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OFFICE OF FISHERIES
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WATERBODY MANAGEMENT PLAN SERIES

PEARL RIVER BASIN

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

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December 2012 - Prepared by
Tim Ruth Biologist Manager, District 8

August 2013 – Updated by
Tim Ruth Biologist Manager, District 8

December 2014 – Updated By:
Gary Vitrano, Biologist Manager, District 8

August 2015 – Updated By:
Gary Vitrano, Biologist Manager, District 8

August 2020 – Updated By:
Gary Vitrano, Biologist Manager, District 8
Matthew Duplessis, Biologist Supervisor, District 8
Jonathan Winslow, Biologist III, District 8

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TABLE OF CONTENTS

WATERBODY EVALUATION	4
STRATEGY STATEMENT	4
<i>Recreational</i>	<i>4</i>
<i>Commercial</i>	<i>4</i>
<i>Species of Greatest Conservation Need</i>	<i>4</i>
EXISTING HARVEST REGULATIONS	4
<i>Recreational Fishing Regulations</i>	<i>4</i>
<i>Commercial Fishing Regulations</i>	<i>4</i>
<i>Species of Greatest Conservation Need</i>	<i>4</i>
SPECIES EVALUATION	4
<i>Recreational</i>	<i>4</i>
<i>Fish Assemblages in the Main Stem of the Pearl River and Bogue Chitto</i>	<i>10</i>
<i>Freshwater Mussel Assemblages</i>	<i>14</i>
<i>Commercial</i>	<i>16</i>
<i>Species of Greatest Conservation Need</i>	<i>16</i>
HABITAT EVALUATION	16
SPECIAL PROJECTS	17
CONDITION IMBALANCE / PROBLEM	18
CORRECTIVE ACTION NEEDED	18
RECOMMENDATIONS	19
LITERATURE CITED	21
APPENDIX I	22
APPENDIX II	32
APPENDIX III	34

WATERBODY EVALUATION

STRATEGY STATEMENT

Recreational

Sportfish species such as largemouth bass are managed to maintain a sustainable population while providing anglers the opportunity to catch or harvest numbers of fish to maintain angler interest and efforts.

Commercial

Commercial species are managed with statewide regulations to provide an optimum sustainable yield that does not contribute to declines in future population strength.

Species of Greatest Conservation Need

Species of Greatest Conservation Need are managed to protect the current population and to provide for a sustainable population.

EXISTING HARVEST REGULATIONS

Recreational Fishing Regulations

Statewide regulations are in effect for all fish species and may be viewed at the link below: <https://www.wlf.louisiana.gov/subhome/recreational-fishing>

Commercial Fishing Regulations

Statewide regulations are in effect for all species. Commercial fishing regulations may be viewed at the link below:

<https://www.wlf.louisiana.gov/subhome/commercial-fishing>

Louisiana Revised Statute RS 56:404 prohibits the use of seines, nets, or webbing in the Bogue Chitto River; logging and hand grabbing of fish in the Bogue Chitto River is also prohibited.

Species of Greatest Conservation Need

Louisiana prohibited the take of all sturgeon in 1991. Critical habitat was established in the Pearl River Basin (PRB) for the Gulf sturgeon in 2003. It is also illegal in Louisiana to possess a threatened or endangered species.

SPECIES EVALUATION

Recreational

Largemouth Bass Relative Abundance, Structural Indices and Relative Weight

Largemouth Bass (LMB) occur throughout the PRB. However, the species is most abundant and most targeted by anglers in the lower portion of the river. Analysis of LMB data will concentrate on samples collected by LDWF in the East / Middle / West Middle / West Pearl River (LDEQ water body codes 090207, 090202, & 090102). This area is tidally influenced, and salinities can fluctuate throughout the year. Increased water levels and flow rates associated with spring flood pulses may adversely affect the efficacy of electrofishing efforts. Therefore, prior to 2018, only data from fall electrofishing samples were considered in data

analysis. Currently, data collection occurs only during summer and fall months (typically lower river levels). Frequency and location of electrofishing samples in the basin prior to 2018 were not consistent over time; therefore, accurate statistical analyses were not possible. Present data collection utilizes standardized boat electrofishing samples for LMB from nine sites in main stem navigable areas of the lower river (see Pearl River Basin MP-A Table 9).

The most recent length distributions for largemouth bass collected in the summer of 2019 in the PRB are presented in Figure 1. The LMB ranged from 1 to 18 inches total length (TL). Total catch per unit of effort (CPUE) was 48.4 fish/hr for this population which was lower than previous year (Figure 3). CPUE analyses by length category indicates a population dominated by the sub stock class (<8 inches TL) group accounting for 48% of the total population (Figure 2.). In addition, all LMB individuals < 12 inches TL accounted for 83% of the total CPUE (Figure 2.).

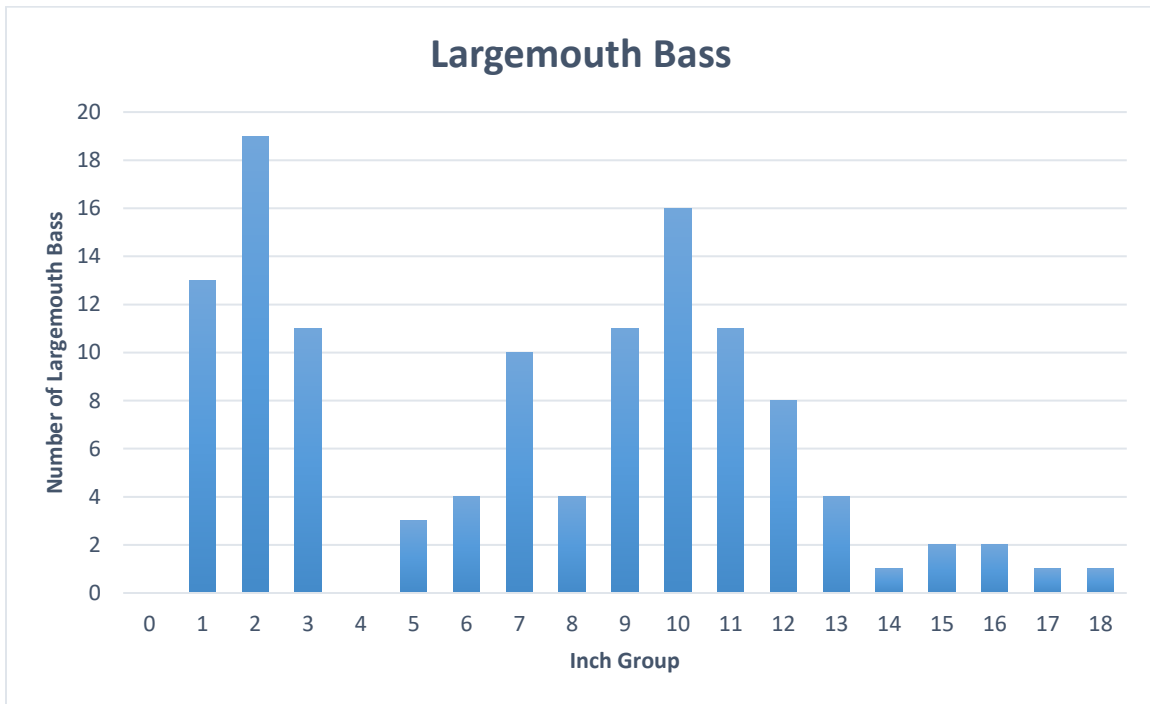


Figure 1. Size distribution by inch group of LMB collected from the PRB in the summer of 2019, n=121.

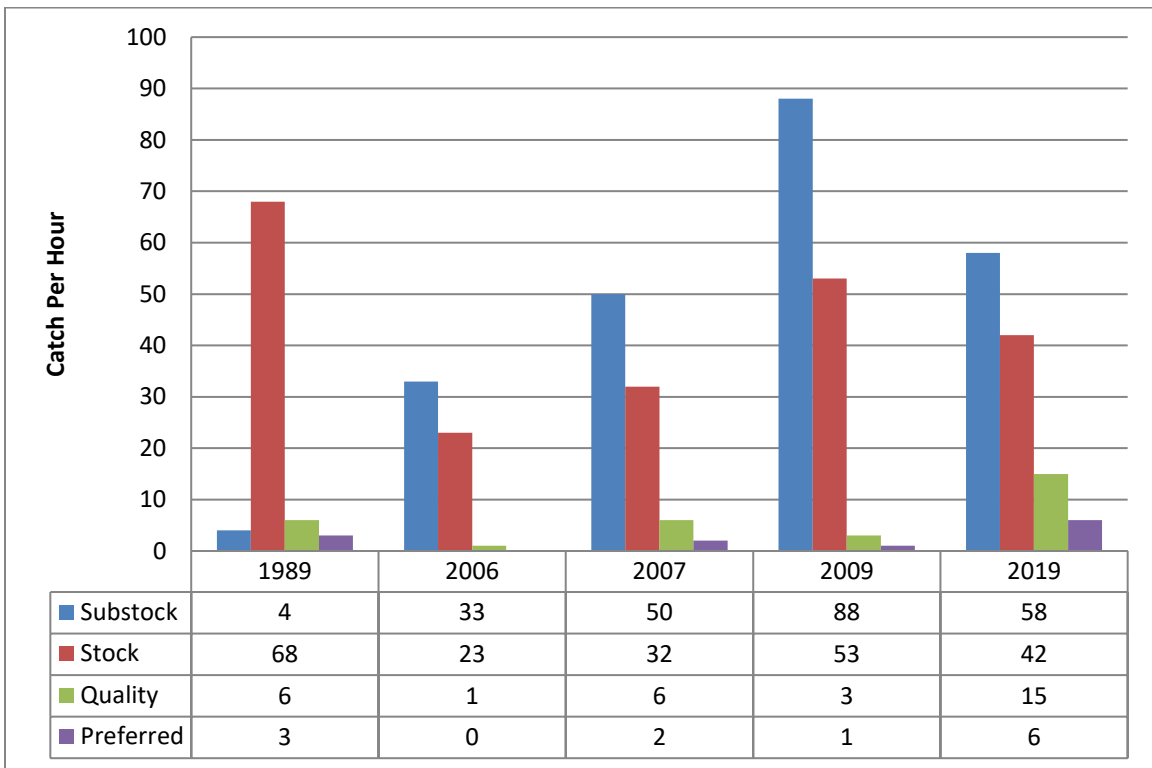


Figure 2. The CPUE of substock- (< 8 inches), stock- (8-12 inches), quality- (12 - 15 inches), and preferred-size (15 - 20 inches) largemouth bass from PRB, collected during fall and summer electrofishing efforts in 1989, 2006, 2007, 2009, and 2019.

