

Appendix A

June 12, 2013 WRIA Kick-Off Meeting Agenda, Summary and Participant List

June 13, 2013 WRIA Field Visit Agenda and Summary

Threats, Needs and Recommendations (summary from kick-off meeting)

MEETING SUMMARY

Water Resources Inventory and Assessment (WRIA) for Lower Suwannee National Wildlife Refuge

Meeting Date: Wednesday, June 12, 2013 (8:30 AM – 5:00 PM) Eastern

Meeting Location: USGS Southeast Ecological Science Center
7920 NW 71st Street, Gainesville, FL 32653

Meeting Purpose:

1. Provide an overview of the WRIA process including outcomes, and timelines for completion
2. Identify expertise, data, information, contacts, etc. for various sections within the WRIA process
3. Begin the WRIA process at Lower Suwannee NWR
4. Collaborate and share information/data about the river, refuge, management issues and other related work happening in the watershed including public education/outreach.
5. Meeting products – list of immediate, short-term, and long-term threats to the Suwannee River basin, along with recommendations and data needs related to those issues

Goals and Objectives:

WRIA - The goal of the National Wildlife Refuge System (NWRS) Water Resources Inventory and Assessment (WRIA) effort is to provide up-to-date, accurate data on Refuge System water quantity and quality in order to acquire, manage, and protect adequate supplies of clean and fresh water.

- a. Achieve a greater understanding of existing refuge water resources
- b. Identify data needs, concerns, and threats to those resources at multiple spatial and temporal scales
- c. Provide a basis for refuge management actions and operational recommendations

Meeting Agenda:

8:30 AM – 10:30 AM – Welcome, Meeting Logistics, and Introductions

- Welcome / Housekeeping (Theresa Thom, FWS)
- Introductions (all)
- Brief introduction to the refuge and its management history (Andrew Gude, FWS)
- Overview of the Suwannee River, including biological resources, past disturbance, future threats, personal experience, long-term view of the Suwannee River (Ursula Nash, USGS; Steve Walsh, USGS; Theresa Thom, FWS; all participants)

10:30 AM – 10:45 AM (BREAK)

10:45 AM – 12:00 PM – Water Resources Inventory and Assessment (WRIA) Process

- Introduction, goals, timeline and data needs for WRIA process (John Faustini, FWS)
- WRIA components, data sources and initial data collected for Lower Suwannee NWR (Rebecca Burns & Mark Register, Atkins)
 - Discussion: Region of Hydrologic Influence (RHI) to incorporate for WRIA process
 - Discussion: data, data gaps, potential sources, contacts, management issues, timeline, etc.

12:00 PM – 1:30 PM – (LUNCH) – on your own (several places to eat 2-3 miles away)

1:30 PM – 5:00 PM – Water Resource Inventory and Assessment (WRIA) Process (continued)

- Discussion of water resource issues of concern, recommendations, potential solutions (all)
 - **Urgent/immediate** issues, recommendations, solutions, data needs
 - **Long term** issues, recommendations, solutions, data needs
- Discussion and populating of the WRIA spreadsheet data items (group contributions)
 - Identify data gaps, potential sources, contacts, management issues, timeline, etc.
 - Assignments for data needs, milestones, etc.
- Dates for future meetings/follow-up for WRIA and other action items

Attendees:

*Indicates those who participated by phone/webinar, others participated in person in Gainesville, FL.

Last Name	First Name	Affiliation(s)	E-mail
Adler	Jenny	University of Florida	jennifermadler@ufl.edu
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Faustini	John	USFWS - Regional Hydrologist	john_faustini@fws.gov
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Greenhalgh	Tom	Florida Geological Survey	tom.greenhalgh@dep.state.fl.us
Gude	Andrew	USFWS – Lower Suwannee NWR	andrew_gude@fws.gov
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St. Aubin	Channing	USFWS - Panama City Field Office	Channing_StAubin@fws.gov
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Thomas	Hugh	FL Dept. of Agriculture - Office of Agricultural Water Policy	Hugh.thomas@freshfromflorida.co
Walsh	Steve	USGS - Southeast Ecological Science Center	swalsh@usgs.gov
Warren	Gary	FL Fish and Wildlife Conservation Commission	gary.warren@myfwc.com
Williams	Jim	USGS (retired); FL Fish and Wildlife Conservation	fishwilliams@gmail.com
Willson	George	Willson Consulting, LLC, The Conservation Fund, Audubon	willsonconsult@gmail.com

Meeting Summary:

Andrew Gude (FWS – Lower Suwannee NWR Project Leader)

Introduction to Lower Suwannee NWR:

- There are not many on-refuge threats (e.g., invasive species, hog hunting, sea level rise and climate change, water quantity and quality).
- The refuge's water quantity hasn't been significantly studied; however, the resources rely on flooding of forest and adequate water supplies.
- There is a significant amount of data on water quality and quantity in the Suwannee River, including modeling; however, it may not be comprehensive and it has not yet been examined holistically. A transparent discussion of these issues in a forum of experts ("brain trust") is needed to start coming up with some answers.
- The refuge not actively monitoring saltwater intrusion, but is "eyeballing" vegetation changes. The city of Cedar Key had to move its wellfield pretty far inland. Franklin Percival has some minor transects in the marsh from exposed water to uplands that could hopefully be used to monitor saltwater intrusion impacts in the future. Ken Sulak and Gary Mahon (USGS) did a multi-year study and produced a report on saltwater intrusion modeling (online) that is probably the best research completed to date. There are two USGS professional papers: one on estuary and one on forested wetlands where they looked at increased stage in floodplains.
- Aside from sea level rise, other anticipated changes to the watershed from climate change include warmer temperatures, increasing evapotranspiration rates, changes in rainfall and changes in land use. (some research currently underway with University of Florida –Dr. David Kaplan)
- There is a large amount of land within the basin that is in the public trust so inland migration is possible, as a potential solution to sea-level rise (SLR).
- The local economies within the basin rely heavily on the provision of ecosystem services and all local water users, from individuals to businesses, have concerns about water quality and quantity.

Ursula Nash (USGS) – highlights of work with Nate Johnson and mussel populations

Suwannee River Basin Analysis – Factors Affecting the Status and Distribution of Imperiled Species:

- The study area includes the upper, middle and lower Suwannee River as well as the Withlacoochee, Santa Fe and New rivers.
- In Florida a positive El Nino Southern Oscillation (ENSO) means cool, wet winters and negative means dry winters and springs.
- This study compared the historic droughts in the 1950s (worst on record) with what is going on today.
 - The 2000-2009 drought was pretty severe, but not as bad as the 1950s. However, precipitation similar from 1950s to 2000s.
 - In 2010-2012 there was more rain in Florida, a little less in Georgia.
- This study compared land use in Florida from 1995 and 2008.
 - Seventeen land use (LU) classes were assigned to the 12-digit subwatersheds (HUC-12s).
 - Decrease in forest cover in the upper/middle basin and an increase in the eastern lower basin, but not near the estuary. There were decreases along I-75 between Gainesville and Lake City.

- Increase in pine plantations in the upper basin and decreases near the Ichetucknee River.
- Large population and residential development increases in 2000s around I-75.
- Population (based on census data from 2000 to 2010) increased in Jacksonville, Tallahassee, Valdosta and Alachua, Marion and Clay counties.
- Future population projections for 2030 show increases in Leon, Marion and Alachua counties as well as slight increases in the center of the basin, around Lake City.
- Increase in cropland/pasture class around Ichetucknee River, Withlacoochee confluence with the Suwannee River and lower Suwannee River Basin. Decrease around I-75 corridor.
- Dairy/Cattle/Poultry/Swine (CAFOs) increased in Lafayette and Fieldcrest counties, Trenton (middle basin) and Withlacoochee.
- Open land class (cattle grazing) increased in Hamilton County (mining area reclamation) and the headwaters of Santa Fe River; decreases in middle and lower Suwannee.
- Combined CAFOs, cropland and open land classes increased in the lower Withlacoochee (which has periods of being dry) and Ichetucknee rivers.
- There has been an increase in cattle in the basin since Kissimmee River operations were bought out and moved north in 1990s.
- Discharge data from USGS gaging stations on the Suwannee, Withlacoochee and Santa Fe rivers were analyzed as part of the study.
 - 1999-2002 showed a general downward trend, even though there was more precipitation (river levels are not recovering), particularly evident in the Santa Fe.
 - From 2003-2012 the downward trend (in river levels) continued.
 - Q7,10 is an estimate of the average flow expected in 7-day period with a recurrence interval of 10 years. It is a good indicator of low flow conditions during drought. The number of occurrences below the Q7,10 drastically increased from the 2000s through 2012.
 - Approximately 40% of the low flow measurements occurred between 2006 and 2012.
- There are unique interactions between precipitation and river flows, groundwater use, and groundwater levels.
- The number of wells (residential and irrigation) has increased, but started to decrease in the mid-2000s. (SRWMD data on well installations - need for cumulative well data)
- The change in irrigation (as a percent area of irrigated land) decreased in the lower Suwannee from 1992-2007, but increased substantially in Georgia. – USDA irrigated land data
- Water use in the St. Johns River Water Management District (WMD) has decreased since 1995 but the 2030 projected numbers are much higher. Use for agriculture is decreasing but other land uses are increasing in usage. The Jacksonville Electric Authority (JEA) has a permit to increase well pumping 142 million gallons per day (MGD) to 155 by 2031 (with reclamation this number could increase to 162.5 MGD).
- Overall water use in the Suwannee River WMD is stable; however, the Floridan aquifer groundwater divide in the Suwannee River Basin has shifted inward with the loss of recharge zones. The Keystone lakes are drying up. When there is input to the system, it is shifting east to Jacksonville (not the Suwannee River Basin) because of extensive pumping from the east. They first detected that Jacksonville was sucking water to the east in 1980s. There is a permit pending for Adena Springs Ranch in Marion County (large cattle operation).

- Questions about water use in the Suwannee and St. John's WMD – with major withdrawals in the Santa Fe and New River, also Lusty Creek
- Also concern that land use change, reduction of replanting, that recharge zones of groundwater is different with various soil types, and loss of forest to center pivot Ag. In Suwannee esp. Hamilton, Dixie, LaFayette, and the conversion of timberlands to Ag. lands
- Palmer Drought Severity Indices are increasing and becoming more severe. Withdrawals are increasing for agriculture and other human demands from growing population.
- Stochastic events, such as releases from Georgia wastewater treatment plants (WWTP) caused by flooding, increase nutrients and decrease dissolved oxygen.(causing water quality issues)
- There are two federally-listed aquatic species in basin: the oval pigtoe mussel (*Pleurobema pyrifforme*) and the Gulf sturgeon (*Acipenser oxyrinchus desotoi*). There are also two candidate species for listing: Suwannee moccasinshell (*Medionidus walkeri*) and the Southern lance (*Elliptio ahenea*).
- There is phosphorus mining in Hamilton County and sand mining in Bradford County (headwaters of New River) in the upper Suwannee River Basin.
- The primary areas of concern are the Withlacoochee and New rivers, and the upper and middle portions of the Suwannee River.
- There is a decrease in discharge from Okefenokee Swamp.
- The next steps for this study are to assess how land use has changed since 2008, how quickly populations will increase and how this will affect trust species, water quality, and water demand in the basin.
- Other issues include flashiness of flows and extreme events – to evaluate flashiness and not just base flow work.
- The Suwannee River WMD is currently preparing a report on the minimum flows and levels (MFL) for Lower Santa Fe River.
- Forest is also being lost to center pivot irrigation (Ellaville). The Adena Springs buyer is buying thousands of acres in Dixie County. Need to look at the increase in consumptive use permits for intensive agriculture in the lower Suwannee River Basin.

Steve Walsh (USGS)

Aquatic Faunal Biodiversity in Suwannee River Basin:

- This presentation focuses on less charismatic fauna (not megafauna) in the Suwannee River Basin.
- Florida is a hotspot for biodiversity associated with karst. Historical sea levels have a lot to do with the flora and fauna of Florida (see “The Geology of Florida”).
- The Suwannee River Basin has three distinct sections, around which biological distributions are centered.
 - Upper basin: confined aquifer, numerous surficial features, highly tannic, low pH
 - Middle basin: semi-confined to unconfined, pH rises
 - Lower basin: unconfined; estuary and intermix of surface and submarine groundwater
 - The Cody scarp is an ancient coastline where the Santa Fe River goes underground. It is a defined area for aquatic faunal distributions (and chemistry – tannic water)

- Information on imperiled species (in this presentation) comes from the following sources:
 - Lists of federally threatened and endangered species
 - Lists of state threatened and endangered species
 - American Fisheries Society lists of imperiled fish, crustaceans and mollusks (independent of federal agencies)
 - Center for Biological Diversity's petition for the USFWS to list 404 aquatic, riparian and wetland species in the Southeast U.S., which relies on NatureServe and IUCN red list rankings.
- Imperiled species in this presentation were compiled from the above sources for the area from Okefenokee Swamp (not inclusive) to the Suwannee River estuary but not including marine or brackish species – although the presentation does include sea turtle species.
 - 47% of the mussels in the basin are imperiled (no federally-listed gastropods), 35% of crustaceans and 41% of turtles (including sea turtles).
 - There is one federally-threatened crustacean (Squirrel Chimney Cave shrimp – [or Florida cave shrimp] *Palaemonetes cummingi*). <http://www.fws.gov/northflorida/Species-Accounts/PDFVersions/Squirrel-Chimney-Cave-Shrimp-2005.pdf> (potentially extinct)?
 - There is a lot of diversity in Stygobiont assemblages (aquatic cave obligate species) in the Suwannee and St. Johns rivers. Florida has the most diverse cave crayfish species diversity, centered in the Suwannee River Basin. Many endemic snails, crayfish, amphipods, isopods, and other crustaceans.
 - The Gulf Sturgeon is the only federally-listed fish in the basin. Marine invaders freely move in and out of karst systems in Florida.
 - There are no listed frogs or snakes in the basin, one federally listed salamander (frosted flatwoods salamander) and one candidate (striped newt).
 - The spotted bullhead catfish is endemic to the Suwannee River; there are a few in the Ochlocknee River.
- Past and Present Studies in the Basin:
 - Fred Thompson's identification manual for Florida is gastropods available at: <http://www.flmnh.ufl.edu/natsci/malacology/fl-snail/snails1.htm>.
 - Ken Sulak has been studying sturgeon for the last several decades and just put out a publication in March 2013 (bibliography of all Gulf sturgeon publications). Another paper (Categorical Habitat Attribute Acceptability Tool) describes a decision-making tool that would look at what habitat attributes are important. It could be applied to any system or species to help with management decisions. It will be available in the near future.
 - In 2011 a report of mussel surveys on the Santa Fe River (O'Leno State Park, Worthington Springs) was published.
 - As part of the Florida Springs Initiative (April 2003), Steve Walsh and Jim Williams published an inventory of fishes and mussels in the springs in North-Central Florida state parks, including three parks in the Suwannee Basin and nine in the St. Johns River basin.

Endemic species documented included spotted bullhead, Suwannee bass, etc. The Suwannee River and Ochlocknee Rivers were clustered in relation to fish diversity.

- The USGS has an Amphibian Research and Monitoring Inventory (ARMI) program (Jamie B) that is surveying and monitoring herpetofauna within the Southeast, focusing on refuges. The 2005 report surveyed the Savannah, St. Marks, Harris Neck and Lower Suwannee River refuges.
- Threats to Aquatic Fauna in the Basin (Florida Wildlife Commission):
 - Water availability, increasing groundwater withdrawals
 - Droughts, long-term climate change
 - Possible interbasin transfers (drawing water towards Jacksonville)
 - Nutrients (high algae on Santa Fe during low flow periods)
 - Recreational impacts
 - Invasive species (Cuban tree frog, armored catfish in Santa Fe, carp)
 - Habitat conversion
 - Concentrations of low dissolved oxygen, especially during algal blooms

John Faustini (USFWS – Region 4 Hydrologist)

WRIA Process:

Rebecca Burns (Atkins)

WRIA Components, Data Sources and Initial Data Collected:

Next Steps and Final Thoughts:

- Consolidate threats, recommendations and data needs
- Send meeting summary out for review, along with data spreadsheet and attendance list
- There will be no group conference calls; follow up will be via email
- Theresa will send a link to the Lower Suwannee River NWR WRIA SharePoint site for those who want access
- The presentations will be posted on the SharePoint site
- Andrew Gude would like this work to tie in with Restore Act funding; he is hoping to capitalize on other conservation efforts in the Big Bend region. He is committed to finding ways for the federal government to support research projects underway. Others mentioned tying in with U.S. Army Corps of Engineers funding, Gulf sturgeon restoration funding, Natural Resources Conservation Service (NRCS) work and National Oceanic and Atmospheric Administration (NOAA) projects.
- Several people mentioned the need to find ways to communicate this work to the public (contacting Charlie Dean – state senator and natural resources leader, link to refuge on Paddle Florida website, National Blueways designation for Suwannee River, USFWS avenues for public involvement, smart phone application for refuge, contacting Dana Bryan with Florida state parks about media/advertising, etc.).

