LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES SECTION

WATERBODY MANAGEMENT PLAN PART B

AMITE RIVER, LOUISIANA

WATERBODY EVALUATION &
RECOMMENDATIONS 2023

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED EVERY THREE YEARS

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TABLE OF CONTENTS

WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational
Recreational fish species are managed to maintain sustainable populations while providing anglers the opportunity to catch or harvest numbers of fish.

Commercial
Commercial fish species are managed to provide sustainable populations.

Species of Greatest Conservation Need
Species of special concern are managed toward viable, self-sustaining populations.

EXISTING HARVEST REGULATIONS

Recreational
All statewide regulations apply to game fish species, see link below:
https://www.wlf.louisiana.gov/page/seasons-and-regulations

Commercial
All statewide regulations apply to commercial fish species, see link below:
https://www.wlf.louisiana.gov/page/seasons-and-regulations

Species of Greatest Conservation Need
Paddlefish (*Polyodon spathula*) 30" max lower jaw fork length, 2 fish daily limit, fish cannot be retained alive; fish cannot be harvested by snagging methods. Pallid Sturgeon (*Scaphirhynchus albus*), Shovelnose Sturgeon (*Scaphirhynchus platorynchus*), and Gulf Sturgeon (*Acipenser oxyrinchus desotoi*); no legal harvest or possession.
https://www.wlf.louisiana.gov/page/seasons-and-regulations

SPECIES EVALUATION

Recreational
Largemouth Bass (*Micropterus nigricans*) are targeted for evaluation since they are a species indicative of the overall fish population due to their high position in the food chain and because they are highly sought after by anglers. Electrofishing is the best indicator of Largemouth Bass abundance and size distribution, with the exception of large fish.

Largemouth Bass Catch Per Unit Effort and Structural Indices
Spring electrofishing results indicate considerable variability of catch-per-unit-effort (CPUE) of Largemouth Bass following Hurricanes Katrina, Gustav, and Isaac in 2005, 2008, and 2012,

respectively (Figure 1). The storms created unfavorable water quality conditions, such as low dissolved oxygen, that resulted in major fish kills. In the second year following Hurricane Gustav, 2010, the mean total CPUE for Largemouth Bass rebounded to nearly 120 fish per hour. A similar rebound was observed in the second year following Hurricane Isaac, 2014, with a mean total CPUE of nearly 100 fish per hour. As years passed without major fish kills induced by tropical weather events, mean CPUE of Largemouth Bass stabilized and demonstrated consistency over the course of several years (2018-2020) (Figure 1). In 2014, the mean total CPUE consisted primarily of sub-stock-size fish, whereas in 2018, 2019, & 2020 after several years without impacts from tropical weather systems, the total CPUE included a higher number of stock-, quality-, and preferred- sized fish (Figure 2). However, in August of 2021, a hurricane once again resulted in widespread and devastating fish kills across the Lake Maurepas watershed. Of note is that in the spring of 2023, CPUE of sub-stock size (less than 8") Largemouth Bass was at an all-time high (150 bass/hr), signaling that a successful spawn transpired in the spring of 2022. This indicates that natural recovery is already ongoing, as is typical in years immediately following tropical weather system induced fish kills.

