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 ft^2 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

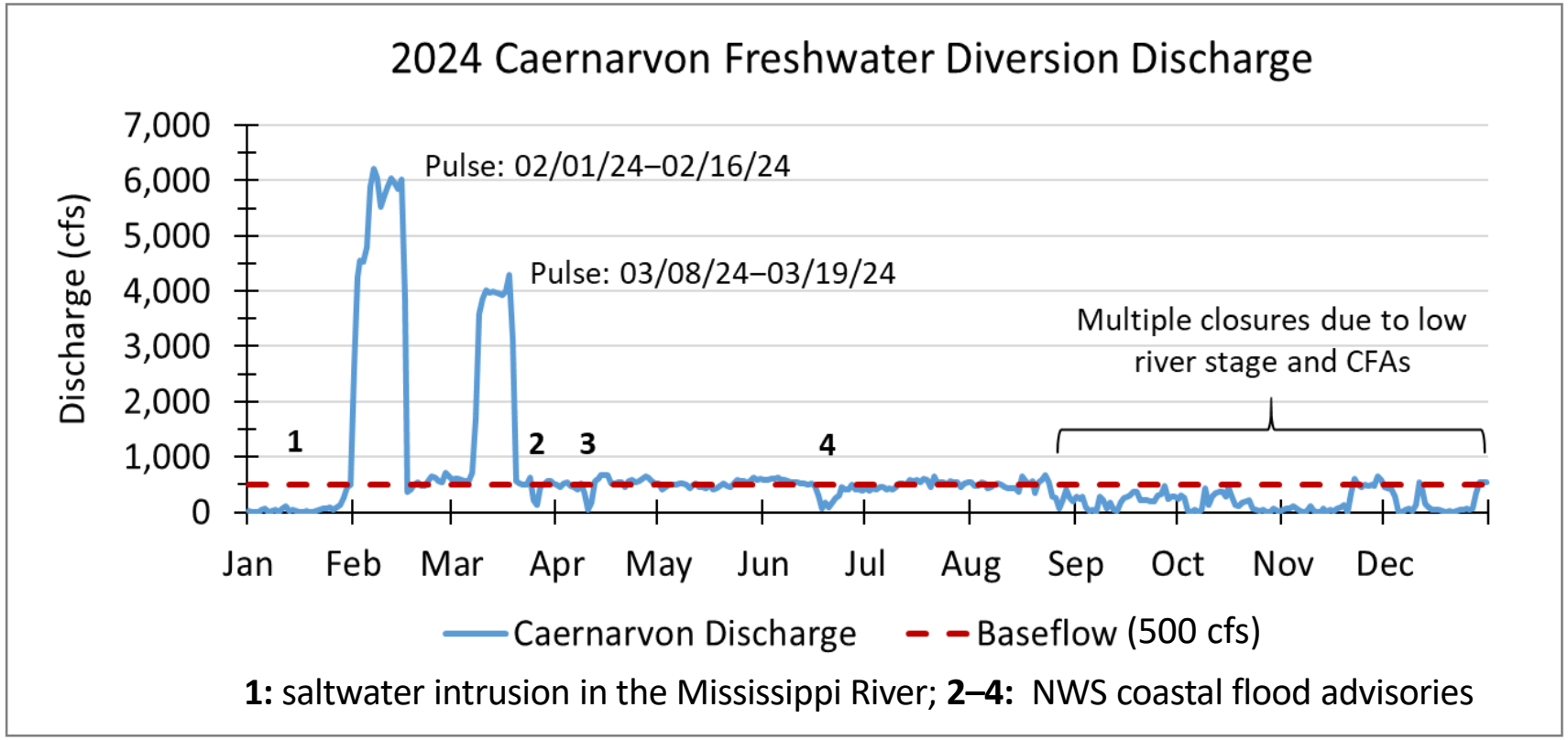
3. Increase productivity of significant commercial and recreational fish and wildlife

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.



1: saltwater intrusion in the Mississippi River; **2–4:** NWS coastal flood advisories

Mean Discharge

Annual: 674 cfs

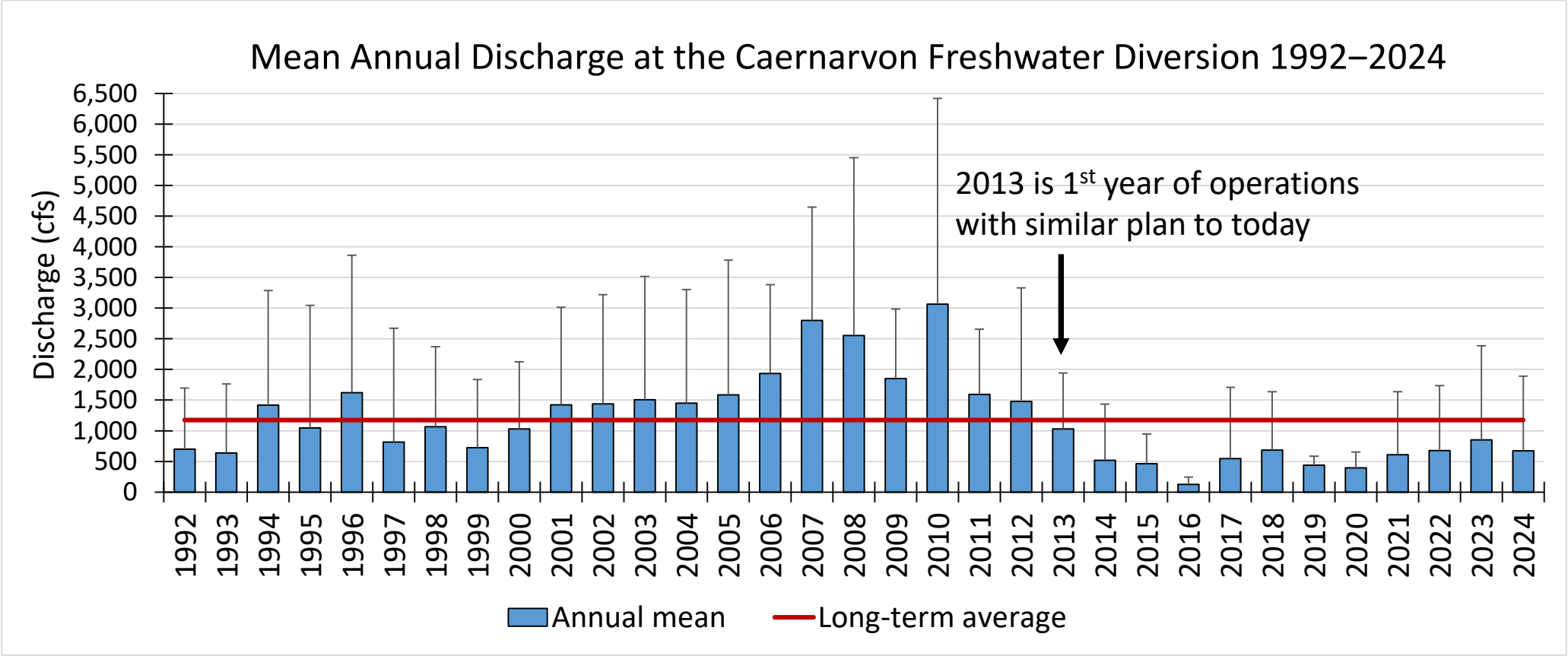
1st pulse (16 days): 5,485 cfs
2nd pulse (11 days): 3,967 cfs