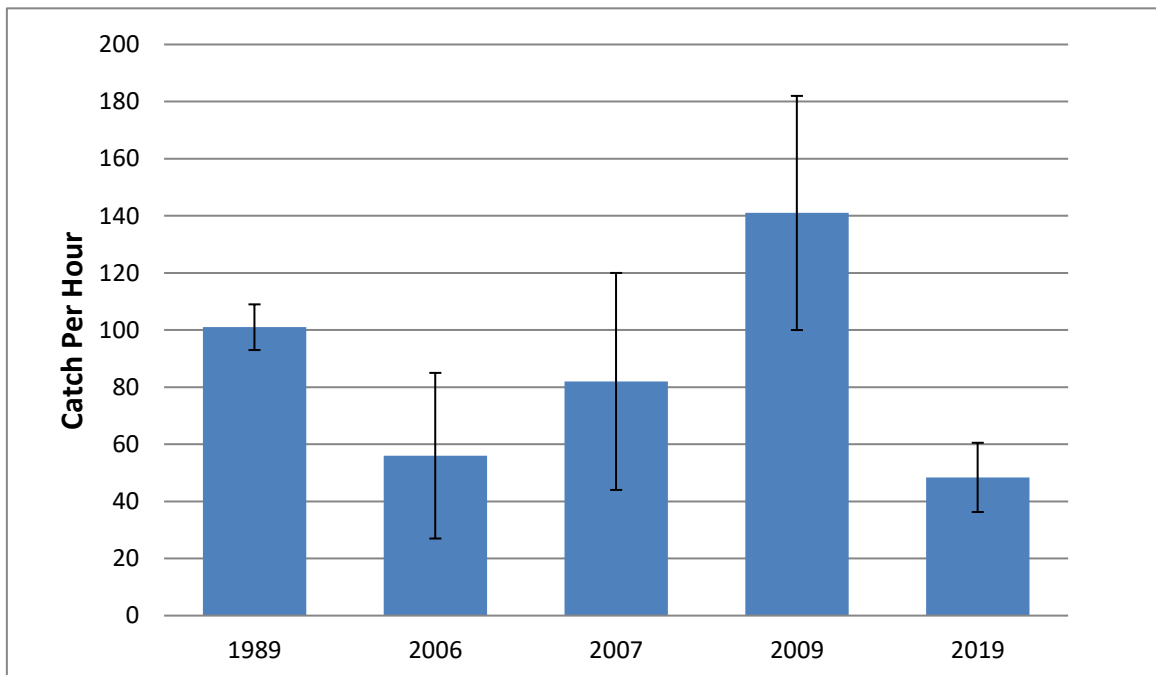


Figure 3. Mean total CPUE (\pm SE) for largemouth bass collected in the summer and fall electrofishing samples for the PRB for the years 1989, 2006, 2007, 2009 & 2019.

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.

$$\text{PSD} = \frac{\text{Number of bass} \geq 12 \text{ inches}}{\text{Number of bass} \geq 8 \text{ inches}} \times 100$$

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

$$\text{RSD}_P = \frac{\text{Number of bass} > 15 \text{ inches}}{\text{Number of bass} > 8 \text{ inches}} \times 100$$

Ideal PSD and RSD values for LMB range from 40-70 and 10-40, respectively. Figure 4 below indicates that PSD and RSD_P values for LMB in the PRB are 36 and 14 respectively.

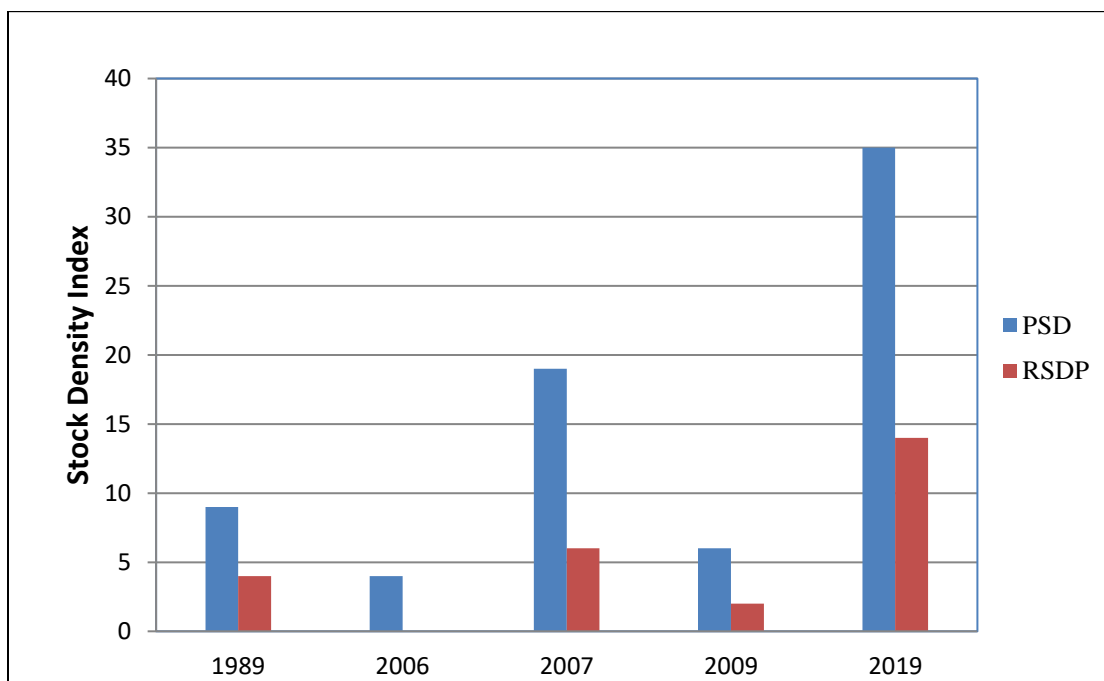


Figure 4. The PSD and RSD_P for Largemouth Bass collected in fall electrofishing samples from PRB for the years 1989, 2006, 2007, 2009, and 2019.

Spotted Bass

Spotted Bass are found throughout the PRB; however, they are predominantly found in faster flowing water, whereas LMB tend to dominate more as flow velocity decreases. In certain stretches of these river systems, it is common to encounter both species living in unison. For the purpose of analysis, only data from the main-stem of the river was utilized. The most recent

length distributions for Spotted Bass collected in the summer of 2019 in the PRB are presented in Figure 5. The Spotted Bass ranged from 1 to 15 inches total length (TL). CPUE was 14.5 for this population.

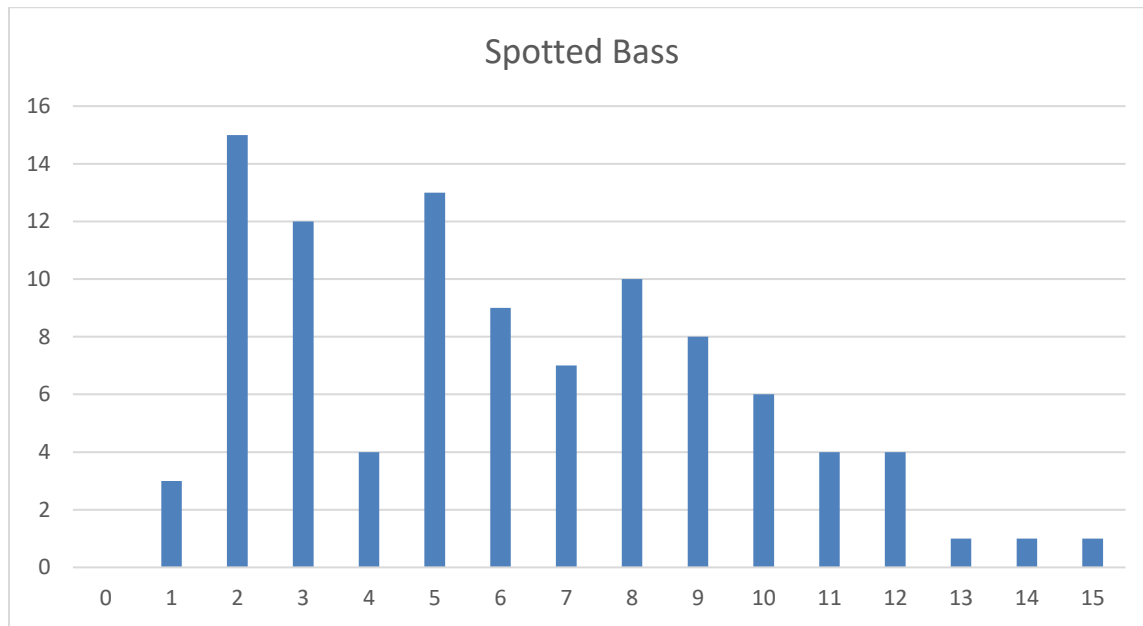


Figure 5. Size distribution by inch group of Spotted Bass collected from the main-stems of the PRB, in the summer of 2019, n=98.

Crappie

Electrofishing is not the most efficient sampling method for crappie. Lead nets are often used to determine the abundance and size structure of crappie populations. We have experimented with the placement and method of fishing lead nets to monitor the crappie population in the PRB. However, no sound method for crappie sampling within the river has been determined.

Forage

Forage abundance and availability is typically measured directly through LDWF fishery independent sampling (electrofishing and shoreline seine sampling) and indirectly through assessment of Largemouth Bass body condition (relative weight). Relative weight (W_r) 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 relative weights below 80 indicate a potential problem with forage availability. Values near 100 indicate robust body condition. Mean relative weight for stock size LMB in the PRB are acceptable (Figure 6.). LMB of stock-size length category are in good condition and forage does not appear to be a limiting factor. Forage availability can also be illustrated by the number of fish available in the habitat under 6 inches, (Figure 7. And Table 1.).

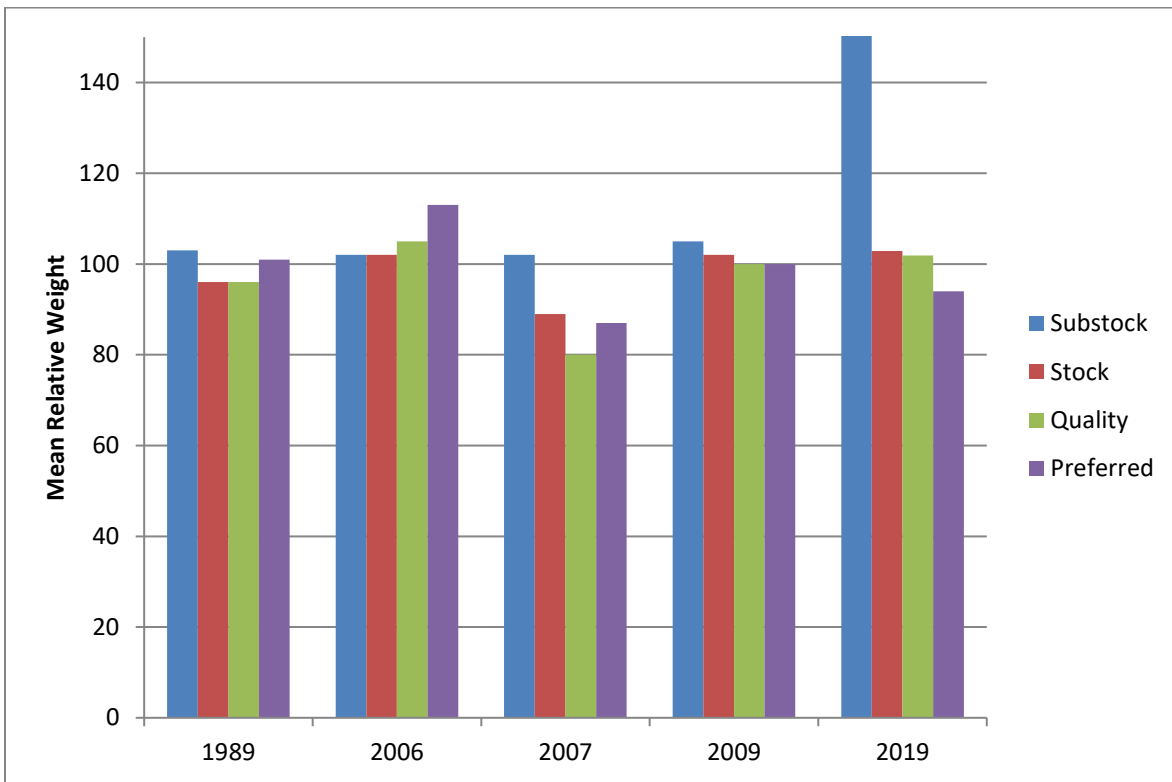


Figure 65. Mean relative weights for the various size classes of LMB collected from the PRB for the years 1989, 2006, 2007, 2009 & 2019.