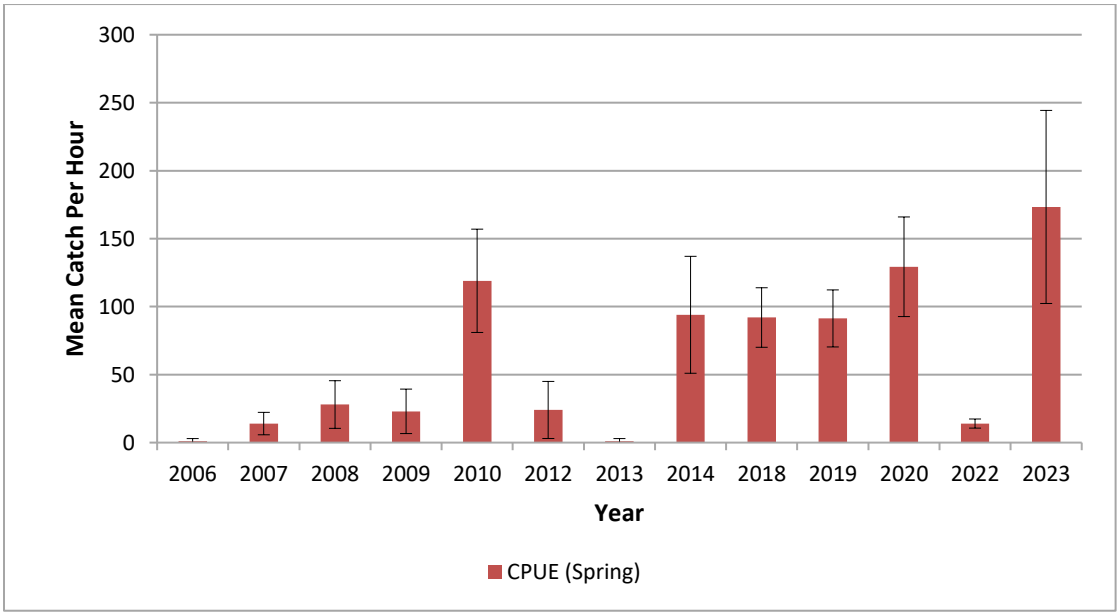

Figure 1. The mean CPUE number per hour for Largemouth Bass from Amite River, LA, in spring electrofishing results from 2006 to 2023. Error bars represent 95% confidence limits of the mean CPUE.

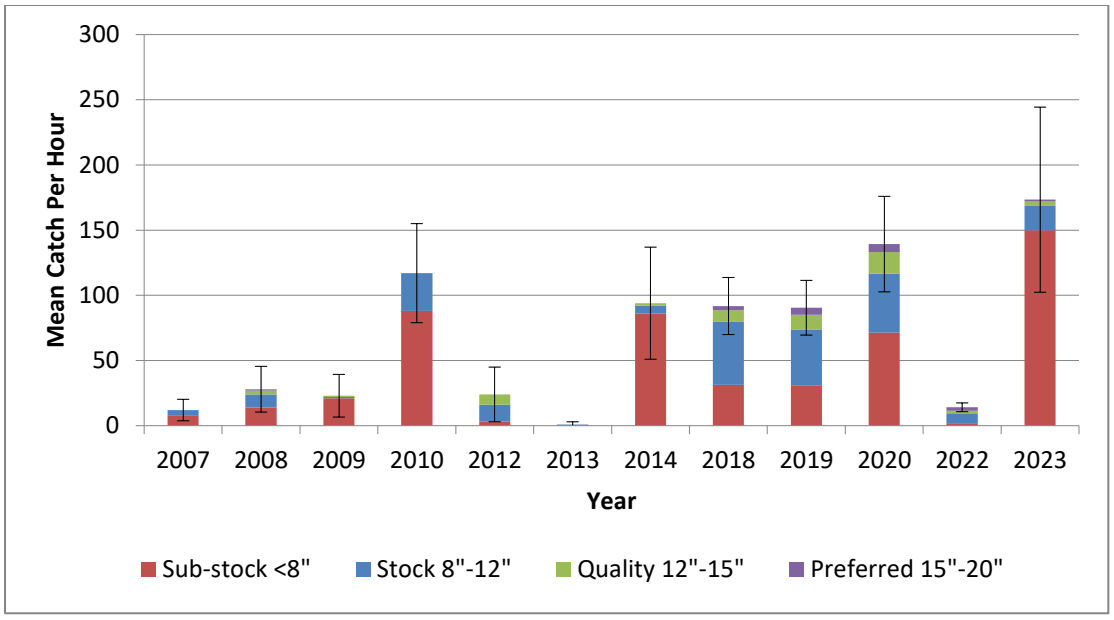

Figure 2. The mean CPUE for sub-stock- (<8"), stock- (8"-12"), quality- (12"-15") and preferred-size (15"-20") Largemouth Bass from the Amite River, LA for spring electrofishing results from 2007 to 2022. Error bars represent 95% confidence limits of the mean total CPUE.

