

# **LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES**



**OFFICE OF FISHERIES  
INLAND FISHERIES DIVISION**

**2018 AQUATIC VEGETATION CONTROL PLAN**

**CADDO LAKE**

Date Lake Formed – Caddo Lake is a natural lake formed in 1811 when the New Madrid earthquake caused the land in this area to subside. U.S. Army Corps of Engineers (USACOE) built a spillway across Cypress Creek in 1914 and stabilized the boundary of Caddo Lake. In 1971, the USACOE completed a new dam just downstream from the old structure.

Waterbody Type – natural lake situated on gently rolling, poorly drained soils with minimum pool maintained by manmade spillway. Large areas of the lake are comprised of bald cypress (*Taxodium distichum*) forests.

Parish – Caddo Parish; the lake encompasses portions of Texas and Louisiana with the state line bisecting the lake into roughly equal portions.

Age and condition of control structure – no control structure; spillway is approximately 47 years old, good condition

Type of control structure – no drawdown capability; spillway of stepped design with 860 feet of the concrete spillway set at 168.5 MSL and 1540 feet of the concrete spillway set at 170.5 MSL.

Water level (MSL) – 168.5 MSL at normal pool stage. Normal seasonal water level fluctuations from approximately 166.5 MSL to 171.5 MSL

Surface area – 25,400 acres at normal pool stage, ranges from 18,700 acres during normal seasonal low water levels up to 35,000 acres at normal seasonal high water levels. Approximately 13,000 acres in Louisiana.

Average depth – 5.5 feet at normal pool stage

Watershed ratio – 69:1

No Drawdown Capability

Lake Commission – Caddo Lake Watershed District Commission

This commission is inactive, has not met in approximately 11 years and was not active prior to that time.

Not to be confused with the Caddo Lake Institute or the Greater Caddo Lake Association – two separate groups of concerned citizens organized to support Caddo Lake.

Creation / Nomination – The Caddo Lake Watershed District Commission created by state statute. The Caddo Parish Commission appoints members.

#### PART XIX. CADDO LAKE WATERSHED DISTRICT

##### §3087.71. Creation; location

There is hereby created a recreation and water conservation district to be known as the "Caddo Lake Watershed District" to be comprised of all of Ward 1 of Caddo Parish.

Acts 1995, No. 345, §1.

Caddo Lake Watershed District Commission - INACTIVE

Name	Address	Phone #	Term Expires
Wes Wyche	P.O. Box 31109 Shreveport, LA 71130	(318) 673-6072	12-12-2012
J. B. "Bob" Roddey	12971 Highway 1 Oil City, LA 71061	(318) 995-6497	12-12-2012
Patsy Lee	6555 Northwood Lane Blanchard, LA 71009	(318) 929-4518	12-12-2012
Dale Nix, Jr. (Chairman)	P.O. Box 595 Mooringsport, LA 71060	(318) 996-7653	12-12-2012
Dr. Charles McCormick	P.O. Box 566 Vivian, LA 71082	(318) 221-3902	12-12-2012

Procedure for spillway openings – Not applicable as there is no drawdown capability.

What significant stakeholders use the lake?

Recreational use of Caddo Lake is primarily by anglers, duck hunters, lake residents, and non-consumptive nature observers.

Caddo Lake is unique in that offshore drilling for oil occurs on many areas of the lake, and the oil companies have a stake in maintaining boating access throughout the lake.

Several municipalities in Louisiana and Texas rely on Caddo Lake as a municipal water supply: Caddo Waterworks, Oil City Water System, Mooringsport Water System, Vivian Water System, East Cove Utilities Shreveport, Town of Greenwood, Blanchard Water System, and Blanchard

The AEP/Swepco Lieberman Power Plant in Louisiana uses the water from Caddo Lake for cooling purposes.

What are their needs and concerns?

The primary concern of the majority of user groups is recreational fishing, boating and hunting access. The primary concern of shoreline residents is maintaining access to the lake from their homes and camps and the aesthetic quality of their lakeside home sites.

The oil companies engaged in offshore operations on the lake are interested in maintaining access for boats and barges to service the platforms.

Municipalities that withdraw water from the lake are interested in maintaining a sufficient lake level so that intakes draw water of good quality for purification and intakes are not blocked by aquatic vegetation. They are also concerned about applications of herbicides, oil and chemical spills and other pollutants near the water intakes or in sufficient quantities to affect the potable water.

The primary concern of the electric power plant is maintaining a sufficient lake level and the intake being free of aquatic vegetation.

What is the history of aquatic vegetation complaints?

