LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

OFFICE OF FISHERIES
INLAND FISHERIES DIVISION

PART VI -A

WATERBODY MANAGEMENT PLAN SERIES

BIG MAR - CAERNARVON

LAKE HISTORY & MANAGEMENT ISSUES

CHRONOLOGY

DOCUMENT SCHEDULED TO BE UPDATED ANNUALLY

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WATER BODY HISTORY

GENERAL INFORMATION

The Big Mar – Caernarvon Freshwater Diversion Outfall is an area of coastal wetlands located southeast of New Orleans, LA in Plaquemines Parish and is situated east of the Mississippi River (Figure 1). It is composed of interconnected lakes, bayous, lagoons, and canals that are subjected to tidal influence. Big Mar is an open water area created by an abandoned agriculture field covering 2,040 acres. The Caernarvon Freshwater Diversion was designed to divert freshwater from the Mississippi River (including nutrients and sediment) at a rate of up to 8,000 cubic feet per second (cfs) into the adjacent marshes to promote wetland restoration and wildlife and fisheries enhancement (LDNR 2003). The area ranges from fresh to salt marshes and is monitored by several agencies and non-government organizations. Specifically, the Louisiana Department of Natural Resources (LDNR) monitors the plant communities, and the Louisiana Department of Wildlife and Fisheries (LDWF) monitors the freshwater (Inland Fisheries Division) and saltwater (Marine Fisheries Division) fish/shell fish communities. Alligator, duck, and muskrat populations are also monitored by LDWF.

Date waterbody formed

The agricultural field, that would later be named Big Mar, was created in the early 1900's. The United States Department of Agriculture promoted the draining of marsh to provide agricultural opportunities for farmers. This field, along with several others, was considered unsuccessful as an agricultural operation.

The Caernarvon Freshwater Diversion Project was constructed between 1988 and 1991, and began operations in August 1991 (LDNR 2003).

Impoundment

Owners

The Delacroix Corporation is the major landowner of the marsh in the Caernarvon Freshwater Diversion outfall area. However, there are several other landowners in the area, including Milton Nussbaum et al., landowner of the marsh surrounding Big Mar.

Purposes for creation

Prior to the creation of the Caernarvon Freshwater Diversion, the surrounding area was losing approximately 1,000 acres of marsh annually and experiencing increases in salinity. The addition of river levees prohibited natural flooding of the river that once provided the marshes with freshwater, nutrients, and sediment. The diversion was created to artificially restore the connection between the river and the surrounding marshes. This connection delivers freshwater, nutrients, and sediments into the surrounding area to restore wetlands, build land, and enhance fisheries and wildlife production.

Size

The Caernarvon Freshwater Diversion affects approximately 77,000 surface acres of surrounding marsh.

Watershed
The watershed includes Plaquemines Parish east of the Mississippi River guide levee, New Orleans East, and St. Bernard, west of the Mississippi River Gulf Outlet. Areas included in the Mississippi River watershed also affect the area as a result of the diverted river water.

Parish/s located
The Big Mar – Caernarvon Freshwater Diversion is located in both Plaquemines and St. Bernard Parishes of Louisiana.

Border waters
The Big Mar – Caernarvon Freshwater Diversion is bordered by the Mississippi River in the North, Bayou Terre Aux Boeufs in the East, Breton Sound in the South, and by the Forty Arpent Canal in the West.

Diversion Structure description
Gate size – 15-foot square gated culverts
Number of gates - 5
Condition – The gates are currently in good working condition. Repairs were made as a result of minor damage following Hurricanes Katrina and Gustav.
Flow rate – The maximum allowable discharge of the structure is 8,000 cubic feet per second (cfs). The average annual flow for a 12 year period, August 1991 to September 2003, when the structure was operational ranged from 1,741 cfs to 1,108 cfs including periods when the structure was not operated.