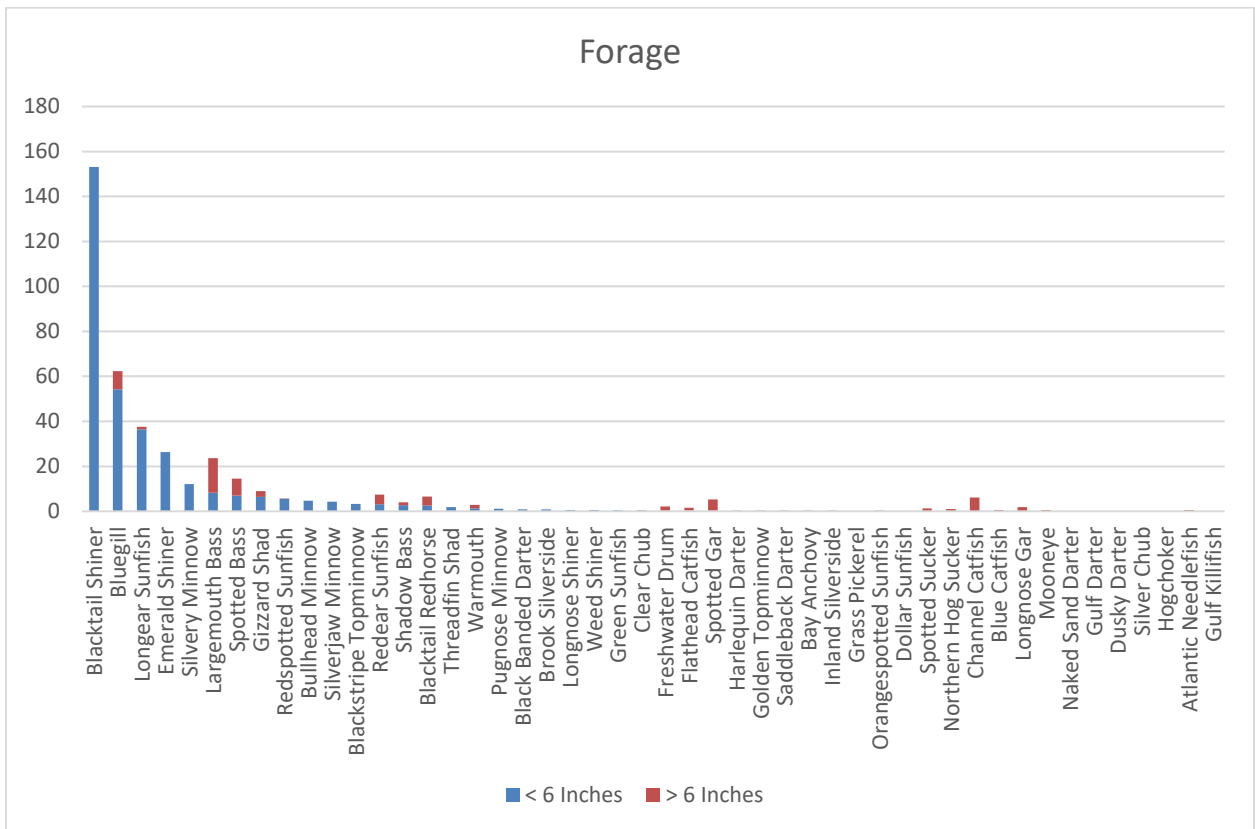


Figure 7. CPUE of fish species < 6 inches and > 6 inches collected from the PRB in 2019.

Table 1. CPUE of species ≤ 6 inches collected on the main stem of the PRB in 2019.

Species	CPUE ≤ 6 Inches	Total CPUE
Bluegill	75.2	90.4
Blacktail Shiner	27.6	27.6
Largemouth Bass	18.4	48.4
Redspotted Sunfish	12.8	13.2
Longear Sunfish	10	10
Redear Sunfish	8	19.2
Blackstripe Topminnow	6	6
Gizzard Shad	5.2	6.8
Threadfin Shad	4.4	4.4
Emerald Shiner	3.6	4.4
Silvery Minnow	3.2	3.2
Bullhead Minnow	3.2	3.2
Warmouth	2.4	6.4
Brook Silverside	2.4	2.4
Spotted Bass	1.2	3.6
Spotted Gar	0.8	7.2
Clear Chub	0.8	0.8
Pugnose Minnow	0.8	0.8
Golden Topminnow	0.8	0.8
Bay Anchovy	0.8	0.8
Inland Silverside	0.8	0.8
Grass Pickerel	0.4	0.4
Shadow Bass	0.4	0.8
Orangespotted Sunfish	0.4	0.8
Spotted Sucker	0.4	3.6
Northern Hog Sucker	0.4	0.4
Longnose Gar	0.4	2
Atlantic Needlefish	0.4	1.6
Gulf Killifish	0.4	0.4

Fish Assemblages in the Main Stem of the Pearl River and Bogue Chitto

A total of 2,852 fish were collected from the main stem of the Pearl River and the Bogue Chitto River in 2019 (Table 2). These samples represent 57 distinct species. Diversity indices on main stem sites were: 1.869 [Shannon's (H')] and 0.743 [Simpson's (1-D)].

Table 2. Species collected on the main stem of the Pearl River and the Bogue Chitto River in 2019.

Common	Scientific	Number of Species
Blacktail Shiner	<i>Cyprinella venusta</i>	1034
Bluegill	<i>Lepomis macrochirus</i>	423
Longear Sunfish	<i>Lepomis megalotis</i>	254
Emerald Shiner	<i>Notropis atherinoides</i>	182
Largemouth Bass	<i>Micropterus salmoides</i>	160
Spotted Bass	<i>Micropterus punctulatus</i>	98
Silvery Minnow	<i>Hybognathus nuchalis</i>	82
Gizzard Shad	<i>Dorosoma cepedianum</i>	61
Redear Sunfish	<i>Lepomis microlophus</i>	50
Blacktail Redhorse	<i>Moxostoma poecilurum</i>	44
Channel Catfish	<i>Ictalurus punctatus</i>	41
Redspotted Sunfish	<i>Lepomis miniatus</i>	39
Spotted Gar	<i>Lepisosteus oculatus</i>	36
Bullhead Minnow	<i>Pimephales vigilax</i>	32
Silverjaw Minnow	<i>Ericymba buccata</i>	29
Shadow Bass	<i>Ambloplites ariommus</i>	27
Blackstripe Topminnow	<i>Fundulus notatus</i>	22
Striped Mullet	<i>Mugil cephalus</i>	21
Warmouth	<i>Lepomis gulosus</i>	19
Longnose Gar	<i>Lepisosteus osseus</i>	17
Freshwater Drum	<i>Aplodinotus grunniens</i>	15
River Carpsucker	<i>Carpionodes carpio</i>	15
Smallmouth Buffalo	<i>Ictiobus bubalus</i>	15
Threadfin Shad	<i>Dorosoma petenense</i>	13
Flathead Catfish	<i>Pylodictis olivaris</i>	11
Spotted Sucker	<i>Minytrema melanops</i>	9
Black Crappie	<i>Pomoxis nigromaculatus</i>	8
Northern Hog Sucker	<i>Hypentelium nigricans</i>	8
Pugnose Minnow	<i>Opsopoeodus emiliae</i>	8
Black Banded Darter	<i>Percina nigrofasciata</i>	6
Blue Sucker	<i>Cycleptus elongatus</i>	6
Brook Silverside	<i>Labidesthes sicculus</i>	6
Mooneye	<i>Hiodon tergisus</i>	5
Weed Shiner	<i>Notropis texanus</i>	5
American Eel	<i>Anguilla rostrata</i>	4
Atlantic Needlefish	<i>Strongylura marina</i>	4
Blue Catfish	<i>Ictalurus furcatus</i>	4

Longnose Shiner	<i>Notropis longirostris</i>	4
Quillback	<i>Carpionodes cyprinus</i>	4
Clear Chub	<i>Hybopsis winchelli</i>	3
Green Sunfish	<i>Lepomis cyanellus</i>	3
White Crappie	<i>Pomoxis annularis</i>	3
Bay Anchovy	<i>Anchoa mitchilli</i>	2
Golden Topminnow	<i>Fundulus chrysotus</i>	2
Harlequin Darter	<i>Etheostoma histrio</i>	2
Inland Silverside	<i>Menidia beryllina</i>	2
Orangespotted Sunfish	<i>Lepomis humilis</i>	2
Saddleback Darter	<i>Percina vigil</i>	2
Bowfin	<i>Amia calva</i>	1
Dollar Sunfish	<i>Lepomis marginatus</i>	1
Dusky Darter	<i>Percina sciera</i>	1
Grass Pickerel	<i>Esox americanus vermiculatus</i>	1
Gulf Darter	<i>Etheostoma swaini</i>	1
Gulf Killifish	<i>Fundulus grandis</i>	1
Hogchoker	<i>Trinectes maculatus</i>	1
Naked Sand Darter	<i>Ammocrypta beani</i>	1
Silver Chub	<i>Hybopsis storeriana</i>	1
Skipjack Herring	<i>Alosa chrysochloris</i>	1
	Total	2852

Fish Assemblage in Wadeable Tributaries and Headwaters

Samples collected on thirty-four 1st order through 4th order river tributaries in 2018 produced 4,130 individual fish (Table 3). Longear Sunfish and Black Banded Darter were the most abundant species, accounting for 524 and 369 individuals, respectively, while the Spotted Sucker and the Starhead Topminnow were the least abundant. Diversity on these tributaries was moderate to high for Louisiana waters at 2.3656 (Shannon Wiener index) and 0.86395 (Simpson index).

Table 3. Fishes assemblage found at thirty-four sample sites on tributaries of the PRB, conducted in the summer of 2018.