Aquatic vegetation complaints are common and have become chronic following the invasion of giant salvinia (*Salvinia molesta*) in 2006. Most complaints of giant salvinia and water hyacinth (*Eichhornia crassipes*) originate from the Jeem's Bayou area and those concerning American lotus (*Nelumbo lutea*) and occasionally alligator weed (*Alternanthera philoxeroides*) are from the lower end of the lake.

Have there been any controversial issues on the lake?

As Caddo Lake is a border water shared with Texas, there have been many controversies, over the years concerning fisheries management, recreational and commercial fishing regulations, aquatic vegetation control efforts, and enforcement efforts.

The issue, which has had the greatest impact on Caddo Lake, was altering the inflows to the lake following construction of the Lake of The Pines upstream on Big Cypress Bayou. This event greatly altered the water regime, which has now had many negative impacts on Caddo Lake, particularly on the Texas side of the lake. Without the flushing action that was historically present, organic build-up and sedimentation rates increased, contributing to the presence of hypoxic / anoxic zones in parts of the lake.

### **Aquatic Vegetation Status:**

LDWF biologist, James Seales, performed a vegetation type map in October of 2017. There were approximately 1,677 acres (12%) on the Louisiana side of the lake, which had some degree of aquatic vegetation coverage. There was roughly 280 acres of giant salvinia observed during the survey, ranging from dense mats of tertiary stage plants with Cuban bulrush (*Oxycaryum cubense*) growing on top to scattered plants drifting throughout the lake. The majority of the giant salvinia was found in the upper end of Jeem's Bayou, the Buzzard's Bay area and the state line area near Big Green Break and Big Sandy Island. Salvinia was often interspersed with American lotus, spatterdock (*Nuphar luteum*), alligator weed, and primrose (*Ludwigia spp.*). A five-foot wide fringe of giant salvinia was found along the majority of the shoreline.

Buzzard Bay was approximately 50% covered with American lotus. Lotus were also found in the Big Green Break area, and approximately 25 acres were located near the power plant. The area between the Mooringsport Bridge and the dam had very little lotus. Prior to 2015, this area had a severe problem with lotus that was limiting access to only the marked boat row.

The Big Green Break and Big Sandy Island areas had a mixture of spatterdock, primrose, alligatorweed, giant salvinia and American lotus. The Jeem's Bayou area was in much better shape than recent years. The majority of the giant salvinia was in the upper end of Jeem's Bayou or in the very heavily timbered areas. There were a few areas of moderate infestations in shallow areas that consisted primarily of spatterdock with primrose, alligatorweed, and

giant salvinia mixed in.

Water hyacinth was present at very low densities throughout the Louisiana side of the lake where it was occasionally seen mixed in with other vegetation. Total acreage of water hyacinths on the Louisiana side was less than 5 acres.

Giant cutgrass (*Zizaniopsis miliacea*) was the most prevalent species of marginal vegetation found around the lake. Other marginal vegetation present included lizard's tail (*Saururus cernuus*), wild taro (*Colocasia esculenta*), smartweed (*Polygonum hydropiperoides*), torpedo grass (*Panicum repens*), cattail (*Typha spp.*), spike rush (*Eleocharis spp.*) and duck potato (*Sagittaria lancifolia*).

The submersed vegetation in Caddo Lake had begun to rebound following a decline the two previous years. Sparse coverage of hydrilla (*Hydrilla verticillata*), bladderwort (*Utricularia spp.*), fanwort (*Cabomba caroliniana*), coontail (*Ceratophyllum demersum*), widgeon grass (*Ruppia maritima*), and stonewort (*Nitella spp.*) was found in the shallow (< 4 feet) areas of Caddo Lake. Small amounts of hydrilla were found throughout the lake, but not in any large mats. There is an estimated 50-75 acres of hydrilla on the Louisiana side of Caddo.

### **Limitations:**

The biggest limiting factor for aquatic vegetation control efforts on Caddo Lake is the lack of drawdown capability. Other issues are restrictions on herbicide applications near potable water intakes, dense cypress forests, and shallow backwater areas, which restrict access for spray boats.

### **Past Control Measures:**

Historic aquatic plant control efforts have been primarily foliar herbicide applications consisting of either glyphosate or diquat with a non-ionic surfactant for emergent and floating vegetation as needed.