Proportional stock density (PSD) and relative stock density (RSD) are indices used to numerically describe length-frequency data. Proportional stock density compares the number of fish of quality-size (greater than 12 inches for Largemouth Bass) to the number of bass of stock-size (8 inches in length). The PSD is expressed as a percent. A fish population with a high PSD consists mainly of larger individuals, whereas a population with a low PSD consists mainly of smaller fish. For example, Figure 3 below indicates a PSD of 50 for 2009. The number indicates that 50% of the bass stock (fish over 8 inches) in the sample was at least 12 inches or longer.

$$PSD = \frac{\text{Number of bass>12 inches}}{\text{Number of bass>8 inches}} \text{ x100}$$

Relative stock density -preferred (RSD_p) is the proportion of Largemouth Bass in a stock (fish over 8 inches) that are 15 inches (preferred-size) or longer.

$$RSD_p = \frac{\text{Number of bass>15 inches}}{\text{Number of bass>8 inches}} \text{ x100}$$

Although there was an increase in the overall mean CPUE in 2010, the size-structure indices for Largemouth Bass decreased in both the proportion of quality-size and preferred-size fish. However, in 2018, 2019 & 2020, overall mean CPUE exceeded long-term averages, and an increase was observed in both the proportion of quality- and preferred-size fish (Figure 3).

These increases can be attributed to a span of several years of stable habitat and water quality conditions in the absence of impacts from tropical weather events. The size distribution comparison (length frequencies) from 2010 through 2020 for spring electrofishing results show that the post-storm recovery years of 2010 and 2014 were dominated by sub-stock size fish, and as years passed without major fish kills, increased numbers of Largemouth Bass were able to reach larger size classes (Figure 4).

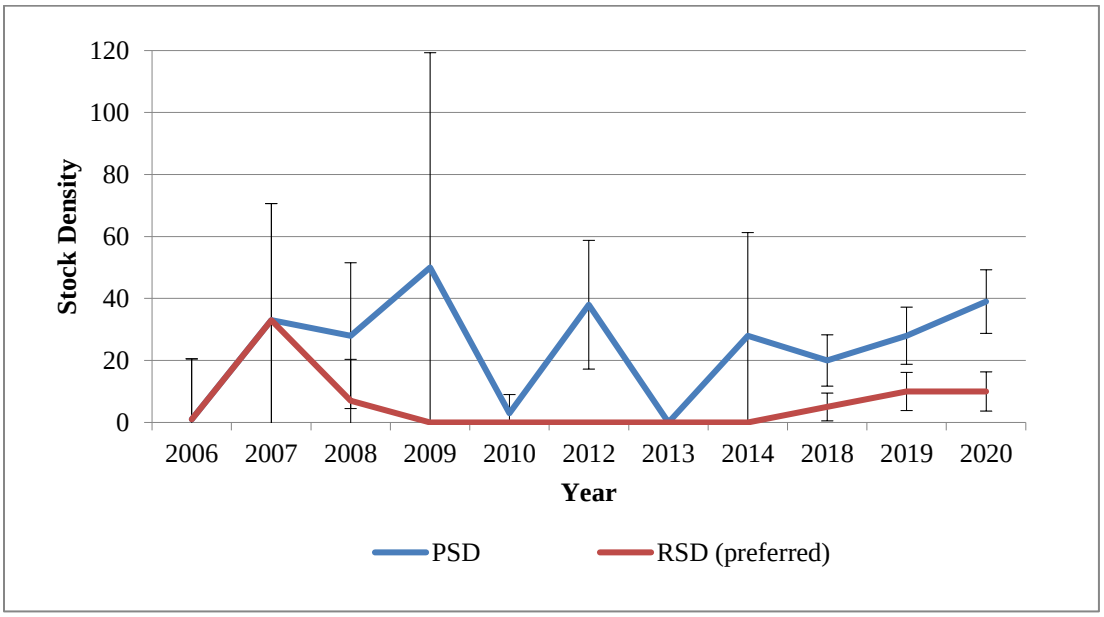

Figure 3. The mean size-structure indices (PSD and RSDp) for Largemouth Bass from Amite River, LA, for spring electrofishing results from 2006 to 2020. Error bars represent 95% confidence limits of the mean size-structure indices.

