Davis Pond Interagency Advisory Committee 2023 Meeting

JOHN TROUTMAN

What we will cover:

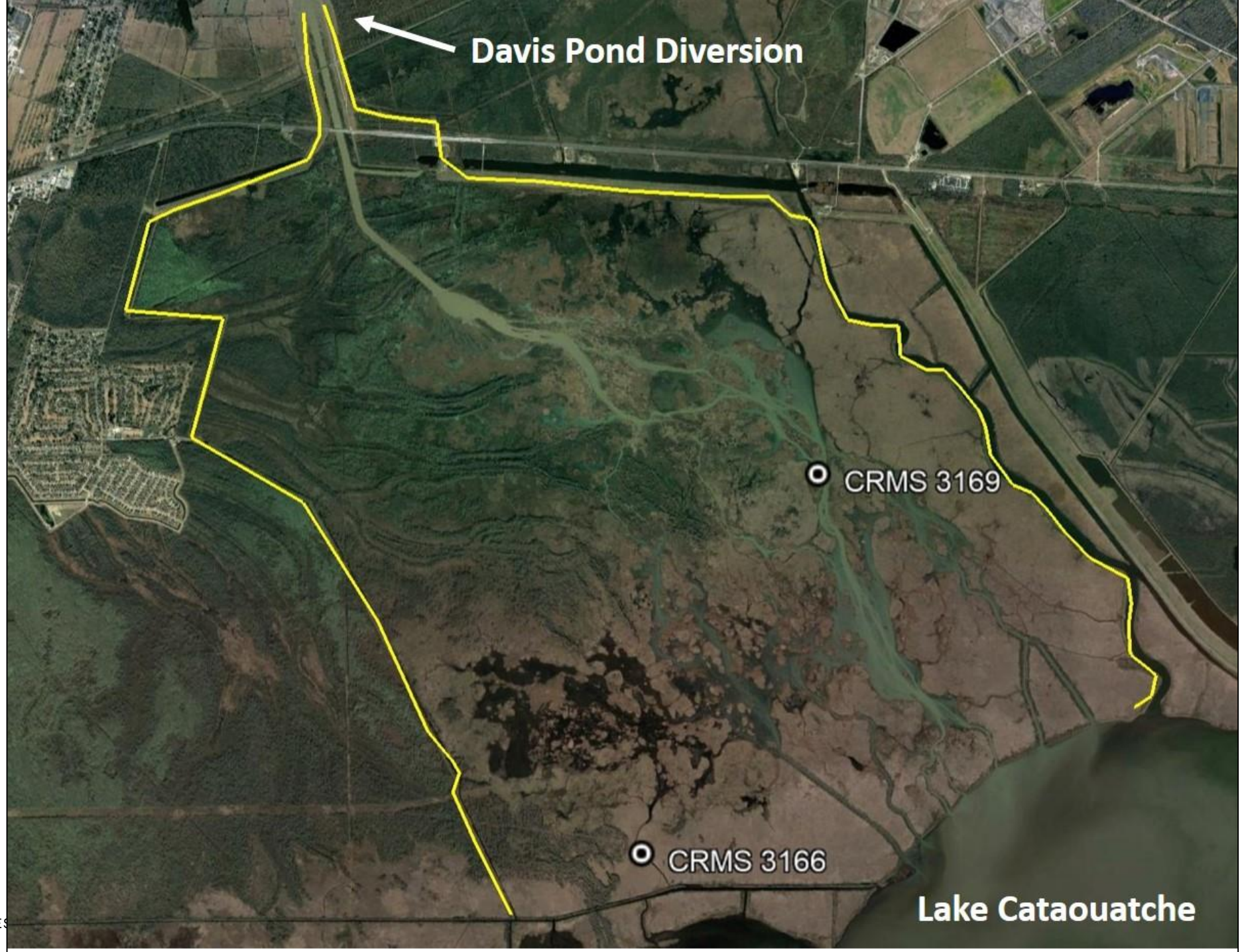
- Purpose and goals of the project
- Why we are here
- 2022 diversion operations and basin conditions
- 2023 snapshot of operations
- Proposed 2024 operations Plan

Davis Pond Facts

- Authorized by U.S. Congress: Flood Control Act 1965 and Water Resources Development Act 1974
- Constructed by USACE; operated by CPRA
- Located on the west bank of Mississippi River in St. Charles Parish
- Four 14 ft^2 gated culverts
- Maximum Discharge = 10,650 cfs
- Operations began in 2002
- and after modifications it became fully operational 2009