Who controls
The Caernarvon Freshwater Diversion Project (BS08) was authorized by the Flood Control Act of 1965, (PL 89-298), the Water Resources Development Act (WRDA) 1974 (PL 93-251), and WRDA 1986 (PL 99-622). The projects objectives include:

1) Enhancement of emergent marsh vegetation growth
2) Reduction of marsh loss
3) Increase in significant commercial and recreational fisheries productivity
4) Increase in significant commercial and recreational wildlife productivity

The U.S. Army Corps of Engineers constructed the freshwater diversion and LDNR is responsible for its operation. The Caernarvon Interagency Advisory Committee (CIAC) consists of 14 representatives from federal and state agencies, fisheries, and landowners and provides overall operational oversight. The advisory committee was established pursuant to a written agreement between the U.S. Army Corps of Engineers and LDNR and is to advise the Secretary of LDNR relative to the operation of the structure. The actual amount of diverted flow depends on a detailed operational plan that is set by the CIAC every year (Table 7) and river stages in the Mississippi River. A technical work committee consisting of the U.S. Army Corps of Engineers and four State agencies was established to provide advice relative to the operation of the structure, and collection, analysis, interpretation and reporting of monitoring data. Additional information is available on LDNR's website:

http://dnr.louisiana.gov/crm/coastres/project.asp?id=BS-08

The Louisiana Department of Natural Resources developed a detailed monitoring plan for the Caernarvon Diversion Outfall Management Project (Carter 2003). The Caernarvon Diversion Outfall Management Project (BS03a) was authorized by the Coastal Wetlands Planning, Protection, and Restoration Act (CWPPRA) to improve the distribution of the diverted freshwater, sediments and nutrients. Monitoring of that project provided information about the affects of the diversion and to provided valuable information to the CIAC

LAKE AUTHORITY

Association
Members – See below

Authorization

The Caernarvon Freshwater Diversion is operated by LDNR. The Caernarvon Interagency Advisory Committee (CIAC) provides insight to the department and recommends flow regimes. The committee consists of the following individuals (2005):

Garrett Broussard (Chair)	LA Dept of Natural Resources
Micheal Saucier	U.S. Army Corp of Engineers
David Walther	U.S. Fish and Wildlife Service
Richard Hartman	National Marine Fisheries Service
Heather Warner-Finley	LA Dept of Wildlife and Fisheries
Bruce Champion	LA Dept of Health and Hospitals
David Oge	LA Dept of Environmental Quality
Lonny Serpas	Plaquemines Parish Government
Charles Reppel	St. Bernard Parish Government
Jim Hasik	Recreational Fisheries
David Dawson	Landowner Representative
Loland Broussard	Natural Resources Conservation Service
Kenny Fox	Local Oyster Representative
George Barisich	Local Shrimp Representative

ACCESS

(SEE LOCATION MAP – Figure 2)

Boat docks/ramps
Public free ramp at Hwy. 39 on the border of St. Bernard, Plaquemines Parish line
Private pay ramp at Hwy. 39 on the border of St. Bernard, Plaquemines Parish line
Private pay ramp/hoist at Delacroix Island Hwy. 300, St. Bernard Parish

Piers
There are no fishing piers in the Big Mar - Caernarvon area.

State/Federal facilities
St. Bernard State Park in St. Bernard on Hwy. 39 offers camping and backpacking. There are no boat ramps in this park (http://www.crt.state.la.us/parks/iStbernrd.aspx).

Reefs
There are no artificial reefs in the Big Mar - Caernarvon area.

SHORELINE DEVELOPMENT

State/National Parks
There is very little development in St. Bernard State Park. The buildings include a maintenance building, comfort station, bathhouse, swimming pool, restrooms, and a pavilion.

Shoreline development by landowners
There are several buildings near the public boat ramp off of LA Hwy 39 east of the diversion canal and Bayou Terre Aux Boeufs is lined with private fishing/hunting camps off of Delacroix highway. However, the majority of the Caernarvon Freshwater Diversion outfall area is undeveloped.

PHYSICAL DESCRIPTION OF WATER BODY

Average depth
4 feet

Maximum depth
12 feet

Natural water fluctuation
Data from the Coastwide Reference Monitoring System (CRMS), established and managed by the LDNR, has recorded water levels ranging from 0.01 to 5.57 NAVD 88 (feet) throughout the Caernarvon area. However, these stations are located in marsh areas and very few represent water levels of canals, lakes, etc. The water levels in this area are affected by

both tidal fluctuations and diversion discharge. Sedimentation from the diversion is decreasing the water depth within Big Mar; marsh vegetation is beginning to grow in areas that were previously open water. Current and recent water levels can be viewed at USGS's website:
http://waterdata.usgs.gov/la/nwis/uv/?site_no=295124089542100&PARAmeter_cd=00065,72020,63160,00060

EVENTS/PROBLEMS

Aquatic Vegetation

The influx of freshwater from the Mississippi River has resulted in an increase of aquatic vegetation such as water hyacinth (*Eichhornia crassipes)* making navigation through waterways difficult.