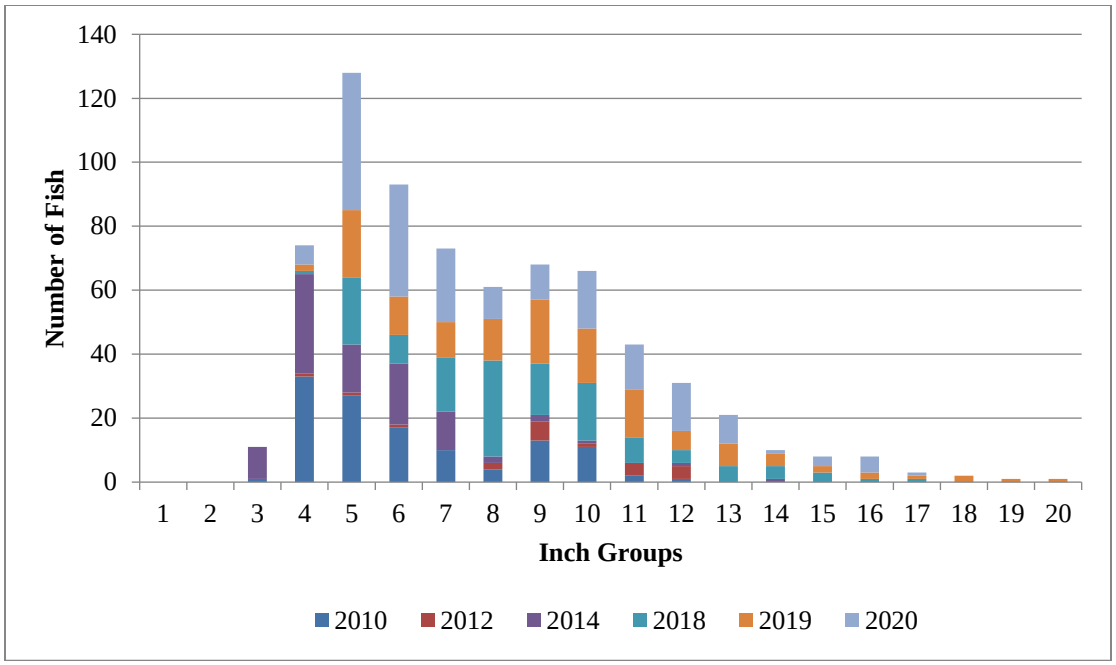

Figure 4. The size distribution (length frequencies) for Largemouth Bass on Amite River, LA, from spring electrofishing results for 2010 to 2020. Values for n by year: n=119 (2010), n=20 (2012), n=94 (2014), n=138 (2018), n=137 (2019), n=194 (2020).

Largemouth Bass Stocking and Genetics

Over 780,000 Florida Bass (*M. salmoides*) have been stocked into the Amite River since 1996 (Table 1). A majority of these fish were stocked post-Hurricanes Katrina and Gustav in response to public concern regarding extensive fish kills that occurred following these storms. In the post-storm absence of predation and competition, the Florida Largemouth Bass should have become dominant in this coastal river, when in fact this species did not become established. Genetic testing conducted in 2010 indicated that less than 10% of the Florida genome was present in the sample results (Table 2). Additionally, higher CPUE's in 2010 (Figures 1 and 2), along with the genetic results, indicate that the remaining native Largemouth Bass population, although greatly reduced from pre-storm levels, recovered robustly and that any stocking efforts were unnecessary. The stocking of Florida Bass in the adjacent Blind and Tickfaw rivers showed a similar fate; the ineffectiveness to establish this genotype during post hurricane recovery. This tenacity for recovery of native Largemouth Bass populations has also been noted in other coastal river systems including the Calcasieu, Mermentau, and Sabine rivers in southwest Louisiana following hurricanes Rita (2005) and Ike (2008). These systems received little to no stockings of Largemouth Bass before and after the hurricane related fish kills, yet yielded record CPUE's two years into recovery. These observations suggest that native coastal populations of Largemouth Bass (and other indigenous fish species) have adapted to these periodic storm events and rapid recovery is part of the natural selection process.

