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LOUISIANA DEPARTMENT OF WILDLIFE AND FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

2018 AQUATIC VEGETATION MANAGEMENT PLAN

COCODRIE LAKE

Date reservoir formed

Bayou Cocodrie Dam was designed by the Louisiana Office of Public Works, constructed by T.P. Groom, Inc. and completed in 1959.

The spillway/dam was completed in 1959 (Good condition)

Type of Control Structure

The dam consists of an earthen embankment, approximately 1,400 feet long with a 12-foot crown at elevation 65 feet MSL. There is one primary spillway consisting of an un-gated reinforcement concrete weir (spillway), approximately 100 feet long with a crest elevation of 51 feet MSL. There is one drawdown structure consisting of a reinforced concrete drop inlet structure with one sluice gate, 111 linear feet of 48-inch diameter corrugated metal pipe running under the embankment, and a reinforced concrete outlet structure. (**See picture below**)

Water Level Range (MSL)
51.0' above mean sea level (MSL)

Surface Area Range
6,100 acres at pool stage

Average depth
5-6 feet

Watershed ratio
16:1 (watershed is 100,000 acres)

Drawdown Capability – Cocodrie Lake drops approximately ½ inch per day with the gate completely opened. The lake can be drawn down 6-8 feet.

Lake Commission
Act 38 of the 1957 Louisiana Legislature created the Cocodrie Lake Game and Fish Preserve and Commission within the Parishes of Evangeline and Rapides. Act 38 specifically protected riparian rights downstream of the project and Bayou Cocodrie flows are not to fall below the established minimum low flows as determined by the United States Geological Survey gauging station at Clearwater, LA. When the Cocodrie Commission was abolished with Act 858 in January 1982, the original riparian rights downstream, as authorized by Act 38 were retained in full force.

<u>Cocodrie Lake Commission</u>
Act 858 of the 1981 Legislature abolished approximately 19 special game and fish commissions including the Cocodrie Lake Game and Fish Commission which governed Cocodrie Lake. Authorities for lakes & structures were transferred to Louisiana Department of Wildlife and Fisheries (LDWF). However, parish government under state law can select/appoint a panel of interested/concerned citizens to serve on committees in an advisory capacity to the jury. The Cocodrie Lake Commission fills that role with respect to fish and wildlife issues on Cocodrie Lake.

Primary Contact Information

Members – Cocodrie Lake commission consists of five members – 2 from Evangeline parish, 2 from Rapides parish and one representative from the CLECO electric plant.

Charles Bo Johnson (Chairman) (337) 461 – 5678	Evangeline Parish
Johnny Barton (318) 488 - 2322	Rapides Parish
Henry Corley (318) 709-1398	Rapides Parish
Sam Johnson (337) 359-7130	Evangeline Parish
Joe Sepulvado (337) 838-3133	CLECO representative

Procedure for Spillway openings

Acts No. 733, § 1, eff. July 23, 1981, RS 38§26 - mandated that …"the Department of Transportation and Development, office of public works, is hereby authorized and directed to operate and maintain the dam, water-control structures, gates, spillway, and related appurtenances to the extent that it deems necessary to insure that the man-made impoundment structure and the attendant water-control devices are functioning to design capabilities" (Including Cocodrie Lake in Rapides parish - Clearwater spillway).

RS 38§26 also says "The operation and maintenance referred to in Subsection C shall not transfer or delegate {to DOTD} the responsibility or authority of the regulation, operation, or maintenance of the surrounding shoreline, water bottom, or for recreational and park operations, nor determination of pool elevations, stage releases, or other lake management activities."
Therefore, for lake management purposes only, LDWF drawdown recommendations will be shared with the Cocodrie Lake Commission and with the Evangeline and Rapides Parish Police Juries. With local consensus, and with LDWF approval up to the Secretary, a detailed request can be forwarded to the Secretary of the Louisiana Department of Transportation and Development (DOTD) for operation of the spillway. The Department of Transportation and Development is solely responsible for maintenance and operation of the structure.

DRAWDOWN HISTORY

Cocodrie Lake became infested with noxious aquatic plants relatively soon after impoundment. The first drawdown was conducted in 1945 in an effort to combat a submerged aquatic plant problem. Since that time, Cocodrie Lake has been lowered regularly for control of aquatic vegetation. Dewatering was limited because the water outlet consists of only one, four-foot control gate. With the gate open to maximum extent, the lake level can be reduced approximately ½ - 1 inch per day. With significant rainfall, the lake level rises rapidly and negates drawdown progress.