IMMEDIATE	MID-RANGE	LONG-TERM
Present day to ... 365 days (1 year) 5 years?	1 to 20 years?	20 + years to infinity (2100)
<p>THREAT: Groundwater withdrawal(s) / pumping; Agricultural use, urban use, industrial use</p> <p>RECOMMENDATION: How much water being pumped from wells (USGS study remote sensing ACF, pilot study to monitor electric meter use); comparison of spring discharge with well use</p> <p>DATA NEED(S): number of wells</p>		
<p>THREAT: Urban / industrial development in groundwater recharge areas</p> <p>RECOMMENDATION: Incentivize land uses that encourage recharge (long leaf pine reestablishment), encourage municipalities to do karst-sensitive development through land use ordinances, incentivize counties to develop comprehensive plans with other counties (at WMD level), BMPs (pervious surfaces, capturing rainfall and reuse, Florida friendly yards)</p> <p>DATA NEED(S): Current land use, land cover data (minimum of 5 years), mapping of recharge areas, aquifer vulnerability assessments, modeling of land development practices (2008/09) – keeping track of changes through BMPs</p>		
<p>THREAT: Nitrate nitrogen (runoff from agriculture)</p> <p>RECOMMENDATION: BMPs, monitoring in estuary, develop advanced BMPs when existing BMPs not adequate, fundamental data on groundwater depletion and nitrate (DEP deploying nitrate monitors – tie in with USGS gages to ID sources and fate and determine levels that stimulate algal blooms, DO monitoring at nighttime)</p>		

DATA NEED(S): adequate application rates for crops at given times, BMP effectiveness monitoring (currently compliance assumed with implementation), DEP nitrate sensors in SW Alachua County		
THREAT: Water storage in the Floridan aquifer (need more water storage) RECOMMENDATION: Capturing excess flows and reinjection (eg Peace River), filling in drainage ditches (Dixie County) – WRP programs, water storage on farmlands (Everglades), releases that mimic natural hydrology DATA NEED(S): seasonal flow dependency of ecosystem (understand flow ecology relationships, cycling between high and low flows)		
THREAT: Eutrophication		
THREAT: Climate change		
THREAT: Sea level rise		
THREAT: Salt water intrusion		
THREAT: Bacterial (fecal coliform TMDL)		
THREAT: Overuse (springs physical perturbation from recreation)		
THREAT: Overfishing		
THREAT: Land use changes/urban development		
THREAT: Transfer of land uses from south Florida to Suwannee River Basin		
THREAT: Dairy farms		
THREAT: Septic tanks		
THREAT: DO levels from eutrophication		

THREAT: Riparian protection (clearing of land right to river, sedimentation)		
THREAT: WQ standards		
THREAT: Suspended sediments as threat to biota		
THREAT: Habitat connectivity		
THREAT: Loss of native biodiversity		
THREAT: Groundwater quality (taking older, deeper water with lower DO levels, aquifer processes, denitrification)		
THREAT: Invasive species (flora and fauna)		
THREAT: Human health impacts (physical, psychological from loss of habitats)		
RECOMMENDATION: fundamental data on nitrates (see above)		
THREAT: Ecosystem function and service with regard to biodiversity and habitat		
THREAT: Habitat conversions from climate change		
THREAT: Maintaining viable economy given dependence on water quality		
THREAT: Watershed alteration for management (drainage, dams, pumping)		
THREAT: Interbasin water transfer		
THREAT: Bottled water		
THREAT: Atmospheric deposition (mercury)		
THREAT: Mining		
THREAT: Storm surges		
THREAT: Wetland changes		
THREAT: Flashiness		
THREAT: Unknowns		

THREAT: Sediment runoff from unpaved roads		
THREAT: Loss of native vegetated habitat (rooted veg, snags) for lower trophic level organisms critical to food web/instream critical habitat		
THREAT: Byproducts (pharmaceutical, endocrine disruptors, chemical products, personal care products such as sunscreens) from recreational use and impacts on species diversity (hormones) (CONTAMINANTS)		
THREAT: Pesticides (endocrine disruptors)		
THREAT: Groundwater pumping and land use activities have altered groundwater chemistry (higher chloride levels)		
THREAT: Nitrogen runoff (infiltration) from urban environments		
THREAT: Valdosta WWTP as point source		
THREAT: Dumping in streams (ex Brian Katz Freon study)		
THREAT: Geomorphic changes from armored catfish (damage to banks, sedimentation)		
THREAT: Phosphate mining in northern basin		
THREAT: Phosphorus runoff from urban environment		
THREAT: Change in forest stewardship practices and climate leading to drying (biogeochemical process changes as a result of changing stewardship)		
RECOMMENDATION: Work with USDA, farmers on management practices, incentives for BMPs		
THREAT: Change from silviculture to high intensity agriculture (corn, peanuts) – issue for both use and quality		
THREAT: Water temperature		
THREAT: Ecosystem shifts from marsh to mangroves		

THREAT: Surplussing of conservation lands along riparian borders (FL)		
THREAT: Shortstopping of water in GA (dams) – loss to evapotranspiration, increasing temperatures, altered timing, channelization and resulting sedimentation (GA publication on water supply impoundments)		
THREAT: Extreme channel and bank modification destabilizing sediments as habitat for benthic organisms		
THREAT: Changing historic flows and impacts on sediment destabilization		
THREAT: Thinking the system can sustain us and all of our activities but we are vulnerable		
THREAT: Energy development		
THREAT: Shifting demographics and economy		
THREAT: Population growth in SRB and adjoining /adjacent basins (Jax, Orlando)		
THREAT: Commercial and economic uses in growing areas and impacts on water supply, quality (outside the basin)		
THREAT: Destabilization of marshes from climate change, SLR, salinity, dredging, physical impacts (wave activity)		
THREAT: Historic flows and hydroperiod – impacts on fisheries, etc. (ecological sense of the water flow) – loss of natural variability		

Water Resource Inventory and Assessment (WRIA) process

Lower Suwannee National Wildlife Refuge – Site Visit

Thursday, June 13, 2013 (8:00 AM – 2:00 PM)

Field Visit Purpose:

- Get outside and see the “heart of the refuge” (the Suwannee River)
- In a small group setting, focus on refuge specific management issues related to, and influencing water resources
- Discuss specific needs (resources, data, information, etc.) to better inform decisions/actions at the refuge scale
- Discuss options for specific collaboration with USFWS, USGS, Univ. of FL, and other partners
- Outline process / ideas for Refuge involvement with watershed issues

Agenda:

8:00 AM - Load up boat and head out from Refuge on the Lower Suwannee River

Explore various sites along the Lower Suwannee River – from more forested sites to lower reaches dominated by tidal saltmarsh. The main goal of the field trip is to be outside on the river. It is about a 17 mile boat ride from the refuge landing to the estuary which can take at a minimum 30 minutes. Various stops will highlight management issues directly and indirectly influencing water resources at the refuge. There might be some terrestrial stops along the way. The agenda for the field trip is informal, but dialogue will hopefully be inspired by the resource!

2:00 PM - end tour and depart

Rain Plan: Driving tour (land-based) highlighting management issues relevant to water resources

Things to Bring: Lunches, water, sunscreen, bugspray, rain gear, camera, notebook(s), etc.

Refuge Phone #: (352) 493-0238

Refuge Tour – General Notes:

- The refuge is implementing a new time schedule. It will be closed from dusk to dawn.
- One partial impoundment is found on the refuge. There are two water control structures, one of which is somewhat active. There are lots of culverts. There is an infrastructure GIS layer that includes everything, including all culverts. GIS data may not be up-to-date with what has actually been burned.
- Roads are all old logging roads (developed for access to timber) that are maintained for access. The refuge has “fire units” – forestry and fire don’t always talk to one another.
- When the water levels are high the Dixie Mainline road floods.

- The Lower Suwannee MFL study identified subbasins in the Econfina-Steinhatchee. George Willson provided hard copy of “Lower Suwannee River and Gulf Watershed Conservation Easement” report that delineates subbasins.
- The history of land use on the refuge is logging → ranch → tree farm → refuge. Everything has been bedded, all ponds are bermed, the river edge was bermed to plant trees. There are 4,000 acres of upland that were manipulated for tree planting with ditches and hills.
- Only one major drainage ditch that doesn’t parallel a road on the refuge. This drainage ditch drains to a creek. Other ditches are roadside drainage ditches. All roads act as drains. There are spoil berms throughout the refuge. Some are along the river but there is no inventory of them. This would affect the hydrology of the refuge slightly during smaller rising and falling water events.
- An active river gage is found on in the river within the refuge boundaries.
- The river is tidally influenced. Tide can fluctuate 4 – 5 feet. The river is incredibly low gradient/low energy. Have to go 40 miles to get to 60 feet.
- The refuge doesn’t get much rain.
- The Vista/Cummer tract is the oldest growth tract. It hasn’t been cut in 60-80 years.
- The USGS monitors sturgeon using buoys that track them when they swim past.
- Oyster beds/bars are disappearing. Hypotheses include water quality, overharvesting and reduced freshwater flow.
- The estuarine marsh is moving upriver due to overstory die-off. Die-off is due to higher levels of saltwater inundating the site → due to lower freshwater flows or sea level rise or combination of both? Salt from the water gets trapped in the soils, making it unsuitable for some vegetation species. Creates a buildup of salt in the soils. Cypress stumps are present in the marsh – no telling their age.
- The Asbow Tract/Fletcher’s Landing (10 acres) is owned by the SRWMD and has primitive camping. It is managed by the USFWS. Was clearcut.
- Floodplain forests along the river varied in age. Most of the trees looked to be in the 80-120 yo range. Clearcut near SRWMD primitive campsite was a lot younger. The Streamside Management Zone looked to buffer the river well. There looked to be no erosion due to the very slight topo change. Road to the river was stabilized well.
- There are inholdings throughout the refuge, including the island that is for sale on Dan May Creek.
- Hogs are abundant on the refuge.
- Daniel Barrand, refuge forester, is going to send a lot of refuge GIS information. Mark has already sent him a link to the Atkins sharing server.
- Refuge goals for uplands – currently, a lot are older planted slash pine.
 - Restore native groundcover through the use plantings (plugs, seed) and prescribed fire.
 - Restore longleaf pine.
 - Restoring upland “islands” found in floodplain forests
- The refuge would like a salinity gage just upriver from the East and West Pass split.
- Two wells are on the site. One is on the east side of the river, one is on the west side.

Other Contacts for Lower Suwannee NWR WRIA:

- David Hornsby – St. Johns WMD
- Jennifer Sagan – transects on Suwannee River for biological monitoring. Also FEMA mapping for basin – she will check on LiDAR.
- Bryan Katz – study of Freon isotopes at 30 sites in Suwannee River Basin
- Jones Center – Elizabeth Blood – center pivot effects on groundwater
- Trey Grubbs – surface water data
- Jack W, Bob Haykey – SRWMD
- Kathleen McKee – bibliography of publications
- Tony Countryman – groundwater in NFWMD
- Darlene Blum – NWIS sites (tell Gary Mahon what we need and he will reach out to Darlene first)
- Charlie Houder - ?

Appendix B

Portions from Appendix B from the Comprehensive Conservation Plan (CCP) for Lower Suwannee and Cedar Keys NWRs, specifically key issues and concerns summarized from the public scoping process.

[USFWS] U.S. Fish and Wildlife Service. 2001. Comprehensive Conservation Plan for Lower Suwannee and Cedar Keys National Wildlife Refuges. Accessed 3 April 2013. Available from: <http://digitalmedia.fws.gov/cdm/ref/collection/document/id/628>.

Appendix B

The Public Involvement Process

The scoping process concerning the future management of the Lower Suwannee and Cedar Keys National Wildlife Refuges consisted of two meetings, two stakeholder workshops, and a comment packet. The first public scoping meeting was held on July 27, 1999. The participants (24) were invited as potential members of the comprehensive conservation plan stakeholders' team. The second public scoping meeting on September 21, 1999, was widely advertised and the participants (approximately 40) represented user groups and the general public. The scoping meeting goals were to:

- Present background information about the National Wildlife Refuge System and about the Lower Suwannee and Cedar Keys National Wildlife Refuges, in particular;
- Present the mission of the National Wildlife Refuge System to the participating public;
- Present the planning process required to develop the comprehensive conservation plan; and
- Provide opportunities for the public to share their thoughts about the refuge by sharing comments at the scoping meeting and by returning an individual comment sheet.

During the welcoming comments, the refuge managers presented a thorough and engaging overview of the refuges and the comprehensive conservation planning process. These presentations included a video on the National Wildlife Refuge System entitled, "America's National Wildlife Refuge System, Where Wildlife Comes First," and a slide presentation on both Lower Suwannee and Cedar Keys National Wildlife Refuges. Comment sheets on which participants could individually respond to key issues concerning the future management of the refuges were passed out and explained. The refuge managers asked for the comment sheets to be returned by October 21, 1999.

After the presentations, the facilitator asked the participants to work in self-selected sub-groups. Three sub-groups were formed (at both meetings) and each group met for 50 minutes discussing the future management of the refuges. Each sub-group selected a recorder who wrote the major comments of each individual.

Attachment One is a summary of the major issues and concerns raised in both meetings. Attachment Two presents the unedited easel paper notes from the meeting on September 21, 1999, and Attachment Three contains the notes from the July 27, 1999, meeting. Since there was no attempt in the sub-groups to create consensus suggestions, some of the comments generated in the sub-groups were diametrically opposed to each other. During the final comments, participants appreciated the chance to hear the comments of others. Also during the scoping process, two stakeholder workshops were held. The first workshop was held on August 12, 1999, with 26 participants representing the following groups: Fish and Wildlife Service; Florida Fish and Wildlife Conservation Commission; Florida Department of Environmental Protection; Florida's Nature Coast Conservancy; Save Our Suwannee; Cedar Key Garden Club; University

of Florida; Cedar Key Historical Society; Development Advisory Services, Inc.; Cedar Key Chamber of Commerce; Nature Coast Canoe and Kayak; Suwannee River Chamber of Commerce; and the Suwannee River Water Management District. The purposes of the workshops were to develop vision statements for each refuge and to review a comment packet that would be distributed to the public.

Following the September public scoping meeting, another stakeholder workshop was held to discuss the range of reasonable alternatives that the planning team should consider. The 16 participants at this meeting created a framework for goals, objectives, and strategies to be developed within the comprehensive conservation plan. Stakeholders at this meeting represented the Fish and Wildlife Service; Florida Department of Environmental Protection; Save Our Suwannee; Florida Fish and Wildlife Conservation Commission; Cedar Key Garden Club; Suwannee River Chamber of Commerce; Suwannee Audubon Society; and the Suwannee River Water Management District.

The final mechanism used to gather public input was a comment packet (Attachment Four). This packet contained general information about the refuges; management statements to agree or disagree with; open-ended questions which allowed the respondent to elaborate on the values, issues, and concerns of the refuges; and a mailing request form and release. This packet was available at the public meeting (September 21, 1999), from the refuge office, and on the Internet at the refuge's web site. A total of 250 packets was distributed at the public meeting, at community meetings, and from the refuge office. It is unknown how many packets were viewed or printed from the Internet.

Forty-three comment packets were returned to the refuge office. Several of these were printed from the refuge's web site. The data from these packets were analyzed and evaluated along with the comments from the public meetings and stakeholder workshops, and from letters received at the refuge office. All comments, whether written or oral, were given equal consideration during preparation of these comprehensive conservation plans. A planning update newsletter (Attachment Five) was developed and sent to all names on the mailing list (Attachment Six).

The following is a summary of what the public valued most about the refuges:

Value Statements

- Diversity of wildlife and habitats
- Quality of the ecosystem
- Water quality
- Natural, unspoiled, wild beauty
- Protection of plant and animal life and habitat, especially from development
- Serenity and isolation
- Public access
- Opportunities for wildlife-dependent recreation, especially hunting, fishing, wildlife observation and wildlife photography
- Research opportunities
- Environmental education programs
- Refuge staff
- Partnerships

Several key issues and concerns surfaced during the scoping process. The planning team reviewed the issues and concerns raised by the approximately 100 people who participated in the scoping process and in comments received in the 43 comment packets that were returned to the refuge office. This list was based on the team's knowledge of the area, information gathered during the scoping meetings, and written comments submitted by the public. Following each statement is the Service's response to the issue, concern, or recommendation.

Key Issues and Concerns Summary

Wildlife Habitat Management

WH1 Not enough is known about the wildlife or habitat of the refuges.

The plan addresses these deficiencies in the strategies developed for the wildlife and habitat management goals. These strategies outline a systematic approach for surveying and monitoring trust species and for evaluating refuge habitat management practices, such as forest thinning, restoration, and prescribed fire. The end result is a set of goals, objectives, and strategies to systematically collect and analyze data and tailor management programs to best meet the needs of the wildlife that use refuge habitats.

WH2 Staff is needed to monitor and manage habitat for endangered species, migratory birds, and resident wildlife.

Lower Suwannee National Wildlife Refuge was established in 1979, but only recently received staffing and funding to begin monitoring trust species and to evaluate refuge habitats. Cedar Keys National Wildlife Refuge is an unfunded and unstaffed refuge. Neither station has biological staff dedicated to developing a comprehensive biological program. These comprehensive conservation plans outline an aggressive wildlife and habitat monitoring, management, and evaluation program to address this need. This program can only be achieved if appropriate staffing and funding are received.

WH3 Staff should initiate research partnerships with U.S. Geological Survey and Suwannee River Water Management District to assist and expand water flow and water quantity impact studies on refuge habitat.

Within the comprehensive conservation plans, several strategies are identified to address this need. Dynamic partnerships with the Suwannee River Water Management District, the University of Florida, and other resource agencies would be developed and expanded. Partnerships throughout the 10,000-square-mile Suwannee River Basin would be fostered. The value of these partnerships lies in the increased opportunity to protect the Suwannee River ecosystem, the wildlife and habitats found within the basin, and to ensure water quality and quantity are protected.

WH4 Staff need to monitor and manage impacts of human use on wildlife and habitat.

While the public valued the opportunities to participate in wildlife-dependent recreation on the refuges, there was an overwhelming concern that public use be monitored and managed. One suggestion centered around clustering public use areas within the refuges in order to limit degradation of resources to certain areas. Other areas would remain natural, without the development of public use facilities. The plan clusters public use areas and improves the facilities available in these areas. However, the plan also allows for the development of trails and facilities in other areas if wildlife compatibility is addressed.

Monitoring the impacts of public use will be accomplished through biological and habitat management programs. For example, an eagle's nest is located on North Key. The beaches of this island are open year round and the nest is located near the beach. If beach use (including wildlife observation, wildlife photography, and fishing) disturbs the nesting pair, then the area around the eagle's nest would be closed during the nesting season to ensure that wildlife use of the area has first priority.

WH5 Management activities should preserve and restore refuge ecosystems.

Many of the lands acquired to establish Lower Suwannee National Wildlife Refuge were severely degraded or were intensively altered by land use practices. Thousands of acres of longleaf, native slash, and scattered loblolly pines were cut and replanted with genetically improved slash pine in plantations that were harvested on a 16- to 20-year rotation. In addition, thousands of acres of mixed pine/hardwood stands were converted to slash pine plantations. Intensive site preparation, which altered the understory vegetation, was needed to make these sites suitable for pine trees. Additionally, an extensive network of roads and ditches was developed to facilitate timber management. Finally, most of the forested land in the swamps and bottoms is second or third generation; there are only a few remnant stands of old growth timber.

The objectives and strategies listed under the habitat management goal outline a plan to restore native ecosystems. Strategies identified include reforestation with longleaf pine and wiregrass, silvicultural thinnings to reduce stand density and create more natural forest conditions, and prescribed fire to reduce woody stems and promote herbaceous understories which were historically present. The Forest Management Plan will address hardwood silvicultural management concerns as well.

Management of refuge habitats on Cedar Keys National Wildlife Refuge is opposite to management of Lower Suwannee National Wildlife Refuge. Cedar Keys Refuge has been protected from development since 1929, and four of the islands are designated as Wilderness Areas. Refuge habitats are pristine and for the most part, unaltered. With the exception of exotic plant removal, management of the islands has been "hands off." The comprehensive conservation plans outline strategies for preserving these delicate coastal ecosystems without using intensive management techniques.

Public Use

PU1-LS Lower Suwannee National Wildlife Refuge should continue to provide the public with compatible consumptive and non-consumptive uses and access in a manner that minimizes conflicts between user groups and does not significantly impact habitat.

The comprehensive conservation plan specifically addresses this need by clustering public use areas and by establishing non-hunting areas in both counties. One of the major concerns expressed by user groups was safety during the hunting season. Currently, the Shell Mound and River Trail areas in Levy County are closed to hunting. These areas are used by an estimated 60,000 visitors a year. The plan proposes closing the Shired Island and Fishbone Creek areas in Dixie County. These areas contain 194 and 58 acres of uplands, respectively, but are mainly characterized as coastal marsh. An estimated 40,000 visitors annually use these two areas. A portion (16 acres) of the Fishbone Creek area

Appendix C

Station characteristics for gaging stations in the contributing watersheds of the Lower Suwannee National Wildlife Refuge and vicinity, Florida and Georgia. There are 149 USGS surface water quantity monitoring sites (stream, lake and spring gages and sites that were periodically measured for water levels) within the RHI. In 2011 and 2012, the USGS constructed a hydrologic database containing detailed streamflow information and analysis for 26 gage sites in contributing watersheds for Lower Suwannee NWR (See Section 5.3.1.1 – Hydrography, Table 15, and Figure 26 in the WRIA report; Buell 2012). This Appendix (Appendix C) gives more details about these stations, including the periods-of-record for gage height and discharge for these stations. Additional information can be found in Table 2A and Table 2B from Buell (2012).

Buell, G.R. 2012. Hydrologic and landscape database including figures and tables for Lower Suwannee NWR. Delivered to FWS (January 2012).

Table 2A . Station characteristics for gaging stations in the contributing watersheds of the Lower Suwannee National Wildlife Refuge and vicinity, Florida and Georgia.