Table 1. Florida Bass stockings into Amite River, LA from 1996 – 2010.

FLORIDA LMB STOCKING	
Year	Number of Fish
1996	17,371
1997	23,750
1999	16,772
2000	13,965
2001	10,000
2002	10,546
2003	10,036
2004	10,013
2005	10,059
2006	171,299
2007	175,695
2008	120,703
2009	186,419
2010	3,680
TOTAL	780,308

Table 2. Results of 2010, 2018, 2019, & 2020 genetic testing for the Florida genome in Largemouth Bass from Amite River, LA.

Year	Number of fish	% Northern	% Hybrid	% Florida
2010	151	91	7	0
2018	98	86	14	0
2019	17	88	12	0
2020	31	87	13	0

Recreational / Other Species

Crappie and Sunfish

Black and White Crappies (*Pomoxis nigromaculatus and P. annularis*) have both been observed but not monitored in the river, as well as Bluegill, Redear, Redspotted, Warmouth and Longear sunfishes (*Lepomis macrochirus*, *L. microlophus*, *L. miniatus*, *L. gulosus*, and *L. megalotis*, respectively).

Forage

Forage availability is typically measured directly through electrofishing and shoreline seine sampling and indirectly through measurement of Largemouth Bass body condition or relative weight. Relative weight (Wr) is the ratio of a fish's weight to the weight of a ''standard'' fish of the same length. The index is calculated by dividing the weight of a fish by the standard weight for its length, and multiplying the quotient by 100. Largemouth Bass Wr below 80 indicate a potential problem with forage availability. Relative weights of Largemouth Bass caught in the Amite River ranged from 91 to 100 from 2018 to 2020 for all stock length-size

and larger fish, indicating an adequate forage base (Figure 5). This high Wr suggests that there is ample forage available for bass production.

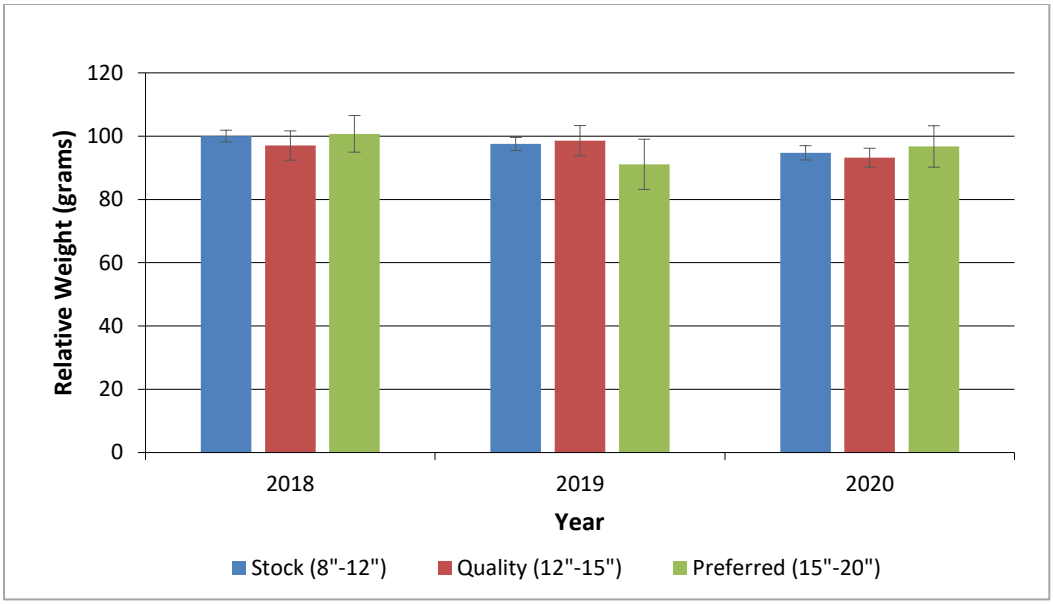

Figure 5. The mean relative weights for stock-, quality-, and preferred- size Largemouth Bass collected from Amite River, LA, in fall electrofishing samples from 2018 to 2020. Error bars represent 95% confidence limits of the mean relative weights.