Max Discharge

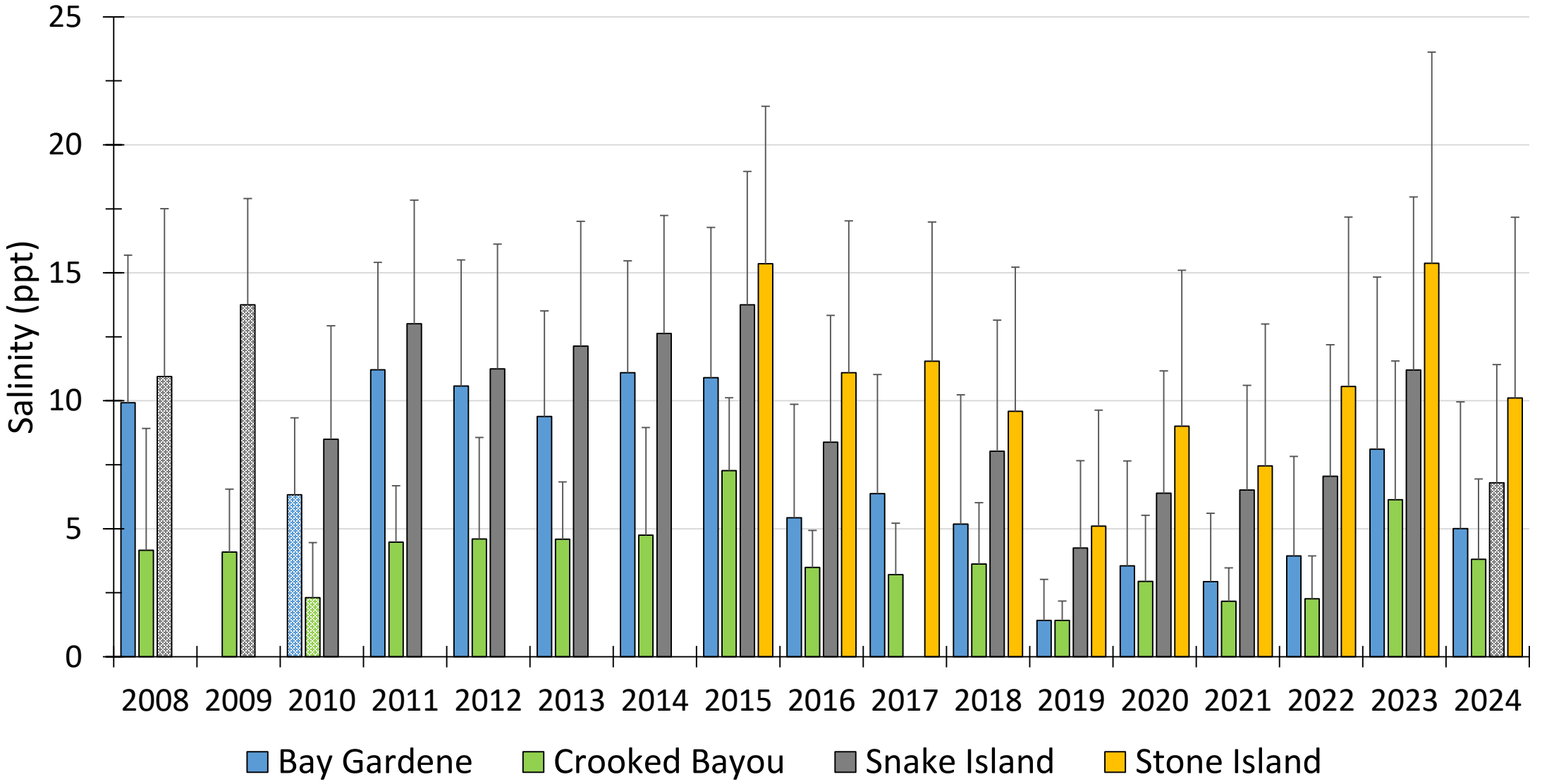
6,820 cfs on 02/07/2024

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



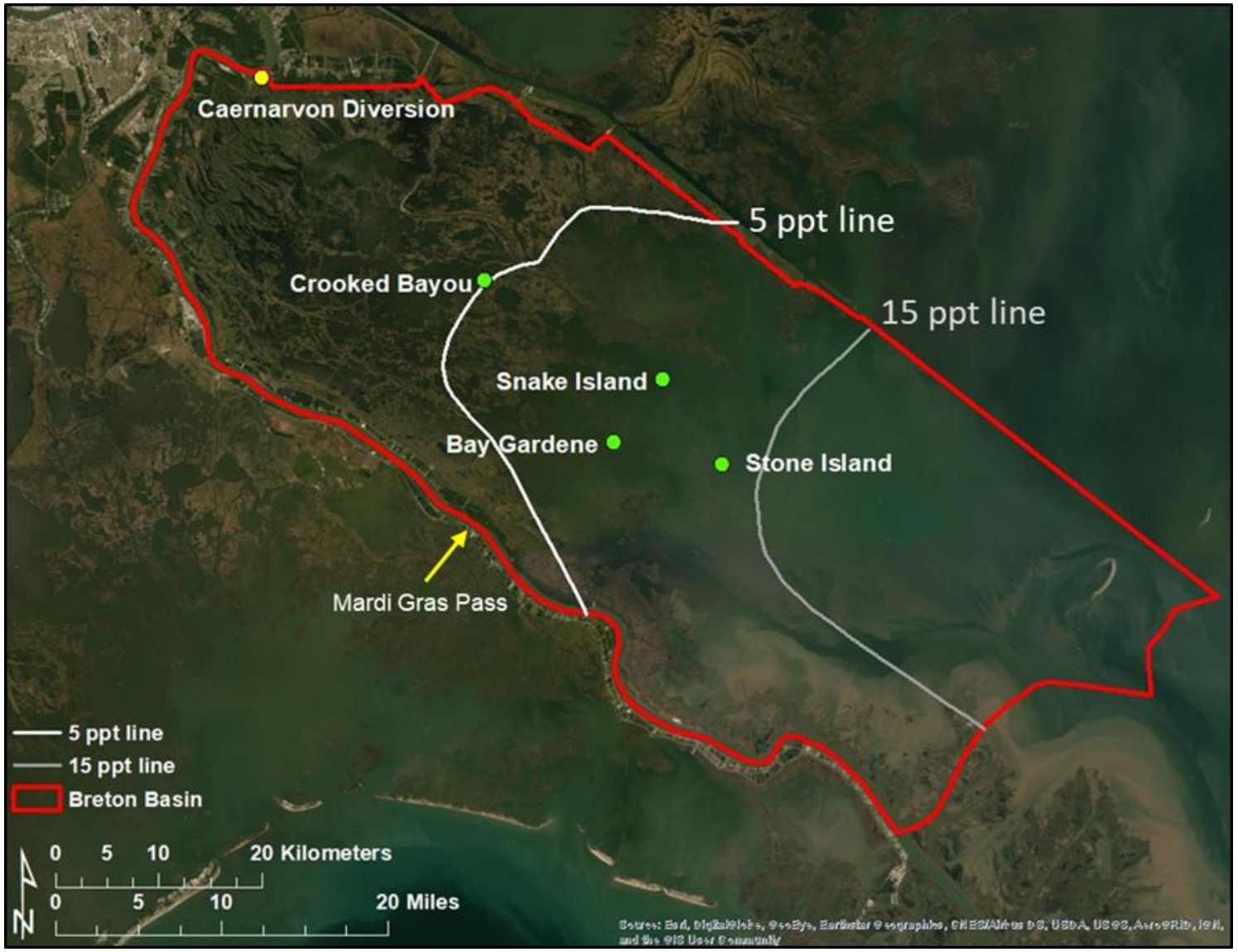
2024 Caernarvon Operations Gages for Salinity (USGS)

- **Primary gages:**

  Stone Island
  - January–May and December
  - 15 ppt isohaline

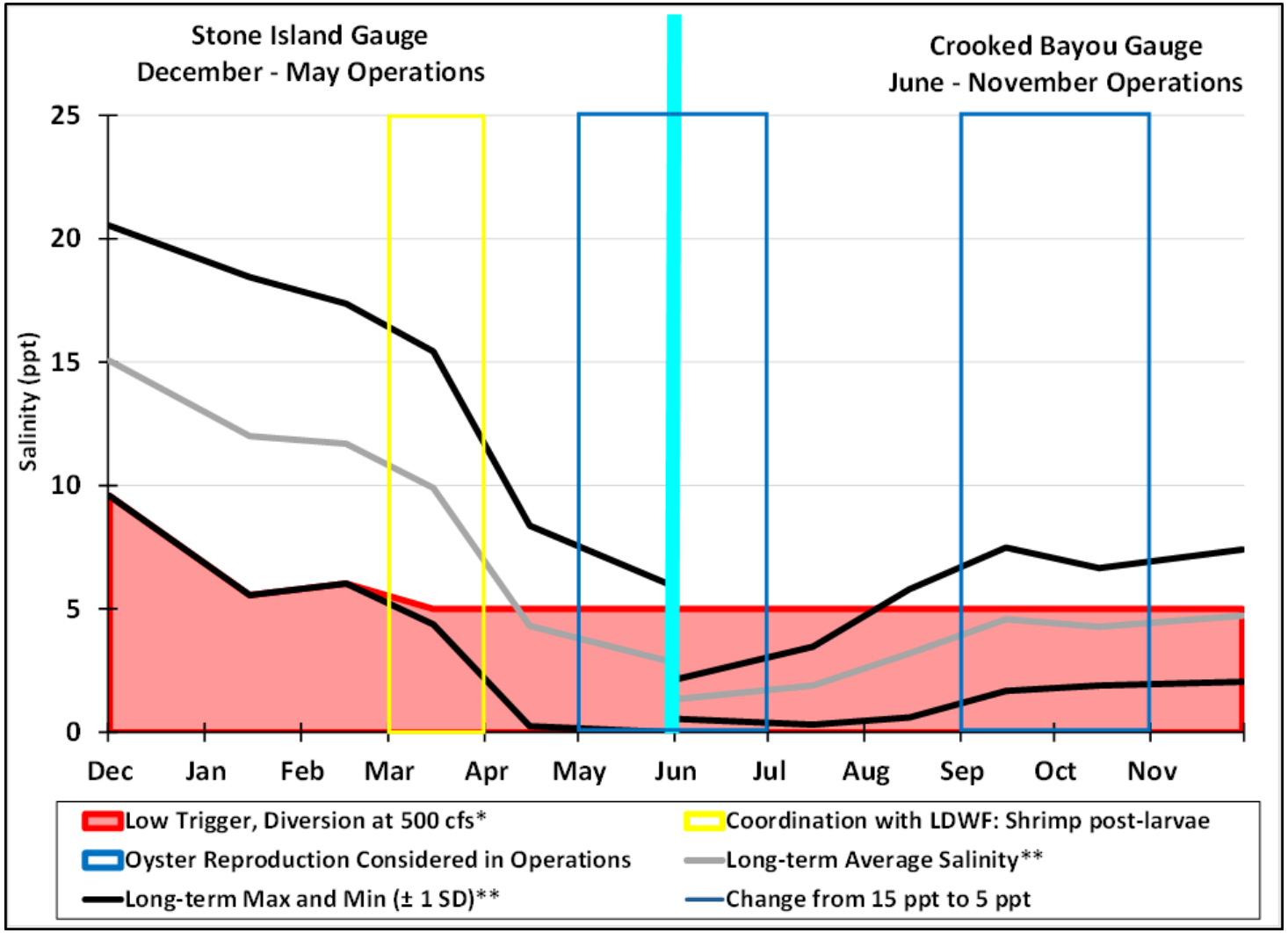
  Crooked Bayou
  - June–November
  - 5 ppt isohaline

- **Reference gages:** Snake Island and Bay Gardene



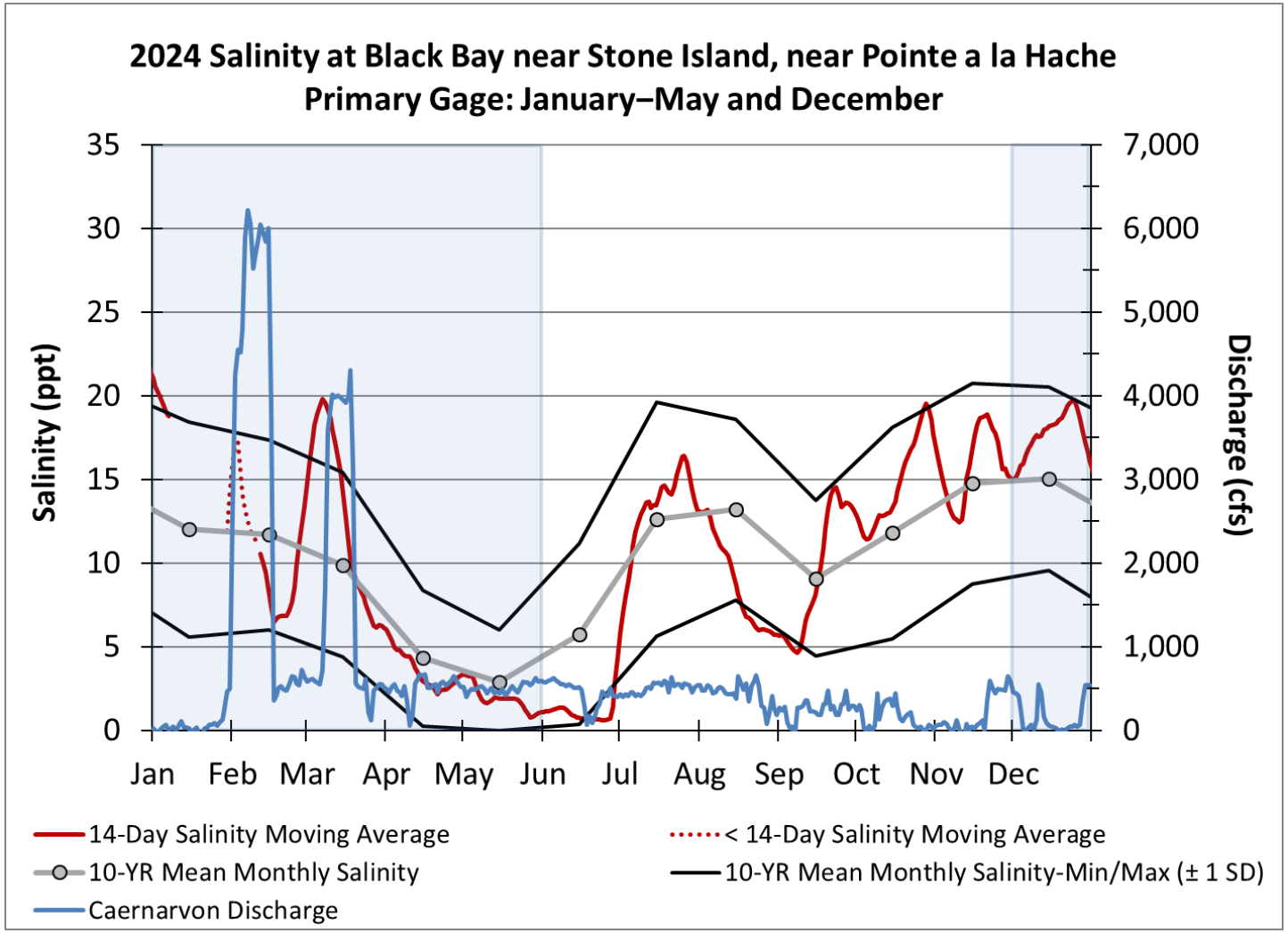
2024 Caernarvon Operations Plan

- 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**



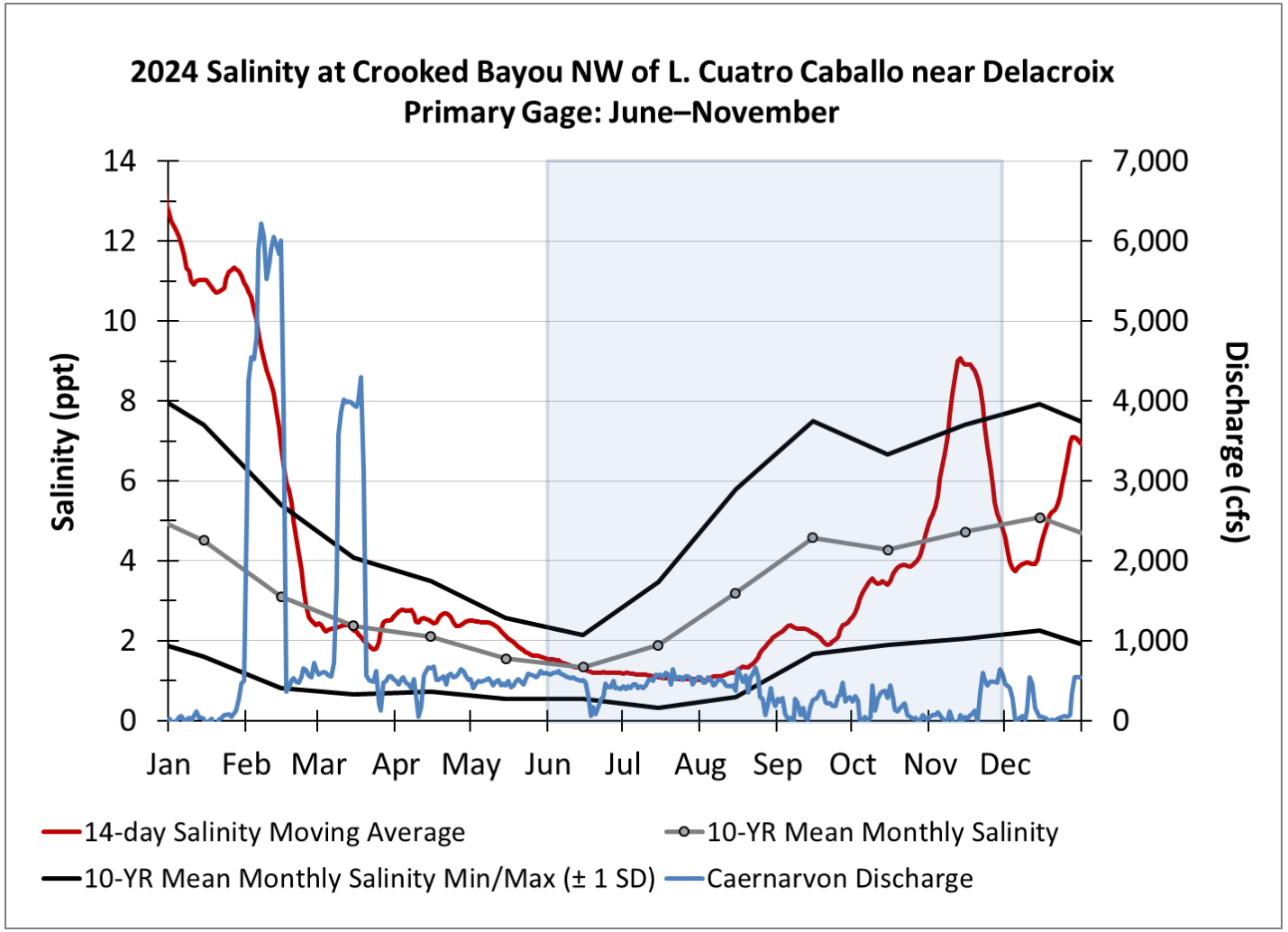
2024 Caernarvon Operations–Stone Island (15 ppt)

- 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 <u>when used for operations:</u>
  - In range: 88%
  - > upper range: 12%
- Considering operational constraints, could have pulsed **25 additional days** (maximum).