<u>Drawdown dates</u>
Fourteen drawdowns have been conducted for control of Cocodrie Lake submerged aquatic vegetation. The majority of the drawdowns were conducted from September – December (Fall/Winter). Other drawdowns were conducted in the summer months or year round to combat noxious aquatic plants such as common salvinia (*Salvinia minima*) and hydrilla (*Hydrilla verticillata*).

During the drought years of 1999 and 2000, water levels remained low. This condition reduced aquatic vegetation and resulted in improved spawning substrate for nesting fishes.

Between the years of 2008 – 2010, the gate remained open year round as part of an effort to

control common salvinia. LDWF spray crews continued to apply herbicide, with some success, as the plants receded from the wooded areas of the reservoir. As a result of the hard freeze of December 2009 and the continued cold weather of January 2010, common salvinia coverage was reduced substantially.

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DRAWDOWN HISTORY				
Date Opened	Date Closed	Purpose	Results	Issues
September 1965	November 1965	To control native submerged vegetation	Good	Lake lowered 3-4’
September 1967	November 1967	To control native submerged vegetation	Fair	Lake lowered 3-4’
September 1970	October 1970	To control native submerged vegetation	Fair	Lake lowered 3-4’
September 1972	October 1972	To control native submerged vegetation	Fair	Lake lowered 3-4’
September 1976	October 1976	To control native submerged vegetation	Fair	Lake lowered 3-4’
September 1983	October 1983	To control native submerged vegetation	Fair	Lake lowered 3-4’
September 1995	November 1995	To control native submerged vegetation	Fair	Lake lowered 3’
September 1996	October 1996	To control native submerged vegetation	Fair	Lake lowered 4-5’
September 1997	October 1997	To control native submerged vegetation	Fair	Lake lowered 3-4’
September 1999	October 1999	To control native submerged vegetation	Fair	Lake lowered 3’
June 2000	August 2000	To control native submerged vegetation	Fair	Lake lowered 5’
May 2008		To control Salvinia and Hydrilla	Fair	Lake lowered 4-5’
2009		To control common salvinia	Good	Lake lowered 4-5’
2010	November 2010	To control common salvinia	Good	Lake lowered 5-6’
June 2013	October 2013	CLECO electric plant in St. Landry, La. requested to open control structure due to lack of rainfall	Good	Lake lowered 3-4’
July 2015	October 2015	CLECO electric plant in St. Landry, La. requested to open control structure due to lack of rainfall	Good	Lake lowered 2-3’

What significant stakeholders use the lake?
Recreational activities (fishing and hunting) and water requirements for CLECO electric plant.

What are their needs and concerns?
Complaints were abundant from 2003-2007 due to infestation of common salvinia. At present complaints are very few. Aquatic vegetation is under control for now.

Have there been any controversial issues on the lake?

The abundance of common salvinia and the use of water fluctuation as a control measure was a controversial issue. Duck hunters and fishermen were hindered during this time. To manage the spread of common salvinia, the control gate was opened completely and left to remain open for three years.

Aquatic Vegetation Status:
Common salvinia has been the main plant problem in Cocodrie Lake. Through the use of drawdowns, herbicide (diquat) applications, and cold/ice weather conditions, this plant species has been reduced and kept under control in recent years. As of November 2012, common salvinia covered approximately 600 acres of the lake.

In 2013, common salvinia covered approximately 25% of the lake. Submerged plants such as coontail (*Ceratophyllum demersum*) and fanwort (*Cabomba caroliniana*) made up 10% of the vegetative cover. Other aquatic plants present included American lotus (*Nelumbo lutea*), alligator weed (*Alternanthera philoxeroides*), and duckweed (*Lemna minor*) which made up approximately 10 percent of plant coverage.

As of November 2014, common salvinia covered approximately 300 acres of the lake. The decrease in the amount of common salvinia was due to the cold/ice weather conditions during the winter of 2013/2014. Submerged plants such as coontail and fanwort made up 10% of the vegetative cover. Other aquatic plants present included American lotus, water hyacinth (*Eichhornia crassipes*), and duckweed which made up approximately 10 percent of plant coverage.

As of November 2015, common salvinia covered approximately 500 acres of the lake. In addition, giant salvinia (*Salvinia molesta*) was discovered sporadically throughout the lake. Submerged plants such as coontail and fanwort made up 10% of the vegetative cover. Other aquatic plants present included American lotus, water hyacinth, and duckweed which made up approximately 10 percent of plant coverage.