Project Features:

- Diversion Structure: 10,650 cfs (4,800,000 gpm) capacity
- Diversion Channel: 2.2 miles from river to ponding area
- Pump Station: 570 cfs (256,000 gpm) capacity
- Ponding Area: 9,311 acres (14.5 square miles)
- Containment Levees: 19 miles (channel + ponding area)
- Oyster leases: Relocated leases
- Rock Weir: 1.8 miles – N shore of Lake Cataouatche


Davis Pond Diversion
CRMS 3169
CRMS 3166
Lake Cataouatche

Davis Pond Freshwater Diversion Project

Goals:

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

With multiple project goals and interests in different fish and wildlife species, it is challenging to operate without causing user group conflicts. Our general approach is to mimic the river – divert high when the river is high and low when low. That time of year addresses most of the goals and limits negative impacts.

Davis Pond Interagency Advisory Committee

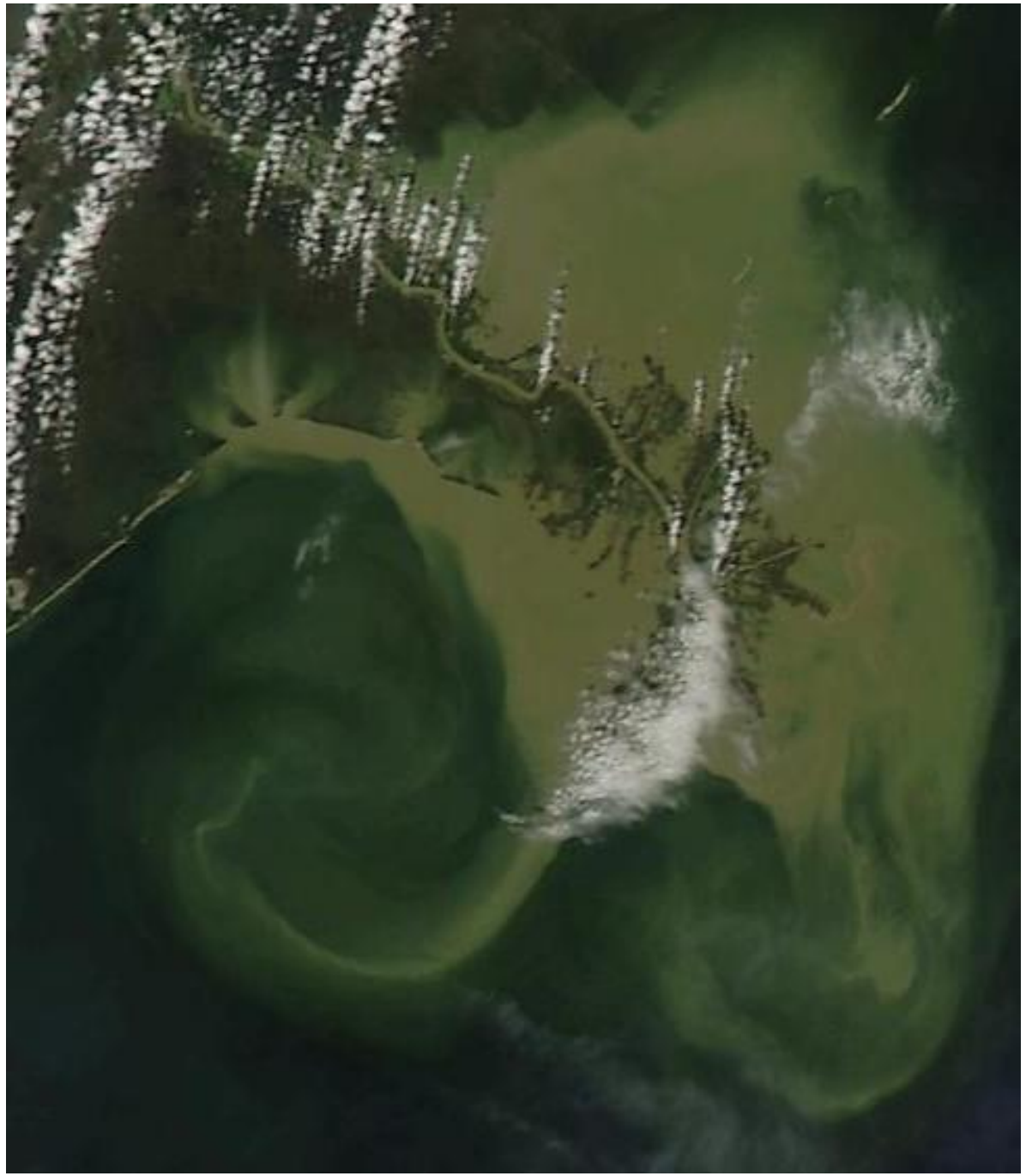
- Purpose:
  - Advise the Executive Director of CPRA relative to an annual operations plan
    - Operational considerations include:
      - Times of year
      - Rate and duration of discharge through the structure
      - Emergency operations and shutdown triggers

