CANE RIVER WATERWAY COMMISSION

AQUATIC VEGETATION CONTROL PLAN

CANE RIVER LAKE

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CANE RIVER LAKE
State of Louisiana
Located in Natchitoches Parish

Cane River Lake is a navigable waterway and is owned by the state of Louisiana. Earthen dams were built at both the northern and southern ends of the lake in the early 1900's. Three earthen dams were constructed, two on the northern end and one on the southern end. One of the northern dams is located on Hargis Rd. near Grand Ecore at latitude: 31.802244°, longitude: -93.073940°. The second northern earthen dam is located on Williams Avenue at latitude: 31.788445°, longitude: -93.053824°. The southern embankment is under LA Hwy 484 near Derry, LA at latitude: 31.568273°, longitude: -92.974914°. The spillway is incorporated into the southern embankment. The current spillway control structure was designed by the Louisiana Department of Public Works in 1947 and was completed on July 8, 1949. Cane River is an abandoned river course of the Red River. Cane River Lake is an abandoned channel of the Red River impounded by construction of Cane River Lake Dam (State ID No.: LA 35-00007) in 1949. It is a winding channel with dangerous curves that pose navigation dangers.

There is a concrete spillway with two 6 ft. X 10 ft. gates to permit water drawdown. New gates and Concrete structure resurfacing occurred in 2012. Additionally, there are gates on the downstream side in place to prevent a reverse flow that would cause further flooding to Cane River. The Natchitoches Levee & Drainage District controls opening/closing of the gates. The Cane River Waterway Commission/Louisiana Department of Wildlife and Fisheries submits request as warranted for the lake needs.

The control structure is limited to a drawdown potential of 4.5 feet below pool stage due to the presence of a soil barricade outside of the structure.

Water level range (MSL) for the lake is Pool stage 98 MSL. High – 103.3 MSL. Low – 93.4 MSL. The estimated Surface area at Pool stage is 1,350 acres; watershed ratio of 16.1:1.

The average depths at pool stage are: North Dam to Pratts Bridge 6-10 feet; Pratts Bridge to Shell Beach Bridge 10-15 feet; Shell Beach Bridge to Melrose Bridge 15-21 feet; Melrose Bridge to South Dam 21-30 feet with one section located at Melrose Subdivision 12-15 feet.

Louisiana Act Numbers 391 and 398 of 1982 created the District and the Commission. Laws resulting from this act appear in Louisiana Revised Statutes under Title 34:3261-3269. This legislation was amended by Acts 1986, No. 315;Acts 1986, No. 135; Acts 1989, No. 176; Acts 1993, Numbers 727 and 728; Acts 2001, No. 350 and Acts 2003, No. 774 as found in LA R.S. 34:3263 to R.S. 38:2717. The Cane River Waterway Commission is the governing authority. The Commission has 5 board members that represent the Natchitoches Levee & Drainage District, Parish Government, Governor of the State of Louisiana, Soil & Water Conservation, and the City of Natchitoches. Members are appointed by the Governor of Louisiana.

The lake is used for recreational boating and water sports as well as recreational fishing. Anglers and boaters require sufficient boating access to the lake, i.e. water levels that allow

boat launching and operation. Shoreline property owners (riparian) desire adequate water levels to maintain the appearance of a "full" lake. Agricultural users require sufficient water for irrigation purposes. The federal fish hatchery requires that water be available for uptake as needed.

There are significant needs and/or concerns for the lake. Riparian Owners value the lake for aesthetic/recreational purposes. Agricultural and Riparian irrigation pumps are commonly found along the shoreline. A U. S. Fish & Wildlife Service fish hatchery is located on the lake. There are approximately 84 pumps registered for irrigation purposes.

The Cane River Waterway Commission is nearing completion of a project to divert water from the Red River into Cane River Lake during drought conditions. The pump station is expected to be up and running by summer 2018.