Recent aquatic plant control measures have primarily targeted giant salvinia with foliar herbicide applications of either diquat (0.75 gal/acre) mixed with a non-ionic surfactant (0.25 gal/acre) or a mixture of glyphosate (0.75 gal/acre) and diquat (0.25 gal/acre) with Turbulence (0.25 gal/acre) surfactant. Limited foliar herbicide applications for emergent vegetation have been made along the inhabited shoreline areas that included water hyacinth, alligatorweed, American lotus, and fragrant water lily (*Nymphaea odorata*). These plants were treated with glyphosate and a non-ionic surfactant at 0.5 gallons and 1 quart per acre, respectively. A helicopter was used to treat 400 acres of American lotus on the lower portion of the lake in 2015. Aerial applications used 0.5 gallons of triclopyr and 0.25 gallons of non-ionic surfactant to treat the lotus due to potable water intakes in the area.

Efforts to control giant salvinia have included large-scale herbicide applications by LDWF

spray crews and the use of private applicators. In 2017, the following aquatic species and acreages were treated by LDWF and contract applicators combined during 171 application efforts:

Giant salvinia- 3,981.5 acres

Alligatorweed- 6 acres

Water pennywort (*Hydrocotyle spp.*)- 6 acres

Giant cutgrass- 4.5 acres

Giant salvinia weevils (*Cyrtobagous salviniae*) were first introduced on the Louisiana side of Caddo Lake during 2007. Weevil-infested giant salvinia was transported from the Texas side of Toledo Bend and stocked in an enclosure that was located in Jeem's Bayou. This area was difficult to access with spray boats. Subsequent introductions were conducted in 2008 and 2009. These introductions were concentrated around potable water intakes in Jeem's Bayou and near Mooringsport. The weevil population in Caddo Lake was devastated by several days of subfreezing weather during January of 2010, followed by another hard freeze in January 2011.

Weevil introductions have continued since 2011 utilizing weevils reared in Lewisville, TX at the U.S. Army Corps of Engineers (USACE) Lewisville Aquatic Ecosystem Research Facility. From 2011-2015, these weevils were stocked in remote locations throughout the Big Green Brake area near the state line. The populations have been monitored annually by a USACE entomologist contracted by the LDWF. Each year, the population became established after initial stocking, slowly began to multiply reaching maximum densities by October, and then declined during the fall and winter becoming almost non-existent by the following spring. In more severe winters, the population would be eliminated. No quantifiable results or effects upon the salvinia could be documented during this time.

To better document weevil success, a second site was added in 2016 near Bonham's Arm. Both stocking locations were encircled using oil spill containment boom, the area photographed, and the weevil populations monitored. The two sites represent the best results of weevils controlling salvinia recorded by LDWF in northwest Louisiana. During 2016-2017, the weevils became established and overwintered at high numbers. No additional weevils were added to the sites in 2017 so as not to skew the results. It is important to note that both winters were very mild and could be viewed as an anomaly for the area. However, the weevils were able to crash the salvinia population within the booms and create open water for short periods. Over the 2-year period, the booms were cleared of salvinia by the weevils 2-3 times. Unfortunately, salvinia quickly rebounded and covered the entire boomed area within weeks. Weevils were able to spread beyond the boom and the population was on the rise prior to the winter of 2017/2018. Although some weevils were documented to survive the freeze events, the population numbers were extremely low to nearly non-existent after the cold weather.

From 2011-2014, The Center for Invasive Species Eradication (CISE) of the Texas A&M Agrilife Extension Service, Texas A&M Agrilife Research and the Texas Water Resources Institute operated the Salvinia Weevil-Rearing Facility at the Caddo Lake National Wildlife

Refuge. The facility was located on the decommissioned Longhorn Army Ammunition Plant in Harrison County, TX near Caddo Lake. The facility was funded for three years and was able to produce many weevils along with documenting/refining the production process. Additional research was conducted on weevils, but little effort was made in documenting salvinia control by the insect. The facility was closed after funding expired. The TPWD has taken over the site and is making upgrades to the facility with plans to begin rearing weevils for use on Caddo and other Texas lakes beginning in 2017.

Additionally, TPWD has contracted with the Caddo Biocontrol Alliance (CBA). CBA is a non-profit group that is a break-off from the Greater Caddo Lake Association. The CBA has collected monies and built a green house facility on the shores of Caddo Lake at Shady Glade Resort in Uncertain, TX. The facility began operation in 2014. TPWD contracted with the group to buy weevils in 2016.

Louisiana Department of Wildlife and Fisheries (LDWF) and TPWD stockings of salvinia weevils on Caddo Lake, 2007-2017.