- Sources of information:
  - Annual Report written by CPRA (2022 data)
  - Your agency or industry data
  - Any other relevant information (e.g., research studies)
  - Draft Operations Plan proposed by the Technical Workgroup (subcommittee of CIAC)
  - Your expertise and experience

MAJOR FRESHWATER INPUTS

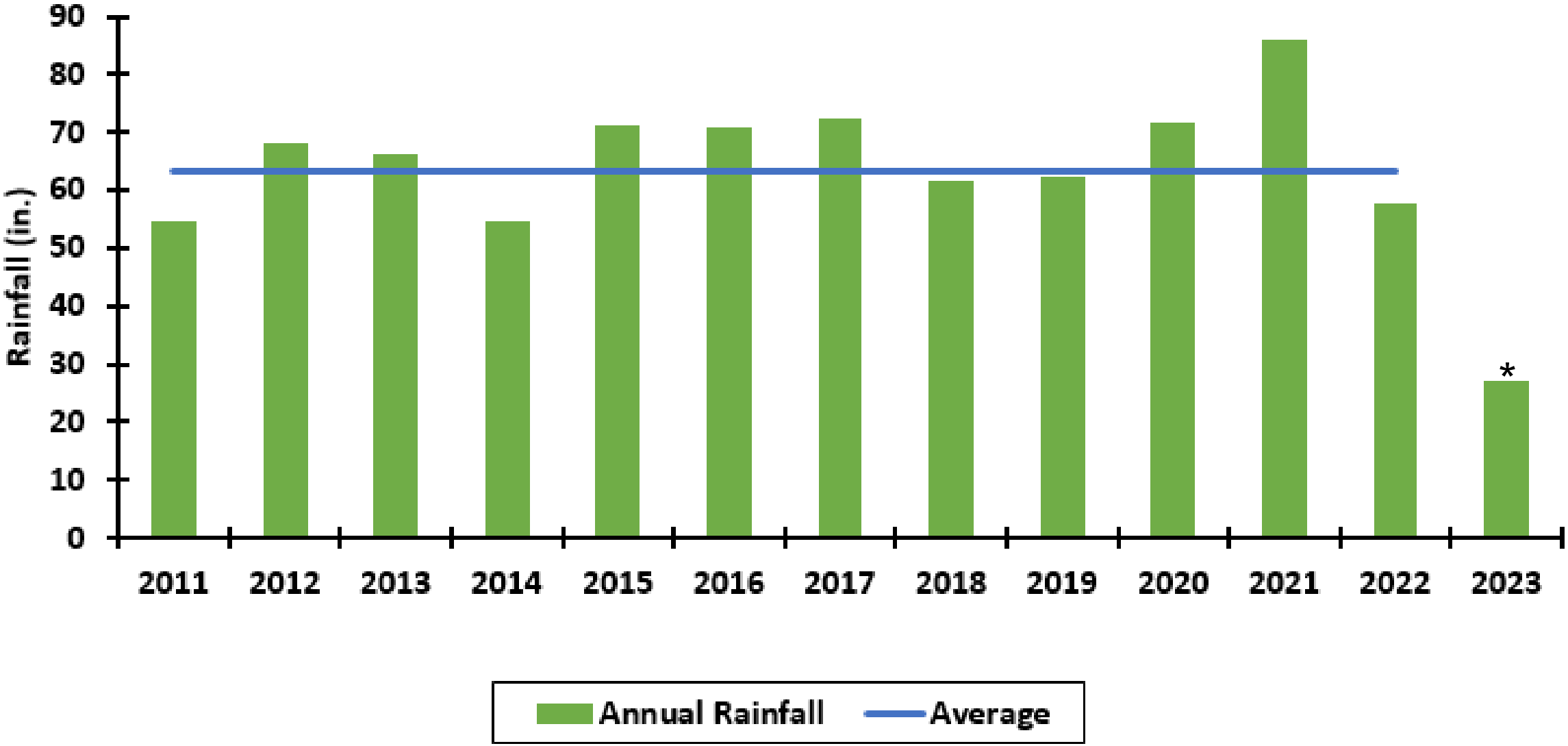
1. Mississippi River Discharge (main driver)
2. Rainfall (wet year 2021 vs. dry year 2023)
3. Diversion, the variable we we can control