Aquatic Vegetation Status:

As of August 31, 2017 the following plants have been located on the lake:

Alligatorweed

Alligatorweed *Alternanthera philoxeroides* has been described as an amphibious plant because is grows in a wide range of habitat types including both terrestrial and aquatic (Vogt et al. 1979). It may be found as either a floating plant or a rooted plant. The aquatic form usually has hollow stems, whereas the terrestrial form does not. The plant originated in the Parana River region of South America (Maddox 1968, Vogt et al. 1979), but has since spread to other areas of South America, as well as North America, Asia, and Australia (Julien et al. 1995). Flowering stems are upright. Leaves are usually elliptic and may be up to 4 inches long. Flowers bloom from April through October if conditions are favorable. Similar to water hyacinth and water lettuce, alligatorweed can clog waterways and limit boating, fishing, hunting, and swimming access.

Hydrilla

Hydrilla was introduced into Florida in the early 1950's through the aquarium trade. It has small (0.5-1.0 inches) leaves arranged in whorls around the stem and was initially marketed as Indian star-vine (Schmitz 1990). Since then the plant has spread throughout Florida, also becoming established widely throughout eastern seaboard states as well as California and Washington (Netherland 1997). As a result of its rapid growth and competitive ability, hydrilla populations often exceed beneficial levels. Bowes et al. (1979) reported dense surface mats of hydrilla may cause wide fluctuations in dissolved oxygen

levels, pH, and temperature. Overabundant hydrilla may also reduce plant and animal diversity

(Barnett and Schneider 1974) and stunt sport-fish populations (Colle and Shireman 1980). Flow rates in canals and rivers may be restricted (TPWD staff observations), and access may become limited, precluding water recreation, as well as the economic benefits of recreational activities (Colle et al. 1987).

Two characteristics that are most problematic include its rapid growth rate under a wide range of environmental conditions, and its ability to reproduce in a variety of ways. Hydrilla can grow up to one inch per day until it nears the surface of the water. Once near the surface it forms a thick mat of branches and leaves that intercept sunlight, often preventing native plants from growing underneath. Hydrilla commonly occurs in reservoirs ranging from oligotrophic (low in nutrients) to eutrophic (high in nutrients) conditions. Although hydrilla does best at pH of 6-8 (Langeland 1990) it can grow under a wide range of pH conditions. Hydrilla can also tolerate relatively high salinity, but perhaps its greatest advantage is the ability to grow and photosynthesize in less than 1% of full sunlight (Haller 1978). This allows hydrilla to colonize deeper water, frequently growing in water 3 yds deep with instances of establishment in very clear water up to 15 yds deep. It is this ability to grow at greater depths that allows hydrilla to cover such a large portion of relatively shallow reservoirs.

Hydrilla can reproduce in a variety of ways including fragmentation, tubers, turions, and seeds (Langeland 1990). The ability of hydrilla to reproduce from fragments aids its rapid spread within reservoirs and from one reservoir to another. Nearly 50% of fragments with a single leaf whorl can sprout a new plant (and subsequently a new population). For fragments with three or more leaf whorls, the success rate is over 50%. It is easy to see why hydrilla is spread easily by boats, boat trailers, wildlife, and discarded aquarium water. Tubers are actually subterranean (underground) turions that can remain dry for severaldays and still remain viable. Tubers can be buried in undisturbed wet sediment for over four years and survive. They can also survive herbicide treatment and ingestion and regurgitation by waterfowl. It is largely the tubers that allow hydrilla to remain established even during an aggressive treatment program. A single tuber can potentially produce 6,000 new tubers per yd^2.

Turions that form in leaf axils are another potential means of hydrilla expansion. A single turion can potentially produce over 2,800 additional turions per yd^2.

Although hydrilla can reproduce sexually, seed viability is low and the overall importance of seed production is unknown.

