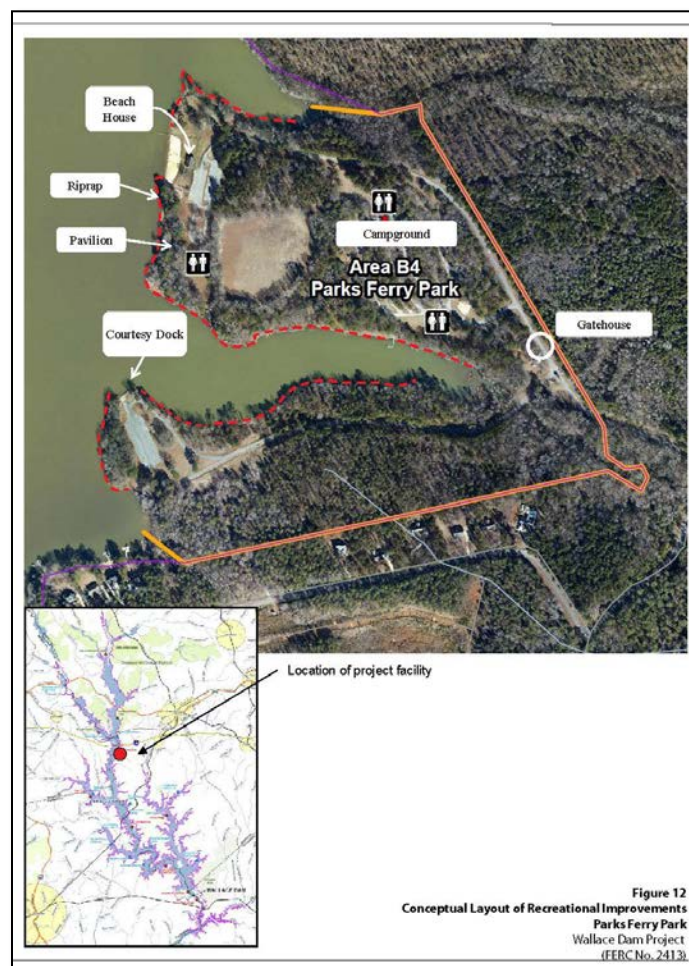


Figure 16
Conceptual Layout of Recreational Improvements
Area C-5
Wallace Dam Project
(FERC No. 2413)

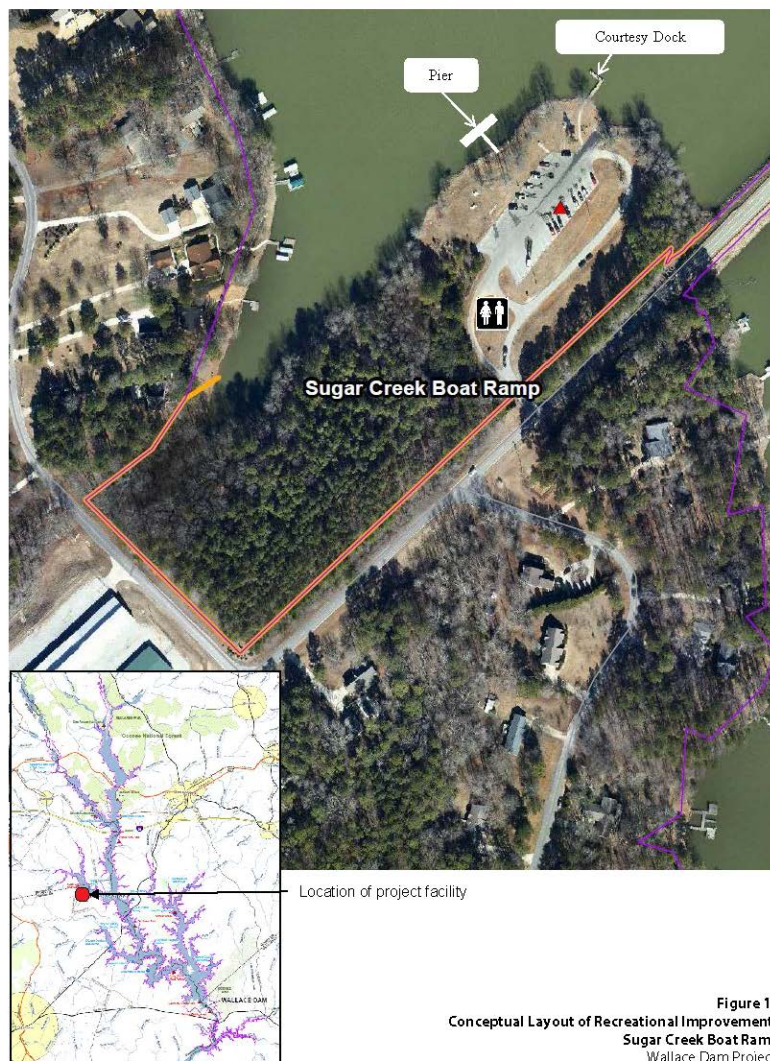
Facility:	Recreation Enhancements at Old Salem Park
Description	Construct new facilities to replace two group docks (and add a third group dock), a pavilion and dedicated pavilion restroom, a boat ramp restroom, a courtesy dock at the boat ramp, a beach house , and a guest relations gate house. Upgrade the current well system that supplies water to park facilities and customers. Reconfigure the park entrance and gate house to reduce single-lane traffic congestion and allow for year-round operation of the boat ramp.
Area in Acres of Ex. Courtesy Dock	0.01
Area of Ex. Group Dock	0.02
Area of Ex. Group Dock at Campground	0.01
Area of New Group Dock	0.02
Area of existing entrance expansion	0.76
Area in Acres of pavilion, restrooms, beach house and guest relations gate house	New facilities will utilize the same foundation and footprint of existing facilities. No disturbance expected.
Total Area of Land Temporarily Disturbed (replacement docks):	0.81
Total Area of Land Permanently Modified for new group dock and improved entrance:	0.78
Description of BMPs	<ul style="list-style-type: none"> • 500 LF silt fence 2 check dams for expanded entrance area • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding



Facility:	Recreation Enhancements at Parks Ferry Park
Description	Construct new facilities to replace two campground restrooms, a beach house, a courtesy dock at the boat ramp, and a pavilion and dedicated pavilion restroom. Upgrade the well system that supplies water to park facilities and customers, replace the underground water and electrical service, and reconfigure the entrance gate and gate house to reduce single land traffic congestion and allow for year-round operation of the boat ramp.
Area in Acres of Entrance Improvements	0.34
Area in Acres of new campground restrooms, beach house, pavilion and pavilion restroom.	New facilities will utilize the same foundation and footprint of existing facilities. No disturbance expected.
Area in Acres of courtesy dock	0.01
Area in Acres of water and electrical systems	0.13
Total Area of Land Temporarily Disturbed:	0.36
Total Area of Land Permanently Modified:	0.24
Description of BMPs	<ul style="list-style-type: none"> • install 300 LF silt fence for entrance expansion • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding



Facility:	Recreation Enhancements at Sugar Creek Boat Ramp
Description of Proposed Enhancements	Install new barrier-free fishing pier, upgrade the vault toilet with a flush toilet and upgrade the courtesy dock.
Area in Acres of New Barrier-free Fishing Pier	0.05
Area in Acres of New Walkway	0.01
Area in Acres of Courtesy Dock	0.01
Area in Acres of Septic System	0.09
Total Area of Land Temporarily Disturbed:	0.15
Total Area of Land Permanently Modified:	0.06
Description of BMPs	<ul style="list-style-type: none"> • install 300 LF silt fence for septic field • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding



Facility:	Recreation Enhancements at Armour Bridge
Description of Proposed Enhancements	Upgrade the vault toilet with a flush toilet and upgrade the courtesy dock.
Area in Acres of Courtesy Dock	0.01
Area in Acres of Septic System	0.10
Total Area of Land Temporarily Disturbed:	0.11
Total Area of Land Permanently Modified:	0.01
Description of BMPs	<ul style="list-style-type: none"> • install 150 LF silt fence for septic • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding

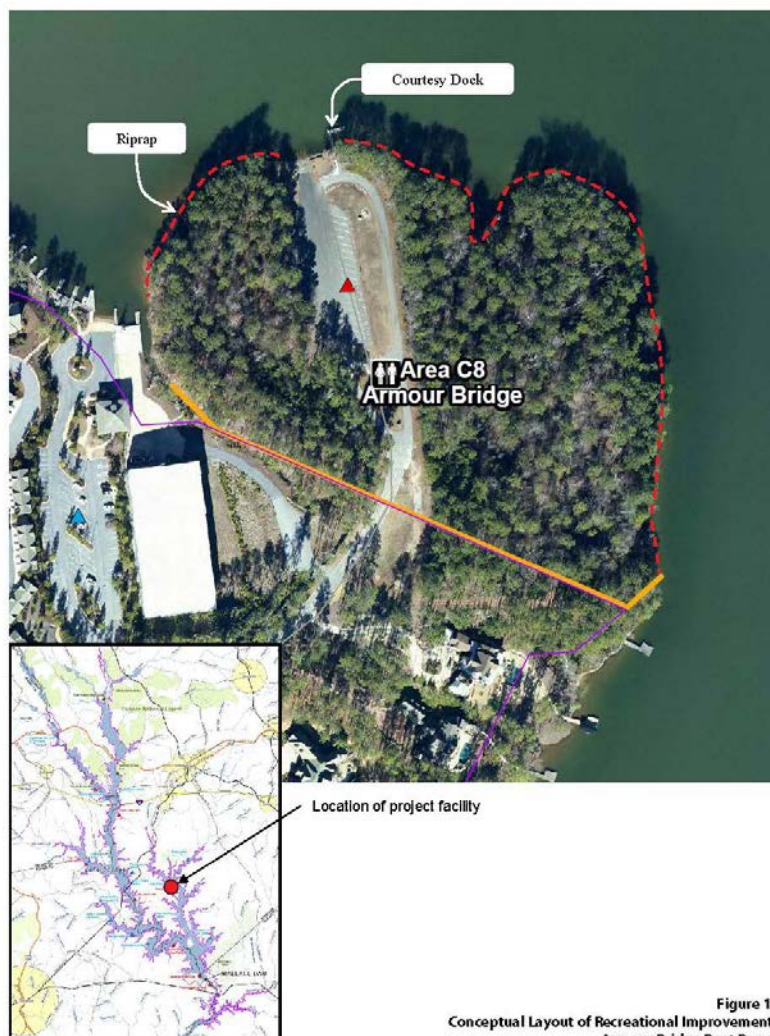


Figure 14
Conceptual Layout of Recreational Improvements
Armour Bridge Boat Ramp
 Wallace Dam Project
 (FERC No. 2413)

Facility:	Shoreline Stabilization at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, Armour Bridge
Description of Proposed Enhancements	Install shoreline stabilization consisting of riprap at Old Salem Park, Parks Ferry Park, Long Shoals Boat Ramp, and Armour Bridge to conserve soil resources, maintain shoreline recreational uses, reduce sedimentation and turbidity of adjacent waters, enhance littoral-zone aquatic habitat.
Area in Acres of Riprap at Old Salem Park	0.59
Area in Acres of Riprap at Parks Ferry	0.69
Area in Acres of Riprap at Armour Bridge	0.39
Area in Acres of Riprap at Long Shoals Boat Ramp	0.23
Total Area of Land Temporarily Disturbed:	None
Area in Acres of Land Permanently Modified:	1.89
Description of BMPs	Rock riprap with graded gravel layer between the riprap and existing shoreline

From Proposed Shoreline Stabilization Plan (Appendix B of Exhibit E in the License Application):

Schedule for Implementation of the Shoreline Stabilization Plan		
Location	Length of Riprap to be Installed (feet)	Completion Date or Deadline
Old Salem Park	5,100	12/31/2023
Parks Ferry Park	6,000	12/31/2023
Long Shoals Boat Ramp	2,000	12/31/2023
Armour Bridge	3,400	12/31/2023

Facility:	Shoreline stabilization at Pond 2 Waterfowl Impoundment
Description of Proposed Enhancement	Repair the eroded shoreline at the Pond 2 waterfowl impoundment and inspect the water level control structure on the eastern shore of the Wallace Dam tailrace area to conserve soil resources, maintain waterfowl refuge habitat, and protect water quality and aquatic habitat.
Area In Acres of Eroded Shoreline	0.5
Total Area of Land Temporarily Disturbed:	0.5
Total Area of Land Permanently Modified:	0.5
Description of BMPs	<ul style="list-style-type: none"> • Due to its proximity to the Oconee River and the terrain at the site, a turbidity curtain will need to be installed for this proposed measure. • riprap outlet protection on the repaired pipe outlet • temporarily disturbed site surfaces will establish vegetation with the utilization of grass mats or other grass seeding methods, such as hydroseeding



Figure B-5
Waterfowl Impoundments in Oconee WMA
Wallace Dam Project
(FERC No. 2413)



ATTACHMENT C

Forest Management Plan for the Wallace Dam Project

Forest Management Plan

for the

Wallace Dam Project

The Wallace Dam Project land base includes approximately 1,136 acres of forested lands in addition to the shoreline buffer and small access areas adjacent to the shoreline. Several forested islands are present within the reservoir as well. The manageable forest tracts are listed by name and acreage below.

A-1 Remainder	125
A-2	471
B-3	87
B-5	79
Oconee Tailrace	374

These lands are managed by a graduate forester under Georgia Power's forest management program and in accordance with the Forestry Policy. Other guiding documents include the Georgia DNR Forestry for Wildlife Partnership Program guidelines and Best Management Practices for Forestry in Georgia (BMPs).

In general, the objectives for these lands are conservation, water quality protection, timber production, wildlife habitat, recreation, cultural site protection and aesthetics. These items are discussed in further detail below.

Conservation – Forest management prescriptions and activities are conducted with a land conservation ethic in mind. This pertains to how the work is done in addition to what is to be done.

Water Quality – Georgia's Best Management Practices for Forestry in Georgia are followed or exceeded on all forest management sites. Streamside management zones (SMZs) minimum widths are followed and many times exceeded to ensure water quality is protected. Selective harvest is often used in lieu of clearcutting for protection of the watershed.

Timber Production – While often a by-product of other objectives, timber stands are established, thinned, and harvested by reputable area vendors. Once merchantable, pine stands are thinned to maintain approximately 30% light penetration to the forest floor which promotes biodiversity and better wildlife habitat. Hardwood stands are maintained on each tract, especially in drainage areas, for conservation reasons. Mast-producing hardwoods are promoted and, once established, are generally not harvested.

Wildlife Habitat – Forest stands are established and maintained across time and space to create a mosaic on the landscape. This diversity of stand types and age classes is recommended by DNR and provides food and cover for many native game and non-game species. Adjacency of differing stand types is planned to maximize the “edge effect” known to promote wildlife carrying capacity. Prescribed fire is used to the extent possible on these forestlands with the objective of better wildlife habitat.

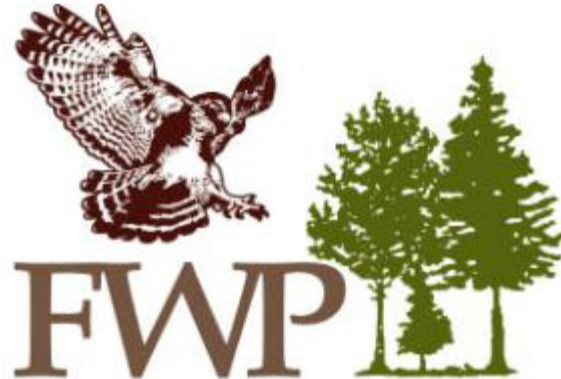
Recreation – Georgia Power allows recreation on these forested lands in the form of hunting, hiking, birding, etc. The Oconee WMA is mostly company owned and is managed by DNR along the project boundary.

Cultural Sites – The forester works under the direction of the company archaeologist to protect cultural resource sites within the project.

Aesthetics – Forest management plans consider viewsheds from the lake and public roadways. Buffers are used where complete harvests are done, and stringers of timber are left across larger stands being harvested.

Shoreline Tree Removal

The forester assists the shoreline management personnel in implementing the shoreline management program with respect to tree removal issues. Lake residents are required, under the multi-use access lease, to obtain permission for tree removal. The forester is consulted to give guidance in granting tree removal permits and for making tree replacement recommendations. Species suitability and landscape diversity is considered when giving guidance for tree replacement.



FWP Overview *Forestry For Wildlife Partnership*

The Forestry for Wildlife Partnership (FWP) program conserves wildlife habitat and provides the public with recreational access on wildlife management areas. FWP invites corporate forest landowners to take part in this voluntary, flexible, non-competitive and participant-driven conservation partnership. FWP:

- Forms a strong, proactive partnership.
- Enhances wildlife conservation on corporate forestlands.
- Facilitates wildlife technical assistance, training and outreach.
- Publicly recognizes partners for wildlife conservation achievements.
- Maintains or increases opportunities for wildlife-associated recreation.

In February 1996, the Wildlife Resources Division, with assistance from several other conservation organizations, joined hands with corporate forest landowners throughout Georgia and developed the FWP. This comprehensive wildlife management program helps restore and maintain critical characteristics of natural ecosystems. The program's focus is lands managed mainly for silvocultural (forest agricultural) purposes.

Wildlife abundance and diversity rests largely in the hands of landowners, who own 93 percent of our landscape. Georgia's human population has increased steadily for decades, growing by 9.7 percent from 2000 to 2010. The population reached an estimated 9.8 million in 2011. As of 2010, Georgia averaged 168 people per square mile. This rapid population growth and expansion results in substantial loss and degradation of wildlife habitat. It creates a need for landscape-level planning to ensure Georgia's wildlife remain healthy for future generations.

Corporations participating in FWP are among the largest landowners in Georgia. They have the potential to impact wildlife habitat on a landscape level. This public/private partnership program provides opportunities to enhance wildlife conservation practices on these lands. Companies also benefit from public recognition for current and future wildlife conservation achievements.

Participating companies are assessed based on their involvement and forethought regarding:

- wildlife conservation planning
- education and outreach
- management practices
- sensitive sites/special concerns
- recreation, and
- partnerships.

Companies that achieve a certain level of wildlife stewardship on their lands are recognized by the state as a well-deserving partner.

CatchMark Timber Trust, Georgia Power and Weyerhaeuser are the 2017 Forestry for Wildlife partners.

The hope is that FWP and related comprehensive conservation programs achieve long-term sustainability of natural resources in Georgia. This will only be possible with continued partnership efforts that protect:

- same-size corridors of natural ecosystem
- agricultural and development landscapes woven by landscape-sculpting conservation plans, such as the Sustainable Forestry Initiative Inc.
- and regional wildlife plans.

GEORGIA POWER COMPANY -- Forestry for Wildlife Partnership

INTRODUCTION

Georgia Power Company (GPC) is an investor owned utility serving customers in 57,000 of the state's 59,000 square miles. Georgia Power owns and manages approximately 74,000 acres of land not occupied by facilities throughout the state. The Land Management Section of the Land Department and its foresters manage these lands under three basic guidelines: 1) Protection of assets and the environment. 2) Promote the use of company forest lands and lakes for the public good. 3) Wise use and utilization of our renewable natural resources to generate revenue and opportunities for outdoor recreation. The Forestry For Wildlife Partnership Program (FWP) matches well with GPC's past and present land management goals and objectives to blend wildlife and timber management on these company lands.

GOALS & OBJECTIVES OF THE PLAN FOR GPC LANDS

A. Develop and implement forest management plans that blend wildlife and timber management. B. Protect sensitive sites and endangered species along with other assets. C. Increase public awareness of GPC's environmental commitment. D. Continue to encourage and support partnerships, memoranda of understanding (MOU). E. Utilize wildlife management practices at stand and landscape levels. F. Promote the public use of company owned forest lands and its water resources. G. Continue to build and utilize a Geographic Information System (GIS) database to assist in

GPC has in the past and will continue to provide and enhance wildlife habitat for public use. Approximately 33,000 acres (45%) of our company's forest lands are managed by the Georgia Department of Natural Resources (DNR) for Wildlife Management Areas (WMA) and State Parks to enhance wildlife habitat and to provide outdoor recreation. Forest management plans that blend wildlife and timber management objectives have been written and implemented on most of our WMAs. These plans were written using DNR recommendations and guidelines that exceed today's FWP management guidelines. Using aerial photography, stands were created to meet the size criteria. Foresters then collected field data from each stand to create a database of information. Using all the information at hand, long term management plans were written to balance the age class distribution and rotation length while implementing wildlife practices to enhance wildlife habitat.

Approximately 20,000 acres (27%) of our land base are not currently being managed for timber management purposes. These lands include tracts associated with hydro electric projects containing residential lease lots, and also most of those tracts located in the North Georgia mountains. These areas along with other sensitive sites will remain in their natural state with little or no timber management activities planned. Included in the lands leased to the DNR, approximately 4,250 acres (6%) are associated with state parks. Without state park approval, no timber or wildlife management activities will be planned in those areas. Cooperative efforts will be made by company foresters and

DNR wildlife biologist to obtain proper approvals from state park personnel for the establishment of forestry silvicultural practices to enhance wildlife habitat on these lands.

GPC will manage its land to enhance wildlife habitat on a landscape and site specific scale. GPC lands provide a diversity of habitats including openings, all ages of pine stands, hardwood bottoms and uplands, wetlands, M.A.R.S.H. Projects, Longleaf-wiregrass communities, sensitive sites and numerous others. On a landscape scale, habitat diversity will continue to be a goal using many of the suggested practices outlined in the Forestry For Wildlife brochure. Long range plans are being made to build a GIS database for all tracts. Using the GIS tools, stands will be mapped and catalogued to assist in management decisions. Field data will be collected for each stand. Using the FWP guidelines, timber harvesting schedules will be developed and implemented. Each tract will be evaluated to identify the best methods of management to benefit timber production, wildlife, wetlands, endangered species, sensitive areas and the water resources of the site.

Foresters will keep detailed quarterly activity reports at the landscape level and a FWP stand-level activity report which will be submitted to the wildlife biologist at the end of each year for the annual report. The GPC staff wildlife biologist will compile this data and provide the Wildlife Resources Division a detailed written annual report by March 31 that documents activities from January through December of the previous year. The annual report will be divided into three sections as follows: I) Landscape Level Silvicultural Practices - An overview of company contributions to habitat diversity at the landscape level; II) Silvicultural Assessment for Newly Established Stands - A summary of practices applied to new regeneration areas which facilitates assessment of stand diversity; and III) Narrative - A summary of all wildlife conservation achievements outlining those FWP program categories concerning education and outreach, wildlife management practices, sensitive sites and special concerns, wildlife recreation, and partnerships.

Sites will be monitored by the DNR biologist on WMAs and by the GPC wildlife biologist on other company owned lands. Monitoring will include recommendations for improving habitat diversity and protection of the natural resources. Implementing and monitoring the plan will be accomplished through the use of existing communication and coordination channels. GPC foresters and the staff wildlife biologist are in constant radio contact with each other. Several staff meetings are held throughout the year to discuss and update all aspects of land management activities. GPC foresters work closely with DNR biologist on WMAs and receive continuous feedback on land issues including timber management. Suggestions from wildlife professionals are discussed and implemented when possible. The Forestry for Wildlife Partnership Program and its reporting should increase our awareness of all wildlife species and practices to improve habitat diversity at the landscape and stand levels.

DESCRIPTION OF PLANNED CONSERVATION ENHANCEMENT ACTIVITIES

Education & Outreach: GPC managers, foresters, and wildlife biologist have attended the FWP training classes and will train other company personnel involved in the FWP program. GPC foresters will work directly with forestry related contractors working on company land to educate them and insure proper

implementation of such activities. The forestry group is planning to develop a large display for exhibiting at different professional meetings and conventions. In addition, a slide program will be developed by the company to inform and educate company employees and the public of GPC's commitment to sound forestry and wildlife management. Forestry groups, civic groups, hunting clubs, and school groups are some possibilities for presentations of the program. To support and promote Wildlife Management Areas, GPC has recently developed a color brochure describing the management objectives on those WMAs located on company lands. These brochures are available at those WMAs for the user public. In addition, they are set up for distribution at such shows as the Georgia Forestry Association Convention, Society of American Foresters meetings, Fish-a-Rama and Buck-a-Rama to name a few.

Wildlife Management Practices: GPC foresters will evaluate and manage each tract independently to identify the best methods of management to benefit timber production, wildlife, wetlands, endangered species, sensitive areas and the water resources of the site. The foresters will also refer to the FWP Program brochure, which outlines many wildlife management practices and recommendations, when writing individual forest management plans and prescriptions for timber management. Whenever possible and appropriate, those recommended guidelines will be evaluated and implemented on a stand by stand basis with emphasis on creating diversity at both the landscape and stand level to benefit wildlife.

Sensitive Sites & Special Concerns: This category has and will continue to have a major impact on GPC land management activities. Since the majority of our land holdings are associated with rivers and lakes, all those special concerns such as priority riparian areas, long rotation pine forest, priority isolated wetlands, threatened and endangered species, and special land forms listed in the FWP Program brochure exist somewhere on company lands. Several eagle's nest sites are located on company lands and provisions have been made to protect and maintain those sensitive sites. Several rare plant communities and special land forms have been identified and protected. We have also cooperated with the Georgia Heritage Program on protecting other sites. Our company wildlife biologist will continue to be involved in the Neotropical Migrant Bird Programs and will also recommend practices to protect reptile and amphibian habitat in sensitive areas.

Wildlife Recreation: GPC is committed to providing and enhancing company lands for public outdoor recreation by participating in all those programs mentioned in the FWP Program brochure outline. Approximately 33,000 acres are leased and managed by the DNR for wildlife management areas and state parks to enhance wildlife habitat and provide outdoor recreation for the public. GPC also leases hunting rights on several tracts around the state. Company employees and their families are allowed to hunt on those land associated with plant sites. GPC foresters also issue hunting permits to the public on certain tracts of land. GPC's Forestry and Rights of Way Department has initiated Project W.I.N.G.S. (Wildlife Incentives for Non-Game and Game Species) to assist landowners financially and technically in converting brush land under transmission rights of way into wildlife openings. GPC also provides and maintains company owned recreational sites around the state for the general public. Several parks associated with our hydro electric projects are made available for camping, fishing, and hiking. GPC has on staff a wildlife biologist and fishery biologist to assist the land management department in their

management activities for wildlife. GPC plans to continue and possibly further enhance the wildlife recreational opportunities on its lands for the general public.

Partnerships: Partnerships with outside organizations and agencies will be a priority in accomplishing our goals and commitments to support wildlife management. These partnerships create opportunities to communicate with those wildlife organizations and the public in building relations of cooperation and understanding of forestry and wildlife management. GPC currently has partnership programs established with Partners in Flight, National Wild Turkey Federation, Ducks Unlimited, Quail Unlimited, the Georgia Heritage Program, the Wildlife Habitat Council, and both Georgia and South Carolina DNR. Partnerships can be formed both formally and informally. These agreements may involve minimal or short-term commitments and some may be long-term. More details on these two types of partnerships can be found in the FWP Program brochure.

CONCLUSION

In this plan, GPC has summarized its goals and objectives in becoming a FWP Partner. In doing so, we briefly mentioned our past and present accomplishments in all the planned conservation enhancement categories for two basic reasons. First, to define our current commitments to wildlife and environmental conservation; and second, to develop new activities, using the FWP Program outline, to enhance and build upon our present program for the benefit of wildlife, the environment, and the public good. Much of the same information, but in more detail, may be reported in the narrative section of the annual FWP report as GPC continues to support and implement present programs and activities. The FWP Program brochure will be used by GPC foresters, as a guide, to develop new forest management plans and scheduling prescribed land management activities. Different methods of management will be implemented to create diversity at both the landscape and stand level to blend wildlife and timber management together. The FWP partnership will hopefully improve our opportunities to communicate with other wildlife organizations and the public in building relations of cooperation and understanding of forestry and wildlife management.

ATTACHMENT D

Georgia Forestry Commission
Georgia's Best Management Practices for Forestry

WATER QUALITY
P R O G R A M

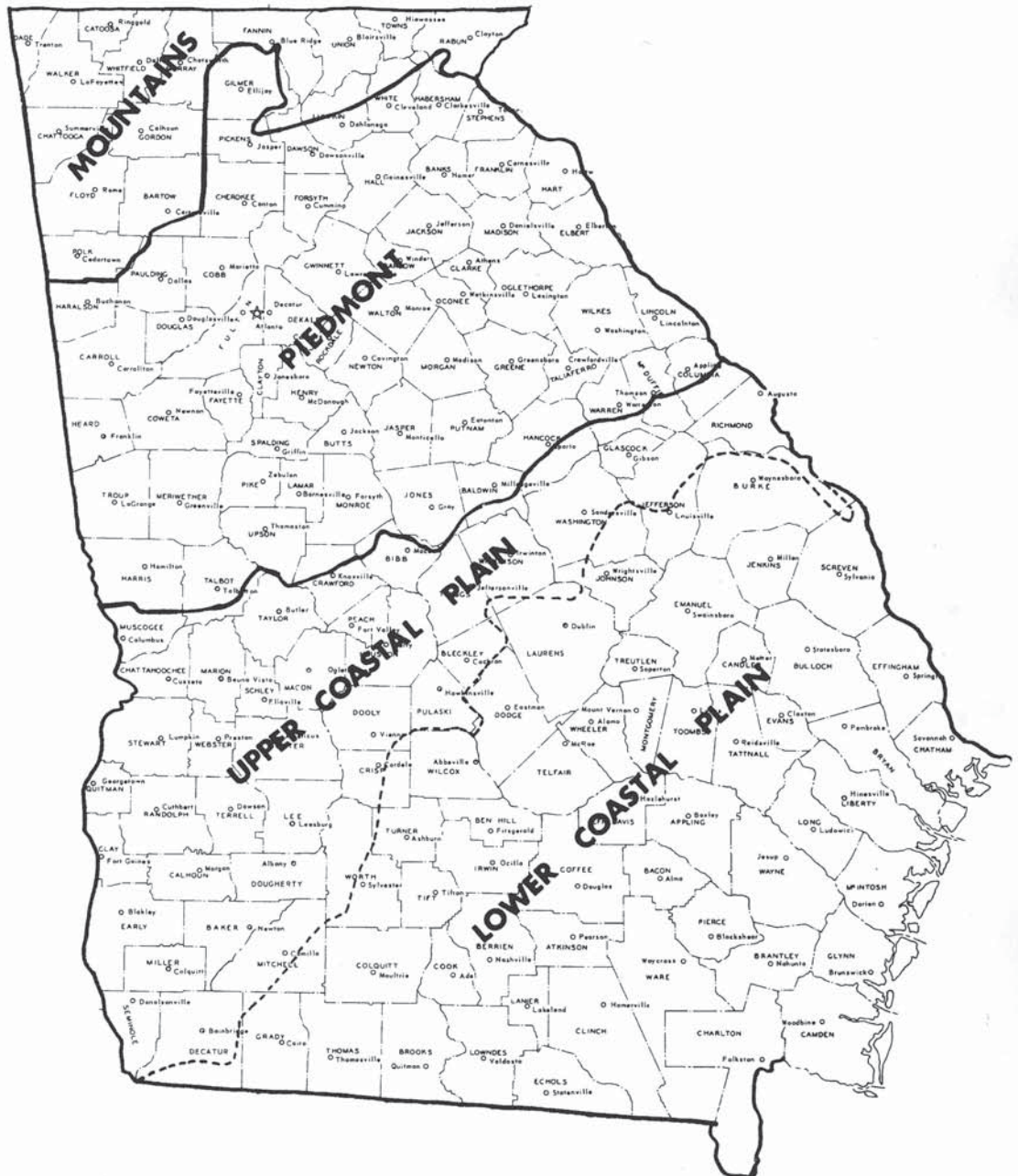
GEORGIA FORESTRY
COMMISSION



GEORGIA'S **Best Management Practices** for Forestry



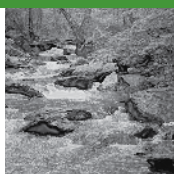
Physiographic Regions of Georgia



Georgia's

Best Management Practices for Forestry





Foreword

Georgia's Best Management Practices for Forestry

The purpose of this manual is to inform landowners, foresters, timber buyers, loggers, *site preparation* and reforestation contractors, and others involved with *silvicultural* operations about common-sense, economical and effective practices to minimize *non-point source pollution* (soil *erosion* and stream sedimentation) and *thermal pollution*. These minimum practices are called **BEST MANAGEMENT PRACTICES** and are commonly referred to as **BMPs**. They were initially developed in 1981 by a Forestry Non-Point Source Pollution Technical Task Force as required by the Federal Water Pollution Control Act. That act mandated states to develop a program to protect and improve the physical, chemical, and biological integrity of the nation's waters so they remain "fishable" and "swimmable" for today's and future generations.