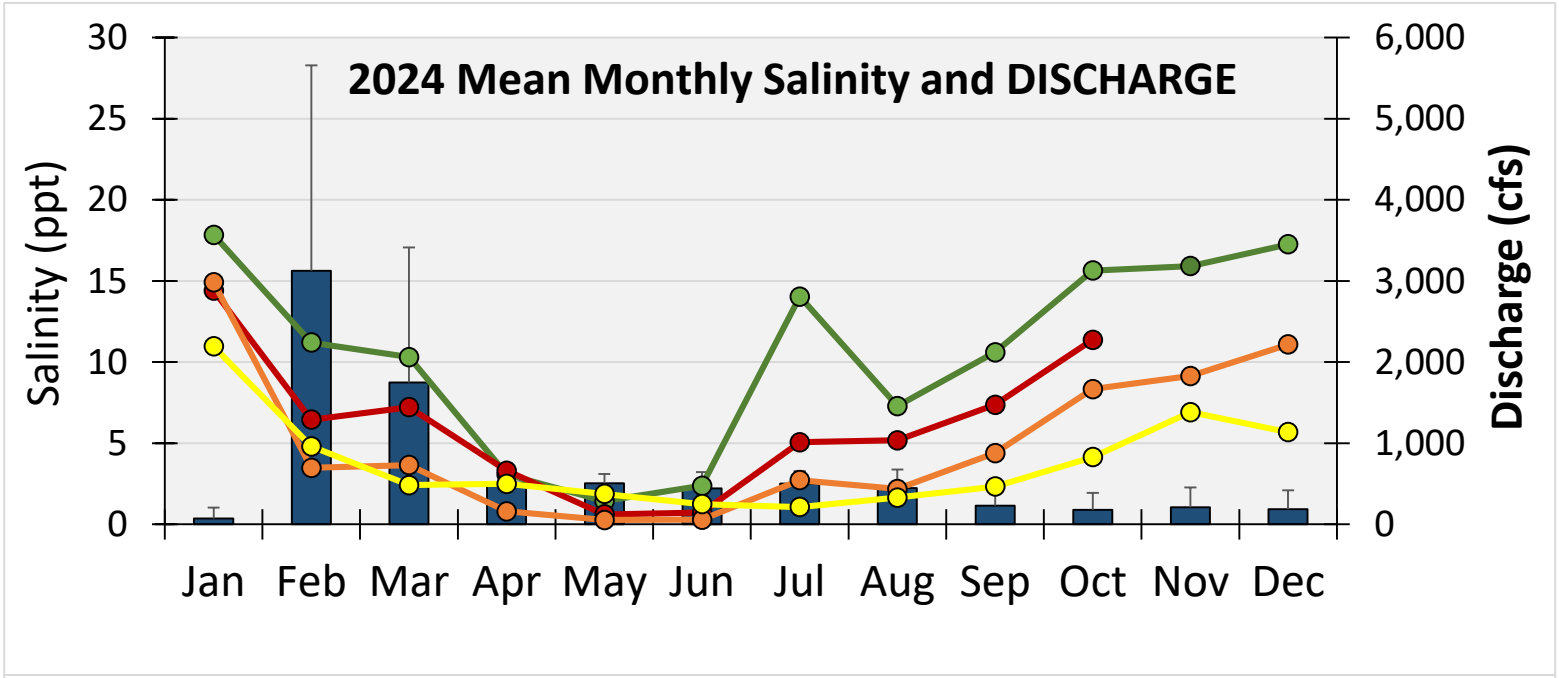
2024 Caernarvon Operations–Crooked Bayou (5 ppt)

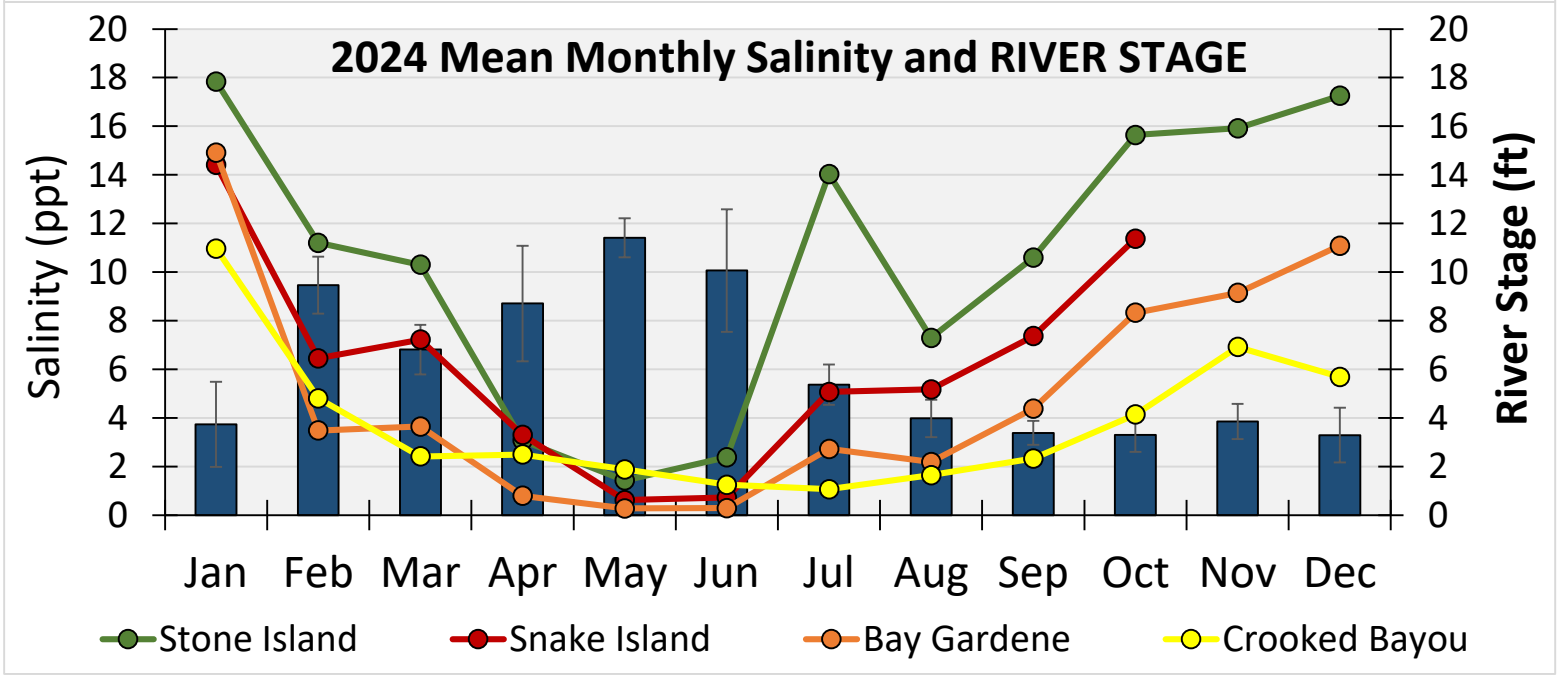
- 14-day salinity moving average:
  - Annual mean: **3.9** ppt
  - Mean when used for operations: **2.8** ppt
- 14-day salinity in relation to range <u>when used for operations</u>:
  - In range: 92%
  - > upper range: 8%
- Considering operational constraints, could have pulsed **0** days.



Monthly Salinity, Discharge and River Stage

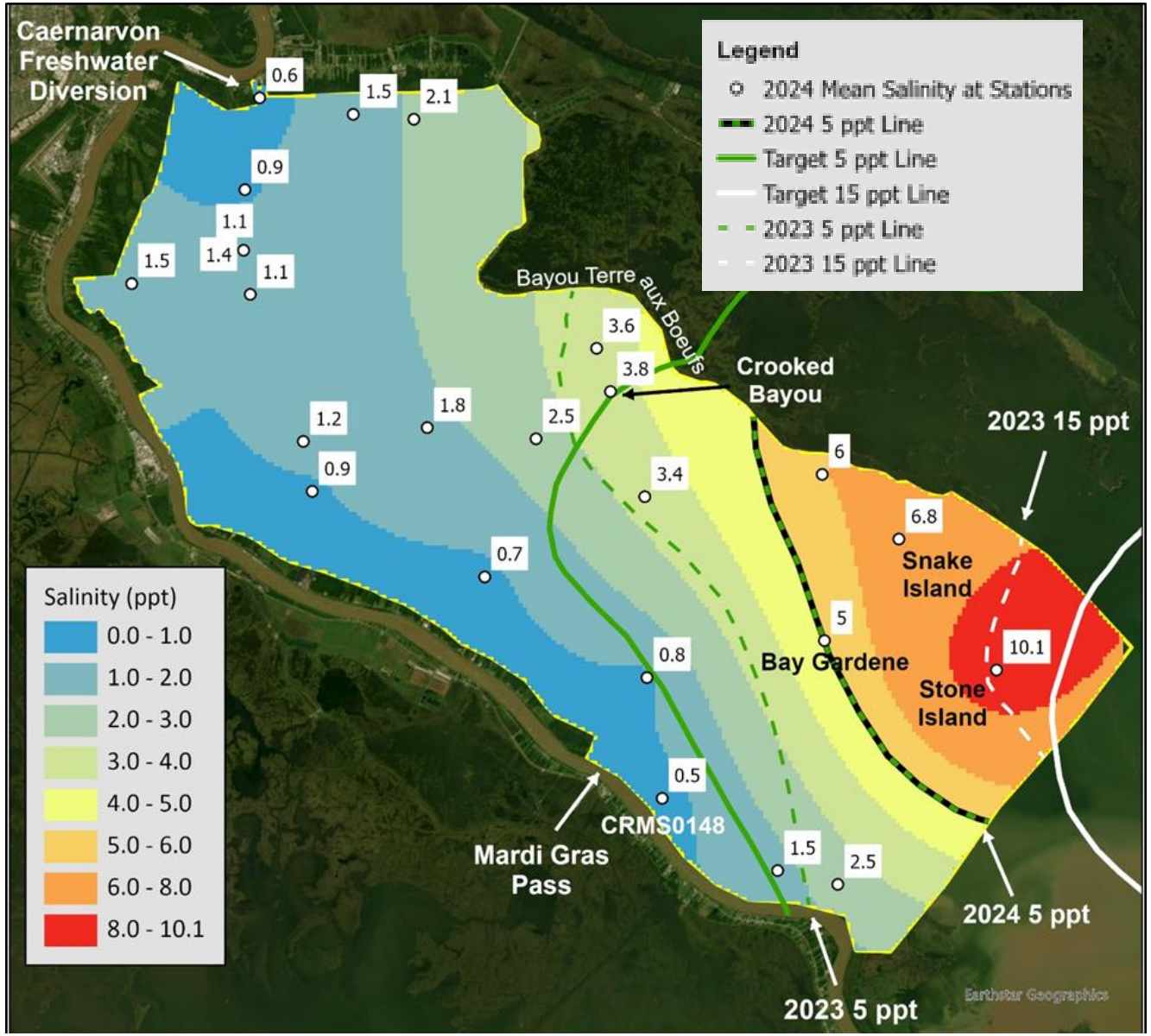
- **Jan:** diversion closed; low river–**HIGHEST SALINITY**
- **Feb/Mar: HIGHEST DISCHARGE**; river rises; salinity declines
- **Discharge:** baseflow or < April–Dec
- **May/June**: **HIGHEST RIVER STAGE; salinity lowest** at most gages
- **River stage:** ≤ 4 ft Aug–Dec salinity increases summer–fall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