Salvinia

Two species of aquatic fern, genus *Salvinia*, have been identified. Both are small floating plants with oval shaped leaves (fronds) that have tiny hairs on the upper surface. Common salvinia *S. minim*a and the more ecologically threatening Giant salvinia S.molesta. *S. minima* is smaller and is readily distinguished from *S. molesta* by the morphology of its leaf hairs. In S.*minima* the hairs are split four ways near the tip. In

S. molesta the hairs are also split, but they come together at the tip forming an egg-beater type structure. Typically, mature leaves of *S. molesta* are quarter to halfdollar sized, about twice the size of *S. minima*. Giant salv[illegible] Weed, has spread from its native habitat in southern Brazil to many other countries around the world including Australia, New Guinea, New Zealand, Zambia, Zimbabwe, and now to the United States (Mitchell 1976). It ranks second behind water hyacinth on the nuisance aquatic weed list where it was placed in 1984 (Barrett 1989). Giant salvinia damages aquatic ecosystems by outgrowing and replacing native plants that provide food and habitat for native animals and waterfowl. Additionally, salvinia blocks out sunlight and decreases oxygen concentration to the detriment of fish and other aquatic species. When plant masses die, decomposition lowers dissolved oxygen still further. Blockage of waterways to traffic is common. Giant salvinia infestations often expand very rapidly. Doubling times as low as two days have been observed in the laboratory, and under field conditions doubling times of approximately a week are not unusual.

Water hyacinth

Water hyacinth is a large floating plant, native to South America, which has been called the world's worst aquatic weed (Cook 1990). It is believed to have been introduced into the United States at the World's Industrial and Cotton Centennial Exposition of 1884-1885 in New Orleans, Louisiana, and may have been cultivated in the U.S. as early as the 1860's (Tabita and Woods 1962). By the late 1890's, water hyacinth had become such a problem for navigation that Congress was prompted to pass The Rivers and Harbors Act of 1899 which authorized the U.S. Army Corps of Engineers (ACOE) to begin major aquatic plant control programs (North American Lake Management Society and Aquatic Plant Management Society 1997). Water hyacinth reproduces by budding daughter plants, or by producing seeds when its distinctive purple flower is in bloom. Populations may double in size every 6-18 days (Mitchell 1976). Perhaps due to its rapid growth rate, efforts by the ACOE were unable to control water hyacinth, and populations expanded to over 125,000 acres in Florida by the late 1950s (United States Congress 1965). Light and oxygen diffusion (Gopal 1987), as well as water movement (Bogart 1949) can be severely reduced by the presence of overabundant water hyacinth. Water hyacinth can smother beds of submersed vegetation and eliminate plants that are important to waterfowl (Tabita and Woods 1962; Chesnut and Barman 1974). Similarly, low oxygen concentrations underneath water hyacinth mats can cause fish kills (Timmer and Weldon 1967). Water hyacinth has completely eliminated resident fish populations in some small Louisiana

lakes (Gowanloch 1945). The combination of large leaves and hanging roots can produce evapotranspiration rates in excess of twice normal evaporation. Water hyacinth induced water loss can be significant in West Texas water supply systems where drought conditions often occur. Water hyacinth infestations are often associated with reduced boating, fishing, hunting, and swimming access.

Coontail

Coontail (Ceratophyllum demersum) being a species that is often viewed negatively. In truth, coontail has both positive and negative attributes, and methods are available to control its growth.

Coontail is classified as a submerged aquatic species, meaning it grows below the surface of the water. It is a free-floating, rootless, perennial native aquatic plant that is capable of forming dense colonies covering large areas of water. The green, forked, serrated leaves are relatively stiff and are arranged in whorls on the stem. These leaves

have a strong resemblance to a raccoon's tail which is probably how coontail got its name. The plant is found in ponds, lakes and streams across the United States, Mexico, Canada and much of the world. It reproduces through very small seeds and fragmentation. Fragmentation occurs when a portion of the plant breaks off and becomes a new plant. Coontail and other aquatic plants spread to new areas when impoundments containing the plants overflow into other water bodies or when seeds or fragments are introduced by birds, boats, livestock, etc.

