LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES DIVISION

PART VI -B

WATERBODY MANAGEMENT PLAN SERIES

BIG MAR - CAERNARVON

WATERBODY EVALUATION &
RECOMMENDATIONS

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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TABLE OF CONTENTS

STRATEGY STATEMENT

Recreational

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. Other species such as bream (*Lepomis* spp.), catfish, and crappie are of importance to recreational anglers; however, these species do not comprise a large fishery. These species are managed to maintain a sustainable population.

Commercial

Commercial species are managed with statewide regulations for maximum sustainable yield.

Species of Special Concern

Species of special concern are managed to protect the current population and to provide an opportunity for recovery to a sustainable population.

EXISTING HARVEST REGULATIONS

Recreational

Table 1. Statewide recreational fishing regulations for freshwater and saltwater species.

STATEWIDE REGULATIONS BY SPECIES	
FRESHWATER	
Crappie	50 daily per person; no size restriction
Largemouth Bass	10 daily per person; no size restriction
Catfish	100 daily per person, with the following mins: **Note: A maximum of 25 undersize fish of a single or combination of all 3 may be kept within the 100 fish daily creel limit**
Channel Catfish	11" minimum TL
Blue Catfish	12" minimum TL
Flathead Catfish	14" minimum TL
Striped Bass	5 daily per person; no more than 2 bass >30”
Lepomis (all sunfish species)	No limit
White Bass	50 daily per person; no size restriction
Freshwater Drum	25 daily per person; 12” minimum TL
Buffalo Fish	25 daily per person; 16” minimum TL
Bowfin	No limit; 16” minimum TL
SALTWATER	
Red Drum	5 daily per person; 16” minimum TL; only 1 > 27” max TL

Black Drum	5 daily per person; 16” minimum TL; only 1 > 27” max TL
Spotted Seatrout	25 daily per person; 12” minimum TL
Southern Flounder	10 daily per person; no size restriction

Commercial

Statewide species and gear specific regulations apply. There are no special regulations for the Caernarvon area.

Species of Special Concern

The taking or harassment of any threatened or endangered species is a violation of state and federal law and includes the Gulf sturgeon (*Acipenser oxyrinchus desotoi*).

SPECIES EVALUATION

Table 2. Freshwater and brackish species indicated to be common to the Big Mar and Caernarvon Diversion outfall area from Louisiana Department of Wildlife and Fisheries sampling data.

Freshwater Species	
Lepomis miniatus	red spotted sunfish
Lepomis gulosus	warmouth
Lepomis microlophus	redear sunfish
Lepomis macrochirus	bluegill
Pomoxis nigromaculatus	black crappie
Gambusia affinis	western mosquitofish
Micropterus salmoides	largemouth bass
Lepisosteus oculatus	spotted gar
Lepisosteus osseus	longnose gar
Morone saxatilis	striped bass
Aplodinotus grunniens	freshwater drum
Amia calva	bowfin
Dorosoma petenense	threadfin shad
Ictiobus bubalus	smallmouth buffalo
Ictiobus cyprinellus	bigmouth buffalo
Ictalurus furcatus	blue catfish
Ameiurus natalis	yellow bullhead
Ictalurus punctatus	channel catfish
Herichthys cyanoguttatus	Rio Grande cichlid
Brackish Marsh Species	
Cynoscion nebulosus	spotted seatrout
Paralichthys lethostigma	southern flounder

Sciaenops ocellatus	red drum
Pogonias cromis	black drum
Poecilia latipinna	sailfin molly
Menidia beryllina	inland silverside
Cyprinodon variegatus	sheepshead minnow
Dorosoma cepedianum	gizzard shad
Anadromous Species	
Acipenser oxyrinchus desotoi	Gulf sturgeon
Invertebrate Species	
Callinectes sapidus	blue crab
Litopenaeus setiferus	white shrimp
Farfantepenaeus aztecus	brown shrimp
Crassostrea virginica	American oyster