As of November 2016, a mixture of mostly giant salvinia and small amounts of common salvinia covered approximately 50% of the lake. Submerged plants such as coontail and fanwort made up 10% of the vegetative coverage. Other aquatic plants present included American lotus, water hyacinth, and duckweed which made up approximately 5 percent of plant coverage.

As of November 2017, giant salvinia mixed with small amounts of common salvinia covered approximately 60% of the lake. Submerged plants such as coontail and fanwort made up 10% of the vegetative cover. Other aquatic plants present included American lotus, water hyacinth, and duckweed which made up approximately 5 percent of plant coverage.

Limitations:
Limitations include the restriction to application of certain herbicides, such as 2,4-D, during the growing season of agricultural crops such as corn, soybeans and cotton. This restriction is in effect during the period of March 15 through September 15. The Department of Agriculture and Forestry will consider requests for waivers to allow for applications of 2,4-D during this period. Cocodrie Lake is heavily laden with standing timber comprised primarily of water tupelo (*Nyssa aquatica*) and bald cypress (*Taxodium distichum*). Access for spray crews is greatly restricted.

Public concerns related to restricted access are expressed during drawdowns.

Past Control Measures:

Drawdowns and herbicide applications have been the primary means of control for aquatic vegetation in Cocodrie Lake.

From 2008 – 2010, the gate remained opened year round in an effort to control common salvinia. Spray crews applied herbicides as the plants receded from the woods. During that time, 236 gallons of diquat were applied to 275 acres. Another herbicide used was imazamox (Clearcast) totaling 85 gallons on 206 acres. Both herbicides were applied at a rate of 0.75 gallons per acre.

In 2011, there was approximately 5% coverage of common salvinia throughout the lake. In addition, floating plants such as duckweed (5% coverage) and water hyacinth (10% coverage) were spread throughout the lake.

In 2012, foliar herbicide applications were made on nuisance plants such as water hyacinth, duckweed and common salvinia in Cocodrie Lake. A total of 303 gallons were applied to 726 acres. To control water hyacinth, 2,4-D was applied at a rate of 0.5 gallons per acre. Diquat and glyphosate were applied at 0.75 gallons per acre to control common salvinia and duckweed.

In 2013, foliar herbicide applications were made on nuisance aquatic plants such as water hyacinth, alligator weed and common salvinia. A total of 195 gallons were applied to 440 acres. To control water hyacinth, 2,4-D was applied at a rate of 0.5 gallons per acre. A mixture of diquat (0.25 gal/acre) and glyphosate (0.75 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz./acre) surfactants was used to control common salvinia.

In 2014, foliar herbicide applications were made on nuisance plants such as water hyacinth and common salvinia in Cocodrie Lake. A total of 20 gallons were applied to 33 acres. To control water hyacinth, 2,4-D was applied at a rate of 0.5 gallons per acre. A mixture of diquat (0.25 gal/acre) and glyphosate (0.75 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz./acre) surfactants was used to control common salvinia.

In 2015, foliar herbicide applications were made on nuisance plants such as water hyacinth, common salvinia and giant salvinia in Cocodrie Lake. A total of 22.5 gallons were applied to 30 acres. A mixture of diquat (0.25 gal/acre) and glyphosate (0.75 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz./acre) surfactants was used to control these plants.

In 2016, foliar herbicide applications were made on nuisance plants such as water hyacinth, common salvinia and giant salvinia in Cocodrie Lake. A total of 77.5 gallons were applied to 102 acres. A mixture of diquat (0.25 gal/acre) and glyphosate (0.75 gal/acre) with Aqua King Plus (0.25 gal/acre) and Air Cover (12 oz./acre) or Turbulence (0.25 gal/acre) surfactants were used to control these plants.

In 2017, foliar herbicide applications were made on nuisance plants such as water hyacinth, common salvinia and giant salvinia in Cocodrie Lake. A total of 317 gallons were applied to 421 acres. To control water hyacinth, 2,4-D was applied at a rate of 0.5 gallons per acre. A mixture of diquat (0.25 gal/acre) and glyphosate (0.75 gal/acre) with Turbulence (0.25 gal/acre) surfactant were used to control salvinia.

In 2017, salvinia weevils (*Cyrtobagous salviniae*) were released in Cocodrie Lake. A total of 33,440 adult weevils were released throughout the lake. LDWF collected these weevils from the LSU AgCenter St. Gabriel Research Station near Baton Rouge.