Due to changes in technology and the rules and regulations governing land disturbing activities, the forestry community and regulators encouraged a revision of the 1981 BMPs. A separate set of wetland BMPs were developed in 1989 which were incorporated into the 1999 comprehensive manual by a similar task force. Since 1999, additional guidance has been developed. This 2009 manual represents the collective best efforts to establish sound, responsible, guiding principles for silvicultural operations in the State of Georgia.

Note: Words in *Italics* are found in the glossary.



Legal justice scale denotes mandated law or requirement.



A "no" symbol indicated practices to avoid.

ACKNOWLEDGMENTS

The Georgia Environmental Protection Division, the Georgia Forestry Commission and the Georgia Forestry Association wish to express appreciation to those organizations and individuals that contributed to the development and review of this publication. These individuals are listed under Contributors and Sources of Information (See page 71).

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MAY 2009



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Section 1.0

Introduction

Georgia's 24.2 million acres of *commercial forests* provide a variety of benefits for the people of the state. In addition to forest products, forests provide clean water, clean air, soil conservation, wildlife habitat, *flora* and *fauna*, and opportunities for recreation, *aesthetics*, education, and research. These forests are managed by landowners with varying objectives and their individual management decisions may be designed to support a broad variety of specific focused benefits related to the list above and others from Section 7.0. Figure 1-A shows the percentage of forest land in the state and Figure 1-B indicates the ownership makeup of that forest land.

Figure 1-A
Georgia's Land Use

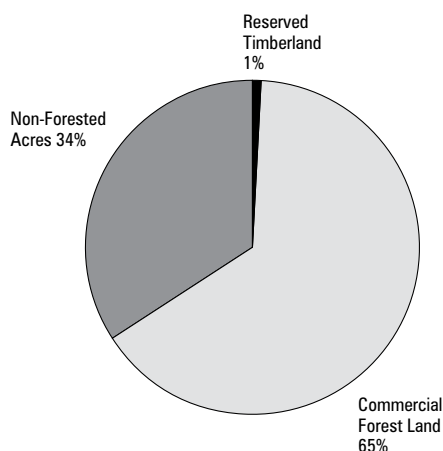
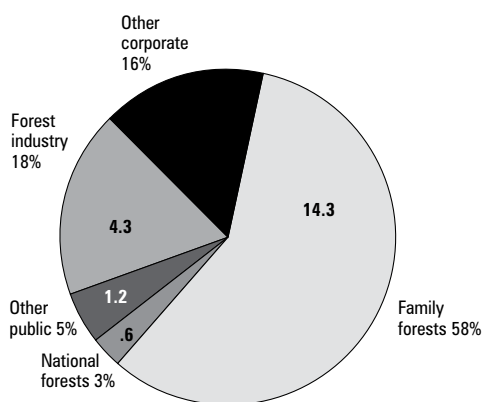


Figure 1-B
Georgia's Commercial Forest Ownership



Note: Numbers on pie chart represent million acres.

Georgia has 44,056 miles of *perennial streams* (approximately 4,000 miles of which are designated as *mountain trout waters*), 23,906 miles of *intermittent streams* and 603 miles of *ditches* and *canals* for a total of 68,565 stream miles. The state also has 425,382 acres of public lakes and reservoirs, 4.8 million acres of *wetlands* (nine percent tidally affected), 854 square miles of *estuaries* and 100 miles of coastline. This document emphasizes the protection of the state's water resources, when conducting forestry operations, through *Best Management Practices* (BMPs) in controlling or minimizing soil *erosion* and stream sedimentation. BMPs are the most appropriate or applicable practices to attain a *silvicultural* goal while protecting the physical, chemical, and biological integrity of the state's waters.

By using proper forest management and sound conservation practices including BMPs, forests can continue to provide benefits for future generations. Failure to follow BMPs may result in civil and criminal fines and penalties. Some counties already require plan reviews, permits, fees, performance bonds and compliance audits. See Appendix 8.3, page 65. Therefore, to prevent any potential water quality problems, it is in the best interest of everyone involved in silvicultural operations to properly plan and supervise their operations. By consistently following BMPs, problems can be avoided or corrected as soon as possible.

Since 1978, the Georgia Forestry Commission (GFC) has been designated by the Georgia Environmental Protection Division (GAEPD) as the lead agency to coordinate the forest water quality program. The program's primary responsibilities include: educating the forestry community on BMPs through training and demonstrations; conducting BMP use and effectiveness monitoring surveys; and investigating and mediating forestry water quality complaints.

"It is in the best interest of everyone involved in silvicultural operations to properly plan and supervise their operations by consistently following BMPs to prevent any potential water quality problems."

**For more information about BMPs, contact the
Georgia Forestry Commission, P.O. Box 819, Macon, GA, 31202,
1-800-GA-TREES or visit us at www.gatrees.org.**



Section 2.0

Planning for Water Quality

Any forest management activity, regardless of potential impact on water quality, should be thoroughly planned. Whether the activity involves seasoned timber buyers or landowners selling timber for the first time, the planning process should address the objectives of the proposed activity as well as potential impacts of all actions that disturb the soil surface or impact water quality. The planning process should help identify sensitive areas and applicable BMPs to be used during timber sales, road construction, stream crossings, harvesting, *site preparation*, reforestation, and *herbicide* applications. The planning process should help identify terms and conditions of a written contract for any forestry practice. While BMPs do not specifically require written plans, it is generally a sound practice to maintain written records of any forest management activity on the land. Plans should include:

- history of the site including past land use,
- identification of sensitive areas such as *perennial and intermittent streams*, *ephemeral areas*, lakes, ponds, *wetlands*, steep slopes, highly erosive or *hydric soils*, active *gully* systems, etc.,
- regulations and/or permitting requirements and, location, type, timing and logistics of each activity.

Useful resources for planning forest operations include United States Geologic Survey (USGS) topographic maps, Natural Resource Conservation Service (NRCS) county soil survey maps with interpretations, aerial photographs and tax maps. These maps can help users locate tract boundaries and sensitive areas. Because no map is 100 percent accurate, they should be used as a reference to identify potentially sensitive areas that must then be verified and plotted during field reconnaissance to minimize impacts on them before silvicultural operations begin. Except for tax maps, the GFC maintains these documents at all District Offices. The NRCS maintains soil and topographic maps at local field offices where field personnel can assist in map and resource information interpretation. These maps can be accessed by visiting www.websoilsurvey.nrcs.usda.gov or www.gis.state.ga.us.

Water quality protection begins with recognizing watercourses and water bodies. According to the federal Clean Water Act, “*waters of the U.S.*” include lakes, rivers, *perennial and intermittent streams*, *wetlands*, *sloughs* or natural ponds. Georgia

law (OCGA 12-7-3.13) defines “waters of the state” to mean all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, *springs*, wells, and other bodies of surface or subsurface water, natural or artificial, lying within or forming part of the boundaries of the state that are not entirely confined and retained completely upon the property of a single individual, partnership or corporation.

Identifying stream types (*perennial*, *intermittent*, or *ephemeral*) is important in prescribing the level of protection through the implementation of BMPs listed in this manual. USGS topographic maps and NRCS county soil maps can be used as a reference to identify stream types. Where available, they should be cross-referenced and field verified. See Figure 2-A.

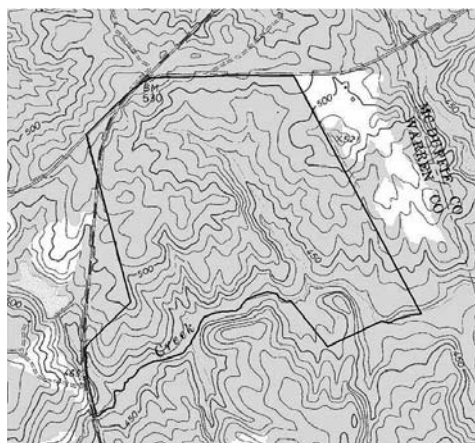


Figure 2-A:
The following examples illustrate the same tract of land showing how streams are identified as they appear in different types of available maps. Left, USGS topo map. Bottom left, NRCS county soil survey map. Bottom right, NRCS web soil survey map.





Section 2.0

Planning for Water Quality

Stream Types

Perennial streams flow in a well-defined *channel* throughout most of the year under normal climatic conditions. Some may dry up during drought periods or due to excessive upstream uses. They are usually identified as solid blue lines on USGS topographic maps and as either solid black or black lines separated by one dot on NRCS soil maps. Aquatic organisms are normally present and easily found in these streams.

Intermittent streams flow in a well-defined *channel* during wet seasons of the year but not for the entire year. They generally exhibit signs of water velocity sufficient to move soil material, litter and fine debris. They are usually identified as blue lines separated by three dots on USGS topographic maps and as black lines separated by two or more dots on NRCS soil maps. Aquatic organisms often are difficult to find or not present at all in these streams.

Ephemeral areas can direct stormflow into surface waters. Care should be taken to minimize these areas from becoming sources of *pollutants*. For a more detailed description and BMPs for *ephemeral areas*, see page 18.

The landowner or manager may be familiar with a stream's flow characteristics and make the determination of stream type. In some cases there may be uncertainty. For example, *ephemeral areas* may be difficult to locate when they are not actively flowing. In such situations, consult a *qualified professional*.

2.1 STREAMSIDE MANAGEMENT ZONES (SMZs)

Streamside Management Zones (SMZs) are *buffer strips* adjacent to *perennial* or *intermittent streams* or other bodies of water (lakes, ponds, reservoirs, etc.) that should be managed with special considerations to protect water quality. Trees and other vegetation in the SMZ provide shade that buffers water temperatures; woody debris vital to the aquatic ecosystem; natural filtration of *sediment* and other *pollutants* (nutrients and *pesticides*); and travel corridors and habitat for wildlife. SMZs also provide some flood protection by dissipating the velocity of moving water.

When planning and laying out harvest or treatment areas, SMZs should be identified on maps or aerial photos and clearly designated in the field with paint or flagging. You should also identify local, state or federal regulations that may supersede or mandate the use of BMPs, such as those for protected *water-supply reservoirs/watersheds* or *protected river corridors*.

Note: Words in *italics> are found in the glossary.*

2.1.1 Perennial and Intermittent Stream SMZ Width Recommendations

There is no uniform formula to determine the appropriate width of an SMZ. In general, however, the steeper the slope and more erosive the soil, the wider the SMZ should be. Slope should be determined at 100-foot perpendicular to the streambank. Therefore, SMZ widths may vary along a stream’s course and on opposite sides of the same stream. SMZs should be measured along the ground from the streambank on each side of the stream and not from the centerline of the stream (Refer to Figure 2-B and Table 2-A).

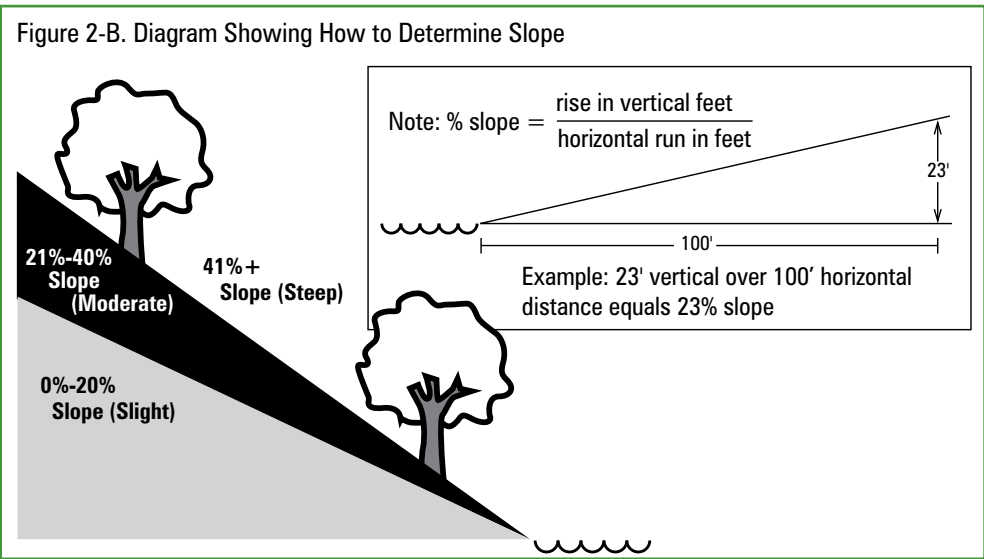


Table 2-A. SMZ Widths by Slope Class and Stream Type

Slope Class	Minimum Width (ft) of SMZ on Each Side		
	Perennial (feet)	Intermittent (feet)	Trout (feet)
Slight (<20%)	40	20	100
Moderate (21%-40%)	70	35	100
Steep (>40%)	100	50	100



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Remember that these are recommended minimum widths, and conditions such as unstable or erosive soils or lack of ground cover may warrant a wider SMZ for adequate water quality protection. SMZs also have a limited filtering capacity and are not intended to correct problems created by poor upslope or adjacent practices.

2.1.1.1 BMPs for Perennial and Intermittent Stream SMZs

(Does NOT include trout streams. Trout stream BMPs are discussed in 2.1.2)

Management activities may occur within an SMZ provided that the disturbance to soil or ground cover is minimized. Water quality objectives should prevent movement of soil or other potential *pollutants* from within the SMZ into the watercourse and protect streambank integrity. The BMPs associated with typical *silvicultural* activities are listed below.

- Identify any local, state, or federal regulations that may supersede or mandate the use of BMPs.
- Determine and designate the appropriate SMZ widths on site prior to conducting any timber sale or forest practice.
- Along *perennial streams*, leave an average of 50 square feet of *basal area* per acre evenly distributed throughout the zone or at least 50% *canopy cover* after a harvest to provide shade.
- Along *intermittent streams*, leave an average of 25 square feet of *basal area* per acre evenly distributed throughout the zone or at least 25% *canopy cover* after a harvest to provide shade.
- Minimize stream crossings. (See Section 3.3 page 30 and 4.3 page 40)
- Except at planned stream crossings, locate new *access roads* outside the SMZ.
- Maintain existing roads within SMZs with adequate *water control structures* and stabilization measures as needed. (See Section 3.2 page 27) If not possible, consider relocating road.
- Locate *log decks*, *staging areas*, and *skid trails* outside the SMZ, preferably on well-drained, stable soils.
- Where used, *firebreaks* should be installed parallel to streams and outside SMZs. (See Section 5.5 page 49)
- Minimize the intensity of a *prescribed fire* in the SMZ to maintain forest floor cover and protect the soil surface.

- Periodically inspect the SMZ and evaluate the effectiveness of the BMPs, adjusting practices when necessary.

2.1.1.2 Practices to Avoid Within SMZs of Perennial and Intermittent Streams

- Cutting streambank trees.
- Unnecessary *access roads* and main *skid trails*.
- *Log decks*.
- Portable sawmills.
- Significant soil compaction and rutting by harvesting equipment.
- Removal of ground cover or understory vegetation.
- *Felling* trees into the streambed or leaving *logging debris* in the stream.
- Servicing or refueling equipment.
- Mechanical *site preparation* and *site preparation* burning.
- Mechanical tree planting.
- Broadcast application of *pesticides* or *fertilizers*.
- Handling, mixing, or storing toxic or hazardous materials (fuels, lubricants, solvents, *pesticides*, or *fertilizers*).

2.1.2 Trout Streams

Trout require cool (less than 70°F), high-quality water. They, and the insects they eat, are extremely sensitive to *sediment* and *thermal pollution* (elevated water temperatures). Therefore, *trout streams* require additional protection. Streams designated as Primary Trout Waters are waters supporting a self-sustaining population of rainbow, brown or brook trout. Streams designated as Secondary *Trout Streams* are those in which trout can survive but there is no evidence of natural trout reproduction. The Georgia DNR Wildlife Resources Division publishes a list of Georgia's *trout streams*, available at www.georgiawildlife.com. For regulation purposes, the Georgia EPD maintains a list of *trout streams* at www.gaepd.org.

2.1.2.1 SMZ Width Recommendation and BMPs for Trout Streams

- Establish 100-foot SMZs on both sides of designated streams and tributaries according to the following options:

Option A: A minimum 100-foot SMZ that includes a no-harvest zone within the



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first 25-feet of primary or secondary *trout streams*. Timber harvests within the remaining 75-feet of the SMZ should leave an average of 50 square ft of *basal area* per acre or at least 50% *canopy cover*.

Option B: Within the 100-ft. SMZ, leave an average of 50 square feet of *basal area* per acre evenly distributed throughout the zone to provide shade. Option B may be selected if a *qualified professional* is consulted.

- Follow all other BMPs for *perennial* and *intermittent streams* noting the 100-ft. zone.

2.1.2.2 Practices to Avoid Within SMZ of Trout Streams

- Any forestry activity within 25 feet of the stream, unless using Option B.
- Mechanical *site preparation* and high intensity burns on *ephemeral areas* above trout waters.

2.2 SPECIAL MANAGEMENT AREAS

Some water bodies in upland and bottomland areas have particular characteristics or regulatory requirements that require different management approaches. These include, but are not limited to *canals* and *ditches*, *floodplain* features, *headwater* areas, *lakes* and *ponds*, *protected mountain tops*, *protected river corridors*, *sinkholes*, *water supply reservoirs/watersheds*, and *wetlands*. In such situations, consult a *qualified professional*.

2.2.1 Canals and Ditches

Minor drainage to temporarily lower the water level on a wetland site during road construction, timber harvesting and *site preparation* is considered normal and exempt from 404 permitting. Most *canals* were established for flood control purposes prior to Section 404 guidance. Today, the construction of *canals* would most likely be considered major drainage and require Section 404 permits.

Construction of minor drainage *ditches* in wetlands is exempt from Section 404 permitting, provided:

- it does not result in the immediate or gradual conversion of a wetland to a non-wetland;

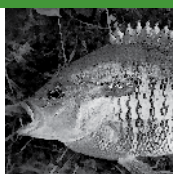
- it does not facilitate the conversion from one wetland use to another;
- it does not significantly modify a stream, lake, swamp, bog, or any other wetland or aquatic area constituting *waters of the U.S.*;
- it is not located in a SMZ.

2.2.1.1 BMPs for Canals and Ditches

- Maintenance of existing *canals* and *ditches* (C&Ds) is allowed, provided the original dimensions are not exceeded. This is normally conducted at the end of each timber stand rotation.
- In order to conduct maintenance dredging, access for equipment and the placement of spoil materials (sidecasting) is permitted along banks. Therefore, there may not be a tree canopy on one or both sides immediately adjacent to C&Ds.
- *Ditches* constructed through non-wetland areas are not normally associated with natural stream *channels*. They dry out and water temperature violations should not be a problem. Therefore, no SMZ with *basal area* requirements is practical.
- Where C&Ds were established in old perennial and *intermittent stream channels* that are now acting as the stream, the establishment of SMZs with *basal area* requirements is appropriate. Evaluate on a case by case basis.
- Maintenance should occur during the dry season to prevent *turbidity* problems. If *sediment* is likely to move from C&Ds into a stream, consideration should be given to stabilization and *sediment* control measures, such as sloping and grassing of *ditch* banks and spoil piles. The need for *sediment* control will be determined by soil type, the distance to a stream, and the amount of vegetated filter between the *ditch* and the stream.

⊘ 2.2.1.2 Practices to Avoid in Canals and Ditches

- *Bedding* that channels surface runoff into C&Ds, including road *ditches*.
- Placing logging and *site preparation* debris in C&Ds.
- Excessive crossings; where necessary, fill over *culverts* should be stabilized.
- Applying chemicals that are not labeled for aquatic applications directly to C&Ds with standing or flowing water.



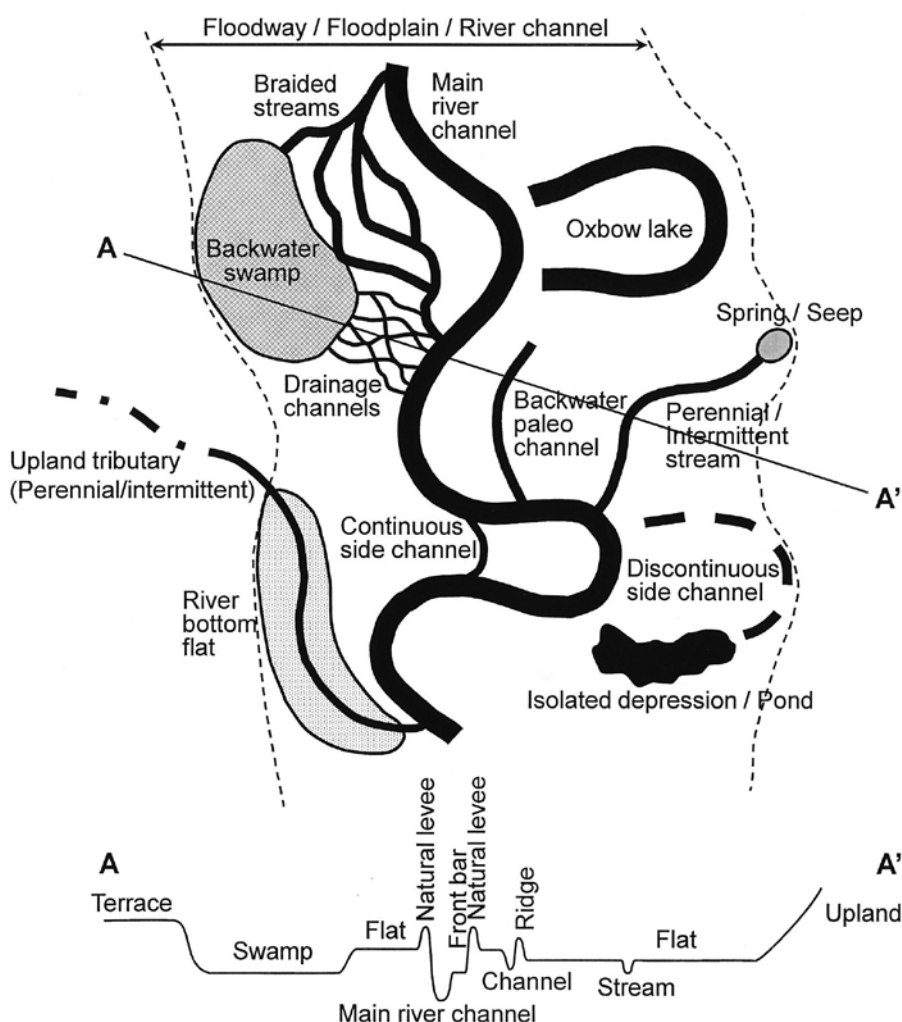
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2.2.2 Floodplain and Riparian Landforms

Floodplains support a wide variety of fluvial features, which perform diverse hydrologic, biological, and ecological functions. The objectives of this guidance are to better characterize floodplain features in terms of *hydrology*, geomorphology, and biology and also to provide better BMP guidance to protect water quality and biological integrity of these features.

Figure 2-C: Schematic of Floodplain Physiographic Features and Elevational Cross-Section



(Modified from Mitsch and Gooselink, 1993 and Hodges, 1998.)

The general goals of this guidance are to:

- Prevent movement of soil, fertilizer, and *herbicide* from forest operation areas into the surface water system.
- Maintain water temperatures and dissolved oxygen levels adequate for biotic survival.
- Maintain input of organic matter and coarse woody debris into water bodies.
- Maintain structural integrity of floodplain features.

Floodplain Features

Overbank mainstem flows, mainstem backwater flow, floodplain groundwater drainage, and tributary inflows create many different features in floodplains (Figure 2-C). Such features include the main river *channel*, upland tributaries, *springs* and *seeps*, *continuous side channels*, *braided streams*, *drainage channels*, *floodway*, *river bottom flats*, *discontinuous side channels*, *backwater paleo channels*, *backwater swamps*, isolated depressions, oxbows/ponds, front bars, natural levees, and ridges. Although many of these features are broadly described as “*sloughs*,” there is obviously great variation in their origin and form.

The water quality effects of *silvicultural* activities along these features depend on the flood frequency and durations, flow regime or energy, and the types of forestry operations conducted. All of these factors should be considered when evaluating floodplain management. For example, if a discontinuous side *channel* is rarely connected to *perennial streams*, then it may serve as breeding habitat for amphibians, but is unlikely to serve as fish habitat. In this case, maintaining a stringer of bank trees to protect the stability of the feature and to provide some woody debris input is desired, but a larger *streamside management zone* (SMZ) for shade or for chemical adsorption and filtration is not necessary.

Determining all the relevant water body characteristics in a single site visit can be difficult. For guidance in determining the appropriate floodplain feature, see Figure 2-D. (The corresponding BMPs for each can be found in Table 2-B: Summary Characteristics of Floodplain Features and the Corresponding BMPs, on page 18.) These water types are:

- **Tributaries that originate in uplands and flow across floodplain:** These usually well-defined *channels* with sandy substrate originate in the uplands and flow across the floodplain to the main river in continuous *channel* features.
- **Springs and Seeps:** Water emerges from these features within the flood-



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plain and flows all or part of year in most years. *Channel* structure and substrate of *springs* are usually well defined and sandy, but those of *seeps* are less defined and mixed. If they flow all year long, treat them as *perennial streams* or otherwise as intermittent.

- **Continuous side channels and Braided streams:** These less distinct *channels* and banks flow intermittently and are connected to the main *channel* network at both ends. The *channels* often contain mixed substrates (sand, organics, fine *sediments*). Treat each *channel* individually, depending upon whether the stream is *perennial*, *intermittent* or *ephemeral*. These unique streams require highly site-specific management planning and recommendations. In some cases, the potential for wind throw of trees left in the SMZ will dictate variances in the removal of the *canopy cover*. Seek the assistance of a *qualified professional*.
- **Drainage channels:** These less distinct *channels* begin on the floodplain and usually flow intermittently during periods of high water tables via a continuous linear drainage system to the main river. The *channels* often contain mixed substrates (sand, organics, fine *sediments*).
- **Floodway and River bottom flats:** Area of floodplain with significant water velocities during frequent overbank flows (flows less than the two-year low flow). Evidence of scour and debris movement can be found. The *floodway* is usually identified on FEMA floodplain maps. Smaller *floodway* or riparian areas in minor streams are also called *river bottom flats*.
- **Discontinuous side channels:** *Channel* features that may or may not be connected, on at least one end, to medium or higher flow energy *channels*. May have distinct or indistinct *channel* features, but the *channel* features disappear and reappear.
- **Backwater paleo channels:** Usually well-defined deep *channel* features that are remnants of earlier river and side *channel* configurations. Mixed *channel* substrates (sand, organics, fine *sediments*). Flow usually backs into these features from the main river. Organic debris is often found piled against the “wrong” side of obstructions.
- **Backwater swamps.** *Backwater swamps* are wetland areas formed in old overflow *channels* on the margins of floodplains at the base of the adjacent slopes. They feature wetland vegetation, *hydric soils*, and fine and organic substrates, but they may show evidence of scour and debris movement.

Figure 2-D. Decision Tree for Application of Forestry Best Management Practices to Floodplain and Riparian Landforms in Georgia.

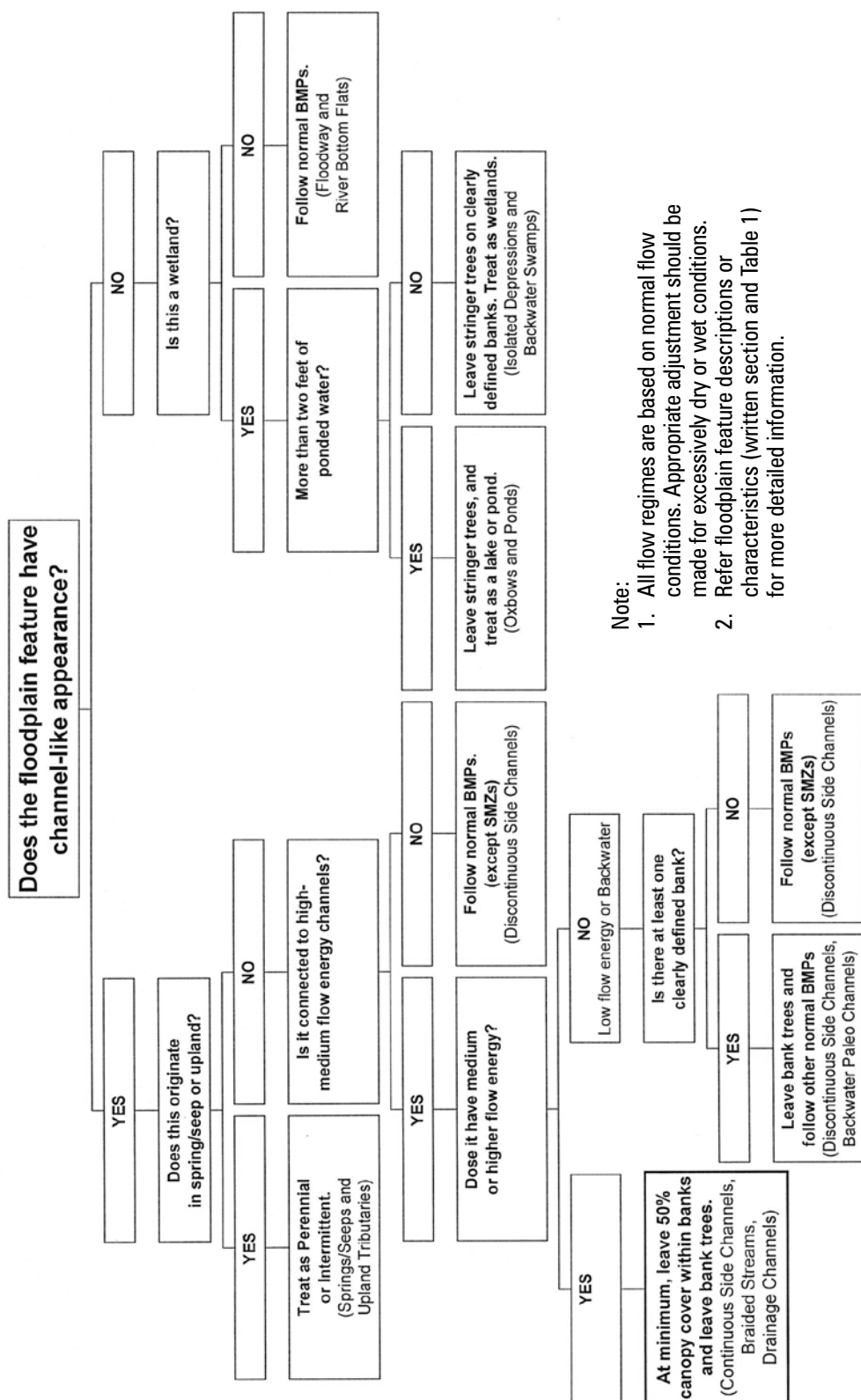


Table 2-B. Summary Characteristics of Floodplain Features and the Corresponding BMPs.

