

COASTAL PROTECTION AND RESTORATION AUTHORITY

2024 Caernarvon Freshwater Diversion Operations and Monitoring Summary

CIAC: 12/12/2025



Primary Purpose of the CIAC

Advise CPRA's Executive Director (CIAC Chair) on information relative to the diversion's operational management.

- Information includes recommendations from TWG, OM&M reports, state and federal agency comments, public comments, and other relevant information

Primary Purpose of the TWG

Develop draft Caernarvon and Davis Pond operations plans to recommend to the CIAC/DPAC for the upcoming year.

Caernarvon Freshwater Diversion Background

- ❖ Constructed by USACE between 1988–1991 (start of operations)
- ❖ Located on the east bank of the Mississippi River in Plaquemines Parish (river mile 81.5 above Head of Passes)
- ❖ Five gated 15 ft² culverts; maximum discharge: 8,000 cfs; gravity driven
- ❖ OM&M cost-shared between the USACE (75%) and CPRA (25%)
 - 50-year OM&M plan; 2025: project year 34
- ❖ CPRA is responsible for managing diversion operations.

Goal & Objectives: Caernarvon Freshwater Diversion

Goal

Utilize a controlled Mississippi River diversion to reduce saltwater intrusion in the Breton Sound Basin; maintain estuarine gradient in the basin

Objectives

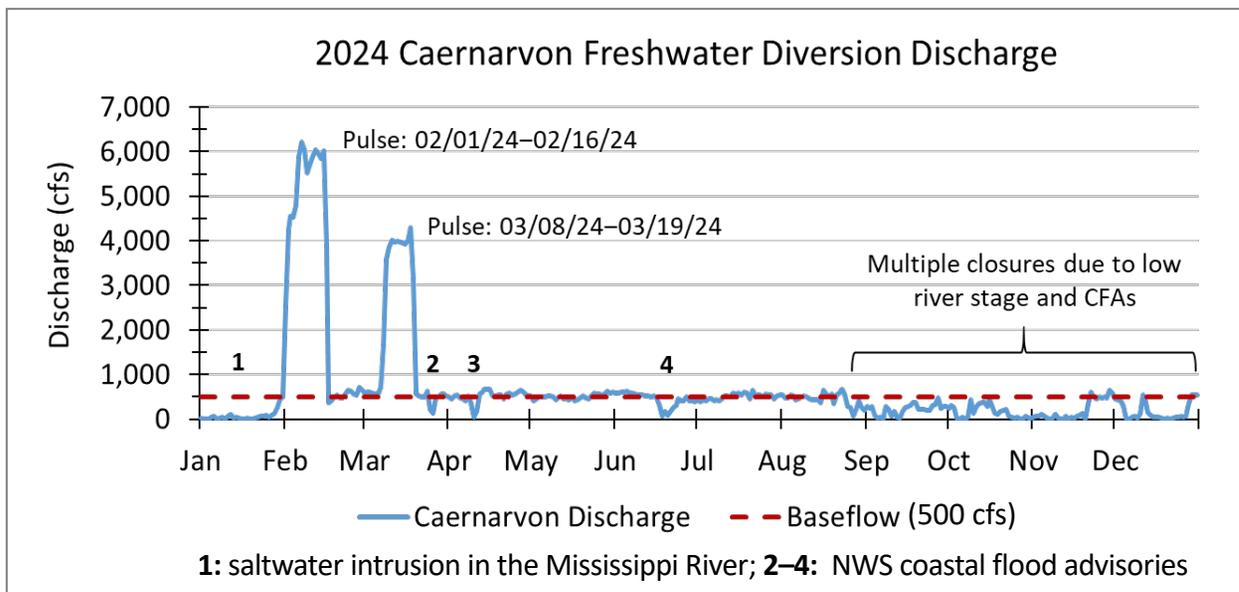
1. Enhance emergent marsh vegetation growth
2. Reduce marsh loss
3. Increase productivity of significant commercial and recreational fish and wildlife

**Caernarvon
Freshwater
Diversion
2024
Operations
Summary**



2024 Caernarvon Operations

- ❖ Two pulses: **27 days** (7% of year)
- ❖ Diversion closed **107 days** (29% of the year): low river stage, NWS advisories, and saltwater intrusion in river.