Recreational

Largemouth Bass –

Standard Sampling

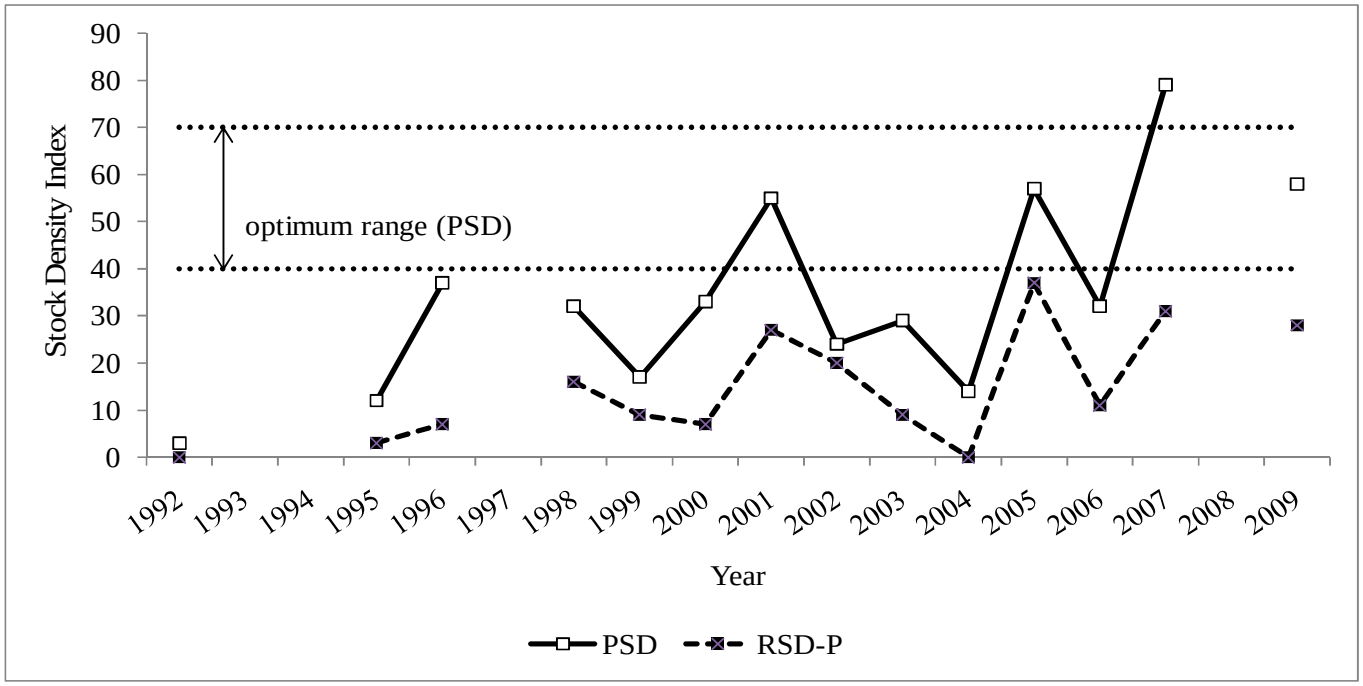

Figure 1. Largemouth bass proportional stock density (PSD) and relative stock density of preferred-length fish (RSD-P) collected in spring electrofishing samples from 1992-2009 in the Caernarvon area. No samples were collected in 1993, 1994, 1997, and 2008.

Recent proportional stock densities (PSD) and relative stock densities for preferred length fish (14-20 inches) in the Caernarvon area are within the objective range of 40-70 and 10-40,

respectively, for a balanced largemouth bass population (Figure 1; Anderson and Neumann 1996). Mean catch rates (Figure 2), total catch rates by length classification (Figure 3), and length frequency distributions (Figure 4) indicate a healthy bass population.

Catch rates appear to decrease with increasing mean discharge from the diversion (Figure 2). However, mean annual discharge did not significantly predict catch rate and only 10% of the variation in catch rate was explained by mean annual discharge (linear regression: $F = 0.67$; $df = 1,6$; $r^2 = 0.10$; $P = 0.44$; alpha = 0.05). Several studies have shown increases in catch rates in reservoirs as a result of increasing spring-time water levels (Boxrucker et al. 2005; Meals and Miranda 1991; Sammons et al. 1999; Sammons and Bettoli 2000). There was no significant relationship between mean spring-time discharge (average discharge from February, March, and April) and catch rates ($F = 1.85$; $df = 1,6$; $r^2 = 0.24$; $P = 0.22$). In addition, it is possible that changes in habitat at fixed stations have caused bias in largemouth bass abundance estimates. The potential use of randomly-selected sampling stations in this dynamic area will be investigated to determine if the fishery can be assessed with greater accuracy. It is possible that largemouth bass abundance has decreased at fixed stations and may not reflect true trends in relative abundance changes in the fishery as a whole.