[Major drainage boundaries and locations of U.S. Geological Survey (USGS) gaging stations shown in figure 1; USGS hydrologic subregions, hydrologic-subregion codes, hydrologic cataloguing units, and hydrologic-cataloguing-unit codes, listed as subheadings and also shown in figure 1; dms, latitude and longitude coordinates in degrees, minutes, and seconds; mi², square mile; ft, foot; gage location in relation to the refuge property: us, upstream; usds, upstream and downstream; ds, downstream]

USGS station number	Station name	County and state	Latitude and longitude ^a (dms)	Hydrologic cataloguing unit ^b	Drainage area ^c (mi ²)	Datum of gage ^d (ft)	Gage location
Suwannee (0311)							
Upper Suwannee (03110201)							
02314274 ^e	Suwannee R at Sill nr Fargo, GA	Charlton, GA	304814N, 0822503W	03110201	—	117.00	us
023142741 ^e	N Fork Suwannee R at Sill nr Fargo, GA	Charlton, GA	304858N, 0822449W	03110201	—	117.00	us
02314495	Suwannee R ab Fargo, GA	Clinch, GA	304227N, 0823221W	03110201	1,260	91.90	us
02314500	Suwannee R (US 441) at Fargo, GA	Clinch, GA	304050N, 0823338W	03110201	1,130	91.90	us
02315500	Suwannee R at White Springs, FL	Columbia, FL	301932N, 0824418W	03110201	2,430	0.00 ^f (48.54)	us
02315550 ^e	Suwannee R at Suwannee Springs, FL	Suwannee, FL	302334N, 0825600W	03110201	2,630	0.00	us
Alapaha (03110202)							
02317500	Alapaha R at Statenville, GA	Echols, GA	304214N, 0830200W	03110202	1,400	76.77	us
02317620	Alapaha R nr Jennings, FL	Hamilton, FL	303553N, 0830424W	03110202	1,680	0.00 ^g (58.22)	us
Withlacoochee (03110203)							
02318500	Withlacoochee R (US 84) nr Quitman, GA	Brooks, GA	304735N, 0832713W	03110203	1,480	84.30	us
02319000	Withlacoochee R nr Pinetta, FL	Madison, FL	303543N, 0831535W	03110203	2,120	47.21	us
02319300 ^e	Withlacoochee R nr Madison, FL	Hamilton, FL	302856N, 0831435W	03110203	2,240	0.00	us
02319394	Withlacoochee R nr Lee, FL	Madison, FL	302437N, 0831049W	03110203	2,330	0.88	us
Lower Suwannee (03110205)							
02319500	Suwannee R at Ellaville, FL	Suwannee, FL	302304N, 0831019W	03110205	6,970	27.22	us
02319800	Suwannee R at Dowling Park, FL	Lafayette, FL	301441N, 0831459W	03110205	7,190	0.00	us
02320000	Suwannee R at Luraville, FL	Suwannee, FL	300559N, 0831018W	03110205	7,280	0.00 ^h (16.49)	us
02320500	Suwannee R at Branford, FL	Suwannee, FL	295720N, 0825540W	03110205	7,880	4.81	us
02323000	Suwannee R nr Bell, FL	Gilchrist, FL	294728N, 0825528W	03110205	9,390	0.00 ⁱ (3.60)	us
02323500	Suwannee R nr Wilcox, FL	Levy, FL	293522N, 0825612W	03110205	9,640	-0.53	usds
02323592	Suwannee R ab Gopher R nr Suwannee, FL	Dixie, FL	292021N, 0830512W	03110205	9,973	-2.10	usds
291841-083070800 ^e	East Pass Suwannee r nr Suwannee, FL	Levy, FL	291841N, 0830708W	03110205	—	—	usds

Table 2A—continued. Station characteristics for gaging stations in the contributing watersheds of the Lower Suwannee National Wildlife Refuge and vicinity, Florida and Georgia.

[Major drainage boundaries and locations of U.S. Geological Survey (USGS) gaging stations shown in figure 1; USGS hydrologic subregions, hydrologic-subregion codes, hydrologic cataloguing units, and hydrologic-cataloguing-unit codes, listed as subheadings and also shown in figure 1; dms, latitude and longitude coordinates in degrees, minutes, and seconds; mi², square mile; ft, foot; gage location in relation to the refuge property: us, upstream; usds, upstream and downstream; ds, downstream]

USGS station number	Station name	County and state	Latitude and longitude ^a (dms)	Hydrologic cataloguing unit ^b	Drainage area ^c (mi ²)	Datum of gage ^d (ft)	Gage location
Suwannee (0311)—continued							
Santa Fe (03110206)							
02320700 ^e	Santa Fe R nr Graham, FL	Alachua, FL	295046N, 0821311W	03110206	94.9	103.55	us
02321500	Santa Fe R at Worthington Springs, FL	Alachua, FL	295518N, 0822535W	03110206	575	42.74	us
02321975 ^e	Santa Fe R (US 441) nr High Springs, FL	Alachua, FL	295109N, 0823631W	03110206	859	49.96	us
02322000 ^e	Santa Fe R nr High Springs, FL	Columbia, FL	295033N, 0823752W	03110206	868	26.36	us
02322500	Santa Fe R nr Ft White, FL	Gilchrist, FL	295055N, 0824255W	03110206	1,017	20.86	us
02322800	Santa Fe R nr Hildreth, FL	Gilchrist, FL	295441N, 0825138W	03110206	1,374	3.50	us

^a Latitude and longitude coordinates in normal font are referenced to NAD 27, those in italicized font are referenced to NAD 83.

^b The 8-digit hydrologic units were developed by the U.S. Geological Survey as a standardized set of hydrologic boundaries and numerical codes for the river-basin units of the United States (Seaber and others, 1994). The 8-digit hydrologic unit code encompasses four levels of subdivision: region (2-digit), subregion (4-digit), accounting unit (6-digit), and cataloguing unit (8-digit).

^c Drainage areas in parentheses are shown when the contributing drainage area is less than the actual drainage area. —, the drainage area is either indeterminate or not delineated.

^d Datum-of-gage values in normal font are from records of the USGS, those in italicized font are from records of the Georgia Department of Transportation. All datum-of-gage values are referenced to NGVD 29. —, datum of gage not established.

^e Inactive station.

^f Datum of gage was 48.54 ft NGVD 29 prior to October 1, 1979, 0.00 ft NGVD 29 October 1, 1979 to present.

^g Datum of gage was 58.22 ft NGVD 29 prior to October 1, 1999, 0.00 ft NGVD 29 October 1, 1999 to present.

^h Datum of gage was 16.49 ft NGVD 29 prior to October 1, 1937, 0.00 ft NGVD 29 October 1, 1937 to present.

ⁱ Datum of gage was 3.60 ft NGVD 29 prior to November 17, 1956, 0.00 ft NGVD 29 November 17, 1956 to present.

Table 2B. Hydrologic-data periods-of-record for gaging stations in the contributing watersheds of the Lower Suwannee National Wildlife Refuge and vicinity, Florida and Georgia.

[Major drainage boundaries and locations of U.S. Geological Survey (USGS) gaging stations shown in figure 1; USGS hydrologic subregions, hydrologic-subregion codes, hydrologic cataloguing units, and hydrologic-cataloguing-unit codes, listed as subheadings and also shown in figure 1; water year, October 1, preceding calendar year, through September 30, current calendar year; calendar year, January 1 through December 31]

USGS station number	Station name	Parameter	Water-year record		Calendar-year record	
			Period of record ^a	Record completeness ^a	Period of record ^a	Record completeness ^a
Suwannee (0311)						
Upper Suwannee (03110201)						
02314274 ^b	Suwannee R at Sill nr Fargo, GA	Discharge	2000–2002	3, 0, 0–1.00	1999–2002	2, 2, 0–0.75
023142741 ^b	N Fork Suwannee R at Sill nr Fargo, GA	Discharge	1999–2003	4, 1, 0–0.98	1998–2003	4, 2, 0–0.81
02314495	Suwannee R ab Fargo, GA	Gage height	2000–2009	5, 5, 0–0.90	1999–2009	6, 5, 0–0.82
02314500	Suwannee R (US 441) at Fargo, GA	Gage height	1987–2009	4, 8, 11–0.49	1986–2009	3, 11, 10–0.47
02315500	Suwannee R at White Springs, FL	Discharge	1927–2009	75, 4, 4–0.93	1927–2009	74, 4, 5–0.93
		Gage height	1906–2009	50, 37, 17–0.79	1906–2009	47, 39, 18–0.79
		Discharge	1906–2009	83, 4, 17–0.82	1906–2009	83, 3, 18–0.82
02315550 ^b	Suwannee R at Suwannee Springs, FL	Discharge	1975–1996	22, 0, 0–1.00	1974–1996	21, 2, 0–0.96
Alapaha (03110202)						
02317500	Alapaha R at Statenville, GA	Gage height	1998–2009	7, 5, 0–0.98	1997–2009	7, 6, 0–0.90
		Discharge	1921–2009	76, 3, 10–0.88	1921–2009	77, 3, 9–0.88
02317620	Alapaha R nr Jennings, FL	Gage height	1976–2009	11, 7, 16–0.45	1976–2009	8, 11, 15–0.45
		Discharge	1976–2009	14, 3, 17–0.44	1976–2009	11, 8, 15–0.44
Withlacoochee (03110203)						
02318500	Withalacoochee R (US 84) nr Quitman, GA	Gage height	1994–2009	4, 12, 0–0.90	1993–2009	3, 14, 0–0.84
		Discharge ^c	1929–2009	31, 6, 44–0.42	1928–2009	30, 8, 44–0.41
02319000	Withalacoochee R nr Pinetta, FL	Gage height	1932–2009	58, 20, 0–0.99	1931–2009	59, 20, 0–0.98
		Discharge ^c	1932–2009	77, 1, 0–1.00	1931–2009	77, 2, 0–0.99
02319300 ^b	Withalacoochee R nr Madison, FL	Gage height	2005–2010	3, 3, 0–0.81	2004–2009	4, 2, 0–0.81
		Discharge	2005–2008	3, 1, 0–0.97	2004–2008	3, 2, 0–0.78
02319394	Withalacoochee R nr Lee, FL	Gage height	2001–2009	3, 6, 0–0.95	2000–2009	3, 7, 0–0.86
		Discharge	2001–2009	7, 2, 0–0.97	2000–2009	8, 2, 0–0.87
Lower Suwannee (03110205)						
02319500	Suwannee R at Ellaville, FL	Gage height ^c	1927–2009	59, 24, 0–0.98	1927–2009	54, 29, 0–0.98
		Discharge ^c	1927–2009	81, 2, 0–0.99	1927–2009	81, 2, 0–0.99
02319800	Suwannee R at Dowling Park, FL	Gage height	1997–2009	2, 11, 0–0.94	1996–2009	3, 11, 0–0.88
		Discharge	1997–2009	11, 2, 0–0.99	1996–2009	12, 2, 0–0.92
02320000	Suwannee R at Luraville, FL	Gage height ^c	1927–2009	15, 11, 57–0.28	1927–2009	13, 12, 58–0.28
		Discharge ^c	1927–2009	22, 4, 57–0.29	1927–2009	22, 3, 58–0.29
		Water temperature	1996–2009	2, 7, 5–0.45	1996–2009	2, 8, 4–0.45
02320500	Suwannee R at Branford, FL	Gage height ^c	1931–2009	68, 11, 0–0.99	1931–2009	69, 10, 0–0.99
		Discharge ^c	1931–2009	77, 2, 0–0.99	1931–2009	77, 2, 0–0.99
		Specific conductance	1990–1990	0, 1, 0–0.13	1990–1990	0, 1, 0–0.13
02323000	Suwannee R nr Bell, FL	Gage height ^c	1932–2011	14, 27, 39–0.46	1932–2011	10, 31, 39–0.46
		Discharge ^c	1932–2011	35, 3, 42–0.45	1932–2011	34, 3, 43–0.45

Table 2B—continued. Hydrologic-data periods-of-record for gaging stations in the contributing watersheds of the Lower Suwannee National Wildlife Refuge and vicinity, Florida and Georgia.

[Major drainage boundaries and locations of U.S. Geological Survey (USGS) gaging stations shown in figure 1; USGS hydrologic subregions, hydrologic-subregion codes, hydrologic cataloguing units, and hydrologic-cataloguing-unit codes, listed as subheadings and also shown in figure 1; water year, October 1, preceding calendar year, through September 30, current calendar year; calendar year, January 1 through December 31]

USGS station number	Station name	Parameter	Water-year record		Calendar-year record	
			Period of record ^a	Record completeness ^a	Period of record ^a	Record completeness ^a
Suwannee (0311)—continued						
Lower Suwannee (03110205)—continued						
02323500	Suwannee R nr Wilcox, FL	Gage height ^c	1931–2011	42, 28, 11–0.79	1930–2011	42, 29, 11–0.78
		Discharge ^c	1931–2011	71, 0, 0–0.88	1930–2011	69, 4, 9–0.87
		Water temperature	1999–2011	0, 12, 0–0.64	1999–2011	0, 12, 0–0.64
02323592	Suwannee R ab Gopher R nr Suwannee, FL	Gage height	1999–2011	5, 8, 0–0.92	1999–2011	4, 9, 0–0.92
		Discharge	1999–2011	11, 2, 0–0.94	1999–2011	10, 3, 0–0.94
		Water temperature	1999–2011	3, 10, 0–0.92	1999–2011	3, 10, 0–0.92
		Specific conductance	1999–2011	3, 10, 0–0.71	1999–2011	1, 12, 0–0.71
		Salinity	1999–2011	5, 8, 0–0.87	1999–2011	4, 9, 0–0.87
291841- 083070800 ^b	East Pass Suwannee r nr Suwannee, FL	Discharge	1995–2001	1, 6, 0–0.66	1995–2000	0, 6, 0–0.77
		Water temperature	1995–2001	1, 6, 0–0.58	1995–2000	0, 6, 0–0.68
		Salinity	1995–1999	0, 5, 0–0.56	1995–1999	0, 5, 0–0.56
Santa Fe (03110206)						
02320700 ^b	Santa Fe R nr Graham, FL	Discharge ^c	1957–1998	41, 1, 0–0.98	1957–1998	40, 2, 0–0.98
02321500	Santa Fe R at Worthington Springs, FL	Gage height	1932–2011	40, 38, 2–0.94	1931–2011	38, 42, 1–0.93
		Discharge ^c	1932–2011	80, 0, 0–1.00	1931–2011	79, 2, 0–0.99
02321975 ^b	Santa Fe R (US 441) nr High Springs, FL	Discharge ^c	1993–2002	9, 0, 0–0.90	1992–2002	7, 4, 0–0.82
02322000 ^b	Santa Fe R nr High Springs, FL	Discharge	1931–1971	40, 1, 0–0.99	1931–1971	39, 2, 0–0.99
02322500	Santa Fe R nr Ft White, FL	Gage height	1928–2010	39, 36, 8–0.82	1927–2010	38, 41, 5–0.81
		Discharge ^c	1928–2010	80, 2, 1–0.97	1927–2010	79, 4, 1–0.96
02322800	Santa Fe R nr Hildreth, FL	Gage height	1947–2010	23, 32, 9–0.75	1947–2010	19, 36, 9–0.75
		Discharge	2001–2010	7, 2, 1–0.79	2000–2010	6, 4, 1–0.72

^aPeriod shown is for indicated type of year and includes gaps if data collection was discontinuous. Record completeness: number of complete-record, partial-record, and null-record water or calendar years—fraction of total record length with mean-daily values. The fraction-of-total-record-length calculation is based on complete beginning and ending water or calendar years as well as complete intervening years. Therefore, the fraction-of-total-record-length numbers may be different for water years when compared to calendar years.

^bInactive station.

^cIndicators of Hydrologic Alteration (IHA) analysis was performed for these parameters. Periods of record for IHA analyses shown in figure 4 (gage height) and figure 5 (discharge).

Appendix D

Water Quality Monitoring Data from surface water monitoring gage SUW160 "Suwannee River at Fanning Springs" (period of record: 1998 to current). This site is part of the surface water component of the Trend Network (SWTV) that consists of 76 fixed sites placed on or near rivers entering the state from Alabama and Georgia or at the point a river exits a watershed basin. SWTV sites are sampled on a monthly basis and reporting data are available at

<http://waterwebprod.dep.state.fl.us/ambient/swtv/default.htm>

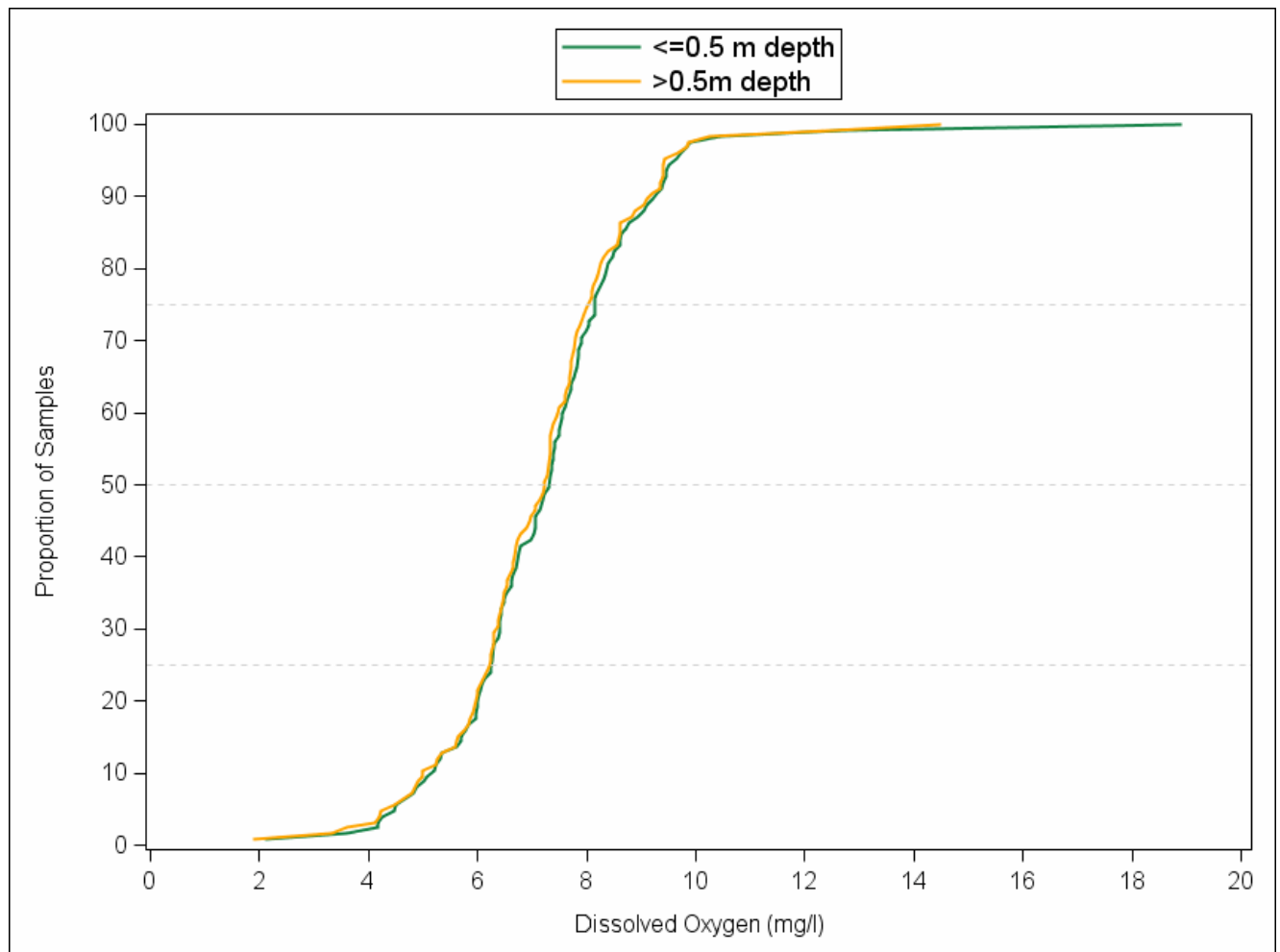
Summary of Surface Water Quality Monitoring Data for SUW160