Hydroperiod	Floodplain Feature	Flow Energy ¹	Channel Characteristics (Bank Structures, Substrate Materials, and Other Features)	Biological Values	Floodplain Protection Measures / SMZs ²	Mechanical Site Prep. w/in SMZs ³	Herbicide, Fertilizer, and Burning w/in SMZs
Perennial	<ul style="list-style-type: none"> • Tributaries originating in uplands and flowing across floodplain • Springs 	High-Medium	Well defined channel, sandy substrate.	Aquatic fauna	Perennial stream BMPs	No	Not allowed
	<ul style="list-style-type: none"> • Tributaries originating in uplands and flowing across floodplain • Seeps, • Continuous side channels, • Braided stream, or • Drainage channels 	Medium-Low	Less distinct channel, mixed substrate (sand, organics, fines). These may be connected to the mainstem directly or indirectly.	Aquatic and terrestrial fauna, Off channel rearing habitat, High-flow refugia	For tributaries, intermittent stream BMPs. For other floodplain features, at minimum, leave 50% canopy cover within banks and leave bank trees.	No	Not allowed
Ephemeral	<ul style="list-style-type: none"> • Floodway • River bottom flats 	High-Medium	Area of floodplain. Occasional evidence of scour and debris movement.	Terrestrial fauna	N/A	Low impact	Avoid
	<ul style="list-style-type: none"> • Discontinuous side channels 	Medium-Low	Channels appear and disappear, and may or may not be connected on at least one end.	Terrestrial fauna	Leave bank trees if one end is connected and/or has a clearly defined bank.	Low impact	Avoid
	<ul style="list-style-type: none"> • Backwater paleo channels 	Medium-Low	Well defined, deep channel. Mixed substrate (sand, organics, fines). Debris piled on "wrong" side of obstructions.	Terrestrial fauna, High flow refugia	Maintain trees on banks, maintain channel stability	No	Avoid
Ponded	<ul style="list-style-type: none"> • Backwater swamps 	Medium-Low	Located on floodplain margins. Usually no channel. Wetland vegetation. Hydric soils. Organic and fine substrate. Sometimes evidence of debris movement.	Aquatic and terrestrial fauna, Off channel rearing habitat, High-flow refugia	Treat as wetlands. Leave stringer trees if defined banks apparent	N/A ⁴	Only wetland approved herbicides
	<ul style="list-style-type: none"> • Isolated depressions 	Low	No channel. Wetland vegetation. Hydric soils. Organic and fine substrate.	Aquatic and terrestrial fauna, Off channel rearing habitat, High-flow refugia	Treat as wetlands. Leave stringer trees if defined banks apparent.	N/A ⁴	Only wetland approved herbicides
	<ul style="list-style-type: none"> • Oxbows • Ponds 	Low	Deep (>2 feet) standing water. Wetland vegetation. Hydric soils. Organic and fine substrate.	Aquatic and terrestrial fauna, Off channel rearing habitat, High-flow refugia	Treat as lakes or ponds. Leave stringer trees on banks.	N/A ⁴	Only wetland approved herbicides

¹ Flow energy under normal flow conditions.² Floodplain protection measure includes SMZs (GA Forestry BMP manual Pg. 8, 63) and special management areas (GA Forestry BMP manual Pg. 12).³ Follow EPA/COE memorandum to field (GA Forestry BMP manual Pg. 34)⁴ See wetlands section of GA Forestry BMP manual.

- **Isolated depressions:** Feature wetland vegetation, *hydric soils*, fine and organic substrates, no evidence of fluvial scour.
- **Oxbows and Ponds:** Ponded deep water (>2 feet deep), fine and organic substrates, no evidence of fluvial scour.

As a rule of thumb, if the following conditions exist, corresponding BMPs should be considered for *all* floodplain features. If the area has:

- perennial or intermittent water flows; establish SMZs.
- potential surface runoff inputs from adjacent lands (exception of flooding); establish SMZs.
- steep, unstable, and/or well defined banks; protect banks by bank trees or undisturbed zone.
- wet or ponded depression areas; shade water by bank trees.
- prolonged flooding areas; treat as a wetland and apply wetland BMPs.
- surface water; do not spray any chemicals.

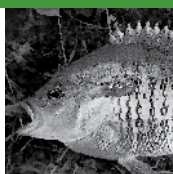
Note: All flow regimes described above are based on normal flow conditions. Appropriate BMP adjustments should be required during excessively dry or wet conditions.

2.2.3 Headwater Areas

Headwaters include two types of conveyances: *ephemeral areas* and gullies. Refer to Figure 2-E, Headwater Decision-Making Tree on page 20 to determine conveyance type. See Table 2-C: Headwater Stream Types and the Hydrological and Biological Characteristics, pg. 21.

2.2.3.1 Ephemeral Areas

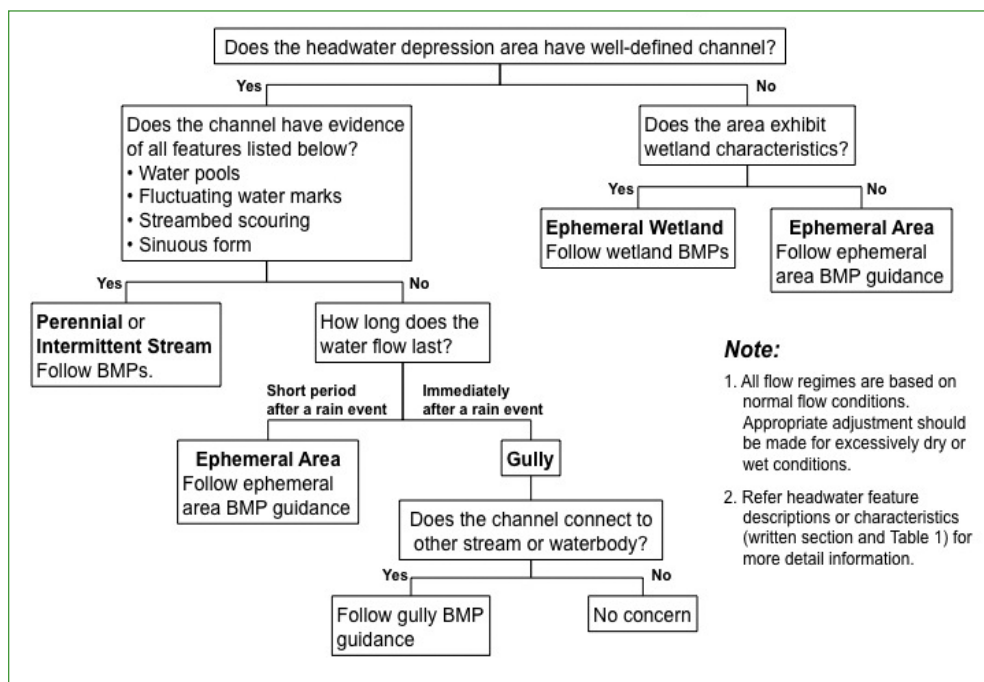
Ephemeral areas are depressions or swales (sometimes called drains, draws, or *dry washes*) that have no defined continuous *channel*, and that are well-connected to intermittent or *perennial streams*. *Ephemeral areas* are characterized by water tables that often rise to the surface during high water table months, and these areas produce surface flow for short periods during and following rainfall. Forest floors in *ephemeral areas* are intact, and hydrophytic vegetation may or may not be present. Aquatic insects are usually not present in these areas. Soils in these areas may quickly become saturated during rainy or thawing periods. Soils in *ephemeral areas* feature finer textures and higher organic contents



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Figure 2-E. Headwater Decision-Making Tree



than soils in adjacent uplands. Fluvial power is generally low, but there may be evidence of small debris jams of leaf litter and other small organic matter deposited after surface flows. These areas are usually not identified on USGS or NRCS maps. Water from *ephemeral areas* may carry *sediment* and other contaminants directly into streams. Ephemeral Wetlands are a part of *Ephemeral Areas*, which exhibit partial or full wetland characteristics.

Silvicultural activities should:

- Minimize soil disturbance, litter layer removal, and avoid high-intensity fire within *ephemeral areas*. These activities can increase the possibility of introducing *pollutants* to intermittent or *perennial streams*.
- Cover inadvertently exposed soils with *logging debris*, grass, or mulch.
- Minimize equipment trafficking within and around *ephemeral areas*. Should trafficking be justifiable due to site constraints, take precautions to minimize soil disturbance and litter layer removal. Placement of *logging debris* or logging mats in traffic areas may be appropriate. Debris, mats, and other soil protecting structures should not interfere with the natural flow of water.

Table 2-C. Headwater Stream Types and the Hydrological and Biological Characteristics.

Characteristics	Perennial	Intermittent	Ephemeral Area	Ephemeral Wetland	Gully
Hydroperiod	Year-round (> 90% of the time)	During the wet season	Short period after a rain event	Moist year-round, wet during the wet season	Immediately after a rain event
Channel definition	Well defined	Somewhat defined	Somewhat – not defined	Not defined	Clear
Sediment and litter movement	Clearly observable	Partially observable	Minimum	Minimum	Clearly observable
Streambed scouring	Evident	Somewhat evident	Not evident	Not evident	N/A
Water pools	Present	Transition	Absent	Mostly absent	Absent
Stream shape	Sinuuous	Less sinuous	Mostly straight	Not observable	Straight
High water marks	Present	Transition	Absent	Transition	Absent
USGS topographic map marker	Solid or dotted blue line	Dotted blue line or concave contour line	Concave contour line	Concave contour line	N/A
Energy level	High	Medium	Low	Very Low	High-Low
Erosion potential	Low-Medium	Low-Medium	Medium-Low	Non	High
Vegetation	Wetland plants at edge or in a stream	Wetland and mesic plants at edge or in a stream	Mesic plants around and in an area	Wetland and mesic plants in and around an area	No vegetation in an active gully
Aquatic insects	Present	Present	Transition	Transition	Absent
Fish	Present	Transition	Absent	Absent	Absent

- Avoid direct tie-in of turnouts and outfall of *water bars*/breaks to *ephemeral areas*. Extra care should be taken where a *skid trail* crosses an *ephemeral area*.
- See Section 5.3, page 48, for *herbicide* application.
- See Section 6.3, page 52, for fertilizer application.

2.2.3.2 Gullies

Gullies are narrow ravines, often caused by past land cultivation. They are typically V- or U-shaped *channels* that may or may not have exposed soil surfaces within the *channel*. They carry water only during and immediately following rainstorms or thawing events. *Dry wash*, draw, swale, arroyo, and gulch are other common names for gullies. Old agricultural gullies often have mature trees growing within their banks. Gullies often occur in uplands, upper slopes of *ephemeral areas*, at relatively steep stream-sideslopes, or on exposed erodible soils. Gullies may or may not be directly connected to *ephemeral areas*, intermit-



tent, or *perennial streams*. Because of their short hydroperiod, gullies do not generally provide suitable habitat for aquatic *flora* and *fauna*.

Gullies with a contributing area (catchment/watershed above the *gully*) larger than 0.2 acres and directly connected to *ephemeral areas*, intermittent or *perennial streams* may require special attention because they can be activated by forestry operations. For these types of gullies, the following BMPs are recommended, but soil, slope, and other topographic characteristics should be considered to address local conditions:

- Protect soil and litter layers within a *gully* and the banks during forestry operations¹. Low impact operational methods should be used for harvesting and *site preparation* in and around a *gully*.
- Placement of *logging debris* and slash in a *gully* is recommended to provide hydraulic resistance to flow and thus promote *sediment* deposition².
- Avoid high-intensity *prescribed burning* in a *gully* to protect decomposed litter layers from burning and minimize exposure of mineral soils.
- Minimize trafficking within and around gullies, especially within and adjacent to severely eroded areas.
- Avoid direct tie-in of turnouts and outfall of *water bars*/breaks to gullies.
- See Section 5.3, page 48 for *herbicide* application.
- See Section 6.3, page 52 for fertilizer application.

¹ Leaving some trees and shrubs on the banks and inside of gullies may serve as a marker for subsequent harvesting, site preparation, planting, herbicide application, and other forestry operations.

² Avoid creating an impoundment behind logging debris or slash placed in a gully.

2.2.4 Lakes, ponds, and other bodies of flowing water

Follow the BMPs recommended for *perennial streams* if they could potentially move *sediments* or other *pollutants* off site.

2.2.5 Protected Mountain Tops

Forestry activities on mountain tops above 2,200-ft. elevation with slopes greater than 25% including the reforestation requirement shall comply with BMPs. (See Appendix Section 8.2.3.4 with map, page 63.)

2.2.6 Protected River Corridors

Forestry activities within the 100-ft. buffers along those rivers at a point and below where the flow is 400 cubic feet per second (cfs) shall comply with BMPs. (See Appendix Section 8.2.3.3 with map, page 62.)

2.2.7 Sinkhole

A geologic feature, typically found in Karst geology, that might provide a direct connection between land surface and groundwater. Treat as *perennial streams*.

2.2.8 Water Supply Reservoir/Watershed

(See Appendix Section 8.2.3.1 with map, page 60.)

- For government-owned impoundments or intakes within a 100-square mile or larger watershed, forestry activities within a 150-ft. buffer adjacent to all reservoirs and 100-ft. buffer adjacent to all *perennial streams* within a seven-mile radius above intakes shall comply with BMPs.
- For government-owned impoundments or intakes within a watershed of less than 100-square miles, forestry activities within a 150-ft. buffer adjacent to the reservoir, a 100-ft. buffer adjacent to *perennial streams* within a seven-mile radius, and a 50-ft. buffer adjacent to all *perennial streams* above the seven-mile radius shall comply with BMPs.

2.2.9 Wetlands

For regulatory purposes, *wetlands* are defined by the presence or absence of specific plant communities, *hydric soils* and hydrologic conditions. Because of the generally wet soil conditions associated with forested *wetlands*, these areas are sensitive to forestry activities. For instance, bottomland hardwood sites, Carolina bays, cypress domes, other swamps, and some pine savannas differ from upland forest types because their soils are wet most of the year. They frequently are connected directly to a larger aquatic system, often have overbank flow from nearby stream flooding, and may accumulate *sediments* and nutrients from upstream *erosion* and runoff.

To properly manage forested *wetlands*: plan for *regeneration*; consider the areas beyond the actual harvest site; and remember that special harvesting



techniques may be necessary to protect water quality. Any stream *channels* should be identified and the appropriate SMZs established. The BMPs that apply to any other forest type generally apply to forested *wetlands*. For more information on harvesting and site-preparing *wetlands*, refer to Section 4.7 page 42 and Section 5.2 page 46.

Benefits of Planning

Forest managers, landowners, foresters, timber buyers, loggers, *site preparation* and reforestation contractors should clearly identify water bodies, Special Management Areas and *streamside management zones* (SMZs) in the field to decide which BMPs apply, when and where to apply them, and to carefully design *access roads*, *log decks*, and stream crossings. They should supervise these operations to make sure BMPs are followed where necessary, so that water quality is not compromised.

Forest health issues such as fire management, *integrated pest management*, disease control and natural disasters may also require a *qualified professional* to prescribe appropriate actions.

The benefits of a well written plan and/or written contract include: better communications of expectations between the landowner and forestry professionals; maximum return from the harvest; potential longer term productivity; better infrastructure; economic efficiency; minimal environmental impacts; compliance with federal, state and local laws; and avoidance of fines or penalties. For information regarding sample contracts and management planning, contact the GFC. Planning for the protection of water quality makes good sense.

Notes:

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.



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Road Location, Construction, Stream Crossings, Maintenance, Retirement

Access roads are an essential part of any forest management operation and provide access for other activities on forestland. With proper planning, location, construction, and maintenance techniques, well-constructed *access roads* allow for productive operations and cause minimal soil and water quality impacts. However, poorly located, poorly constructed, or poorly maintained access roads, especially at stream crossings, can result in sediment-laden streams, changing stream-flow patterns, degraded fish and aquatic organism habitats, and adversely affected *aesthetics*.

There are two types of *access roads* typically constructed in the state. In mountainous and hilly terrain, the *broad-based dip* road is used. In the flatwoods and along major flood plains, the *crown and ditch* road is commonly used.

3.1 BMPs FOR ROAD LOCATION

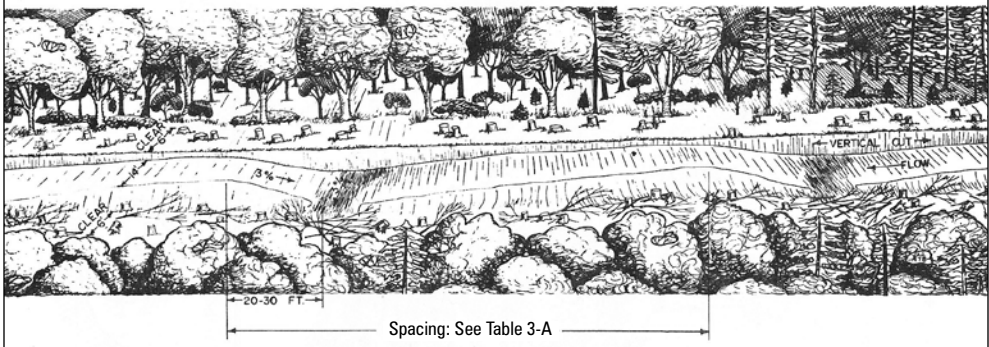
- Identify federal, state and local laws, regulations or ordinances that apply to road purpose, construction, and maintenance prior to construction and operation. Include needed considerations and measures to meet requirements.
- Use soil surveys and topographic maps to identify soils, stream locations and other natural features (rocky areas, steep slopes, wet areas, etc.) on the property that might pose problems.
- Locate potential control points, i.e. *log decks* and stream crossings on topographic maps prior to designing *access roads* in the field.
- New permanent *access roads* should follow the *contour* as much as possible with grades ideally kept below 10%. An engineer's divider can be used to lay out roads with the desired grade on a topographic map. Grades can run up to 12% for short distances. If soil is highly erosive, reduce grades. Plan to install *water control structures*.
- Temporary *access roads* should follow the *contour* as much as possible. Grades can run up to 25% for short distances provided that *water control structures* are properly installed.
- Except for planned stream crossings, locate new roads outside of SMZs.
- Minimize stream crossings. Where crossings are necessary, see Section 3.3, page 30.
- Minimize the number, length, and width of *access roads*.
- Locate new *access roads* on high ground, preferably on the sides of ridges, for proper surface drainage.

- Locate new *access roads* on southern or western sides (*aspect*) of ridges if possible, to expose the roadbed to more sunlight.
- Conduct site reconnaissance to verify road layout with potential soil problems, stream locations, sensitive areas (see Section 7.4, page 57), and *watershed* conditions.
- Evaluate the condition of existing roads and potential water quality impacts. If necessary, plan for improvements or replace with new routes.

3.2 BMPs FOR ROAD CONSTRUCTION

- Construct *access roads* only wide enough (usually 12-16 feet) to safely handle equipment that will use the road.
- Schedule construction during favorable weather.
- Maximize sunlight exposure along roadsides where surface drainage is a problem.
- On permanent *access roads* with three percent or more grade, *broad-based dips* should be installed at proper intervals; at 30-degree angles across road surfaces; have reverse grades of three percent; and the bottom of the dips should be *outsloped* about three percent. If necessary, outfall of dips may need *sediment* barriers such as rock, hay bales, or *silt fence* installed. (See Figure 3-A for a schematic of a *broad-based dip* road and Table 3-A for recommended spacing of dips.)
- On temporary access or spur roads that have little traffic at low speeds, rolling dips can be installed. They resemble “stretched out” *water bars*. See Figure 3-B and Table 3-A for spacing.

Figure 3-A: Recommended Spacing for Broad Based Dips in Permanent Access Roads and Rolling Dips in Temporary Access Roads





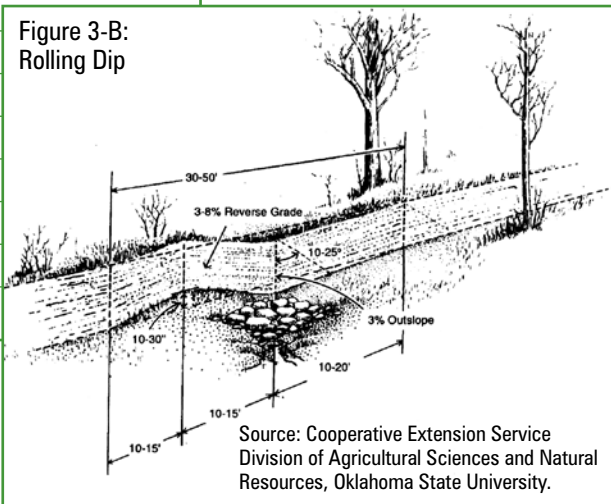
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Road Grade (percent)	Distance Between Dips and Turnouts (feet)
3	235
4	200
5	180
6	165
7	155
8	150
9	145
10	140
12	135

Table 3-A:
Recommended spacing for Broad-
based Dips in Permanent Access
Roads and rolling Dips in Temporary
Access Roads

Figure 3-B:
Rolling Dip



- On *crown and ditched* roads, install *water turnouts* at proper intervals. See Figure 3-C and Table 3-B. Turnouts should never tie directly into streams or water bodies. If necessary, outfall of turnouts may need *sediment* barriers such as rock, hay bales, or *silt fence* installed.

Figure 3-C: Design and Installation of Turnouts

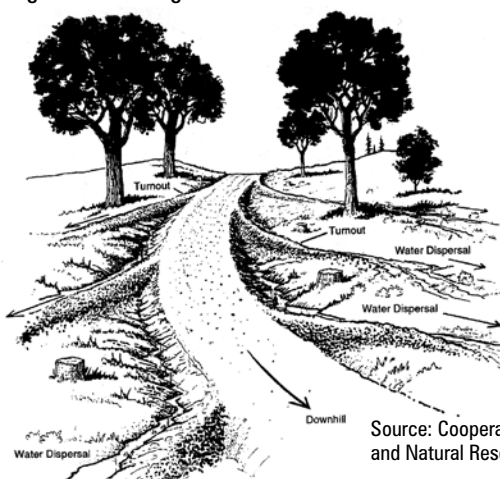


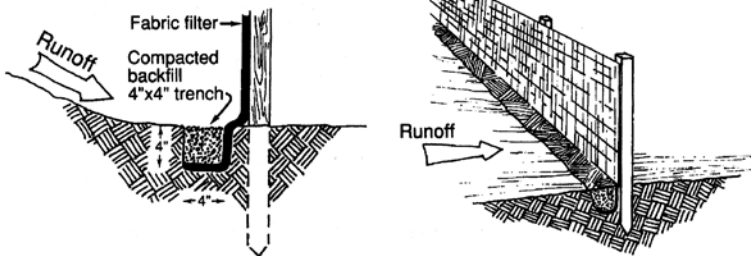
Table 3-B: Spacing of Turnouts

Road Grade (percent)	Spacing (feet)
2 – 5	500-300
6 – 10	300-200
11 – 15	200-100
16 – 20	100

Source: Cooperative Extension Service Division of Agricultural Sciences and Natural Resources, Oklahoma State University.

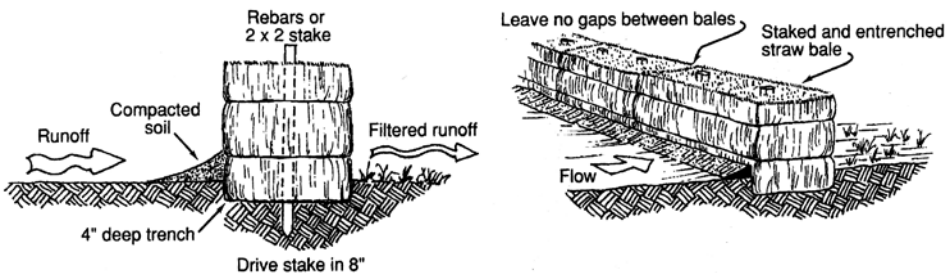
- Keep roads free from obstructions and *logging debris*.
- Roadbeds on erosive soils should be stabilized with appropriate measures.
- Stabilize exposed soil on shoulders of permanent or temporary *access roads* located within SMZs, *wetlands* or at stream crossings as soon as possible with any one or combination of the following: seed and mulch; *silt fence*; hay bales; *excelsior blankets*; *geotextiles*.
 1. See Section 6.4 for grassing recommendations.
 2. Type A (36 inch) or Type B (22 inch) *silt fence* can be used. Wooden stakes should be fastened to the fence every six feet on the down slope side. The bottom edge of the fence should be installed in a four-inch deep trench with the bottom two inches of the fence facing upslope in the trench. See Figure 3-D.
 3. Hay bales should be placed on sides in four-inch deep trenches and staked down. See Figure 3-E.

Figure 3-D: Silt Fence Installation



Source: Bureau of Forestry, Wisconsin Department of Natural Resources

Figure 3-E: Installation of Hay Bales



Source: Bureau of Forestry, Wisconsin Department of Natural Resources

- For more information refer to Georgia Soil and Water Conservation Commission's Field Manual for Erosion and Sediment Control in Georgia, page 79.



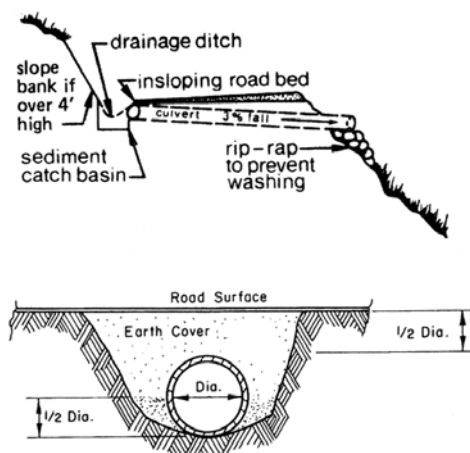
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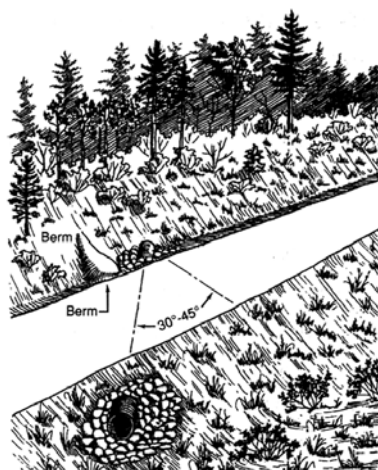
3.2.1 Practices to Avoid during Road Construction

- Road construction inside the SMZ, except at planned stream crossings.
- Insloping of roads. Where unavoidable, use *cross-drain culverts* positioned under the road at a 30 degree angle and spacing as in Table 3-B for proper inside road drainage. Place *riprap* at *culvert* outfall to prevent washing. See Figure 3-F.
- Using *ditches* on steep roads. Some *ditches* may have to be lined with rock to prevent *gully*ing and sedimentation.
- Turnouts tied directly into *perennial* and *intermittent streams* or *ephemeral areas*.

Figure 3-F: Cross-drain Culvery Design and Installation



Source: Georgia Forestry Commission



Source: Bureau of Forestry, Wisconsin
Department of Natural Resources

3.3 STREAM CROSSINGS FOR ROADS

Stream crossings are often necessary for access to forestlands. From a water quality standpoint, stream crossings are the most critical aspect of the road system. Failure of a stream crossing, due to improper planning or construction, can result in *erosion* and introduction of *sediment* into a stream, adversely affecting water quality.

Where crossings are necessary, planning should address the type of road and road-use pattern, stream *channel* characteristics, stream flow levels and the aquatic organisms in the stream. Minimizing impacts is critical. Permanent and temporary stream crossings should be based on expected applicable

storm-flow return intervals and *watershed* acreage above the crossing. See Table 3-C, page 34.



3.3.1 Clean Water Act Provisions and Requirements for Stream Crossings

The Federal Clean Water Act, Section 404, (40 CFR Part 232.3), exempts normal, established, ongoing *silvicultural* activities from the permitting process for discharges of dredged or fill material in jurisdictional *wetlands*. However, fifteen (15) baseline provisions for forest road construction and maintenance in and across *waters of the U.S.* (lakes, rivers, *perennial* and *intermittent streams*, *wetlands*, *sloughs* and natural ponds) are mandated to qualify for the forest road exemption:

1. Permanent roads, temporary access roads and *skid trails* (all for forestry) in *waters of the U.S.* shall be held to the minimum feasible number, width and total length consistent with the purpose of specific *silvicultural* operations, and local topographic and climatic conditions;
2. All roads, temporary or permanent, shall be located sufficiently far from streams or other water bodies (except for portions of such roads that must cross water bodies) to minimize discharges of dredged or fill material into *waters of the U.S.*;
3. The road fill shall be bridged, *culverted* or otherwise designed to prevent the restriction of expected flood flows;
4. The fill shall be properly stabilized and maintained during and following construction to prevent *erosion*;
5. Discharges of dredged or fill material into *waters of the U.S.* to construct a road fill shall be made in a manner that minimizes the encroachment of trucks, tractors, bulldozers or other heavy equipment within *waters of the U.S.* (including adjacent *wetlands*) that lie outside the lateral boundaries of the fill itself;
6. In designing, constructing and maintaining roads, vegetative disturbances in the *waters of the U.S.* shall be kept to a minimum;
7. The design, construction and maintenance of the road crossing shall not disrupt the migration or other movement of those species of aquatic life inhabiting the water body;
8. Borrow material shall be taken from upland sources wherever feasible;
9. The discharges shall not take or jeopardize the continued existence of a threatened or endangered species as defined under the Endangered Species



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- Act, or adversely modify or destroy the critical habitat of such species;
10. Discharges into breeding and nesting areas for waterfowl, spawning and *wetlands* shall be avoided if less harmful alternatives exist;
 11. The discharge shall not be located in the proximity of a public water supply intake;
 12. The discharge shall not occur in areas of concentrated shellfish production;
 13. The discharge shall not occur in a component of the National Wild and Scenic River System;
 14. The discharge of material shall consist of suitable material free from toxic *pollutants* in toxic amounts; and,
 15. All temporary fills shall be removed in their entirety and the area restored to its original elevation.

Note: The ultimate determination of whether activities are exempt can only be made by the US Army Corps of Engineers and the US Environmental Protection Agency.

There are three types of stream crossings to consider in forest management operations: bridges, *culverts*, and fords.

Bridges, whether permanent or temporary, typically create the least disruption to stream flow and have less effect on fisheries than other stream-crossing methods.

Culverts can be either temporary or permanent. *Culvert* sizing is critical to minimizing problems. Consider both the purpose of the crossing and the duration of use. Sizing may increase if the need is permanent.

Fords can be used for haul roads only where the streambed is firm, banks are low and stable and the stream is shallow.

3.3.2 General BMPs For Stream Crossings

In addition to the 15 CWA mandated provisions

- Approaches to all permanent or temporary stream crossings should be made at gentle grades of slope (three percent or less) wherever possible.
- Approaches should be made at right angles to stream flow where practical.
- Approaches should have *water control structures*, such as *water turnouts* or *broad-based dips*, on both sides of a crossing to prevent road runoff from

entering the stream.

- If necessary, approaches should be stabilized with rock extending at least 50 feet from both sides of the streambank during the operation.
- For temporary *access roads*, temporary bridges or spans are favored over *culverts* or fords.
- Wetlands fill roads should be built outside the SMZ, except when crossing the channel. Cross-drainage structures (*culverts*, bridges, portable spans, etc.) may be necessary in the fill road to allow for surface water movement across the site.
- Exposed soil around permanent or temporary stream and wetlands crossings should be stabilized with any one or a combination of the following: seed and mulch; hay bales; rock; *silt fence*; *geotextiles*; and/or *excelsior blankets*. (See Section 3.2, page 27)

3.3.3 Specific BMPs for Bridges

- Use bridges to cross streams with 300 + acre or larger *watersheds* if other alternatives are not suitable for containing storm flows.
- Remove temporary bridges and stabilize approaches and streambanks when operations are completed.

3.3.4 Specific BMPs for Fords

- Use fords only for haul roads (not *skid trails*).
- Locate fords where stream banks are low and the bottoms are relatively hard and level.
- Where necessary, establish a smooth, hard-surface, low water crossing. For a permanent ford use gravel or rock filled *geowebb*, or concrete pads. For temporary fords use dragline mats or logs to armor (protect) the stream bottom.
- Material should not significantly impound stream flow, impede fish passage or cause erosive currents. Remove temporary crossings from the *channel* when operations are completed.

3.3.5 Specific BMPs for Culverts

- Where fords or bridges are not appropriate, use *culverts* to cross streams with approximate 300-acre or less watersheds, depending on physiographic region, including *braided streams* in broad flats. See the figure on the



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inside cover of this manual.

- When crossing streams with a *watershed* larger than 300 acres, consult a *qualified professional*.
- Size permanent *culverts* so that the cross-sectional area will accommodate expected 25-year, 24-hour storm flows. See Table 3-C for recommended diameters.
- Size temporary *culverts* so that the cross sectional area will accommodate the two-year, 24-hour storm flows. See Table 3-C for recommended diameters.