Hurricanes

The Caernarvon area was greatly affected by Hurricane Katrina in 2005. The area experienced significant land loss and increased salt intrusion.

Oyster Reefs

Before the construction of the Mississippi River levees, the Caernarvon area was a freshwater system. Louisiana began construction on the Mississippi River levees in the 18th century. These levees prohibited the natural flooding and freshwater input from the river. As a result, increases in salinity drew oyster reefs north into the Caernarvon area.

The Caernarvon Freshwater Diversion was constructed to restore the connection between the marsh and the Mississippi River while maintaining flood protection to the surrounding areas.

MANAGEMENT ISSUES

AQUATIC VEGETATION

Type map

November 20, 2006 - The tide was low and northwest winds had pushed most of the water out of Big Mar. The following plants were observed throughout the waterbody and adjacent canals: floating primrose (*Ludwigia spp.*), water hyacinth (*Eichhornia crassipes*), coontail (*Ceratophyllum demersum*) and Eurasian water milfoil (*Myriophyllum spicatum*). The submerged species, coontail and water milfoil, were the dominant species and were observed from the shoreline to a depth of 2 feet. Water hyacinth was the predominant floating species in the system. Due to high river stages, the diversion was open and river water was flowing through the system; however, navigation was impossible due to shallow water. A mud boat will be used for the next type-map.

September 27, 2007 – Big Mar was surveyed for aquatic plant composition and densities (Figure 3). The average depth of the main water body was 2.5 ft. The most significant observation that year was the presence of giant salvinia. It was sparse near the Caernarvon freshwater diversion structure. Samples were collected and identified as *Salvinia molesta*. Immediate eradication was recommended. Water hyacinth (*Eichhornia crassipes*) was the dominant species. It was located in clumps along the fringes of the main water body. However, it completely blocked several oil gas canals. Coontail (*Ceratophyllum demersum*) and Eurasian water milfoil (*Myriophyllum spicatum*) were found in moderate densities throughout the area. Duckweed (*Lemna minor*) and common salvinia (*Salvinia minima*) were found interspersed with water hyacinth. Water paspalum (*Paspalum repens*), bull tongue (*Sagittaria lancifolia*), primrose (*Ludwigia* spp), and alligator weed (*Alternanthera philoxeroides*) were found in moderate densities along the edge of canals.

Biomass

No samples taken

Treatment history by year available

Biological

No biological controls have been utilized to date.

Chemical

2, 4-D is banned in Plaquemines Parish; therefore, Rodeo is used to control water hyacinth. The most frequently treated areas are Big Mar, Bayou Terre Aux Boeufs, Lake Leary and Oak River.

2008 – 303.5 gallons of Rodeo were used to treat 605.99 acres

Tidal influence also functions as a control measure for aquatic vegetation. Salt water intrusions as a result of Hurricanes Katrina, Gustav, and Ike have limited giant salvinia and water hyacinth in the surrounding area. There has been little to no need for chemical treatments in 2009.

HISTORY OF REGULATIONS

A total of 693 anglers were interviewed in 2000 during the first year of a three year creel survey. The survey included standard creel census questions in addition to angler opinion questions. Anglers were asked a series of questions regarding the implementation of additional creel and or length regulations for largemouth bass in the area. Results of the survey indicated that 78.1% of anglers wanted an increase in length and or creel regulations and only 10.7% wanted to keep the current state regulations. Suggested regulations included some type of minimum size restriction (18.3%), reduced creel (12.8%), change in creel and minimum size restriction (24.3%), and a slot limit (22.7%). In response to the creel survey and decreased catch rates, the Department considered a size restriction and reduced creel limit for largemouth bass. The proposition included two options:

1. A slot limit of 15-18" with a daily creel limit of 5 fish and only one fish over 21"
2. A 14" minimum size limit with a daily creel limit of 5 fish

The first option included a caveat that all anglers fishing in professional bass tournaments were allowed to keep fish within the slot limit.