MODIS Satellite
March 13, 2020



2022 Mississippi River Stage (at Carrollton)

Precipitation at the New Orleans Airport



Davis Pond

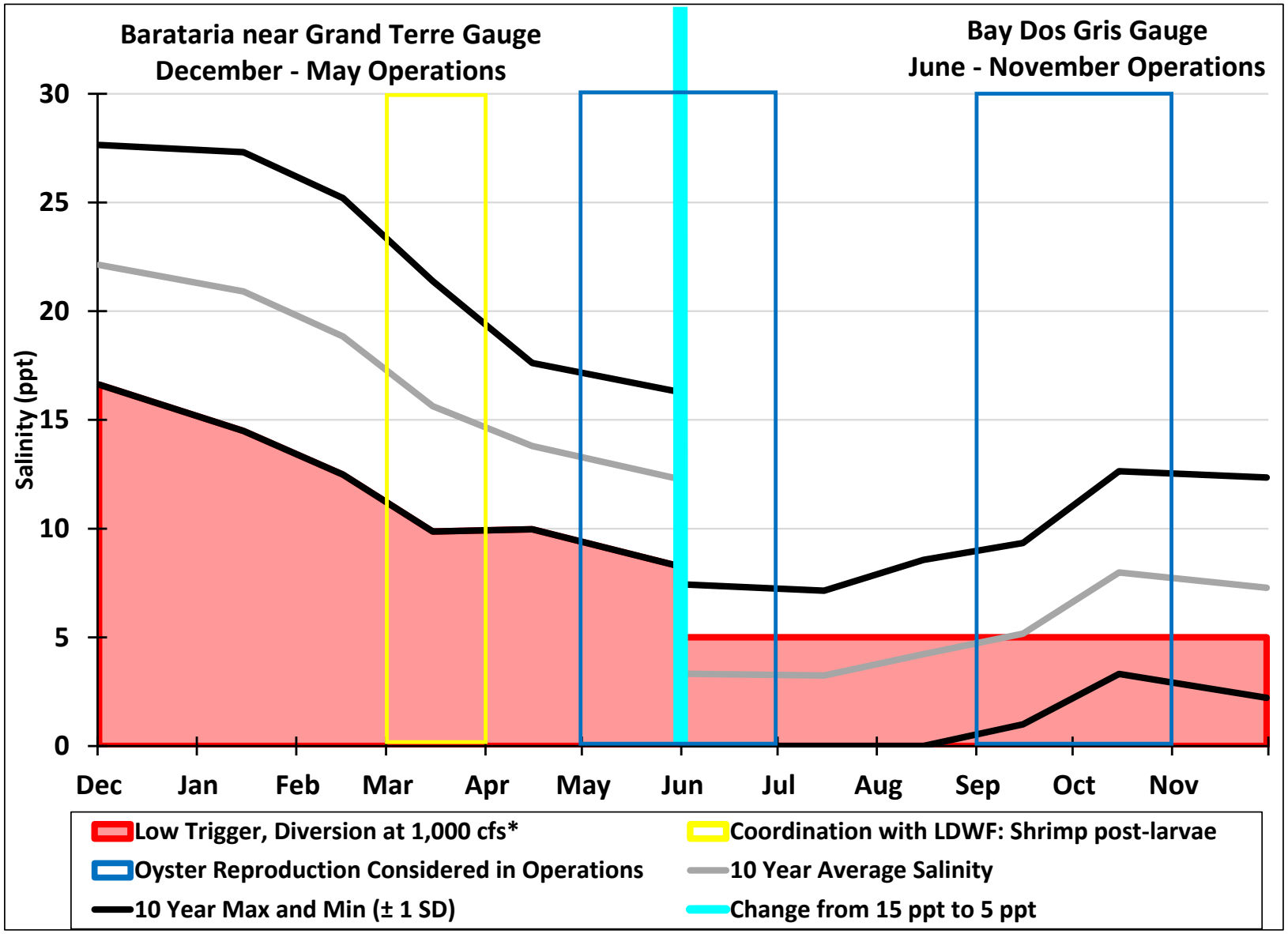
2022 Operations


5 ppt Isohaline
5 ppt isohaline
Barataria Waterway
Bay Dosgris
Hackberry Bay
15 ppt isohaline
Barataria Bay N Grand Terre
15 ppt Isohaline
Data Collection Platform
BA-0001 Davis Pond Freshwater Diversion