Table 3-C: Recommended Diameters for Permanent/Temporary Culverts

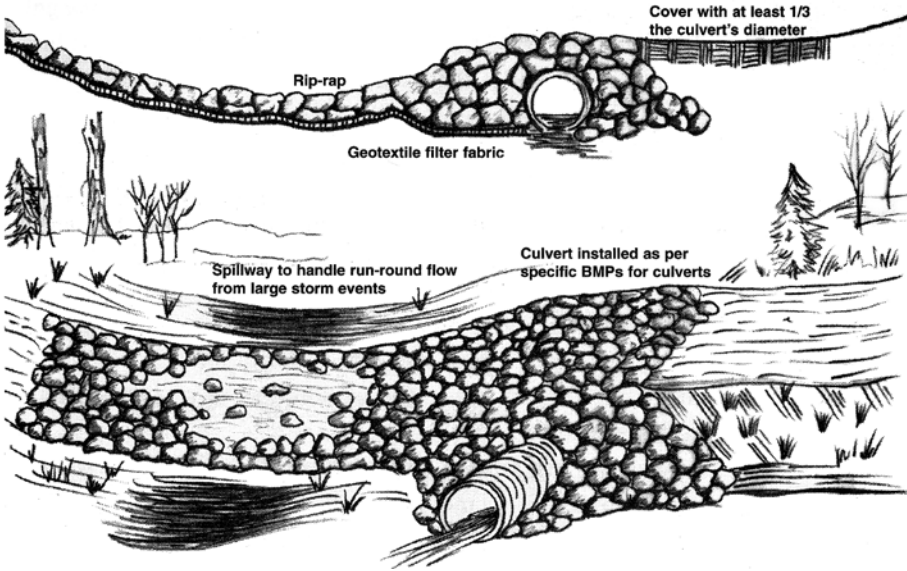
Drainage Area (acres)	Lower Coastal Plain (inches)	Upper Coastal Plain (inches)	Piedmont (inches)	Mountains and Ridge and Valley (inches)
PERMANENT BASED ON 25-YEAR, 24-HOUR STORM FLOWS)				
10	24	15	30	24
50	36 or (2-30")	18	48 or (2-36")	48
100	48	24	54 or (2-42")	60 or (2-48")
200	60	36	72 or (2-54")	72
300	2-48"	54	84 or (2-60")	78 or (2'60")
Drainage Area (acres)	Lower Coastal Plain (inches)	Upper Coastal Plain (inches)	Piedmont (inches)	Mountains and Ridge and Valley (inches)
TEMPORARY BASED ON 2-YEAR, 24-HOUR STORM FLOWS)				
10	15	15	18	15
50	18	15	30	24
100	24	18	36	30
200	30	24	42 or (2-30")	36
300	48	30	48	42

Under normal conditions, two alternative methods are acceptable:

1. Smaller multiple *culverts* can be substituted to provide for the same cross-sectional area of pipe required as shown in the table above.
2. A combination of a smaller *culvert*(s) with rock surfaced road dips constructed in the roadbed to handle the run-around flow from larger storm events.

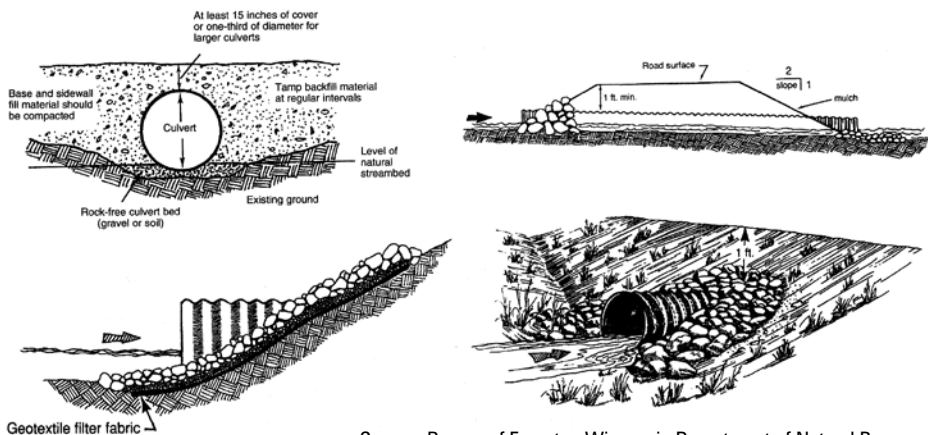
See Figure 3-G.

Figure 3-G: Combination of Smaller Culvert and Rock Surfaced Road Dip



- Culverts less than 15 inches in diameter are not recommended.
- Multiple *culverts* should be spaced a distance of at least 1/2 the *culvert's* diameter apart.
- Place the *culvert* in a straight section of the stream, free of obstructions.
- Place the bottom of the *culvert* at the same elevation as the bottom of the stream. (See Figure 3-H, page 35, for proper *culvert* installation.)

Figure 3-H: Stream Culvert Installation with Specifics of Slope, Placement, Fill, etc.



Source: Bureau of Forestry, Wisconsin Department of Natural Resources



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- Place fill dirt around the lower half of the *culvert* and pack during installation.
- Place at least 15 inches or at least 1/3 the *culvert*'s diameter, whichever is greater, of fill dirt over the top of the *culvert* so that the fill over the *culvert* is the high spot in the stream crossing. This creates an emergency run-around for high flows.
- The *culvert*'s ends should be long enough to achieve no more than a 2:1 slope on the fill.
- Stabilize fill at ends of a *culvert* with *riprap*, geoweb, *excelsior blankets*, *gabions*, headwalls, grass seed and mulch, hay bales, etc.
- Periodically inspect *culverts* and remove any debris inside.
- Remove all temporary *culverts* and fill material used in stream or wetland crossings and stabilize streambanks when operations are completed. (See Section 3.2 for stabilization recommendations.)

3.3.6 Practices To Avoid When Constructing Stream Crossings

- Using steep approaches greater than three percent into the stream *channel*.
- Crossings at bends in the stream.
- Using fords in streams for *skid trails*.
- Constructing hard surface crossings on streams with mucky, muddy or unstable bottoms.
- Using asphalt materials for low-water crossings.
- Anything that impedes the free or expected flow of water.
- Temporary crossings of logs and brush "topped" with soil.
- Using undersized *culverts*.

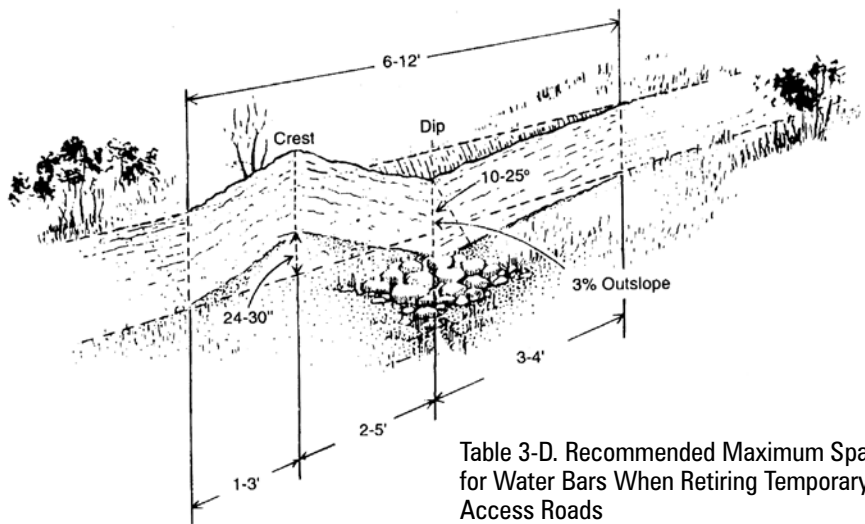
3.4 BMPs FOR THE MAINTENANCE AND RETIREMENT OF ROADS

- Maintain existing roads in accordance with BMPs.
- Maintain points of ingress from county roads or highways to prevent the introduction of mud and debris onto these roads.
- Minimize road grading and reshaping on hilly or mountainous terrain unless required to repair damaged road sections.
- Keep outfall of *broad-based dips*, *water bars*, and *water turnouts* open at all times during logging operations. If necessary, install *sediment* barriers such as rock, hay bales, or *silt fence* just below outfall.
- Retire temporary *access roads*, *log decks*, *skid trails*, by re-shaping and/or

constructing *water bars* at recommended intervals. Stabilize as necessary by seeding and *mulching* or scattering *logging debris* over the road surface. (See Figure 3-I and Table 3-D for spacing recommendations.)

- Periodically inspect retired roads to assure stabilization techniques are still effective and permanent stream crossings are clear and operating properly.

Figure 3-I: Profile of Retired Temporary Access Road Showing Water Bars



Source: Cooperative Extension Service
Division of Agricultural Sciences and Natural
Resources, Oklahoma State University

Table 3-D. Recommended Maximum Spacing
for Water Bars When Retiring Temporary
Access Roads

Road Grade (percent)	Distance Between Water Bars (feet)
2	245
5	125
10	80
15	60
20	50
25	40

3.4.1 Practices To Avoid During Road Maintenance and Retirement

- Excessive traffic on wet roads.



Section 4.0

Timber Harvesting

Timber harvesting encompasses several operations. In addition to cutting trees, it typically includes the layout of *access roads*, *log decks*, and *skid trails* and the construction and stabilization of these areas. Timber harvesting can be accomplished while protecting water quality and site productivity and improving the composition and quality of future forests. Evolving timber harvesting technology, equipment, and procedures will provide for better protection of Georgia's waters.

Potential water quality impacts can be avoided or minimized if the harvest plan addresses seasonal weather conditions, stand composition, soil type, soil moisture, topography, and type of equipment used. In order to maintain the integrity of stream banks, water flow, and stream biology, it is important to stay out of streams. Specific BMPs for *log decks* and *skid trails* are provided in this section. BMPs for roads are presented in Section 3.

4.1 LOG DECKS

Log decks, also called brows and landings, are areas of concentrated equipment and traffic resulting in a high degree of soil disturbance, soil compaction, and rutting. Storm water runoff and surface *erosion* may increase on these exposed areas and, depending on their locations, could impact water quality. Runoff may contain toxic materials from fuels and lubricants. The following BMPs should be implemented to prevent runoff from reaching nearby watercourses.

4.1.1 BMPs for Log Decks

- Locate *log decks* when planning the road system.
- Minimize the number of *log decks* necessary for the operation.
- Minimize the size of *log decks* to minimize the affected area.
- Locate *log decks* uphill and *skid* up to them. This results in a cone-shaped pattern of *skid trails*, which disperses water running downhill. If trees must be skidded downhill, *erosion* can be minimized using smaller *log decks* with fewer, shorter and less-traveled *skid trails* leading to any one deck. To disperse water, install *water bars* with *water turnouts* in *skid trails* prior to final approach to deck.
- Locate *log decks* in a stable, well-drained area away from gullies when possible.
- When the harvest is completed, stabilize as needed, using *water bars*, logging slash or vegetative cover. (See Section 6.4 for seeding recommendations.)

Control and minimize site-damaging effects to soil stability and water quality, such as rutting, puddling and compaction from harvest equipment.

⊘ **4.1.2 Practices to Avoid for Log Decks**

- Locating *log deck* within the SMZ.
- Allowing decks to concentrate storm runoff onto roads, trails, etc. leading to a watercourse.

4.2 SKID TRAILS

Skid trails are for temporary use during the timber harvest. You should strive to control and minimize site-damaging effects to soil stability and water quality, such as rutting, puddling, and compaction from harvest equipment. If trails will remain after the harvest for vehicular access, upgrade them to road building standards.

4.2.1 BMPs for Skid Trails

- *Skid* uphill to *log decks* on ridges or hills.
- Have periodic breaks in grade to help disperse surface flow.
- Use temporary closure techniques, such as *water bars* or covering with logging slash, if significant *erosion* may occur before permanent closure techniques are installed.
- Retire, as needed, as soon as possible with properly installed *water control structures*. For *water bars* see Figure 3-I, page 37, and Table 4-A for proper spacing.
- When grades exceed 15%, use *water bars* with *water turnouts*.

Table 4-A. Spacing of Water Bars on Skid Trails and Firebreaks

Grade of Skid Trail or Firebreak (percent)	Distance Between Water Bars (feet)
2	250
5	135
10	80
15	60
20	45
25	35
40*	30

* Use grades of 40% and steeper only for short stretches.

⊘ **4.2.2 Practices to Avoid With Skid Trails**

- Trails over 40% grade except for short stretches.
- Bladed trails unless required on side slopes to create the appropriate grade for safe operations.
- Using stream and drains with defined *channels* as *skid trails*.
- Main *skid trails* within SMZs.



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Timber Harvesting

4.3 SKID TRAIL STREAM CROSSING

In certain situations, crossing a stream with a temporary *skid trail* may be preferable to a permanent road crossing. Factors to consider include the value of the timber to be accessed relative to the cost of a permanent crossing, topographic features limiting construction of permanent crossings, and the size of the stream and/or the upstream watershed. Regardless of the factors, the considerations for protecting water quality are critical to maintain the integrity of the stream bank, to use water-permeable fill materials that are easy to recover in the restoration process, and to minimize the amount of fill dirt entering the stream.

4.3.1 BMPs For Skid Trail Stream Crossings

- Follow Federal mandates. (See Section 3.3.1, page 31)
- Minimize the number of crossings.
- Cross stream at right angles.
- Maintain stream bank integrity.
- Approach streams at gentle grades of slope, ideally at less than three percent.
- Use of temporary bridges or spans rather than temporary *culverts*.
- If temporary *culverts* are used, make sure they are properly sized for the *watershed*. (See Table 3-C, page 34.)
- Stabilize *culvert* fill during and after construction using any one or a combination of: hay bales; seed and *mulch*; *silt fence*; rock; *excelsior blankets*; *geotextiles*; etc. (See Section 3.2, page 27)
- Use logs or stems as fill over temporary *culverts* instead of fill dirt whenever possible.
- Remove all temporary fills and restore the *channel* to its original elevation. Stabilize approaches during and after construction.



4.3.2 Practices to Avoid For Skid Trail Stream Crossings

- Stream crossings whenever possible.
- Use of fords.
- Blocking stream flow.
- Blocking the migration of aquatic organisms.
- Using *sloughs* as *skid trails*.



Portable steel bridge

- Random crossings with mechanized equipment.
- Leaving logs or stems in stream crossing.

4.4 RUTTING

During harvesting, some soil disturbance and rutting is inevitable, due to the mechanized nature of most harvesting systems. Excessive or inappropriate rutting can impact water quality when it causes *sediment* or silt-laden runoff to enter a stream or when it interrupts or changes the natural flow of water to the stream. Rutting that results in the discharge of *sediment* to a stream may violate federal and state water-quality laws.

4.4.1 BMPs to Minimize Rutting

- Use low ground pressure equipment, logging mats, or other techniques on saturated soils where practical.
- Minimize the grade of *skid trails*.
- Follow the BMPs recommended for *skid trails* in Section 4.2, page 39.

4.4.2 Practices to Avoid For Rutting

- Facilitating the potential movement of *sediment* to a stream or water body.
- Breaking down the integrity of a stream bank.

4.5 EQUIPMENT WASHING AND SERVICING

Improper equipment washing and servicing can introduce hazardous or toxic materials to the harvest site, which can affect water quality.

4.5.1 BMPs for Washing and Servicing Equipment

- Wash and service equipment away from any area that may create a water



Natural pole bridge



Portable timber bridge



Section 4.0

Timber Harvesting

quality hazard, especially within SMZs and along *ephemeral areas*.

- Dispose of oils, lubrications, their containers and other wastes according to local, state and federal regulations.
- Remove all used tires, batteries, oil cans, and trash from logging operations before leaving the site.
- Clean up and/or contain fuel and oil spills immediately. Comply with state and federal regulations when reporting spills. Report any fuel, oil or chemical spills to the DNR EPD HAZARDOUS SUBSTANCES OFFICE. (1-800-241-4113)

⊘ 4.5.2 Practices to Avoid When Washing and Servicing Equipment

- Washing or servicing equipment where it could affect water quality.

4.6 PROTECTING STREAMSIDE MANAGEMENT ZONES (SMZs) DURING HARVESTING

4.6.1 BMPs for Harvesting Streamside Management Zones

In addition to the BMPs listed in Section 2.1, page 8:

- Use techniques that minimize soil disturbance, such as backing trees out with machine using low ground pressure equipment, using equipment with booms, or cable winch.
- Maintain the integrity of stream banks.
- Minimize the exposure of mineral soil by spreading logging slash and using it to drive over.

⊘ 4.6.2 Practices to Avoid When Harvesting Within SMZs

In addition to the avoidance guidelines listed in Section 2.1, page 8:

- Using trees or de-limbing gates in the SMZ.
- Leaving tops in stream *channels*.
- Rutting.

4.7 PROTECTING WETLANDS DURING TIMBER HARVESTING

4.7.1 BMPs FOR HARVESTING FORESTED WETLANDS

In addition to the recommendations in Section 2.2.9, page 23:

- Plan the timber harvest for the dry season of the year when possible.
- Use site-specific equipment and methods to minimize water quality impacts, including high-flotation, low-pressure harvesting equipment, shovel logging or cable yarding.
- Concentrate *skid trails* and use logging slash, mats or other techniques to minimize soil compaction and rutting.
- Use practices conducive to rapid *regeneration*.
- Follow federally mandated stream and wetland crossings. (See Section 3.3.1, page 31.)

4.8 MAT (SHOVEL) LOGGING

- Minimize the width of *skid trail* mats. Mats should not exceed an average 20 feet in width, except for sections of the trail where it is necessary for equipment to pass; in these sections the minimum width may be doubled.
- Minimize the number of *skid trail* mats. Typically, trails should not be spaced closer than 200 feet, on average. Where conditions prohibit tracked machines from operating off the mat and to minimize site disturbance, spacing may be reduced to 50 feet. However, under no conditions should *skid trail* mats exceed 25% of the harvest area.
- Timber for *skid trail* mats should be laid down in the direction of the trail under normal conditions.
- Use only one layer of timber for *skid trail* mats, except where multiple layers are necessary to prevent site disturbance.
- Where multiple layers of timber are necessary to construct the *skid trail* mat and to maximize weight distribution, the bottom layer may be laid down perpendicular to the trail, and may exceed 20 feet in width.
- Merchantable material in *skid trail* mats should be removed after logging operation is complete.
- For stream crossings with *skid trail* mats, refer to the stream crossing section of the BMP Manual.



Section 5.0

Site Preparation and Reforestation

Site preparation facilitates the *regeneration* process and is the first step toward successful *regeneration*. Typical methods prepare harvested and non-forested areas for desired tree species and stocking. *Site preparation* may be used for both natural and artificial forest *regeneration*. Methods chosen should reduce *logging debris*, lessen logging impacts, control competing vegetation, and enhance seedling survival.

The *site preparation* technique used depends on soils, slope, condition of the site, vegetation, crop tree species, cost, location and landowner goals. Analyze the *erosion* potential of the site prior to any *site preparation*. Topography, soil type and residual ground cover determine *erosion* potential.

Topography – The steepness and length of the slope are major considerations when determining the treatment intensity. Intensive treatments that are acceptable in areas of little or no slope may be unacceptable in areas of steep slope.

Soil Type – Soil types or mapping units differ in texture, slope, stoniness, erodibility, wetness or other characteristics that affect the use of the soils by man. Soil surveys describe these limitations as slight, moderate, or severe. Any limitations should receive extra attention in order to prevent soil degradation.

Residual Ground Cover – The amount, species and size of ground vegetation, *logging debris* and other organic matter should be a consideration in prescribing the type and intensity of the treatment.

Site preparation techniques can be grouped into three categories: mechanical, chemical, and *controlled burning*. Combinations of these techniques are common.

5.1 MECHANICAL SITE PREPARATION

Mechanical *site preparation* includes *shearing*, *raking*, subsoiling, *chopping*, *windrowing*, piling, *bedding* and other physical methods to cut, break apart or move *logging debris*, or to improve soil conditions following harvest. This category is often described by its impact on the soil. Methods vary from low intensity to high intensity. High-intensity methods such as disking and *bedding* expose the soil on more than 50% of the site. *Chopping* is a low-intensity method. *Erosion* potential usually increases with higher-intensity methods, especially in areas with steep slope. Therefore, high-intensity methods are appropriate for flat and gentle slopes, used with caution on moderate slopes, and avoided on steep slopes. Low-intensity

methods are preferred on moderate to steep slopes.

5.1.1 BMPs FOR MECHANICAL SITE PREPARATION

- Thoroughly plan the *site preparation* before beginning the job to ensure that the best treatment is implemented.
- Use the minimum intensity of *site preparation* required.
- On slopes of 6%-10%, intensive mechanical methods should follow the *contour* of the land.
- On slopes of 11%-20%, mechanical methods other than *chopping* should follow the *contours* of the land. On soils with moderate to severe *erosion* potential, strips of untreated areas or *windrows* should be left to slow water and soil movement down the slope.
- On slopes of 21%-30% with severely erosive soils, use only low-intensity mechanical methods that follow the *contour*. Drum *chopping* should be perpendicular to the slope.
- On slopes greater than 30%, use only hand tools (chain saw *felling*).
- Where accelerated *erosion* is likely, use methods that leave *logging debris* and other litter scattered evenly over the site.
- When constructing beds on slopes greater than five percent, follow land *contours*.
- Protect forest floor and limit soil disturbance in stabilized gullies that are not eroding.

⊘ 5.1.2 Practices to Avoid During Mechanical Site Preparation

- Any mechanical methods except drum roller *chopping* or spot cultivation on slopes greater than 30%. Drum *chopping* should not follow the *contour*.
- Intensive mechanical methods on slopes greater than 20% with severe *erosion* potential.
- *Windrow* construction that could direct runoff into waterways.
- Mechanically preparing sites when soils are saturated.
- Mechanical methods in SMZs.
- Blocking any drainage with beds, *windrows*, or similar structures.
- *Bedding* that channels surface runoff into waterways and roadbeds.
- Moving soil into *windrows* and piles.
- Re-activating stabilized gullies.



Section 5.0

Site Preparation and Reforestation



5.2 MECHANICAL SITE PREPARATION IN WETLANDS

Forested *wetlands* offer unique challenges for *site preparation*. The EPA and Army Corps of Engineers have determined that major drainage in jurisdictional wetlands will require a Section 404 permit from the Army Corps of Engineers. Also a 404 permit may be required for mechanical *site preparation* for pine establishment in the following forested wetland types, unless they no longer exhibit their unique distinguishing characteristics due to past practices:

- 1. Permanently flooded, intermittently exposed and semi-permanently flooded wetlands:** Examples include Cypress-Gum Swamps, Muck and Peat Swamps, and Cypress Strands/Domes.
- 2. Riverine Bottomland Hardwood wetlands:** Seasonally flooded or wetter bottomland hardwood sites within the first or second bottoms where overbank flooding has resulted in alluvial features such as natural levees. Soils are listed in NRCS surveys as poorly or very poorly drained. Bottomland hardwoods do not include sites in which greater than 25% of the canopy is pine.
- 3. White Cedar Swamps:** *Wetlands* greater than one acre in headwaters and greater than five acres elsewhere, underlain by peat of greater than 40 inches, where natural white cedar represents more than 50 % of the *basal area* and where the total *basal area* for all tree species is 60 square feet or greater.
- 4. Carolina Bay wetlands:** Oriented, elliptical depressions with a sand rim, either underlain by (a) clay-based soils and vegetated by cypress or (b) peat of greater than 20 inches and typically vegetated with an overstory of Red, Sweet, and Loblolly Bays.
- 5. Non-riverine Forest wetlands:** Rare, high quality (undisturbed) wet forests, with mature vegetation, located on the Southeastern coastal plain, whose *hydrology* is dominated by high water tables. Two forest community types fall into this group:

Wet Hardwood Forests — interstream flats comprising ten or more contiguous acres typically found on the margins of large peatland areas that are seasonally flooded or saturated by high water tables. Soils are listed as poorly drained mineral soils. Vegetation is dominated (greater than 50% of *basal area*) by mature swamp chestnut oak, cherrybark oak, or laurel oak, alone or in combination.

Swamp Forests — flats comprising five or more contiguous acres found on sites that are seasonally to frequently flooded or saturated by high water tables. Soils are listed as very poorly drained. Vegetation is dominated by

mature bald cypress, pond cypress, swamp tupelo, water tupelo, or Atlantic white cedar, alone or in combination.

Note: Sites dominated by red maple, sweetgum, or loblolly pine alone or in combination are not considered to be of high quality, and therefore do not require a permit.

- 6. Low Pocossin wetlands:** Central, deepest parts of domed peatlands on poorly drained interstream flats, underlain by peat soils greater than 40 inches, typically vegetated by a dense layer of short shrubs.
- 7. Wet Marl Forest:** Hardwood forest *wetlands* underlain with poorly drained marl-derived, high pH soils.
- 8. Tidal Freshwater Marshes:** *Wetlands* with dense herbaceous vegetation located on the margins of estuaries or drowned rivers and creeks regularly or irregularly flooded by freshwater.
- 9. Maritime Grasslands, Shrub Swamps, and Swamp Forests:** Barrier island *wetlands* in dune swales and flats, underlain by wet mucky or sandy soils vegetated by wetland herbs, shrubs, and trees.

These forested wetland areas are more precisely described in an EPA and Corps November 1995 memorandum concerning Application of *Best Management Practices* to Mechanical Silvicultural Site Preparation Activities for the Establishment of Pine Plantations in the Southeast. Consult a *qualified professional* for additional information to determine if one of these wetland types is on a site.

5.2.1 Other Wetlands

Other jurisdictional forested *wetlands* do not require a Section 404 permit if conducted according to the following six federally mandated minimum BMPs.



5.2.1.1 Federally Mandated BMPs for Mechanical Site Preparation in Wetlands

1. Position shear blades or rakes at or near the soil surface. *Windrow*, pile and move logs and *logging debris* by methods that reduce dragging or pushing through the soil to minimize soil disturbance associated with *shearing*, *raking* and moving trees, stumps, brush and other unwanted vegetation.
2. Activities should avoid excessive soil compaction and maintain soil tilth.



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Site Preparation and Reforestation

3. Arrange *windrows* to limit *erosion*, overland flow and runoff.
4. Prevent disposal or storage of logs or *logging debris* in SMZs.
5. Maintain the site's natural *contour* and ensure that activities do not immediately or gradually convert the wetland to a non-wetland.
6. Conduct activities with appropriate water management mechanisms to minimize off-site water quality impacts.

5.3 CHEMICAL SITE PREPARATION

Herbicides are a valuable tool in forest management and are used to control competing vegetation in the establishment and management of natural and planted pine stands. If conducted properly, *herbicide* treatments are acceptable *site preparation* methods on all slopes.

Proper planning and execution are key to safe *herbicide* use. Follow label directions and applicable state and federal laws in the storage, transportation, handling and application of all *herbicides*. Apply *restricted-use herbicides* only under the supervision of a certified *pesticide* applicator.

5.3.1 BMPs For Chemical Applications

- Establish appropriate buffers along *perennial* and *intermittent streams* and flowing bodies of water.
- Consider weather conditions such as temperature, wind speed and *precipitation*, equipment capabilities and *pesticide* formulations to avoid *pesticide* drift into the SMZ.
- Conduct all on-site *pesticide* handling, such as tank mixing, loading and rinsing equipment, away from streams, ponds, wells and roadside *ditches*.
- Dispose of *pesticide* containers and/or excess *pesticides* according to label requirements and local, state and federal regulations.
- Clean up and/or contain all *pesticide* spills immediately and comply with local, state and federal regulations for reporting hazardous materials spills. Report spills to the DNR EPD Hazardous Substance Office (1-800-241-4113).



5.3.2 Practices to Avoid During Chemical Applications

- Applying a *pesticide* directly to water bodies (streams, lakes, and swamps), unless it is specifically prescribed and labeled for aquatic management.
- Broadcast applications of *pesticides* within SMZs.

5.4 SITE PREPARATION (CONTROLLED) BURNING

Controlled fire is often used alone or in conjunction with chemical or mechanical *site preparation* to prepare sites for *regeneration*. A properly executed site prep burn only slightly increases the chance for *erosion*. Fires that expose significant mineral soil on steep slopes, however, may increase *erosion* potential. Other factors also must be taken into consideration. If in doubt about appropriate *site preparation* treatment, consult a *qualified professional*.

5.4.1 BMPs for Site Preparation Burning

- Unless protected by natural barriers, the area to be burned should be protected by *firebreaks* installed following BMP recommendations. (See Section 5.5)
- Moisture levels within the soil, forest fuels and the air should be sufficient to prevent major exposure or damage to the mineral soil, especially on moderate to severely erosive soils.
- Exclude high-intensity *site preparation* fires from the SMZ. Cool, low-intensity, hazard-reduction fires that do not consume the *duff* layer are allowed.

5.5 PRE-SUPPRESSION FIREBREAKS

Pre-suppression *firebreaks* aid in *site preparation* (controlled) burning, *prescribed burning* and in controlling wildfires. Proper planning and BMP implementation for pre-suppression *firebreaks* can minimize *sediment* delivery to surface water. Aerial photographs, topographic maps, or county soil survey maps should be used to locate tract boundaries, streams, *wetlands*, rock outcrops, gullies, cemeteries, etc. that require extra precautions.

5.5.1 BMPs for Firebreaks

- Where possible, use natural barriers such as roads, streams, and fields as *firebreaks*.
- Install *firebreaks* on the *contour* as much as possible.
- When *firebreaks* cannot be installed on the *contour*, use a gradual grade.
- Use bladed or harrowed *firebreaks* instead of plowed *firebreaks* whenever possible.
- On slopes exceeding three percent, install *water bars* with *water turnouts* in *firebreaks* according to the BMP recommendations for *skid trail* retirement. (See Table 4-A page 39.)



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Site Preparation and Reforestation

- Use hand tools or *back blade firebreaks* away from the edge of streams, roads, or *gullies*.
- Install *water bars* and *water turnouts* at approaches to streams, roads, and *gullies* to prevent channeling water from *firebreaks* into these areas.
- Treat active *gullies* the same as streams, using appropriate buffers and plowing practices.



5.5.2 Practices to Avoid During Firebreak Construction

- *Firebreaks* that channel surface runoff into streams, roads, or *gullies*.
- Plowing inside the SMZ.

5.6 REFORESTATION

Reforestation can be accomplished artificially or naturally. Natural *regeneration* and hand planting generally pose less of a threat to water quality than mechanical methods. Complete artificial *regeneration* projects as quickly as practical. A *qualified professional* can provide advice on reforestation choices.

5.6.1 BMPs for Reforestation

- Hand plant on >21% slopes with severely erosive soils.
- Machine plant on the *contour* on slopes between 2% and 20%.



5.6.2 Practices to Avoid During Mechanical Reforestation

- Machine planting up and down slopes greater than five percent.
- Machine planting within SMZs.



Mechanical Tree Planting

Notes:

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Section 6.0

Management and Protection

6.1 PRESCRIBED BURNING/HAZARD REDUCTION

P*rescribed burning* is used to reduce hazardous accumulations of forest fuels, manage competing plant vegetation, improve wildlife habitat and perpetuate certain endangered plant and animal ecosystems. When properly planned and conducted, *prescribed burning* has minimal impacts on water quality. These burns should follow federal, state, county and local regulations.

6.1.1 BMPs for Prescribed Burning

- Follow same BMPs as in 5.4 and 5.5 page 49.

6.2 WILDFIRE SUPPRESSION

Wildfires are suppressed aggressively with the safety of personnel and equipment a primary concern. After suppression, when safety allows, BMPs should be installed during mop up or as soon as possible.

6.2.1 BMPs for Wildfire Suppression Firebreaks

- Locate camps and *staging areas* on upland sites.
- Stabilize areas designated for *water supply points* and dip sites for helicopters to prevent excessive rutting from support equipment.
- Mix and/or handle fire retardants, lubricants, etc. away from streams, ponds, wells and roadside *ditches*.
- Repair wildfire suppression *firebreaks* as soon as practical after the fire is under control to meet BMPs for pre-suppression plowing.

6.3 FERTILIZATION

Forest fertilization is a valuable *silvicultural* practice that enhances tree survival and growth. The primary nutrients applied are nitrogen and phosphorus. Plan any forest fertilization to prevent direct applications and runoff into water bodies. When conducted properly, forest fertilization poses little threat to water quality. Fertilizer applications should not result in the exceeding of state water quality standards for nitrates and phosphorous for lakes. For more information, contact the DNR EPD Water Protection Branch for those standards.

6.3.1 BMPs for Fertilization

- Consider weather conditions (such as temperature, wind speed and *precipi-*

tation) and equipment capabilities to avoid *fertilizer* drift into the SMZ.

- Conduct all on-site *fertilizer* handling, such as mixing and loading, away from streams, ponds, wells and roadside *ditches*.
- Clean up and/or contain all *fertilizer* spills immediately and comply with any local, state and federal regulations for reporting spills of hazardous materials.
- Dispose of *fertilizer* containers and/or excess *fertilizer* according to local, state and federal regulations and label requirements. In case of accidental spills, call 1-800-241-4113.

6.3.2 Practices to Avoid When Applying Fertilizers

- Applying *fertilizer* directly to water bodies (streams, lakes, and swamps) unless specifically prescribed and approved for aquatic management.
- Applications of *fertilizer* within SMZs.