Mean Discharge

Annual: 674 cfs

1st pulse (16 days): 5,485 cfs

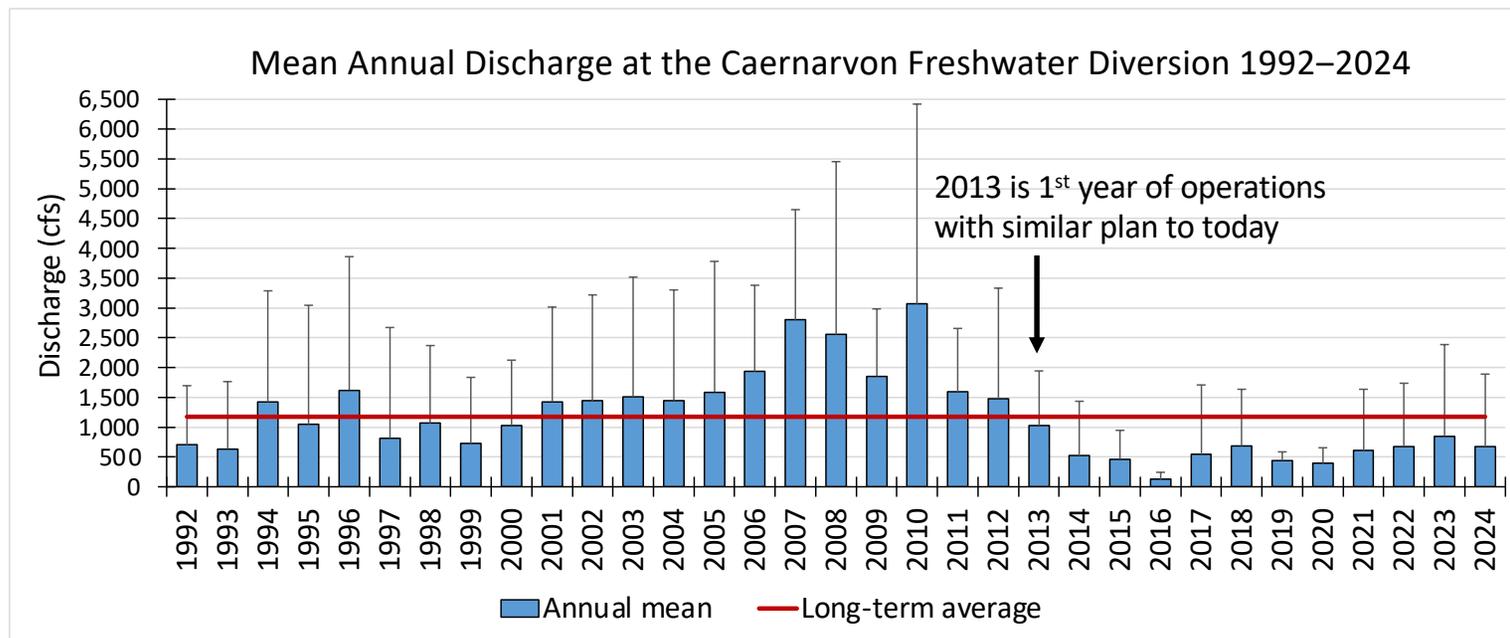
2nd pulse (11 days): 3,967 cfs

Max Discharge

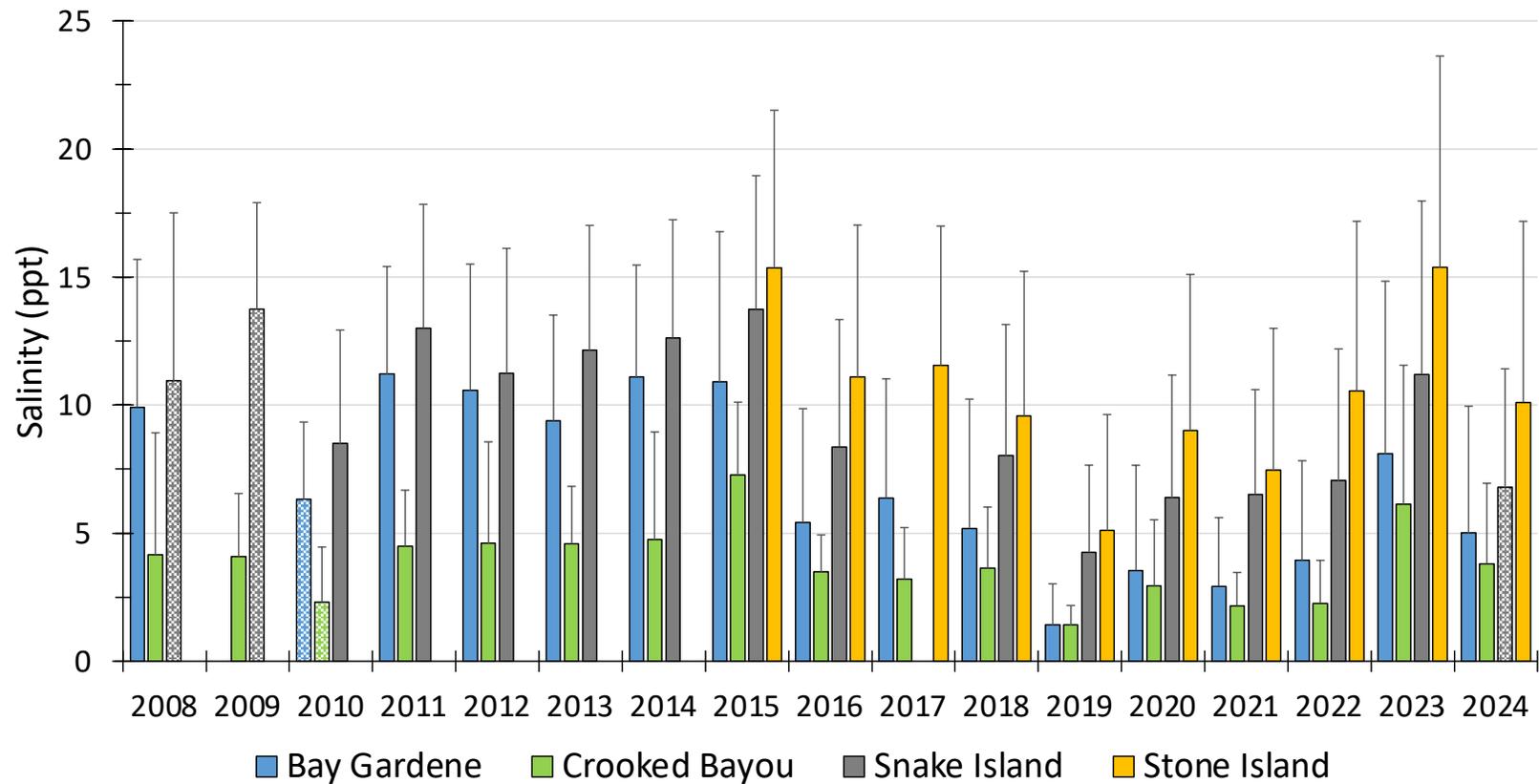
6,820 cfs on 02/07/2024

Annual Caernarvon Operations

- ❖ Pulsed 11 days **less** in **2024** (27 days) than in **2023** (38 days)
- ❖ 2024 annual mean discharge **declined 17%** from 2023 (810 cfs)
- ❖ Current long-term average of 1,174 cfs was last exceeded in 2012.



Annual Caernarvon Salinity



2024 Caernarvon Operations Gages for Salinity (USGS)

❖ Primary gages:

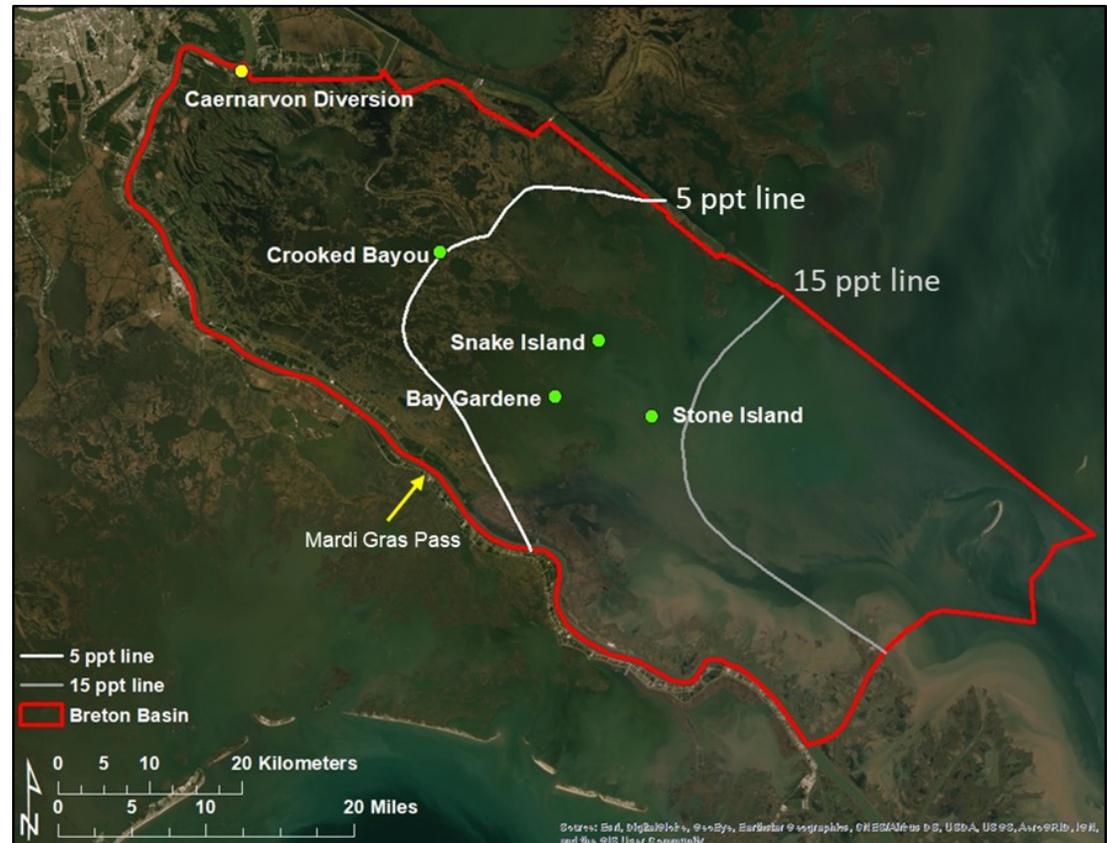
Stone Island

- January–May and December
- 15 ppt isohaline

Crooked Bayou

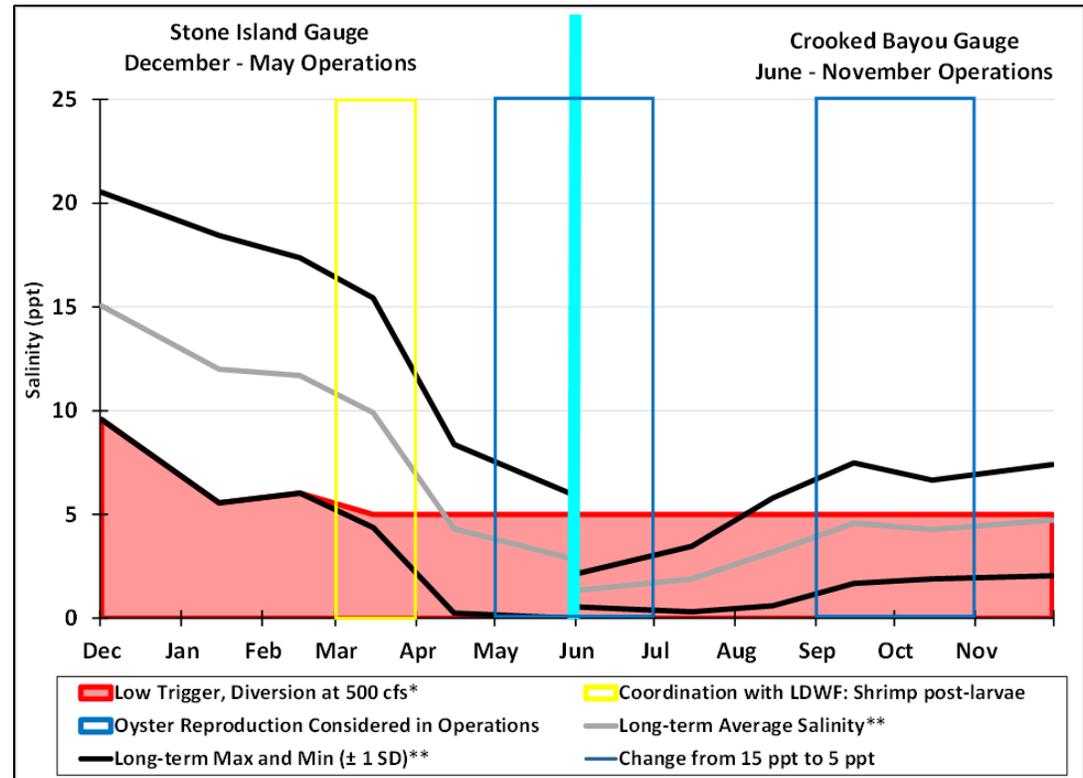
- June–November
- 5 ppt isohaline

❖ Reference gages: Snake Island and Bay Gardene



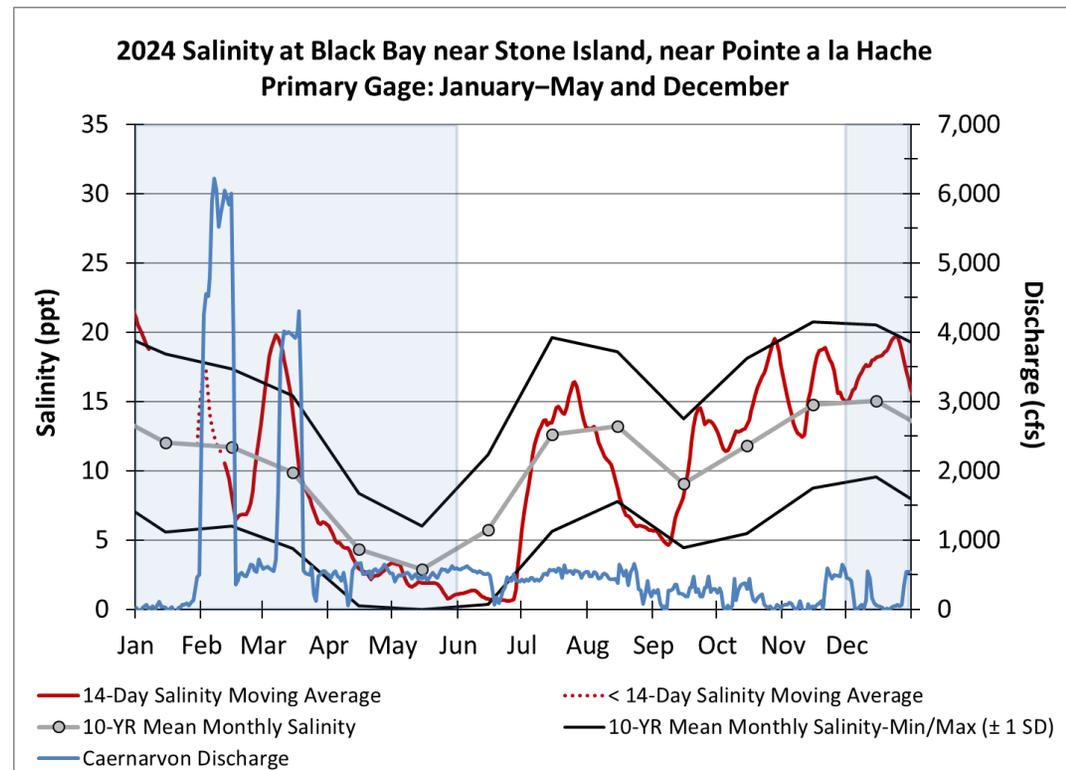
2024 Caernarvon Operations Plan

- ❖ 14-day salinity moving average
- ❖ 10-year monthly mean salinity with range (± 1 SD)
- ❖ Low salinity trigger: **higher** of -1 SD of 10-year monthly mean, or 5 ppt
- ❖ 500 cfs baseflow
- ❖ 3 LDWF consult periods
- ❖ **Adopted a revised plan in 2025 in response to declining basin salinity**



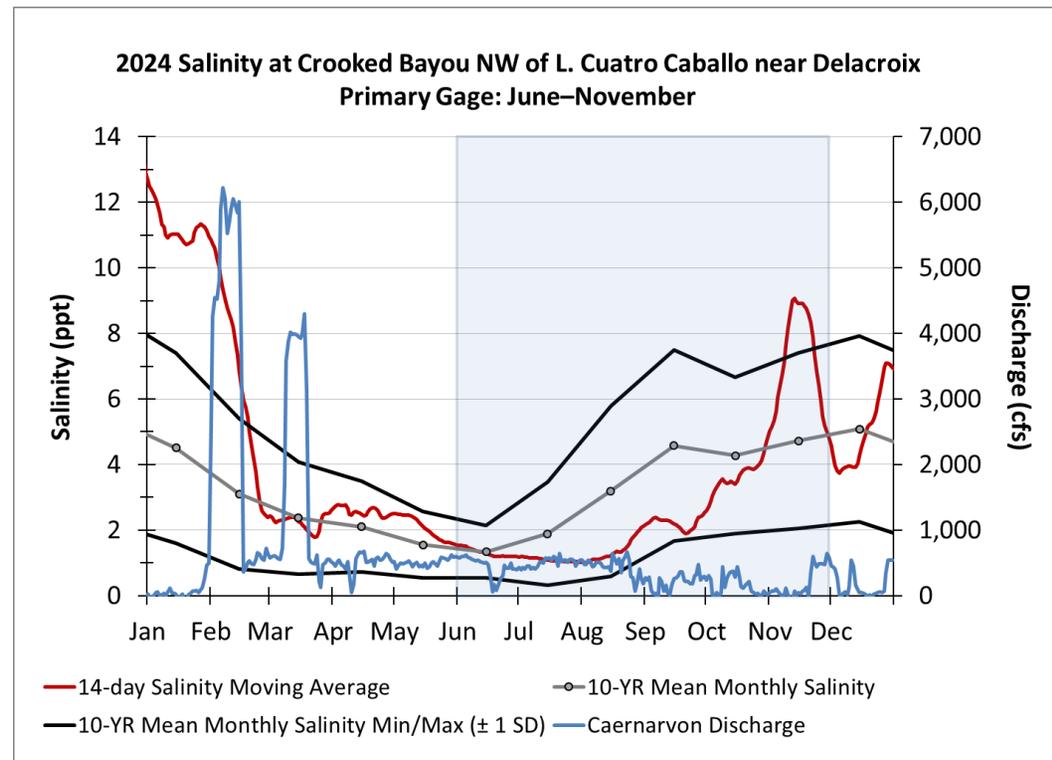
2024 Caernarvon Operations – *Stone Island* (15 ppt)

- ❖ 14-day salinity moving average:
 - Annual mean: **10.1 ppt**
 - Mean when used for operations: **9.5 ppt**
- ❖ 14-day salinity in relation to range when used for operations:
 - In range: 88%
 - > upper range: 12%
- ❖ Considering operational constraints, could have pulsed **25 additional days** (maximum).



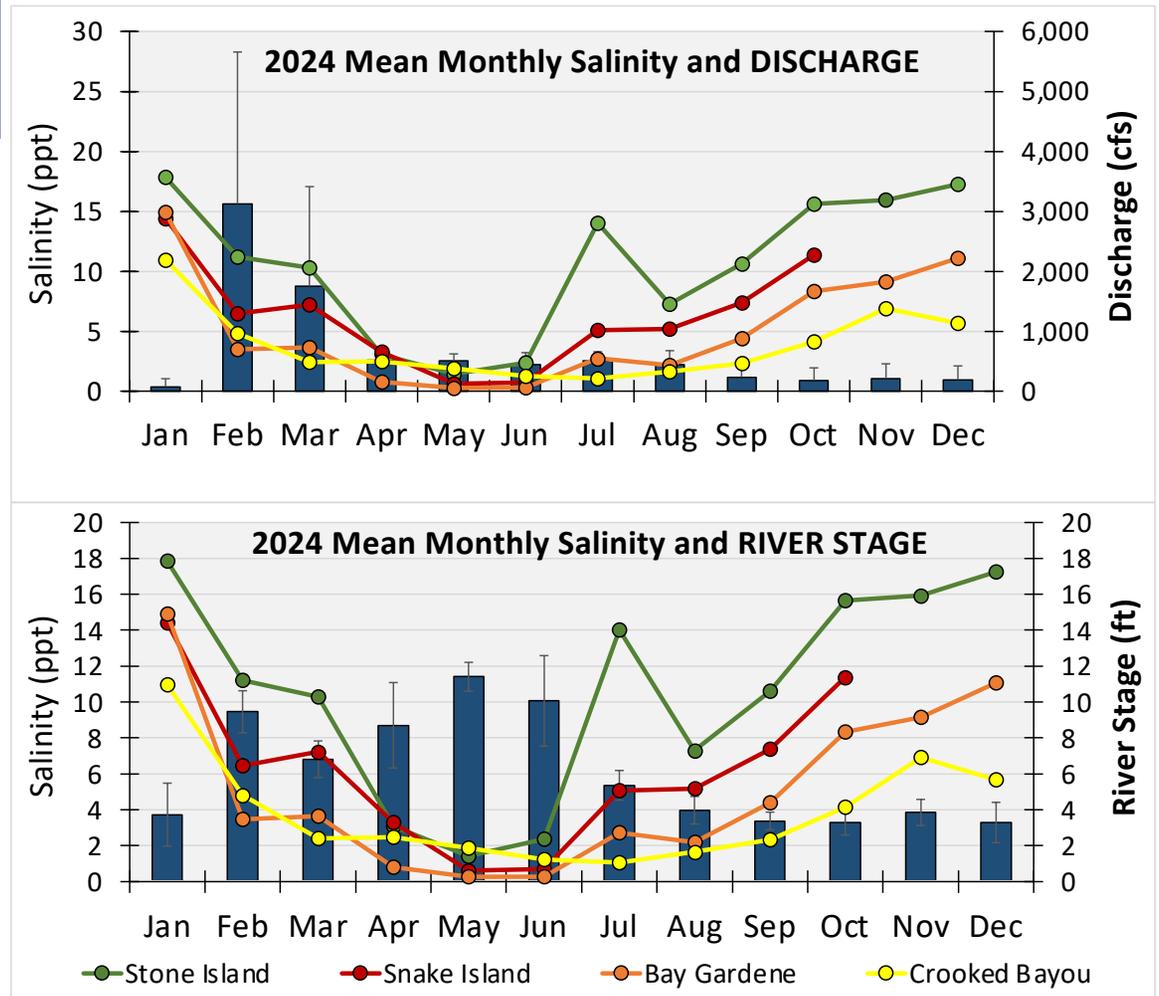
2024 Caernarvon Operations – *Crooked Bayou* (5 ppt)

- ❖ 14-day salinity moving average:
 - Annual mean: **3.9 ppt**
 - Mean when used for operations: **2.8 ppt**
- ❖ 14-day salinity in relation to range when used for operations:
 - In range: 92%
 - > upper range: 8%
- ❖ Considering operational constraints, could have pulsed **0** days.