Coontail can be either desirable or undesirable depending on the management goals for a particular body of water. Desirable attributes may include increasing species diversity, limiting unwanted fishing, creating fish habitat, providing food for waterfowl and improving water clarity. When coontail is excessive, undesirable effects can include a reduction of open water, creation of a "scummy" appearance, limiting of desirable fishing access, interfering with boating and swimming, stunting fish by hiding too many from predators and becoming invasive.

Water clarity typically improves with abundant underwater aquatic vegetation such as coontail. Coontail can be considered desirable when managing for waterfowl and

fisheries. The leaves and seeds of coontail are eaten by waterfowl, and it provides a home for a variety of aquatic insects. These insects then serve as food for many species of fish and waterfowl. Coontail also provides cover for small fish, which is probably more important in relatively clear ponds. As a rule of thumb, aquatic vegetation may become counterproductive in an impoundment managed for sport fishing when it covers more than 25 percent of the surface area. With this in mind, it is not typically recommended to plant coontail in a sport fishing impoundment due to its aggressive growth.

Spatterdock

Spatterdock, a useful native plant, is a rooted, floating-leaved plant with bright yellow flowers commonly seen in Washington lakes and ponds. Its scientific name is Nuphar polysepala, and it is also commonly called the yellow pond or cow lily. Spatterdock can sometimes be confused with the fragrant water lily (Nymphaea odorata), a similar looking exotic plant that has been introduced in many Washington lakes. However, if they are blooming they can be easily distinguished, for the fragrant water lily has showy white or sometimes pink many-petaled flowers.

In early spring the spatterdock's leaves are below the surface, light green in color, and look like lettuce growing on the lake bottom. But by late spring the broad, dark green, heart-shaped leaves float on the water's surface or often stand above the water as the summer progresses.

The floating leaves are connected by long stalks to large horizontal roots in the sediments. The roots can be up to six inches in diameter and many feet long! The roots look something like palm-tree trunks, with knobby scars where leaves have grown.

The bright yellow, ball-like flowers bloom from June to mid-August and also stand just above the water surface. They are composed of several broad fleshy yellow sepals, with many inconspicuous petals inside. In the center is a yellow flask-shaped seed pod. The flower emits a strong brandy-like odor which attracts pollinating insects. Spatterdock reproduces by seeds and spreads by growth of its large fleshy roots. It will also grow from fragments of roots if the plant is broken up.

Humans have put spatterdock to many uses. Historically many cultures ate the roots cooked fresh in stews or dried and ground into flour for baking. The seeds were gathered by Native Americans and either ground into flour or popped like popcorn. The leaves and roots also contain tannin which was put to use in dyeing and tanning.

Medicinally, the leaves were used to stop bleeding, and roots were used in a poultice for cuts, swelling, and other ailments. The Quinault Tribe believed that some of the roots looked like men, and others like women, so they chose a root appropriate for the patient before using it as a pain remedy. Most recently spatterdock has been used as an aquarium and water garden plant.

Spatterdock is also a valuable plant for fish and wildlife habitat. Its large leaves provide shade, cover from predators, and a home for many tiny invertebrates which fish use for food. The seeds are eaten by ducks and other birds, and muskrat, beaver, and nutria will eat the roots. Deer have also been known to browse the flowers and leaves. When spatterdock is accompanied by other native aquatic plants, it is very beneficial to wildlife habitat and an important part of a lake ecosystem.