6.4 REVEGETATION AND STABILIZATION OF SITES

Forest management often creates openings in the form of roads, stream crossings, *log decks*, *skid trails*, and *firebreaks*. Establishing a vegetative cover as soon as possible on these sites reduces *erosion* and prevents sedimentation. In addition to protecting the soil, vegetative cover can enhance wildlife habitat. Establishing a vegetative cover may include selecting the proper plant species, preparing the site, liming, fertilizing, seeding and *mulching*. This section provides managers with a variety of seeding mixtures that stabilize sites quickly and also provide benefits to wildlife. Table 6-A on page 54 provides a quick reference to help with the selection and establishment of seeding mixtures. Selection of plant species, establishment methods and maintenance procedures should be based on site characteristics, including climate, soils, *aspect* and land-use objectives.

6.4.1 Land Preparation

Site preparation, such as smoothing or reshaping rutted roads and landings, may be necessary before conventional equipment can prepare seedbeds, which are important for vegetation establishment. Disc *harrowing* and dragging will firm and smooth soil and promote good germination. Heavily compacted areas may require *sub-soiling*, ripping or *disking* to allow water infiltration and to provide a suitable seedbed for root growth.

Table 6-A. Seeding Mixtures for Erosion Control Plantings

Fall Plantings		Planting Date				Wildlife Value	Remarks
Recommended Planting ¹	Seeding ² Rate (lb/acre)	Coastal	Piedmont	Mountains	Fertilizer (lb/acre)		
Ladino Clover ³	5						
Red Clover	10						
Ryegrass	15	September 15 to November 15	September 1 to November 1	August 1 to October 15	500	Excellent	Well drained clayey or loamy soils. Perennial clover can persist for several years. Inoculate clover seed. Maintaining pH above 6.0 is critical.
Rye	30				10-10-10		
Wheat	30						
Crimson Clover	15	September 15 to November 15	September 1 to November 1	September 1 to October 15	500	Excellent	Well drained clayey or loamy soils. Inoculate clover. Tolerates lower soil pH. Disk lightly in September to encourage re-seeding and overseed with wheat.
Hairy Vetch	15				10-10-10		
Wheat	60						
Arrowleaf Clover or Crimson Clover	15	September 15 to November 15	September 1 to November 1	September 1 to October 15	500	Good	Well drained sandy or loamy soils. Inoculate clover. Disk lightly in September to encourage re-seeding of clover and overseed with wheat and rye.
Ryegrass	15				10-10-10		
Wheat	40						
Wheat or Rye	50	September 1 to December 15	September 1 to December 1	September 1 to November 15	500	Poor	Cool season annuals provide value for wildlife during fall and winter of first year. Maintain by mowing for weed control and fall fertilization.
Unhulled Bermuda in sandy soil or Fescue in clayey soil	10				10-10-10		
	25						
Spring Plantings		Planting Date				Wildlife Value	Remarks
Recommended Planting	Seeding Rate (lb/acre)	Coastal	Piedmont	Mountains	Fertilizer (lb/acre)		
Ryegrass	20	Feb. 15 to April 1	Feb. 15 to April 1	March 1 to April 15	500	Excellent	Low maintenance, reseeding annuals. Inoculate Kobe Lespedeza.
Kobe Lespedeza	30				10-10-10		
Bahiagrass	25	March 25 to July 1	April 15 to July 1	XXXXXX	500	Good	Include hulled Bermuda at a rate of 10 lb. per acre on sandy sites. Kobe Lespedeza can be added at 10 lb. per acre to increase wildlife value.
Brown Top Millet	25				10-10-10		
Bermuda grass	10	March 15 to July 1	March 15 to July 1	April 15 to July 1	500	Fair	Does well in dry, sandy sites.
Brown Top Millet	25				10-10-10		
Footnotes for Erosion Control Plantings Table							
1) To maximize wildlife value, avoid plantings with Fescue, weeping love grass, Bermuda grass, and sericea Lespedeza.							
2) Seeding depths should be 1/4 inch unless otherwise noted.							
3) For mixtures including Ladino clover, lime at the rate indicated by soil test or at the rate of 2 tons per acre.							

6.4.1.1 Fertilizer and Lime

A soil test can determine fertility and pH. If a soil test is not available and lime has not been applied in the past three years, apply it at the rate shown in Table 6-B. Lime and *fertilizer* are most efficient when incorporated into the soil. Spread them uniformly over the site prior to land preparation and mix them completely with the soil. Lime takes several months to react with the soil and become fully effective.

Forest soils are typically low in phosphorous and/or potassium and usually require lime. Clovers are not productive in acid sites (below pH 6.0) with low fertility unless *fertilizer* and lime are added.

Table 6-B. Rate of Lime to Use When a Soil Test is Unavailable

Soil Texture	Tons/Acre	Pounds/1000 sq. ft.
Sands and loams	2	100
Clayey, acidic	3	150
Clayey, alkaline	0	0

Base additional applications of lime on soil test recommendations.

6.4.1.2 Seeding and Mulching

Seeding can be done in a number of ways. The most common method utilizes a farm tractor and a broadcast seeder. On steep or severely erosive sites, use a hydroseeder. Seed should be covered by pulling a section harrow, cultipacker, or brush.

Mulch should be used on slopes greater than five percent, on sites where vegetation will establish slowly, or on deep sands or heavy clay soils. Mulch helps prevent *erosion* and allows vegetation to become established. Structural measures such as a diversion, which moves concentrated runoff, usually require mulch. Where there is a danger of mulch being blown or washed off-site, anchor it by running over the mulched area with a disk harrow with the discs set to run straight. On steep slopes, anchor mulch with netting and tack-down staples or spray it with a tackifier.



Section 7.0

Additional Management Objectives

The *Best Management Practices* recommendations in this publication are directed at maintaining water quality, which is critical for the conservation of all natural resources. Forest management practices such as timber harvesting, *site preparation*, tree *regeneration*, and within-stand treatments may be conducted in ways that enhance fish and wildlife habitat, *aesthetics* and recreational opportunities, while accommodating sensitive sites and endangered species. Landowners may have other resource objectives that can be achieved only through the use of practices that vary but are consistent with the protection of water quality. The following comments describe additional management options that landowners may wish to consider.

7.1 WILDLIFE MANAGEMENT

- Compare your current habitat conditions and those on adjacent lands to your wildlife management objectives before making land management decisions.
- Some fish and wildlife species benefit from SMZs wider than the minimum widths specified for water quality BMPs.
- Manage for a diversity of forest types and age classes to enhance wildlife habitat quality.
- Maintain mature mast producing hardwoods in groups or stands.
- Leave corridors of trees connecting mature forest stands to provide food, cover and travel avenues for wildlife while adjacent stands are regenerating.
- Leave snags, dead and down woody debris, brush piles or *windrows* throughout timber harvest areas.
- Use *prescribed fire*, which is one of the most cost-effective forest and wildlife management practices.
- Use wildlife-friendly plantings for *log decks*, roads and *skid trails* following logging operations.
- For more information on any of the above recommendations, contact the Georgia DNR Wildlife Resources Division.

7.2 PROTECTED SPECIES

The University of Georgia Cooperative Extension Service, the College of Agricultural and Environmental Sciences, and the Georgia Department of Natural Resources Wildlife Resources Division have publications with listings.

If you suspect the presence of an endangered species, contact the Georgia Department of Natural Resources Wildlife Resources Division or the U.S. Fish and Wildlife Service for verification and management considerations.

7.3 AESTHETICS

- Consider *aesthetics* during forest management activities and be aware that appearance may influence public opinion.
- Use forest management methods that can minimize visual impacts such as single tree and group selection, *seed tree* and *shelterwood regeneration*, and small patch clearcuts.
- Leave corridors of trees along well-traveled public roads to enhance visual quality.
- Shape harvest areas with natural features of the landscape.
- Re-seed bare soil areas promptly.
- Maintain a mixed tree species composition.
- During artificial *regeneration*, establish tree rows parallel to the road and avoid 90-degree angles.
- Minimize the “skylining” of residual snags and cull trees.
- For more information, see the American Pulpwood Association’s *Forestry Aesthetics Guide, Image and Opportunity*.



Aesthetics can influence public perception of forestry.

7.4 SENSITIVE SITES

- Consider protective management prescriptions for unique cultural (Native American sites), ecological (protected species), archeological (civil war breastworks), geological (rock formations), or historical (old forts and cemeteries) sites. They may need special consideration to manage their values. Contact the DNR.



Section 8.0

Appendix

8.1 FEDERAL LAWS AND REGULATIONS AFFECTING FOREST LANDOWNERS



8.1.1 The Federal Clean Water Act, Section 404, 40 CFR Part 232.3

- Exempts normal, established, on-going, *silvicultural* operations from permitting.
- Requires *silvicultural* operations to adhere to BMPs and 15 baseline provisions for forest road construction and maintenance in and across *waters of the U.S.* (lakes, rivers, perennial and *intermittent streams*, *wetlands*, *sloughs* and natural ponds) in order to qualify for the *silvicultural* exemption from the permitting process. See Section 3.3.1 page 31.
- Requires Army Corps of Engineers permit for the conversion of forested *wetlands* to other uses such as agriculture or development.
- A Memorandum of Understanding dated November 28, 1995, between the Army Corps of Engineers and the U.S. Environmental Protection Agency requires permits for the conversion of specific high-quality bottom land hardwood *wetlands* to pine plantations by mechanical *site preparation* methods. It also mandates the use of six BMPs in other jurisdictional *wetlands*. See Section 5.2.1.1, page 47.
- Provides for civil and criminal penalties up to \$125,000 per day.



8.1.2 USDA Programs

Participation by landowners in various loan, price support, agriculture, forestry incentive and assistance programs subject them to rules and regulations regarding the Federal Farm Bill (Swampbuster and Sodbuster Provisions).

- Prohibits landowners from converting forested *wetlands* to agricultural uses.
- Provides for penalties including program payments plus interest to be paid back from the time of the conversion, loss of benefits and loss of eligibility in future programs.

8.2 STATE LAWS and REGULATIONS AFFECTING FOREST LANDOWNERS



8.2.1 The Georgia Water Quality Control Act (O.C.G.A. 12-5-29)

- Makes it unlawful to discharge excessive *pollutants* (*sediment*, nutrients, *pesticides*, animal waste, etc.) into *waters of the state* in amounts harmful to

public health, safety, or welfare, or to animals, birds or aquatic life or the physical destruction of stream habitats. See Section 1 or glossary for definition of *waters of the state*.

- Provides for civil and criminal penalties up to \$100,000.00 per day.



8.2.2 (Excerpt from Georgia Rules and Regulations for Water Quality Control Chapter 391-3-6-.03 Water Use Classifications and Water Quality Standards) Amended.

General Criteria for All Waters. The following criteria are deemed to be necessary and applicable to all *waters of the state*:

Turbidity. All waters shall be free from *turbidity*, which results in a substantial visual contrast in a water body due to a man-made activity. The upstream appearance of a body of water shall be as observed at a point immediately upstream of a *turbidity*-causing man-made activity. That upstream appearance shall be compared to a point, which is located sufficiently downstream from the activity so as to provide an appropriate mixing zone.

For land disturbing activities, proper design, installation, and maintenance of **best management practices** and compliance with issued permits shall constitute compliance.

Temperature: Not to exceed 90°F. At no time is the temperature of the receiving waters to be increased more than five degrees Fahrenheit above intake temperature, except that in estuarine waters the increase will not be more than one-point-five degrees Fahrenheit. In streams designated as primary trout or smallmouth bass waters by the Wildlife Resources Division, there shall be no elevation of natural stream temperatures. Streams designated as primary trout waters are waters supporting a self-sustaining population of rainbow, brown or brook trout. In streams designated as secondary trout waters, there shall be no elevation exceeding two degrees Fahrenheit natural stream temperatures. Streams designated as secondary *trout streams* are those with no evidence of natural trout reproduction, but are capable of supporting trout throughout the year.

Trout streams are classified in accordance with the designations and criteria established by the Georgia Environmental Protection Division. This list may be updated every two years. For the most current list, visit www.gaepd.org or call the Georgia EPD at 404-656-4708.



Section 8.0

Appendix



8.2.3 The Georgia Growth Planning Act (O.C.G.A. 12-2-8)

- Authorized the Georgia Department of Natural Resources to develop minimum planning standards and procedures that local city and county planning and zoning jurisdictions could adopt and enforce pertaining to the protection of *river corridors*, *mountain tops*, *water supply reservoirs/watersheds* and *wetlands*.
- Requires local governments to use these minimum standards in developing and implementing local comprehensive growth development plans.
- *Silvicultural* practices are exempt from permitting requirements according to the guidelines, but the activity must comply with BMPs within these sensitive areas. The rules for environmental planning for each of these sensitive areas are:



8.2.3.1 Water Supply Reservoir/Watershed (Chapter 391-3-16-. 01)

- Provides local governments criteria to allow development of a *water supply reservoir* or *watershed* without contaminating the water source to a point where it cannot be treated to meet drinking water standards.
- The criteria establishes buffer zones and requirements for land disturbing activities along *perennial streams* and lakes and applies to existing and future *water supply reservoirs* and *watersheds*. See Figures 8-A and 8-B.
- Local governments may exempt specific forestry activities from the stream and lake corridor buffers, provided the activity complies with *Best Management Practices*.

Figure 8-A. Water Supply Reservoir/Watershed Buffer Zones

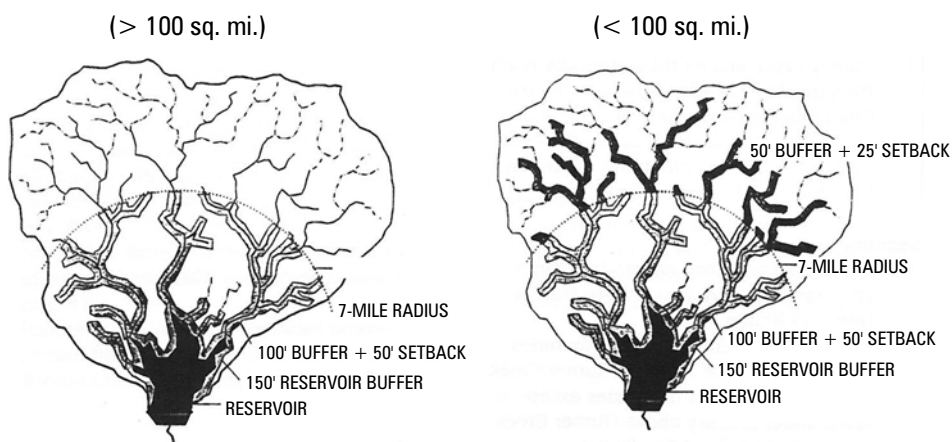
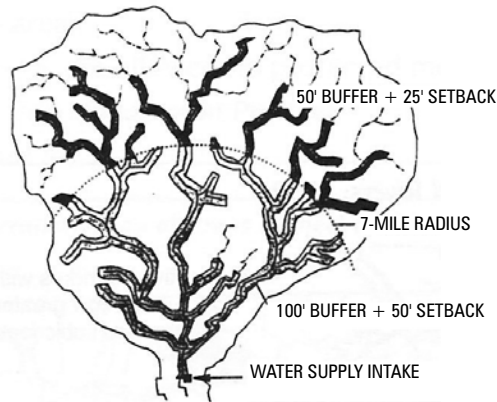


Figure 8-B. Water Supply Intake Watershed (< 100 sq. mi.)



8.2.3.2 Wetlands Protection Act (Chapter 391-3-16-. 03)

- Requires local governments and regional development centers to acknowledge the importance of *wetlands* for the public good in the land-use planning process.
- Where *wetlands* exceed five acres, local governments are encouraged to protect them.
- Timber production and harvesting are considered acceptable uses.



8.2.3.3 River Corridor Protection Act (Chapter 391-3-16-. 04)

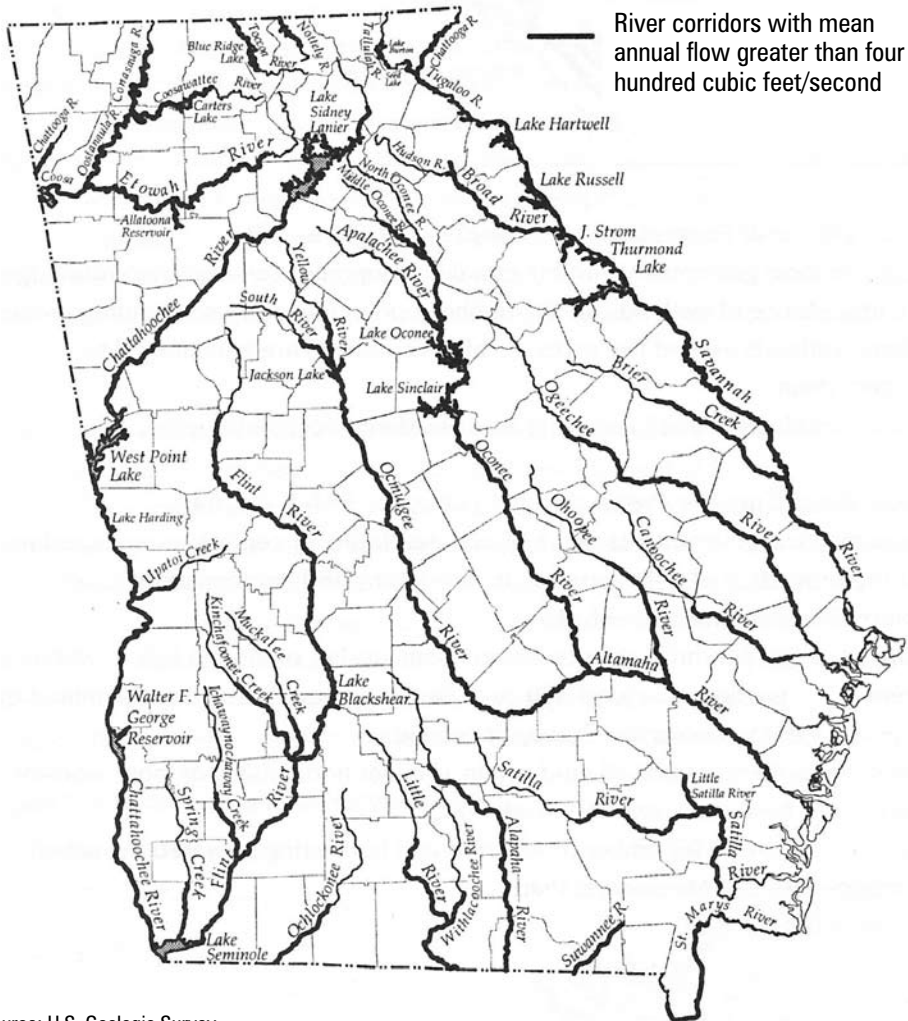
- Requires local governments and regional development centers to use standards for the protection of river corridors in developing and implementing local comprehensive development plans.
- Applies to any *perennial* river or watercourse, at that point and below, where the average annual flow is at least 400 cubic feet per second (cfs) as determined by appropriate U.S. Geological Survey documents.
- Protected buffers include all land within 100 feet horizontally on both sides of the river, as measured from the riverbanks.
- Plans shall allow for timber production and harvesting, provided the activity complies with *Best Management Practices*.
- See map. (Figure 8-C)



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Figure 8-C. State Designated Protected Rivers, 1992



Source: U.S. Geologic Survey



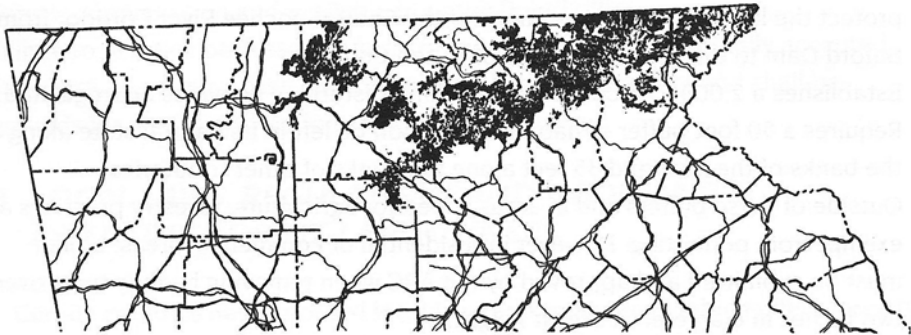
8.2.3.4 Mountain Protection Act Chapter 391-3-16-. 05)

- Requires local governments and regional development centers to use planning standards for the protection of mountain areas in developing and implementing local comprehensive plans.
- Applies to all land area 2,200-feet or more above mean sea level that has a percentage slope of 25 percent or greater for at least 500-feet horizontally,

and shall include the crests, summits, and ridge tops that lie at elevations higher than any such area.

- Forestry practices are allowed on protected mountains, provided the activity complies with *Best Management Practices*.
- See map. (Figure 8-D)

Figure 8-D. Generalized Map of Areas Subject to “Mountain Protection”



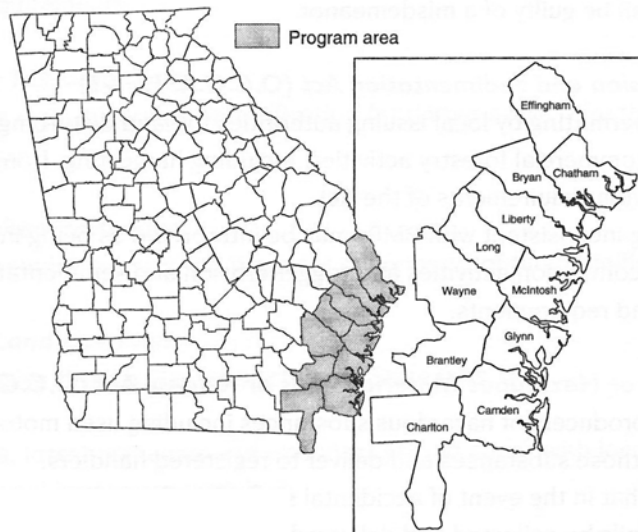
Source: U.S. Geologic Survey



8.2.4 Coastal Management Act (O.C.G.A. 12 -5-260)

- Requires existing authorities in the 11-county coastal area to execute the full range of policies and management techniques identified as necessary for coastal management purposes.
- See map. (Figure 8-E)

Figure 8-E Coastal Zone Management Program Area, 1997



Source: Georgia Coastal Resources Division



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8.2.5 Metropolitan River Protection Act (O.C.G.A. 12-5-440)

- Requires the Atlanta Regional Commission (ARC) to adopt a Plan that would protect the land and water resources of the Chattahoochee River Corridor from Buford Dam to the southwest edge of Fulton County.
- Establishes a 2,000-ft. buffer in which land disturbing activities are regulated.
- Requires a 50-ft. buffer of natural vegetation be left in its natural state along the banks of the river and 35-ft. along the banks of other tributaries.
- Outside of these buffers and in areas zoned for agriculture, forestry practices are exempt from permitting. However in residential or commercial areas, a plan must be submitted and approved by the ARC when removing healthy trees over two inches in diameter at breast height.
- Establishes civil penalties of \$1,000.00 per acre per day or part thereof on which such violation occurs.



8.2.6 Georgia Forest Fire Protection Act (O.C.G.A. 12-6-90)

- Requires any person, firm, corporation, or association entitled to burn any woods, lands, marshes, or any other flammable vegetation, whether in cultivated or uncultivated areas, to notify, prior to burning, and/or obtain a permit from the county office of the GFC wherein such burning is to be made.
- Any person who makes a burn and fails to give notice and/or obtain required permit shall be guilty of a misdemeanor.



8.2.7 Erosion and Sediment Control Act (O.C.G.A. 12-7-1)

- Provides permitting by local issuing authorities for land disturbing activities.
- Exempts commercial forestry activities, including harvesting, from permitting and minimum requirements of the act.
- Harvesting inconsistent with BMPs may be interpreted as being in association with land conversion activities and trigger *Erosion & Sediment* Control permits and requirements.



8.2.8 Oil or Hazardous Material Spills or Release Act (O.C.G.A. 12-14-1)

- Requires producers of hazardous substances including used motor oils or fuels to collect those substances and deliver to registered handlers.
- Requires that in the event of accidental spills, the spill be contained, contaminated soils be collected and delivered to approved waste handling facility, and EPD be notified. (1-800-241-4113)

8.2.9 State Board of Registration for Foresters Standards of Practice (O.C.G.A. 43-1-19) Chapter 220-5.01

- It is the responsibility of each *registered forester* to practice professional forestry in a manner which protects the public welfare and safety and which meets generally accepted standards of practice.
- Generally accepted standards of practice shall include, but are not limited to, adherence to *Best Management Practices* published periodically by the Georgia Forestry Commission and available from the Board office.
- Failure to practice professional forestry in accordance with generally accepted standards of practice shall constitute unprofessional conduct and shall be grounds for disciplinary action as provided for by law.

8.3 LOCAL LAWS, REGULATIONS, AND ORDINANCES AFFECTING FOREST LANDOWNERS

Certain counties have adopted local laws and ordinances, which affect forestry activities. These come under the following categories:

8.3.1 Road Protection

May require permits and bonds before harvesting can begin. The Georgia Forestry Association, the Georgia Forestry Commission and the University of Warnell School of Forestry and Natural Resources Extension Service maintains current list of those counties.

8.3.2 Zoning

Timber harvesting, in other than agriculture zones, may require permits and specific harvesting requirements.

8.3.3 Timber Tax Collection

Certain counties require permits or notification for timber harvest for the collection of timber tax.

8.3.4 Watershed Protection

Some counties require permits and plans for the removal of timber in floodplains.

8.3.5 Local Land Use Plans

See Comprehensive Growth Planning Act under State Laws.

Landowners, forest managers and operators should check with local authorities before undertaking forestry activities.



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8.4 GLOSSARY

Access Road – A permanent or temporary woods road over which timber is transported from a felling site to a public road. Also known as a haul or system road.

Aesthetics – The study or practices designed to maintain the beauty of forests.

Aspect – The compass direction that the slope of the land faces (north, northwest, south, etc.)

Back blading – The practice of laying the bulldozer blade on the ground while operating a crawler tractor or other bulldozer equipment in reverse. This practice is commonly used for smoothing rough soil or for pulling soil or debris away from an area when pushing is not practical.

Backwater paleo channels – Usually well-defined deep channel features that are remnants of earlier river and side channel configurations. Mixed channel substrates (sand, organics, fine sediments). Flow usually backs into these features from the main river. Organic debris is often found piled against the “wrong” side of obstructions.

Backwater swamps – Backwater swamps are wetland areas formed in old overflow channels on the margins of floodplains at the base of the adjacent slopes. They feature wetland vegetation, hydric soils, and fine and organic substrates, but they may show evidence of scour and debris movement.

Basal Area – The area of the cross-section of a tree stem near its base, generally at breast height (4 ½ feet above the ground), inclusive of bark. Expressed in square feet per acre. Stand *basal area* is generally expressed as the total *basal area* per unit area.

Bedding – A site preparation technique in which a small ridge of surface soil is formed to provide an elevated planting or seedbed. It is used primarily in wet areas to improve drainage and aeration for seedlings.

Best Management Practices (BMPs) – Methods, measures or practices to prevent or reduce water pollution, including but not limited to, structural and non-structural controls, operation and maintenance procedures, and other requirements, scheduling, and distribution of activities. Usually BMPs are applied as a system of practices rather than a single practice.

Braided stream – A stream flowing in several dividing and reuniting *channels* resembling the strands of a braid. The divisions are caused by obstruction from sediment deposited by the stream.

Broad-Based Dip – A surface drainage diversion built into the bed of a permanent haul road that consists of a long approach section, a low, out-sloped middle section, and a short terminal section with a reverse grade. They are specifically designed to intercept and divert surface water flow out of a dirt road while allowing vehicles to maintain normal haul speeds. Also called a rolling dip.

Broadcast Burn – A controlled fire within well-defined boundaries to reduce forest fuel hazards.

Brush Barrier – A linear pile of limbs, tops, logs, and other forest debris which is arranged along the lower edge of a road, log deck, or site prepared area to slow, diffuse, or intercept sediment moving off the disturbed site.

Buffer Strip – A transitional area between two different land uses which mitigates the effects of one land use on another. For water quality purposes they are intended to filter surface runoff and trap sediment and associated pollutants before entering water bodies. Some state and local regulations require them.

Canal – A man-made waterbody constructed for the purpose of flood control.

Canopy cover – Indices of percent ground surface shaded by a combination of overstory and midstory trees.

Channel – A natural water-bearing trough cut vertically into low areas of the land surface by erosive action of concentrated flowing water.

Chopping – A mechanical treatment in which vegetation is concentrated near the ground and incorporated in the soil. Chopping may be used to facilitate burning.

Clearcutting – A *silvicultural* system in which all merchantable trees are harvested over a specified area in one operation.

Continuous Side Channels – These less distinct channels and banks flow intermittently and are connected to the main channel network at both ends. The channels often contain mixed substrates (sand, organics, fine sediments).

Commercial Forest land – Forest land bearing or capable of bearing timber of commercial character, currently or prospectively available, and not withdrawn from such use.

Contour – An imaginary line on the surface of the earth connecting points of the same elevation. Also a line drawn on a map connecting points of the same elevation.

Controlled burning (fire) – See prescribed burning

Cross-Drain Culvert – A metal, wooden, plastic or concrete conduit through which ditch flow is directed underneath the road surface to the opposite side of the road.

Culvert – A metal, concrete or plastic pipe, or a constructed box-type conduit through which water is carried under roads or trails.

Discontinuous side channels – Channel features that may or may not be connected, on at least one end, to medium or higher flow energy channels. May have distinct or indistinct channel features, but the channel features disappear and reappear.

Ditch – A man-made feature constructed for the purpose of minor surface water drainage.

Drainage channels – These less distinct channels begin on the floodplain and usually flow intermittently during periods of high water tables via a continuous linear drainage system to the main river. The channels often contain mixed substrates (sand, organics, fine sediments).

Dry Wash – A stream bed that carries water only during and immediately following rainstorms. Sometimes referred to as a gully or ephemeral stream.

Duff – Partially decayed organic matter on the forest floor.

Ephemeral area – Depressions or swales, sometimes called drains, draws, or dry washes, that have no defined continuous channel and that are well-connected to intermittent or perennial streams. Please see page 19 for a more detailed description.

Erosion – The process by which soil particles are detached and transported by water, wind and gravity to a point downslope or downstream.

Estuary – An inlet or arm of the sea where the tide meets the current at the mouth of a river.

Excelsior blanket – A machine produced mat of curled wood excelsior bonded with polymer netting.

Fauna – The animals of a specified region or time.

Felling – Cutting down standing trees.

Fertilizers – Any substance or combination of substances used primarily as a source of plant nutrition or soil amendments.

Firebreaks (Fire Lines) – Artificial barriers that contain fires within an area that typically are established by plowing and/or harrowing.

Floodway and River bottom flats – Area of floodplain with significant water velocities during frequent overbank flows (flows less than the two-year low flow). Evidence of scour and debris movement can be found. The floodway is usually identified on FEMA floodplain maps. Smaller floodway or riparian areas in minor streams are also called river bottom flats.

Flora – The plant of a specified region or time.

Forest Chemicals – Chemical substances or formulations that perform important functions in forest management, including fertilizers, herbicides, insecticides, fungicides and repellents.

Gabion – Large, multi-celled, welded wire or rectangular wire mesh boxes, used in stream *channel* retentions, retaining walls, abutments, check dams, etc to stabilize steep or highly erosive slopes.



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Geotextiles – Fabrics used to improve the load bearing capacity of roads with weak base material.

Geowebb – A heavy-duty polyethylene cellular confinement system used to improve and stabilize structural fill in roads and embankments.

Gully – Narrow ravines, often caused by past land cultivation. Please see page 21 for a more detailed description.

Harrowing (Disking) – A mechanical method of scarifying the soil to reduce competing vegetation and to prepare a site for seeding or planting.

Herbicide – Any chemical or mixture of chemicals intended to prevent the growth of or promote the removal of targeted trees, bushes, and/or herbaceous vegetation.

Humus layer – The organic layer of the soil formed by the decay of organic matter.

Hydric Soils – Soils exhibiting a considerably wet nature, typically characterized by dark or gray mottled colors and associated with wetlands.

Hydrology – The scientific study of the properties, distribution and effects of water on the earth's surface, in the soil and underlying rocks and in the atmosphere.

Inslope – The feature of a road surface, established during construction or maintenance, that slants the roadbed to the inner or uphill side to facilitate drainage of storm runoff from the road in more concentrated flow into a ditch line.

Integrated Pest Management – The maintenance of destructive agents, including insects, at tolerable levels by the planned use of a variety of preventive, suppressive, or regulatory tactics and strategies that are ecologically and economically effective and socially acceptable.