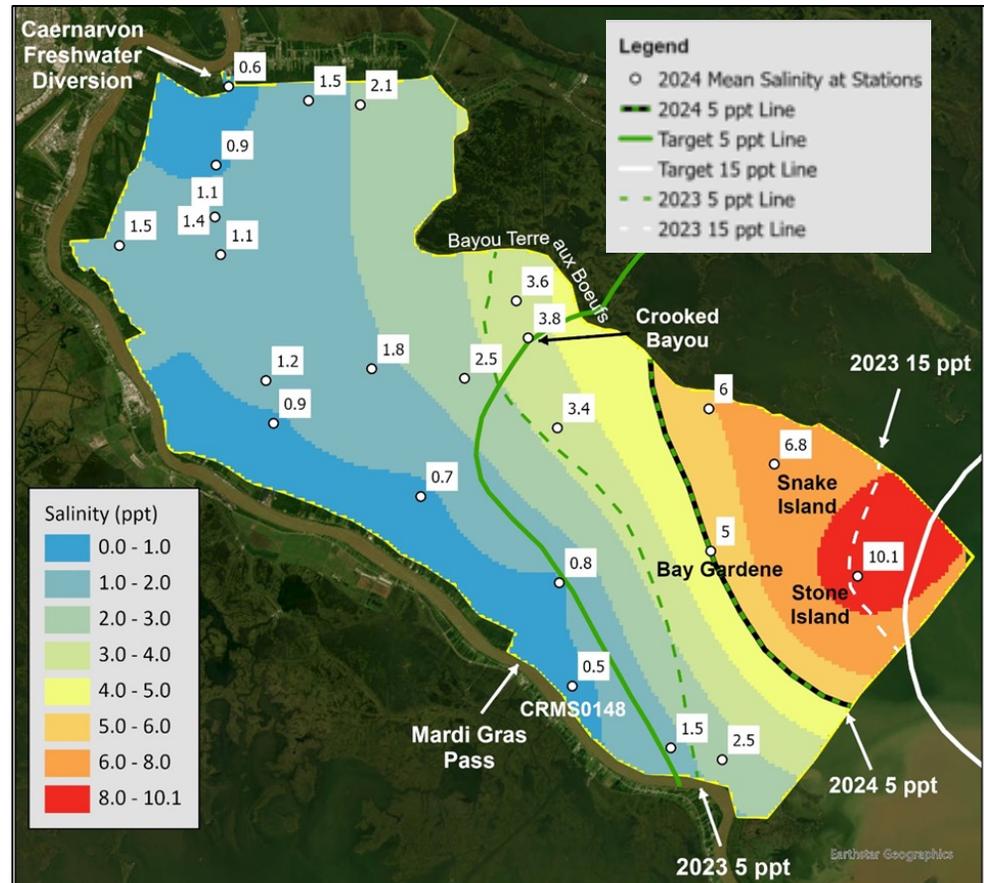
Monthly Salinity, Discharge and River Stage

- **Jan:** diversion closed; low river–**HIGHEST SALINITY**
- **Feb/Mar:** **HIGHEST DISCHARGE;** river rises; salinity declines
- **Discharge:** baseflow or < April–Dec
- **May/June:** **HIGHEST RIVER STAGE;** salinity lowest at most gages
- **River stage:** ≤ 4 ft Aug–Dec salinity increases summer–fall
- Tides, wind speed/direction, precipitation also impact salinity.



2024 Caernarvon Annual Interpolated Salinity

- ❖ Increasing salinity west to east
- ❖ Highest salinity: Stone Island (10.1 ppt)
- ❖ Lowest salinity: CRMS0148 (0.5 ppt)
- ❖ **2024 5 ppt line** ~ 6 miles down basin of target isohaline (**fresher**)
- ❖ **2024 15 ppt line** outside of project area
- ❖ Basin **fresher** than in 2023



**Caernarvon
Freshwater
Diversion
2024
Vegetation**

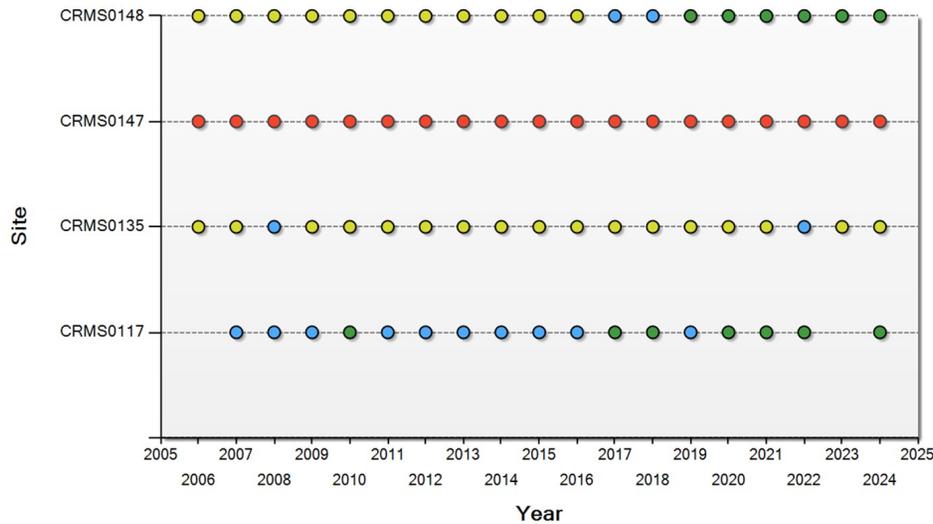


Caernarvon Vegetation: Coastwide Reference Monitoring System (CRMS)

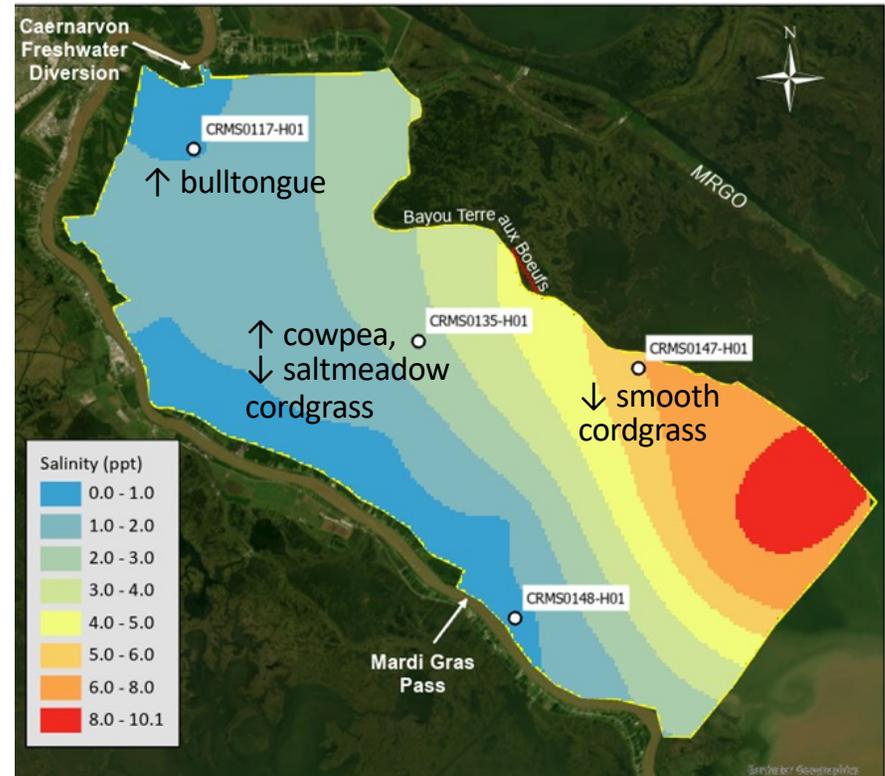
❖ Vegetation analyses from 4 CRMS sites (2006/2007)