The influx of nutrients and freshwater from the Caernarvon Freshwater Diversion created conditions that resulted in an outstanding largemouth bass fishery including some bass up to 11 pounds. This attracted many tournament fishermen including the B.A.S.S. Classic in 1999 and 2001. As a result of the increase in largemouth bass size and popularity, the Department considered upgrading the status of Caernarvon to a trophy or quality lake.

Creel data suggested that any concerns regarding anglers harvesting high numbers of bass were unwarranted. The majority of fish caught by anglers were released in 2000, 2001, and 2002 (76, 83, and 85%, respectively). Electrofishing data collected by LDWF suggested that a minimum length regulation would have protected only a small percentage of harvested fish. Although a slot limit would have protected some larger fish from harvest, the number of harvested fish was minimal and suggested fishing pressure was not of concern.

A study conducted in southern Louisiana suggested that marsh bass (i.e., bass that inhabit low-salinity environments such as Caernarvon) have slower growth rates at younger ages than bass that inhabit freshwater environments (Meador and Kelso 1990).

Based on these factors, it was decided to manage the Caernarvon area utilizing statewide 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

See statewide species and gear specific regulations. There are no special regulations for the Caernarvon area.

FISH KILLS / DISEASE HISTORY, LMBV

In 2002, 63 largemouth bass were collected using standard sampling methods and tested for largemouth bass virus. Six individuals (9.5%) tested positive for LMBV. Cell cultures were used to analyze samples.

CONTAMINANTS/POLLUTION

Water quality

There are no records of contamination or pollution in the Caernarvon Diversion outfall area. The Coastwide Reference Monitoring System (CRMS) records temperature, salinity, and

specific conductivity readings on an hourly basis throughout the outfall area. These data (hourly or monthly) can be downloaded at the following website: http://dnr.louisiana.gov/crm/coastres/monitoring.asp

The U.S. Fish and Wildlife Service monitored contaminants in the area pre- and post diversion. While some changes in contaminants were noted post-diversion, the changes were not significant.

Water level
See Natural Seasonal Water Fluctuations

BIOLOGICAL

Fish samples
History

Table 2. LDWF standard sampling history in the Big Mar and Caernarvon Diversion Outfall area.

CAERNARVON FISH SAMPLING	
1992	Electrofishing – 2-15 minute samples (spring)
1995	Electrofishing – 3-15 minute samples (spring) 4-15 minute samples (fall) 1-7.5 minute forage sample
1996	Electrofishing – 3-15 minute samples (spring) 2-15 minute samples (fall) 1-7.5 minute forage sample
1998	Electrofishing – 2-15 minute samples (spring) 2-15 minute samples (fall) 1-7.5 minute forage sample
1999	Electrofishing – 2-15 minute samples (spring) 4-15 minute samples (fall) 2-7.5 minute forage samples
2000	Electrofishing – 4-15 minute samples (spring) 4-15 minute samples (fall) 1-7.5 minute forage sample Creel Survey
2001	Electrofishing – 4-15 minute samples (spring) 4-15 minute samples (fall) 1-7.5 minute forage sample Creel Survey
2002	Electrofishing – 4-15 minute samples (spring) 4-15 minute samples (fall) 1-7.5 minute forage sample Creel Survey
2003	Electrofishing – 8-15 minute samples (spring)

2004	Electrofishing – 4-15 minute samples (spring) 4-15 minute samples (fall) 1-7.5 minute forage sample
2005	Electrofishing – 9-15 minute samples (spring)
2006	Electrofishing – 3-15 minute samples (spring) 4-15 minute samples (fall)
2007	Electrofishing – 3-15 minute samples (spring) 3-15 minute samples (summer) 4-15 minute samples (fall)
2008	Electrofishing – 2-15 minute samples (fall) 2-7.5 minute forage samples
2009	Electrofishing – 4-15 minute samples (spring) 4-15 minute samples (fall) 1-15 minute forage sample
2010	Standard sampling will be conducted every year in the spring and fall

Lake records

No formal listing of water body records is kept.