American Lotus

American lotus (Nelumbo lutea) is a floating-leaf aquatic plant that often rises above the surface of the water to become emergent. American lotus has round, bluish-green leaves that can be up to 2 feet in diameter and are flat in appearance if the plant is floating and conical when emergent. Although often confused with water lilies when floating, lotus leaves lack the characteristic slit of lily pads and a have a thick central stem. The flowers of American lotus are very large (up to 10 inches across) and appear from July to September. The flowers may have more than twenty delicate petals which range in color from yellowish-white to darker yellow. In the center of the flower is an inverted, yellow, cone-shaped seed pod. The seed pod remains and enlarges after the flower dies. American lotus is found in marshes, quiet backwaters and near-shore areas in large rivers and occurs in muddy, shallow waters to water over 6 feet deep. American lotus propagates through the spreading of seeds or rhizomes.
Why is American Lotus Considered a Nuisance Species? American lotus has the ability to expand rapidly and cover wetland habitats; plants can completely cover a one acre pond in three to four years. Dense populations of American lotus suppress the growth of beneficial native plants by shading out the lower-growing plants, creating a single-species (monotypic) stand which decreases biodiversity. In Rhode Island, American lotus has no natural predators to control its growth. Dense emergent stands inhibit swimming, paddling and boating. The bloom and decomposition of these mats may lower the dissolved oxygen in the water, creating the potential for fish kills. How Did American Lotus Become Established in Rhode Island?
Nelumbo lutea is native to the southern United States, Central America and the Caribbean. Its range was extended northward by Native Americans who used the seeds and tubers for food. American Lotus is among today's most popular aquatic ornamental plants, and is often used in water gardens. Plants may also be intentionally planted in a water body for its aesthetic value. Planting in RI water bodies is prohibited under the

Fresh Water Wetlands Regulations, Rule 5.01. Seeds may be carried by wind, wave or migratory waterfowl.

Native to South and Central America, Water Primrose was introduced to the USA. It grows along the margins of lakes, ponds, and rivers, forming floating mats at first. By summer it becomes slightly woody, forming stalks that will flower above the surface.

Water Primrose

Water primrose was likely brought to the U.S. as an ornamental plant. It now ranges from New York to Florida, west to Texas, and along the west coast. Primrose produces abundant seeds that are very small. It will also reproduce by fragmentation; roots will readily grow from the nodes.

Dense growths of water primrose provide breeding areas for mosquitoes, and will degrade both water quality and habitat for fish and wildlife. It fouls intakes used to supply municipal drinking water and irrigation, and becomes a navigation hazard. Creeping water primrose should never be introduced to open waters.

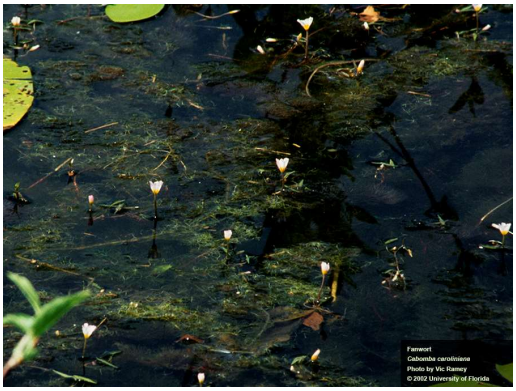
Creeping water primrose is a perennial plant that stands erect along the shoreline but also forms long runners (up to 16 feet) that creep across wet soil or float out across the water surface. The leaves vary from green to red tinged. The plants flower yellow in all seasons except winter. The yellow flower is very distinctive of creeping water primrose. Flowers vary in size from 1 inch to 2 inches in diameter.

Fanwort

Fanwort – Cabomba caroliana is a rooted, submersed plant. However, it may have submersed and floating leaves, of different shapes. Fanwort generally grows in 3 to 10 feet of water; and is frequently found in ponds, lakes, and quiet streams. Fanwort stems

are long and much-branched near the base. They have many slender roots. Fanwort gets its name from the shape of its fanlike, underwater leaves, which are about 2 inches across. These submersed leaves are repeatedly divided. Leaves are arranged oppositely, or in whorls along the stem. The floating leaves of fanwort are few and infrequent. They occur at the stem tips. These floating leaves are narrowly diamond-shaped; and are attached in the center, like an umbrella. Fanwort flowers are white to pink to purplish; and are about one-half inch across. The flowers are on stalks that arise from the tips of the stems. The submersed parts of fanwort resemble the submersed parts of limnophila. Distinguish between the two by looking for floating or emersed leaves. The floating leaves of fanwort are small and diamond-shaped. The emersed leaves of limnophila are deeply lobed and torn-looking.