Common Name	Scientific Name	Total
Longear Sunfish	<i>Lepomis megalotis</i>	524
Black Banded Darter	<i>Percina nigrofasciata</i>	369
Bluegill	<i>Lepomis macrochirus</i>	339
Harlequin Darter	<i>Etheostoma histrio</i>	280
Gulf Darter	<i>Etheostoma swaini</i>	245
Blackstripe Topminnow	<i>Fundulus notatus</i>	215
Northern Hog Sucker	<i>Hypentelium nigricans</i>	151
Southern Striped Shiner	<i>Luxilus chrysocephalus</i>	130
Dusky Darter	<i>Percina sciera</i>	121
Cherryfin Shiner	<i>Lythrurus roseipinnis</i>	120
Speckled Madtom	<i>Noturus leptacanthus</i>	111
Western Mosquito Fish	<i>Gambusia affinis</i>	108
Longnose Shiner	<i>Notropis longirostris</i>	107
Green Sunfish	<i>Lepomis cyanellus</i>	106
Clear Chub	<i>Hybopsis winchelli</i>	93
Dollar Sunfish	<i>Lepomis marginatus</i>	85
Shadow Bass	<i>Ambloplites ariommus</i>	76
Warmouth	<i>Lepomis gulosus</i>	76
Goldstripe Darter	<i>Etheostoma parvipinne</i>	75
Silvery Minnow	<i>Hybognathus nuchalis</i>	72
Speckled Darter	<i>Etheostoma stigmaeum</i>	68
Black Madtom	<i>Noturus funebris</i>	66
Spotted Bass	<i>Micropterus punctulatus</i>	60
Redspotted Sunfish	<i>Lepomis miniatus</i>	52
Weed Shiner	<i>Notropis texanus</i>	50
Grass Pickerel	<i>Esox americanus vermiculatus</i>	49
Blacktail Shiner	<i>Cyprinella venusta</i>	48
Pirate Perch	<i>Aphredoderus sayanus</i>	48
Creek Chub	<i>Semotilus atromaculatus</i>	36
Southern Brook Lamprey	<i>Ichthyomyzon gagei</i>	30
Brindled Madtom	<i>Noturus miurus</i>	29
Flagfin Shiner	<i>Notropis signipinnis</i>	27
Bantam Sunfish	<i>Lepomis symmetricus</i>	26
Chestnut Lamprey	<i>Ichthyomyzon castaneus</i>	16
Largemouth Bass	<i>Micropterus salmoides</i>	15
Yellow Bullhead	<i>Ameiurus natalis</i>	14

Common Name	Scientific Name	Total
Creek Chubsucker	<i>Erimyzon oblongus</i>	13
Frecklebelly Madtom	<i>Noturus munitus</i>	12
Silverjaw Minnow	<i>Ericymba buccata</i>	11
Banded Pygmy Sunfish	<i>Elassoma zonatum</i>	10
Blacktail Redhorse	<i>Moxostoma poecilurum</i>	10
Naked Sand Darter	<i>Ammocrypta beani</i>	9
Bullhead (Mudcat)	<i>Ictalurus spp. (bullheads)</i>	5
Blackspotted Topminnow	<i>Fundulus olivaceus</i>	4
Flier	<i>Centrarchus macropterus</i>	3
Saddleback Darter	<i>Percina vigil</i>	3
Scaly Sand Darter	<i>Ammocrypta vivax</i>	3
Golden Topminnow	<i>Fundulus chrysotus</i>	2
Black Crappie	<i>Pomoxis nigromaculatus</i>	1
Brook Silverside	<i>Labidesthes sicculus</i>	1
Channel Catfish	<i>Ictalurus punctatus</i>	1
Freckled Darter	<i>Percina lenticula</i>	1
Gulf log perch	<i>Percina suttkusi</i>	1
Redear Sunfish	<i>Lepomis microlophus</i>	1
Spotted Sucker	<i>Minytrema melanops</i>	1
Starhead Topminnow	<i>Fundulus nottii</i>	1
Total		4130

Freshwater Mussel Assemblages

In 2018, 56 sample sites were surveyed within the PRB. A total of 10,086 individual mussels were collected, with an estimated species richness of 29, a Shannon-Wiener Diversity H' Index of 2.35, and a CPUE of 201.72 mussels per 90-minute sample. *Cyclonaias refulgens* was the most common species, representing 24% by total number, while *Megalonaias nervosa*, *Lasmigona complanata*, and *Villosa vibex* were the least abundant species (Table 4).

Table 4. Freshwater mussel data summary from the PRB collected in the summer of 2018

Species	Common Name	Total count	Relative Composition
<i>Cyclonaias refulgens</i>	Purple Pimpleback	2461	0.244001586
<i>Quadrula nobilis</i>	Gulf Mapleleaf	1983	0.196609161
<i>Glebula rotundata</i>	Rounded Pearlshell	1371	0.135930993
<i>Quadrula apiculata</i>	Southern Mapleleaf	1121	0.11114416
<i>Potamilus purpuratus</i>	Bleufer	590	0.058496926
<i>Obliquaria reflexa</i>	Threehorn Wartyback	527	0.052250644
<i>Lampsilis teres</i>	Yellow Sandshell	408	0.040452112
<i>Plectomerus dombeyanus</i>	Bankclimber	213	0.021118382

Species	Common Name	Total count	Relative Composition
<i>Tritogonia verrucosa</i>	Pistol Grip	201	0.019928614
<i>Elliptio crassidens</i>	Elephantear	185	0.018342257
<i>Amblema plicata</i>	Three Ridge	144	0.014277216
<i>Pleurobema beadleianum</i>	Mississippi Pigtoe	134	0.013285743
<i>Fusconaia cerina</i>	Southern Pigtoe	118	0.011699385
<i>Lampsilis straminea</i>	Southern Fatmucket	108	0.010707912
<i>Leptodea fragilis</i>	Fragile Papershell	98	0.009716439
<i>Villosa lienosa</i>	Little Spectaclecase	75	0.00743605
<i>Reginaia ebenus</i>	Ebony Shell	65	0.006444577
<i>Pyganodon grandis</i>	Giant Floater	64	0.006345429
<i>Lampsilis ornata</i>	Southern Pocketbook	47	0.004659925
<i>Arcidens confragosus</i>	Rock Pocketbook	42	0.004164188
<i>Toxolasma parvum</i>	Lilliput	25	0.002478683
<i>Toxolasma texasiense</i>	Texas Lilliput	23	0.002280389
<i>Utterbackia imbecillis</i>	Pond Papershell	22	0.002181241
<i>Utterbackiana hartfieldorum</i>	Cypress Floater	20	0.001982947
<i>Obovaria unicolor</i>	Alabama Hickorynut	17	0.001685505
<i>Ligumia subrostrata</i>	Pondmussel	8	0.000793179
<i>Megalonaias nervosa</i>	Washboard	8	0.000793179
<i>Villosa Vibex</i>	Southern Rainbow	7	0.000694031
<i>Lasmigona complanata</i>	White Heelsplitter	1	0.00009915
Total		10086	1

PRB, North and South of Major Impediment on the Pearl River and the Bogue Chitto

1. Bogue Chitto - north of the sill

A total of 1,153 individual mussels were collected with an estimated species richness of 24 and a Shannon-Wiener Diversity H' Index of 1.76. *Cyclonaias refulgens* was the most common species, representing 57% by total number, while *Leptodea fragilis*, *Ligumia subrostrata*, and *Reginaia ebenus* were the least abundant species.

2. Bogue Chitto - south of the sill

A total of 922 individual mussels were collected with an estimated species richness of 23 and a Shannon-Wiener Diversity H' Index of 2.38. *Cyclonaias refulgens* was the most common species, representing 28% by total number, while *Toxolasma texasiense*, *Villosa vibex*, and *Villosa lienosa* were the least abundant species.

3. Pearl River - north of the sill

A total of 824 individual mussels were collected with an estimated species richness of 27 and a Shannon-Wiener Diversity H' Index of 2.03. *Cyclonaias refulgens* was the most common species, representing 29% by total number, while *Megalonaias nervosa*, *Reginaia ebenus*, and *Toxolasma parvum* were the least abundant species.

4. Pearl River - south of the sill

A total of 7,187 individual mussels were collected with an estimated species richness of 21 and a Shannon-Wiener Diversity H' Index of 2.15. *Quadrula nobilis* was the most common species, representing 26% by total number, while *Ligumia subrostrata*, *Elliptio crassidens*, and *Villosa vibex* were the least abundant species.

Inflated Heelsplitter, Potamilus inflatus

Specimens of *Potamilus inflatus*, listed as threatened, were not found in the sampled areas.

Commercial

The PRB supports a small commercial fishery for catfishes and alligator gar (*Atractosteus spatula*).

Species of Greatest Conservation Need

The PRB is home to the highest concentration of aquatic species of greatest conservation need in Louisiana (Holcom et al. 2015). A complete listing can be found in the Pearl River MP-A. Anthropogenic activities within the floodplain have been attributed to the decline of many of these species. Of particular note, the Pearl darter (*Percina aurora*) is now considered extirpated from the river in both LA and MS (Ross 2001). Furthermore, recent surveys in LA have been unable to document the presence of the Inflated Heelsplitter mussel (*Potamilus inflatus*) or Alabama Shad (*Alosa alabamae*). In LA, the Gulf sturgeon (*Acipenser oxyrinchus desotoi*) can be found in the Pearl and Pontchartrain Basins. It is listed as Threatened by USFWS and has been protected in LA since 1991. Dr. Ken Sulak with USGS has provided a post Hurricane Katrina population estimate for Gulf sturgeon in the PRB. He estimated approximately 100-200 individuals based on over 15 years of data collected by LDWF and USFWS. In August of 2011, 28 Gulf sturgeons were found dead as the result of a point source pollution fish kill in the Pearl River.

HABITAT EVALUATION

In 2018, in conjunction with biological assessments, habitat evaluation was conducted at each tributary site on the PRB. This evaluation included physical data collection and a Rapid Habitat Assessment. The RHA total scores ranged from 91 to 170, flow ranged from 0.08 to 3.4 feet per second, and canopy cover ranged from 10% to 100% coverage among sample sites (Table 5.).