Multiple Site Marsh Classification

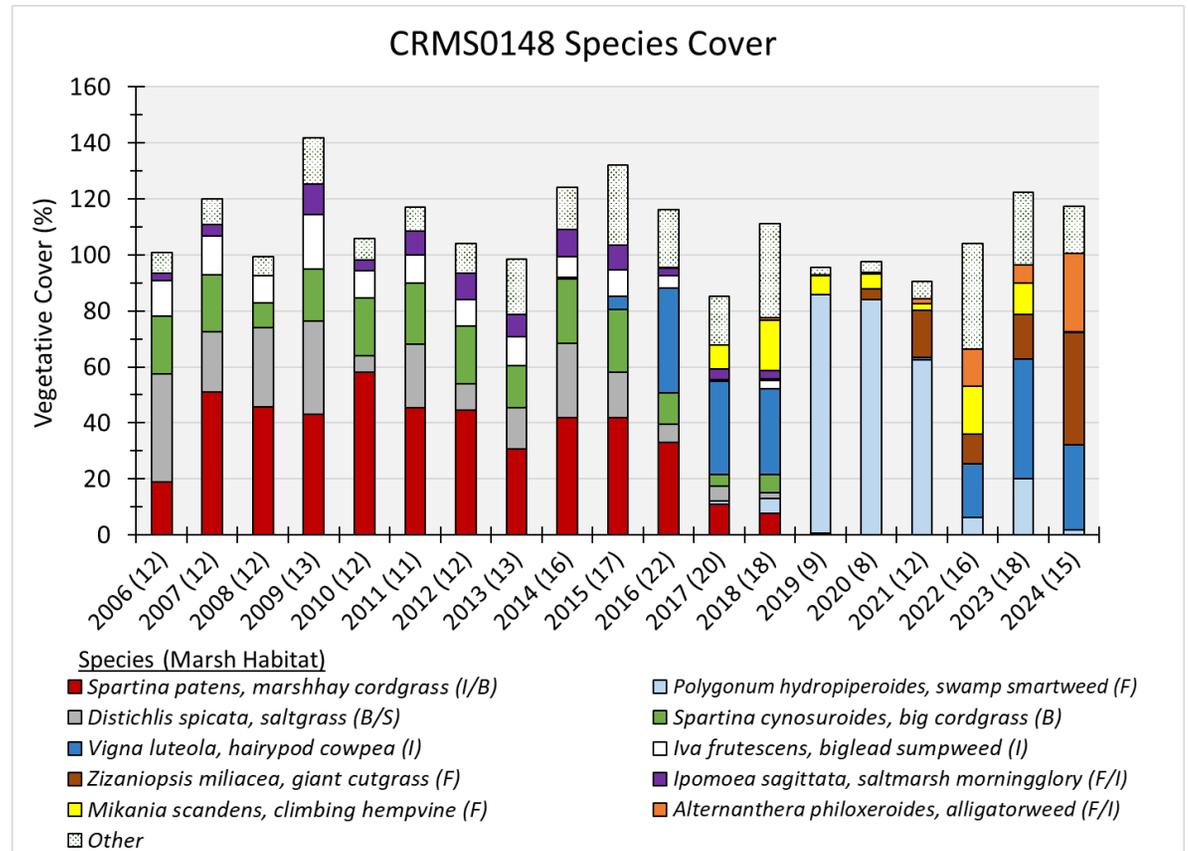


2024 Interpolated Annual Salinity Analysis

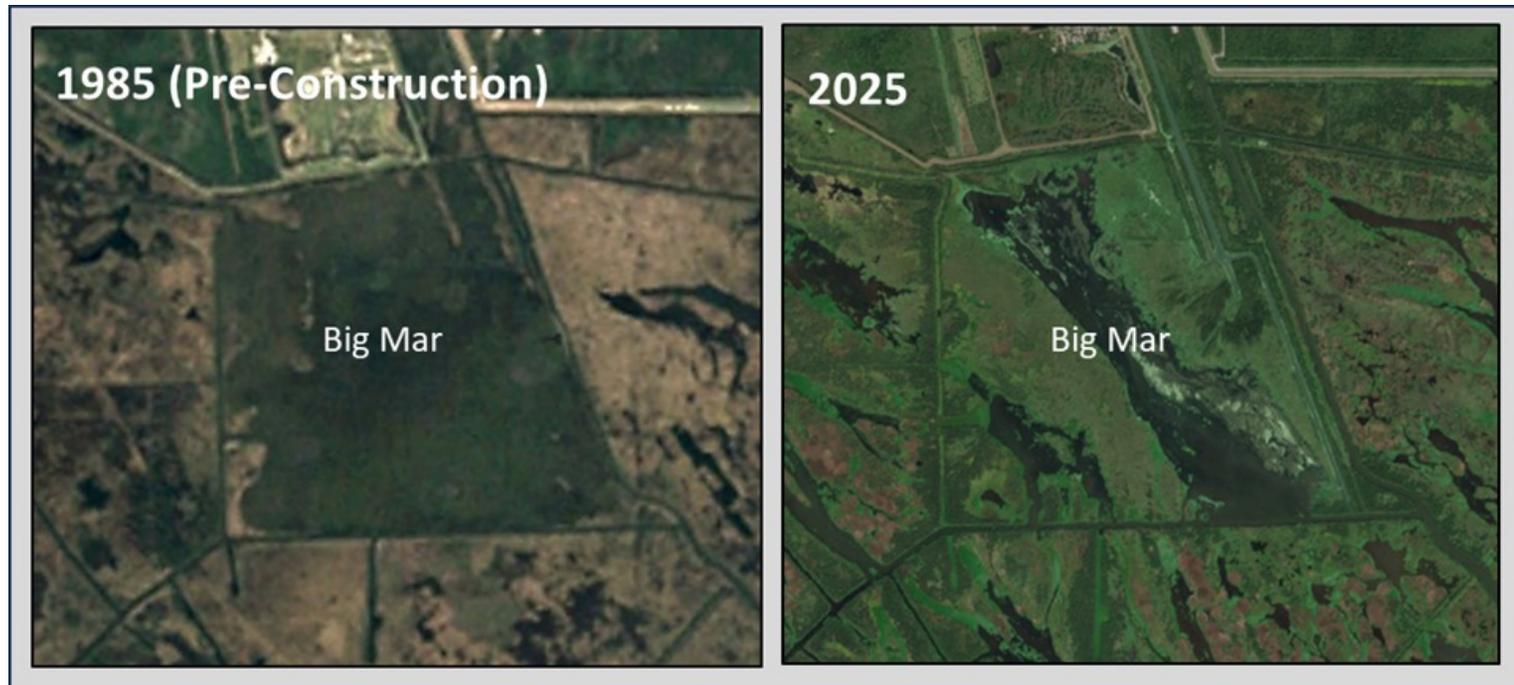


CRMS0148: Marsh Vegetation

- ❖ 2006–2016: brackish marsh
 - Marshhay cordgrass, saltgrass
- ❖ 2017–2018: intermediate marsh
 - Hairypod cowpea, climbing hempvine
- ❖ 2019–2024: fresh marsh
 - Swamp smartweed, giant cutgrass, hairypod cowpea



Big Mar: Water to Land Transition



- ❖ USGS land-water analyses being conducted of project area (1998/2024)
- ❖ Results available in 2025 or 2026 annual report.

**Caernarvon
Freshwater
Diversion
2024 Wildlife
and Fisheries
Summary**



2024 Breton Sound Basin: Wildlife and Fisheries

- ❖ LDWF monitoring is used for wildlife and fisheries management: setting seasons, establishing fishing regulations for species, determining species population size etc.
- ❖ Fisheries data presented were collected through **fisheries independent** monitoring
- ❖ Fisheries data collection methodologies and stations have been more consistent the **past 10/11 years**. Comparisons made within this time frame are more reliable.
- ❖ All fisheries data in this report are available through CIMS.
- ❖ Additional LDWF fisheries information can be found in the report *2024 Annual Report-Coastwide Fish and Shellfish Monitoring Program FY24–26*. LDWF Marine Fisheries Section. Available through CIMS.

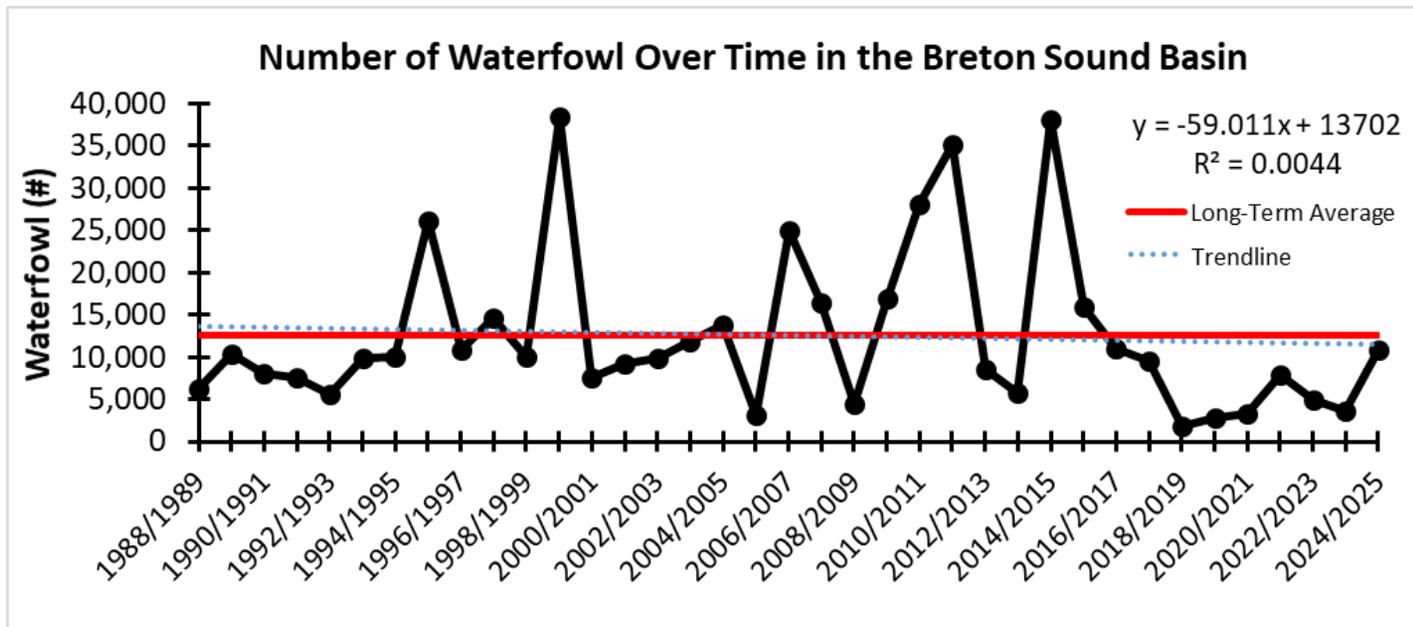
2024/2025 Breton Sound Basin: Aerial Waterfowl Surveys