Note: In February 1999, an 11.32 lb largemouth bass that measured 24 inches in length was caught in the Caernarvon area by a local fisherman. Genetic analysis was not conducted to determine if the fish was a Florida strain bass.

Stocking History

Table 3. LDWF stocking history in the Big Mar and Caernarvon Diversion Outfall area.

Species	Date	Size	Total
FLMB	11/20/1996	Fingerlings	39,000
FLMB	06/25/1997	Fingerlings	55,235
FLMB	04/07/1998	Adults	43
FLMB	05/13/1998	Fingerlings	101,223
FLMB	05/20/1998	Fingerlings	68,267
FLMB	05/20/1998	Fingerlings	4,535
FLMB	05/20/1998	Fingerlings	40,810
FLMB	05/20/1998	Fingerlings	28,768
FLMB	03/9/1999	Adv. Fry	300,000
FLMB	04/28/1999	Fingerlings	112,132
FLMB	05/21/1999	Fingerlings	148,824
FLMB	03/09/2000	Sac Fry	119,900
FLMB	04/14/2000	Fingerlings	51,612
FLMB	04/14/2000	Fingerlings	68,596

FLMB	12/12/2001	Phase II Fingerlings	322
FLMB	12/13/2001	Phase II Fingerlings	1,952
FLMB	12/19/2001	Phase II Fingerlings	1,650
FLMB	12/19/2001	Phase II Fingerlings	6,086
FLMB	01/15/2002	Phase II Fingerlings	1,520
FLMB	03/10/2003	Adults	173
FLMB	10/22/2003	Phase II Fingerlings	2,178
FLMB	01/23/2005	Phase II Fingerlings	400
FLMB	01/20/2005	Phase II Fingerlings	11,310
FLMB	01/27/2005	Phase II Fingerlings	3,000
FLMB	05/10/2006	Fingerlings	46,970
FLMB	05/10/2006	Fingerlings	23,184
FLMB	05/10/2006	Fingerlings	26,270
FLMB	05/20/2006	Adults	92
FLMB	10/09/2006	Phase II Fingerlings	998
channel catfish	10/16/2006	Fingerlings	5,503
bluegill	11/02/2006	Fingerlings	31,005
bluegill	11/02/2006	Fingerlings	9,192
bluegill	11/02/2006	Fingerlings	26,365
bluegill	11/02/2006	Fingerlings	44,622
FLMB	11/14/2006	Phase II Fingerlings	1,027
FLMB	01/11/2008	Phase II Fingerlings	1,200

Species profile

Table 4. Freshwater and brackish species common to the Big Mar and Caernarvon Diversion Outfall area.

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
Dorosoma cepedianum	gizzard 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
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

Genetics

Genetic analysis was conducted on largemouth bass samples collected in the Caernarvon area during 1997, 1999, 2000, 2002, and 2007 electrofishing samples. Allozyme starch gel electrophoresis analyses were conducted at the Louisiana State University School of Renewable Natural Resources.

Table 5. Largemouth bass genetics in the Big Mar and Caernarvon Diversion Outfall area.

Year	N	% Northern	% Hybrid	% Florida
1997	75	80	18	2
1999	100	88	12	0
2000	91	84	16	0
2002	43	81	14	5
2007	100	82	17	1

Threatened/endangered/exotic species

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

CREEL

Type of Creel

Access point interview (public boat ramp @ Hwy 39)

Historic information

A creel survey was conducted in the Caernarvon area from 2000-2002 (3 full calendar years). The calendar months were divided into light and peak fishing periods as shown in Table 6. The creel start time, 2 hours after sunrise (am) or 4 hours before sunset (pm), was chosen randomly. All anglers passing through the access point were surveyed and trailer counts were made once throughout the five hour duration.

Table 6. Creel schedule for the Caernarvon Diversion Outfall area from 2000-2002.

Month	Fishing Pressure	Total # of Days	# of Weekends	# of Weekdays	Survey Duration (hours)
January	peak	6	4	2	5
February	peak	6	4	2	5
March	peak	6	4	2	5
April	light	3	2	1	5
May	light	3	2	1	5
June	light	3	2	1	5
July	light	3	2	1	5
August	light	3	2	1	5
September	light	3	2	1	5
October	peak	6	4	2	5
November	peak	6	4	2	5
December	light	3	2	1	5

Current methods

There is no creel survey in the Caernarvon area at this time.