Electrofishing samples from fall 2013 through 2020 showed that the available forage was Bluegill, Longear, Redear, Redspotted and Warmouth Sunfishes, along with Inland Silversides (*Menidia beryllina*), Striped Mullet (*Mugil cephalus*), and Blackstripe Topminnows (*Fundulus notatus*) (Figure 7).

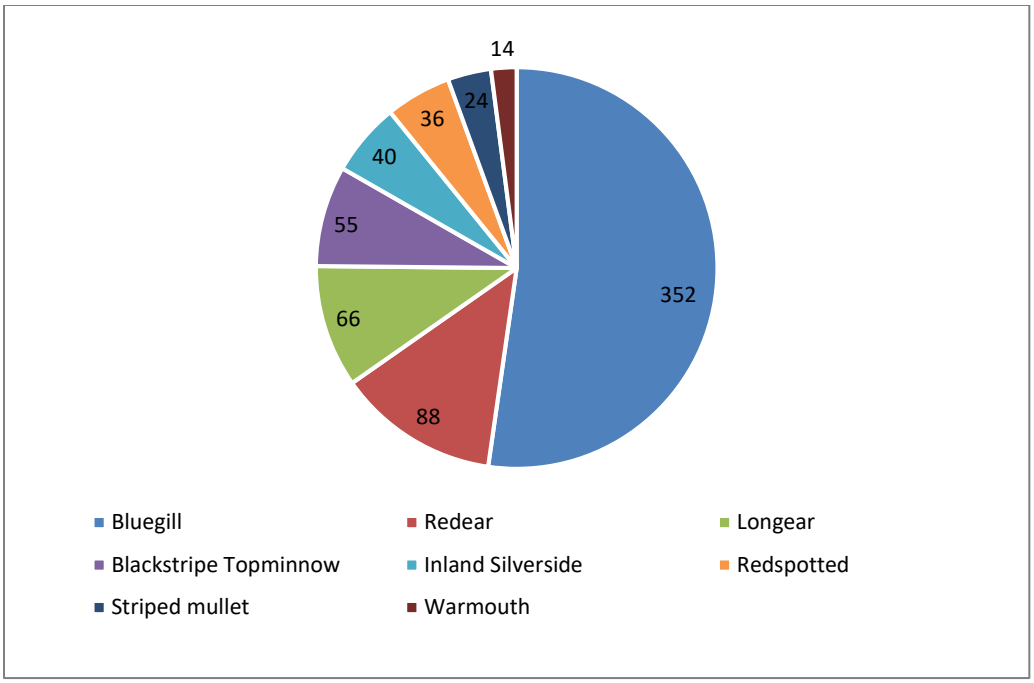

Figure 7. The mean CPUE for forage fish by species for Amite River, LA, from fall electrofishing results from 2013 to 2020.

Aquatic Invasive Species

Though their population has not been monitored, Common Carp (*Cyprinus carpio*) are commonly observed in the river.

In early summer of 2012, two adult Silver Carp (*Hypophthalmichthys molitrix*) were observed in the river. An adult Silver Carp was also observed in late summer of 2013. These fish may have been introduced via the Bonnet Carré Spillway operation by the US Army Corps of Engineers during the 2011 Mississippi River flood event. To date, no juveniles have been observed. Sampling efforts took place in summer of 2013, 2014, 2019 and 2022 to determine if Asian carp are reproducing in the watershed. Samples to date have yielded no Asian carp larvae in the Lake Maurepas watershed.

In winter 2012, following Hurricane Isaac, a commercial fisherman caught a Plecostomus (*Hypostomus plecostomus*) measuring over ten inches in length in a hoop net.