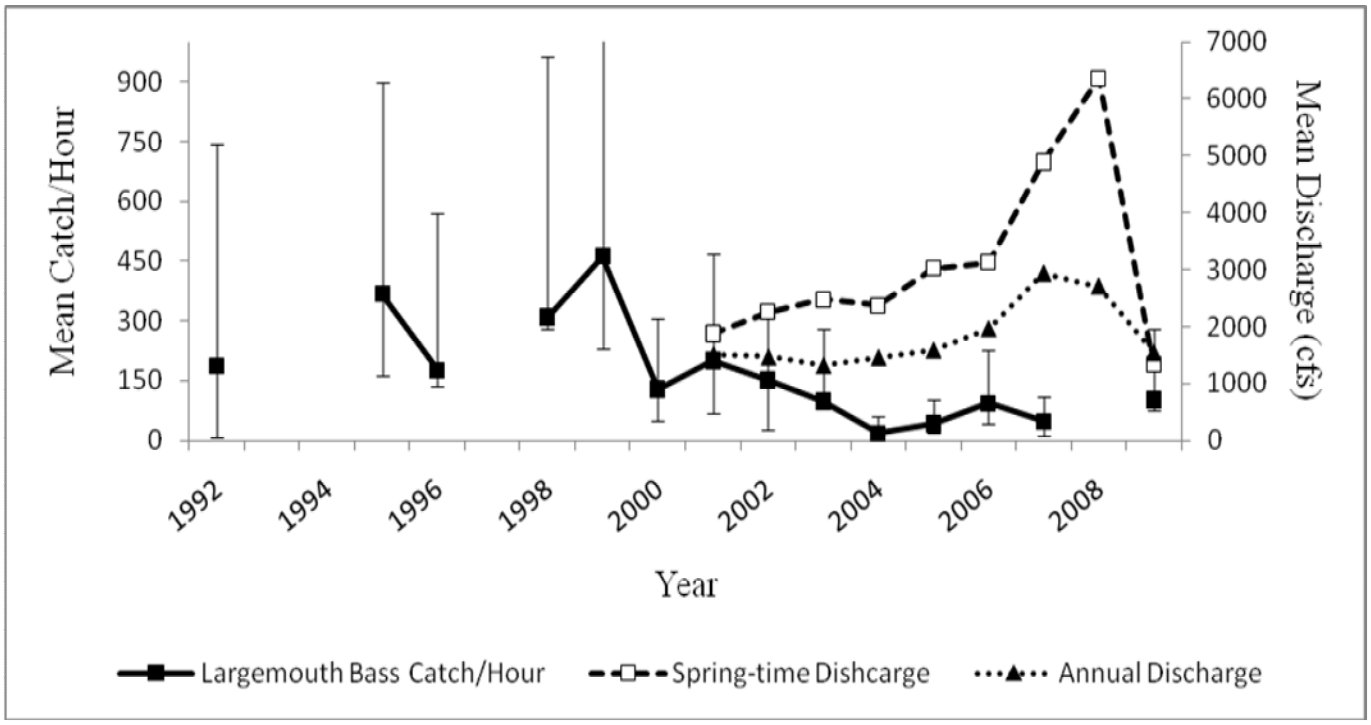

Figure 2. The solid black line represents mean catch per hour of largemouth bass collected in spring electrofishing samples from 1992-2009 in the Caernarvon area. Error bars represent 95% confidence limits of the mean catch per unit effort. The dashed black lines represent mean discharge of the Caernarvon Freshwater Diversion (USGS data). No catch data were collected in 1993, 1994, 1997, and 2008 and discharge data was not available prior to 2001.