HYDROLOGICAL CHANGES

(SEE CAERNARVON FRESHWATER DIVERSION OPERATIONAL PLAN 2009 – Table 7)

The structure has a discharge capacity of 8000 cubic feet/second (cfs). Once diversion waters enter Big Mar, 66% of those waters exit to the southeast via Bayou Mandeville and flow into Lake Leery and ultimately Bayou Terre aux Boeufs. To the southwest and out through the Delacroix Canal flows another 33% of the total discharge. The remaining 1% of Caernarvon discharge flows westward through the Forty Arpent Canal (van Beek et al. 1982). With only 34% of structure discharge going to the south and west, it is critical to optimally manage the structure's outfall in these regions. The overall purpose of the Caernarvon Outfall Management Project is to encourage the inundation of interior marshes south and west of Big Mar with Caernarvon diversion flows before the discharge is conveyed to the lower reaches of the basin by channelized flow through bayous and canals. That will be accomplished by installing culverts with either interior flap gates or exterior sluice gates into existing plugs and spoil banks. Once diversion waters are in the interior marshes, increased retention time is needed to facilitate distribution of the fresh water, deposition of suspended sediments, and assimilation of nutrients by the vegetation communities. That goal will be attained by enhancing existing spoil banks and installing plugs in key locations where introduced diversion waters are currently able to discharge from the interior marshes back into bayous and canals.

WATER USE

Hunting

The Caernarvon area is a popular destination for hunting waterfowl and other game. The Delacroix Corporation leases the majority of their land to duck hunters.

Fishing

Largemouth bass fishing is popular in the Caernarvon area, especially for tournament fishermen. However, increased siltation and presence of aquatic vegetation is making it increasingly difficult to access fishing locations.

Trapping

Alligator harvesting is an important industry in this area and since the opening of the diversion the number of alligator nests increased by 153% (http://sonris.com/direct.asp?path=/sundown/cart_prod/cart_bms_avail_documents_f).

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van Beek, J. L., D. W. Roberts, T. J. Duenckel, D. Davis, D. Sabins, and S. M. Gagliano. 1982. Recommendations for Freshwater Diversion to Louisiana Estuaries East of the Mississippi River. Louisiana Department of Natural Resources. Baton Rouge, Louisiana. 49 pp.

Figure 1. Big Mar – Caernarvon Freshwater Diversion outfall area.

Figure 2. Locations of public and private access points in the Caernarvon Diversion outfall