Recommendations for 2018:

Common and giant salvinia have spread throughout the lake. The invasive plant species occupy approximately 60% of the lake's surface. LDWF spray crews have applied herbicides to control the spread of these invasive plants, and will continue as needed.

Giant salvinia weevils will continue to be stocked in the lake to combat the spread of this plant. The weevils will be stocked multiple times throughout the growing season to insure that they become established on the lake.

Spray crews have a difficult time maneuvering in the dense cypress/tupelo stands in Cocodrie Lake where most of the salvinia is found. Therefore, LDWF, with concurrence from the Cocodrie Lake Commission, recommends five consecutive annual drawdowns to control the spread of giant and common salvinia, and submerged aquatic vegetation. For the first year, we recommend opening the 4-foot control gate on January 1, 2018 and closing the gate on September 30th, 2018. We will lower the lake 1/2 inch per day until a maximum of 5-6 feet below pool stage is reached to allow for adequate drying of the substrate. We recommend repeating this process from 2018 – 2022. Periodic meetings with the Cocodrie Lake Commission will be held to discuss progress of the drawdowns. As the lake recedes, LDWF spray crews will make periodic herbicide applications to the salvinia as it moves from the wooded areas. Because the lake has only one 4-foot control gate, water recession will be slow even under ideal conditions.

Drawdowns can be an effective way of controlling nuisance plants by hindering the growth of and killing aquatic vegetation, drying and oxidation of accumulated leaf litter, and improve water quality and sportfish spawning habitat. This drawdown practice was implemented from 2008-2010 with good success.

The Central Louisiana Electric Company (CLECO) has a generating plant downstream from Cocodrie Lake along Cocodrie Bayou in St. Landry, Louisiana. The water from the bayou is essential for CLECO's power production. The lake serves as a reservoir for cooling water in the event of low flow in the bayou. Therefore, CLECO plays an important role in management decisions concerning Cocodrie Lake, especially decisions which affect the water level in the lake.

To control water hyacinth, 2,4-D will be applied at a rate of 0.5 gallons per acre. Salvinia will be controlled with a mix of glyphosate (0.75 gal/acre) and diquat (0.25 gal/acre) with Turbulence (or approved equivalent, 0.25 gal/acre) surfactant from April 1 to October 31. Outside of that time period, diquat at a rate of 0.75 gallons per acre will be used with 0.25 gallons per acre of a 90:10 non-ionic surfactant. Imazapyr will be used at 0.5 gallons/acre to control alligator weed. These herbicides will be applied as needed. All applications will be made with the addition of an appropriate surfactant at 0.25 gallons/acre.