Table 5. Habitat evaluation of thirty-four sample sites in the PRB conducted in the summer of 2018

Site Code	Temp.	Conductivity	Salinity	pH	Turbidity/NTU	D.O.	Canopy Cover	Flow	Total Score (RHA)	Rating (RHA)	Stream Order
4087	24.31	0.04	0.02	7.17	31.66	8.6	40	3	178	17.8	3
4114	24.67	0.049	0.02	6.97	N/A	7.3	50	1.6	177	17.7	4
4103	23.43	0.037	0.02	6.37	10.4	7.6	85	2.2	176	17.6	3
4090	18.8	0.042	0.02	7.67	13.5	7.9	100	1.6	170	17	3
4095	20.64	0.026	0.01	6.72	5.1	8	40	3.4	170	17	4
4100	29.02	0.043	0.02	6.21	N/A	5.6	80	0.08	170	17	2

Site Code	Temp.	Conductivity	Salinity	pH	Turbidity/NTU	D.O.	Canopy Cover	Flow	Total Score (RHA)	Rating (RHA)	Stream Order
4085	22.445	0.0391	0.02	6.42	22.263	7.9	70	0.8	166	16.6	3
4088	21.5	0.03	0.01	6.75	9.4	7.5	90	1.6	165	16.5	3
4092	19.68	0.025	0.02	7.56	6.5	8.2	75	2	165	16.5	3
4084	22.09	0.06	0.03	6.42	6.1	6.5	75	2.4	164	16.4	2
4108	22.83	0.042	0.02	6.65	N/A	7.6	75	1.4	164	16.4	3
4113	23.39	0.054	0.02	6.88	N/A	7.5	75	2.6	162	16.2	3
4106	22.78	0.045	0.02	6.75	N/A	7.1	30	3.4	157	15.7	3
4115	23.39	0.04	0.02	6.57	36.48	7.1	90	1.2	157	15.7	3
4112	21.16	0.04	0.02	6.21	8.09	7.4	90	0.4	156	15.6	3
4093	19.41	0.27	0.01	6.34	5.9	8	85	1	155	15.5	3
4094	20.14	0.028	0.01	6.65	5.6	8	25	1.6	155	15.5	4
4109	23.3	0.036	0.02	6.09	9.6	7	70	1.8	155	15.5	3
4098	25.3	0.04	0.02	6.29	N/A	5.8	80	2.2	153	15.3	2
4086	23.7	0.05	0.02	6.43	19.64	8.3	20	1.2	152	15.2	3

Aquatic Vegetation

Water hyacinth (*Eichhornia crassipes*), giant salvinia (*Salvinia molesta*), common salvinia (*Salvinia minima*), alligator weed (*Alternanthera philoxeroides*), and duckweed (*Lemna* spp.) have been the primary nuisance aquatic plants in the system.

Plant estimates as of December 2019:

Water hyacinth	700 acres
Common salvinia	650 acres
Duckweed	50 acres
Alligator weed	200 acres
Giant salvinia	150 acres
Submersed vegetation	150 acres

In 2019, 70 acres of aquatic vegetation in the Pearl River basin was chemical treated.

SPECIAL PROJECTS

LDWF has conducted or participated in a number of projects outside of our standard rivers and streams protocols in the past 10 years. These projects were important to documenting baseline data sets, responses to disturbances to the system or as preparations for purposed projects.

The projects include:

1. Pearl River Fish Kill Post Incident Monitoring 2012 – 2014 (Appendix I)
2. Bogue Lusa Creek Fish Assemblage 2014 (Appendix II)
3. Pearl River Navigation Canal (PRNC) between lock #1 and lock #2 2014 (Appendix I)
4. Data Validation of Subsurface Habitat Classification for Aquatic Systems and Expand

Biological Monitoring in the Pearl River Basin in Support of Developing Species-Habitat Relationships and Species Endpoints 2015 – 2016 (Final Report contact USFWS)

5. At-risk Freshwater Mussel Survey of Bogue Chitto National Wildlife Refuge 2018 (Final Report contact LDWF)
6. Status Survey for Frecklebelly Madtom in the Pearl River Drainage of Louisiana May 1, 2018- December 31, 2018(Final Report contact LDWF)
7. Status Survey for Frecklebelly Madtom in the Pearl River Drainage of Louisiana: June 1, 2019- December 31, 2019(Final Report contact LDWF)

CONDITION IMBALANCE / PROBLEM

Low head dams on the Pearl and Bogue Chitto rivers limit the movement of fishes and the distribution of mussels within the basin. The dams are also suspected of altering the spawning migration of Gulf Sturgeon and Alabama Shad, two anadromous species. These dams also restrict boating access and present a threat to boater safety.

The 2004 Water Quality Inventory Report (LDEQ 2009) indicated that 78% of the 23 waterbody sub-segments in the PRB were not supporting their designated use for fish and wildlife propagation. The suspected causes for these water quality problems include metals, nutrients, fecal coliform bacteria, organic enrichment, and low concentrations of dissolved oxygen. Fish consumption advisories for mercury are in effect for the Pearl and Bogue Chitto Rivers in Louisiana.

The headwater dam (Ross Barnett Reservoir) at Jackson, MS has changed normal flow patterns in the lower Pearl Basin. The proposed reservoir south of Jackson could compound the interruption of normal flow patterns in portions (Holcomb et al. 2015).

CORRECTIVE ACTION NEEDED

1. LDWF is in favor of river restoration that includes restoring historic fish migration routes that allow movement of potamodromous, anadromous, and catadromous fish species. Also, restoring safe boating access is important.
2. A safer means of waste disposal for the Bogalusa Paper Mill should be investigated
3. Proposals for projects that could alter the hydrology of the PRB should be closely scrutinized

RECOMMENDATIONS

1. Coordinate with applicable government agencies and non-governmental organizations to develop a comprehensive management strategy for the Pearl River Basin
2. Aquatic vegetation:
 - a. To maintain public access, foliar applications to floating vegetation in the Pearl River will be necessary. Unless conditions change, one to two treatments will be applied annually according to the LDWF Aquatic Herbicide Application Procedures (Table 6),
 - b. LDWF personnel will continue to investigate public complaints concerning aquatic vegetation and conduct appropriate action in a timely manner.
 - c. Annual vegetation surveys will be conducted to monitor the acreage of existing vegetation and the introduction of new species, primarily giant salvinia.
 - d. Biological control for common and giant salvinia will be stocked, as necessary, if and when available.
3. Continue standardized fish and freshwater mussel population sampling that incorporates both species-centric and assemblage analysis
 - a. Develop guidelines to ensure that sampling efforts are standardized with regard to water flow rates
 - b. Investigate sampling methods to increase the precision of catch rate indices and measurements of species abundance
 - c. Develop and implement protocol for sampling fisheries habitat parameters
4. Continue the use of existing recreational harvest regulations until LDWF sampling results indicate that change is necessary from a biological perspective or such time as a change in management strategy is indicated by the collective opinion of area anglers

Table 6. LDWF Aquatic Herbicide Application Procedures.

Plant Species	Herbicide	Surfactant
<i>Salvinia spp. Alternative 1</i> Common/Giant Salvinia (April 1 to October 31)	Glyphosate (0.75 gal/acre) Diquat (0.25 gal/acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
<i>Salvinia spp. Alternative 2</i> Common/Giant Salvinia (April 1 to October 31)	Glyphosate (0.75 gal/acre) Flumioxazin (2 oz./acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
<i>Salvinia spp. Alternative 3</i> Common/Giant Salvinia (April 1 to October 31)	MSM (1 oz./acre) Flumioxazin (1 oz./acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
<i>Salvinia spp. Alternative 4</i> Common/Giant Salvinia (November 1 to March 31)	Diquat (0.75 gal/acre)	Nonionic surfactant (0.25 gal/acre)
<i>Salvinia spp. Alternative 5</i> Common/Giant Salvinia (November 1 to March 31)	Flumioxazin (12 oz./acre)	Turbulence (or approved equivalent, 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/Giant Cut Grass (undeveloped areas)	Imazapyr (0.5 gal/acre)	Turbulence (or approved equivalent, 0.25 gal/acre)
Alligator Weed/Giant Cut Grass (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) or Flumioxazin (8 oz./acre)	Nonionic surfactant (0.25 gal/acre) or Turbulence (or approved equivalent, 0.25 gal/acre)
Cuban Bulrush (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	Diquat (1.0 gal/acre) or Flumioxazin (6 oz./acre)	Nonionic surfactant (0.25 gal/acre) or Turbulence (or approved equivalent, 0.25 gal/acre)

Literature Cited

Holcomb, Samuel R., Amity A. Bass, Christopher S. Reid, Michael A. Seymour, Nicole F. Lorenz, Beau B. Gregory, Sairah M. Javed, and Kyle F. Balkum. 2015. Louisiana Wildlife Action Plan. Louisiana Department of Wildlife and Fisheries. Baton Rouge, Louisiana.

Ross, Stephen T., et al. 2001. Inland Fishes of Mississippi. Mississippi Department of Wildlife, Fisheries and Parks.

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES



**OFFICE OF FISHERIES
INLAND FISHERIES SECTION
DISTRICT VIII
Pearl River Fish Kill Post Incident
Monitoring Report 2014**

The Louisiana Department of Wildlife and Fisheries (LDWF) completed the third year of a 3 year fish and mussel monitoring project in the Pearl River and associated waters. The project’s primary objective is to monitor the recovery of native species following the August 2011 Temple-Inland kill and to identify management actions that may be necessary for a return to pre-incident conditions.

Fish population sampling

Fish population sampling for this monitoring effort will comply with LDWF standardized sampling procedures. Additional sampling will be conducted in tributaries with slight variations of sampling gear to ensure that all representative habitats are sampled. Sampling will be conducted in the normal low flow months of late summer and early fall. Seven stations have been selected for fish sampling in the Pearl River watershed (Table 1). Five of those stations are within the portion of the river that was impacted by the spill. One sampling station is located upstream from the spill impacted area. Three stations have been selected for fish samples in tributaries (Table 1).

Each main stem river station and the Bogue Chitto River tributary station will be sampled using the following gear types and techniques. For each gear listed below all fish will be collected and identified to species. Common species will be sorted to inch group. Individual lengths and weights will be recorded for rare species and species of concern (Table 2).

- 1.) Boat Electrofishing: 900 second samples, randomly chosen shoreline within 500 meters (m) of station GPS location, conducted in downstream manner while speed not exceeding the river flow rate, 3/16 mesh dip net
- 2.) Hoopnets: Four feet (ft.) hoops, 1.5” mesh, 15ft in length, #15 tarred twine, 2 throats, no lead, no bait, three nets per station, set for 72 hours
- 3.) Seines: Standard 25 ft. X 6 ft. X 3/16” mesh with 6 ft. bag, 2 hauls per site, after dark when possible

Each tributary station will be sampled after dark with either a 10 ft. X 6 ft. X 3/16” mesh seine or a 20 ft. X 6 ft. X 3/16” mesh seine. Seine hauls will be made within 100 m of the established station GPS location. All fish collected will be identified to species. Common species will be sorted to inch group. Individual lengths and weights will be recorded for rare species and species of concern (Table 2).