- ❖ LDWF surveys: Sept, Nov, Dec, Jan
 - No 2024 Sept survey (H. Francine)
- ❖ 2024/2025 survey:
 - 10,863 birds
 - 12 species
 - Most in intermediate marsh (69%)
 - Most surveyed in January (4,565)
- ❖ Coots most abundant, followed by blue-winged teal and black-bellied whistling ducks (BBWD)
 - No BBWD counted during the 2023/2024 survey

Common Name	Fresh	Intermediate	Brackish	Salt	Total
American coot	537	3,535			4,072
Black-bellied whistling duck	1,132	566			1,698
Blue-winged teal	1,223	1,584			2,807
Canvasback		38			38
Gadwall	69	140	3	2	214
Green-winged teal	106	272			378
Hooded merganser		2		12	14
Mottled duck	41	136		2	179
Ring-necked duck	30	474			504
Scaup: lesser and greater		392		82	474
Snow goose	85	400			485
Total # by Marsh Type	3,223	7,539	3	98	10,863

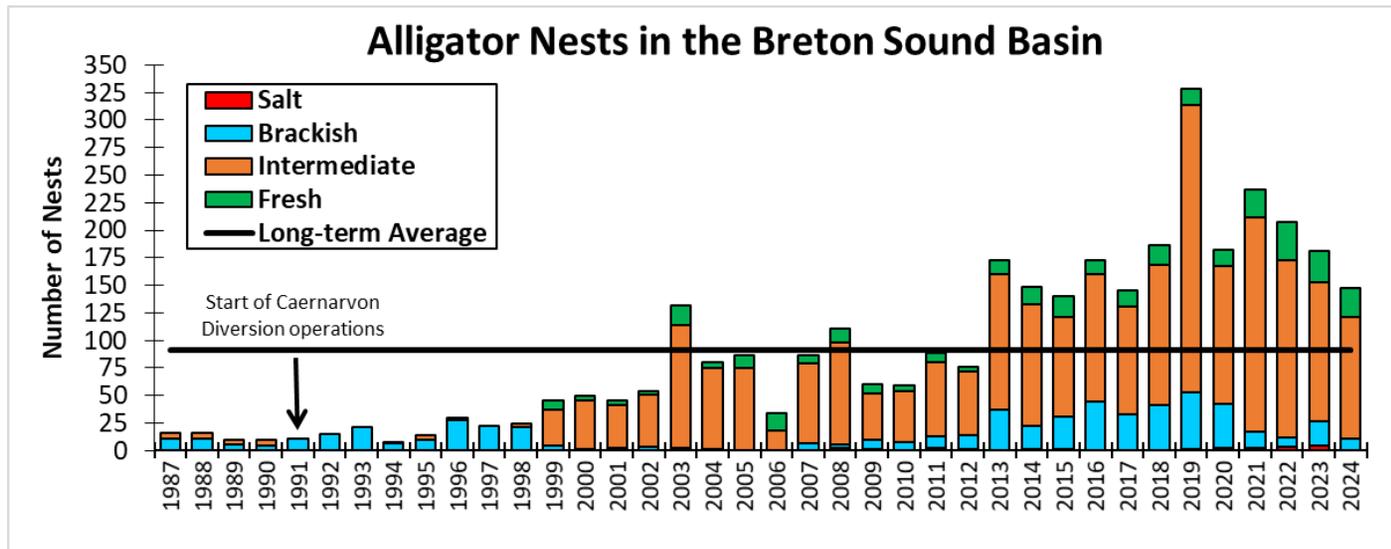
2024/2025 Breton Sound Basin: Waterfowl

- ❖ 193% **increase** from 2023/2024 survey (3,707 birds)
- ❖ 2024/2025 close to LTA of 12,522 birds; highest since 2016/2017



2024 Breton Sound Basin: Alligators

- ❖ LDWF conducts annual aerial surveys of nests (June 23–24, 2024)
- ❖ 2024: 147 nests; 19% **decrease** from 2023 (recent declining trend), still high and **above** LTA (91 nests)
- ❖ **Increase** since 2013 may be due to expansion of fresh and intermediate marsh



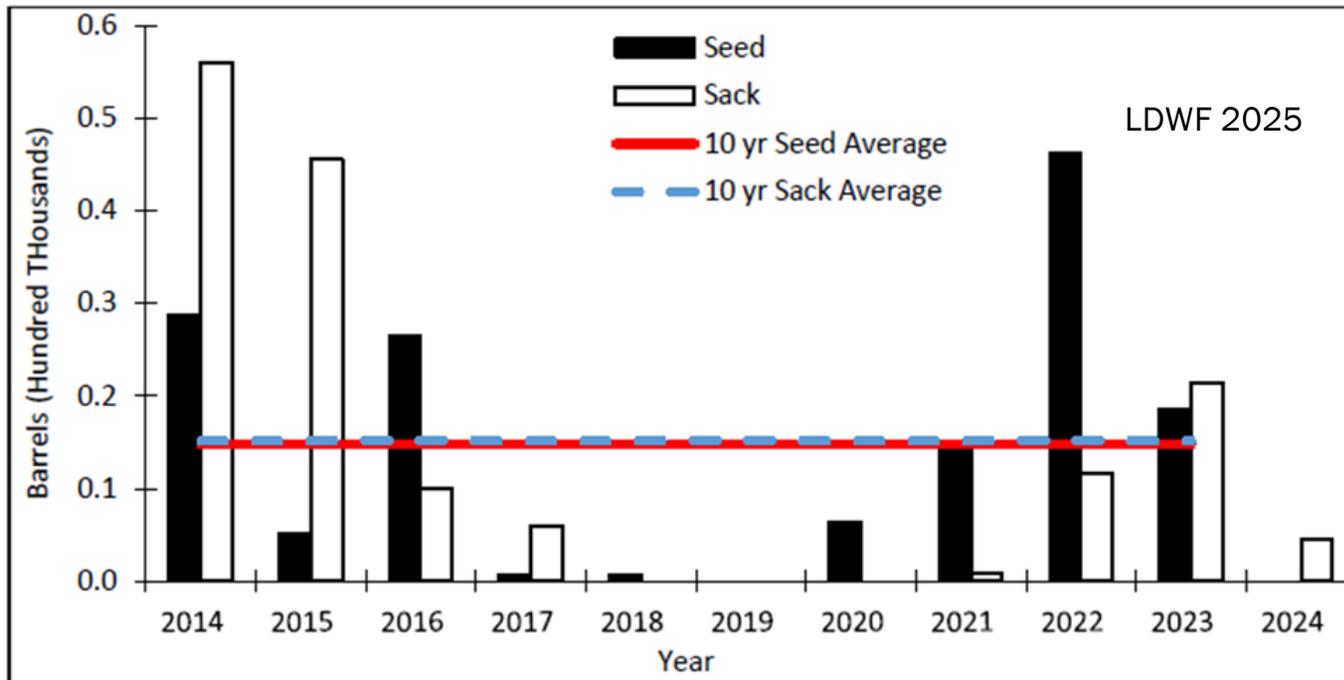
2024 Breton Sound Basin: Oysters

- ❖ 1m² sampling to assess resources on public seed grounds; July; 26 stations
- ❖ **Seed** oysters: < 3 inches long, **sack** oysters: ≥ 3 inches long, harvestable
- ❖ Total stock: 4,557 barrels; 89% **decline** from 2023 stock; no seed;
- ❖ No seed or sack sampled for additional SWAMP samplings in May and Sept/Oct

CSA	Basin	Seed (bbl)	Sack (bbl)	Total Stock (bbl)	% Change from 2023 Total Stock
1 – North	Pontchartrain (Lake Borgne/MS Sound)	259,737	135,390	395,128	+213
1 – South	Pontchartrain (East of MS River, South of MS River Gulf Outlet)	0 (2023: 18,632)	4,557 (2023: 21,436)	4,557 (2023: 40,068)	-89