Fanwort has two types of leaves: submersed leaves and the much-less common floating leaves.
The submersed leaves are fan-shaped and frilly.
The floating leaves are narrowly diamond-shaped. Fanwort's white to purplish flowers are on stalks, and are about one-half-inch across.



Giant Cut Grass

Zizaniopsis miliacea is a species of grass known by the common names giant cutgrass, water millet, and southern wildrice. The name giant cutgrass refers to the plant's large, rough-edged leaves, and the name southern wildrice refers to its resemblance to wildrice (Zizania spp.) It is native to the southeastern United States and it can also be found in central Mexico.

This perennial grass grows from rhizomes, producing stems up to 4 meters tall and 3.5 centimeters wide. The stems root at nodes that come in contact with the substrate. It also spreads via functional stolons (decumbent rooting stems) and vegetative buds that erupt from the stems. The blue-green leaves are up to a meter long and 3 centimeters wide. The panicles may exceed 80 centimeters long and are usually up to 20 centimeters wide.

This plant grows in aquatic habitat, such as marshes and riverbanks. It is also common in former rice paddies. This grass forms large colonies by spreading via its stolon-like stems and rhizomes. It grows in fresh and brackish water, tolerating some salt in the water. It is sometimes planted for erosion control in wetlands. Large stands of the plant are sometimes considered to be a nuisance, providing "poor wildlife habitat"; however, it does provide nesting sites, cover, and food for animals. Riparian Owners can aid in the control of giant cut grass, by removing the offspring that floats on top the water in the fall.

EEL GRASS

Eel-Grass is probably the most environmentally useful water plant that grows to weed-like proportion. It forms extensive underwater meadows that support entire eco-systems of aquatic bacteria, marine worms, snails, limpets, crab, fish and water fowl. Some of the animals use Eel-Grass a nursery, others burrow in the grass and sediments, while others swim or walk among the leaves. It is a thriving community down there. Eelgrass makes it all happen by being as adaptive as normal grass. It grows to maturity within a year, growing profusely in spring and summer and decaying away in the fall and winter. And it leaves behind sturdy roots and a storm of seeds to begin the circle again in spring. This water grass uses rhizomes to propagate - it forms juicy roots that grow horizontally and releases shoots of new plants at intervals as it goes. At the same time, it flowers and grows seeds entirely underwater, another feat that is uncommon, even among real water weeds.

Most times, Eel-grass is not a nuisance, especially when growing in the wild. Most of US States, notably Washington, in fact go out of their way to encourage the spread of this grass of the aquatic prairies. The multi-billion fishing industry is also generally partial to the grass. But grass is grass, even the Eel type, and it can get excessive particularly on streams, dams, lakes and ponds. When that happens, it can get in the way of fishing and recreation and even totally overwhelm the water body. The usual method of destroying unwanted Eel-Grass is to dredge it out. Some herbicides could also do the job, although they would also affect the complex eco-system. But perhaps the most environmentally yet very effective Eel-Grass control measure is the use of the Bottom Lake Blanket. This is our patented weed control product that is unlike anything else in the market. The Bottom Lake Blanket is cut from specially formulated polyethylene - 10 3/4 feet wide sheets with no limit on length - that destroys weeds by blocking away sunlight. It is made of material that is lighter than water, but has designed lateral weighting to allow it to settles down underwater. Only a small percentage of the blanket comes in contact with the lake floor, the rest of the material is free to float just above the Eel-Grass so as to ensure the "water-people" who live in the grass can move about below and above the blanket freely. The blanket is additionally

useful because it affects only the grass it covers, meaning it can be used to reduce the size rather than entirely destroy an Eel-Grass meadow.