Intermittent stream – A watercourse that flows in a well-defined *channel* during wet seasons of the year but not the entire year. They generally exhibit signs of water velocity sufficient to move soil material, litter and fine debris. Aquatic insects often are difficult to find or not present at all.

Log deck – A place where logs or tree-length material is assembled for loading and transporting.

Logging Debris – The unused and generally unmarketable accumulation of large limbs, tops, cull logs, and stumps that remain after harvesting.

Mulching – Any loose covering of forest soil with organic residues such as grass, straw or wood fibers that checks erosion and stabilizes exposed soil.

Non-point source (NPS) pollution – Water pollution that is (1) induced by natural processes including precipitation, seepage, percolation and runoff; (2) not traceable to any discrete or identifiable facility; and (3) better controlled by using BMPs.

Outslope – The feature of a road surface, established during construction or maintenance, that slants the roadbed to the outer or downhill side to facilitate drainage of storm runoff from the road in more diffuse flow than occurs at dips and water bars. Outsloping is a contrasting road design to the crowned roadbed or to an inslope toward a ditch line.

Perennial Stream – A watercourse that flows in a well-defined *channel* throughout most of the year under normal climatic conditions. Some may dry up during drought periods or due to excessive upstream uses. Aquatic insects are normally present and easily found.

Pesticide – Any chemical substance used to control undesirable insects, diseases, vegetation, animals or other life forms. Herbicides, insecticides, fungicides and nematicides are considered pesticides.

Pollutants – Natural or manmade waste material that contaminates air, soil or water.

Precipitation – Any form of water that falls to the ground from the atmosphere, including drizzle, rain, snow, snow pellets, ice crystals, etc.

Prescribed Burning (fire) – The use of planned fire that is deliberately set under specific fuel and weather conditions to accomplish any variety of management objectives and is under control until it burns out or is extinguished.

Protected Mountain Top – Mountain tops above 2,200-ft. elevation and greater than 25% slope.

Protected River Corridors – One hundred-foot buffers along those rivers at a point and below where the flow is at 400 cubic feet per second (cfs).

Qualified Professional – A person whose training and experience qualifies him/her to make forestry and water quality recommendations. Examples include foresters, hydrologists, soil scientists, forest engineers, fishery and wildlife biologists, or technically trained individuals such as those who have completed the Master Timber Harvesters workshops.

Raking – A mechanical site preparation method to remove trees and shrubs by raking and piling debris. Raking usually moves less soil into windrows than bulldozing.

Regeneration – A young tree crop that replaces older trees removed by harvest or disaster; also the process of replacing old trees with young ones.

Registered Forester – A person who is registered and licensed to engage in professional forestry practices as determined by the Georgia State Board of Registration for Foresters.

Restricted Use Pesticide – A pesticide that is applied only by certified persons for specific uses.

Retirement of Roads – Preparing a road for a long period of non-use by methods including mulching, seeding and installing water bars.

Riprap – Rock or other large aggregate that is placed to protect streambanks, bridge abutments or other erodible sites from runoff or wave action.

Rotation Period – The period of time needed to establish, grow and harvest a crop of trees at a specified condition of maturity.

Sediment – Soil particles that have been detached and transported into water during erosion.

Seed Tree Cut – A timber harvesting method that provides for the natural regeneration of a site by leaving single trees, or small groups of seed-bearing trees, evenly distributed throughout the harvest area. Generally results in an even-aged stand

Seep or spring – A place where groundwater flows slowly to the surface and often forms a pool; a small spring.

Selection cut – Removal of select trees in a forest stand based on some economic or physiological criteria. Generally results in an uneven-aged stand.

Shearing – A mechanical site preparation method of removing large numbers of stems too large for disk or drum chopping. Shear blades, mounted on crawler tractors, are angled or V-shaped, have straight or serrated edges and have a “stinger” for splitting larger trees and stumps.

Shelterwood Cut – Removal of mature timber in a forest stand in a series of harvests that extend over a relatively short portion of the rotation. This cut encourages essentially even-aged reproduction under the partial shade of seed trees.

Side cast – The act of moving excavated material to the side and depositing it.

Silt fence – A lofty web of mechanically or melt bonded polymer netting, monofilament or fibers that are entangled to form a strong and dimensionally stable matrix to catch storm runoff and soil particles.

Silviculture – The science and art of growing forest crops. More particularly, the principles, theories and practices for protecting and enhancing the regeneration, growth, development and use of forests for multiple benefits.

Sinkhole – A geologic feature that may provide a direct connection between land surface and groundwater.

Site preparation – A forest activity to remove unwanted vegetation and other material, and to cultivate or prepare soil for reforestation.



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Skid – The short-distance moving of logs or felled trees along the surface of the ground from the stump to the point of loading.

Skid Trail – A temporary, non-structural pathway over forest soil for dragging felled trees or logs to a log deck.

Slough – A poorly defined *channel* in a swamp, bog, marsh, or riverine system, often without a clearly defined inlet or outlet.

Staging area – An area designated for the concentration of vehicles and equipment for a specific activity.

Streamside Management Zone (SMZ) – A designated area of varying width adjacent to the banks of streams and bodies of water where management practices that might affect water quality, fish, or other aquatic resources are modified.

Sub-soiling – A mechanical site preparation method for ripping apart compact soils or soils with plow pans, hard pans, or fragi-pans under the soil surface.

Thermal Pollution – A temperature rise in a body of water sufficient to harm aquatic life.

Trout stream – A perennial stream and its tributaries inhabited by trout. Streams designated as Primary Trout Waters are waters supporting a self-sustaining population of rainbow, brown or brook trout. Streams designated as Secondary Trout Streams are those with no evidence of natural trout reproduction, but are capable of supporting trout throughout the year.

Turbidity – An optical measurement of water clarity.

Water bar – A hump or small dam-type surface drainage structure used to close abandoned roads, skid trails, and fire lines.

Water Control Structure – Any structure used to regulate surface or subsurface water flows.

Watershed – All land and water within a drainage divide.

Waters of the State – Any and all rivers, streams, creeks, branches, lakes, reservoirs, ponds, drainage systems, springs, wells and other bodies of surface or subsurface water, natural or artificial, lying within or forming part of the boundaries of the state, which are not entirely confined and retained completely upon the property of a single individual, partnership or corporation.

Waters of the U.S. – Includes lakes, rivers, streams (including intermittent streams), mud flats, sand flats, wetlands, sloughs, prairie potholes, wet meadows, playa lakes, or natural ponds.

Water Supply Point – An easily accessible location used to pump water into fire-suppression vehicles.

Water Supply Reservoir/Watersheds – Governmentally owned impoundments of water and the watersheds above such impoundments used primarily to provide water to one or more governmentally owned public drinking-water systems.

Water Turnout – The extension of an access road's drainage ditch or skid trail's or fire line's water bar into a vegetated area to disperse and filter storm water runoff.

Wetlands – Areas inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands possess three essential characteristics: hydrophytic vegetation, hydric soils and hydrology. Wetlands generally include swamps, marshes, bogs, river floodplains, Carolina bays, cypress domes and stringers, pine hammocks and similar areas.

Windrow – Logging debris and unmerchantable woody vegetation that is piled into rows to decompose or be burned.

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1-800-GA-TREES
478-751-3500
www.gatrees.org

Georgia Department of Natural Resources
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4220 International Parkway, Suite 101
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www.fs.fed.us

Natural Resources Conservation Service
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Athens, GA 30601
706-546-2272
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Gainesville, GA 30501
770-297-3000
www.fs.fed.us/conf

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U.S. Environmental Protection Agency
Wetlands, Coastal and Water Quality
Atlanta Federal Center
100 Alabama Street, SW
Atlanta, GA 30303
404-562-9355
www.epa.gov/wetlands/awm

U.S. Army Corps of Engineers
Savannah District
P.O. Box 889
Savannah, GA 31402
912-652-5822
www.usace.army.mil

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The Association of Consulting Foresters
Georgia Chapter
c/o Forest Resource Consultants
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Macon, GA. 31211
478-745-4910
www.acf-foresters.org

The Atlanta Regional Commission
40 Courtland St NE
Atlanta, GA 30303
(404) 463-3100
www.atlantaregional.com

The Conservation Fund
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WATER QUALITY P R O G R A M

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GaTrees.org

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of Georgia's forest resources.*

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ATTACHMENT E

Georgia Power's Avian Protection Program

AVIAN PROTECTION PROGRAM FOR GEORGIA POWER COMPANY

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Environmental Supervisor
DCC Supervisor II
Environmental Analyst I

Land Department
Environmental T&D
Substation Engineering & Design
Data Management Center
Transmission Line Support
Transmission Line Support
Transmission Line Design
Distribution
Substation Maintenance
Distribution Design
Environmental Field Services
Environmental Field Services
Macon Distribution Center
Environmental Field Services

This Avian Protection Program (APP) has been incorporated by reference into *Environmental Health and Safety (EHS) Guideline 104, PROTECTED, THREATENED OR ENDANGERED SPECIES/MIGRATORY BIRDS/AVIAN PROTECTION PROGRAM*, by reference and is therefore approved for use and implementation by all affected Georgia Power departments and organizations.

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SAFETY

SAFETY is FIRST. Nothing in this APP is intended to imply that there is any substitute for safe working conditions for Georgia Power Company personnel or the safety of the public and our customers. Any actions necessary for safe operations should be taken in accordance with standard Company safety procedures.

PURPOSE

Regulatory Basis

All native species of North American birds are covered by the Migratory Bird Treaty Act (MBTA). Its main purpose is to protect migratory birds, their parts, nests, and eggs. Birds excluded by the MBTA include introduced and/or exotic species such as English Sparrows, European Starlings, Rock Doves (Common Pigeons), Non-migratory (upland) game birds (*which are protected by state and federal hunting regulations*), and Monk Parakeets. Eagles are also protected by the Bald and Golden Eagle Protection Act (BGEPA). In addition, many species of native birds are protected by the Endangered Species Act (ESA). These federal regulations contain a common term, “take”. “Take” is defined in 50 CFR 10.12 to include: *Pursue, hunt, shoot, wound, kill, capture, or collect, or to attempt any of these acts.* Violation of any of these regulations can result in criminal or civil enforcement action against individual employees and/or Georgia Power Company (GPC or Company) by federal authorities, depending on the nature and severity of the violation. Examples of migratory bird “takes” investigated by federal law enforcement include such non-hunting violations as: pesticide poisoning, chemical poisoning, fisheries long lines, and gillnets, wind power facilities, electrocution, collision with electrical lines or communication towers, and destruction of active nests.

Benefits of an Avian Protection Program and Management Support

Increased awareness of avian (bird) issues and development of an Avian Protection Program (APP or Program) will benefit Georgia Power Company, our customers, and the species. This will be accomplished by ultimate cost savings, improved power reliability, employee pride, increased customer satisfaction and loyalty, resource protection, positive recognition by resource agencies, and will ensure regulatory compliance.

Implicit in the APP is the support and commitment of Company management to support and implement the Company strategy and to minimize risks. Appropriate resources must be committed, budgets for O&M and Capital fixes must be approved, a system for tracking remedial costs and actions must be maintained and supported, and remedial measures must be implemented on a

timely basis. Cooperation with the resource agencies that results in positive relationships must be maintained. Raptor risk surveys and avian issues must be supported and implemented in retrofit and new construction of transmission, distribution, and substation facilities and other Company projects which may contribute to avian interactions. Above all, the Program must be proactive in setting and implementing Avian Protection guidelines.

Bird Mortality

Bird mortality caused by electrocutions and collisions with power lines has received a great deal of attention in recent years by regulatory agencies, utility personnel, and the public. Positive and proactive attempts by Georgia Power Company to reduce or eliminate these avian interactions are essential to maintaining system reliability and are viewed by the agencies and the public as affirmative indicators of good environmental stewardship. They also demonstrate Georgia Power's commitment to fully comply with, or exceed, all environmental laws and regulations.

Mortalities of large birds due to electrocution on GPC systems, based on the information currently available, are primarily caused by vultures (buzzards) roosting or perching on transmission structures. Raptor mortalities due to electrocution have also been reported from transmission, distribution, and substation equipment. Other bird species have been reported to a lesser extent.

Avian mortalities due to collisions with conductors, guy wires, and overhead ground (static) wires have not been specifically documented on GPC system components, but are known to occur on other utilities' systems and communication systems. It is therefore likely, at least to a minimum extent, some collision mortality may have occurred. GPC has installed spiral vibration dampers to increase visibility on some of our transmission lines, especially along the coastal areas where the Federally Endangered Wood Stork is known to nest and forage.

Bird Nests

Nesting birds have been documented on GPC equipment and structures. Examples of these nests include osprey and great blue heron nests on transmission structures, mourning dove nests on substation transformers, American kestrel nests in hollow transmission cross arms, and various woodpecker species constructing nest cavities in wooden poles. These nests have caused reliability problems and service outages due to the presence of the nest itself and/or contamination from the droppings of the nestlings and parents. Woodpecker nests in wooden poles compromise the structural integrity of the poles. Birds nesting in close proximity to energized equipment also present a safety concern for the parent birds, nestlings, equipment, employees, and the

public. Bird nests that may be problematic from a reliability or safety standpoint must be dealt with in a timely, efficient, and legal manner.

Georgia Power Company Program

The GPC Avian Protection Program is intended to be a dynamic program involving all affected departments. The Program will facilitate communications between the various departments and allow for determining the best solutions for individual problem areas based on engineering, cost, practicality, biological information, and compliance with applicable environmental laws and regulations. The Program also provides information and procedures on reporting avian interactions and mortalities, data management and analysis, design and material standards for new/retrofit work to bird safe structures, handling and disposal of birds and nesting materials as appropriate, procedures for reporting and handling problem nests, and information on obtaining necessary assistance from Company environmental personnel. The Program also addresses training of personnel in all aspects of their responsibilities as defined by the Program and state and federal laws and regulations governing native birds in the United States. In addition, the Program addresses ways in which monitoring and enhancement of avian populations may be carried out as well as addressing opportunities for cooperative projects with state and federal resource agencies and other interested organizations or institutions.

General oversight and management of the Company APP will be accomplished by the Environmental Field Services Supervisor with management support from the Environmental Laboratory Manager and Director of Environmental Affairs. Close coordination and participation by management and line personnel from all areas of Distribution, Transmission, Substation, Land, and any other affected Company operations areas will always be maintained.

Definitions

Avian Interaction – Any condition which involves a direct, and usually adverse, relationship between any species of bird and electrical transmission, distribution, substation, and/or communication equipment such as bird electrocutions, collisions, or nesting activities on or with transmission or distribution structures, energized or non-energized conductors or guy wires, etc. or interruption of electrical service caused by bird activities or contamination of electrical components.

Contamination – Generally refers to fouling of electrical equipment, components, insulators, cross arms, etc. by the droppings of adult and/or juvenile birds. Sometimes is also the result of “streamers”, or bird excrement released at the time of a bird’s take-off or landing.

Raptors – Birds of prey with hooked beaks and talons for grasping and killing prey; includes eagles, hawks, falcons, kites, owls, and osprey.

Raptor-safe - Engineering practices to provide safety for large perching birds is referred to as raptor-safe construction standards. These design standards are consistent with raptor-safe specifications recommended by federal wildlife agencies. *The benefits of raptor-safe engineering practices are realized by many species of large perching birds, and are not confined to raptors as the name might suggest.*

Problem Nest – A nest that may cause electrocution and death to the birds, electrical outage, property damage, or otherwise interfere with power operations.

Occupied (or Active) Nest – A nest with an incubating adult (sitting on eggs), or eggs or young present. These normally occur during the breeding season from approximately February through August.

Threatened and Endangered Species (T&E Species) – Species that are threatened with extinction and protected by federal law (Endangered Species Act). All eagles are also protected by the Bald and Golden Eagle Protection Act.

State T&E Species, Species of Concern, Rare, or Unusual Species – Species that are threatened locally, or are rare or unusual in Georgia.

Imminent Danger – Due to the presence of a bird nest, there is an imminent danger of fire or electrocution to the birds, or imminent danger to human life or property. Imminent Danger is normally considered to be a rare situation.

PROCEDURES

Avian Interaction Reporting

All avian interactions must be reported to Environmental Affairs. Threatened and endangered species and injured birds must be reported immediately. The Region Environmental Representative (RER) will generally be the initial point of contact to report an avian interaction. The Region Environmental Representative will complete the Avian Interaction Report and forward it to Environmental Field Services (EFS).

EFS should be contacted if the Region Environmental Representative is unavailable and in all instances concerning removal or relocation of active or inactive nests. The primary contact person is the Environmental Affairs Supervisor, Environmental Field Services. He must be present on site whenever an active nest is moved or removed unless field personnel are instructed otherwise by him. Salvage (handling) of migratory bird, and especially raptor carcasses, other than eagles, also must be under the direction of the EFS Supervisor according to GPC's U.S. Fish & Wildlife Service (USFWS) permit. The permit contains specific conditions for handling, transport, possession, and disposal of such birds. **The carcass should not be moved or removed until EFS has been contacted and instructions are received.** *Under no circumstances should a Federally Listed Threatened or Endangered Species be handled or moved (Bald Eagle, Wood Stork, Red-cockaded Woodpecker). No attempts to capture injured birds should be made. Report T&E species and injured birds to EFS immediately.* Other EFS personnel should be contacted for assistance if the EFS Supervisor is unavailable. Appropriate EFS and RER contact information will be updated and distributed throughout the Company by both written and electronic means on a recurring basis.

Dead birds entangled in or on lines also present an unfavorable public impression and these instances should be reported to the RER and/or EFS and dealt with as soon as possible.

Documentation

All avian interactions must be reported to Environmental Affairs using the Avian Interaction Report Form. As much information as possible, including photographs and a GPS position, should be collected. Especially important is the location of the interaction. Information such as the "official" line name, nearest structure number(s), switch or equipment numbers, street address, substation name, date, and type of bird is extremely useful. Structure type and configuration is also important to assist in determining if configuration contributed to the mortality. Photographs and additional information may be submitted as an

attachment or separate submission. Salvage and nest relocation situations require additional information for reporting to USFWS. All information will be included in the Avian Interaction database and Geographical Information System (GIS) program to aid in data analysis. The name and contact information of the person finding the bird or familiar with the interaction is the single most important piece of information to be included on the form so that follow-up can be made as necessary.

Interaction reports will be maintained in database format by EFS. A Geographical Information System will be utilized for additional data analysis so that interactions can be plotted on system maps and analyzed for patterns or recurring locations. This will help to determine problem locations by allowing for spatial analysis of existing data.

Information collected from the Avian Interaction Reports and other sources will be utilized to prepare the reports required by the USFWS Migratory Bird Special Purpose Salvage and Depredation Permits. Required reports will be submitted to the USFWS by EFS personnel in accordance with permit conditions.

Dealing with Problem Nests (Existing, Upgrade, & Rebuild Lines)

A problem nest is a nest that may cause electrocution and death to the birds, electrical outage, property damage, or otherwise interfere with power operations. In most cases this will be a raptor nest or nest belonging to one of the larger wading birds such as the Great Blue Heron.

If a nest does not meet these qualifications it is not a problem nest and should be left alone. If a problem is anticipated with a particular nest in the future, action should be taken **before** the nest is occupied.

Nest issues are not always straightforward. On April 15, 2003 the USFWS issued a Memorandum on Nest Destruction that details various technical issues and potential liabilities for "take" when destroying bird nests. These include nest identification as it pertains to T&E species and whether or not the nest is actually active. *If work is to be performed on a structure that is found to be a nesting site, the RER or EFS must be contacted prior to performing work that might adversely affect the nesting birds, except in the case of **Imminent Danger**.*

Prior to taking any action on a problem nest, personnel are required to determine:

1. The bird species using the nest. Is it an eagle, wood stork, or other endangered species?
2. The status of the nest. Is it occupied (active) with incubating or tending adults, eggs, or young present?

Non-Eagle and Non-Endangered Species Nests

Unoccupied Problem Nests

Unoccupied nests may be removed. However, simply removing the nest of a raptor (especially Osprey) may not result in a permanent solution because these birds return to the same location year after year. Several options are available for a more satisfactory long-term solution to the structural problem as well as one which is more environmentally sound. Constructing a nesting platform or modifying the structure to accommodate both nest and power operations usually prevents future complications and minimizes costs. Installation of nest or perch discouragers that have been approved for Company use may also be considered in these instances. EFS is available to provide timely consultations and recommendations for your particular situations and **it is required that you contact EFS prior to any nest relocation or removal activities except in situations of imminent danger.**

Occupied Problem Nests

All occupied nests are protected by the Migratory Bird Treaty Act. The Environmental Affairs Supervisor, Environmental Field Services, holds a Migratory Bird Depredation Permit from the U.S. Fish and Wildlife Service. This permit allows GPC employees, under the direct control, supervision, or employment of the EFS Supervisor to relocate active nests of nonthreatened / nonendangered migratory birds for project purposes. The permit contains specific conditions for such activities. It also contains a requirement for annual reporting of all birds, nests, eggs, or young taken and/or relocated under the terms of the permit. **Instructions for proper nest removal or relocation procedures will be given upon contact with EFS.** *Under no circumstances should a Federally Listed Threatened or Endangered Species or its nest, eggs, or young, be handled or moved (Bald Eagle, Wood Stork, Red-cockaded Woodpecker).* Contact EFS prior to conducting any management activity on an occupied nest of any species except in situations of **imminent danger**.

In the exceptional case of imminent danger, nest material may be trimmed, conductors moved, or other appropriate action taken prior to receiving specific instructions from EFS. Practices to ensure the welfare of eggs or young birds, if present, must be followed. Any action taken on an occupied nest prior to EFS notification is highly unusual, and extreme caution is recommended to protect eggs or young and avoid violation of federal law. EFS should be contacted as soon as possible in these cases so that appropriate instructions may be provided.

When managing an **occupied nest** these actions should be taken:

1. Contact EFS before taking action.
2. EFS will ensure proposed action is in accordance with Permit.
3. EFS will provide guidelines and/or recommendations for management actions which will comply with USFWS Depredation Permit.

Eagle or Endangered Species Nest

Eagle nests on transmission/distribution structures or other electrical equipment have not been documented in Georgia. Likewise, Wood Stork nesting on such equipment has not been documented. Nevertheless, such nests **could** occur. Other T&E avian species in the state are unlikely to nest on structures or electrical equipment or cause a problem if they did. However, that is not to say such a nest can not exist. The American Kestrel (a raptor) is known to utilize the hollow cross arms of some of our structures and has a sizeable population and number of nests in these structures. This bird is being considered for federal listing.

Species lists of Georgia Federally Listed T&E species and maps of their ranges may be found in the Appendices to this document.

All eagle and T&E species and their nests are protected by federal law whether or not the nest is occupied. Violations could result in fines to the Company or individuals involved in any unlawful actions.

EFS is available to provide timely consultations and recommendations for your particular situations and you **must contact EFS prior** to any nest relocation or removal activities for eagle or T&E species except in situations of imminent danger.

In the case of imminent danger nest material may be trimmed, conductors moved, or other appropriate action taken prior to receiving a USFWS permit. Practices to ensure the welfare of eggs or young birds, if present, must be followed. Any action taken on an occupied nest prior to EFS notification is highly unusual, and extreme caution is recommended to protect eggs or young and avoid violation of federal law. EFS should be contacted as soon as possible in these cases so that appropriate contact can be made with the USFWS to advise them of the situation and obtain additional instructions or permits.

When managing a **nest of an eagle or T&E species** these actions should be taken:

1. Contact EFS before taking action.
2. EFS will contact the USFWS and provide further instructions.

3. EFS will provide guidelines and/or recommendations for management actions.

Dealing with Dead Birds

If a bird carcass is discovered on a GPC right-of-way (ROW), substation, distribution line or equipment, or other facility where its death can be attributed to electrocution by, or collision with, electrical equipment or other GPC property or structures (e.g. communication towers), an Avian Interaction Report shall be completed as described in the Avian Interaction Reporting section. The carcass should not be moved or removed until EFS has been contacted and instructions are received. Dead birds should be observed for the presence of any special leg bands, markers, or neck collars. Marked birds shall be left on site and EFS notified as soon as possible. EFS will contact the USFWS or Georgia DNR to report the bird.

Generally, if the bird carcass is not a T&E species and is not in a public area, entangled in lines, or causing operating problems, it may be left as is at the site. In a great many instances, leaving the carcass where it was found will be the most appropriate action. Location of the carcass and regard for public concern, safety, or sanitation often will dictate what action is appropriate. Again, the RER or EFS can provide guidance to field personnel. If the bird carcass is entangled in lines or is in a public location or for some other reason must be moved, transported, or buried, contact EFS according to instructions in the preceding section on Avian Interaction Reporting. Instructions for proper handling procedures will be given upon contact with EFS.

If an eagle or other threatened or endangered species (e.g. wood stork, red-cockaded woodpecker) is found, the carcass must be left on site. It may be moved to a safer place at the base of the nearest structure but must not be buried. By law, any eagle mortality must be investigated by the USFWS and this investigation often involves an autopsy of the carcass to determine the cause of death. Any eagle or T&E species mortality must be immediately reported to Environmental Affairs. EFS will contact the USFWS and provide further instructions as to the disposition of the carcass. Under no circumstances should a federally listed threatened or endangered species be handled or moved. Also, if at all possible, take several photos of the bird from different positions to aid in its identification if that is in doubt. The carcass should be handled using gloves if possible.

Dealing with Injured Birds

Company personnel discovering an injured bird within Company facilities or on Company ROWs should contact Environmental Affairs as soon as possible for further instructions. Personnel should **MAKE NO ATTEMPT TO CAPTURE OR RESTRAIN THE BIRD**. EFS will attempt to locate a qualified and permitted

wildlife rehabilitator or the USFWS or Georgia DNR to retrieve the bird. Not only is handling the bird a violation of the law, but large birds can inflict serious injury such as pecking eyes and biting or clawing hands and arms.

Disposal, Transport, Relocation

Company personnel should not have in their possession the carcass of a dead bird, or a live injured or healthy bird, unless specific instructions to do so have been given by EFS. Personnel should also never have in their possession any nests, parts of nests or birds (including feathers), or eggs unless specific instructions to do so have been given by EFS. It is a violation of federal law to “take” (kill, transport, sell, or possess), regardless of intent, without proper permits or authorization.

Avian Interaction Summary:

1. Do not remove the carcass of a dead bird from the site.
2. Contact the RER or EFS to ensure USFWS Salvage Permit conditions are met prior to burial or disposal of the carcass on site. Specific transportation or alternate disposal instructions may be provided by Environmental Field Services if appropriate.
3. If a dead eagle, endangered species, or a bird with a leg band or other marking is discovered, notify the RER or EFS immediately.
4. If an injured bird is found, leave it alone and contact the RER or EFS immediately.
5. Any avian interaction must be documented by utilizing the Avian Interaction Report, even when no outage is documented.

PROACTIVE MANAGEMENT TO REDUCE OR ELIMINATE ADVERSE AVIAN INTERACTIONS

Training

A copy of the current GPC APP is available to all Company personnel on the Southern Company Intranet.

Routine training on issues concerning the MBTA, BGEPA and the APP is the responsibility of the Environmental Services Manager, Environmental Affairs – T & D Services. Affected field organizations may request additional training on the APP or other avian issues from Environmental Affairs.

The training information is entered into the employee's training records in SHIPS as course number 012868.

Risk Assessment

Risk assessment will be an ongoing part of the APP. By use of a GIS based system, spatial analysis of incoming Avian Interaction Reports will be tracked and areas of concentrated problems can be identified early. Raptor use areas, nesting concentrations, electrocution and contamination outage areas and problem poles will be identified and appropriate actions initiated. As more knowledge is gained on avian habitat, usage, and interactions along the Company system, the assessment of risk to resident and migratory bird populations due to potential adverse interactions with electrical equipment will be evaluated and remedial actions will be planned and implemented. Information gathered in other aspects of environmental field work will also be incorporated into the GIS database.

When siting new transmission lines, substations, or other Company facilities, available information on resident and migratory bird populations will be taken into account to ensure that the lines or facilities will have as little adverse impact as practicable on these bird species.

MODIFICATIONS OF EXISTING FACILITIES

Modifications of existing facilities may be necessary if problems persist in certain areas or there are concerns about compliance with federal and/or state regulations. The need for such remedial action may be necessary when "problem structures" are identified through data analysis, notification by resource agency personnel, citizen concerns, or other means. The need to maintain system reliability may also result in the need for modifications to existing structures or other equipment.

The main objective of any remedial actions or modifications to existing structures or equipment is to eliminate or minimize avian interaction problems or avian mortalities and to ensure system reliability. This objective should be accomplished by applying known raptor-safe standard practices or devising innovative solutions to unique problems. The following practices are generally accepted to provide for raptor-safe equipment:

1. to provide for a 60-inch (1.5 –m) minimum separation between conductors and/or grounded hardware;
2. to insulate hardware, structures, or conductors against simultaneous contact if adequate spacing is not possible;
3. to increase the visibility of conductors or shield wires (overhead ground wires) to prevent avian collisions; or
4. to provide safe locations for perching or nest construction;
5. the installation of perch or nest discouragers of various types.

Development of Site Specific Plans

A site specific plan to undertake remedial actions and/or modifications to existing facilities will be developed as problem structures or equipment are identified as noted above. The factors that create a hazardous condition to birds due to Company facilities are most likely to be complex and site specific. Therefore, the solution for correcting a problem line, structure, or other equipment must be developed by considering all relevant information available for that site. This information will consist of biological, ecological, topographic, engineering, or any other applicable data available. A team consisting of the appropriate environmental, operating, transmission, distribution, substation, region, maintenance, and engineering personnel will be assembled in a timely manner to address the issues and develop a workable solution to remedy the adverse avian impacts. A timetable for action will be based on the severity and nature of the problem as well as legal compliance, agency requests, public relations, budget and manpower constraints. Biological considerations that affect the species that are at risk will also be considered. The application of remedial actions to a few “problem structures” or spans often reduces problems over a wide area.

Bird Collisions with Existing Lines

Collisions by birds with overhead wires is typically a problem involving large-bodied, less maneuverable birds, or species that fly at high speeds and at low altitudes, in areas of high concentration (for example, waterfowl near wetland areas). Many factors influence the likelihood of collisions with overhead wires. These include characteristics of the species involved (e.g., use of habitat, body size and flight behavior, age, time of day) as well as environmental characteristics (e.g., weather, land use practices, line configuration and placement). The proximity of a line to high-use areas, vegetation that may attract

birds, and topographical features that affect local and migratory movements should be considered when determining the extent of necessary remedial action.

Many solutions exist for reducing or eliminating the risk of bird collisions with lines. These include such options as marking the line to increase visibility, burying the line, reconfiguring the line, or removing the overhead ground wire. Of these options, increasing the visibility of the line by the use of marker balls, spiral vibration dampers, or bird flight diverters is usually the preferred option. However, because each situation will be site specific due to environmental, biological, and engineering variables, each solution will be unique and will be determined by the team that develops the site specific plan as detailed above.

Placement of New Lines to Avoid Bird Collisions

In areas where agencies are concerned about the safety of protected birds (e.g., near wildlife refuges, rookeries, etc.), consideration of appropriate siting and placement will reduce the likelihood of collisions. When possible, areas with high known bird concentrations will be avoided, and such vegetation or topographic characteristics that would naturally lead to shielding the birds from collision (placement of structures next to tall trees or landforms) will be utilized. If this is not possible, installing visibility devices may also reduce the risk of collision. Examples of these devices are marker balls or other line visibility devices placed in varying configurations, depending on the line or location. The effectiveness of these devices has been validated by federal and state agencies in conjunction with Edison Electric Institute.

Electrocution of Birds on Existing Lines

Most birds that are electrocuted on GPC lines are larger birds such as hawks and owls (raptors) and vultures. Several principal factors contribute to the electrocution of these species. Raptors use the lines and structures for hunting perches or nesting substrate (usually Osprey). Vultures use structures for perching and roosting. Other larger birds that occasionally use structures for nesting and roosting include the Great Blue Heron, Red-tailed Hawk, and American Kestrel. Power line assembly configurations often place energized conductors close enough to other energized phases or to grounded hardware so that birds are able to make simultaneous contact with their wings or other body parts, thus causing phase to phase or phase to ground contact. This risk is increased when the bird's feathers are wet.