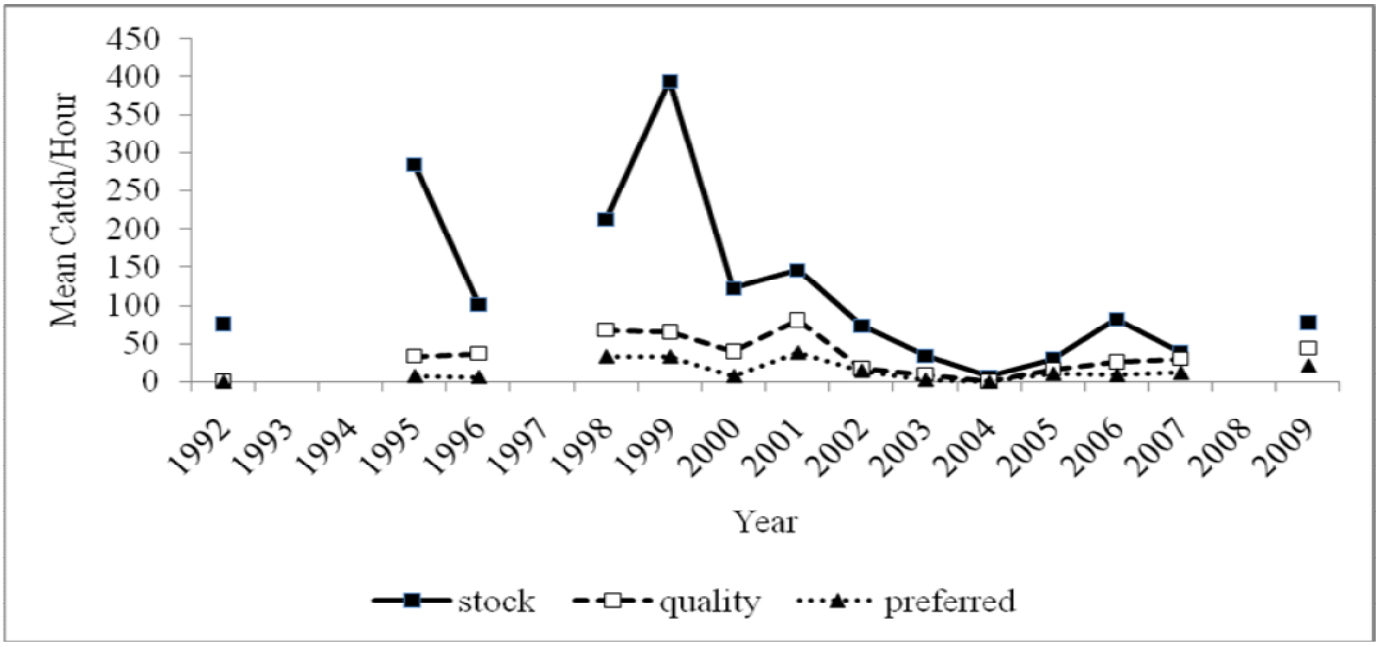

Figure 3. Largemouth bass total catch per hour for stock length, quality length, and preferred length fish collected in spring electrofishing samples from 1992-2009 in the Caernarvon area. No data were collected in 1993, 1994, 1997, and 2008.

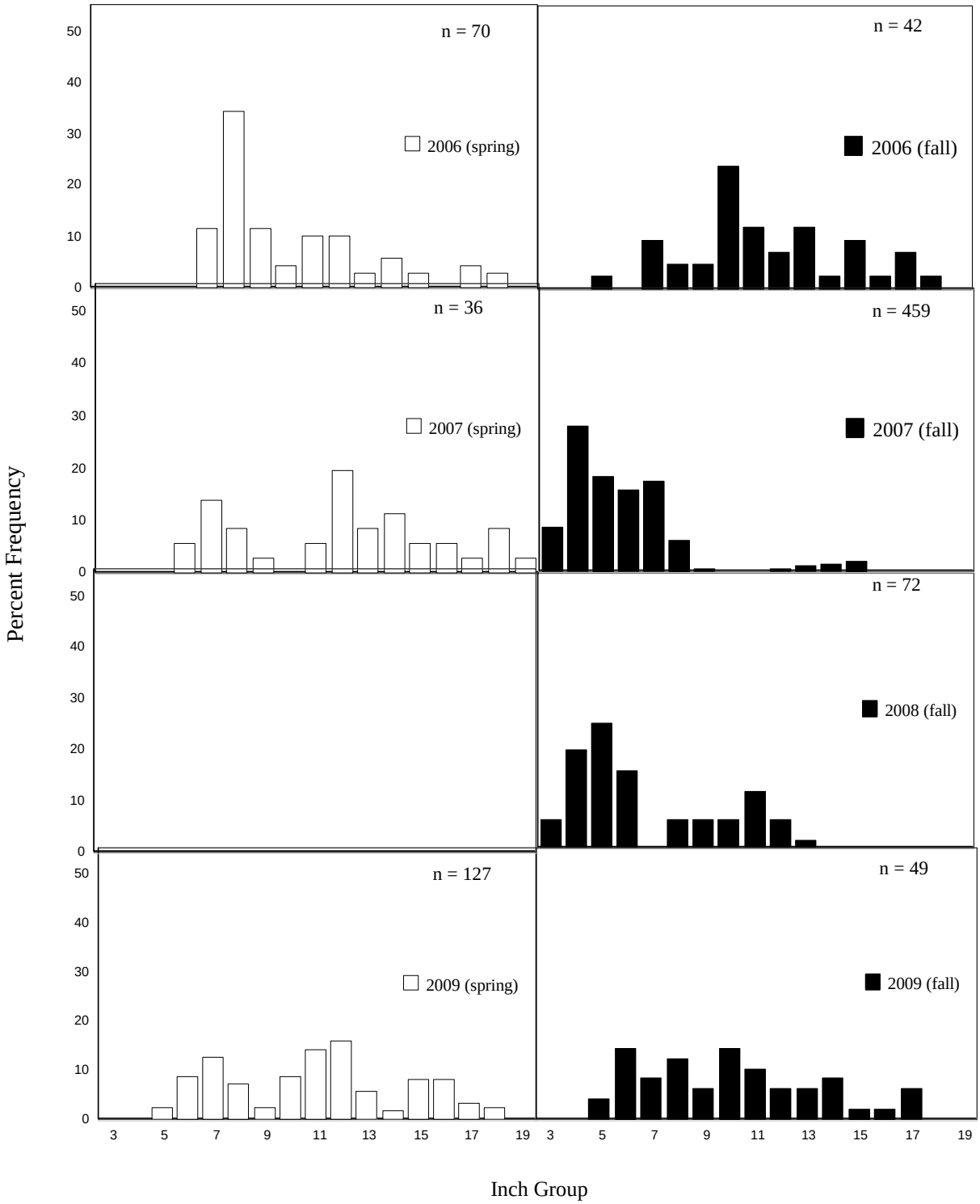

Figure 4. Length frequency distribution for largemouth bass collected in spring and fall electrofishing samples in 2006, 2007, 2008, and 2009 in the Caernarvon area.