Site SUW160 is a surface water quality monitoring site (see Site ID 18 in the WRIA report – Section 5.3.1.2 Water Quality Monitoring). The location of this well is described as “Suwannee River near Fanning Springs”, physically along the Lower Suwannee River between the northern and southern portion of the Lower Suwannee NWR acquisition boundary. This gage is part of the Florida Department of Environmental Protection’s Integrated Water Resource Monitoring Network (IWRM). Data are collected statewide at a variety of river, stream, lake, and canal sites and used to identify and confirm impaired waters, and to determine regulatory compliance. As a part of IWRM, FDEP established a Trend Network (formally designated as the Temporal Variability or “TV” Network) to characterize the environmental conditions of the state’s water resources and to determine how these conditions change over time. The surface water component of the Trend Network (SWTV) consists of 76 fixed sites that are placed on or near rivers entering the state from Alabama and Georgia or at the point a river exits a watershed basin. SWTV sites are sampled on a monthly basis and reporting data are available at <http://waterwebprod.dep.state.fl.us/ambient/swtv/default.htm>

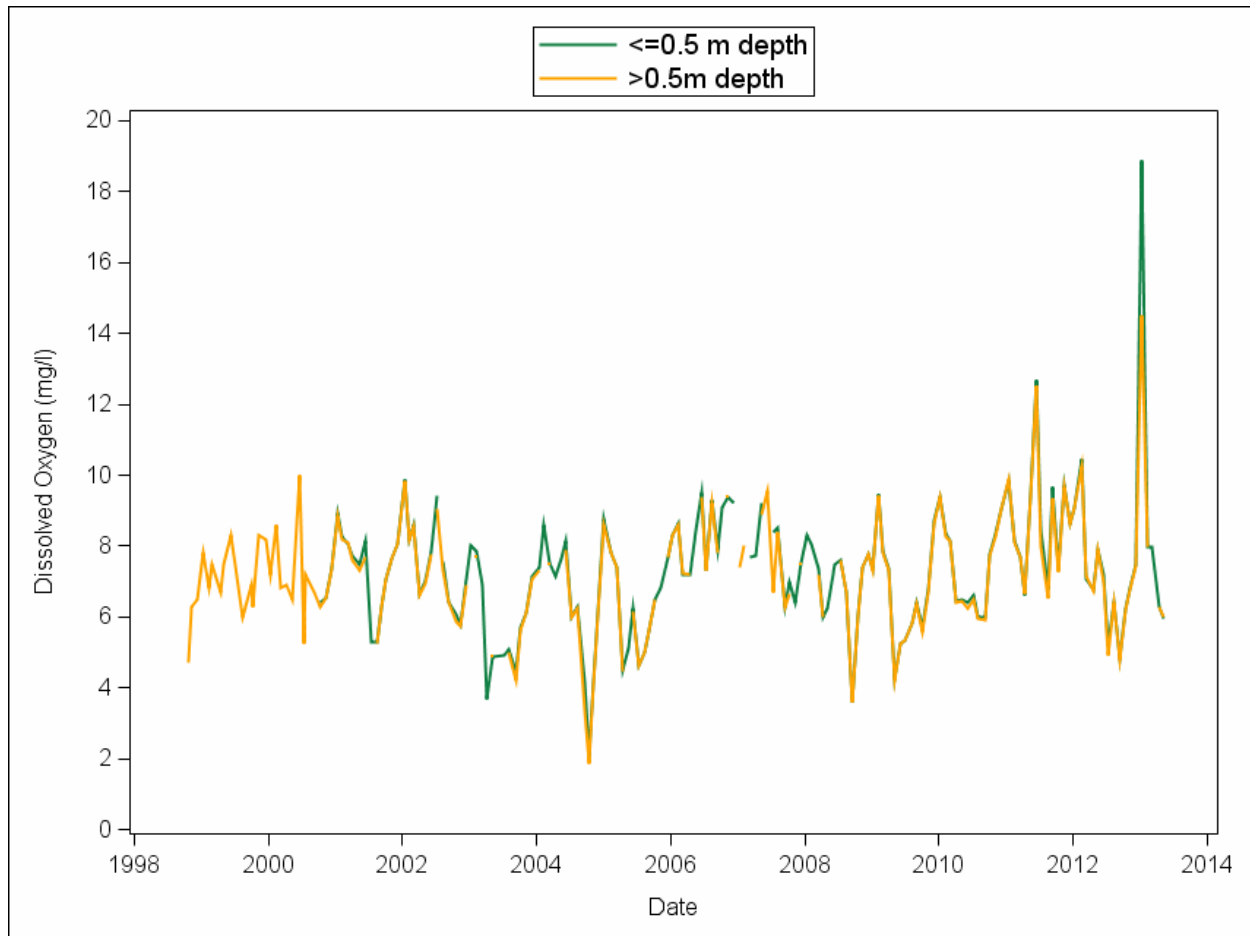
FDEP Station Name	SUW160
STORET Identifier	3519
Station Description	SUWANNEE RIVER AT FANNING SPRINGS
Latitude	29 35 33.432
Longitude	82 56 18.563
Location Method	Differentially Corrected GPS
Locational Datum	WGS-84
Resource Type	STREAM
Waterbody Name	SUWANNEE RIVER
County	DIXIE
Water Management District	SUWANNEE RIVER WATER MANAGEMENT DISTRICT
FDEP District	NORTHEAST DISTRICT - JACKSONVILLE
Period of Record	FDEP: 1998 - present

Dissolved Oxygen

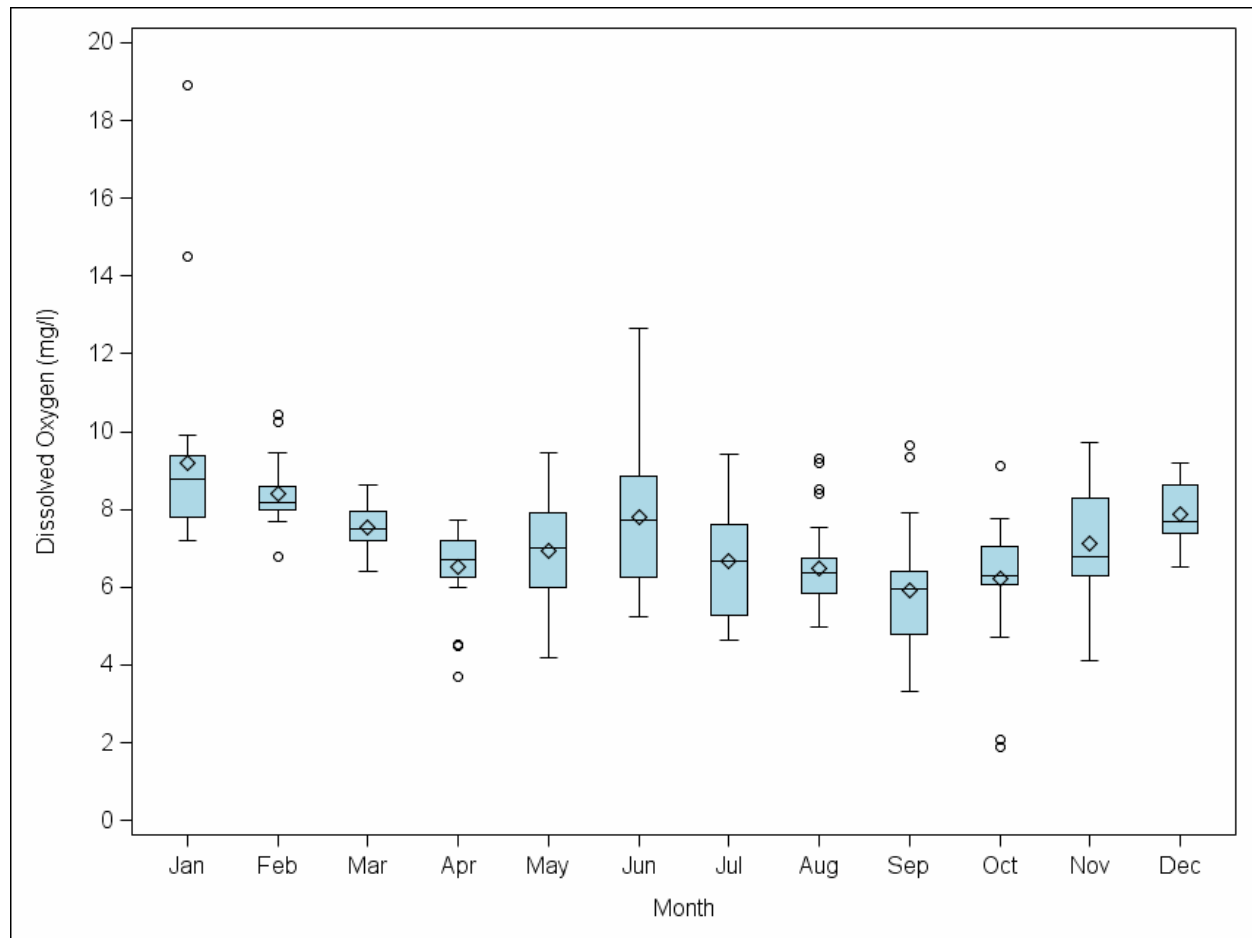
Initially it is clear that there are duplicate samples in the database. In order to correct this the mean dissolved oxygen value was calculated for each sample date*station*depth*units combination in the dataset. The frequency of depths was reviewed and it seems that there are samples taken at 0.5 meters or less which represent surface samples, and then samples taken deeper which I presume are mid water, but could also be bottom samples. Based on this I added a field for relative depth and produced a cdf plot to see what the distribution of surface vs at-depth DO looks like including only sample days where surface and at-depth samples were both taken.



There is no difference between the distribution of the two sample types and the time series indicate that the surface and at depth oxygen remain similar over time, so they are not separated when dissolved oxygen is displayed seasonally. (Note that on the CDF graphic reference lines are drawn at the 25th, 50th, and 75th percentiles)



Dissolved data were displayed using boxplots for each month to show seasonal variability. Dissolved oxygen was generally higher during the colder months. This dataset does not indicate that there are issues with hypoxia at any time.

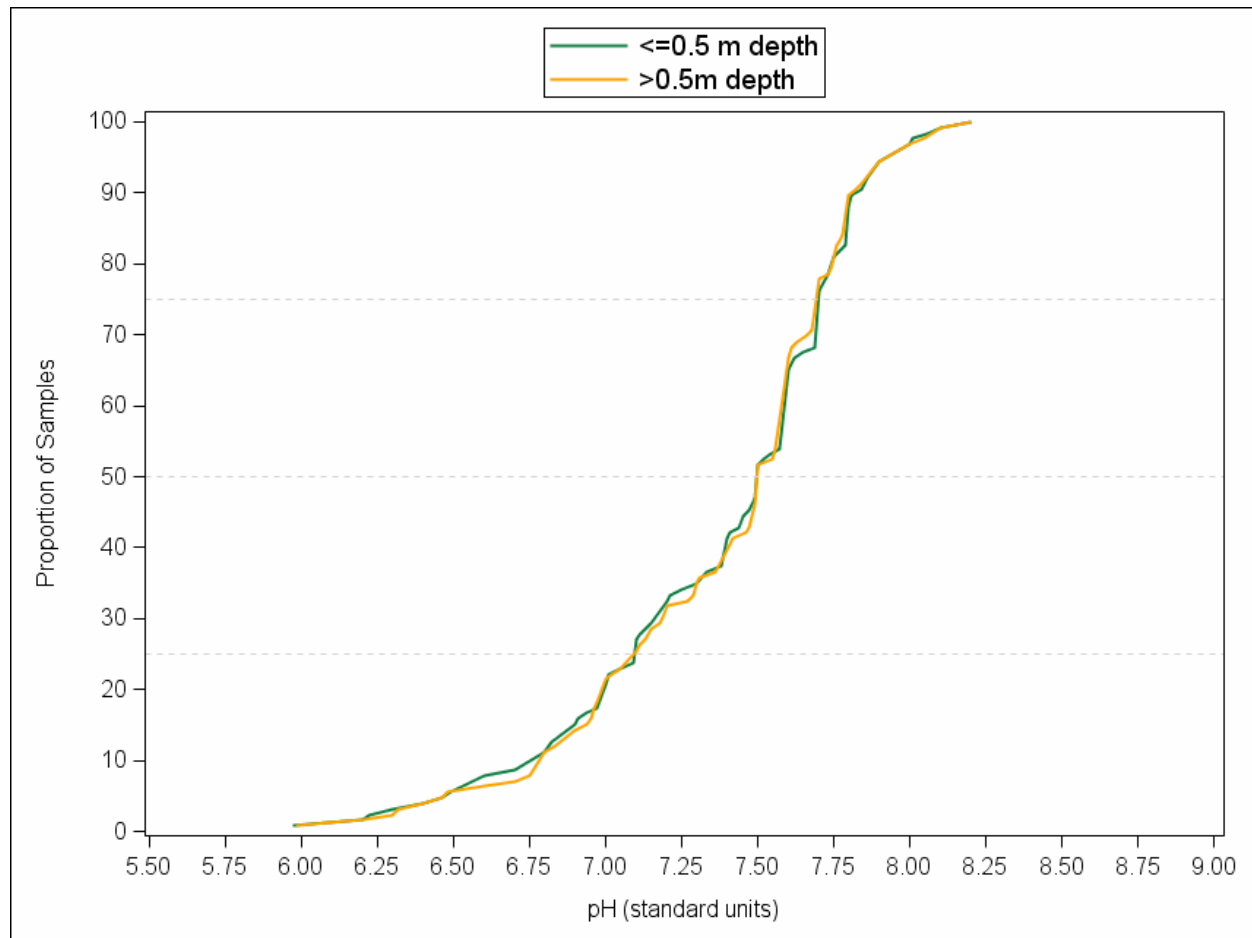


Below is a table of summary statistics with dissolved oxygen concentration summarized by month, and for the entire dataset.

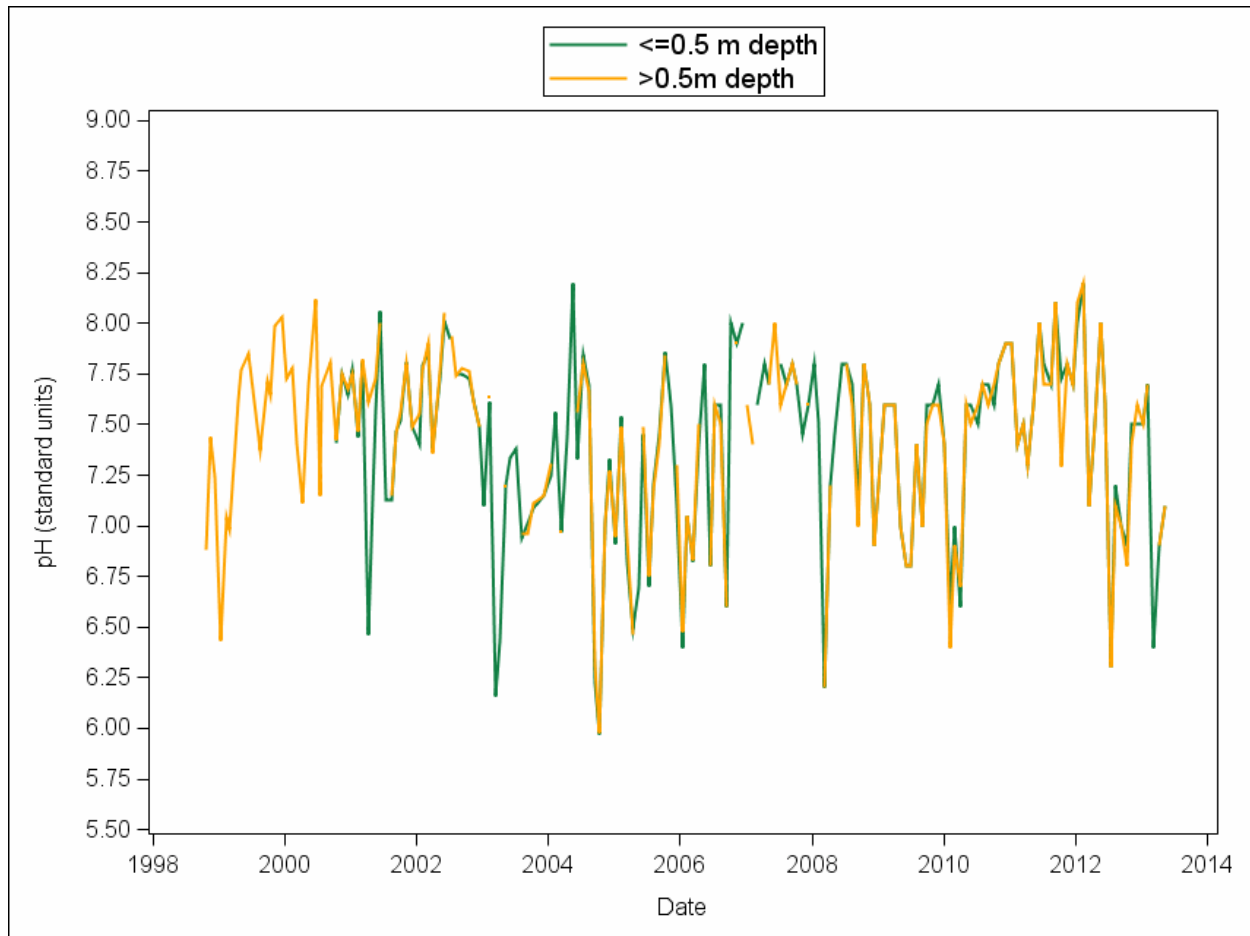
Month	Mean	Standard Deviation	Maximum	75th percentile	Median	25th Percentile	Minimum
Jan	9.19	2.51	18.90	9.39	8.77	7.80	7.20
Feb	8.39	0.79	10.44	8.60	8.19	7.98	6.80
Mar	7.53	0.56	8.61	7.96	7.50	7.21	6.42
Apr	6.53	1.04	7.74	7.20	6.70	6.27	3.70
May	6.92	1.56	9.46	7.90	6.99	5.98	4.20
Jun	7.80	2.04	12.67	8.85	7.73	6.24	5.23
Jul	6.68	1.47	9.42	7.60	6.67	5.26	4.64
Aug	6.49	1.21	9.30	6.76	6.37	5.83	4.99
Sep	5.91	1.60	9.65	6.42	5.96	4.79	3.33
Oct	6.22	1.54	9.10	7.05	6.30	6.05	1.87
Nov	7.11	1.48	9.73	8.27	6.80	6.30	4.11
Dec	7.86	0.73	9.20	8.62	7.70	7.40	6.50
All	7.22	1.72	18.90	8.14	7.30	6.29	1.87