Often, retrofitting only a few structures can significantly reduce most electrocution hazards on existing lines. Again, the solution will be site specific depending on local conditions and line configurations. Increasing the spacing between the conductors, installation of perch discouragers of various types and insulation of conductors, equipment, or support structures are normally considered for a solution to these electrocution problems.

Nests on Power Lines

Raptors (especially Osprey), and occasionally other species, frequently benefit from the presence of power lines by utilizing distribution poles and transmission structures for nesting. American Kestrels are known to utilize the hollow cross arms on certain portions of GPC transmission lines for nesting. Woodpeckers also nest in cavities excavated in wood transmission and distribution poles. Although electrocution of birds that nest on power lines is infrequent, bird nests can cause operational problems and structural damage (e.g., woodpecker nest cavities). Contamination from droppings of adults and young also often can cause operational problems due to contamination of insulating equipment.

Removal of nests often does not completely solve the problem because most species are site-tenacious and rebuild after the nest material is removed. There are also regulatory and public relations problems with nest removal. In addition, GPC has realized that our relations with the public often benefits by providing nesting locations for some species.

Nesting platforms for the larger species such as Osprey have been shown to be a valuable tool in dealing with this issue, both in terms of reducing outages and increasing positive resource agency and public relations. Platforms provide for the spatial needs of the birds, while preventing electrocutions and electrical outages. Platforms are normally placed on the structure where the nesting attempt was made, above the conductors, or sometimes on a newly set pole adjacent to the structure. Nesting platforms are normally most cost effective and reliable when constructed using available materials and customized for the site.

There may be times however, when nesting must be discouraged. This will be determined through the site team analysis process. Placement of nest discouragers on structures may be appropriate in these instances. Woodpecker cavity nesting in wood poles is another example of such an instance. Existing nests must be checked in a manner that will not injure or disturb eggs or nestlings if they are present. When the nests are empty they may be removed and the cavities covered or filled. Contact EFS for additional guidance and assistance.

*EFS must always be contacted prior to any nest relocation or removal actions to ensure that USFWS permit conditions are met (except in the case of **imminent danger**, as provided for previously).*

Raptor-Safe Construction Standards

When designing or rebuilding power lines in high bird use areas or on federal lands, the same concepts used to modify existing power lines to prevent

electrocutions also apply to new construction: conductor spacing and grounding procedures. The objective is to provide 60 inches (1.5 m) between energized conductors and grounded hardware, or to insulate energized hardware if such spacing is not possible. Engineering practices to provide safety for large perching birds is referred to as "raptor-safe" construction standards. These design standards are consistent with raptor-safe specifications recommended by federal wildlife agencies. This will prevent problems from occurring in the future, both from a legal/public relations aspect as well as in providing reliable customer service.

Georgia Power Company construction standards for transmission, distribution, and substation equipment and facilities will reflect the most appropriate and practicable "raptor safe" standards for new and retrofit construction consistent with available information. Products which may be beneficial to the enhancement of "raptor safe" equipment will be identified and stocked in Company inventories as available and appropriate. Whenever new or rebuild projects are undertaken or remediation is necessary, the most recent or appropriate standards will be utilized for the site specific circumstances.

Consultations and Documentation of Follow-Up and Remedial Action Plans

EFS is available for consultation on the effectiveness of remedial approaches and for negotiation of cost-effective prescriptions with state and federal agencies.

All remedial actions and new construction or rebuild to raptor safe standards shall be documented and submitted to EFS for inclusion in any required reports to federal and state resource agencies.

Procedure

After receipt of an Avian Interaction Report, EFS will log the information in the Avian Interaction Report database and GIS. The location of the interaction will be examined to determine if it is near any prior interaction locations and, therefore, may indicate a problem with a particular line, structure, or configuration. EFS will also notify the appropriate operating personnel (i.e. District Support Specialist Senior, District Design Management or Transmission Specialist Senior, Maintenance and Reliability), typically by electronic means such as e-mail, of the details of the interaction. These personnel will be requested to conduct an investigation of the equipment involved in the interaction and make a report of their findings to EFS within 30 days. Their report shall include recommendations as to whether or not any remedial action is necessary and the reason(s) for their recommendations. These recommendations will be based upon the existing design and configuration of the equipment involved, engineering, and/or other applicable data available. Biological and ecological considerations that affect the species at risk will also be considered by EFS personnel. If remedial action is required, it will be undertaken within a reasonable time as budget, manpower, and the criticality of the situation warrant.

Remedial actions may include, but are not limited to: increasing spacing between energized conductors and grounded hardware; insulation of energized components; installation of perch guards; and the use of line marking devices. Costs associated with remedial action(s) will also be tracked and recorded.

The request for investigation will be maintained by EFS and will be tracked through completion. A copy of the report and all supporting information will also be maintained in the EFS files.

APPENDIX A

AVIAN INTERACTION REPORT FORM

AVIAN INTERACTION REPORT

Location/Address of Interaction _____ County _____

Circuit Info., Voltage, ID No., Etc. _____

GPS Position (If Available) Latitude _____ Longitude _____

Operating/TMC office _____

Reported By: _____ (Phone/Radio) _____ Date: _____

Found By: _____ (Phone/Radio) _____ Date/Time: _____

Common Name of Bird: _____ Number of Birds: _____
(From GPC Field Guide Book)

Signs of Death: Electrocution ☐ Collision ☐ Shot ☐ Unknown ☐ Other ☐
Explain: _____

If electrocution: Phase to Phase ☐ Phase to Ground ☐ Unknown ☐

Visible burn marks: Yes ☐ No ☐

Structure/Equipment description: _____

Nest on structure: Yes ☐ (If Yes, Active ☐ Inactive ☐) No ☐ Injured Bird: Yes ☐ No ☐

Disposition of Injured Bird: Transported to Rehabilitator ☐ Picked-up by Rehabilitator ☐ Left on Site ☐
Other (Explain) _____

Disposition of Carcass: Buried on Site ☐ Transported for ID/Necropsy ☐ Left on or Near Site ☐
Other (Explain) _____

Permission to Salvage Carcass from EFS under USFWS MB074770-0 (Includes burial and/or Transport) obtained from _____ Date: _____ Time: _____

Permission for nest (egg, chicks) relocation from EFS under USFWS Depredation Permit MB745135-0 obtained from _____ Date: _____ Time: _____ | Person Relocating _____

Relocated to _____ #Birds _____ Nests _____ Eggs _____ Young _____

Existing Bird Protection: Yes ☐ No ☐ or Nest Platform: Yes ☐ No ☐ on Structure
Explain: _____

Contamination Problem: Yes ☐ No ☐ Explain: _____
(Bird Droppings)

Comments/Recommendations _____

APPENDIX B

**FEDERALLY LISTED
THREATENED AND ENDANGERED
BIRDS IN GEORGIA**



U.S. Fish & Wildlife Service

Georgia Ecological Services Athens, Brunswick & Columbus

REGION 4

[Home](#) > [Endangered Species](#) > [Endangered Birds](#)

Federally Listed Threatened & Endangered Birds in Georgia



T & E Species

[Georgia Birds](#)

[Georgia Fish](#)

[Reptiles &
Amphibians](#)

[Invertebrates](#)


[Georgia Mammals](#)

[Georgia Plants](#)

[Species By County](#)

[Endangered Species](#)
[Glossary of Terms](#)

[...Endangered
Species](#)

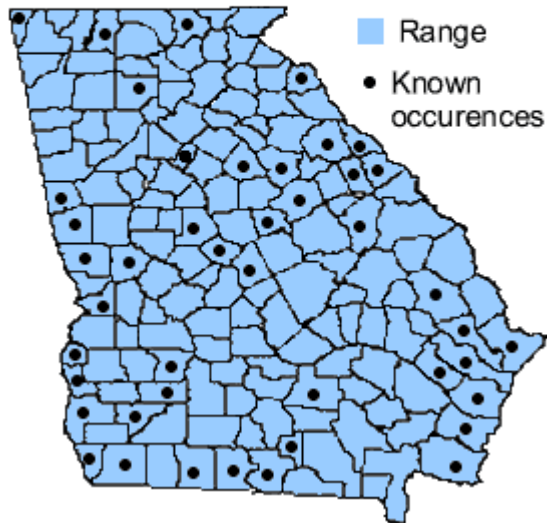
Listed Birds	Status	GA Range	Habitat	Threats
Piping plover <i>Charadrius elodus</i>	T	Coastal beaches MAP	Winters on Georgia's coast; prefers areas with expansive sand or mudflats (for foraging) in close proximity to a sand beach (for roosting)	Habitat alteration and destruction and human disturbance in nesting colonies. Recreational and commercial development have contributed greatly to loss of breeding habitat.
Kirtland's warbler <i>Dendroica kirtlandii</i>	E	Transient on coast during migration MAP	Migrates through Georgia to wintering grounds in the Bahamas	Small population numbers, limited distribution on the breeding and wintering grounds, exacting breeding habitat requirements, and cowbird parasitism
Bald eagle <i>Haliaeetus leucocephalus</i>	T	Statewide MAP	Inland waterways and estuarine areas in Georgia	Major factor in initial decline was lowered reproductive success following use of DDT. Current threats include habitat destruction, disturbance at the nest, illegal shooting, electrocution, impact injuries, and lead poisoning.
Wood stork <i>Mycteria americana</i> 	E	Southeast wetlands MAP	Primarily feed in fresh and brackish wetlands and nest in cypress or other wooded swamps	Decline due primarily to loss of suitable feeding habitat, particularly in south Florida. Other factors include loss of nesting habitat, prolonged drought/flooding, raccoon predation on nests, and human disturbance of rookeries.
Red- cockaded woodpecker <i>Picoides borealis</i>	E	Mature pine forests statewide MAP	Nest in mature pine with low understory vegetation (<1.5m); forage in pine and pine hardwood stands > 30 years of age, preferably > 10" dbh	Reduction of older age pine stands and to encroachment of hardwood midstory in older age pine stands due to fire suppression

APPENDIX C

**RANGE AND KNOWN OCCURRENCE MAPS FOR
FEDERALLY LISTED
THREATENED AND ENDANGERED
BIRDS IN GEORGIA**

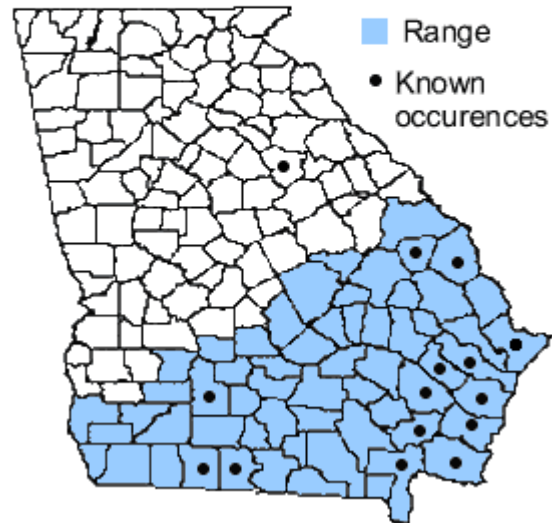
Bald Eagle

Haliaeetus leucocephalus



Wood Stork

Mycteria americana



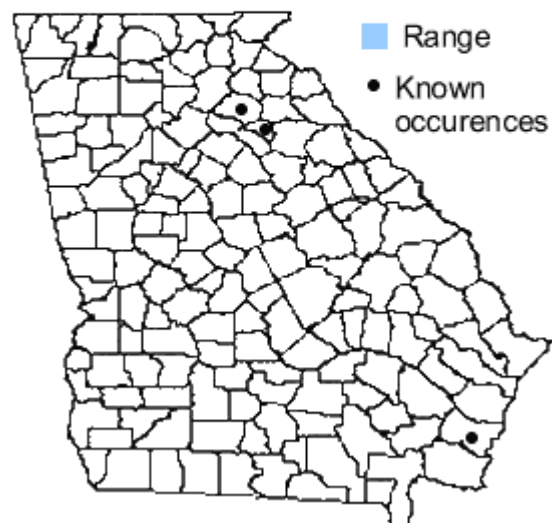
Piping Plover

Charadrius melodus



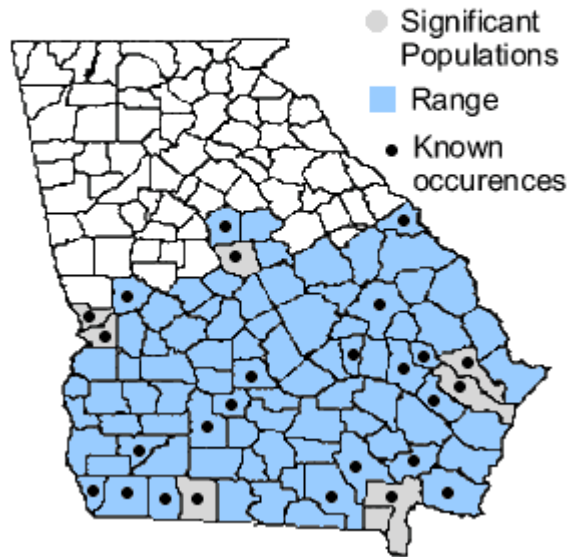
Kirtland's Warbler

Dendroica kirtlandii



Source: U.S. Fish & Wildlife Service Georgia Ecological Services, Region IV

Red-Cockaded Woodpecker *Picoides borealis*



Source: U.S. Fish & Wildlife Service Georgia Ecological Services, Region IV

APPENDIX D

**MAP OF GEORGIA POWER COMPANY REGIONS
CONTAINING BALD EAGLE AND/OR WOOD STORK
NEST SITES**



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ATTACHMENT F

Proposed Recreation and Land Use Plan

PROPOSED RECREATION AND LAND USE PLAN, WALLACE DAM PROJECT (FERC NO. 2413)

Introduction

Georgia Power Company (Georgia Power) proposes to implement the following recreation and land use plan to operate and maintain project recreation facilities and manage Georgia Power-owned lands within the project boundary for recreation, environmental quality, and visual aesthetic purposes for the term of the new license. This plan describes the specific project recreation facilities, lands reserved for future recreation development, shoreline buffer areas for protecting scenic, environmental, and recreation values of the Project, and recreation enhancement measures to increase recreational access and improve the recreational resources of the Project. This proposed plan updates and supersedes the revised Recreation Plan (Exhibit R) approved under the original license order (February 3, 1975).

Project Recreation Facilities

Numerous public and private facilities provide direct access to the Wallace Dam Project. Under Georgia Power's licensing proposal, the number of project recreation facilities owned and operated by Georgia Power would increase from seven to nine facilities. Georgia Power proposes to operate and maintain these facilities for recreation purposes for the term of the new license. The project recreation facilities include (Figure F-1):

- Lawrence Shoals Park: an 83.6-acre facility located on Lake Oconee in Putnam County approximately 0.5 river miles upstream of Wallace Dam. The park is located entirely within the project boundary and provides a campground, day-use area, boat ramp, swimming beach, restrooms, picnic pavilions, picnic tables, nature trails, and parking.
- Old Salem Park: an 83.3-acre facility located on Lake Oconee, south of Hwy 44 in Greene County. The park is located entirely within the project boundary and provides a campground, day-use area, boat ramp, boat docks, swimming beach, restrooms, picnic pavilion, picnic tables, and parking.
- Parks Ferry Park: a 91.0-acre facility located on Lake Oconee just south of Interstate 20 (I-20) in Greene County. The park is located entirely within the project boundary. It consists of a campground, day-use area, playground, boat ramp, swimming beach, restrooms, picnic pavilion, picnic tables, and parking.
- Sugar Creek Boat Ramp: a 10.4-acre boat ramp facility located on the Sugar Creek embayment of Lake Oconee in Putnam County. The facility is located entirely within the project boundary. This facility provides a boat ramp, boat dock, shoreline fishing access, picnic tables, restroom, and parking. Under Georgia Power's licensing proposal, the facility will also include a new barrier-free fishing pier.

- **Armour Bridge:** a 10.7-acre boat ramp facility located on the Richland Creek embayment of Lake Oconee. The facility is located entirely within the project boundary and consists of a boat ramp, boat dock, shoreline fishing access, picnic tables, restroom, and parking.
- **Long Shoals Boat Ramp:** a 12.1-acre facility on the southern main-stem portion of Lake Oconee in Putnam County and located entirely within the project boundary. The facility provides a boat ramp, boat dock, shoreline fishing access, picnic tables, restroom, and parking.
- **Area C-5 Bank Fishing Access (new facility):** a 10-acre tract on Lake Oconee along Hwy 44 within the project boundary in Greene County. The site was previously reserved for future recreation. Georgia Power proposes to develop the site under its licensing proposal to provide a fishing pier, parking, and lighting.
- **Jerry's Hwy 44 Bank Fishing Access (new facility):** a 0.69-acre tract on Lake Oconee along Hwy 44 within the project boundary in Putnam County. Georgia Power proposes to develop the site under its licensing proposal to provide a fishing pier, parking, and lighting.
- **Georgia Hwy 16 Bridge Boat Ramp:** a 2-acre existing access boat ramp facility in the Wallace Dam tailrace area in Hancock County. Under its licensing proposal, Georgia Power proposes to enhance development of the site to also include a fishing pier, vault toilet, and improved lighting.

All nine facilities would include a day-use area and provide bank fishing access and improved lighting. Bank fishing amenities would include barrier-free piers at four facilities. Seven of the facilities would provide boat ramps and restrooms, with year-round boat-fishing and tournament fishing access available at all six boat ramps on Lake Oconee. Three facilities would continue to provide full-service, seasonal campgrounds and swimming beaches.

Project Lands Reserved for Future Recreational Use

Georgia Power also owns and manages specific land parcels within the project boundary that are reserved for future recreational development. Based on the results of the Recreation and Land Use Study and stakeholder consultation, Area C-5 is proposed for development as a bank fishing access area under Georgia Power's licensing proposal.

Georgia Power's proposed Recreation and Land Use Plan for the Wallace Dam Project would reserve the following nine areas within the project boundary for future recreation development (Figure F-2):

- **Area A-1:** a heavily forested 138-acre tract located on a peninsula formed by the confluence of Richland Creek and the Oconee River in Greene County.

- Area A-2: a heavily forested 465-acre tract located at the confluence of Sugar Creek and the Oconee River in Putnam and Morgan Counties.
- Tract B: a 561-acre area next to Lawrence Shoals Park in Putnam County that Georgia Power owned and subsequently conveyed to the State of Georgia. The area includes undeveloped shoreline and associated buffer and a unique granite outcropping (Eatonton Outcrop) that supports two federally protected plant species. It also contains several miles of multi-use and foot trails that connect with Lawrence Shoals Park and the Rock Hawk Effigy and trail system located outside of, and partly inside of, the project boundary.
- Area B-3: a heavily forested 107-acre tract located on the Apalachee River in Greene County approximately 0.5 river miles below U.S. Hwy 278.
- Area B-5: a heavily forested 106-acre tract located on a peninsula formed by the confluence of Richland Creek and Rocky Creek tributaries in Greene County.
- Area C-2: a 9-acre tract located on Lick Creek at Georgia Hwy 44 in Putnam County.
- Area C-4: a moderately forested 8-acre tract located on the Apalachee River in Greene County.
- Area C-6: a 5-acre tract located on Richland Creek at Georgia Hwy 44 in Greene County.
- Area C-7: a 9-acre site located on Beaverdam Creek approximately 2 miles above its confluence with Richland Creek in Greene County.

These lands were set aside in the Project's original Recreation Plan and categorized for various recreational uses. The A tracts were reserved for future development of state parks. Based on our consultation with Georgia Department of Natural Resources (GDNR), that remains the intended purpose of Area A-2, as well as Tract B. Tract B was acquired during a land exchange involving the original A-1 tract (see below). Areas B-3 and B-5 were originally reserved for future day and overnight users, while the C tracts were reserved for future lake access sites. Georgia Power proposes to reserve these lands for future recreation and continue to manage these lands under the new license in a manner consistent with our mission of preserving the scenic, environmental, and recreational values of Lake Oconee.

Future recreation needs were assessed in the Recreation and Land Use Study by examining population trends in the 24 counties representing the majority (89 percent) of the recreation users interviewed in the recreation surveys. The population of these counties is projected to grow by 5 percent (2015-2020), 10 percent (2020-2030), 8 percent (2030-2040), and 7 percent (2040-2050). Recreation use at the Project is forecasted to increase by 33 percent between 2015 and 2050. While the 2016 recreation survey indicates that parking capacity at each of Georgia Power's existing recreation facilities would likely be adequate through the term of the new license, Georgia

Power stands ready to respond to demonstrated increased recreation demand by retaining tracts set aside in the original project license for future recreational development as appropriate.

Area A-1 Land Exchange

Georgia Power's revised Exhibit R (approved by Order issued February 3, 1975) designated Area A-1, an approximately 800-acre peninsula formed by the confluence of the Oconee River and Richland Creek, for future use as a state park. In 1996, the Federal Energy Regulatory Commission (Commission) approved the exchange of 558 acres of Area A-1 for a 421-acre parcel of non-project lands, which became Tract B. To offset the difference in area between the two parcels, the Commission required Georgia Power to add two supplemental parcels totaling about 135 acres to Tract B. Tract B was then placed in the project boundary and reserved for a future state park.

The remainder of Area A-1 stayed in the project boundary as land reserved for future recreational use, per the revised Exhibit R (approved by Order issued March 14, 2002).

U.S. Forest Service Recreation Areas

The U.S. Forest Service (FS) Oconee Ranger District owns and operates three recreation areas on Oconee National Forest (NF) lands north of I-20. They are located within the Redlands Wildlife Management Area (WMA) and provide direct access to the northern-most reaches of Lake Oconee. The three FS recreation areas are (Figure F-1):

- **Dyar Pasture Recreation Area:** a 241.1-acre site located off Copeland Road in Greene County. Approximately 84.93 acres of the recreation area are located within the project boundary. The recreation area inside of the project boundary includes a boat ramp, boat dock, shoreline fishing access, and 49.26-acre waterfowl conservation area. Parking, picnic facilities, a restroom, and nature trails are outside of the project boundary.
- **Redlands Recreation Area:** a 1,393.7-acre site located off U.S. Hwy 278 in Greene County. Only a portion of the recreation area, 8.03 acres, is located within the project boundary. Recreation amenities inside the project boundary include a boat ramp, boat dock, and shoreline fishing access. A large parking lot, picnic facilities, and a restroom are outside of the project boundary.
- **Swords Recreation Area:** a 314.9-acre site located off Blue Springs Road in Morgan County. Only 7.23 acres are within the project boundary. Recreation amenities inside the project boundary include a boat ramp, boat dock, and shoreline fishing access. A large parking lot, picnic facilities, and a restroom are outside of the project boundary.

FS manages these recreation areas under the Land and Resource Management Plan for the Chattahoochee-Oconee National Forests (FS, 2004). GDNr assists FS in managing the waterfowl conservation area at the Dyar Pasture Recreation Area.

Buffer Areas

Article 40 of the original license required Georgia Power to acquire all privately-owned lands within 100 horizontal feet (ft) from the normal operating pool (435 ft msl) for a distance of approximately 20 miles, generally across the reservoir from the 800-acre Area A-1 (original size), which was reserved for a future state park (original Area A-1) (Figure F-3). The article also required Georgia Power to acquire all lands within 200 horizontal ft of the normal operating pool generally across the reservoir from the 500-acre Area A-2, also reserved for a future state park and FS lands (Figure F-2). To achieve this, Georgia Power acquired additional 100-ft buffer strips (about 8 miles in length) along the mainstem of the reservoir in the vicinity of Area A-1 in addition to the shoreline it already owned along the Oconee WMA lands, Area B-5, and Area C-1. The requisite 200-ft buffer strips were also acquired across from Area A-2 tract and FS lands.

As previously noted, Area A-2 is still being reserved for a future state park, so the 200-ft buffer will be maintained in that area, as well as those areas across the reservoir from lands currently owned by FS. Area A-1 is no longer slated as a future state park; therefore, there is no need to maintain a 100-ft buffer in the vicinity (Figure F-3). Georgia Power will maintain those 100-ft strips, along with lands included in the Oconee WMA, Area B-5, and Area C-1 in a manner consistent with our mission to protect the scenic, environmental, and recreation values of Lake Oconee.

Submerged Timber Management Plan

The original license required that a total of 1,250 acres of timber be left uncut in Lake Oconee for fish and wildlife habitat (Figure F-4). Other areas of submerged timber were designated for fish habitat (fish plots), totaling 235 acres, but there were no acreage requirements. These standing timber areas are marked with signage and buoys and identified on maps used by anglers. Forty years after impoundment, much of the standing timber that was intended for wildlife habitat has decayed to the point that it is below the waterline and the timber that remains will continue to decay. In addition to no longer being available for waterfowl and other wildlife, that submerged timber has the potential to create a boating hazard. Georgia Power will, therefore, adapt its management focus to reflect current conditions.

Over the course of the original license, Georgia Power worked with the Commission and the GDNr Wildlife Resources Division (WRD) and Law Enforcement Division to cut timber in areas that posed boating hazards. Using this process as a model, Georgia Power has developed a plan for managing these areas for fish habitat and public safety. If a hazard is identified, Georgia Power will consult with GDNr to determine the area(s) to be cut. Once these areas have been clearly delineated, the trees will be cut to a depth of 10 ft below the surface of the water. Ideally, the cut logs will sink and form a complex bottom habitat; however, those logs that float will be removed from the water.

Recreation Monitoring Report

Georgia Power will periodically monitor recreational use at the project recreation facilities based on campground registration and parking fee collection at its day use areas, as well as staff observations and institutional knowledge. Recreation staff will review this information every six years to determine the need for any changes in recreation facilities. If such a need is identified, Georgia Power will work with the Commission and WRD to develop and implement a plan to address that need. Additionally, Georgia Power will consult with WRD and the Commission every 12 years to evaluate recreation needs and the adequacy of the project recreation plan in meeting those needs. If required, we will update the plan to include any changes agreed upon during consultation.

Specific Measures

Georgia Power will improve recreational access and resources by implementing the following specific measures on Georgia Power lands within the project boundary, in accordance with the provided implementation schedule for the term of the new license. Georgia Power consulted with the GDNR in developing the enhancement measures as part of the license application for the Wallace Dam Project.

Lawrence Shoals Park

Enhancements at Lawrence Shoals Park will consist of constructing new facilities to replace two campground restrooms, a beach house, a boat ramp restroom, a courtesy dock at the boat ramp, a pavilion and dedicated pavilion restroom, and a guest relations gate house. In addition, Georgia Power will install improved lighting at the boat ramp and upgrade the current well system that supplies water to park facilities and customers. These improvements would continue to support quality recreation opportunities. Figure F-5 shows the locations of these enhancement measures.

Old Salem Park

Georgia Power will enhance recreation amenities at Old Salem Park by constructing new facilities to replace two group docks (and add a third group dock), a pavilion and dedicated pavilion restroom, a boat ramp restroom, a courtesy dock at the boat ramp, a beach house, and a guest relations gate house. In addition, Georgia Power will install improved lighting at the boat ramp, upgrade the current well system that supplies water to park facilities and customers, and reconfigure the park entrance and gate house to reduce single-lane traffic congestion and allow for year-round operation of the boat ramp. These improvements would continue to support quality recreation opportunities and enhance year-round boat-fishing and tournament-fishing access to Lake Oconee. Figure F-6 shows the locations of these enhancement measures.

Parks Ferry Park

Recreation amenities at Parks Ferry Park will be enhanced by constructing new facilities to replace two campground restrooms, a beach house, a courtesy dock at the boat ramp, and a pavilion and dedicated pavilion restroom. In addition, Georgia Power will install improved lighting at the boat ramp, upgrade the current well system that supplies water to park facilities and customers, replace the underground water and electrical service, and reconfigure the entrance gate and gate house to reduce single-lane traffic congestion and allow for year-round operation of the boat ramp. Reconfiguring the park entrance will benefit multiple users, including those wanting to access the northern extent of Lake Oconee for later winter/early spring fishing. These improvements would continue to support quality recreation opportunities and enhance year-round boat-fishing and tournament-fishing access to Lake Oconee. Figure F-7 shows the locations of these enhancement measures.

Sugar Creek Boat Ramp

Georgia Power will enhance recreation amenities and increase bank fishing access at Sugar Creek Boat Ramp by adding a new barrier-free fishing pier. In addition, Georgia Power will upgrade the vault toilet with a flush toilet, upgrade the existing courtesy dock at the boat ramp, and install improved lighting. Figure F-8 shows the locations of these enhancement measures.

Armour Bridge

Recreation amenities at Armour Bridge will be enhanced by upgrading the existing courtesy dock at the boat ramp, replacing the vault toilet with a flush toilet, and installing improved lighting at the facility. The locations of these enhancements are shown in Figure F-9.

Long Shoals Boat Ramp

Georgia Power will enhance recreation amenities at Long Shoals Boat Ramp by upgrading the courtesy dock, trimming existing vegetation to provide additional shoreline access to bank fishing sites, and installing improved lighting. The locations of these enhancements are shown in Figure F-10.

Proposed Area C-5 Bank Fishing Access

Georgia Power will add a new bank fishing access development at the Area C-5 tract to provide additional bank fishing opportunities on Lake Oconee. The proposed amenities include a barrier-free fishing pier, a gravel parking area, and new or improved lighting. Figure F-11 shows the proposed locations of the new amenities.

Proposed Jerry's Hwy 44 Bank Fishing Access

Georgia Power will increase bank fishing access on Lake Oconee by providing a new bank fishing access development at Jerry's Hwy 44 within the project boundary. The proposed amenities

include a barrier-free fishing pier, a gravel parking area, and new or improved lighting. Figure F-12 shows the proposed locations of the new amenities.

Georgia Hwy 16 Bridge Boat Ramp (Tailrace)

Georgia Power will enhance recreation amenities and improve tailrace bank fishing access at the Georgia Hwy 16 Bridge Boat Ramp downstream of Wallace Dam by providing a new, barrier-free tailrace fishing pier, installing a vault toilet, and installing improved lighting. The new fishing pier would replace the existing bank fishing access provided at the Tailrace Fishing Area, which would be closed due to its limited public use and for security of Wallace Dam's adjacent equipment yard. Figure F-13 shows the locations of these enhancement measures.

Schedule

Recreation enhancement measures will be implemented according to the following schedule:

Schedule for Implementation of the Recreation Enhancement Measures Plan	
Activity	Completion Date or Deadline ^a
Lawrence Shoals Park	
Replace two campground restrooms	12-31-2022
Replace existing courtesy dock and restroom at boat ramp	12-31-2022
Replace existing guest relations gate house	12-31-2022
Replace existing pavilion and dedicated pavilion restroom	12-31-2022
Replace existing beach house	12-31-2022
Install improved lighting	12-31-2022
Upgrade well system that supplies water to park facilities and customers	12-31-2022
Old Salem Park	
Replace two existing group docks and install a third group dock	12-31-2021
Replace existing courtesy dock and restroom at boat ramp	12-31-2021
Replace existing guest relations gate house and reconfigure park entrance	12-31-2021
Replace existing pavilion and dedicated pavilion restroom	12-31-2021
Replace existing beach house	12-31-2021
Install improved lighting	12-31-2021
Upgrade existing well system that supplies water to park facilities and customers	12-31-2021
Provide for year-round operation of the boat ramp	12-31-2021

Schedule for Implementation of the Recreation Enhancement Measures Plan

Activity	Completion Date or Deadline ^a
Parks Ferry Park	
Replace two existing campground restrooms	12-31-2023
Replace existing courtesy dock at boat ramp	12-31-2023
Replace existing guest relations gate house and reconfigure park entrance	12-31-2023
Replace existing pavilion and dedicated pavilion restroom	12-31-2023
Replace existing beach house	12-31-2023
Install improved lighting	12-31-2023
Upgrade existing well system that supplies water to park facilities and customers	12-31-2023
Replace existing underground water and electrical service	12-31-2023
Provide for year-round operation of the boat ramp	12-31-2023
Sugar Creek Boat Ramp	
Construct new barrier-free fishing pier	12-31-2021
Upgrade existing courtesy dock	12-31-2021
Replace existing vault toilet with a flush toilet	12-31-2021
Install improved lighting	12-31-2021
Armour Bridge	
Upgrade existing courtesy dock	12-31-2022
Replace existing vault toilet with flush toilet	12-31-2022
Install improved lighting	12-31-2022
Long Shoals Boat Ramp	
Upgrade existing courtesy dock	12-31-2023
Trim vegetation along shoreline to provide additional bank fishing access	12-31-2023
Install improved lighting	12-31-2023
Proposed Area C-5 Bank Fishing Access	
Construct new barrier-free fishing pier	12-31-2021
Construct new gravel parking area	12-31-2021
Install new or improved lighting	12-31-2021
Proposed Jerry's Hwy 44 Bank Fishing Access	
Construct new barrier-free fishing pier	12-31-2021
Construct new gravel parking area	12-31-2021
Install new or improved lighting	12-31-2021

Schedule for Implementation of the Recreation Enhancement Measures Plan

Activity	Completion Date or Deadline ^a
GA Hwy 16 Bridge Boat Ramp (Tailrace)	
Construct new barrier-free fishing pier	12-31-2021
Install a vault toilet	12-31-2021
Install improved lighting	12-31-2021
Tailrace Fishing Area	
Close existing facility	12-31-2021

^a Completion dates assume license issuance by May 31, 2020.