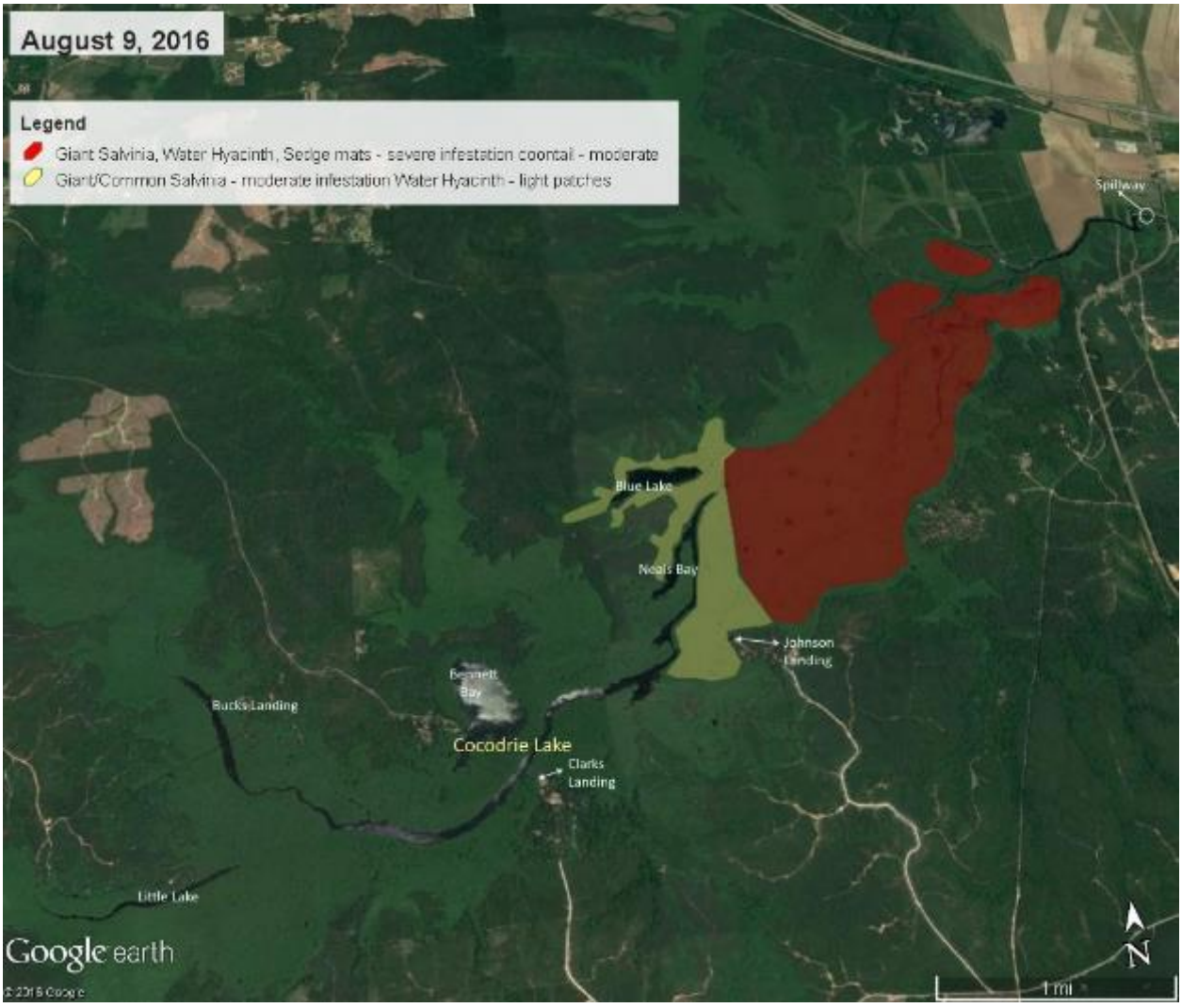
TYPE MAPS

Survey of Aquatic Vegetation in Cocodrie Lake 8/9/16

Personnel: Brad Launey & Philip Allemond
Report by: Brad Launey

A survey of aquatic vegetation present in Cocodrie Lake was conducted on 8/9/16 and revealed a severe infestation of dense aquatic vegetation on the eastern end of the lake. Starting at the spillway, we began to move west down the bayou observing very light patches of giant/common salvinia, water primrose, fanwort, coontail, American lotus, and sagittaria growing along the banks. The majority of the vegetation seen in the eastern end of the lake was water hyacinth, giant/common salvinia, duckweed, and coontail. Mats of sedge grass were also observed growing in areas where giant salvinia was most dense. Approximately 80% of the vegetation infested areas was comprised of giant/common salvinia, with the bulk of it being giant salvinia.

Moving across the lake from east to west, vegetation acreage thinned from very little to eventually zero at the halfway point between the east end spillway and Johnson's boat launch. The remaining area of the lake was virtually clear of aquatic vegetation with little to no common/giant salvinia observed, except for very small amounts of salvinia found near the base of cypress and tupelo trees in the Fontenot Bay area.


August 9, 2016
Legend
Giant Salvinia, Water Hyacinth, Sedge mats - severe infestation coontail - moderate
Giant/Common Salvinia - moderate infestation Water Hyacinth - light patches
Spillway
Blue Lake
Neals Bay
Johnson Landing
Bennett Bay
Bucks Landing
Cocodrie Lake
Clarks Landing
Little Lake
Google earth
1 mi
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Lake Cocodrie Vegetation Survey 8/16/2011

By M. Plonsky and P. Allemond

Lake Cocodrie was mostly free of any type of aquatic vegetation. There were small amounts of coontail (*Ceratophyllum demersum*) and water paspalum (*Paspalum repens*) observed at the Johnson boat launch (30.966601; -92.435672) along with a couple of white water lily (*Nymphaea odorata*). Small patches of common salvinia (*Salvinia minor*) were seen in the end of Neal's bay (30.970467; -92441578) and the entrance into Blue Lake (30.978448; -92.434431). Only small amounts of alligator weed (*Alternanthera philoxeroides*) were observed in the lake surrounding a couple of the smaller trees or stumps within the lake such as in Bennett bay (30.964112; -92.456313). Other than this condition, Bennett bay was free of aquatic vegetation. Small amounts of common salvinia and duckweed were seen surrounding the outflow pipe located adjacent to the spillway structure (31.001387; -92.382661). At this time, the outflow pipe remained open and lake water was flowing through the pipe and into Bayou Cocodrie. No water was flowing over the spillway and the lake water level was about one foot below the top of the spillway. For the most part, especially when in comparison to previous amounts, Lake Cocodrie is free of any considerable amount of aquatic vegetation.