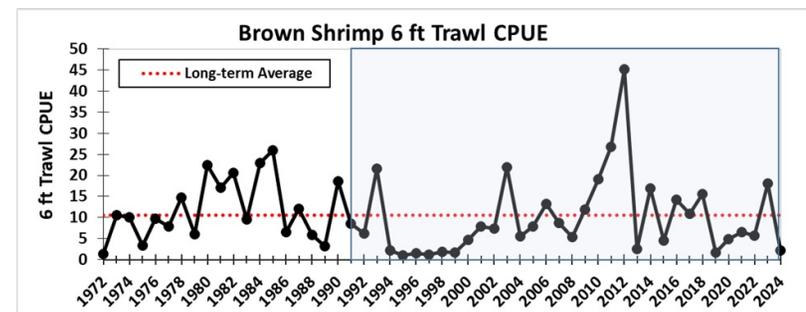
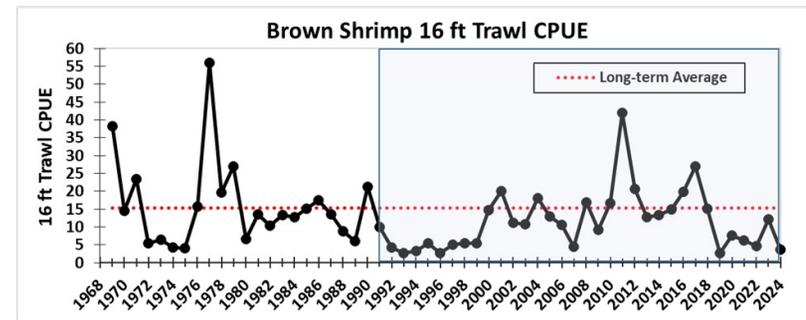
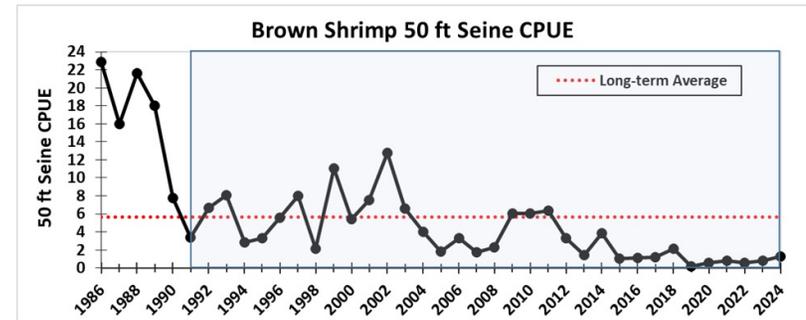
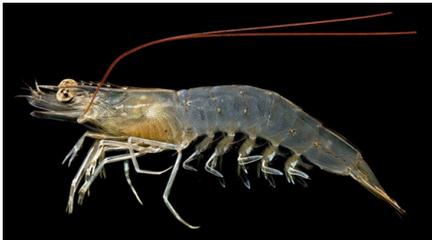
2024 Breton Sound Basin: Oysters

- ❖ 2024 sack oysters: 70% decline from previous 10-year average of 15,148 barrels



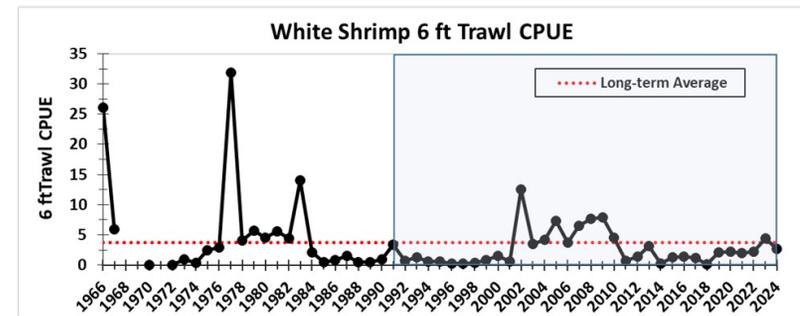
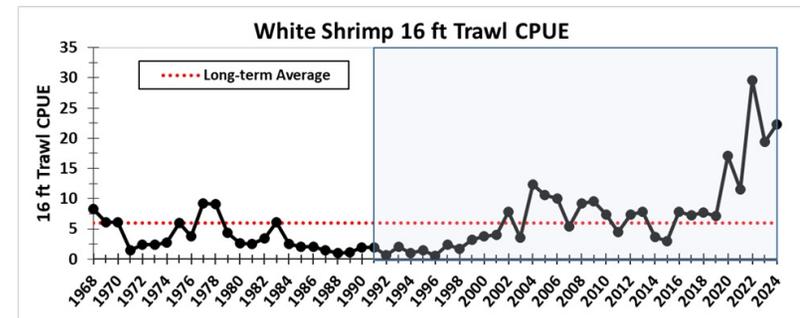
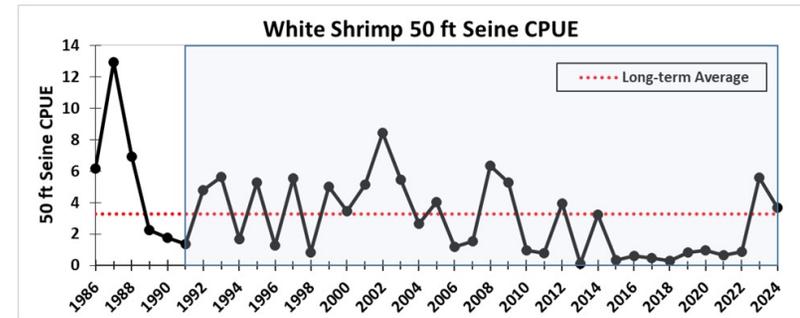
2024 Breton Sound Basin Brown Shrimp

- ❖ Dominant shrimp landed during the spring inshore season (May–July)
- ❖ CPUE **below** LTA in all 3 gear types
 - 50 ft seines—CPUE: 1.3; **highest** since 2018, but still low
 - 16 ft trawls—CPUE: 3.7; 70% decline from 2023
 - 6 ft trawls—CPUE: 2.2; 88% decline from 2023



2024 Breton Sound Basin White Shrimp

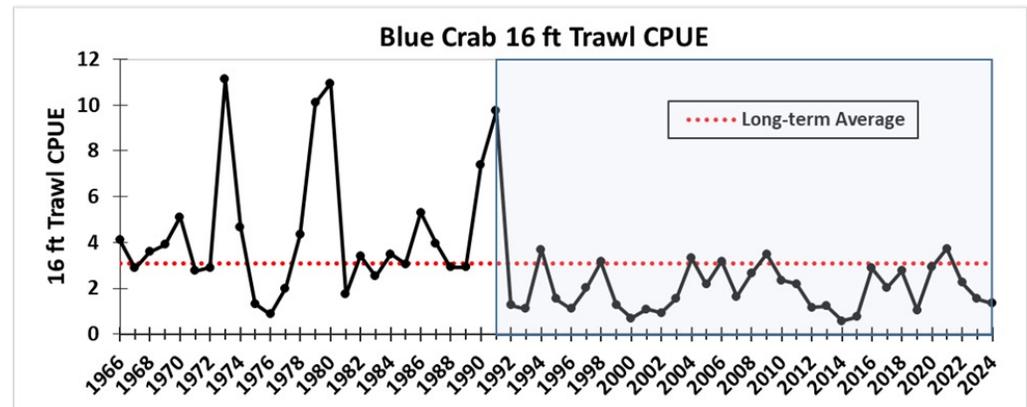
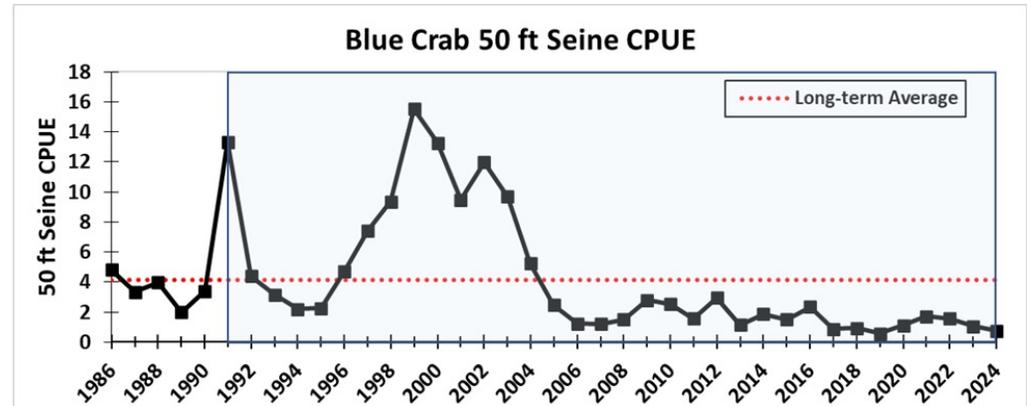
- ❖ Dominant shrimp landed during fall inshore season (mid-August to mid-Dec, some regions open into January)
- ❖ 2024 CPUE **above** LTA for 50 ft seine and 16 ft trawl sampling; **below** LTA for 6 ft trawl
 - 50 ft seines—CPUE: 3.7, **2nd highest** since 2012
 - 16 ft trawls—CPUE: 22.3, **2nd highest for data record**
 - 6 ft trawls—CPUE: 2.7, **2nd highest** since 2013
- ❖ Salinity higher during white shrimp season; lower river