Table 1. Pearl River Fish Monitoring Stations

Site	Latitude	Longitude	Main River Sample	Tributary Sample
PRFK 1	30.78555	-89.81933	X	
PRFK 2	30.72111	-89.84086	X	
PRFK 3	30.61188	-89.82227	X	
PRFK 4	30.52452	-89.80802	X	
PRFK 5	30.47272	-89.77833	X	
PRFK 6	30.37611	-89.73036	X	
BogueChitto1	30.62330	-89.87627	X	
Pushepatapa Creek	30.86508	-89.81302		X
Bogalusa Creek	30.76961	-89.89144		X
Cryer Slough	30.53905	-89.82763		X

Table 2. Pearl Basin Freshwater Fish Species of Concern (LDWF 2005)

Common Name	Scientific Name
Gulf sturgeon	<i>Acipenser oxyrinchus</i>
Paddlefish	<i>Polyodon spathula</i>
Alabama shad	<i>Alosa alabamae</i>
Flagfin shiner	<i>Pteronotropis signipinnis</i>
Bluenose shiner	<i>Pteronotropis welaka</i>
Longjaw minnow	<i>Ericymba amplamala</i>
River Redhorse	<i>Moxostoma carinatum</i>
Southeastern Blue sucker	<i>Cycleptus meridionalis</i>
Frecklebelly madtom	<i>Noturus minutus</i>
Crystal darter	<i>Crystallaria asprella</i>
Channel darter	<i>Percina copelandi</i>
Freckled darter	<i>Percina lenticula</i>
Pearl darter	<i>Percina aurora</i>
Gulf logperch	<i>Percina suttkusi</i>

Freshwater Mussel Sampling

Mussel population sampling for this effort will be consistent with a protocol previously established by Louisiana State University (Brown et al. 2010) - see detailed sampling protocol below. Sampling will be conducted annually from late summer to early fall to coincide with the normal period of low flow. A total of eight stations have been selected for monitoring (Table3). Six of these stations were sampled in 2007, three of which were sampled again in 2011 (Table 3). These stations are within the area impacted by the Temple-Inland kill from Bogalusa to the Interstate-59 overpass. Two additional sites were selected in areas of the river that were not impacted by the Temple-Inland kill. One of those is located upstream from the affected area. The other is located in the Bogue Chitto River, downstream of the low head sill.

The majority of dead mussels observed during the Temple-Inland kill were the same species, *Leptodea fragilis*. This species and other thin-shelled mussels have a low relative abundance in comparison to other mussel species found in the Pearl River (Miller, A.C. and Payne 1997). In 2007, thin-shelled species accounted for only 4.32 percent of mussels sampled (Brown et al. 2010).

Additional samples at all sites in depths >1 meter will be collected in an effort to expand the understanding of mussel habitat and species community composition. Additional sampling will be conducted if the threatened inflated heelsplitter (*Potamilus inflatus*) or other species of conservation concern are encountered (Table 4). In addition, the location, photographs, and measurements of total shell length will be recorded for each these mussels observed during sampling.

Analysis of these data will include: mortality (% of the individuals collected dead), catch per unit effort (total number of mussels collected per site in 90 minutes), species richness, and Shannon-Wiener Diversity Index (H').

Sampling Protocol

Timed qualitative searches, consistent with protocol conducted by Louisiana State University (Brown et al. 2010) before and after the Temple-Inland kill will be performed at each established sample site. A ninety person-minute sample will be conducted at each site where biologists will work along the littoral zones (<1

m depth) locating mussels by tactile search, retrieving both living mussels and shell. All collected mussels will be identified to species level. Additional samples will be conducted in water >1 m depth adjacent to samples taken in the littoral zone et al. sites. Biologists will utilize SCUBA equipment for these samples. At each site, water quality parameters will be collected, which include water temperature, conductivity, salinity, turbidity, P.H. and dissolved oxygen.

Table 3. Freshwater Mussel Monitoring Sites

Site	Latitude	Longitude	2007	2011	New	>1 m depth
111	30.39830	-89.72236	X	X		X
113	30.47441	-89.77951	X	X		X
114	30.42955	-89.73927	X	X		X
123	30.51872	-89.80377	X			X
130	30.60380	-89.82227	X			X
143	30.72508	-89.83950	X			X
150	30.78305	-89.82730			X	X
BC	30.6224	-89.87725			X	X

Table 4. Mussel Species of Conservation Concern (LDWF 2005).

Common Name	Scientific Name
Rayed Creekshell	<i>Anodontooides radzatus</i>
Elephant-Ear	<i>Elliptio crassidens</i>
Mississippi Pigtoe	<i>Pleurobema beadleianum</i>
Inflated Heelsplitter	<i>Potamilus inflatus</i>
Southern Rainbow	<i>Villosa vibex</i>

Results:

Fish Population Sampling

Four thousand, eighty nine individual fish representing forty species from fourteen families were collected (Table 3). Members of the family Cyprinidae were most abundant in the samples. Ten species of Cyprinidae accounted for 82% of the total individuals collected. Two species of Cyprinidae dominated: Blacktail shiner and Silvery minnow alone accounted for 75% of the total individuals collected. Members of the family Ictaluridae (catfishes) were second most abundant in the samples comprising 6.2% of the total collected, followed by members of the family Centrarchidae with 5.5% of the total collected.

Table 3. PRFK Post Incident Monitoring 2012-2014 Fish Species List

FAMILY	SCIENTIFIC NAME	COMMON NAME	TOTAL COUNT
Achiridae	<i>Trinectes maculatus</i>	Hogchoker	38
Atherinopsidae	<i>Labidesthes sicculus</i>	Brook silverside	1
Catostomidae	<i>Carpionodes carpio</i>	River carpsucker	6
	<i>Cycleptus elongatus</i>	Blue sucker	1
	<i>Hypentelium nigricans</i>	Northern hogsucker	2
	<i>Ictiobus bubalus</i>	Smallmouth buffalo	11
	<i>Moxostoma poecilurum</i>	Blacktail redhorse	4
Centrarchidae	<i>Ambloplites macrochirus</i>	Shadow bass	1
	<i>Lepomis macrochirus</i>	Bluegill	80
	<i>Lepomis megalotis</i>	Longear sunfish	68
	<i>Lepomis microlophus</i>	Redear sunfish	1
	<i>Micropterus punctatus</i>	Spotted bass	30
	<i>Micropterus salmoides</i>	Largemouth bass	38
	<i>Pomoxis annularis</i>	White crappie	4
	<i>Pomoxis nigromaculatus</i>	Black crappie	1
Clupeidae	<i>Alosa chrysochloris</i>	Skipjack herring	2
	<i>Dorosoma cepedianum</i>	Gizzard shad	62
	<i>Dorosoma petenense</i>	Threadfin shad	65
Cyprinidae	<i>Ctenopharyngodon</i>	Grass carp	1
	<i>Cyprinella venusta</i>	Blacktail shiner	1515
	<i>Hybognathus nuchalis</i>	Silvery minnow	1553
	<i>Luxilus chrysocephalus</i>	Striped shiner	9
	<i>Notropis atherinoides</i>	Emerald shiner	48
	<i>Notropis longirostris</i>	Longnose shiner	56
	<i>Notropis texanus</i>	Weed shiner	2
	<i>Notropis volucellus</i>	Mimic shiner	71
	<i>Notropis winchelli</i>	Clear chub	21
	<i>Pimephales vigilax</i>	Bullhead minnow	93
Fundulidae	<i>Fundulus notatus</i>	Blackstripe	3
Ictaluridae	<i>Ictalurus furcatus</i>	Blue catfish	16
	<i>Ictalurus punctatus</i>	Channel catfish	219
	<i>Noturus leptacanthus</i>	Speckled madtom	2
	<i>Noturus miurus</i>	Brindled madtom	2
	<i>Pylodictis olivaris</i>	Flathead catfish	13
Lepisosteidae	<i>Lepisosteus oculatus</i>	Spotted gar	4

Moronidae	<i>Morone</i>	Hybrid striped bass	1
Mugilidae	<i>Mugil cephalus</i>	Striped mullet	5
Percidae	<i>Ammocrypta asprella</i>	Crystal darter	2
	<i>Ammocrypta beani</i>	Naked sand darter	14
	<i>Etheostoma stigmaeum</i>	Speckled darter	3
	<i>Percina nigrofasciata</i>	Blackbanded darter	8
	<i>Percina sciera</i>	Dusky darter	5
	<i>Percina suttkusi</i>	Gulf logperch	4
Poeciliidae	<i>Gambusia affinis</i>	Western mosquitofish	1
Sciaenidae	<i>Aplodinotus grunniens</i>	Freshwater drum	3
TOTAL			4,089

Mussel Population Sampling

Diversity and species richness

Sixteen total samples were taken at eight different sites on the West Pearl River and the Bogue Chitto River. Eight samples at one meter and less yielded a result of: 1203 total individuals, a species richness of 20 and a Shannon-Wiener H' value of 2.012764272 (Table 4). Eight samples at greater than one meter yielded a result of 886 individuals, a species richness of 16 and a Shannon-Wiener H' value of 1.811957628 (Table 5). Sixteen combined samples yielded a result of 2089 individuals, a species richness of 20 and a Shannon-Wiener H' value of 2.001181217 (Table 6). The six most common species sampled were *Quadrula refulgens* at 30%, *Quadrula apiculata* at 24%, *Glebula rotundata* at 14%, *Quadrula quadrula* at 12%, *Obliquaria reflexa* at 6% and *Potamilus purpuratus* at 4%. These species represent 89% of the total collected (Chart 1).

Mussel Species of Conservation Concern

No *Potamilus inflatus* were found.

Mussel Mortality

Lampsilis teres displayed the highest percentage of mortality at a 61.9% mortality rate (Table 7).

Table 4.

Mussels sampled at 8 different sites at < 1 Meter

SPECIES	NUMBER OF INDIVIDUALS	RELATIVE ABUNDANCE
<i>Quadrula refulgens</i>	300	0.249376559
<i>Glebula rotundata</i>	261	0.216957606
<i>Quadrula apiculata</i>	212	0.176226101
<i>Quadrula quadrula</i>	197	0.163757273
<i>Obliquaria reflexa</i>	63	0.052369077

Potamilus purpuratus	46	0.038237739
Lampsilis teres	40	0.033250208
Fusconaia flava	18	0.014962594
Pyganodon grandis	17	0.014131338
Anodonta suborbiculata	11	0.009143807
Plectomerus dombeyanus	9	0.007481297
Leptodea fragilis	8	0.006650042
Villosa lienosa	5	0.004156276
Amblema plicata	4	0.003325021
Lampsilis ornata	3	0.002493766
Toxolasmus Parvus	3	0.002493766
Tritogonia verrucosa	3	0.002493766
Arcidens confragosus	1	0.000831255
Ligumia subrostrata	1	0.000831255
Utterbackia imbecilis	1	0.000831255
Total # of Individuals	1203	1
Species Richness	20	
H'	2.012764272	

Table 5.

Mussels sampled at 8 different Site AT > 1 Meter

SPECIES	NUMBER OF INDIVIDUALS	RELATIVE ABUNDANCE
Quadrula refulgens	322	0.363431151
Quadrula apiculata	283	0.319413093
Obliquaria reflexa	52	0.058690745
Potamilus purpuratus	48	0.054176072
Quadrula quadrula	46	0.051918736
Glebula rotundata	38	0.042889391
Plectomerus dombeyanus	24	0.027088036
Villosa lienosa	17	0.019187359
Lampsilis teres	13	0.014672686

Toxolasmus Parvus	11	0.01241535
Pyganodon grandis	9	0.010158014
Leptodea fragilis	8	0.009029345
Fusconaia flava	7	0.007900677
Anodonta suborbiculata	6	0.006772009
Lampsilis ornata	1	0.001128668
Ligumia subrostrata	1	0.001128668
TOTAL # OF INDIVIDUALS	886	
SPECIES RICHNESS	16	

Table 6.