2024 Caernarvon Annual Interpolated Salinity

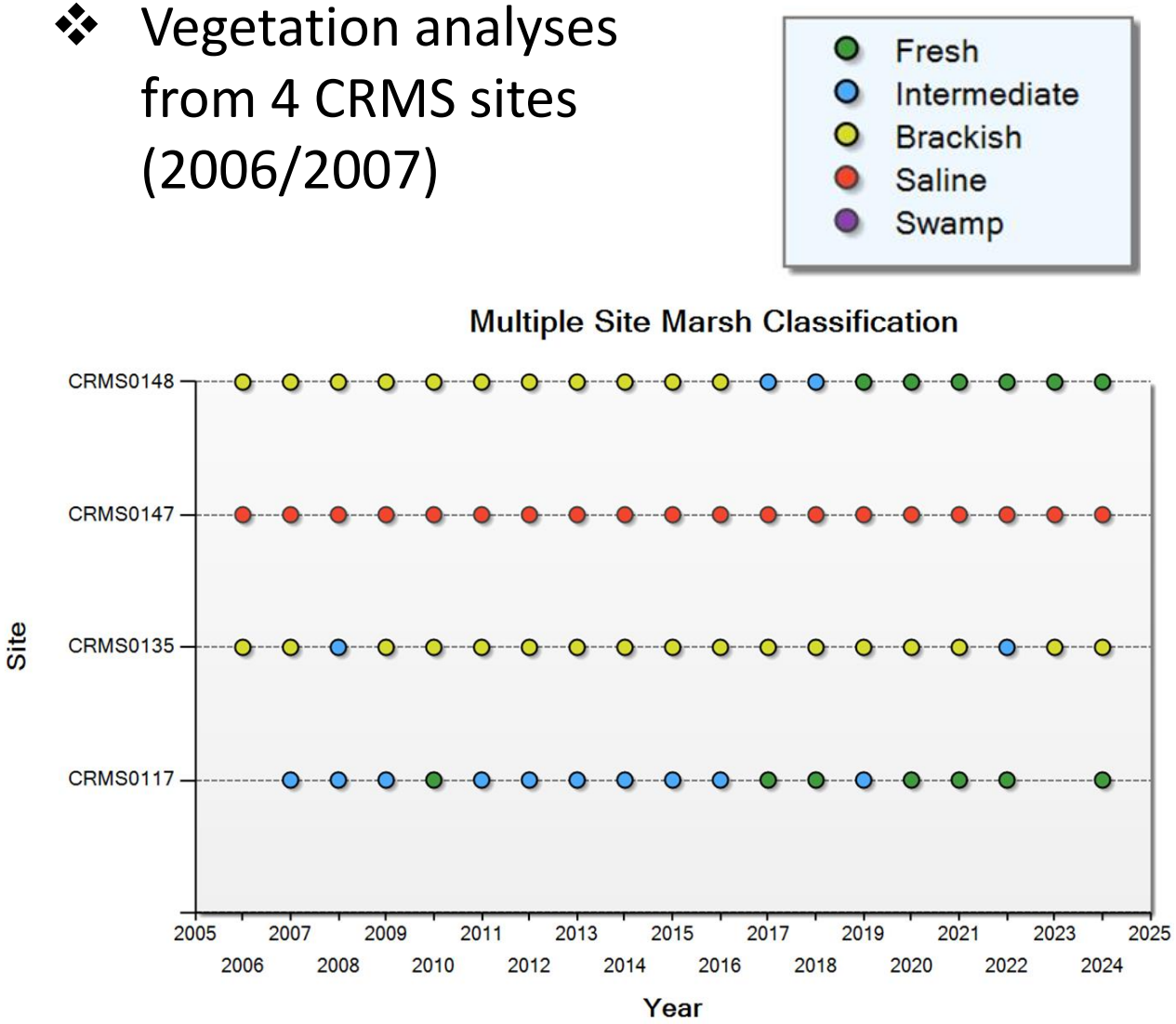
- Increasing salinity west to east
- Highest salinity: Stone Island (10.1 ppt)
- Lowest salinity: CRMS0148 (0.5 ppt)
- **2024 5 ppt line** ~ 6 miles down basin of target isohaline (**fresher**)
- **2024 15 ppt line** outside of project area
- Basin **fresher** than in 2023



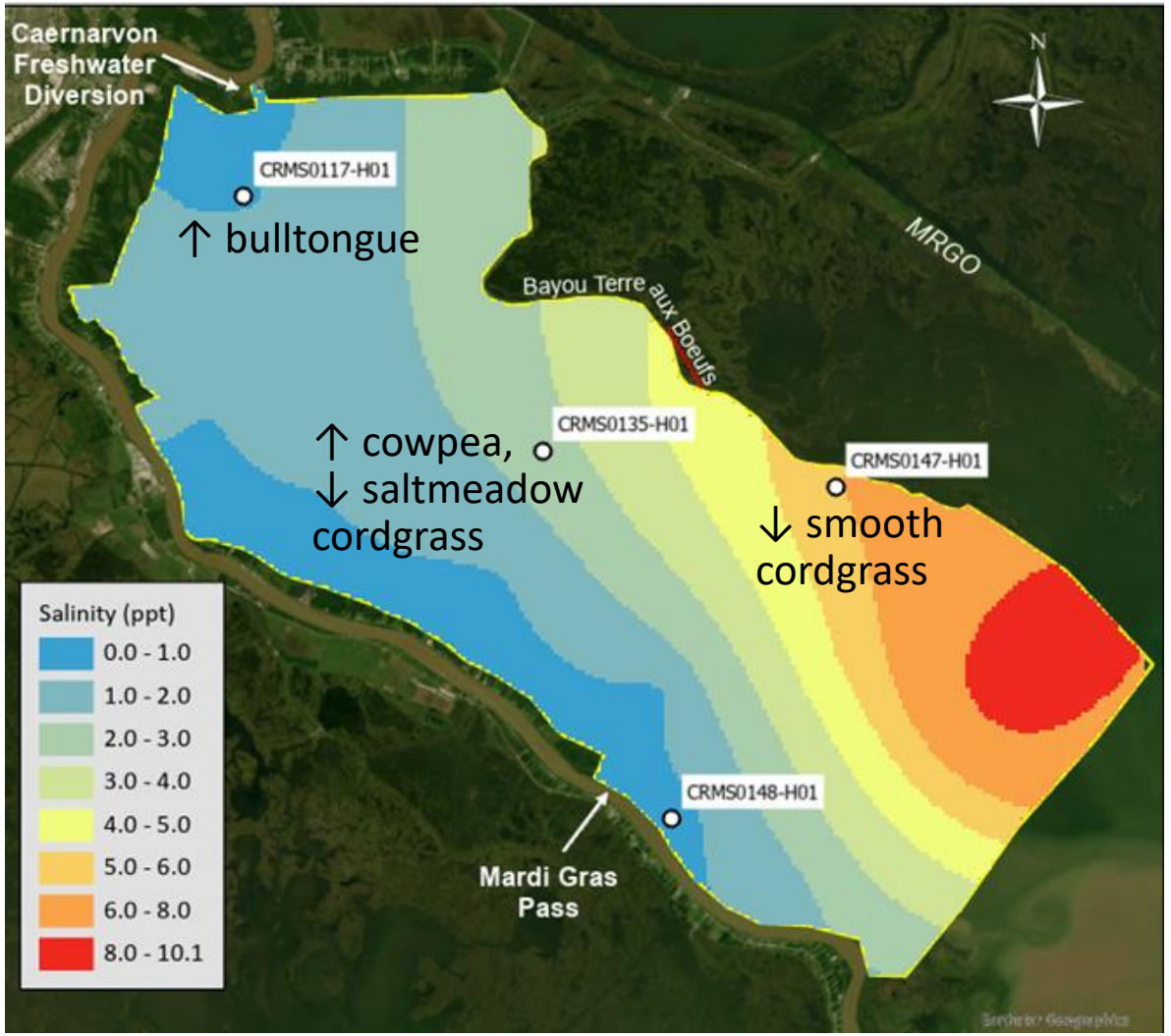
Caernarvon Freshwater Diversion 2024 Vegetation

Caernarvon Vegetation: Coastwide Reference Monitoring System (CRMS)

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

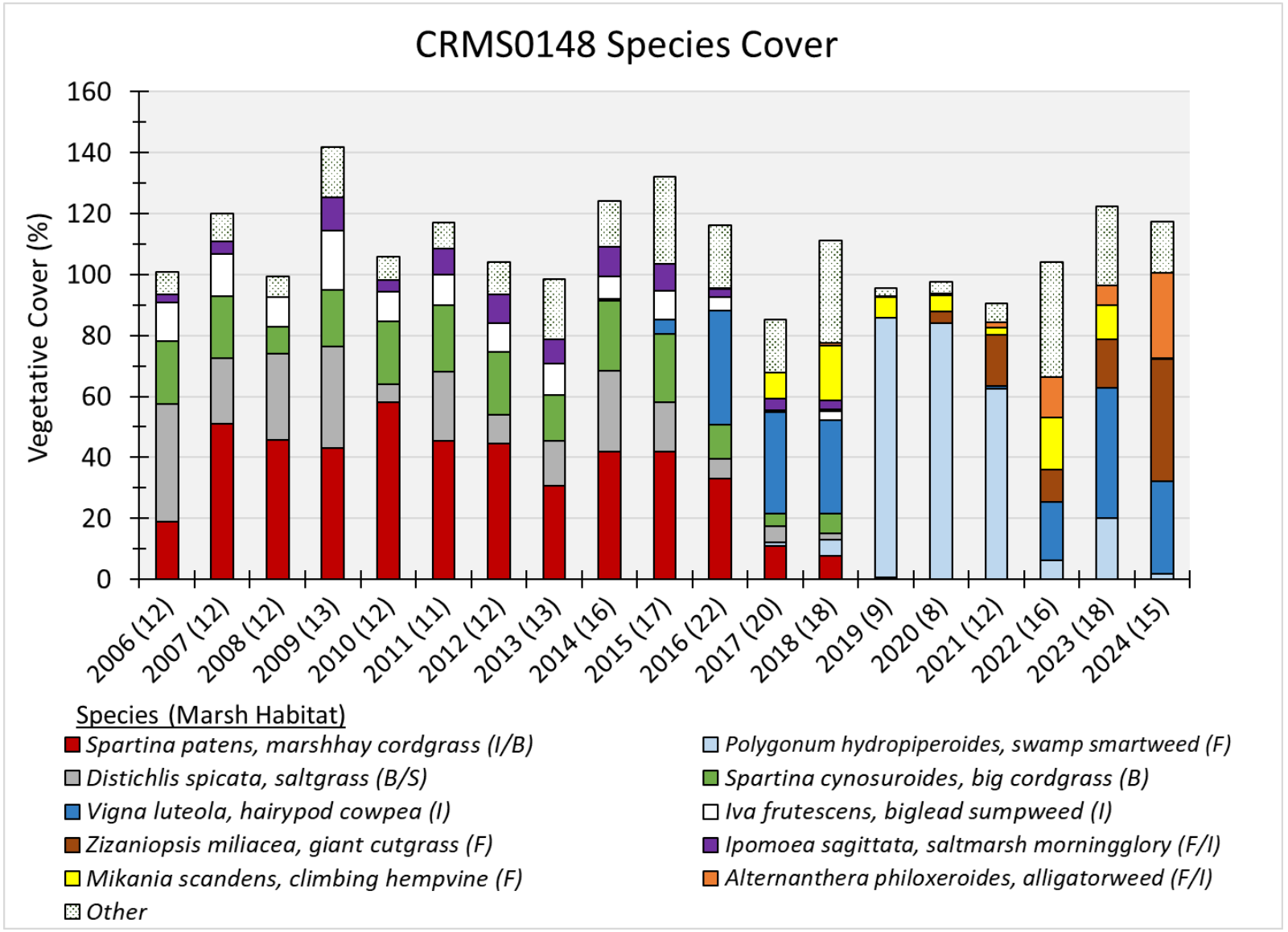


2024 Interpolated Annual Salinity Analysis



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.