pH

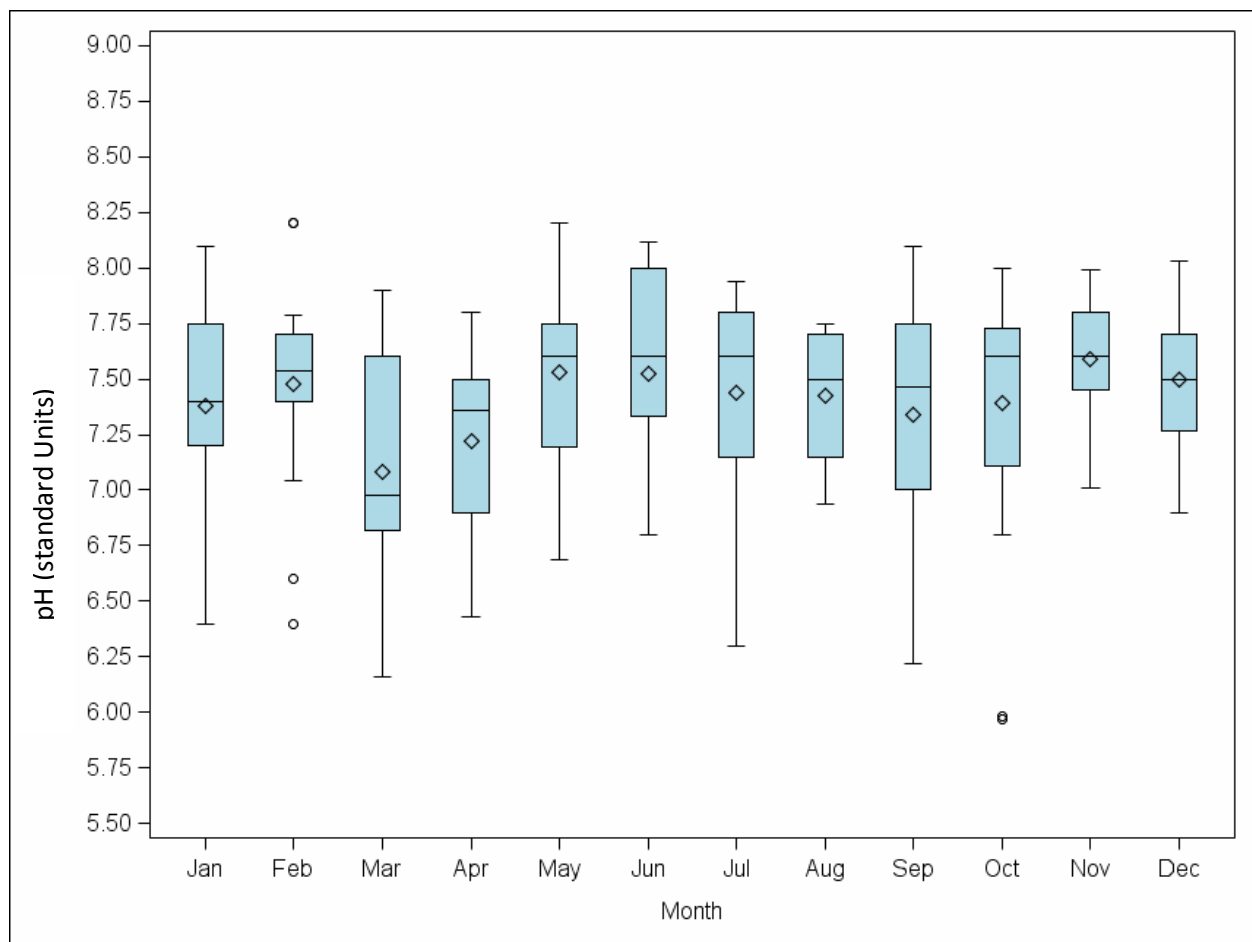
Analysis of pH followed the same methodology as analysis of dissolved oxygen, the pH value was calculated for each sample date*station*depth*units combination in the dataset. The frequency of depths was reviewed and it seems that there are samples taken at 0.5 meters or less which represent surface samples, and then samples taken deeper which I presume are mid water, but could also be bottom samples. Based on this I added a field for relative depth and produced a cdf plot to see what the distribution of surface vs at-depth pH looks like including only sample days where surface and at-depth samples were both taken.



As was the case with dissolved oxygen there was not a difference in the distribution of pH values based upon surface vs at-depth measures. When the time series was reviewed there was very little difference between same day surface and at-depth measures. Therefore the surface and at-depth values were not separated for the seasonal analysis.



pH were displayed using boxplots for each month to show seasonal variability. This dataset indicates that pH is typically between 7 and 7.75, with the clear outlier being the month of March (and to a small extent April). During March median pH is below 7, this is the only month where median pH is below 7.3. The strong dips in the time series graphic are likely due to events which tend to occur during the month of March.



Below is a table of summary statistics with pH summarized by month and for the entire dataset.

Month	Mean	Standard Deviation	Maximum	75th percentile	Median	25th Percentile	Minimum
Jan	7.38	0.47	8.10	7.75	7.40	7.20	6.40
Feb	7.48	0.41	8.20	7.70	7.54	7.40	6.40
Mar	7.08	0.52	7.90	7.60	6.98	6.82	6.16
Apr	7.22	0.42	7.80	7.50	7.36	6.90	6.43
May	7.53	0.37	8.20	7.75	7.60	7.20	6.69
Jun	7.53	0.48	8.12	8.00	7.60	7.33	6.80
Jul	7.44	0.50	7.94	7.80	7.60	7.15	6.30
Aug	7.43	0.29	7.75	7.70	7.50	7.15	6.94
Sep	7.34	0.52	8.10	7.75	7.47	7.00	6.22
Oct	7.39	0.54	8.00	7.73	7.60	7.11	5.97
Nov	7.59	0.27	7.99	7.80	7.61	7.45	7.01
Dec	7.50	0.30	8.03	7.70	7.50	7.27	6.90
All	7.41	0.45	8.20	7.73	7.50	7.11	5.97

Appendix E

Dams within the Region of Hydrologic Influence (RHI) in both Georgia and Florida, including descriptions for each dam, ownership, and location.

Dam Name	Other Dam Names	NID ID	Owner Name	NID Height (Feet)	NID Storage (Acre-Feet)	Purposes	River or Stream	County	State	Dam Length (Feet)	Maximum Discharge (Cubic Feet/Second)	Drainage Area (Square Miles)	Longitude (decimal degrees)	Latitude (decimal degrees)	Spillway Type	Spillway Width (Feet)	Surface Area (Acres)	Year Completed	Volume of Dam (Cubic yard)
KELLEY LAKE DAM		GA02986	KELLY, C. D.	24	247	IRRIGATION	UNKNOWN	WORTH	GA	1380	850	0	-83.658333	31.495278		0	26	1976	0
JONES IRRIGATION POND DAM		GA03118	JONES, J. E.	13	75	RECREATION	UNKNOWN	WILCOX	GA	680	850	0.17	-83.561111	32.015833		0	12	1948	0
HOLT POND DAM		GA03121	HOLT, HAROLD	8	81	RECREATION	UNKNOWN	WILCOX	GA	1695	120	0.13	-83.513056	31.94		0	19.3	1965	0
SARGENT IRRIGATION POND DAM (SOUTH)		GA03122	SARGENT, C. A.	15	98	IRRIGATION	UNKNOWN	WILCOX	GA	660	480	0.45	-83.609722	31.914444		0	12	1972	0
WALKER IRRIGATION POND DAM (SOUTH)		GA03124	WALKER, JACK	12	60	IRRIGATION	UNKNOWN	WILCOX	GA	531	650	0	-83.409444	31.865278		0	0	1977	0
MORRISON POND DAM		GA03125	MORRISON, JARRETT JR.	14	106	RECREATION	UNKNOWN	WILCOX	GA	480	400	0.28	-83.473333	31.941667		0	14	1970	0
LARRY BROWN LAKE DAM		GA03381	BROWN, LARRY	14	116	IRRIGATION	UNKNOWN	BEN HILL	GA	600	0	0.24	-83.395	31.764444		0	14.5	0	0
DORMINY & LUKE LAKE POND DAM		GA03382	LUKE, J. WELDON	11	95	IRRIGATION	UNKNOWN	BEN HILL	GA	960	0	1.48	-83.375833	31.7625		0	15	0	0
JACKSON LAKE DAM		GA03383	JACKSON, JESSEE	9	262	FIRE/FARM POND	UNKNOWN	BROOKS	GA	745	0	0.4	-83.683333	30.76		0	36	1960	0
LANGDALE CO. LAKE DAM		GA03386	LANGDALE CO.	22	209	FIRE/FARM POND	UNKNOWN	BROOKS	GA	600	0	0.3	-83.493056	30.749444		0	16.5	1965	0
CHAPPELL LAKE DAM		GA03387	CHAPPELL, JIMMY	11	175	FIRE/FARM POND	UNKNOWN	BROOKS	GA	630	0	4.84	-83.463056	30.858889		0	23	0	0
VICKERS LAKE DAM		GA03412	VICKERS, W. A.	18	75	RECREATION	UNKNOWN	COLQUITT	GA	580	0	0.09	-83.613889	31.235833		0	7.5	1972	0
VEREEN LAKE DAM		GA03416	VEREEN, HARVEY B.	14	204	FIRE/FARM POND	UNKNOWN	COLQUITT	GA	600	0	0	-83.765556	31.195278		0	14.5	1960	0
W.D. HALL L/D		GA03420	MRS. W.D. HALL	10	208	RECREATION	UNKNOWN	COLQUITT	GA	550	0	0	-83.666111	31.283611		0	33	1940	0
GRAY LAKE DAM		GA03421	GRAY, JAMES	14	86	FIRE/FARM POND	UNKNOWN	COLQUITT	GA	640	0	0.05	-83.660278	31.328889		0	10	1973	0
LINDSEY LAKE DAM		GA03422	MICHAEL L. WILLIS	13	144	IRRIGATION	UNKNOWN	COLQUITT	GA	835	0	0	-83.558611	31.261111		0	14	1979	0
ROWELL LAKE DAM		GA03423	ROWELL, L. G.	12	114	IRRIGATION	UNKNOWN	COLQUITT	GA	710	0	0.52	-83.747222	31.131111		0	15	1955	0
COLQUITT COUNTY LAKE DAM		GA03424	MOULTRIE COLQUITT COUNTY																
COBB LAKE DAM		GA03425	INDUSTRIAL DEVELOPMENT	13	140	RECREATION	UNKNOWN	COLQUITT	GA	825	0	0.1	-83.742778	31.181667		0	17	1950	0
ADAMS LAKE DAM		GA03425	SOMMER, ROBERT	12	296	IRRIGATION	UNKNOWN	COLQUITT	GA	720	0	0	-83.688611	31.23		0	30	1966	0
SUMNER LAKE DAM		GA03426	ADAMS, EUGENE	11	64	IRRIGATION	UNKNOWN	COLQUITT	GA	600	0	0.25	-83.651944	31.247222		0	11	1968	0
WHITEHURST POND DAM		GA03427	SUMNER, RONNIE JO	8	63	FIRE/FARM POND	UNKNOWN	COOK	GA	920	0	5.41	-83.488333	31.229444		0	15.5	1940	0
CITY OF ADEL LAKE DAM		GA03428	MOBLEY PLANT COMPANY	16	400	IRRIGATION	UNKNOWN	COOK	GA	1020	0	0	-83.467778	31.066667		0	55	0	0
PURVIS LAKE DAM		GA03429	CITY OF ADEL	11	128	OTHER	UNKNOWN	COOK	GA	1430	0	0.04	-83.391111	31.12		0	28	0	0
PAULK LAKE DAM	GRIST LAKE DAM	GA03430	PURVIS, FRED	9	255	FIRE/FARM POND	UNKNOWN	COOK	GA	690	0	4.41	-83.535278	31.151944		0	23	1957	0
GRiffin LAKE DAM		GA03431	ALLEN, JAMES	16	95	IRRIGATION	UNKNOWN	COOK	GA	360	0	1.22	-83.503333	31.234167		0	11	0	0
BETTS LAKE DAM		GA03432	GRIFFIN, S. E.	21	74	RECREATION	UNKNOWN	COOK	GA	720	0	0.12	-83.483333	31.303333		0	8	1956	0
HOGAN IRRIGATION POND DAM		GA03433	BETTS, E. J.	11	56	RECREATION	UNKNOWN	COOK	GA	730	0	0.19	-83.477222	31.264444		0	13.5	0	0
FLETCHER LAKE DAM		GA03436	YARBOROUGH, ROSA LEE	8	131	FIRE/FARM POND	UNKNOWN	IRWIN	GA	738	0	2.53	-83.352778	31.645833		0	25	0	0
STRIPLING IRRIGATION POND DAM		GA03437	FLETCHER, FLOYD	16	218	FIRE/FARM POND	UNKNOWN	TURNER	GA	790	0	0	-83.491944	31.626944		0	25	0	0
BROWN POND DAM		GA03438	STRIPLING, FLOYD T.	13	79	FIRE/FARM POND	UNKNOWN	IRWIN	GA	600	0	0.34	-83.386389	31.634722		0	10.5	0	0
PATE POND DAM	CLEMENTS LAKE DAM	GA03439	BROWN, H. D.	14	102	FIRE/FARM POND	UNKNOWN	IRWIN	GA	600	0	0.71	-83.393056	31.640833		0	14	0	0
BILL HARPER IRRIGATION POND DAM	HARPER LAKE DAM	GA03440	PATE, L. A.	12	74	FIRE/FARM POND	UNKNOWN	IRWIN	GA	780	0	0.6	-83.386389	31.716667		0	11.5	0	0
THORNBILL LAKE DAM		GA03441	HARPER, BILL	14	205	FIRE/FARM POND	UNKNOWN	IRWIN	GA	810	0	0	-83.226944	31.523611		0	29	0	0
GARRISON LAKE DAM		GA03453	THORNBILL, JOHN	16	115	IRRIGATION	UNKNOWN	TIFT	GA	755	0	0.19	-83.563333	31.504722		0	12	1967	0
JONES LAKE DAM NO 2		GA03455	GARRISON, ANDY M.	18	206	RECREATION	UNKNOWN	TIFT	GA	470	0	0.2	-83.538333	31.555		0	21	1964	0
JONES LAKE DAM NO 3		GA03456	JONES, DERRIS	17	131	IRRIGATION	UNKNOWN	TIFT	GA	660	0	0.15	-83.569722	31.565		0	12	1975	0
PATRICK LAKE DAM		GA03457	JONES, DERRIS	16	90	IRRIGATION	UNKNOWN	TIFT	GA	520	0	0.23	-83.575	31.564444		0	9	1979	0
RUTLAND LAKE DAM SOUTH		GA03458	PATRICK, GIBBS	11	117	RECREATION	UNKNOWN	TIFT	GA	685	0	1.41	-83.611667	31.333889		0	20	1954	0
MCALLISTER LAKE DAM		GA03459	RUTLAND, BRUCE	15	131	IRRIGATION	UNKNOWN	TIFT	GA	270	0	0.3	-83.508333	31.341667		0	13	1975	0
BOWEN LAKE DAM		GA03460	MCALLISTER, CURTIS	15	152	RECREATION	UNKNOWN	TIFT	GA	1230	0	0.1	-83.425278	31.493333		0	16	1956	0
BANY LAKE DAM		GA03461	BOWEN, BILL	9	74	FIRE/FARM POND	UNKNOWN	TIFT	GA	710	0	0.77	-83.428611	31.448056		0	15.5	1939	0
STONE LAKE DAM		GA03462	BARRY, W. I.	13	176	FIRE/FARM POND	UNKNOWN	TIFT	GA	615	0	0.51	-83.413333	31.426944		0	21	0	0
DILLARD LAKE DAM		GA03463	STONE, CLEO	9	66	RECREATION	UNKNOWN	TIFT	GA	520	0	0.58	-83.408333	31.406944		0	13	0	0
HAWES LAKE DAM		GA03465	COARSEY FARMS	15	136	IRRIGATION	UNKNOWN	TIFT	GA	1000	0	0.09	-83.428333	31.401389		0	16	0	0
SPRADLEY LAKE DAM		GA03466	HAWES, W. T.	10	70	RECREATION	UNKNOWN	TIFT	GA	565	0	0.52	-83.48	31.395278		0	9	1965	0
JONES LAKE DAM		GA03467	SPRADLEY, JAMES	11	70	RECREATION	UNKNOWN	TIFT	GA	480	0	0.49	-83.511111	31.386667		0	13	1960	0
MARCHANT LAKE DAM		GA03468	JONES FARM	16	192	IRRIGATION	UNKNOWN	TIFT	GA	790	0	0.34	-83.593333	31.421389		0	19	1970	0
BALDWIN LAKE DAM		GA03469	MARCHANT, AMOS	12	90	IRRIGATION	UNKNOWN	TIFT	GA	710	0	0.2	-83.615	31.497222		0	14	1960	0
AGRIRAMA LAKE DAM		GA03470	ABRAHAM BALDWIN COLLEGE	20	117	RECREATION	UNKNOWN	TIFT	GA	680	0	0.06	-83.534444	31.485556		0	11.5	1967	0
MOORMAN LAKE DAM		GA03471	HALL, CHARLES	10	76	RECREATION	UNKNOWN	TIFT	GA	540	0	0.88	-83.531944	31.463889		0	16.5	1932	0
MORRIS LAKE DAM	TUCKER LAKE DAM	GA03472	MOORMAN, DAVID	15	126	IRRIGATION	UNKNOWN	TIFT	GA	830	0	0.17	-83.583333	31.381111		0	12	1976	0
STEPHENS LAKE DAM		GA03473	MORRIS, LEONARD	14	69	RECREATION	UNKNOWN	TIFT	GA	560	0	0.09	-83.436667	31.500556		0	9.6	1972	0
BEADLES LAKE DAM		GA03474	STEPHENS, WALTER	19	244	IRRIGATION	UNKNOWN	TIFT	GA	780	0	0.73	-83.486111	31.52		0	18	1940	0
CITY OF SYLVESTER LAKE		GA03484	VARNER, JOHN L.	12	66	RECREATION	UNKNOWN	WORTH	GA	510	0	0.57	-83.756389	31.326944		0	9.2	0	0
CITY OF SYLVESTER LAKE DAM (NORTH)		GA03486	CITY OF SYLVESTER	11	119	OTHER	UNKNOWN	WORTH	GA	3900	0	0.05	-83.826111	31.511944		0	31	1971	0
BURKETT LAKE DAM		GA03487	CITY OF SYLVESTER	7	119	OTHER	UNKNOWN	WORTH	GA	5000	0	0.05	-83.805556	31.533889		0	31.3	1971	0
KNIGHT LAKE DAM		GA03488	JENSEN, RAY E.	12	145	IRRIGATION	UNKNOWN	WORTH	GA	1320	0	0.19	-83.78	31.594722		0	17.4	0	0
KNIGHT LAKE DAM WEST		GA03489	KNIGHT, WILLIAM R.	12	87	FIRE/FARM POND	UNKNOWN	WORTH	GA	810	0	0.12	-83.793611	31.6025		0	10.1	0	0
BROWN LAKE DAM		GA03490	KNIGHT, WILLIAM R.	11	91	FIRE/FARM POND	UNKNOWN	WORTH	GA	1620	0	0.28	-83.799444	31.601389		0	14.2	0	0
SHINGLE FARM SERVICE LAKE DAM		GA03491	BEADLES LUMBER COMPANY	16	121	RECREATION	UNKNOWN	WORTH	GA	450	0	0	-83.820833	31.376111		0	13.8	0	0
SIZEMORE LAKE DAM		GA03492	SUMNER RAINBOW FARM SERVICE, INC.	21	241	FIRE/FARM POND	UNKNOWN	WORTH	GA	750	0	0.11	-83.805556	31.393333		0	21.1	0	0
PATTERSON LAKE DAM		GA03495	SIMS, JOHN JR.	16	135	IRRIGATION	UNKNOWN	WORTH	GA	450	0	0.48	-83.774444	31.476667		0	14.7	0	0
WALKER LAKE DAM		GA03496	PATTERSON, W. A.	19	127	RECREATION	UNKNOWN	WORTH	GA	705	0	0.34	-83.717222	31.406944		0	11	0	0
WASTE DISPOSAL POND DAM #3	FITZGERALD CITY DAM	GA03497	WALKER, JOHN EDWIN	30	151	RECREATION	UNKNOWN	WORTH	GA	1110	0	1.73	-83.673611	31.376944		0	19.7	0	0
LAKE BEATRICE DAM		GA03498	FITZGERALD WATER, LIGHT & BOND COMMISSION	14	152	OTHER	UNKNOWN	BEN HILL	GA	3360	0	0.03	-83.242778	31.7		0	18	1961	0
		GA03499	VICKERS, ELIE	11	750	RECREATION	UNKNOWN	BEN HILL	GA	1750	2550	0	-83.247222	31.655		0	132	1866	0
WASTE DISPOSAL POND DAM # 2	FITZGERALD DAM # 2	GA03500	FITZGERALD WATER, LIGHT & BOND COMMISSION	9	235	OTHER	UNKNOWN	BEN HILL	GA	3700	0	0.04	-83.255	31.699167		0	23	0	0
SIMMS LAKE DAM		GA03501	SIMMS, DAVID	18	180	RECREATION	UNKNOWN	BEN HILL	GA	610	40	0.09	-83.288889	31.706667		0	13	1950	0
TUCKER LAKE DAM		GA03503	TUCKER, J. C.	19	141	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	610	0	0.26	-83.180556	31.41		0	13	0	0
BOBBEN LAKE DAM		GA03504	STATE OF GEORGIA DEPARTMENT OF NATURAL RESOURCES	11	320	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	2120	90	0.1	-83.351389	31.403333		0	64	1968	0
PATRICK LAKE DAM		GA03505	STATE OF GEORGIA DEPARTMENT OF NATURAL RESOURCES	11	587	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	2016	1290	2.8	-83.356111	31.401389		0	104	1946	0
HORSESHOE 4 LAKE DAM		GA03506	STATE OF GEORGIA DEPARTMENT OF NATURAL RESOURCES	9	150	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	1420	0	0.24	-83.359722	31.394722		0	32	0	0
HORSESHOE 5 LAKE DAM		GA03507	STATE OF GEORGIA DEPARTMENT OF NATURAL RESOURCES	8															