The invasive apple snail (*Pomacea maculata*) has been documented in the New River Canal, a discharge canal that empties into the Petite Amite River. Infestations of the snail have been reported throughout the lower Amite River from Port Vincent to Lake Maurepas.

HABITAT EVALUATION

Aquatic Vegetation

Nuisance Species

Common salvinia (*Salvinia minima*) and water hyacinth (*Pontederia crassipes*) have been the main source of access and habitat complaints over the past several years. Floating aquatic vegetation is scattered throughout the basin and is consistently restocked by draining swamps and bayous. Within the river system, the desire to own/sell waterfront property has led to the construction of numerous man-made canals over the past 4 decades. These canals are typically 50 to 200 feet wide, dead-end offshoots of the main river channel. The canals are lined with houses, camps, boat slips, docks, and an occasional boat ramp. The canal systems are rarely designed so that river water can flow through unimpeded (i.e. horseshoe in shape, etc.). Consequently, these dead-end canals have no inherent "flushing" mechanism to remove floating vegetation. Invariably, some form of aquatic vegetation makes its way into these canals each year is stranded due to the stagnant water conditions, and thrives. When the undesirable vegetation in these canals has reached unacceptable levels, shoreline property owners call LDWF to complain.

Coverage

Estimates of vegetation coverage (as of February 2, 2023) are provided below:
Problematic Species -
Common Salvinia (*Salvinia minima)* – 15 acres
Water Hyacinth (*Pontederia crassipes)* – 25 acres
Duckweed (*Lemna spp.)* – 15 acres
Duck Lettuce (*Ottelia alismoides*) – 50 acres
Crested Floating Heart (*Nymphoides cristata*) – 2 acres

Beneficial Species -
Yellow Water Lily (*Nuphar lutea)* – 100 acres
Coontail (*Ceratophyllum demersum)* – 500 acres

Biological Control

Salvinia weevils were stocked in the adjacent Blind River area in 2008, and will continue to be stocked as necessary and as they become available. Shortly after the initial stocking, Hurricane Gustav impacted the region and flooded the small slough where our weevil enclosure was located. The flood waters widely dispersed the very small concentration of weevils, inhibiting the ability for them to colonize the area. A site visit was made in 2009, samples were taken, and weevils were not found in samples pulled from the immediate or surrounding area. In late 2013, salvinia weevils living on common salvinia were again introduced into the Blind River area. Follow-up site visits have indicated that weevils are reproducing and spreading in the stocked area. Weevils have been, and will continue to be, stocked as they become available.

Chemical Control

A total of 886 acres of nuisance aquatic vegetation has been treated over the last four years by department personnel (Table 3).

Table 3. Herbicide treatments in Amite River, Louisiana 2019-2022.

AMITE RIVER HERBICIDE TREATMENTS						
SPECIES	Herbicides*	Application rates	Acres Treated			
			2019	2020	2021	2022
Water hyacinth	2,4-D	0.5 gal/acre	330	313	115	4
	Glyphosate	0.75 gal/acre				
Common salvinia	Glyphosate/Diquat mixture	0.75 & 0.25 gal/acre	33	15	5	15
	Diquat	0.75 gal/acre				
Other	Glyphosate/Diquat mixture	0.75 gal/acre	16	18	17	5
	2,4-D	0.5 gal/acre				

*All foliar herbicide applications included surfactant at a rate of 0.25 gal/acre, except for 2,4-D which includes a non-ionic surfactant at a rate of 0.125 gal/acre.

Limitations

During high water periods within this river complex, floating vegetation floods into the surrounding swamps where it flourishes. LDWF spray crews are unable to access these areas due to dense timber and shallow water. Consequently, floating vegetation is transported from the swamp into the river when water levels drop.

Water Quality

In 2010, the EPA listed Amite River as an impaired river due to mercury, fecal coliform, dissolved oxygen levels, nitrate/nitrite, phosphorus, chloride and other dissolved solids. This listing was updated in 2022, and large segments of the river are labelled as not supporting the river's designated use for fish and wildlife propagation, as well as primary contact recreation. https://mywaterway.epa.gov/

Substrate

Sandy river bottoms, high in inorganic material.