2024 Breton Sound Basin: Blue Crabs

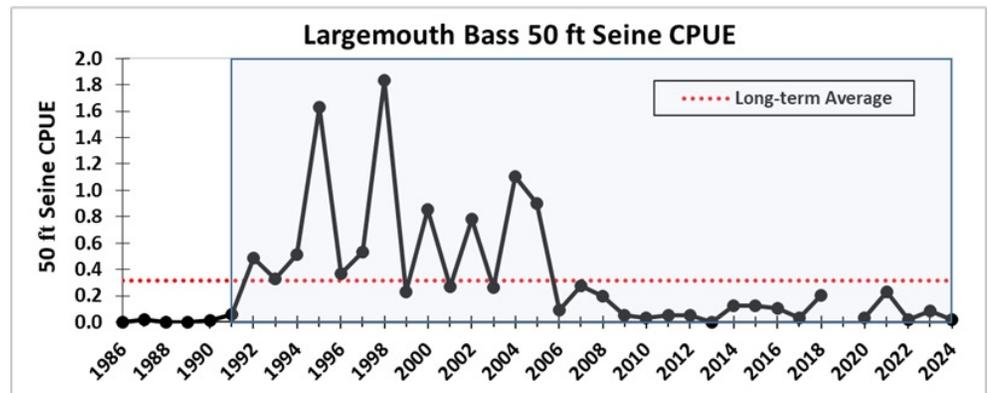
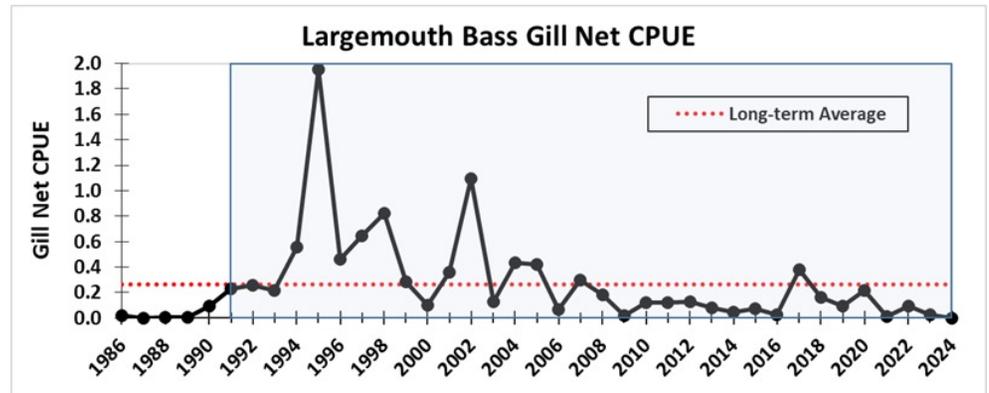
❖ Below LTA for 50 ft seines and 16 ft trawls; slight decline from 2023 in both gear types

- 50 ft seines: CPUE = 0.8
- 16 ft trawls: CPUE = 1.3



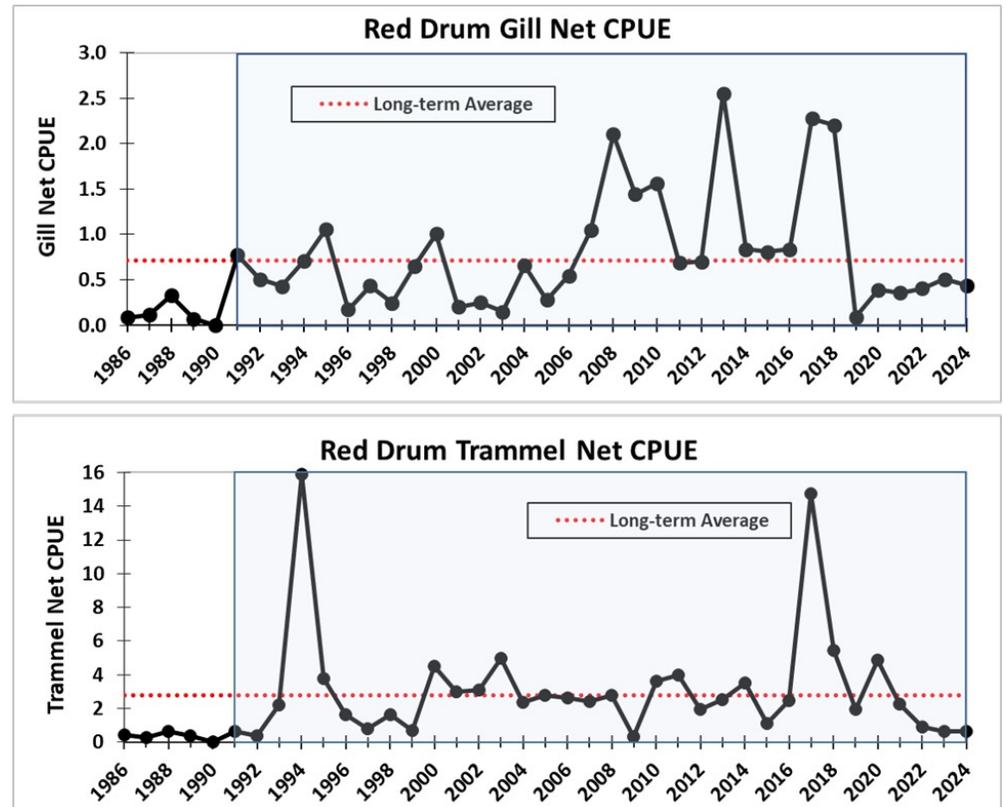
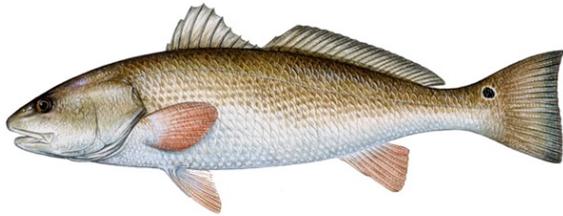
2024 Breton Sound Basin: Largemouth Bass

- ❖ Largemouth bass are found in fresher areas of basin
- ❖ Gill nets: 0 fish caught in 2024; last > LTA in 2017
- ❖ 50 ft seine: CPUE = 0.02 (8 fish sampled); last > LTA in 2019 (CPUE = 12; 1,135 fish)



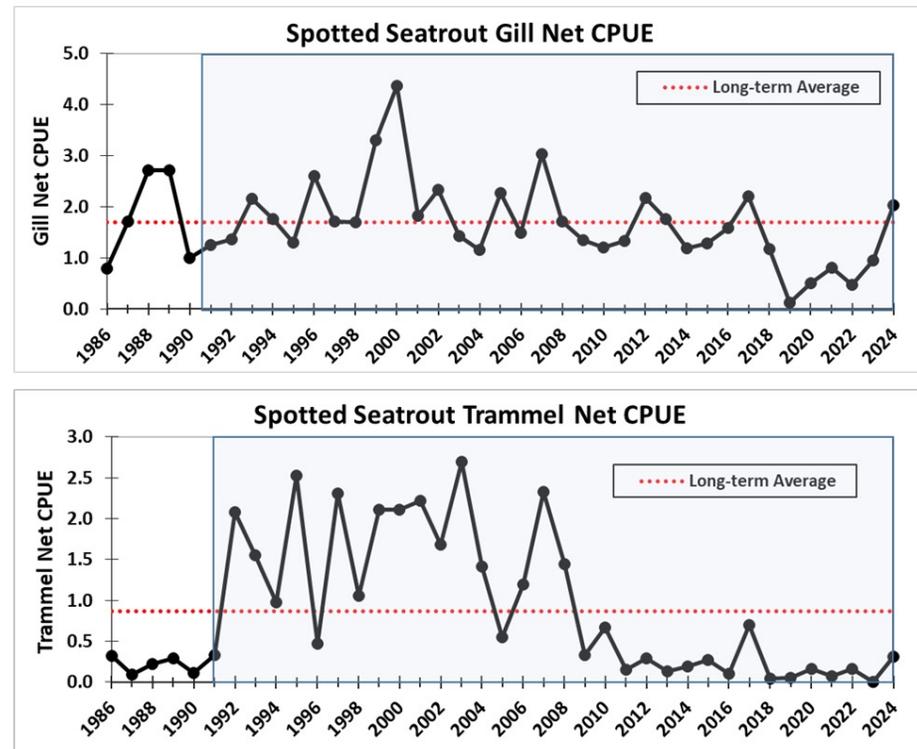
2024 Breton Sound Basin: Red Drum

- ❖ Red drum are estuarine/marine fish
- ❖ Gill net: CPUE = 0.4; similar to CPUE for past 5 years
- ❖ Trammel net: CPUE = 0.6; same as in 2023



2024 Breton Sound Basin: Spotted Seatrout (Speckled Trout)

- ❖ Spotted seatrout are marine/estuarine fish
- ❖ CPUE increased from 2023 in gillnet and trammel net sampling
- ❖ Gill net: CPUE = 2.0; above LTA; last above LTA in 2017
- ❖ Trammel net: CPUE = 0.3; below LTA



2024 Caernarvon Freshwater Diversion–Summary

- ❖ Mississippi River water entering Breton Sound basin through passes on the east bank of the river is continuing to significantly lower salinity in the mid- to lower basin. Salinity was lowest closest to Mardi Gras Pass and increased west to east.
- ❖ This freshwater input is significantly impacting the ability to pulse the Caernarvon Diversion
 - Pulsed for only 27 days in 2024
 - Mean annual discharge of 674 cfs was 43% decline from the long-term average of 1,174 cfs
 - **CIAC adopted a revised operations plan for 2025, with a salinity range based on oysters**
- ❖ Freshwater input through the passes is influencing the marsh composition, with a transition to fresher marsh seen close to Mardi Gras Pass.
- ❖ Due to infrequent Caernarvon operations, diversion impacts on wildlife and fisheries in the basin are not discernable.