DUCK WEED

Common duckweed is a very small light green free-floating, seed bearing plant. Duckweed has 1 to 3 leaves, or fronds, of 1/16 to 1/8 inch in length. A single root (or root-hair) protrudes from each frond. Duckweeds tend to grow in dense colonies in quiet water, undisturbed by wave action. Often more than one species of duckweed will be associated together in these colonies. Duckweeds can be aggressive invaders of ponds and are often found mixed in with mosquito fern or watermeal. If colonies cover the surface of the water, then oxygen depletions and fish kills can occur. These plants should be controlled before they cover the entire surface of the pond.

 Duckweed colonies provide Habitat for micro invertebrates but if duckweed completely covers the surface of a pond for an extended period it will cause oxygen

depletions. These colonies will also eliminate submerged plants by blocking sunlight

penetration. Many kinds of ducks consume duckweed and often transport it to other bodies of water.

One of the more important factors influencing the distribution of wetland plants, and aquatic plants in particular, is nutrient availability. Duckweeds tend to be associated with fertile, even eutrophic conditions. They can be spread by waterfowl and small mammals, transported inadvertently on their feet and bodies, as well as by moving water. In water bodies with constant currents or overflow, the plants are carried down the water channels and do not proliferate greatly. In some locations, a cyclical pattern driven by weather patterns exists in which the plants proliferate greatly during low water-flow periods, then are carried away as rainy periods ensue.

Duckweed is an important high-protein food source for waterfowl and also is eaten by humans in some parts of Southeast Asia. As it contains more protein than soybeans, it is sometimes cited as a significant potential food source. The tiny plants provide cover for fry of many aquatic species. The plants are used as shelter by pond water species such as

bullfrogs and fish such as bluegills. They also provide shade and, although frequently confused with them, can reduce certain light-generated growths of photoautotrophic algae.

The plants can provide nitrate removal, if cropped, and the duckweeds are important in the process of bioremediation because they grow rapidly, absorbing excess mineral nutrients, particularly nitrogen and phosphates. For these reasons, they are touted as water purifiers of untapped value.

The Swiss Department of Water and Sanitation in Developing Countries, associated with the Swiss Federal Institute for Environmental Science and Technology, asserts that as well as the food and agricultural values, duckweed also may be used for wastewater treatment to capture toxins and for odor control, and that if a mat of duckweed is maintained during harvesting for removal of the toxins captured thereby, it prevents the development of algae and controls the breeding of mosquitoes. The same publication provides an extensive list of references for many duckweed-related topics.

These plants also may play a role in conservation of water because a cover of duckweed will reduce evaporation of water when compared to the rate of a similarly sized water body with a clear surface.

Despite these benefits, however, because duckweed prefers high-nutrient wetland environments, they are seen as an invasive species when conditions allow them to proliferate in environments that are traditionally low in nutrients. This is the case within the Everglades, where surface runoff and agricultural pollution have introduced increased levels of nutrients into an otherwise low-nutrient system, allowing invasive species such as duckweed to establish themselves, spread, and displace native species such as sawgrass.

Limitations:

Some limitations exist for plant control measures on Cane River Lake as noted below. The majority of limitations listed are based upon water level, specifically the maintenance of a sufficient level (near pool stage) to satisfy user groups and maintenance of water quality.

No significant physical or water quality limitations on control measures exist at Cane River Lake. Regulatory and public factors include:

There is significant shoreline development in the form of residences and businesses. Several historic sites are located along the lake including plantation homes, Fort St. Jean Baptiste, and Oakland Plantation.

Cane River Lake serves as a focal point for tourism in Natchitoches Parish. The lake is the center piece of the downtown area of the City of Natchitoches. The downtown area of the lake is the site of an annual fireworks shows, events, and festivals.

Riparian Owners, anglers and boaters support plant control measures but desire water levels and water quality to remain high.