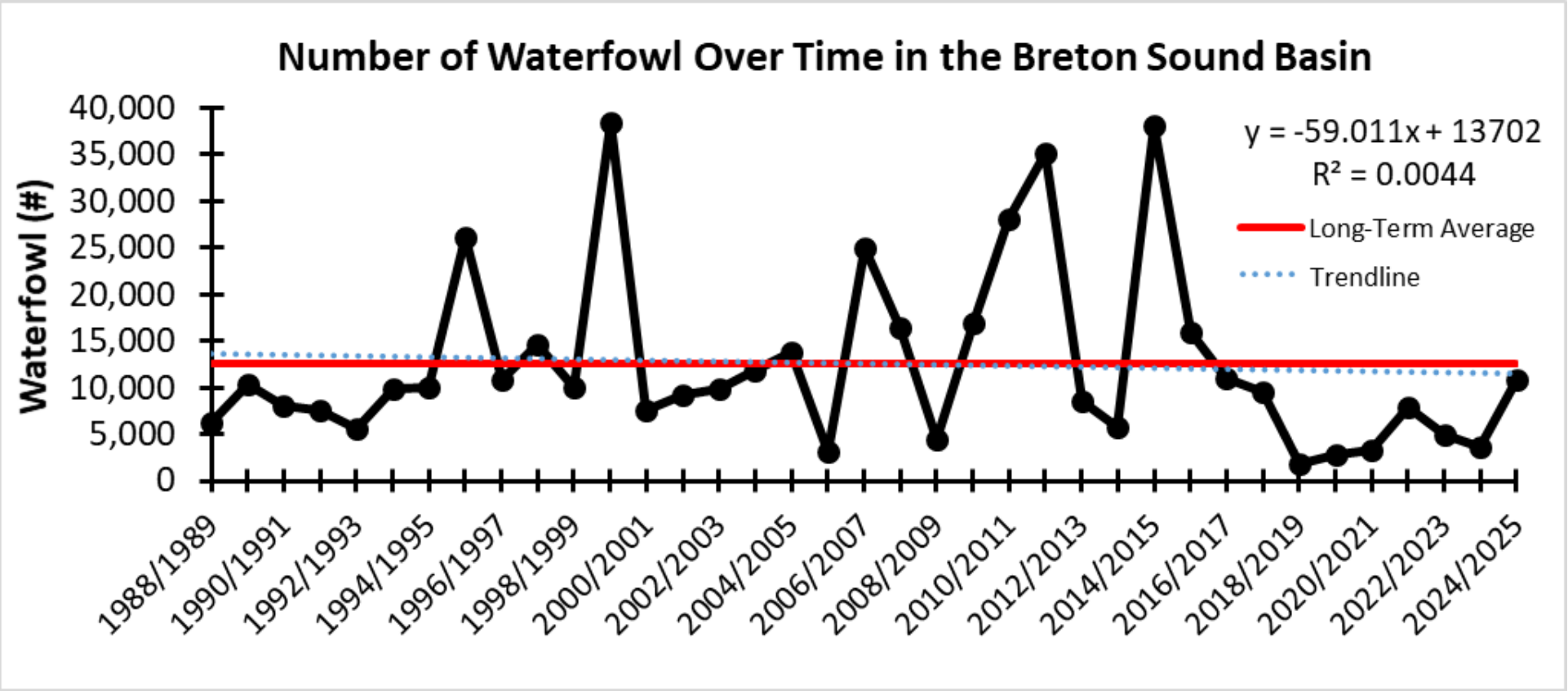
2024/2025 Breton Sound Basin: Aerial Waterfowl Surveys

- 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**

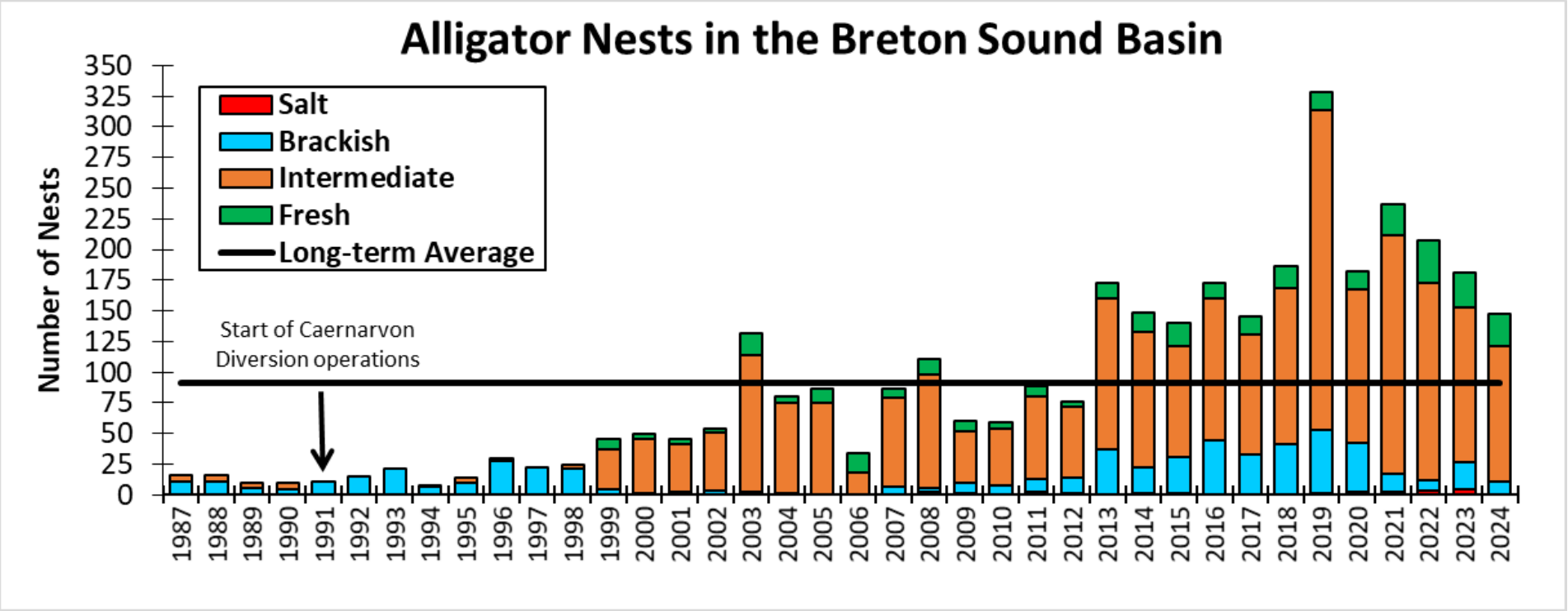
2024/2025 Breton Sound Basin: Waterfowl

- 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



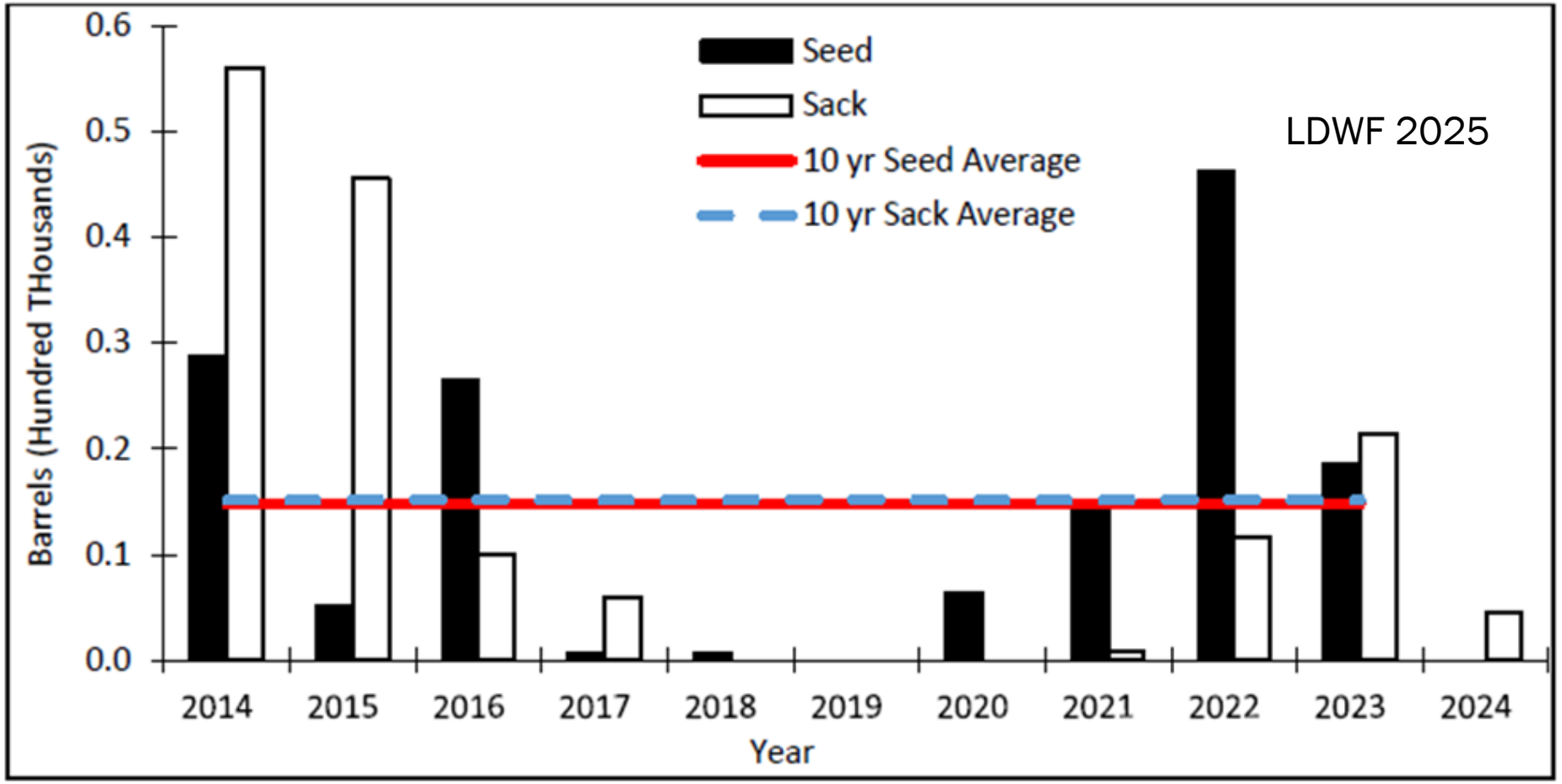
2024 Breton Sound Basin: Oysters

- $1m^2$ 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

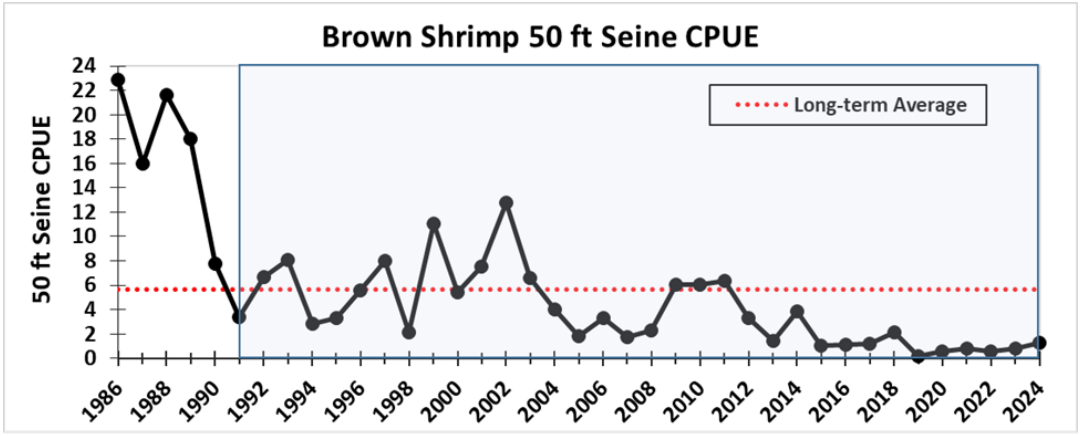
2024 Breton Sound Basin: Oysters

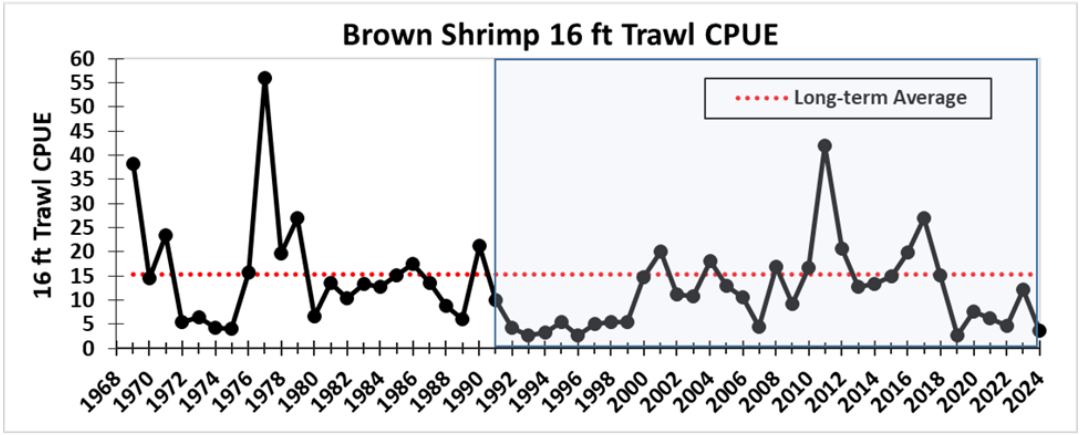
- 2024 sack oysters: 70% decline from previous 10-year average of 15,148 barrels