CONDITION IMBALANCE / PROBLEM

1. Agricultural and urban development in the watershed has resulted in water quality impairment via contaminated runoff.

2. Channel modification and the creation of spoil banks have disconnected much of the surrounding swamp from the river system. As a result, there has been alteration in the natural hydrology, wetland degradation and loss, tree mortality, saltwater intrusion, swamp impoundment, reduced swamp access to aquatic life, and swamp subsidence.

3. Sand and gravel mining in the river has led to vegetation loss, bank instability and increased turbidity and sedimentation. Extensively mined reaches of the river have geomorphically changed from a meandering to a braided stream that is wide and shallow and void of riffle/pool complexes.

4. Amite River is very susceptible to major fish kills, especially in the event of a tropical storm or hurricane.

5. Nuisance aquatic vegetation impedes navigation and degrades habitat.

6. Shredded tires have been permitted to be deposited in the floodplain/sandbars of the Amite as bank stabilization. Tire pieces have been observed up to 13 miles downstream from the deposition site, and pose a threat to aquatic health.

CORRECTIVE ACTION NEEDED

1. Practice of BMPs to reduce contaminants entering the river, thus improving water quality.

2. Restore the hydrology between the river and the adjacent swamp.

3. Restoration of reaches of the river that have been subject to mining activity.

4. Identify, protect, and restore critical fisheries habitat in the watershed.

5. Control nuisance aquatic vegetation in the system and upstream at its source.

RECOMMENDATIONS

1. Work with landowners and other agencies to implement BMPs.

2. Continue to work with land owners and other agencies on projects to restore the hydrology between the river and the adjacent swamp

3. Work with the mining industry and other agencies on projects to restore reaches of the river that have been subject to mining activity.

4. Continue to support large-scale habitat and watershed improvement projects.

5. This area will be assessed monthly during the growing season for nuisance aquatic plant infestations. Public complaints will receive a timely response. Problem areas will be treated as they arise with foliar applications in accordance with the approved LDWF Aquatic Herbicide Application Procedures (Table 4).

6. Work with DEQ to rewrite shredded tire beneficial use rules to not allow deposition in floodplains, river banks, and river bottoms.

Table 4. LDWF Aquatic Herbicide Application Procedures.

Plant Species	**Herbicide**	**Surfactant**
Common/Giant Salvinia (April 1 to October 31)	Glyphosate (0.75 gal/acre) + Diquat (0.25 gal/acre) or Clipper (2 oz./acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
Common/Giant Salvinia (November 1 to March 31)	Diquat (0.75 gal/acre)	Nonionic surfactant (0.25 gal/acre)
Water Hyacinth	2, 4-D (0.5 gal/acre)	Nonionic surfactant (1 pint/acre)
Water Hyacinth in waiver areas (March 15 to September 15)	Glyphosate (0.75 gal/acre)	Nonionic surfactant (0.25 gal/acre)
Alligator Weed (undeveloped areas)	Imazapyr (0.5 gal/acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
Alligator Weed (developed areas)	Imazamox (0.5 gal/acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
American Lotus	2, 4-D (0.5 gal/acre)	Nonionic surfactant (1 pint/acre)
American Lotus in waiver areas (March 15 to September 15)	Glyphosate (0.5 gal/acre)	Nonionic surfactant (0.25 gal/acre)
American Lotus in waiver areas with potable water intakes (March 15 to September 15)	Triclopyr (0.5gal/acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
Duckweed	Diquat (1.0 gal/acre)	Nonionic surfactant (0.25 gal/acre)
Cuban Bulrush (*Oxycaryum cubense*)(sedge)	2, 4-D (0.5 gal/acre)	Nonionic surfactant (1 pint/acre)
Cuban Bulrush (sedge) in waiver areas (March 15 to September 15)	Glyphosate (0.75 gal/acre)	Nonionic surfactant (0.25 gal/acre)
Water Lettuce (*Pistia stratiotes*)	Diquat (1.0 gal/acre)	Nonionic surfactant (0.25 gal/acre)