In 2010, The Cane River Waterway Commission, under the supervision of Louisiana Department of Wildlife and Fisheries treated 63 acres of coontail (*Ceratophyllum demersum*) and spadderdock (*Nuphar luteum*) in the upper end of the lake with Aquathol K at a rate of 10 gallons per surface acre. The treatment method used was injection of liquid Aquathol K. The herbicide was provided by the Commission at a cost of $46,000.00 and applied by LDWF and Commission employees.

In 2011, The Cane River Waterway Commission, under the supervision of Louisiana Department of Wildlife and Fisheries treated 60.6 acres of hydrilla (*Hydrilla veticillata*)/ coontail (Ceratophyllum demersum) from Vienna Bend south to Pratt's Bridge of Cane River Lake. The treatment method used was injection of liquid Aquathol K at a rate of 15 gallons per surface acre. The herbicide was provided by the Commission at a cost of $160,000.00 and applied by LDWF and Commission employees.

In 2013, The Cane River Waterway Commission, under the supervision of Louisiana Department of Wildlife and Fisheries treated 17miles of hydrilla (*Hydrilla veticillata*)/ coontail (Ceratophyllum demersum) from Shell Beach Bridge south to Spillway. The treatment method used was injection of liquid Aquathol K. The herbicide was provided by the Commission at a cost of $325,000.00 and applied by LDWF and Commission employees.

Treatment Plans are scheduled for spring of 2018 to control coontail (Ceratophyllum demersum) overgrowth. Treatment area is projected from Orchard Run south to Pratts Bridge. The budgeted cost for this project is $400,000.00.

The Cane River Waterway Commission, Commission Administrator, is certified through Louisiana Department of Agriculture & Forestry in Aquatic Control.

The Commission uses aquatic use chemicals to treat the waterway. There are many choices for chemical use on the waterway, however the Commission is very selective taking into consideration riparian owners and agricultural properties. They strive to maximize the plant kill ratio and diligently work to control chemical drift. The Commission works with riparian owners in an effort to meet the desires for property use as it relates to chemical treatments. This service is free of charge. Weather plays an important role in vegetation control. The biggest vegetation challenge is to balance the control measures between riparian owner desire, aquatic life, and recreational needs. The Commission uses the following chemicals to treat the waterway: Dipotassium Endothal, Oxabicyclo Heptane, Dicarboxylic Acid, Diquat Dibromide, Flumioxazin, Glyphosate, Elemental Copper, Pyridinecarboxylic acid, Methoxymethyl, Imazamox.

Herbicide treatments are coordinated between the Cane River Waterway Commission and Louisiana Department of Wildlife and Fisheries to avoid potential conflicts concerning post treatment water usage. All submerge chemical treatments require the Cane River Waterway Commission and the Louisiana Department of Wildlife and Fisheries authorization, with the Louisiana Department of Wildlife and Fisheries providing the strategic parameters "mapping" and supervision to ensure the protective measures of water quality, aquatic life, and public safety. Chemical treatment plans must consider water chemistry near the Natchitoches Federal Fish Hatchery and irrigation water intakes. Riparian Owners are not permitted to treat the waterway.

The Commission treats the waterway as needed for unwanted/overgrowth vegetation. Spring is the beginning of plant growth, and when submerge vegetation treatments occur. Fall is the shoreline maintenance treatment time for the waterway. The Commission is closely monitoring giant salvainia in an effort to maintain a healthy, navigable waterway. It is in every body of water and has a devastating effect. It is transported by boat trailers, and high water events.
The Cane River Waterway Commission and Louisiana Department of Wildlife and Fisheries are working to prevent the vegetation intrusion by way of canals and drainage ditches leading to Cane River lake. Use of booms, submerge "full waterbody" treatments, and chemical contract treatments are in the current plan.

The control measures currently in place are meeting the needs of Cane River Lake.

The Cane River Waterway Commissions Vegetation Control Plan parallels the Louisiana Department of Wildlife and Fisheries Plan. The Commission and Louisiana Wildlife and Fisheries work well together. The Commission recognizes the vital role both agencies play that provides for enjoyment of public use.