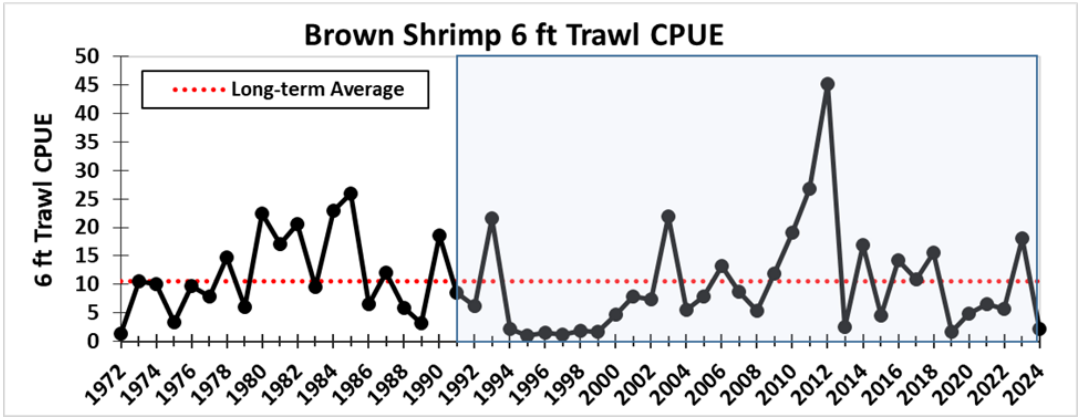


2024 Breton Sound Basin Brown Shrimp

- 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

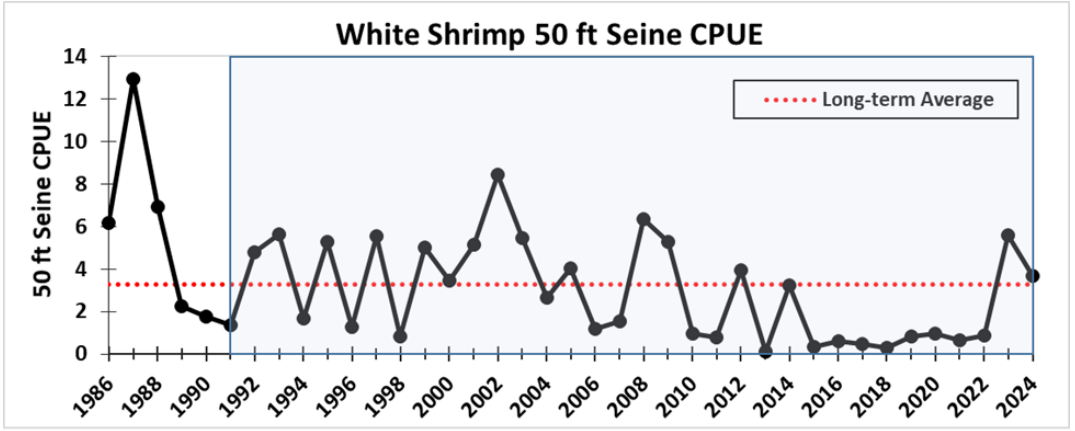


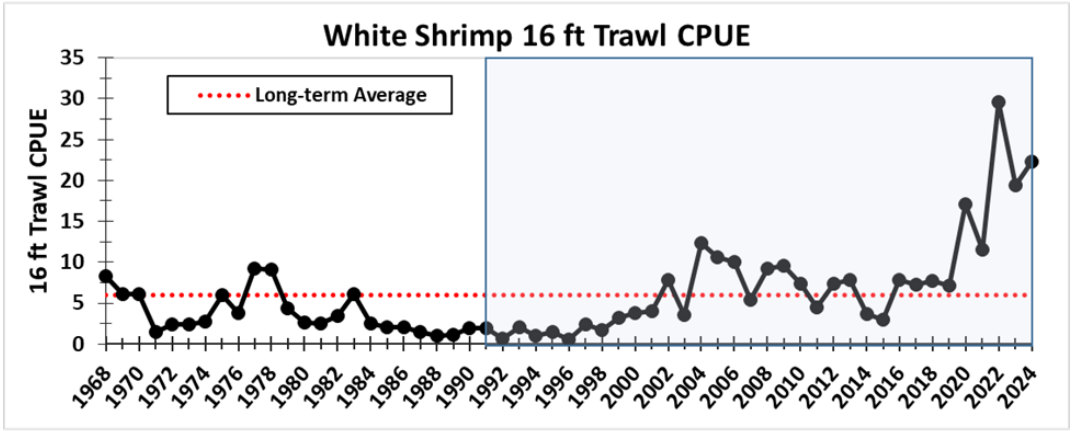


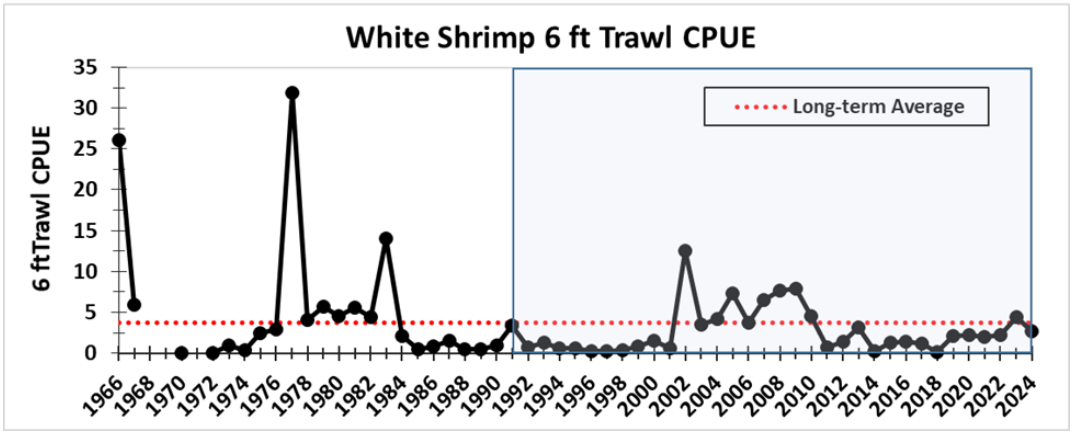


2024 Breton Sound Basin White Shrimp

- 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

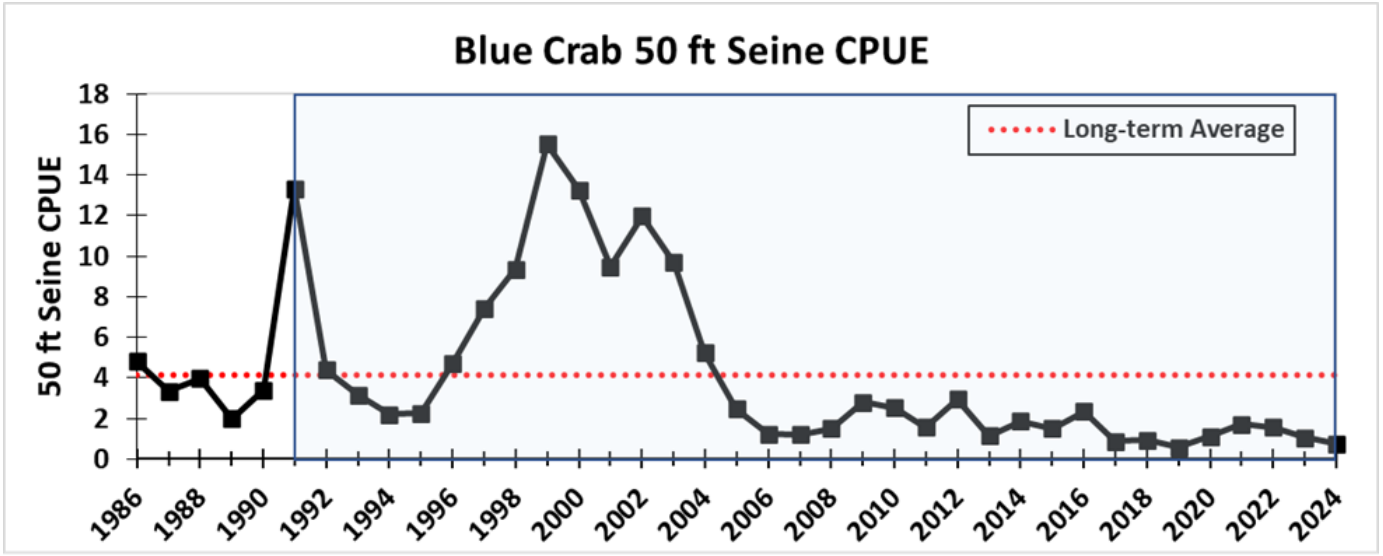


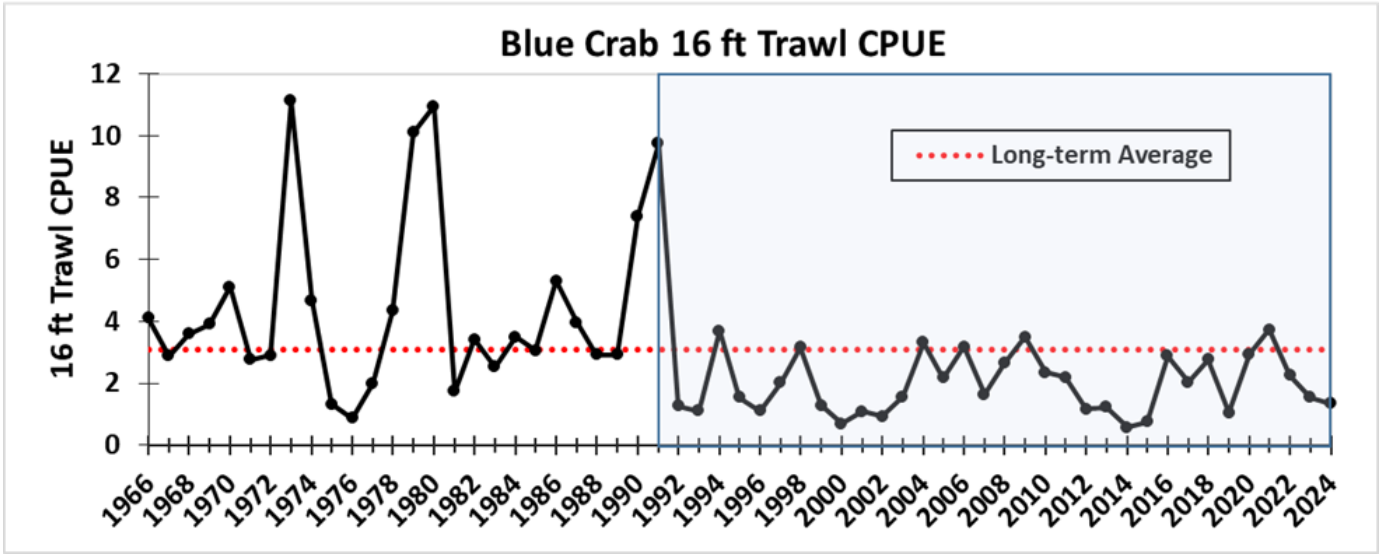




2024 Breton Sound Basin: Blue Crabs

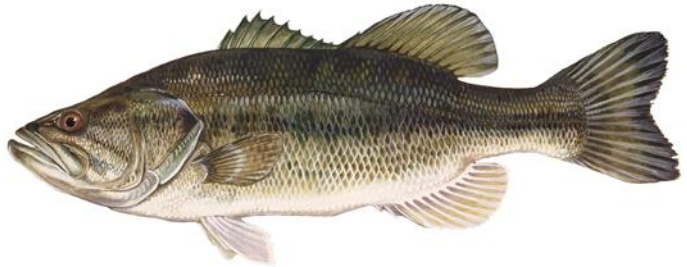
- Below LTA for 50 ft seines and 16 ft trawls; slight decline from 2023 in both gear types
  - 50 ft seines: CPUE = 0.8
  - 16 ft trawls: CPUE = 1.3