Dissolved oxygen levels were above 3.0 mg/l at the surface throughout the system however these levels were below 2.0 mg/l and often below 1.0 mg/l at any depth greater than 3.0 feet. Water temperatures were above 30 degrees centigrade at surface and ph was found to be above 6.0 at both surface and bottom at all stations recorded. One boat with one person was observed fishing in Bennett bay.

Date	Temp	SpCond	Salinity	Depth	pH	pHmV	Turbidity+	Chlorophyl	d.o. percent	d.o. mg/l	
08/16/11	29.67	0.063	0.03	3.087	6.93	3.9	269.4	46.8	5.00	0.38	bennet
08/16/11	31.87	0.063	0.03	0.609	6.99	0.3	3.4	17.7	59.20	4.33	
08/16/11	18.06	0.178	0.08	8.868	6.56	23.7	39.9	54.5	4.70	0.45	little lake
08/16/11	29.38	0.094	0.04	0.381	6.74	14.6	0.8	15.0	44.90	3.43	
08/16/11	21.06	0.166	0.08	10.899	6.60	21.7	27.3	56.0	3.80	0.34	fontenot
08/16/11	30.58	0.060	0.03	0.169	6.60	22.7	1.0	15.3	39.20	2.94	

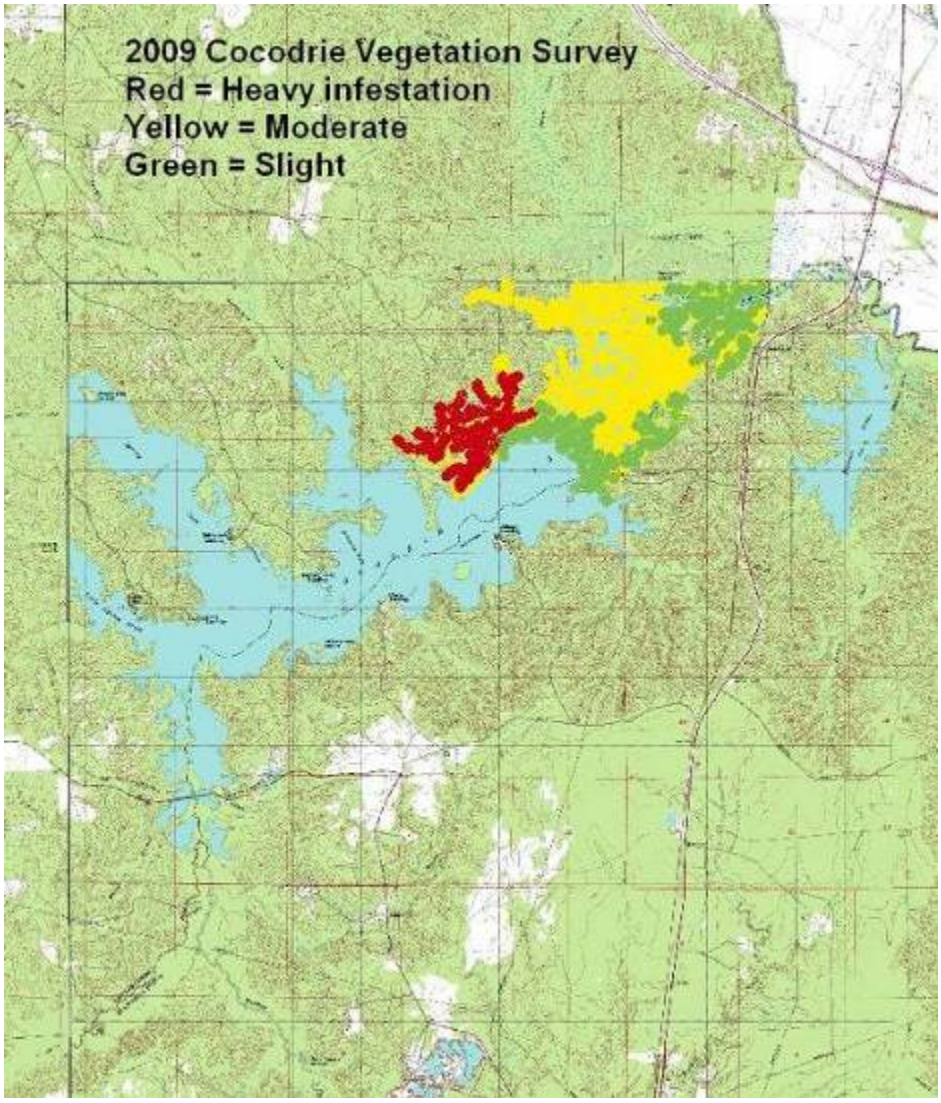

Peterson Island
entrance to Blue Lake
slight common salvinia