Dam Name	Other Dam Names	NID ID	Owner Name	NID Height (Feet)	NID Storage (Acre-Feet)	Purposes	River or Stream	County	State	Dam Length (Feet)	Maximum Discharge (Cubic Feet/Second)	Drainage Area (Square Miles)	Longitude (decimal degrees)	Latitude (decimal degrees)	Spillway Type	Spillway Width (Feet)	Surface Area (Acres)	Year Completed	Volume of Dam (Cubic yard)
STATE OF GEORGIA DEPARTMENT OF																			
RUSSELL LAKE DAM		GA03508	NATURAL RESOURCES	11	155	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	1025	0	0.1	-83.356667	31.392222		0	26	0	0
HAND LAKE DAM		GA03509	HAND, J. A.	15	57	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	570	210	0	-83.416111	31.355		0	0	1975	0
MCMILLIAN LAKE DAM		GA03510	MCMILLIAN, J. R.	6	83	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	920	170	0.77	-83.351667	31.351389		0	21	1960	0
LINDSEY LAKE DAM		GA03511	BRYANT, LONNIE	9	72	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	420	0	2.25	-83.279444	31.31		0	11	0	0
GASKINS LAKE DAM		GA03512	GASKINS, A. W.	14	151	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	530	1600	0.55	-83.333889	31.258889		0	14	1968	0
FELIX BURTON LAKE DAM		GA03513	BURTON, FELIX L.	11	445	FIRE/FARM POND	UNKNOWN	BROOKS	GA	1030	0	0.8	-83.547778	31.015833		0	53	0	0
LAWSON LAKE DAM WEST		GA03515	LAWSON, HOWARD	15	189	FIRE/FARM POND	UNKNOWN	BROOKS	GA	620	1150	4.3	-83.493889	31.961667		0	14.5	1970	0
EASTER PLANTATION LAKE DAM #1	RIVERBEND PLANTATION LAKE DAM	GA03517	LUPTON, THOMAS C., TRUSTEE	11	1056	FIRE/FARM POND	UNKNOWN	BROOKS	GA	510	600	1.32	-83.685	30.875278		0	133	1960	0
POPE LAKE DAM		GA03518	POPE, BREWER	17	646	FIRE/FARM POND	UNKNOWN	BROOKS	GA	675	480	2.11	-83.719444	30.884167		0	56	1960	0
MATTHEWS LAKE DAM		GA03519	MATTHEWS, JEFF	12	89	FIRE/FARM POND	UNKNOWN	BROOKS	GA	755	116	0.63	-83.731944	30.976667		0	13	1960	0
NICHOLS LAKE DAM # 1		GA03520	NICHOLS, T. F.	8	988	RECREATION	UNKNOWN	BROOKS	GA	740	60	0	-83.65	30.958333		0	220	1880	0
BRYAN LAKE DAM		GA03521	LUPTON, THOMAS C., TRUSTEE	21	109	FIRE/FARM POND	UNKNOWN	BROOKS	GA	780	1070	0.46	-83.680556	30.914444		0	9	1966	0
LAKE VERNE DAM		GA03529	LAKE VERN LAND CORPORATION	7	2131	RECREATION	UNKNOWN	CLINCH	GA	740	2800	0	-82.816667	30.884722		0	490	1915	0
CARDIN LAKE DAM		GA03531	CARDIN, K. G.	14	249	IRRIGATION	UNKNOWN	COLQUITT	GA	715	1700	1.86	-83.6	31.0925		0	29	1969	0
SAUNDERS LAKE DAM	ALLEN LAKE DAM	GA03532	ALLEN, JIMMY	14	307	FIRE/FARM POND	UNKNOWN	COOK	GA	740	1350	2.75	-83.543611	31.125		0	46	1950	0
WEAVER POND DAM		GA03557	WEAVER, WAYNE	8	242	OTHER	UNKNOWN	IRWIN	GA	765	0	0.48	-83.302778	31.635833		0	57	0	0
OCILLA FARMS POND DAM		GA03558	OCILLA FARMS	9	85	RECREATION	UNKNOWN	IRWIN	GA	846	0	0.28	-83.280556	31.63		0	14	0	0
GOLDEN POND LAKE DAM	TAYLOR LAKE DAM	GA03559	GOLDEN, FRANCIS	13	65	FIRE/FARM POND	UNKNOWN	IRWIN	GA	600	0	0.2	-83.344444	31.72		0	7	0	0
WALTERS LAKE DAM	FOREST ESTATES LAKE DAM	GA03561	WALTERS, W. EMORY	20	121	RECREATION	UNKNOWN	IRWIN	GA	726	0	0.17	-83.286667	31.654167		0	10	1973	0
MCINTYRE LAKE DAM		GA03562	MCINTYRE, WALDO	8	70	FIRE/FARM POND	UNKNOWN	IRWIN	GA	380	0	0.44	-83.389444	31.668056		0	11	1973	0
TYLER LAKE DAM		GA03595	LOUDERMILK, ROBERT	18	148	FIRE/FARM POND	UNKNOWN	THOMAS	GA	1200	0	0.19	-83.763889	30.892222		0	14	1962	0
WARD LAKE DAM SOUTH		GA03597	WARD, MARVIN	14	156	RECREATION	UNKNOWN	TURNER	GA	560	0	0.32	-83.689444	31.731944		0	18	1964	0
WARD LAKE DAM WEST		GA03598	WARD, MARVIN	8	76	RECREATION	UNKNOWN	TURNER	GA	535	0	2.87	-83.718056	31.720278		0	15	1940	0
WELLS LAKE DAM		GA03600	WELLS, CURTIS	11	111	IRRIGATION	UNKNOWN	TURNER	GA	570	0	0.8	-83.545278	31.660833		0	17.3	1962	0
BAKER LAKE DAM		GA03601	BAKER, JAMES G.	15	129	IRRIGATION	UNKNOWN	TURNER	GA	1275	0	0.37	-83.622222	31.615833		0	17	1954	0
SUMNER LAKE DAM		GA03602	SUMNER, JAKE	15	161	IRRIGATION	UNKNOWN	TURNER	GA	900	0	0.78	-83.589444	31.614444		0	18.5	1960	0
ODUM LAKE DAM		GA03603	ODUM, W. O.	20	116	RECREATION	UNKNOWN	TURNER	GA	930	0	0.09	-83.529167	31.620833		0	11	1977	0
HARDY MILLPOND DAM		GA03610	COARSEY, AUSTIN	12	987	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	1150	0	0	-83.36	31.419167		0	120	0	0
MARTIN LAKE DAM		GA03611	MARTIN, EUNICE	16	130	FIRE/FARM POND	UNKNOWN	BERRIEN	GA	950	0	0.65	-83.325	31.378056		0	17	0	0
RAYS MILL POND DAM		GA03613	BOOTH, LAMAR	9	3562	RECREATION	UNKNOWN	BERRIEN	GA	1050	0	0	-83.173333	31.08		0	1008	0	0
SUMNER MILLPOND DAM		GA03620	SUMNER, JOHN	12	248	FIRE/FARM POND	UNKNOWN	IRWIN	GA	1050	0	3.92	-83.225556	31.6375		0	55	0	0
PLEASURE LAKE DAM	FLETCHERS LAKE DAM	GA03621	PLEASURE LAKE, INC.	11	434	RECREATION	UNKNOWN	IRWIN	GA	655	0	0	-83.390556	31.554722		0	68	0	0
FLETCHER IRRIGATION POND DAM		GA03622	FLETCHER, CHARLES	16	130	FIRE/FARM POND	UNKNOWN	IRWIN	GA	650	0	0	-83.436944	31.619444		0	15	0	0
MCDANIEL POND DAM		GA03623	MCDANIEL, C. W.	15	130	FIRE/FARM POND	UNKNOWN	IRWIN	GA	750	0	0.17	-83.422222	31.620833		0	15	0	0
BISBIN LAKE DAM		GA03624	BISBIN, B.F.	12	58	FIRE/FARM POND	UNKNOWN	IRWIN	GA	0	0	0	-83.468889	31.593056		0	0	0	0
LATHON LAKE DAM		GA03625	LATHON, W. H.	19	109	FIRE/FARM POND	UNKNOWN	IRWIN	GA	630	0	0.09	-83.495556	31.585278		0	8	1953	0
LATHON LAKE DAM NORTH		GA03626	LATHON, W. H.	11	91	FIRE/FARM POND	UNKNOWN	IRWIN	GA	735	0	0.65	-83.4875	31.588889		0	15	0	0
CHILES LAKE DAM		GA03627	CHILES, A. H.	20	74	FIRE/FARM POND	UNKNOWN	IRWIN	GA	495	0	0.11	-83.4875	31.580556		0	7	1975	0
GEORGIA DEPARTMENT OF																			
BANKS LAKE DAM		GA03630	TRANSPORTATION	15	5018	RECREATION	UNKNOWN	LANIER	GA	360	0	9.38	-83.097222	31.036111		0	700	1930	0
LAKE IRMA DAM		GA03631	CITY OF LAKELAND	13	378	RECREATION	UNKNOWN	LANIER	GA	475	0	10.36	-83.074722	31.043333		0	25	0	0
HOWELL LAKE DAM		GA03632	HOWELL, DOT	8	78	FIRE/FARM POND	UNKNOWN	LANIER	GA	740	0	0.19	-83.0675	31.066667		0	15.5	1967	0
CARTER LAKE DAM		GA03633	BRASWELL, MARY	11	642	FIRE/FARM POND	UNKNOWN	LANIER	GA	1210	0	0.79	-83.077222	30.9625		0	88	1960	0
BEAR GARDEN SWAMP DAM		GA03635	NEKOOSA PACKAGING CORP.	10	1804	OTHER	UNKNOWN	LOWNDES	GA	1050	0	5.16	-83.276389	30.658333		0	330	1969	0
CARROLLS POND DAM	BEAR GARDEN SWAMP LAKE DAM (LOWER)	GA03636	OWENS ILLINOIS CORPORATION	8	80	OTHER	UNKNOWN	LOWNDES	GA	600	0	5.23	-83.275	30.662778		0	17.5	0	0
NEKOOSA PACKAGING LAKE DAM #2		GA03637	NEKOOSA PACKAGING CORP.	12	135	OTHER	UNKNOWN	LOWNDES	GA	1200	0	0.04	-83.305833	30.703333		0	24	1953	0
NEKOOSA PACKAGING		GA03638	NEKOOSA PACKAGING CORP.	11	259	OTHER	UNKNOWN	LOWNDES	GA	3600	0	0	-83.301389	30.694444		0	72	1953	0
DELOACH LAKE DAM		GA03639	DELOACH, RICHARD	10	142	RECREATION	UNKNOWN	LOWNDES	GA	1480	0	0	-83.16	30.773333		0	18	1950	0
PETERS LAKE DAM		GA03640	PETERS, HENRY	10	162	FIRE/FARM POND	UNKNOWN	LOWNDES	GA	770	0	0	-83.245	31.001667		0	24	1960	0
WETHERINGTON LAKE DAM		GA03641	FIRST NATIONAL BANK OF GEORGIA	18	139</														