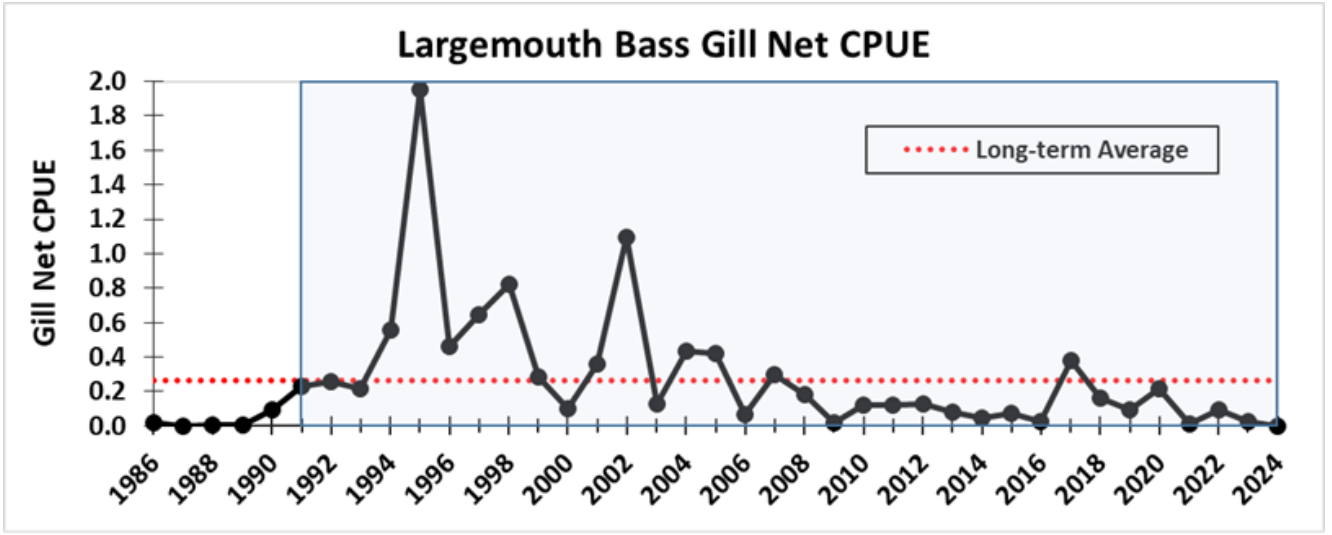


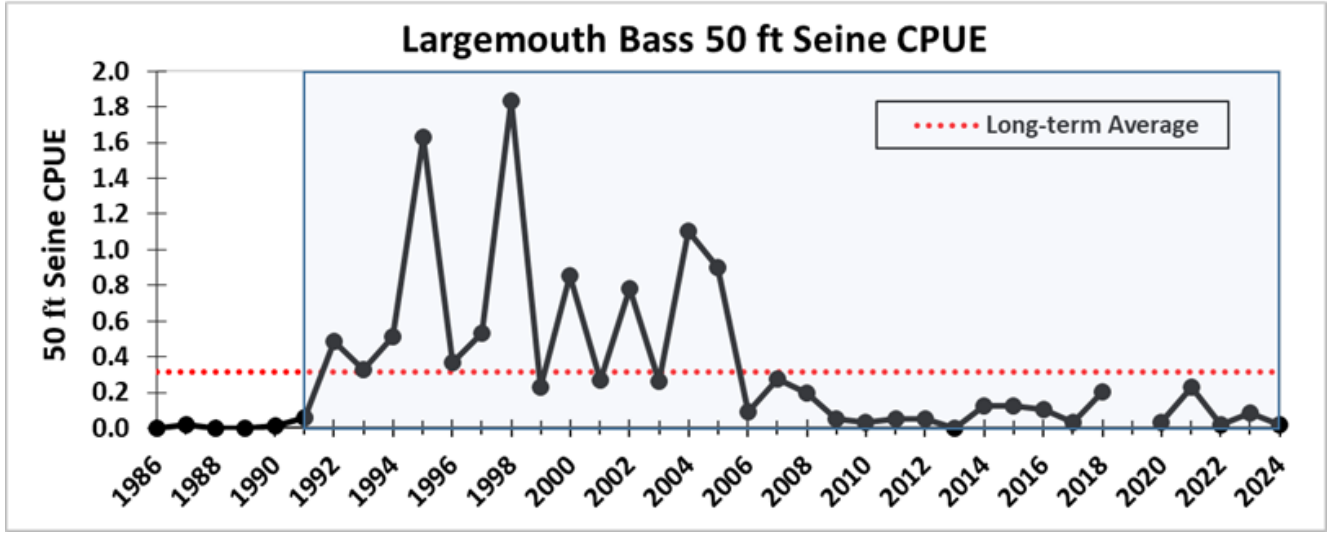


2024 Breton Sound Basin: Largemouth Bass

- 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)