Mussels sampled from a total of 16 samples < >1 Meter

SPECIES	NUMBER OF INDIVIDUALS	RELATIVE ABUNDANCE
Quadrula refulgens	622	0.29775012
Quadrula apiculata	495	0.236955481
Glebula rotundata	299	0.143130685
Quadrula quadrula	243	0.1163236
Obliquaria reflexa	115	0.055050263
Potamilus purpuratus	94	0.044997607
Lampsilis teres	53	0.025370991
Plectomerus dombeyanus	33	0.015797032
Pyganodon grandis	26	0.012446146
Fusconaia flava	25	0.011967449
Villosa lienosa	22	0.010531355
Anodonta suborbiculata	17	0.008137865
Leptodea fragilis	16	0.007659167
Toxolasmus Parvus	14	0.006701771
Amblema plicata	4	0.001914792
Lampsilis ornata	4	0.001914792
Tritogonia verrucosa	3	0.001436094
Ligumia subrostrata	2	0.000957396
Arcidens confragosa	1	0.000478698
Utterbackia imbecilis	1	0.000478698
TOTAL # OF INDIVIDUALS	2089	1
SPECIES RICHNESS	20	
SHANNON-WIENER	2.001181217	

Chart 1.
Relative Abundance

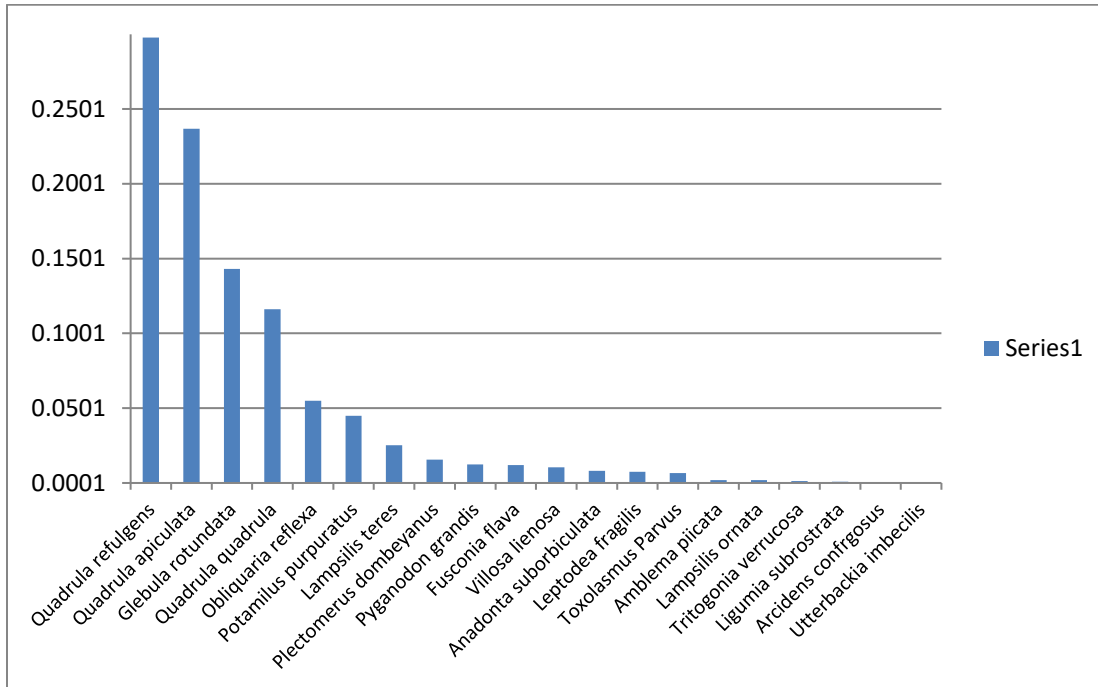


Table 7.

Mussel Mortality

Species	Total % mortality per species
Lampsilis teres	61.90%
Lampsilis ornata	34.15%
Leptodea fragilis	11.11%
Glebula rotundata	10.53%
Toxolasma parva	7.14%
Potamilus purpuratus	6.15%
Villosa lienosa	5.88%
Obliquaria reflexa	4.92%
Fusconia flava	4.10%
Plectomerus dombeyanus	2.86%
Quadrula apiculata	2.29%
Pyganodon grandis	2.26%
Quadrula refulgens	1.85%

Quadrula quadrula	0.58%
Ligumia subrostrata	0.00%
Uttebackia imbecilis	0.00%
Andodonta suborbiculata	0.00%
Amblema plicata	0.00%
Arcidens confragosus	0.00%
Fusconaia ebena	0.00%
Lampsilis claibornensis	0.00%
Toxolasma texasensis	0.00%
Tritogonia verrucosa	0.00%
Uniomerus tetralasmus	0.00%

APPENDIX II

Bogue Lusa Fish Assemblage

Fish Assemblage Sampling

In preparation for the proposed Washington Parish Reservoir, samples were performed to establish a baseline data set for fish communities on the Bogue Lusa creek. Two hundred and ninety-two individual fish were collected in 2014 in six 100-meter backpack electrofishing samples (Table 1). These samples represent a species richness of 27 and a Shannon-Weiner H' per sample of 2.2481. *Percina nigrofasciata* (blackbanded darter) was the most common species in these samples in aggregate. Eight hundred and ten individual fish were collected in 2015 in eight 100-meter backpack electrofishing samples (Table 1). These samples represent a species richness of 33 and a Shannon-Weiner H' per sample of 2.4544. *Percina nigrofasciata* (blackbanded darter) was the most common species in these samples in aggregate (Figure 1).

Table 1. Fish species list, total number of individuals, species richness and Shannon-Wiener H' per site for samples collected in Bogue Lusa Creek in 2014 and 2015.

SPECIES	TOTAL 2014	TOTAL 2015
Black Banded Darter	38	104
Black Striped Topminnow	23	65
Blacktail Redhorse	1	4
Blacktail shiner	12	12
Bluegill	16	16
Bluehead Chub	14	14
Brindled Madtom	6	28
Cherryfin shiner	14	14
Chestnut Lamprey	1	9
Clear Chub	19	19
Creek Chub		22
Dollar Sunfish	2	1
Dusky Darter	20	85
Freckled Madtom	3	23
Gambusia	2	2
Grass Pickerel		4
Green Sunfish	6	12
Gulf Darter	5	11
Harlequin Darter		3
Longear	24	71
Longnose Shiner	10	22
Naked Sand Darter		1
Northern Hogsucker		3
Pirate Perch		10
Red Spotted Sunfish	3	16

Shadow Bass	1	19
Southern Striped Shiner	17	94
Southern Brook Lamprey	21	31
Speckled Darter	10	39
Speckled Madtom	14	36
Spotted Bass		7
Warmouth	8	11
Western Creek Chubsucker	2	2
TOTAL INDIVIDUALS	292	810
TOTAL INDIVIDUALS PER SAMPLE	48.66	101.25
SPECIES RICHNESS	27	33
SPECIES RICHNESS PER SAMPLE	13	17.5
SHANNON WEINER H' PER SAMPLE	2.2481	2.4544

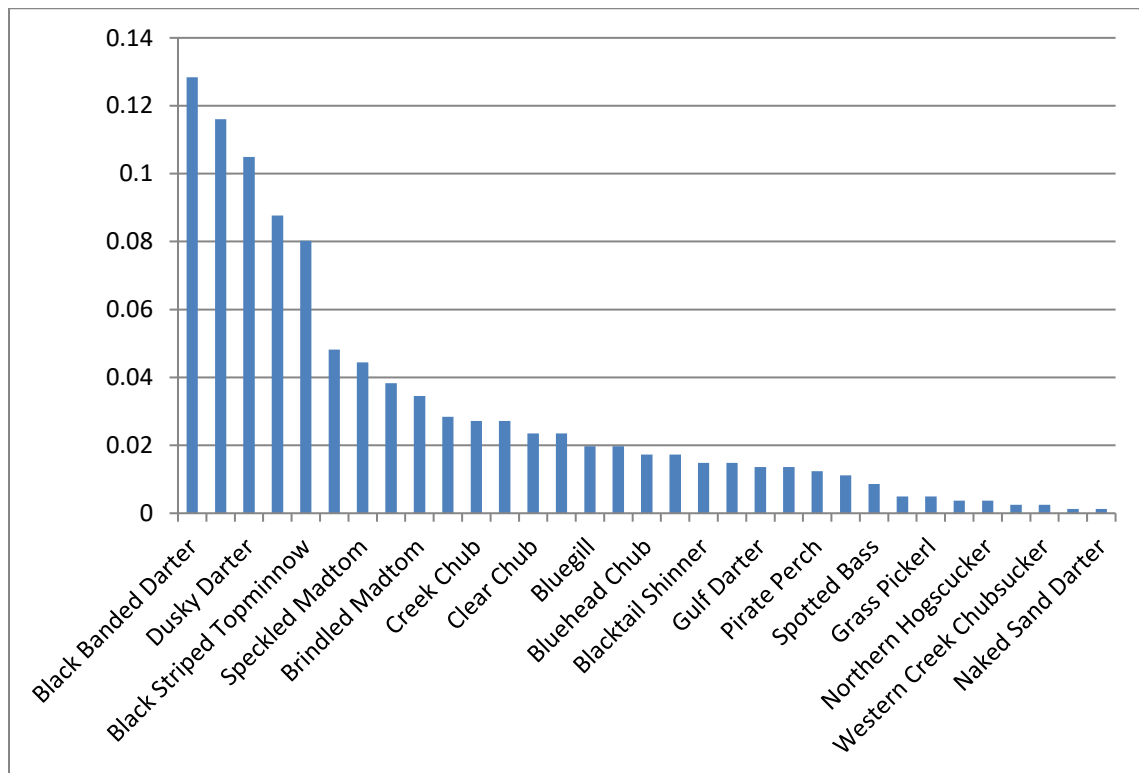


Figure 1. Relative composition of fish sampled in the Bogue Lusa creek in 2015 (n = 810).

APPENDIX III

Pearl River Navigation Canal (PRNC) between lock #1 and lock #2

Four samples were conducted in the semi-impounded 10.77 mile portion of PRNC between lock #1 and lock #2 to assess fishery community structure, abundance and condition.

Largemouth Bass

Electrofishing has proven to be the most effective method for collecting warmwater freshwater fishes and is used to evaluate LMB relative abundance (i.e., CPUE) and size distribution. Standardized electrofishing samples were collected in the PRNC between lock #1 and lock #2 from four sites in the summer of 2014.

Largemouth bass relative abundance, size distribution and relative weight

The length distributions for LMB collected in the summer of 2014 are presented in Figure 1. The mean sample catch per hour was 58. The LMB ranged from 1 to 13 inches total length (TL). Mean relative weight (Wr) of LMB sampled ranged from 81.024 to 227.7 and is in the acceptable range (i.e., above 80). Largemouth bass mean relative weights below 80 may indicate a potential problem with forage availability.