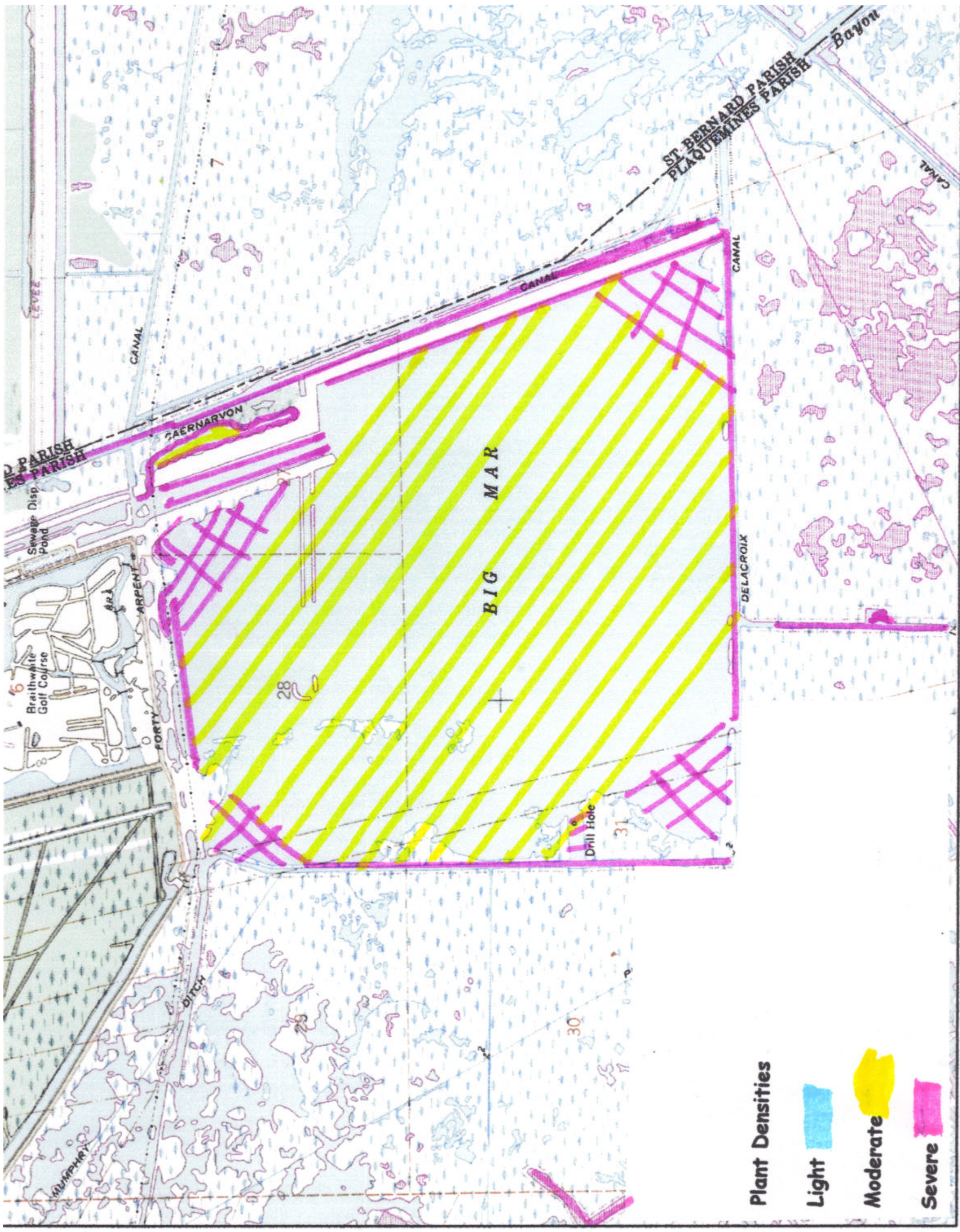

Figure 3. September 27, 2007 type map of aquatic vegetation coverage in Big Mar, LA.

Table 7. Caernarvon Freshwater Diversion Operational Plan 2009.

Month	Flow Range (cfs)[1,2,4]
January	May pulse up to 8,000 and 20 days, otherwise 0-8,000[5]
February	May pulse up to 8,000 and 20 days, otherwise 0-8,000[5]
March	May pulse up to 8,000 and 20 days, otherwise 0-8,000[5]
April	May pulse up to 8,000 and 20 days, otherwise 0-8,000[5]
May	May pulse up to 8,000 and 20 days, otherwise 0-8,000[3,5]
June	May pulse up to 8,000 and 20 days, otherwise 0-8,000[3,5]
July	0-8,000
August	0-8,000
September	0-8,000
October	0-8,000
November	0-8,000
December	May pulse up to 8,000 and 20 days, otherwise 0-8,000[5]

[1] Notwithstanding these flow range targets, operational procedures relating to emergencies, closure of the structure or reduction of flow to reduce the threat of coastal flooding or high water levels reflected by monitoring and operational procedures pertaining to low Mississippi River stage or drought conditions shall all remain in effect.
[2] Salinity at Bay Gardene will be monitored to stay above 3 ppt as a 4 week moving average.
[3] For oyster production, if the salinity at the Bay Gardene station rises above 9 ppt, based on a 4 week moving average, Caernarvon discharge will be increased, but will not exceed 8,000 cfs, to decrease the average to 8-9 ppt.
[4] Seek to maintain annual average 5 ppt line, based on a yearly average, and monitor salinities as to promote enhancement of oyster production in the public seed grounds and to achieve other stated benefits of the project, up to 8,000 cfs.
[5] May modify timing of pulse based on waterfowl or fisheries concerns. Every effort will be made to pulse during river rise for sediment delivery for marsh recovery. Pulses during frontal passage may be done at the discretion of the structure coordinator. The length of the pulse may be at the discretion of the structure coordinator and depend on salinity conditions.