Reference

U.S. Forest Service (FS). 2004. Land and resource management plan, Chattahoochee-Oconee National Forests. U.S. Department of Agriculture, Forest Service Southern Region, Atlanta, GA. Management Bulletin R8-MB 113A. January 2004.

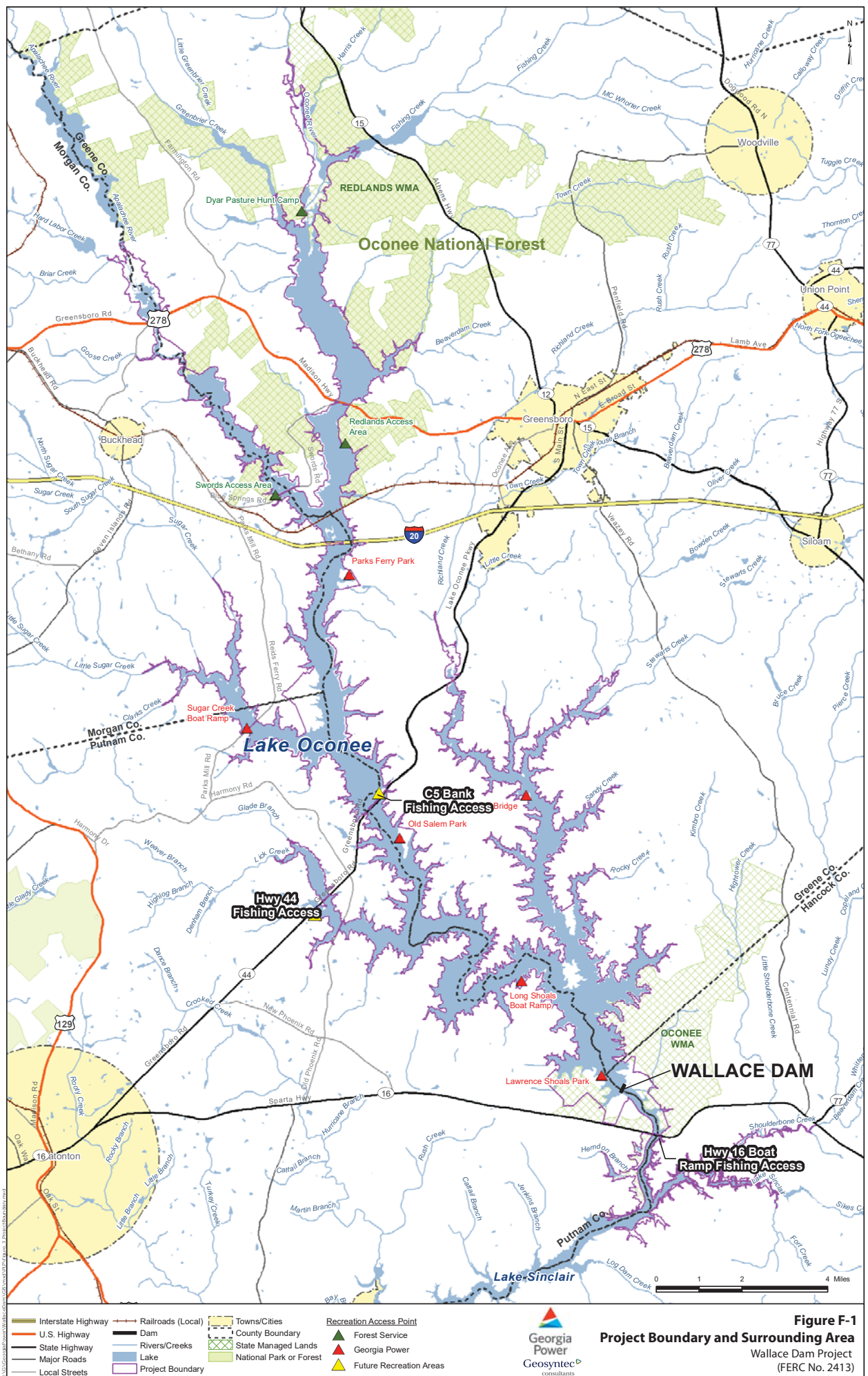
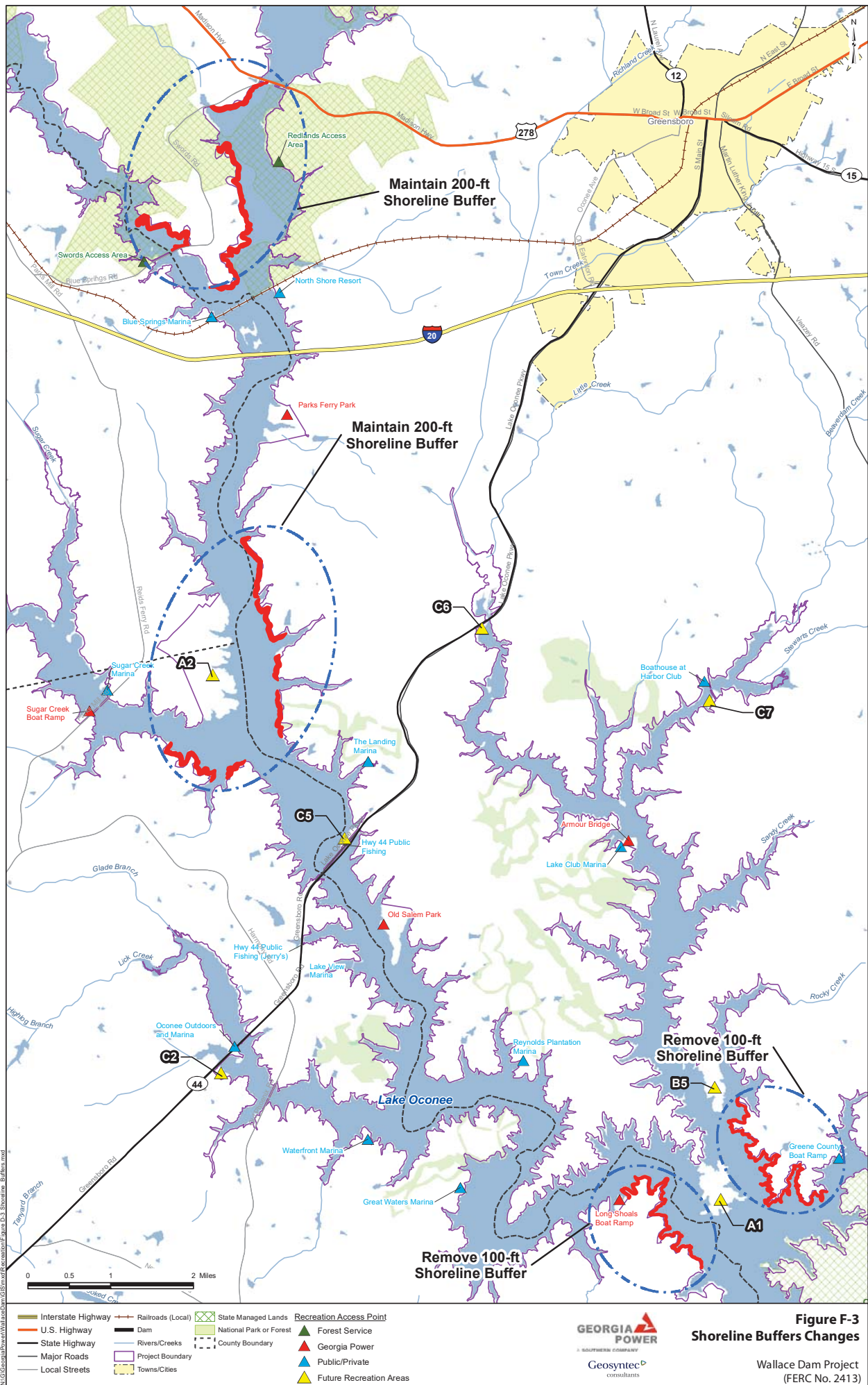


Figure F-1
Project Boundary and Surrounding Area
 Wallace Dam Project
 (FERC No. 2413)



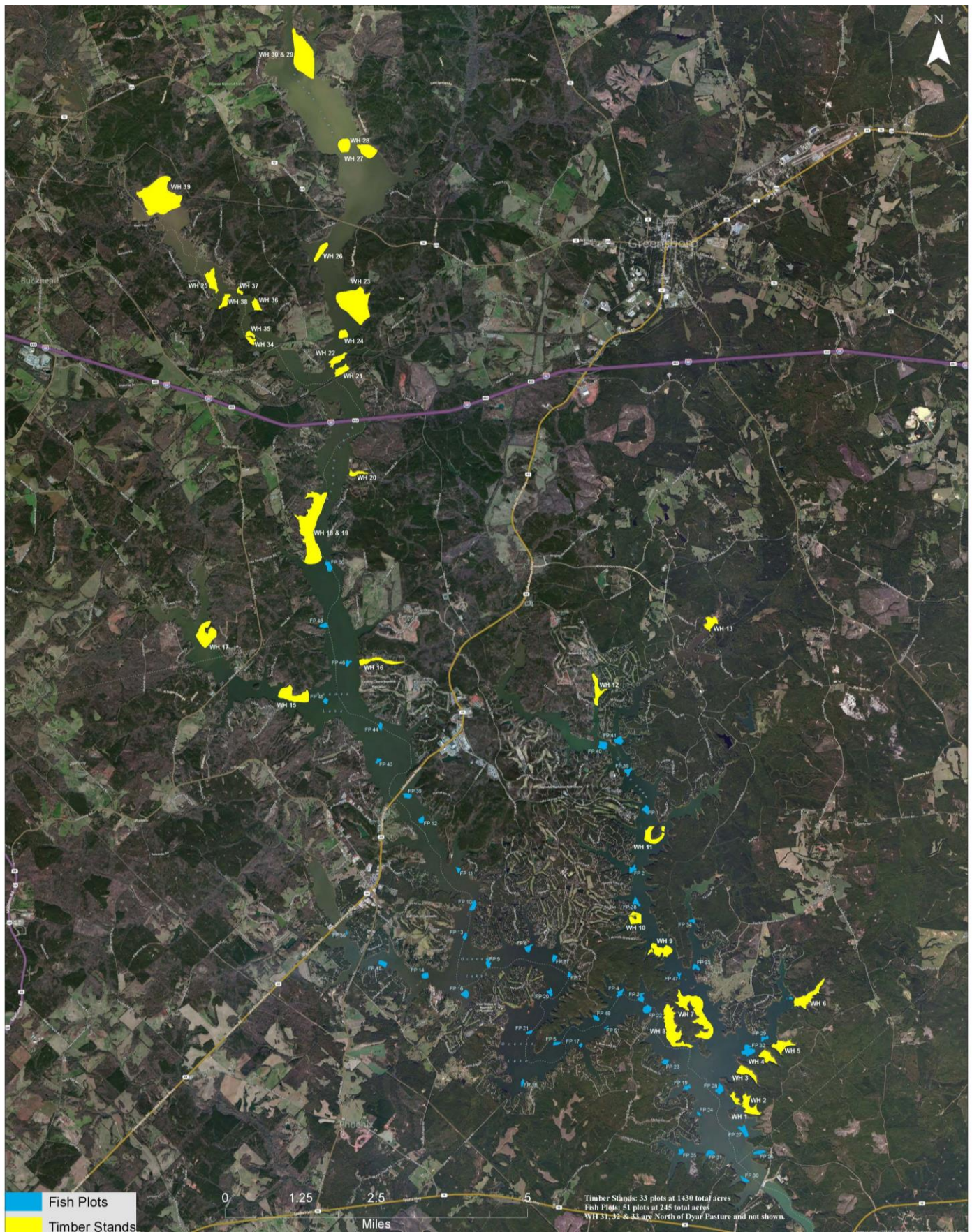


Figure F-4
Standing and Submerged Timber Stands
 Wallace Dam Project
 (FERC No. 2413)

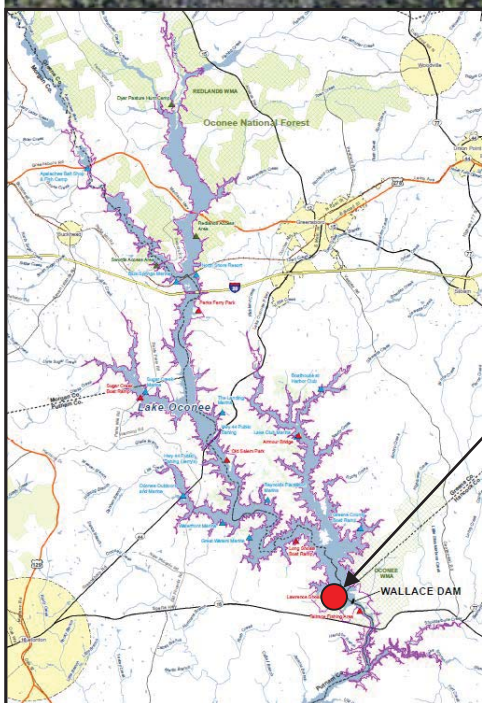


Figure F-5
Conceptual Layout of Recreational Improvements
Lawrence Shoals Park
 Wallace Dam Project
 (FERC No. 2413)

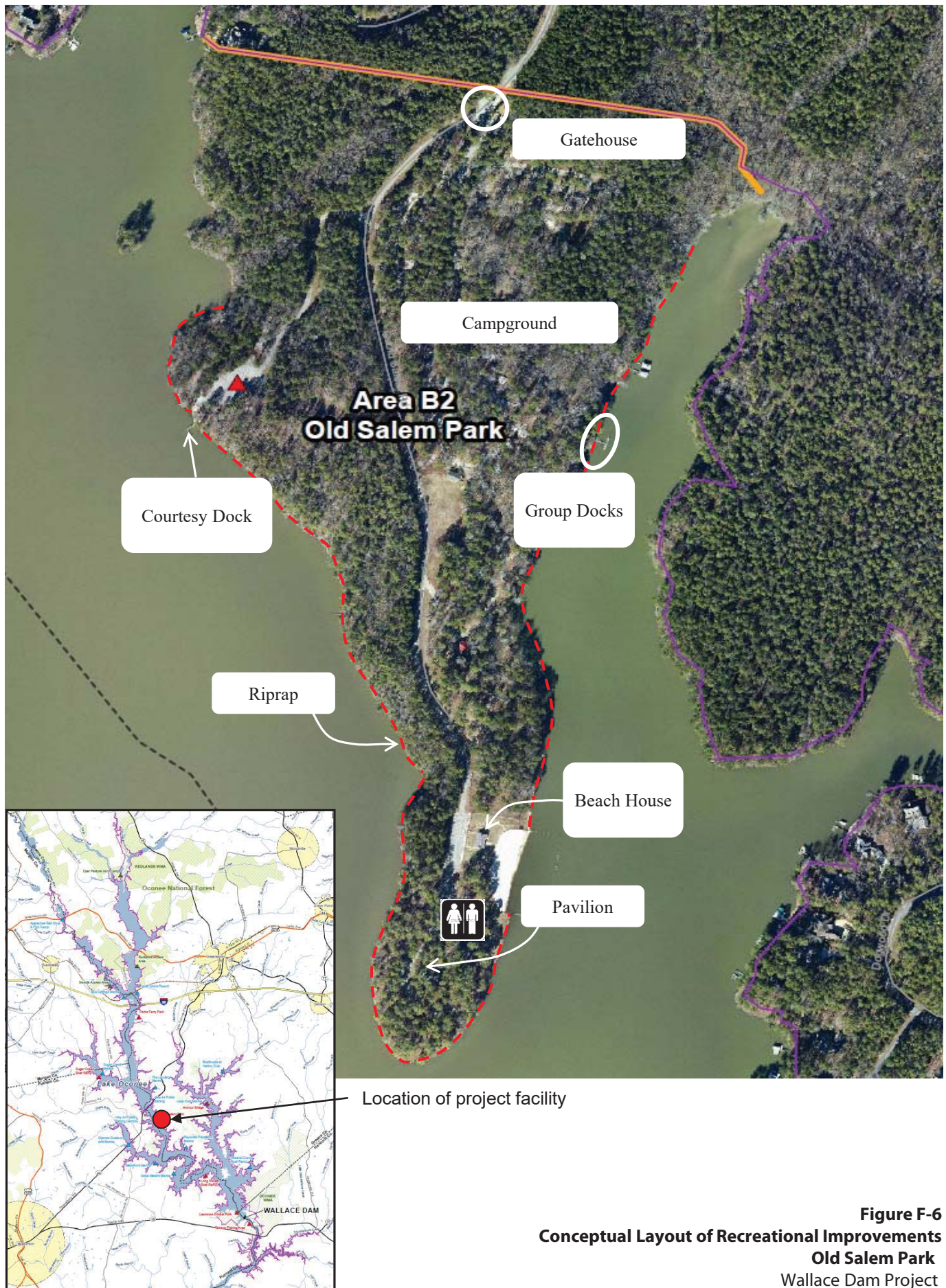


Figure F-6
Conceptual Layout of Recreational Improvements
Old Salem Park
Wallace Dam Project
(FERC No. 2413)

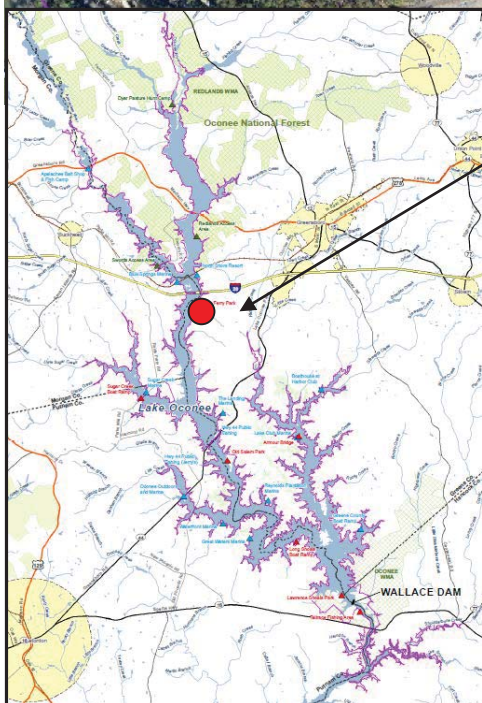


Figure F-7
Conceptual Layout of Recreational Improvements
Parks Ferry Park
 Wallace Dam Project
 (FERC No. 2413)





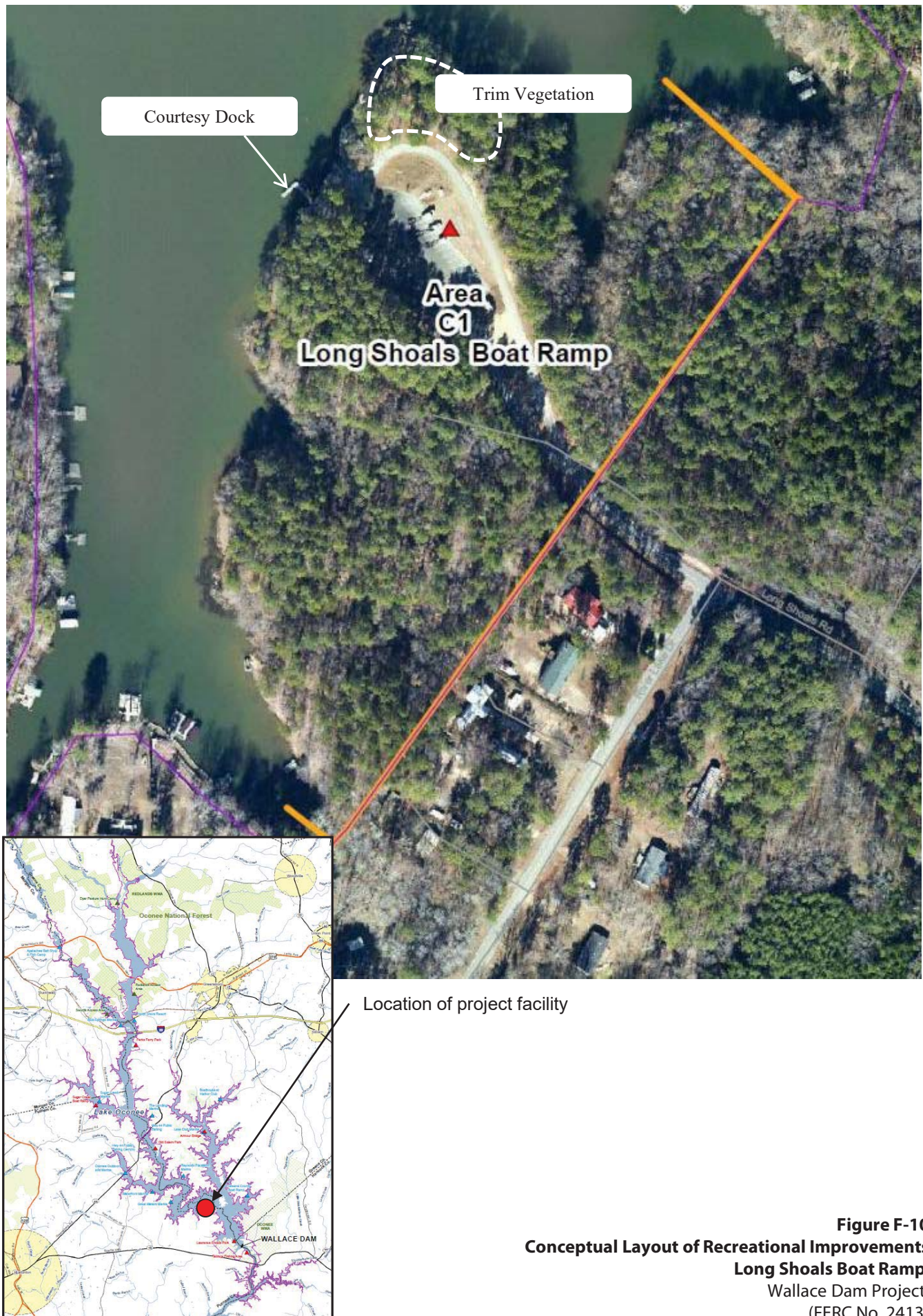


Figure F-10
Conceptual Layout of Recreational Improvements
Long Shoals Boat Ramp
Wallace Dam Project
(FERC No. 2413)



Figure F-11
Conceptual Layout of Recreational Improvements
Area C-5
Wallace Dam Project
(FERC No. 2413)



Figure F-12
Conceptual Layout of Recreational Improvements
Jerry's Hwy 44
Wallace Dam Project
(FERC No. 2413)

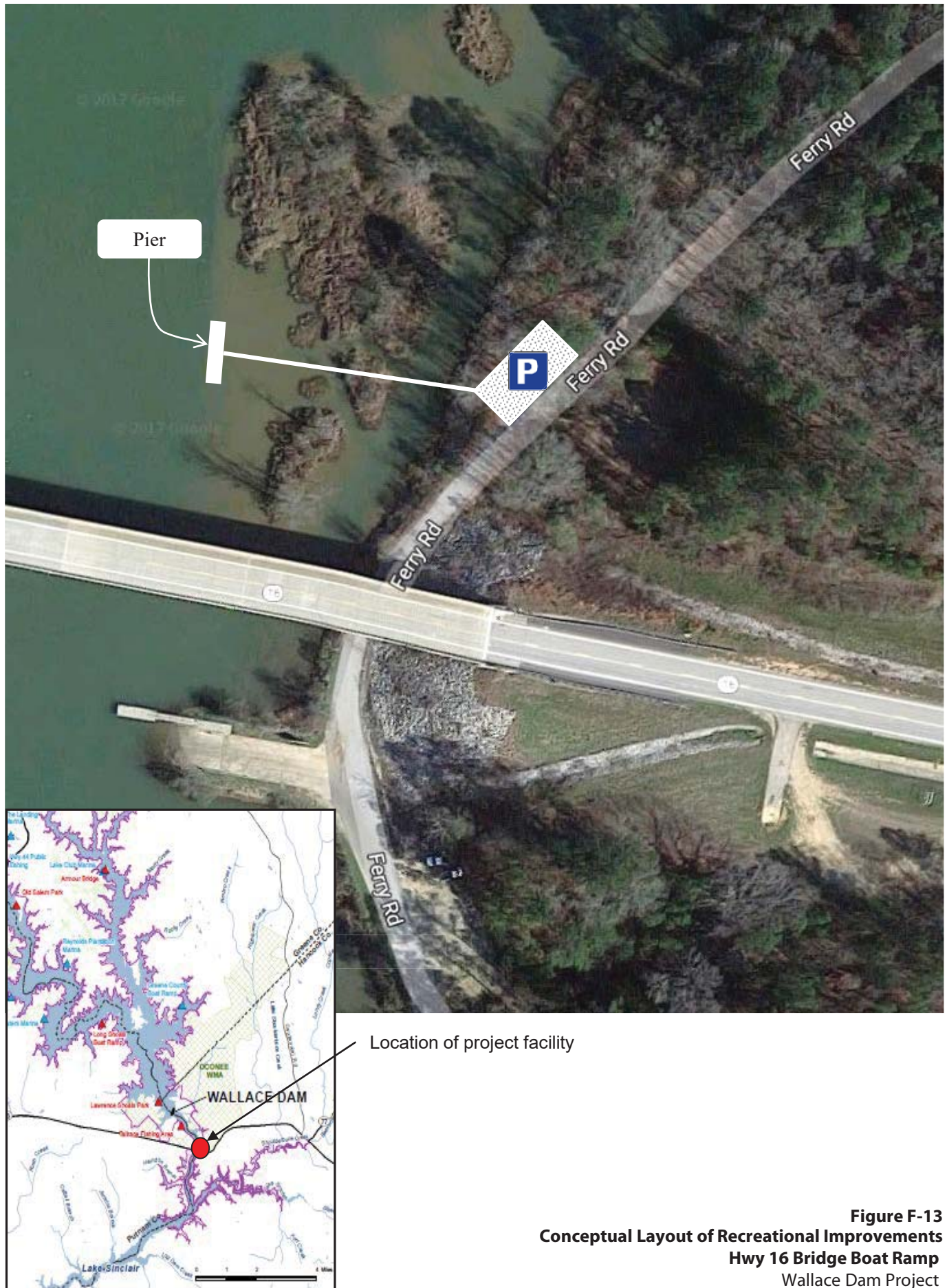


Figure F-13
Conceptual Layout of Recreational Improvements
Hwy 16 Bridge Boat Ramp
 Wallace Dam Project
 (FERC No. 2413)

ATTACHMENT G

USFS Recreation Areas



Dyar Pasture Recreation Area (USFS).



Dyar Pasture Recreation Area (USFS).



Redlands Recreation Area (USFS).



Swords Recreation Area (USFS).

ATTACHMENT H

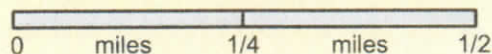
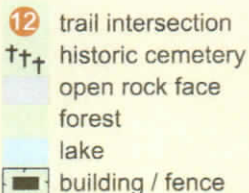
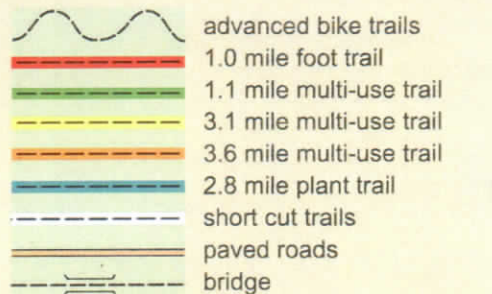
Rock Hawk Effigy and Trails Figure

Rock Hawk Effigy and Trails

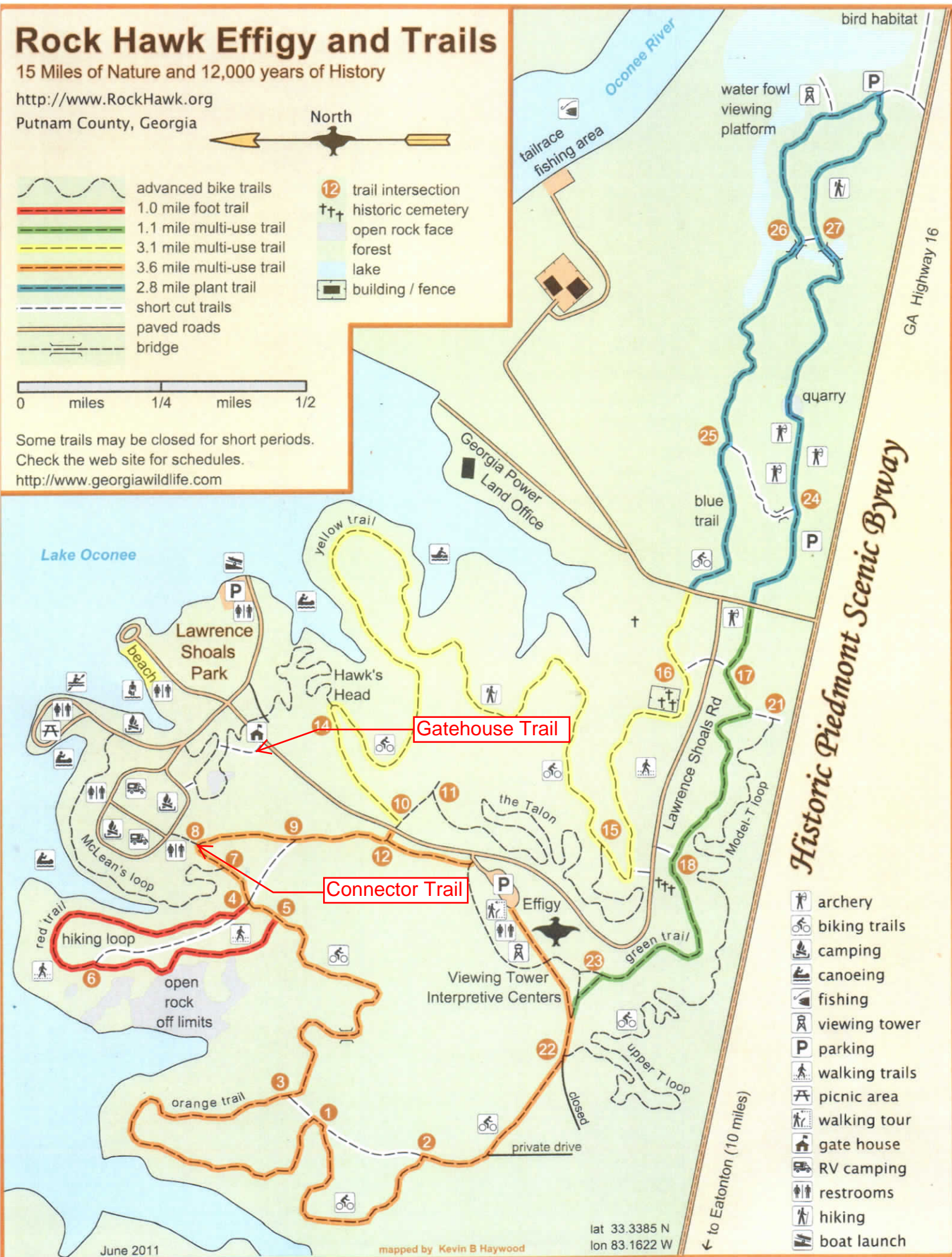
15 Miles of Nature and 12,000 years of History

<http://www.RockHawk.org>

Putnam County, Georgia



Some trails may be closed for short periods.
Check the web site for schedules.
<http://www.georgiawildlife.com>



Historic Piedmont Scenic Byway

- archery
- biking trails
- camping
- canoeing
- fishing
- viewing tower
- parking
- walking trails
- picnic area
- walking tour
- gate house
- RV camping
- restrooms
- hiking
- boat launch

June 2011

mapped by Kevin B Haywood

lat 33.3385 N
lon 83.1622 W

← to Eatonton (10 miles)

ATTACHMENT I

Response 16 Shape Files