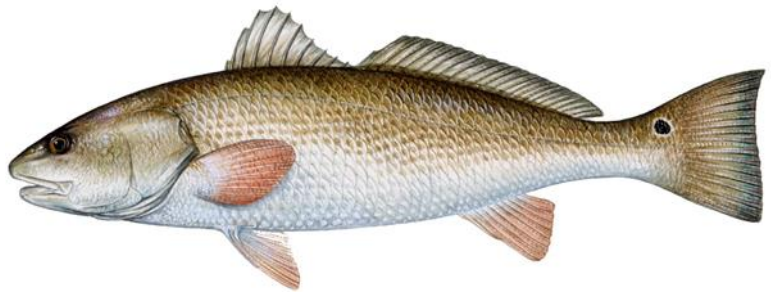


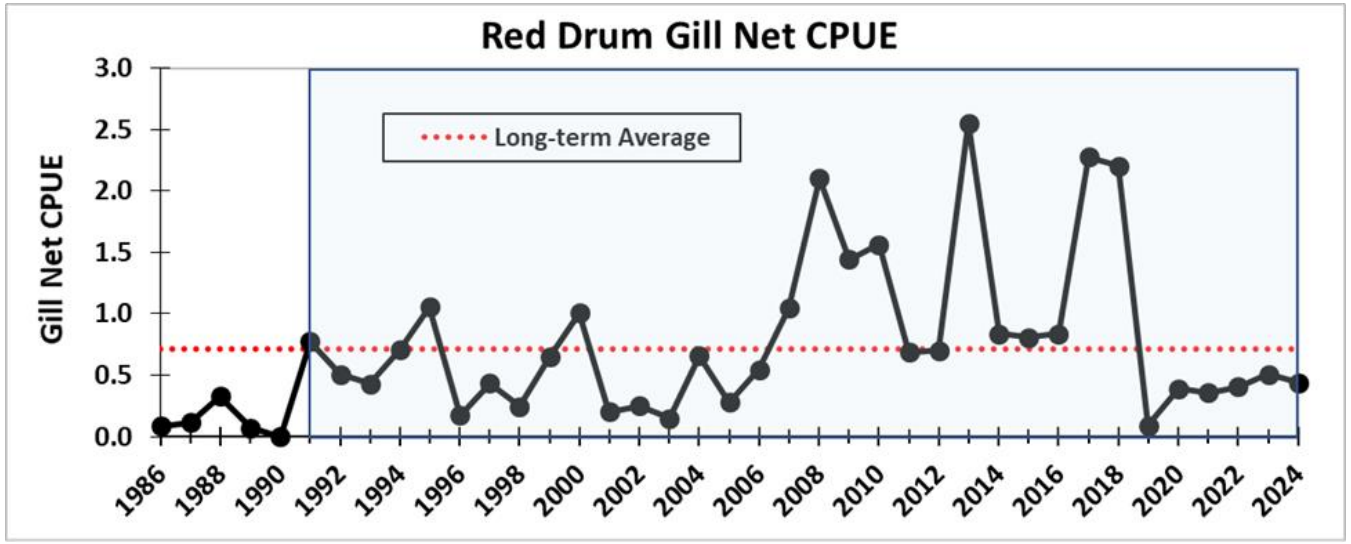


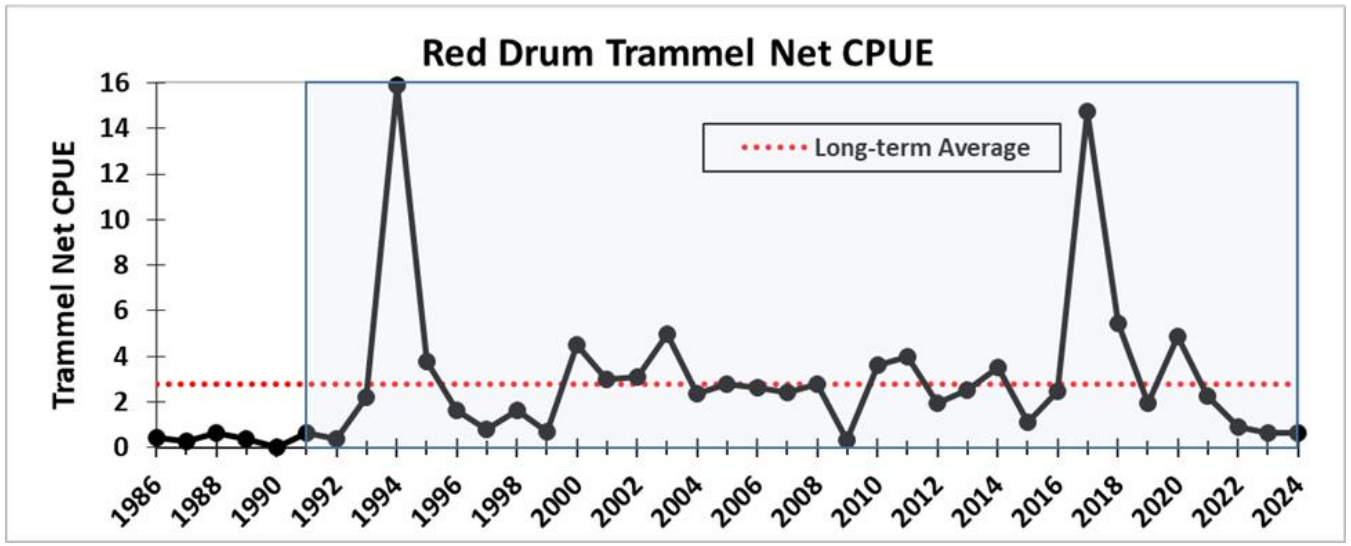


2024 Breton Sound Basin: Red Drum

- 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

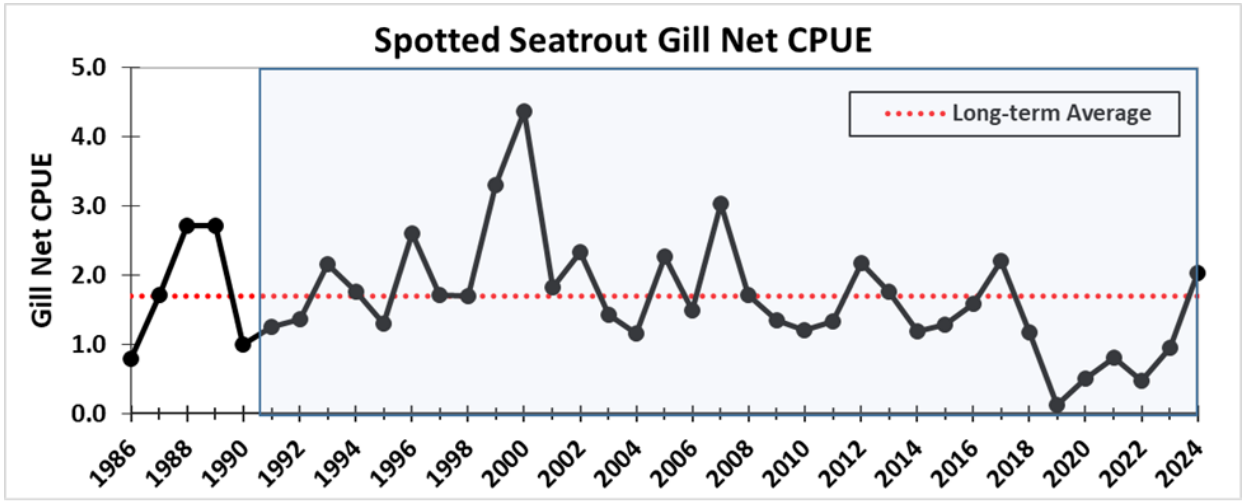


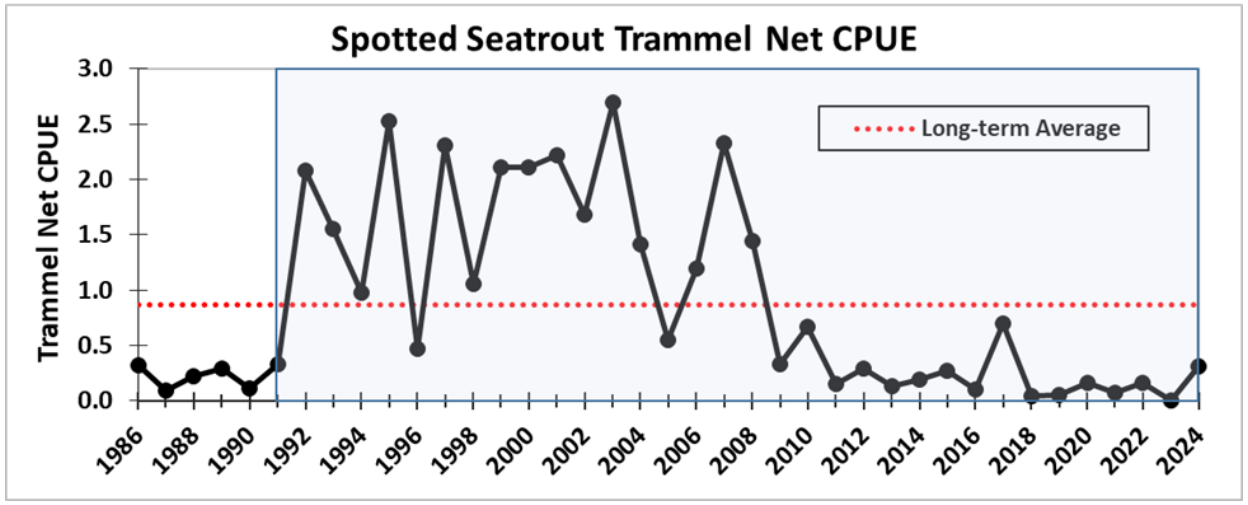




2024 Breton Sound Basin: Spotted Seatrout (Speckled Trout)

- 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**

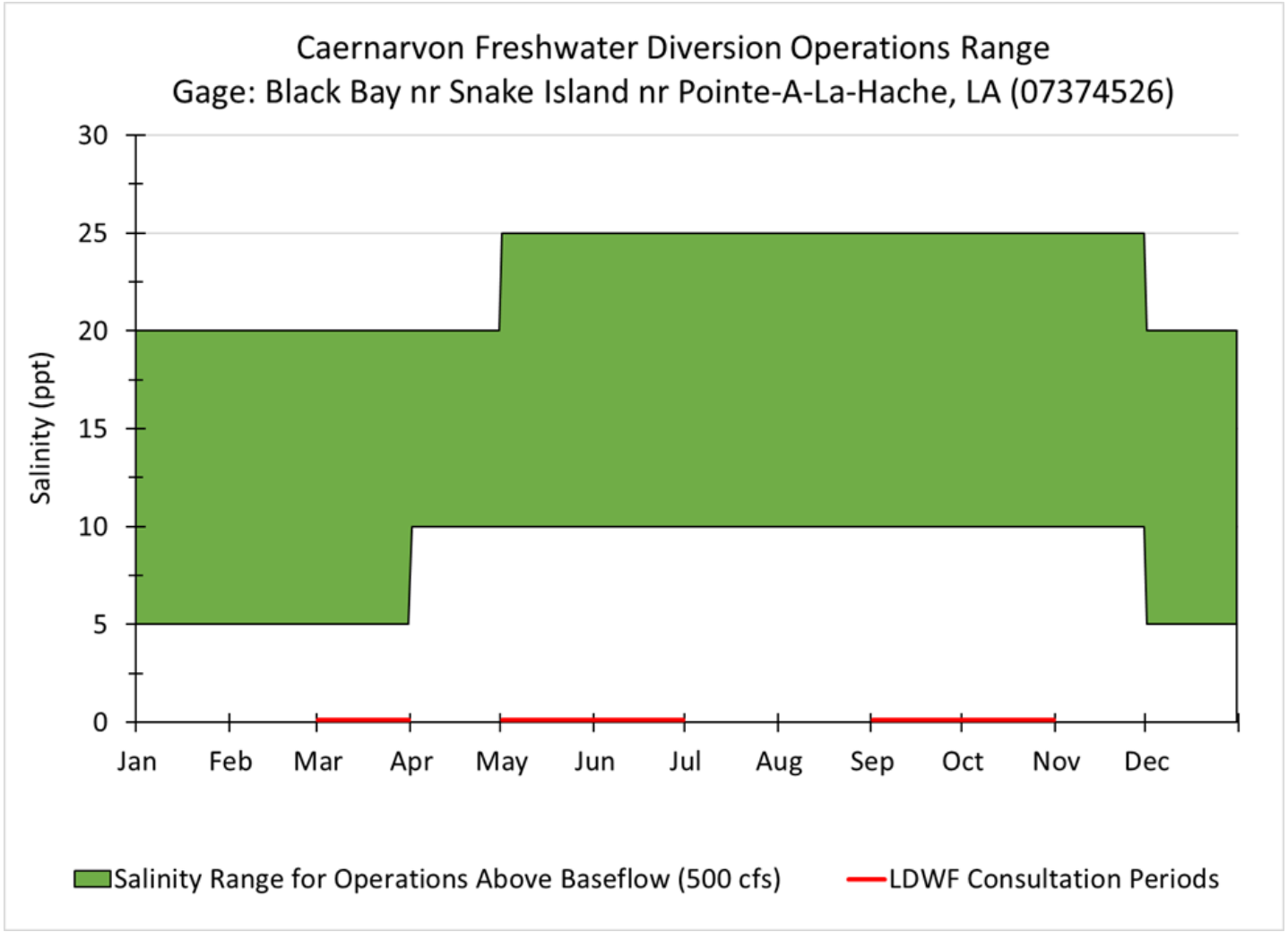
- Freshwater input through the passes is influencing the marsh composition, with a transition to fresher marsh seen close to Mardi Gras Pass.

- Due to infrequent Caernarvon operations, diversion impacts on wildlife and fisheries in the basin are not discernable.

2026 Proposed Caernarvon Freshwater Diversion Operations Plan

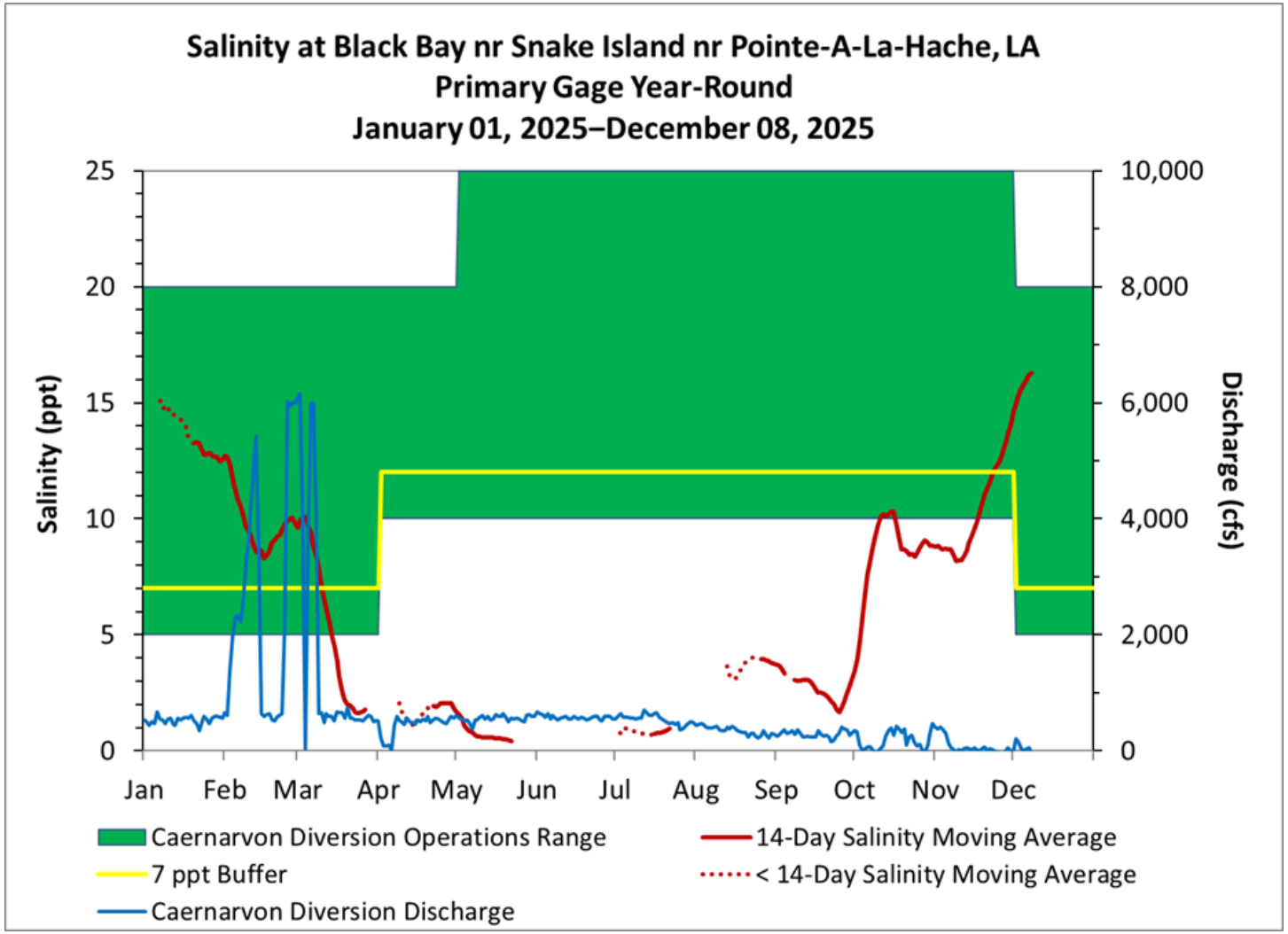
2026 Caernarvon Proposed Operations

- Same operations plan as 2025
- Utilizes Snake Island gage year-round
- Utilizes oyster salinity range (LDWF)
  - 1st ops plan (1991) was based on oyster salinity range
- Includes LDWF consultation periods for brown shrimp and oysters
- Incorporates 2 ppt buffer > lower salinity limit for pulsing



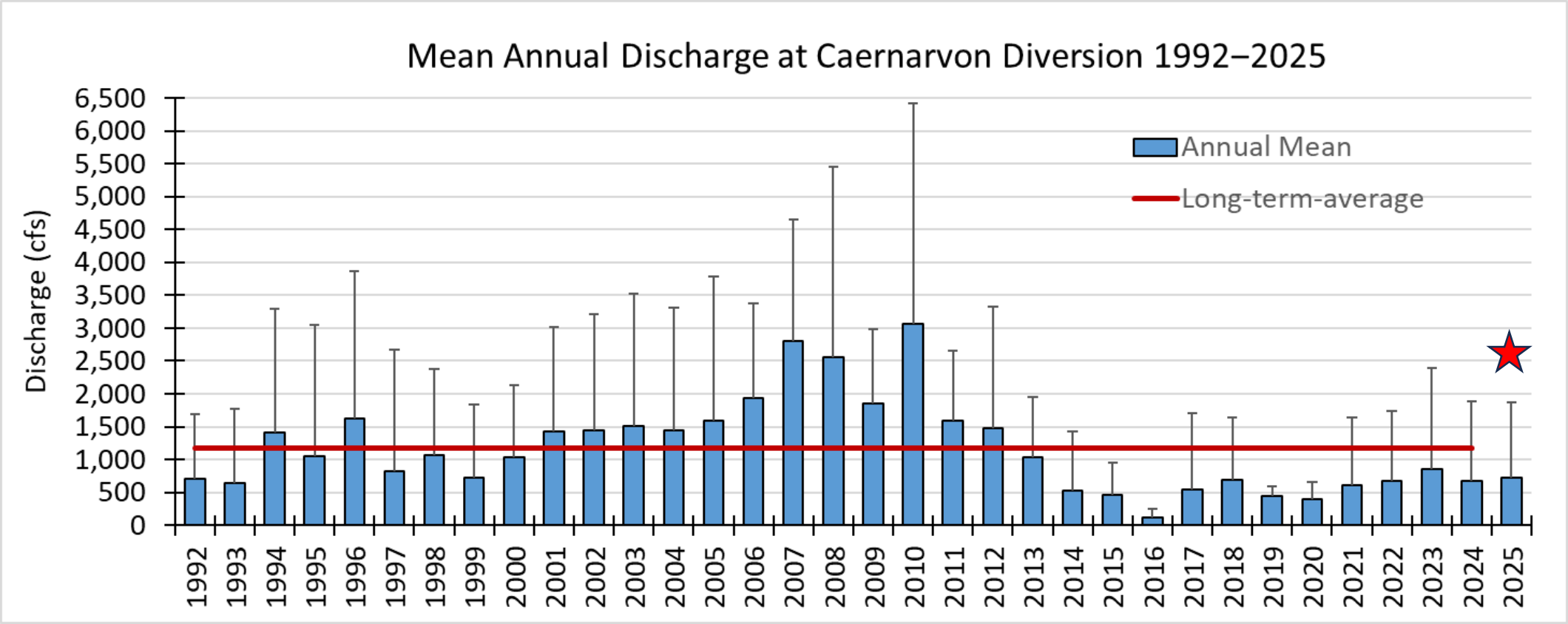
2025 Caernarvon Operations Through 12/08/25–Current Plan

- 2025: Pulsed **23 days** (current)
  - 02/03–02/14 (declining salinity/weekend)
  - 02/24–03/03 (closed: CFA)
  - 03/05–03/08 (declining salinity)
- 2024: pulsed **27 days**



2025 Mean Annual Discharge through 12/08/2025

- 727 cfs (2024: 674 cfs); expected to decline with full year of data
- 38% decrease from LTA of 1,174 cfs (1992–2024)



2025 Caernarvon Operations – Current vs. Previous Plan

❖ **Potential days to pulse (no constraints, through 12/08/25):**

Stone Island

- Previous Plan: 88 days / Current Plan: 75 days

Crooked Bayou

- Previous Plan: 2 days / Current Plan: 7 days

Total Days

- Previous Plan: 90 days / Current Plan: 82 days

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