Dam Name	Other Dam Names	NID ID	Owner Name	NID Height (Feet)	NID Storage (Acre-Feet)	Purposes	River or Stream	County	State	Dam Length (Feet)	Maximum Discharge (Cubic Feet/Second)	Drainage Area (Square Miles)	Longitude (decimal degrees)	Latitude (decimal degrees)	Spillway Type	Spillway Width (Feet)	Surface Area (Acres)	Year Completed	Volume of Dam (Cubic yard)
BEAVER POND		GA03982	GEORGIA DEPARTMENT OF NATURAL RESOURCES,PARKS AND	17	126	FISH & WILDLIFE	UNKNOWN	BERRIEN	GA	690	0	0.18	-83.356111	31.39		0	14.5	1978	0
TACKLE BUSTER POND		GA03983	PATRICK, W. R.	10	92	FISH & WILDLIFE	UNKNOWN	BERRIEN	GA	750	0	0.79	-83.355	31.400556		0	18	1977	0
HORSESHOE LAKE DAM # 3		GA03984	STATE OF GEORGIA DEPARTMENT OF NATURAL RESOURCES	13	109	FISH & WILDLIFE	UNKNOWN	BERRIEN	GA	930	0	0.16	-83.363333	31.38		0	17	1977	0
HUTCHINSON IRRIGATION POND		GA03986	HUTCHINSON, JOE L.	12	87	RECREATION	UNKNOWN	BERRIEN	GA	600	0	1.42	-83.386389	31.378333		0	16	1964	0
PARADISE LAKE DAM		GA03987	GEORGIA DEPARTMENT OF NATURAL RESOURCES,PARKS AND	6	127	RECREATION	UNKNOWN	BERRIEN	GA	5900	0	0.06	-83.358333	31.411667		0	40	0	0
RIDDLE POND		GA03988	RIDDLE, E. J.	13	390	RECREATION	UNKNOWN	BERRIEN	GA	1650	0	1.2	-83.346111	31.395833		0	60	1980	0
AYERS - MCKEEVER LAKE DAM	TAYLOR	GA03989	AYERS, THEDA JANE	7	196	RECREATION	UNKNOWN	BERRIEN	GA	580	0	1.22	-83.303056	31.36		0	36	0	0
AVERYS MILL POND		GA03990	BEASLEY, PAULINE	10	2006	RECREATION	UNKNOWN	BERRIEN	GA	1200	0	0	-83.190278	31.221667		0	83	0	0
BENTLEY LAKE DAM		GA03998	BENTLEY, A. J.	16	295	RECREATION	UNKNOWN	BROOKS	GA	915	0	0	-83.706667	30.908056		0	20	1989	0
SUMNER LAKE DAM		GA04119	SUMNER, ROBERT	9	165	RECREATION	UNKNOWN	COLQUITT	GA	1620	0	0	-83.516667	31.324167		0	22	0	0
MATHEWS LAKE DAM		GA04120	MATHEWS, DEAN	7	88	RECREATION	UNKNOWN	COLQUITT	GA	645	0	0	-83.718889	31.122778		0	18.4	0	0
SPOONER LAKE DAM		GA04121	SPOONER, JOHNNY	8	210	RECREATION	UNKNOWN	COLQUITT	GA	0	0	0	-83.717778	31.102222		0	34	0	0
HOLLOWAY LAKE DAM		GA04123	HOLLOWAY, G. H.	9	76	RECREATION	UNKNOWN	COLQUITT	GA	600	0	0	-83.621111	31.188611		0	13.3	0	0
VICKERS LAKE DAM EAST		GA04124	VICKERS, W. A.	11	74	RECREATION	UNKNOWN	COLQUITT	GA	1250	0	0.4	-83.599722	31.239722		0	12.8	0	0
NORMAN LAKE DAM		GA04137	NORMAN, RUSSELL	12	124	RECREATION	UNKNOWN	COLQUITT	GA	590	0	0.8	-83.703333	31.167222		0	14.5	0	0
GASKINS 5 MILE CREEK LAKE DAM		GA04139	GASKIN, RONNIE	7	245	RECREATION	UNKNOWN	BERRIEN	GA	810	0	0	-83.125556	31.216667		0	51	1930	0
HORNE LAKE DAM		GA04143	HORNE, DONALD	13	149	RECREATION	UNKNOWN	COLQUITT	GA	880	0	0	-83.833333	31.320278		0	16	0	0
SPRING CREEK LAKE DAM		GA04146	WEAVER, JAMES	25	406	RECREATION	UNKNOWN	COLQUITT	GA	1040	0	0.14	-83.821944	31.309444		0	30	1978	0
MCQUEEN LAKE DAM		GA04148	GENE MCQUEEN ESTATE	15	482	RECREATION	UNKNOWN	COLQUITT	GA	910	0	4.81	-83.760278	31.095833		0	42	0	0
WILLIAMS LAKE DAM		GA04158	WILLIAMS, CHARLES	16	160	RECREATION	UNKNOWN	CRISP	GA	510	0	0	-83.682222	31.651111		0	17	1990	0
CONNELL POND		GA04180	CONNELL, JERRY L. AND WILLIAM H.	7	96	IRRIGATION	UNKNOWN	COOK	GA	535	0	1.36	-82.365	31.181389		0	35	0	0
SUMNER ESTATE IRRIGATION POND		GA04181	SUMNER, PAUL C. REV.	8	88	RECREATION	UNKNOWN	COOK	GA	550	0	0.57	-83.404167	31.229722		0	20	1960	0
HUTCHINSON MILL POND		GA04182	WILLIAMS INVESTMENT COMPANY	13	1140	RECREATION	UNKNOWN	COOK	GA	870	0	0	-83.351944	31.056111		0	175	0	0
KENNETH SMITH IRRIG. POND DAM		GA04197	GREEN, BOBBY	21	265	RECREATION	UNKNOWN	CRISP	GA	1500	0	0.49	-83.695	31.828611		0	22	1982	0
RIVER ANGLE		GA04253	PEARCE, ROY	21	160	RECREATION	UNKNOWN	ECHOLS	GA	495	0	0	-83.061944	30.66		0	15	1986	0
JOSEPH FLETCHER IRRIGATION DAM		GA04319	FLETCHER, JOSEPH	15	210	IRRIGATION	UNKNOWN	IRWIN	GA	996	0	0.34	-83.4325	31.570833		0	26	1981	0
K.A. & LEROY VEAL IRRIGATION POND DAM		GA04320	VEAL, K. A. AND LEROY	10	118	IRRIGATION	UNKNOWN	IRWIN	GA	945	0	0.17	-83.194722	31.576667		0	18	1980	0
MOREHEAD IRRIGATION POND DAM		GA04321	MOREHEAD, JOHN C.	10	130	IRRIGATION	UNKNOWN	IRWIN	GA	1200	0	0.22	-83.345	31.669444		0	25	1981	0
POPE POND DAM		GA04322	POPE, LEONARD	13	80	FIRE/FARM POND	UNKNOWN	IRWIN	GA	680	0	0.55	-83.1625	31.595556		0	10	1979	0
GREEN POND DAM		GA04323	GREEN, MARION	13	104	RECREATION	UNKNOWN	IRWIN	GA	636	0	1.23	-83.234444	31.510833		0	13.3	0	0
H. DAVIS POND DAM	DAVIS POND DAM	GA04324	DAVIS, H. L.	17	106	RECREATION	UNKNOWN	IRWIN	GA	720	0	0.14	-83.338889	31.726389		0	10.6	0	0
FULLER IRRIGATION POND DAM SOUTH		GA04329	FULLER, A. T.	17	78	IRRIGATION	UNKNOWN	IRWIN	GA	930	0	0.13	-83.4225	31.734722		0	7	1982	0
SUNSET LAKE DAM		GA04344	CITY OF QUITMAN	12	50	RECREATION	UNKNOWN	BROOKS	GA	600	0	0	-83.573611	30.780278		0	4.1	1951	0
OLD DISMUKES POND DAM		GA04639	HENDLEY, BOBBY	12	66	RECREATION	UNKNOWN	IRWIN	GA	375	0	0.28	-83.275556	31.641111		0	10	0	0
JOHN AUBREY HARPER IRRIGATION DAM		GA04641	HARPER, JOHN AUBREY	15	131	IRRIGATION	UNKNOWN	IRWIN	GA	920	0	0.25	-83.182778	31.528333		0	15	0	0
LAYTON CABIN POND DAM		GA04642	LAYTON, H. L.	12	88	RECREATION	UNKNOWN	IRWIN	GA	660	0	0.43	-83.484722	31.592778		0	14	0	0
PAULK POND DAM (EAST)		GA04661	PAULK, ELMER	13	90	RECREATION	UNKNOWN	IRWIN	GA	624	0	0.32	-83.177778	31.585278		0	12	0	0
BOBBY BROWN LAKE DAM		GA04706	BROWN, BOBBY	7	121	RECREATION	UNKNOWN	WORTH	GA	615	0	0	-83.740278	31.603611		0	18.4	0	0
NORTHLAKE EST., INC. LAKE DAM	KNIGHT LAKE DAM	GA04707	NORTHLAKE EST. INC.	17	150	RECREATION	UNKNOWN	WORTH	GA	840	0	0.74	-83.831111	31.572778		0	19.3	1978	0
SELPH IRRIGATION POND DAM		GA04725	SELPH, DONALD E.	14	138	IRRIGATION	UNKNOWN	WILCOX	GA	475	0	1.84	-83.531944	31.072778		0	16	1978	0
FLAKE & MCCARVEY POND DAM		GA04726	FLAKE, DAVID	15	104	RECREATION	UNKNOWN	WILCOX	GA	480	0	0.13	-83.564444	31.925		0	12.5	0	0
SARGENT IRRIGATION POND DAM (NORTH)		GA04727	SARGENT, C. A.	15	84	IRRIGATION	UNKNOWN	WILCOX	GA	990	0	0.14	-83.612222	31.922222		0	11	1975	0
WARREN POND DAM (HWY 233)		GA04728	WARREN, ELLA	11	65	RECREATION	UNKNOWN	WILCOX	GA	405	0	0.29	-83.425556	31.859722		0	9	1982	0
WARREN POND DAM		GA04729	WARREN, ELLA	10	72	RECREATION	UNKNOWN	WILCOX	GA	375	0	0.18	-83.511111	31.881389		0	13.5	1952	0
JONES IRRIGATION POND DAM (SOUTH)		GA04730	JONES, J. E.	13	71	RECREATION	UNKNOWN	WILCOX	GA	610	0	0.12	-83.529167	31.881111		0	38	0	0
WALKER IRRIGATION POND DAM (NORTH)		GA04732	WALKER, JACK	12	71	IRRIGATION	UNKNOWN	WILCOX	GA	705	0	0.2	-83.418056	31.874167		0	10	1979	0
ALAPAHA DAM		GA04836	LAKE ALAPAHA DEVELOPMENT CORPORATION	16	2700	RECREATION	UNKNOWN	LOWNDES	GA	350	0	0	-83.036111	30.890833		0	350	1987	0
GRIFFIN & CARROLL LAKE DAM		GA04845	GRIFFIN, HILDA CARROLL	15	197	RECREATION	UNKNOWN	LOWNDES	GA	510	0	0.42	-83.225556	30.690556		0	28	0	0
SUNSET LAKE DAM		GA04846	MATERA INVESTORS, INC.	12	136	RECREATION	UNKNOWN	LOWNDES	GA	635	0	0	-83.250833	30.656944		0	12	0	0
NEKOOSA PACKAGING WASTE WATER POND		GA04847	NEKOOSA PACKAGING CORP.	10	140	RECREATION	UNKNOWN	LOWNDES	GA	730	0	0	-83.293056	30.683333		0	18	0	0
VALDOSTA OXIDATION POND		GA04849	CITY OF VALDOSTA	11	281	RECREATION	UNKNOWN	LOWNDES	GA	2730	0	0.04	-83.263889	30.802222		0	22	0	0
BOYETTE GIN POND (UPPER)		GA04850	BOYETTE, KENNETH	9	120	RECREATION	UNKNOWN	LOWNDES	GA	365	0	0.7	-83.350556	31.018889		0	20.9	1964	0
BOYETTE LOWER POND		GA04851	BOYETTE, N. A.	13	69	RECREATION	UNKNOWN	LOWNDES	GA	2800	0	0.77	-83.350556	31.018889		0	10.6	1964	0
LILLY POND DAM		GA04852	EYE, FRANK	12	345	RECREATION	UNKNOWN	LOWNDES	GA	885	0	1.3	-83.2125	30.65		0	55	1964	0
BEAR GARDEN SWAMP		GA04853	NEKOOSA PACKAGING CORP.	9	116	RECREATION	UNKNOWN	LOWNDES	GA	300	0	2.81	-83.277778	30.673333		0	20	0	0
WHITEWATER LAKE DAM (LOWER)		GA04854	WHITEWATER HUNTING CLUB	11	239	RECREATION	UNKNOWN	LOWNDES	GA	500	0	2.5	-83.255	30.673611		0	38	0	0
SHILOH LAKE DAM		GA04856	ASHLEY PAULK, INC.	13	281	RECREATION	UNKNOWN	LOWNDES	GA	705	0	3.59	-83.25	31.006111		0	40	1980	0
ELKS LAKE DAM (EAST)		GA04857	LAKE SHERI HOMEOWNERS ASSOCIATION, INC.	20	147	RECREATION	UNKNOWN	LOWNDES	GA	675	0	0	-83.329722	30.850833		0	12	1968	0
WETHERINGTON POND		GA04858	WETHERINGTON, JAMES O.	8	70	RECREATION	UNKNOWN	LOWNDES	GA	480	0	0	-83.251667	30.689722		0	16	0	0
LAKE JOREE MILLPOND DAM		GA04859	LAKE JOREE	8	85	RECREATION	UNKNOWN	LOWNDES	GA	615	0	2.61	-83.309722	30.865556		0	19	1900	0
BALFOUR LAND COMPANY LAKE DAM NO 1		GA04991	BALFOUR LAND COMPANY	20	179	RECREATION	UNKNOWN	THOMAS	GA	765	0	0.44	-83.033333	30.831111		0	13.5	1983	0
ALLEN LAKE DAM		GA05006	ALLEN, H. B.	15	125	RECREATION	UNKNOWN	TIFT	GA	540	0	0.32	-83.514722	31.566111		0	14.7	1966	0
BRIGHTON LAKE DAM		GA05007	SUNBELT PROPERTIES, INC.	14	339	RECREATION	UNKNOWN	TIFT	GA	2200	0	1.71	-83.426111	31.511111		0	44.5	0	0
SMITH LAKE DAM		GA05008	LEONARD MORRIS COMPANY	10	124	RECREATION	UNKNOWN	TIFT	GA	640	0	0.66	-83.432778	31.505		0	21.6	1974	0
GIBBS PATRICK IRRIGATION POND		GA05009	PATRICK, GIBBS	14	131	IRRIGATION	UNKNOWN	TIFT	GA	750	0	0.87	-83.571389	31.371389		0	16.5	1981	0
BLALOCK IRRIGATION POND DAM		GA05010	BLALOCK, T. W.	15	106	RECREATION	UNKNOWN	TIFT	GA	655	0	0.95	-83.568333	31.498611		0	12	1977	0
KELLY IRRIGATION POND		GA05011	KELLY, C. D.	10	100	RECREATION	UNKNOWN	TIFT	GA	755	0	0.6	-83.644444	31.595278		0	13.5	0	0
WALKER POND		GA05012	WALKER, JAMES M. JR.	10	89	RECREATION	UNKNOWN	TIFT	GA	700	0	1.38	-83.465278	31.486944		0	15	1977	0
KMC IRRIGATION POND DAM NORTH		GA05013	KELLY MANUFACTURING COMPANY	19	107	IRRIGATION	UNKNOWN	TIFT	GA	1770	0	0.47	-83.443889	31.541111		0	5.6	1978	0
PARRISH IRRIGATION POND DAM #1		GA05014	PARRISH FARMS INC.	16	475	IRRIGATION	UNKNOWN	TIFT	GA	1830	0	0.53	-83.6075	31.447778		0	55	1977	0
PARRISH IRRIGATION POND #2		GA05015	PARRISH FARMS INC.	16	105	IRRIGATION	UNKNOWN	TIFT	GA	900	0	0.2	-83.633889	31.443333		0	12	1977	0
BOWEN IRRIGATION POND DAM		GA05016	BOWEN, BILL	10	87	RECREATION	UNKNOWN	TIFT	GA	425	0	0.33	-83.408333	31.438889		0	14	0	0
CARSON I																			

Dam Name	Other Dam Names	NID ID	Owner Name	NID Height (Feet)	NID Storage (Acre-Feet)	Purposes	River or Stream	County	State	Dam Length (Feet)	Maximum Discharge (Cubic Feet/Second)	Drainage Area (Square Miles)	Longitude (decimal degrees)	Latitude (decimal degrees)	Spillway Type	Spillway Width (Feet)	Surface Area (Acres)	Year Completed	Volume of Dam (Cubic yard)
ARNETT POND DAM		GA05018	ARNETT, GEORGE	10	77	RECREATION	UNKNOWN	TIFT	GA	750	0	0.26	-83.463056	31.473056		0	11	0	0
SUMMERS BIG CYPRESS POND		GA05019	SUMMERS, C. R.	8	156	RECREATION	UNKNOWN	TIFT	GA	900	0	0.37	-83.623611	31.579167		0	35	1977	0
DUNN IRRIGATION POND		GA05020	DUNN, LARRY	7	109	IRRIGATION	UNKNOWN	TIFT	GA	1125	0	0	-83.586111	31.353333		0	25	1930	0
SMITH IRRIGATION POND		GA05021	SMITH, JOHN ALLEN	13	84	IRRIGATION	UNKNOWN	TIFT	GA	600	0	0.22	-83.625556	31.588611		0	13.5	1974	0
H. C. BRANCH IRRIGATION POND DAM		GA05022	BRANCH, H. C.	13	110	RECREATION	UNKNOWN	TIFT	GA	585	0	0.54	-83.534722	31.573056		0	11	0	0
BRUMBY POND		GA05023	BRUMBY, MIKE	15	105	RECREATION	UNKNOWN	TIFT	GA	825	0	0.27	-83.463889	31.551944		0	14	0	0
BOWEN IRRIGATION POND DAM WEST		GA05024	BOWEN, BILL	16	165	RECREATION	UNKNOWN	TIFT	GA	825	0	0.31	-83.460278	31.446111		0	17	1981	0
			COASTAL PLAINS EXPERIMENT																
PONDER FARM LAKE DAM		GA05025	STATION	12	67	IRRIGATION	UNKNOWN	TIFT	GA	570	0	0.49	-83.641111	31.500278		0	11	1968	0
H. C. DODSON INC. IRRIGATION POND		GA05026	H. C. DODSON, INC.	10	102	IRRIGATION	UNKNOWN	TIFT	GA	690	0	1.28	-83.590278	31.404722		0	9	0	0
GIDDENS POND DAM		GA05060	GIDDENS, GARLAND	10	58	RECREATION	UNKNOWN	TURNER	GA	350	0	0	-83.688333	31.611944		0	12	1949	0
KENDRICK IRRIGATION DAM # 2		GA05061	KENDRICK, W. C.	17	61	RECREATION	UNKNOWN	TURNER	GA	600	0	0.11	-83.5375	31.629167		0	8	1980	0
WHELCHER IRRIGATION POND		GA05062	WHELCHER, GEORGE	16	110	RECREATION	UNKNOWN	TURNER	GA	495	0	0.5	-83.596389	31.848333		0	13	1977	0
SUMNER IRRIGATION POND # 2		GA05063	SUMNER, JAKE	12	55	RECREATION	UNKNOWN	TURNER	GA	670	0	0.16	-83.602222	31.62		0	10	1980	0
LEGG POND DAM		GA05064	LEGG, L. P.	9	65	RECREATION	UNKNOWN	TURNER	GA	700	0	2.66	-83.515833	31.756389		0	14	1977	0
GORDAY IRRIGATION POND DAM		GA05065	GORDAY, H. R.	17	76	RECREATION	UNKNOWN	TURNER	GA	700	0	0.12	-83.541667	31.778333		0	15	1979	0
VEQO FARMS IRRIGATION POND DAM (EAST)		GA05066	VEQO FARMS	10	103	RECREATION	UNKNOWN	TURNER	GA	500	0	1.06	-83.546389	31.738889		0	15	1973	0
REINHARDT IRRIGATION POND DAM (UPPER)		GA05067	REINHARDT, MILDRED ELROD	16	106	RECREATION	UNKNOWN	TURNER	GA	660	0	0.14	-83.546389	31.695833		0	12	1977	0
KELLY POND DAM		GA05068	KELLY, C. D.	17	204	RECREATION	UNKNOWN	TURNER	GA	830	0	0.59	-83.629722	31.640278		0	23	0	0
WIGGINS POND DAM		GA05070	WIGGINS, ROY	11	62	RECREATION	UNKNOWN	TURNER	GA	600	0	1.23	-83.598056	31.656111		0	11	1980	0
M M WALKER IRRIGATION POND DAM		GA05125	WALKER, M. M.	9	81	IRRIGATION	UNKNOWN	IRWIN	GA	546	0	0.75	-83.353889	31.734167		0	11.5	0	0
DUNCAN & HOWELL LAKE DAM		GA05126	HOWARD, WYNELLE	15	132	RECREATION	UNKNOWN	IRWIN	GA	450	0	0	-83.403333	31.676944		0	10	1986	0
CARTER IRRIGATION POND DAM		GA05140	CARTER, J. W. "DUB"	20	82	IRRIGATION	UNKNOWN	TURNER	GA	630	0	0.19	-83.5125	31.695556		0	12.8	0	0
PHILLIPS IRRIGATION POND		GA05176		12	138	IRRIGATION	UNKNOWN	BEN HILL	GA	710	0	0	-83.310278	31.708333		0	20	0	0
LOWER DALE POND DAM		GA05211	CURTIS, DALE	14	131	RECREATION	UNKNOWN	IRWIN	GA	1400	0	0	-83.328611	31.731389		0	17	0	0
COTTLE IRRIGATION POND DAM		GA05220	COTTLE, TOMMY E.	20	186	IRRIGATION	UNKNOWN	TIFT	GA	1200	0	0	-83.613889	31.472222		0	15	1992	0
CARTER IRRIGATION POND DAM		GA05242		20	130		UNKNOWN	TURNER	GA	630	0	0.19	-83.5125	31.695556		0	12.8	1948	0
SAND HAMMOCK LAKE DAM		GA05243	WEBB, HUGH	17	115	RECREATION	UNKNOWN	TIFT	GA	710	0	0	-83.574444	31.448611		0	12	1978	0
MCEACHIN IRRIGATION POND DAM #2		GA05256	MCEACHIN, W. F.	12	172	IRRIGATION	UNKNOWN	IRWIN	GA	2112	0	0.91	-83.226944	31.65		0	17	1982	0
PROPOSED DIXON		GA05427	DIXON, STEVE	19	798	RECREATION	UNKNOWN	BERRIEN	GA	0	0	0	-83.259167	31.379167		0	62	0	0
PROPOSED GASKINS		GA05428	GASKINS, DOUG	12	240	RECREATION	UNKNOWN	BERRIEN	GA	0	0	0	-83.344167	31.288889		0	25	0	0
PROPOSED J. A. NORMAN LAKE DAM		GA05487	NORMAN, J. A.	15	142	RECREATION	UNKNOWN	COLQUITT	GA	0	0	0	-83.723889	31.160556		0	15	0	0
NETTLES LAKE DAM		GA05498	NETTLES, RANDY	12	96	RECREATION	UNKNOWN	BROOKS	GA	0	0	0	-83.496667	30.854444		0	13	0	0
DIXON LAKE DAM		GA05499	DIXON, STEVE	24	798	RECREATION	UNKNOWN	BERRIEN	GA	900	0	0	-83.259167	31.379167		0	62	0	0
SUWANNEE RIVER SILL		GA10014	DOI FWS	13	325000	FISH & WILDLIFE	UNKNOWN	CHARLTON	GA	23760	0	650	-82.411667	30.811667	CONTROLLED	0	0	1958	0
						FIRE PROTECTION, STOCK, OR SMALL FISH													
CELLON DAM	-	FL00438	ROY CELLON	12	64	POND	UNKNOWN	ALACHUA	FL	250	0	0	-82.41192	29.872036	-	0	0	1950	0
SANTA FE RIVER RANCH DAM	-	FL00143	SANTA FE RIVER RANCH	11	54	OTHER	UNKNOWN	ALACHUA	FL	490	0	0	-82.48	29.91	-	0	0	1963	0
TRAIL RIDGE PLANT SETTLING AREA	-	FL00700	DUPONT-TRAIL RIDGE PLANT	20	1865	OTHER	UNKNOWN	BRADFORD	FL	10000	0	0	-82.04	29.91	-	0	0	1976	0
HORTON DAM	-	FL00550	C.C.HORTON	20	200	RECREATION	UNKNOWN	COLUMBIA	FL	535	0	0	-82.551546	29.953389	-	0	0	1970	0
L.P.HILL DAM	HILL DAM	FL00140	L.P. HILL	20	240	IRRIGATION	UNKNOWN	COLUMBIA	FL	910	878	0.75	-82.609813	30.171412	UNKNOWN	50	0	1966	35038
L.P.HILL DAM #2	NONE	FL00554	L.P. HILL	21	74	IRRIGATION	UNKNOWN	COLUMBIA	FL	300	130	0.62	-82.607083	30.173298	UNKNOWN	65	0	1954	6550
LOPER PEAT	PUMP LOCATION	FL53000	WILLIAM LOPEZ	9	240	FLOOD CONTROL	UNKNOWN	MADISON	FL	220	25	130	-83.34	30.24	CONTROLLED	20	34	1986	86000
SUWANNEE LAKE DM	SUWANNEE LAKE	FL00139	SUWANNEE CO.CO	18	312	FLOOD CONTROL	UNKNOWN	SUWANNEE	FL	240	80	1.1	-82.930739	30.299152	UNKNOWN	40	0	1966	12036
SA 14 S.R.	SR14	FL11080	PCS	28	30000	TAILINGS	UNKNOWN	HAMILTON	FL	28000	220	2.5	-82.7542	30.3847	CONTROLLED	64	1614	2000	1630000
SA 13 S.R.	SR13	FL10001	PCS	29	14000	TAILINGS	UNKNOWN	HAMILTON	FL	18868	220	1	-82.7557	30.4045	CONTROLLED	64	636	2000	1095700
SA 4 S.C.	-	FL10006	PCS	31	34000	TAILINGS	UNKNOWN	HAMILTON	FL	27368	220	2.14	-82.837	30.4054	CONTROLLED	64	1418	1986	2010000
SA 12 S.R.	SR12	FL10000	PCS	29	20000	TAILINGS	UNKNOWN	HAMILTON	FL	17700	220	901	-82.7556	30.413	CONTROLLED	64	901	1982	820000
OCCIDENTAL CHEMICAL CO DAM	SWIFT CREEK DAM	FL00441	OCCIDENTAL CHEMICAL CO	22	4352	OTHER	UNKNOWN	HAMILTON	FL	19008	0	0	-82.81	30.42	-	0	0	1970	0
DOCP2	-	FL10011	PCS	12	5000	-	UNKNOWN	HAMILTON	FL	8000	110	0.31	-82.79	30.42	CONTROLLED	32	200	0	10667
DOCP1	-	FL10010	PCS	12	5000	-	UNKNOWN	HAMILTON	FL	8000	110	0.31	-82.78	30.42	CONTROLLED	32	200	0	10667
SA 8A S.C.	SC8B	FL10008	PCS	35	16700	TAILINGS	UNKNOWN	HAMILTON	FL	15100	220	0.82	-82.8255	30.422	CONTROLLED	64	524	1994	1460900
SA 3 S.C.	-	FL10005	PCS	29	23000	TAILINGS	UNKNOWN	HAMILTON	FL	19830	220	1.39	-82.8532	30.4225	CONTROLLED	64	973	0	1151609
ALTMAN BAY DAM	-	FL00443	OCCIDENTAL CHEMICAL CO	27	56320	OTHER	UNKNOWN	HAMILTON	FL	99999	0	0	-82.772071	30.423866	-	0	0	1970	0
SA 8B S.C.	SC8B	FL10020	PCS	34	42000	TAILINGS	UNKNOWN	HAMILTON	FL	4106	220	206	-82.8299	30.4246	CONTROLLED	64	1320	1999	206
SA 9 S.R.	SR9	FL10024	PCS	30	3200	TAILINGS	UNKNOWN	HAMILTON	FL	6500	220	0.21	-82.7565	30.4245	CONTROLLED	64	137	1978	430000
SA 6A S.C.	SCGA	FL10007	PCS	38	24000	TAILINGS	UNKNOWN	HAMILTON	FL	22300	220	1.13	-82.8149	30.425	CONTROLLED	64	724	1992	2023500
SCGYPSUM	-	FL10004	PCS	105	52500	-	UNKNOWN	HAMILTON	FL	22000	110	0.78	-82.87	30.43	CONTROLLED	32	500	0	256667
SA 1 S.R.	SR1	FL00721	PCS	24	2400	TAILINGS	UNKNOWN	HAMILTON	FL	10685	220	0.19	-82.7741	30.4294	CONTROLLED	64	124	1965	455900
SC 1,2	-	FL00719	OCCIDENTAL CHEMICAL CO.	27	27540	OTHER	UNKNOWN	HAMILTON	FL	29000	0	0	-82.83	30.43	-	0	0	1980	0
CTCGYPSUM	-	FL10002	PCS	105	52500	-	UNKNOWN	HAMILTON	FL	20000	110	0.78	-82.79	30.43	CONTROLLED	32	500	0	233333
LONG PERCOLATION POND DAM	-	FL00551	OCCIDENTAL CHEMICAL CO	27	56320	OTHER	UNKNOWN	HAMILTON	FL	99999	0	0	-82.79	30.43	-	0	0	1970	0
DOGYPSUM	-	FL10009	PCS	105	52500	-	UNKNOWN	HAMILTON	FL	20000	110	0.78	-82.78	30.43	CONTROLLED	32	500	0	233333
OXY-9,10	-	FL00720	OCCIDENTAL CHEMICAL CO.	28	25060	OTHER	SWIFT CREEK-OFFSTREAM	HAMILTON	FL	32250	0	0	-82.73	30.43	-	0	0	1978	0
OXY-1	-	FL11025	OCCIDENTAL CHEMICAL CO.	30	750	TAILINGS	SUWANNE	HAMILTON	FL	2890	50	0.05	-82.7702	30.4346	CONTROLLED	20	32	1965	193000
SA 1 S.C.	-	FL10012	PCS	28	12590	TAILINGS	SWIFT CREEK	HAMILTON	FL	19500	220	0.82	-82.8599	30.4365	CONTROLLED	64	577	0	902800
SA 2 S.C.	SC2	FL10013	PCS	32	16000	TAILINGS	SWIFT CREEK	HAMILTON	FL	10530	220	0.82	-82.8456	30.4373	CONTROLLED	64	525	1976	702000
SA 2 S.R.	SR2	FL10019	PCS	22	1800	TAILINGS	SUWANNE	HAMILTON	FL	8518	220	0.14	-82.7797	30.4399	CONTROLLED	64	88	1966	305386
SA 5 S.R.	SR5	FL10022	PCS	23	5500	TAILINGS	SUWANNE	HAMILTON	FL	4155	220	0.56	-82.77	30.4399	CONTROLLED	64	362	1972	154000
SA 7 S.R.	-	FL10017	PCS	23	8000	TAILINGS	SUWANNE RIVER	HAMILTON	FL	14500	220	0.86	-82.759	30.4416	CONTROLLED	64	550	1995	520000
SA 3A S.R.	SR3A	FL10021	PCS	20	1500	TAILINGS	SUWANNE	HAMILTON	FL	6580	220	0.13	-82.7799	30.4428	CONTROLLED	64	84	1968	195000
SA 3B S.R.	SR3B	FL10018	PCS	30	2000	TAILINGS	SUWANNE	HAMILTON	FL	6350	220	0.11	-82.7856	30.4464	CONTROLLED	64	73	1968	294000
SA 6A S.R.	-	FL10016	PCS	27	2500	TAILINGS	SUWANNE	HAMILTON	FL	1000	220	0.23	-82.7601	30.4471	CONTROLLED	64	147	1974	462963
OXY-2-8	-	FL00718	OCCIDENTAL CHEMICAL CO.																