Island Gap Island
Neal's Bay slight
common salvinia
Peachtree Island
167
Cocodrie Lake
Jayhawkers Island

Typemap

Cocodrie Lake Sep. 16th 2009

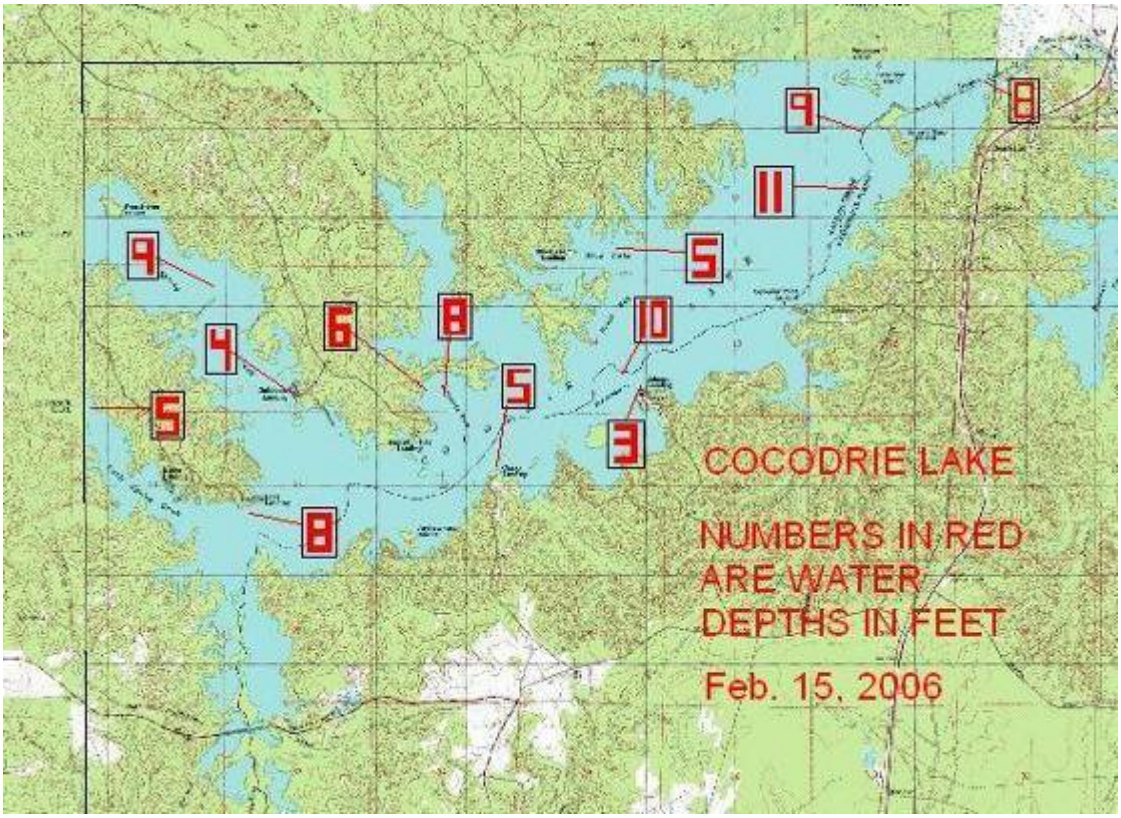
Field personnel: J. David & M. Plonsky
Report by: J. David

Cocodrie Lake is going in the last year of its three-year drawdown which began in 2008 to control the spread of Common Salvinia. A survey was conducted on September 16th, 2009 to observe common salvinia. The lake was approximately 4 feet below pool stage. Common Salvinia was observed near the northwest end of the lake, near blue lake, in the channel. Majority of the wooded areas were dry which has reduced the amount of C. salvinia. Other areas observed was Bennett's Bay and Little River where no vegetation was discovered. Neal's Bay and Blue Lake had moderate to heavy amounts of C. Salvinia and light amounts of fanwort and hydrilla. Majority of the common salvinia was in the channel flowing towards the control gate.