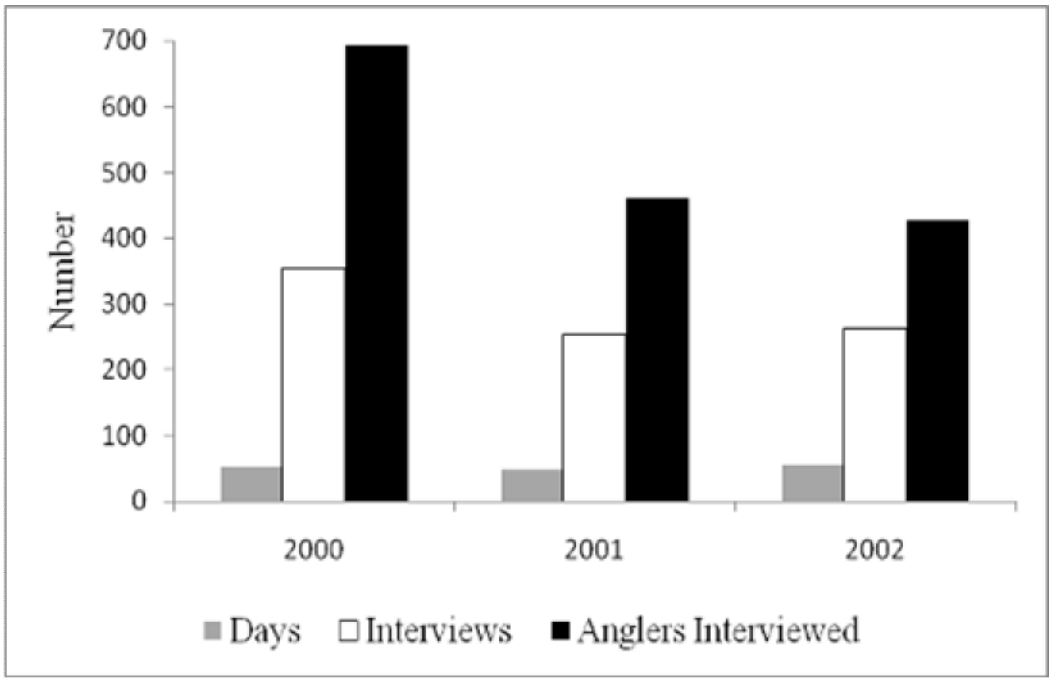

Figure 5. Number of creel days, interviews, and anglers interviewed during a three year (2000-2002) access point creel survey in the Caernarvon area.

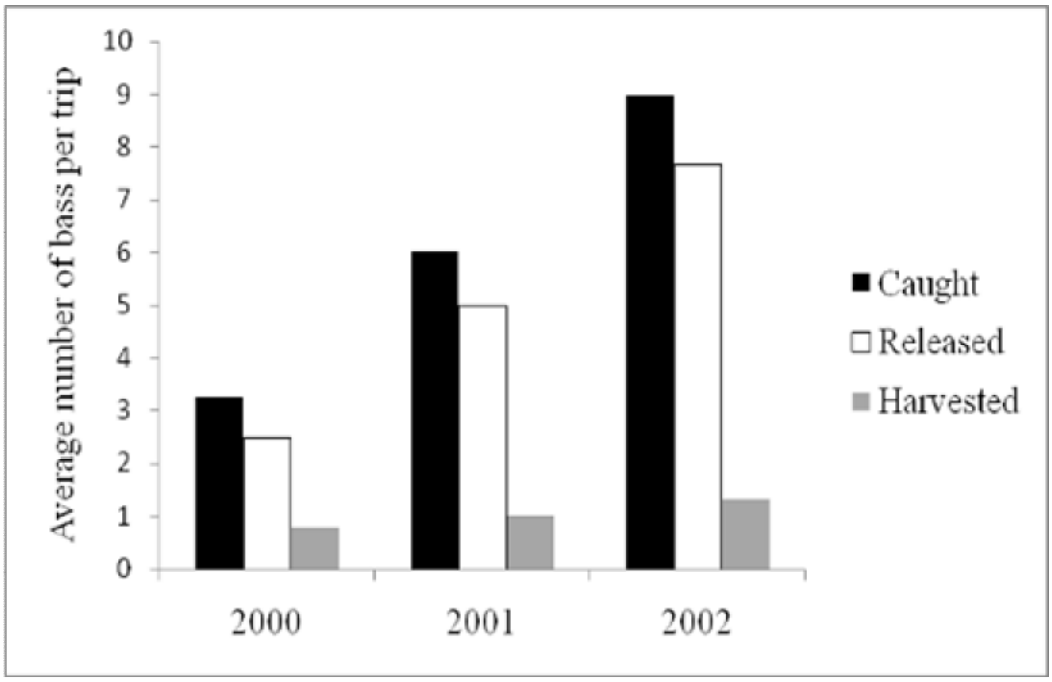

Figure 6. Average number of bass caught, released, and harvested per trip and reported by anglers during a three year (2000-2002) access point creel survey in the Caernarvon area.