<b>Year</b>	<b># Weevils</b>	<b>Source</b>
2007	489	Toledo Bend (TPWD assistance)
2008	200	LSU (Gheens)
2009	500 (approximate)	LSU (Gheens)
2011	830 (approximate)	USACE (Lewisville)
2012	42,392	USACE (Lewisville)
2013	25,713	USACE (Lewisville)
2014	182,100	USACE (Lewisville)
2015	54,030	USACE (Lewisville), Red River Waterway Commission (Colfax)
2016	52,315 263,400 146,500	USACE (Lewisville) TPWD Caddo Biocontrol Alliance
2017	140,819	TPWD

	232,952	Caddo Biocontrol Alliance
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**Recommendations:**

- Continue an integrated management approach to control invasive aquatic vegetation.
- a. LDWF will combine aggressive herbicide applications and biological control measures to achieve combined benefits. Foliar herbicide applications will be conducted in accordance with the approved LDWF Aquatic Herbicide Application Procedures. The herbicide diquat (0.75 gal/acre) and a non-ionic surfactant (0.25 gal/acre) will be used for giant salvinia control from November 1 through March 31. Outside of that period, giant salvinia will be controlled with a mixture of glyphosate (0.75 gal/acre) and diquat (0.25 gal/acre) with Turbulence (or approved equivalent, 0.25 gal/acre) surfactant.
  - b. Salvinia weevil introductions will continue. Weevil survival and stocking success will be monitored. Salvinia weevils will be stocked in areas that are difficult to access for foliar herbicide applications. Potential sites include the water intake area on the upper end of Jeem's Bayou and Green Brake.

Vegetation control efforts will be conducted in coordination with the Texas Parks and Wildlife Department.

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**Typemap:**

Inland Fisheries personnel conducted vegetation type map surveys in 2006, 2007, 2009, 2014, and 2017.



Caddo Lake (including TX/LA state line)

**CADDO LAKE  
CADDO PARISH, LA  
VEGETATION TYPE MAP  
2017**

An aquatic vegetation survey was performed on the Louisiana side of Caddo Lake (Caddo Parish, LA) on October 11 & 17, 2017. Inland Fisheries biologist James Seales conducted the survey. The lake was at approximately 3 inches below pool stage at the time of the survey. There was a moderate to heavy algae bloom present.

**Species Present**

<u>Common Name</u>	<u>Scientific Name</u>
Alligatorweed	<i>Alternanthera philoxeroides</i>
American lotus	<i>Nelumbo lutea</i>
Bladderwort	<i>Utricularia</i> spp.
Bulrush	<i>Scirpus</i> spp.
Buttonbush	<i>Cephalanthus occidentalis</i>
Cattail	<i>Typha</i> spp.
Coontail	<i>Ceratophyllum demersum</i>
Cuban bulrush	<i>Oxycaryum cubense</i>
Duck potato	<i>Sagittaria latifolia</i>
Duckweed	<i>Lemna</i> spp.
Fanwort	<i>Cabomba caroliniana</i>
Fragrant water lily	<i>Nymphaea odorata</i>
Giant cutgrass	<i>Zizaniopsis miliacea</i>
Giant salvinia	<i>Salvinia molesta</i>
Hydrilla	<i>Hydrilla verticillata</i>
Lizard's tail	<i>Saururus cernuus</i>
Pondweed	<i>Potamogeton</i> spp.
Slender spike rush	<i>Eleocharis baldwinii</i>
Smartweed	<i>Polygonum</i> spp.
Spatterdock	<i>Nuphar luteum</i>
Stonewort	<i>Nitella</i> spp.
Torpedo grass	<i>Panicum repens</i>
Water hyacinth	<i>Eichhornia crassipes</i>
Water pennywort	<i>Hydrocotyle umbellata</i>
Water primrose	<i>Ludwigia</i> spp.
Water shield	<i>Brasenia schreberi</i>
Widgeon grass	<i>Ruppia maritima</i>
Wild taro	<i>Colocasia esculenta</i>

**Severity**

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**Discussion**

The majority of the Louisiana side of Caddo Lake is presently in good condition. Aggressive foliar herbicide applications have been ongoing for giant salvinia in 2017 (in excess of 3,500 acres treated) and has helped reduce giant salvinia in the Jeem's Bayou area. Some shoreline property owners experience problems from giant salvinia and emergent aquatic vegetation.

High turbid water in the early growing seasons of both 2015 and 2016 reduced submersed vegetation coverage on the lake from historic levels. Submersed vegetation appears to be rebounding in 2017, but is not causing any significant problems and is beneficial for anglers. Prior to 2015, there was a severe American lotus infestation from the Mooringsport Bridge to the

dam. An aerial application was performed in this area in 2015 with plans for follow up applications the next year to treat any plants that returned from viable seeds. Initial results from the application reduced lotus in the area. Since 2015, lotus in the area have been far less problematic and no follow up applications have been needed. Other potential contributing factors include record flooding on the lake in March 2016 and record flooding on the Red River in 2015, where the water back-flowed into the lake from downstream of the spillway.