Appendix F

Inventory of culverts and other water structures within Lower Suwannee NWR, Florida.

Data sources: Shapefiles provided by USFWS (dx_cul.shp and lvy_cul.shp). Culverts and control structure data are current as of March 13, 2015.

Type	Latitude	Longitude	Condition	Diameter	Length
Steel	29.375778	-83.04183	Excellent	18"	30'
Steel	29.304823	-83.045821	Good	24"	24'
Steel	29.292689	-83.044067	Fair	18"	30'
Aluminum	29.306497	-83.03609	Fair	18"	28'
Steel	29.263158	-83.02749	Fair	24"	28'
Aluminum	29.313439	-83.040961	Fair	22" & 22"	24' & 24'
Steel	29.276274	-83.024127	Good	12"	20'
Aluminum	29.367276	-83.048744	Excellent	18"	24'
Aluminum	29.439175	-83.183343	Excellent	24"	30'
Steel	29.365034	-83.040564	Needs Replacing	18"	24'
Aluminum	29.438698	-83.177764	Fair	24"	30'
Steel	29.313868	-83.047312	Good	30"	30'
Steel	29.30816	-83.05126	Fair	24"	30'
Aluminum/Steel	29.310778	-83.054436	Fair	12"	24'
Aluminum	29.314544	-83.054355	Fair	24"	30'
Steel	29.441718	-83.176283	Good	24"	30'
Steel	29.364824	-83.051282	Fair	18"	30'
Steel	29.358569	-83.044823	Good	24"	30'
Steel	29.329258	-83.066399	Fair	24" & 24"	24' & 24'
Steel	29.260594	-83.020774	Excellent	18"	26'
Aluminum	29.354133	-83.054216	Excellent	30" & 30"	30' & 30'
Steel	29.470868	-83.012137	Good	24"	30'
Aluminum	29.440269	-83.027989	Needs Replacing	18"	24'
Steel	29.320782	-83.072723	Excellent	36"	30'
Steel	29.349922	-83.051587	Fair	24"	24'
Steel	29.463701	-83.016762	Excellent	36"	30'
Steel	29.311963	-83.067627	Fair	30"	26'
Steel	29.311674	-83.072729	Needs Replacing	24"	30'
Steel	29.345319	-83.12861	Fair	24"	28'
Steel	29.263571	-83.045772	Fair	36"	30'
Steel	29.308514	-83.075706	Fair	18"	28'
Steel	29.265314	-83.045831	Good	36" & 36"	30' & 30'
Steel	29.266725	-83.045992	Good	24"	30'
Steel	29.34629	-83.051743	Fair	40"	30'
Aluminum	29.351993	-83.1331	Excellent	24"	26'
Steel	29.343173	-83.05199	Needs Replacing	36"	28'
Steel	29.352615	-83.135793	Excellent	18"	30'
Steel	29.341575	-83.051984	Good	30"	30'
Alum	29.30691	-83.078206	Needs Replacing	18"	28'
Aluminum	29.322365	-83.034593	Fair	36"	36'
N/A	29.306808	-83.072139	Fair	18" & 18"	30' & 30'

Type	Latitude	Longitude	Condition	Diameter	Length
Aluminum	29.27217	-83.052017	Good	40"	25'
Steel	29.309335	-83.06642	Excellent	24"	30'
Aluminum	29.266468	-83.052408	Excellent	30"	30'
Steel	29.305703	-83.06753	Excellent	18"	30'
Steel	29.275721	-83.053867	Excellent	24"	30'
Aluminum	29.310247	-83.056453	Excellent	18"	30'
Steel	29.277116	-83.054908	Excellent	18"	30'
Steel	29.354138	-83.127827	Excellent	24"	30'
Aluminum	29.334413	-83.04728	Excellent	24" & 24"	30' & 30'
Steel	29.277996	-83.064038	Excellent	24"	26'
Steel	29.35931	-83.126668	Fair	24"	30"
Steel	29.420421	-83.032007	Fair	24" x 24"	24' & 24'
Steel	29.36461	-83.128755	Fair	24"	30'
Steel	29.308857	-83.044694	Good	40"	28'
Steel	29.338914	-83.055997	Excellent	24" & 24"	28' & 28'
Steel	29.37139	-83.138341	Fair	24" & 24"	24' & 24'
Steel	29.420443	-83.037195	Excellent	18"	30'
Steel	29.441326	-83.182383	Good	40"	28'
Steel	29.373257	-83.139521	Fair	24"	28'
Aluminum	29.282979	-83.061318	Fair	24"	22'
Steel	29.420051	-83.037774	Good	18"	22'
Steel	29.376948	-83.142058	Good	24"	22'
Steel	29.302087	-83.034641	Excellent	36"	26'
Steel	29.336559	-83.054795	Good	24"	22'
Steel	29.382269	-83.149021	Good	24"	30'
Steel	29.334295	-83.053631	Fair	24" & 24"	22' & 22'
Steel	29.386454	-83.150497	Excellent	18"	26'
Steel	29.331543	-83.051625	Good	30"	22'
Steel	29.298944	-83.045193	Excellent	40" & 40"	30' & 30'
Steel	29.329923	-83.05133	Excellent	40" & 40"	28' & 28'
Steel	29.298263	-83.045992	Excellent	24"	28'
Steel	29.395831	-83.150309	Excellent	24"	30'
Steel	29.328416	-83.050032	Needs Replacing	40" & 40"	28' & 28'
Steel	29.399993	-83.150502	Good	36"	36'
Steel	29.326732	-83.050783	Fair	40" & 40"	28' & 28'
Aluminum	29.401388	-83.14775	Good	24"	24'
Steel	29.297292	-83.047789	Good	30"	30'
Steel	29.40201	-83.051818	Excellent	18"	24'
Steel	29.330036	-83.047226	Good	18"	24'
Steel	29.295655	-83.056609	Excellent	18"	22'
Steel	29.304689	-83.060133	Good	30"	30'
Aluminum	29.303048	-83.050209	Needs Replacing	18"	20'

Type	Latitude	Longitude	Condition	Diameter	Length
Aluminum	29.401753	-83.152723	Good	24' & 24"	24' & 24'
Aluminum	29.401882	-83.155223	Needs Replacing	24"	26'
Steel	29.389468	-83.070733	Good	24"	30'
Aluminum	29.453316	-83.205825	Excellent	24"	30'
Steel	29.393256	-83.066672	Excellent	18"	24'
Aluminum	29.401946	-83.156371	Excellent	24"	30'
Aluminum	29.455247	-83.203315	Excellent	18"	30'
Aluminum	29.455869	-83.19905	Excellent	24"	26'
Steel	29.402096	-83.159927	Excellent	18"	24'
Steel	29.386271	-83.07569	Excellent	18"	24'
Concrete	29.405122	-83.171176	Excellent	48''' & 48"	30' & 30'
Both Steel	29.406989	-83.172657	Fair	18"	24'
Concrete	29.40892	-83.174003	Excellent	36"	30'
Steel	29.410894	-83.175371	Excellent	48" & 48"	30' & 30'
Steel	29.41113	-83.175602	Excellent	24"	30'
Steel	29.41231	-83.17645	Fair	18"	24'
Steel	29.325433	-83.041819	Excellent	30"	24'
Steel	29.414413	-83.177919	Fair	16"	30'
Steel	29.414606	-83.178021	Good	36"	26'
Aluminum	29.291369	-83.059902	Good	36"	26"
Aluminum	29.324902	-83.047425	Good	36"	26'
Steel	29.419348	-83.179942	Excellent	30"	28'
Steel	29.442683	-83.194195	Excellent	30"	30'
Steel	29.420367	-83.180291	Excellent	30"	28'
Steel	29.290806	-83.050515	Excellent	18"	28'
Steel	29.426263	-83.182297	Excellent	48" & 48"	28' & 28'
Steel	29.431193	-83.183917	Excellent	36" & 36"	28' & 28'
Aluminum	29.323921	-83.05214	Fair	18"	28'
Aluminum	29.287292	-83.056308	Excellent	24"	30'
Aluminum	29.318776	-83.054355	Fair	18" & 18"	24' & 24'
Steel	29.285769	-83.058915	Fair	24"	26'

Appendix G

Internet links and on-line data sources (including monitoring data, raw data, and summarized reports) cited in the WRIA document text. :Links are current as of March 13, 2015.

Section 4.7.3.2: RSET Monitoring

Vegetation monitoring data from Carolina Vegetation Survey (CVS) is available at:

<http://cvs.bio.unc.edu/>

Section 5.1: Water Resources

Water Resource links from the USGS, including links to streamflow and groundwater data and relevant water resource reports for the Lower Suwannee subbasin (HUC 03110205) (and the other subbasins in the RHI) are available from the USGS website:

<http://water.usgs.gov/lookup/getwatershed?03110205/www/cgi-bin/lookup/getwatershed>.

Section 5.3.1.1: Water Level and Discharge Monitoring

The SRWMD reports hydrologic conditions from its monitoring sites in monthly reports, available at

<http://www.srwmd.state.fl.us/Archive.aspx?AMID=35>.

Section 5.3.1.2: Water Quality Monitoring

The surface water component of the Trend Network (SWTV) consists of 76 fixed sites that are placed on or near rivers entering the state from Alabama and Georgia or at the point a river exits a watershed basin. SWTV sites are sampled on a monthly basis and reporting data are available at

<http://waterwebprod.dep.state.fl.us/ambient/swtv/default.htm>.

Section 5.3.1.3: Aquatic Habitat and Biota

Nuisance aquatic invasive species (NAS) are reported by USGS and accessible from

<http://nas.er.usgs.gov/queries/huc8.aspx?state=FL> .

A report summarizing water quality and biological monitoring data is available from Florida Department of Environmental Protection: <http://www.dep.state.fl.us/water/sas/guidance/springs.htm>.

Section 5.3.2.1: Groundwater Level Monitoring

The SRWMD reports hydrologic conditions from its monitoring sites in monthly reports, available at

<http://www.srwmd.state.fl.us/Archive.aspx?AMID=35>.

Section 5.3.2.2: Groundwater Quality Monitoring

The SRWMD conducts groundwater quality monitoring at 104 sites within the RHI. Site locations and data are available from SRWMD by request.

Statewide, FDEP maintains 49 fixed-site sampling points under the groundwater component of its Trend Network monitoring program (GWTV). GWTV sites are located within confined and unconfined aquifers and sampled on a quarterly basis in October, January, April, and July. Within the RHI, there are 6 GWTV sites; one of them is within the 10-digit HUs closest to and containing the refuge approved acquisition boundary (**Error! Reference source not found., Error! Reference source not found.**). All GWTV sites within the RHI sample the Upper Floridan aquifer system. Site information is available at: <http://waterwebprod.dep.state.fl.us/ambient/gwtv/default.htm>.

Section 5.4.1: Historical Streamflows

The closest USGS spring gage to the refuge is located at Manatee Springs, a first magnitude spring near Chiefland, FL which has been measured continuously since 2001. Field measurements were also taken between 1932 and 2000.

(http://waterdata.usgs.gov/fl/nwis/nwisman/?site_no=02323566&agency_cd=USGS).

Section 5.4.2: Historical Groundwater

The USGS measured groundwater levels 25 times between 1961 and 1991 at an observation well located at Porters Tackle Shop in Suwannee within the refuge acquisition boundary:

http://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=291940083090101.

The SRWMD has monitored groundwater levels at site S111326004 at Manatee Hickory Loop monthly since 1981: <http://www.mysuwanneeriver.org/portal/groundwater.htm>.

Section 5.5.2.1: Florida Impaired Waters and TMDLs

In order to meet Clean Water Act and FWRA requirements, watersheds within the state, as defined by FDEP (<http://www.dep.state.fl.us/water/basin411/default.htm>), have been allocated into five groups based on geography.

FDEP maintains TMDL Tracker, an application that facilitates access to updated TMDL status information: <http://webapps.dep.state.fl.us/DearTmdl/welcomehz.do>.

Section 5.5.2.2: Georgia Impaired Waters and TMDLs

Although GAEEPD monitors most state waters on a five year basis, approximately 70 stations across the state are monitored annually and used for assessment purposes in developing 305(b)/303(d) lists of waters. Information on listing of impaired waters and TMDLs in Georgia is available at <http://epd.georgia.gov/tools-total-maximum-daily-load-tmdl-implementation-and-watershed-planning>.

Section 5.5.2.3: NPDES Permits

For wastewater, FDEP further categorizes NPDES facilities as domestic or industrial and maintains a list of facilities in its Wastewater Facility Regulation (WAFR) database: <http://www.dep.state.fl.us/water/wastewater/facinfo.htm>.

Section 5.5.4: Groundwater Quality

More information on the water quality of specific springs in the Florida portion of the RHI can be found in: <http://www.dep.state.fl.us/water/sas/guidance/springs.htm>.

Section 5.5.5: Land Use Activities Affecting Water Quality

More information on pollutants associated with various agricultural land use practices is available from the USDA at http://www.srs.fs.usda.gov/sustain/report/pdf/chapter_19e.pdf.

More information on silviculture impacts on water quality is available from the USDA at http://www.srs.fs.usda.gov/sustain/report/pdf/chapter_21e.pdf.

The establishment of BMPs is required for waterbodies with TMDLs. BMP Manuals have been established by the Florida Department of Agriculture and Consumer Services and adopted for several activities.

Agriculture:

<http://www.freshfromflorida.com/Divisions-Offices/Agricultural-Water-Policy/Enroll-in-BMPs/BMPs-At-a-Glance>

Silviculture and Forest Hydrology:

<http://www.freshfromflorida.com/Divisions-Offices/Florida-Forest-Service/Our-Forests/Best-Management-Practices-BMP>.