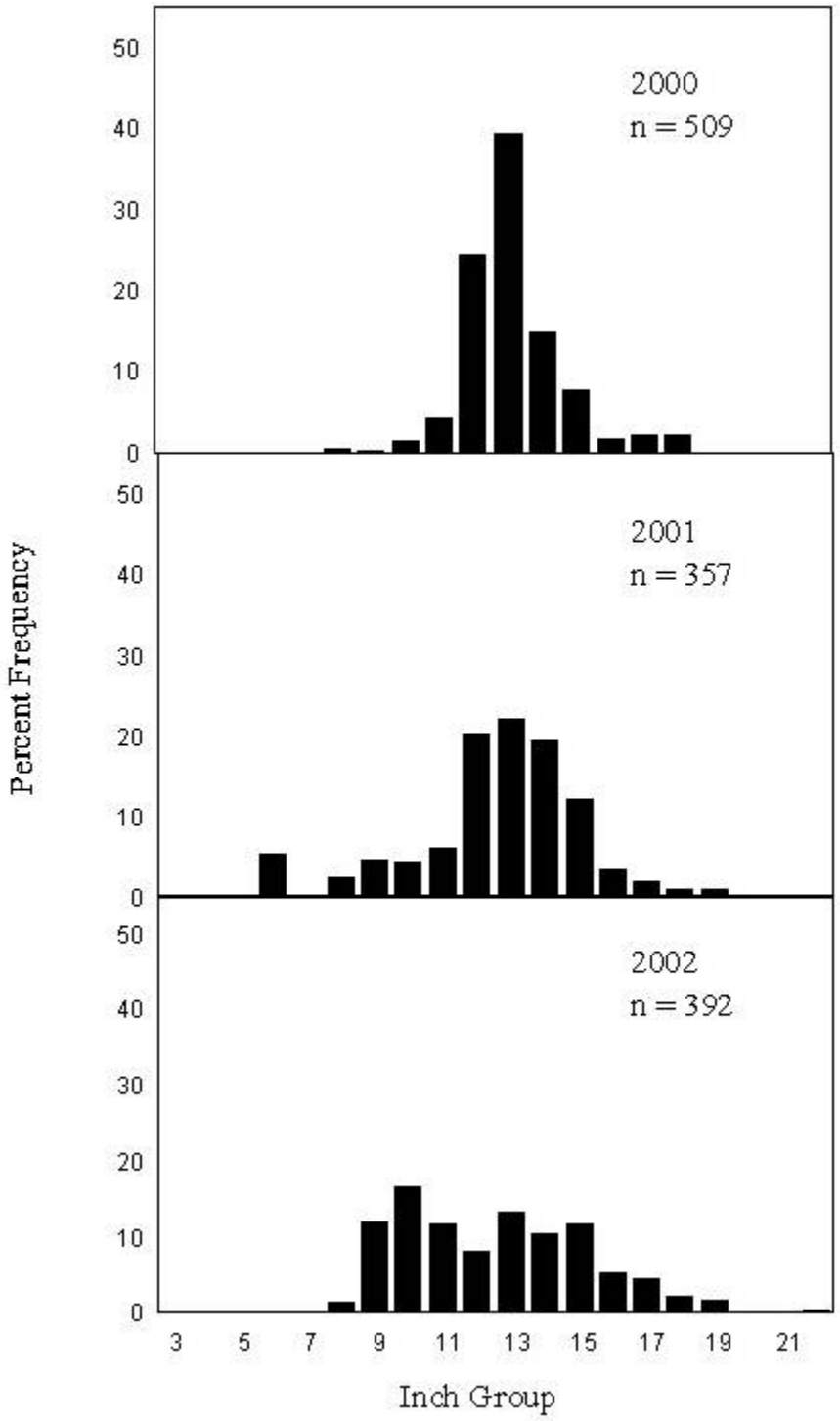

Figure 7. Length frequency distribution for largemouth bass harvested by anglers and reported during a three year (2000-2002) access point creel survey in the Caernarvon area.

In response to angler requests for more protective regulations for largemouth bass in the Caernarvon area, a three year access point creel survey was initiated in 2000. The purpose of the survey was to collect pertinent data regarding the public use of the local largemouth bass fishery. The number of creel days ranged from 48-55 per year from 2000-2002 (Figure 5). The number of interviews conducted and the number of anglers interviewed ranged from 255-354 and 428-693, respectively from 2000-2002 (Figure 5).