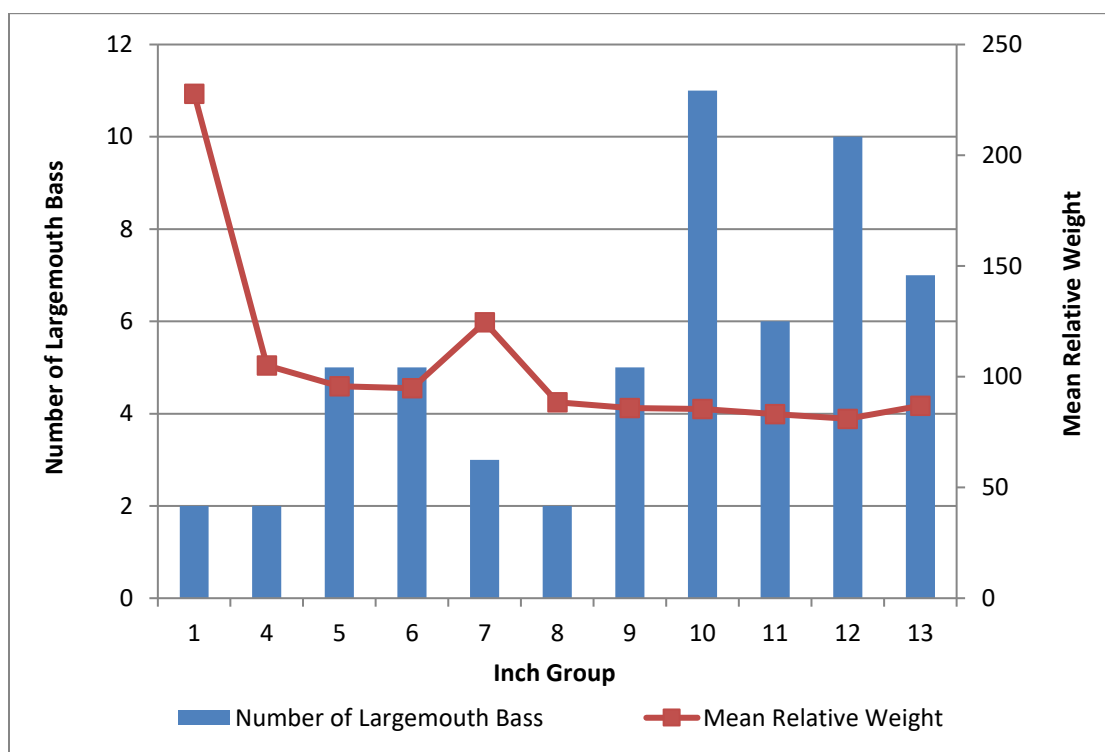


Figure 1. Size distribution by inch group and Wr of LMB collected from the PRNC between lock #1 and lock #2 in the summer of 2014.

Fish Assemblage Sampling

One hundred, fifty five individual fish were collected in four, 900-second electrofishing samples, which were performed to establish a baseline data set for fish community on the

PRNC (Table 1.). These samples represent a species richness of 20. Largemouth bass was the most abundant species in these samples in aggregate (Figure 2).

Table 1. Fish species list, total number of individuals and species richness for samples conducted on PRNC in 2014.

SPECIES	TOTAL #	Relative Abundance
Largemouth Bass	58	0.3742
Bluegill	17	0.1097
Black Crappie	9	0.0581
Redear Sunfish	9	0.0581
Spotted Sucker	9	0.0581
Gizzard Shad	8	0.0516
Chain Pickerel	7	0.0452
Spotted Bass	6	0.0387
Lake Chubsucker	6	0.0387
Spotted Gar	6	0.0387
Blacktail Redhorse	5	0.0323
Grass Pickerel	3	0.0194
Longear Sunfish	3	0.0194
Channel Catfish	2	0.0129
Gulf logperch	2	0.0129
Warmouth	1	0.0065
Clear Chub	1	0.0065
Taillight Shiner	1	0.0065
Blackstripe Topminnow	1	0.0065
Brook Silverside	1	0.0065
TOTAL # OF INDIVIDUALS	155	
SPECIES RICHNESS	20	

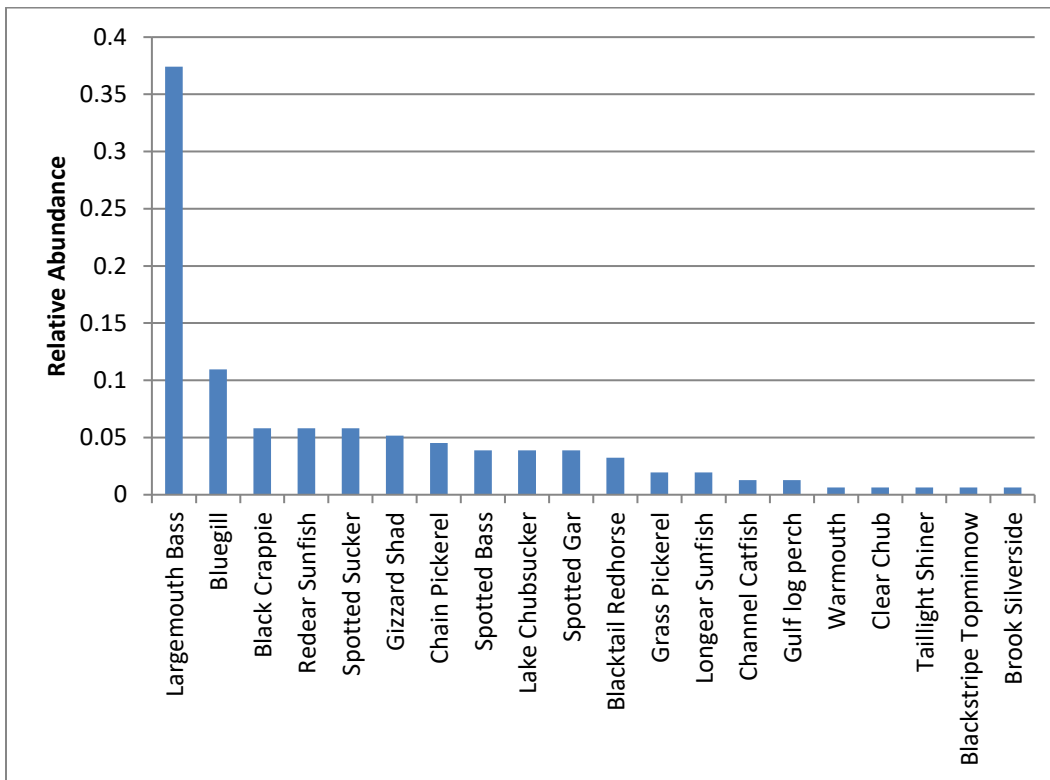


Figure 2. The relative abundance of fish collected from the PRNC between lock #1 and lock #2 in the summer of 2014.

Water Quality

Water quality worsened from lock #2 to lock #1 (Figure 3.). Low pH and dissolved oxygen was observed at sample site PRNC1 and PRNC2, both of which are closest to lock #1 (Table 2).

Table 2. Water quality parameters for samples conducted on PRNC in 2014.

STATION	WATER TEMPERATURE (c)	CONDUCTIVITY (mS/cm)	SALINITY (ppt)	PH (pH)	TURBIDITY (NTU)	DISSOLVED OXYGEN (mg/l)
PRNC1	25.06	0.049	0.02	5.84	8.9	2.85
PRNC2	27.62	0.053	0.02	6.02	8.3	3.5
PRNC3	25.9	0.059	0.03	6.54	14.3	6.28
PRNC4	24.96	0.064	0.03	6.7	21.4	5.78

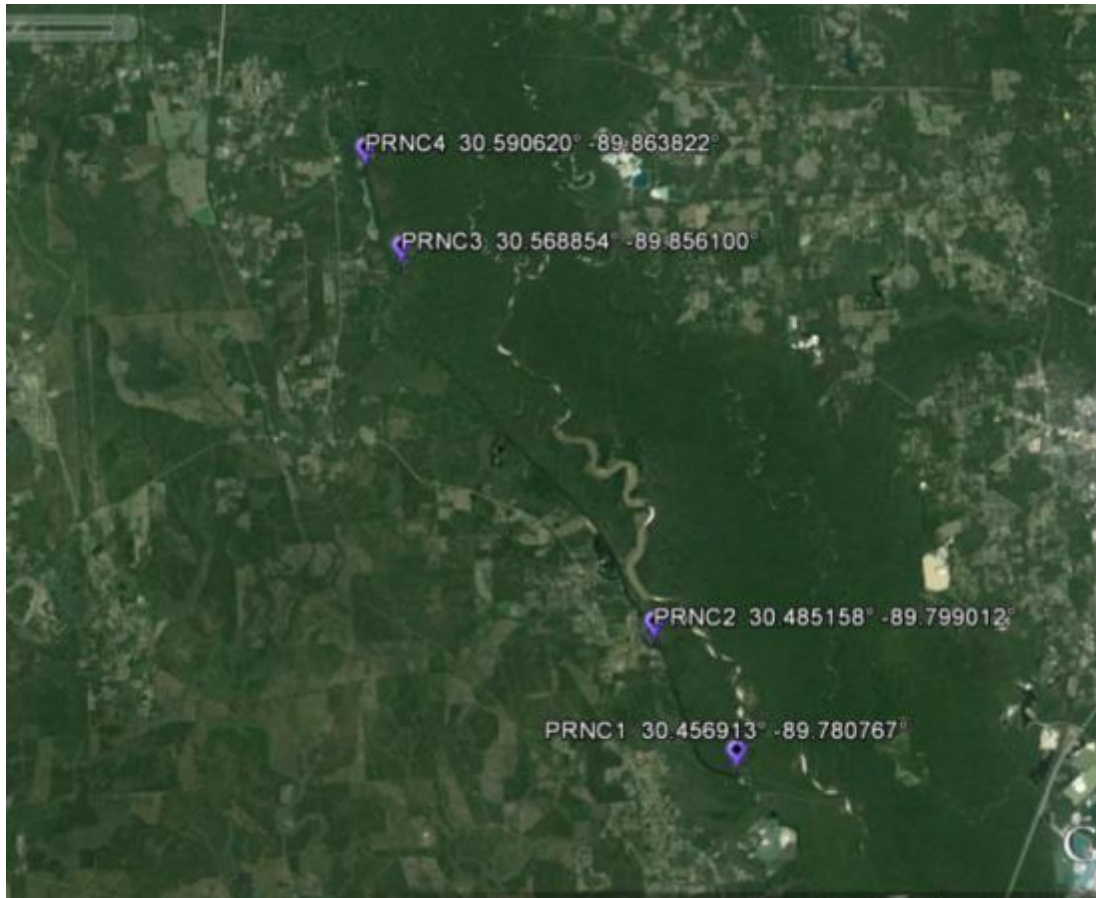


Figure 3. Electrofishing stations for the PRNC sampled in 2014.
(return to water quality)