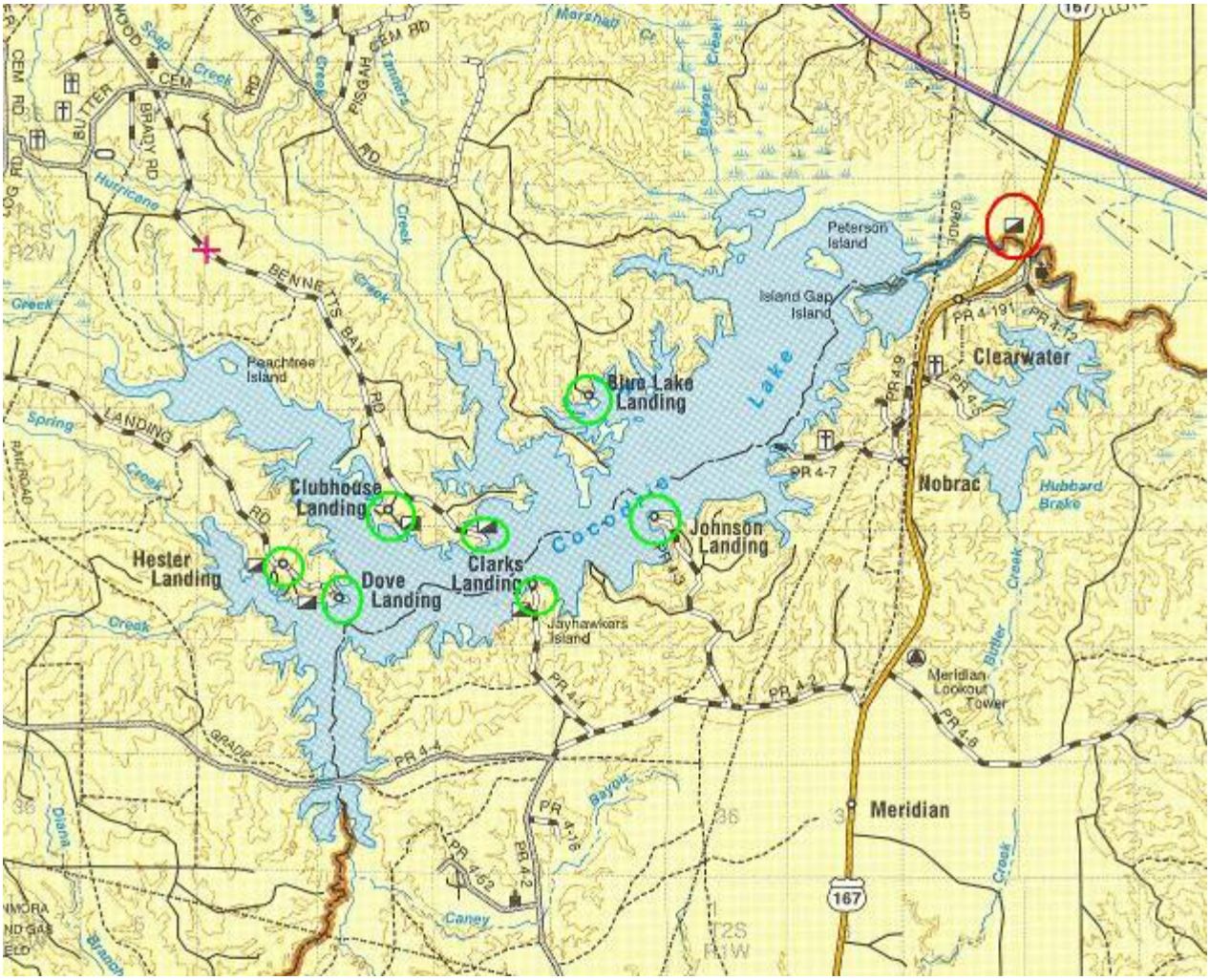


Type map sampling history: (years) 1994, 1995, 1998, 1999, 2003, 2005, 2007, and 2009

Vegetative type maps were conducted in the fall of each year and in turn have kept a summary of aquatic vegetation.



Cocodrie Lake Average Water Depths



Map of Cocodrie Lake with public boat landings

Photo of Cocodrie Lake Spillway. LDWF file.