Creel data suggested that any concerns regarding anglers harvesting high numbers of bass were unwarranted (Figure 6). The majority of fish caught by anglers were released in 2000, 2001, and 2002 (76, 83, and 85%, respectively; Figure 6). Electrofishing data collected by LDWF suggested that there were sufficient smaller bass < 9 inches total length (TL) available for harvest (Figure 4). The majority of surveyed anglers targeted fish > 9 inches TL (Figures 7) and released smaller fish. Only 31, 18, and 42 percent of harvested bass in 2000, 2001, and 2002, respectively, were < 12 inches TL. A minimum length regulation would have protected only a small percentage of harvested fish. While a slot limit would have protected some larger fish from harvest, the number of harvested fish was minimal. Because survey results suggested that angler harvest was a minor influence, more restrictive harvest regulations were considered unnecessary.

Genetics

Genetic analysis was conducted on largemouth bass samples collected in the Caernarvon area during 1997, 1999, 2000, 2002, and 2007 electrofishing samples (Table 1). The average total length of bass used for analysis was 379, 354, 329, and 347 mm in 1997, 1999, 2000, and 2002, respectively. The average weight of bass used for analysis was 1152, 811, 651, and 870 grams in 1997, 1999, 2000 and 2002, respectively. No length and weight data were available for fish collected in 2007. Allozyme starch gel electrophoresis analyses were conducted at the Louisiana State University School of Renewable Natural Resources.

The continued stocking of Florida largemouth bass was dependent upon the population's genetic make-up after 3 years of stocking. If the population had at least a 20% Florida gene influence, then the water body was considered a viable candidate. However, if the Florida gene influence was less than 20% after 3 years, stocking was discontinued.

After several years of stocking, the Florida largemouth bass gene was not successfully incorporated into the Caernarvon largemouth bass population (Table 1). Bass stocked at very small sizes most likely became prey for larger predators before becoming established. In addition, there is increased predation on largemouth bass in a marsh system compared to a freshwater lake or reservoir (Meador and Kelso 1990). However, native northern largemouth bass have successful recruitment and high relative weights despite increased exposure to predations. It is possible that Florida largemouth bass are not successfully recruited to the fishery because of their initial susceptibility to predation and reproductive competition with native largemouth bass.

Table 1. Percent composition of northern, Florida, and F_x largemouth bass (intraspecific hybrids) collected during fall electrofishing samples. Included are size and number of Florida largemouth bass stocked in the Caernarvon area.

YEAR	SIZE	FLMB STOCKED	GENETIC SAMPLING RESULTS				
			N	% NLMB	% FLMB	% F_X	TOTAL FLORIDA INFLUENCE
1996	Fingerlings	39,000					
1997	Fingerlings	55,235	75	80	2	18	20
1998	Fingerlings	243,603					
	Adults	43					
1999	Advanced Fry	300,000	100	88	0	12	12
	Fingerlings	260,956					
2000	Sac Fry	119,900	91	84	16	0	16
	Fingerlings	120,208					
2001	Phase II Fingerlings	10,010					
2002	Phase II Fingerlings	1,520	43	81	5	14	19
2003	Phase II Fingerlings	2,178					
	Adults	173					
2005	Phase II Fingerlings	14,710					
2006	Fingerlings	96,424					
	Phase II Fingerlings	2,025					
	Adults	92					
2007			100	82	1	17	18
2008	Phase II Fingerlings	1,200					

Forage –

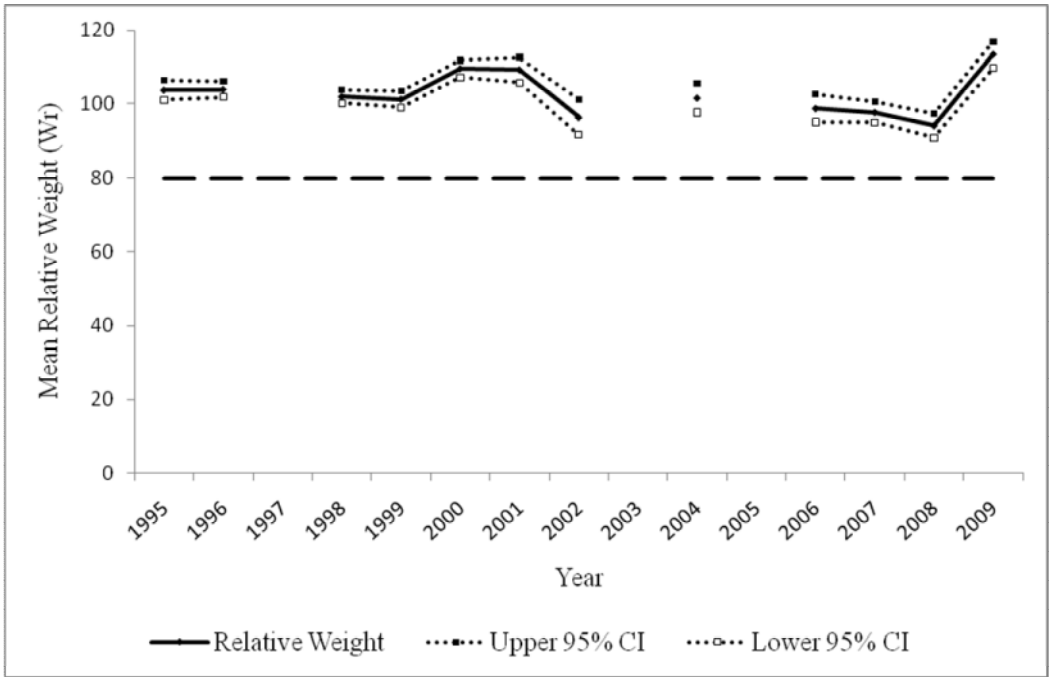

Figure 8. Mean relative weight of largemouth bass collected in fall electrofishing samples in the Caernarvon area 1995-2009. No samples were collected in the fall of 1997, 2003, and 2005.

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. Low largemouth bass relative weights below 80 indicate a potential problem with forage availability. Relative weights of largemouth bass caught in the Caernarvon area are between 95 and 120 for all stock length fish, indicating an adequate forage base (Figure 8). Shoreline seine sampling is not a practical sampling method in the Caernarvon area because of the abundance of organic material and steep sloping banks along oil field canals throughout the system.

Crappie –

There are limited data available for crappie in the Caernarvon area. Crappies are seldom collected in electrofishing samples and lead nets cannot be set because of shallow depths. During the 2000-2002 creel survey, only one angler reported crappie as their target species. Because crappies in the Caernarvon area are such a minor component of the fish population, continuous monitoring and specific management for the species is not conducted.

Commercial

According to trip ticket information submitted to LDWF by commercial fisherman, commercial species of interest in the Caernarvon area include alligator gar, minnows, blue

catfish, channel catfish, and gizzard shad (Table 2). Commercial landings are relatively low and cause no concern for additional regulations.

Table 2. Commercial landings reported from the Caernarvon area from 2000-2007 at the non-confidential level ("0" indicates confidential landings and "." indicates no reported landings).

Species	2000	2001	2002	2003	2004	2005	2006	2007
Alligator Gar	13,964	11,477	0	0	0	0	0	0
Minnows	1,003	0	575	0	994	.	.	.
Blue Catfish	0	0	.	0	.	0	.	.
Channel Catfish	0	.	.	0	.	0	.	.
Gizzard Shad	.	.	.	0	.	.	.	.

Species of Special Concern

The Gulf Sturgeon (*Acipenser oxyrinchus desotoi**)*** is a threatened species of concern in southeastern Louisiana. On January 25, 1994 a 42 lb. Gulf sturgeon measuring 57 inches total length was caught, tagged and released in the southeastern part of Caernarvon near Delacroix. The tagged fish was never relocated. An unsuccessful attempt to track the fish by plane was made on August 2, 1994.

HABITAT EVALUATION

Aquatic Vegetation

Salt water intrusions as a result of Hurricanes Katrina, Gustav, and Ike have limited the spread of giant salvinia (*Salvinia molesta*) and water hyacinth (*Eichhornia crassipes*) in the surrounding area. There was little need for chemical treatments in 2009. The area will continue to be monitored for nuisance aquatic vegetation.

Substrate

The Caernarvon area is a marsh environment with soft organic substrate that is typically associated with preferred nesting fish habitat. However, largemouth bass recruitment is evident and the population is self-sustaining.

Complex Cover

A combination of hanging tree limbs, stumps, tree roots, submerged woody debris, and submerged aquatic vegetation provide adequate structure in this marsh environment. No artificial structure is needed.

CONDITION IMBALANCE / PROBLEM

1. There is an abundance of organic material in this area. Organic material is not ideal for optimal largemouth bass spawning success.
2. Several popular fishing canals were silted in as a result of Hurricanes Katrina, Gustav, and Ike.

CORRECTIVE ACTION NEEDED

1. Dredge canals to increase bass habitat and angler access.

RECOMMENDATIONS

There are numerous stakeholders in the Caernarvon Freshwater Diversion Outfall Area that are impacted (positively or negatively) by the operations of the diversion. The project was authorized to enhance emergent marsh vegetation growth, reduce marsh loss, and increase the productivity of significant commercial and recreational fish and wildlife (LDNR 2003). However, it is difficult to manage the diversion and satisfy all stakeholders. I recommend the following steps before requesting changes to the operational plan of the diversion for sportfish management.

1. Continuation of standard sampling and increase efforts to:
    a. Standardize sampling conditions (i.e., sampling is conducted during similar flow rates in the spring and fall each year)
    b. Investigate random sample site selection in order to increase the precision of catch rate indices.
    c. Collect growth and mortality data for largemouth bass in the Caernarvon area to have a better understanding of the population. Additional data such as age class structure and growth rates will enable us to look for trends in the overall condition of the population in relation to environmental parameters.

To avoid negative impact to other stakeholders, we need to increase the precision of our largemouth bass catch indices before conclusions and associated recommendations are submitted.

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