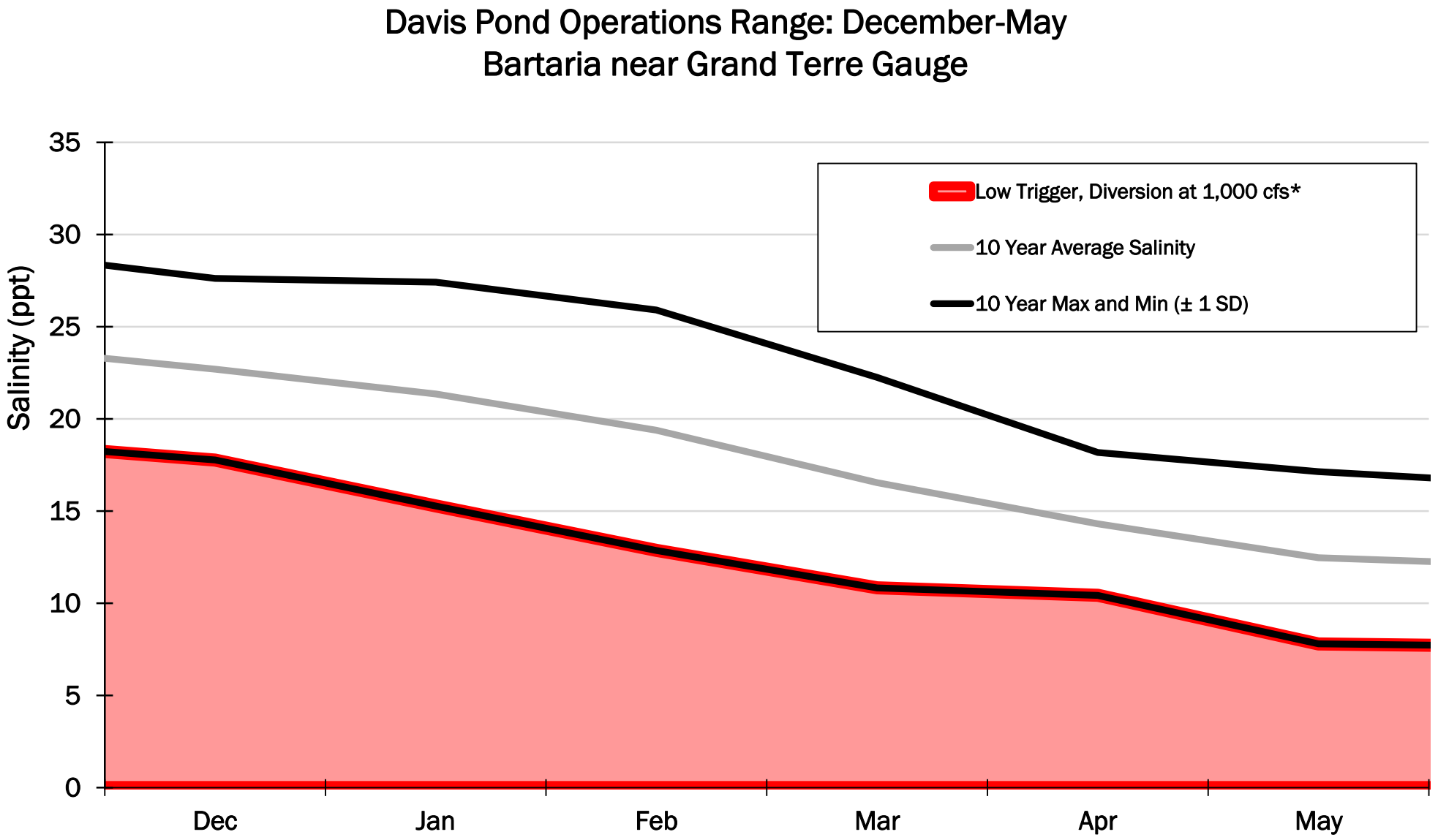
2022 Operations Plan

Operational notes:

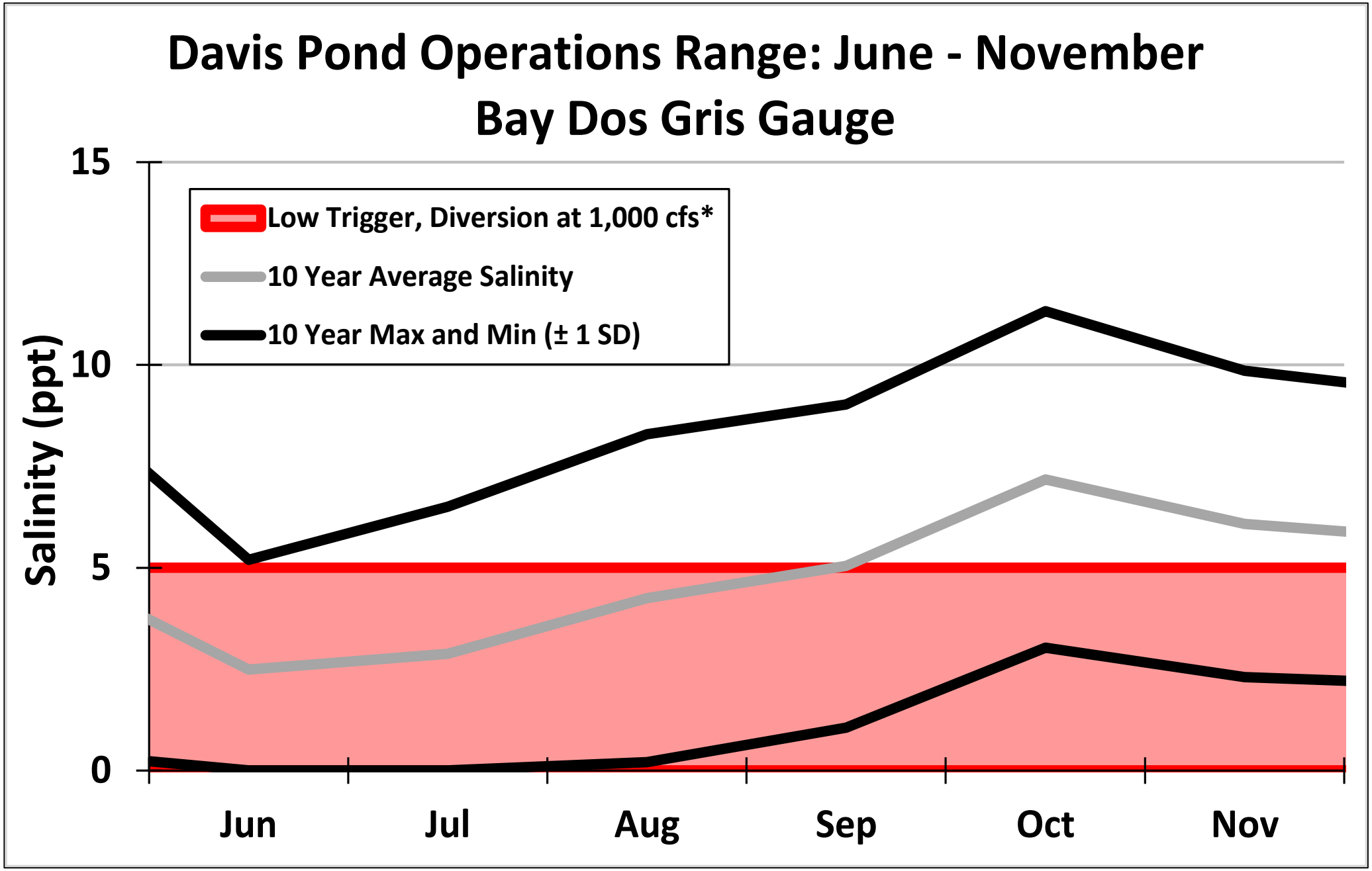
- Average conditions
- Seasonal operations (15 vs. 5 isohaline; mimic the river)
- Official fisheries consideration periods: post-larval shrimp recruitment and oyster spawns
- Minimum discharge (1000 cfs)
- Low triggers = reduce to mimimum



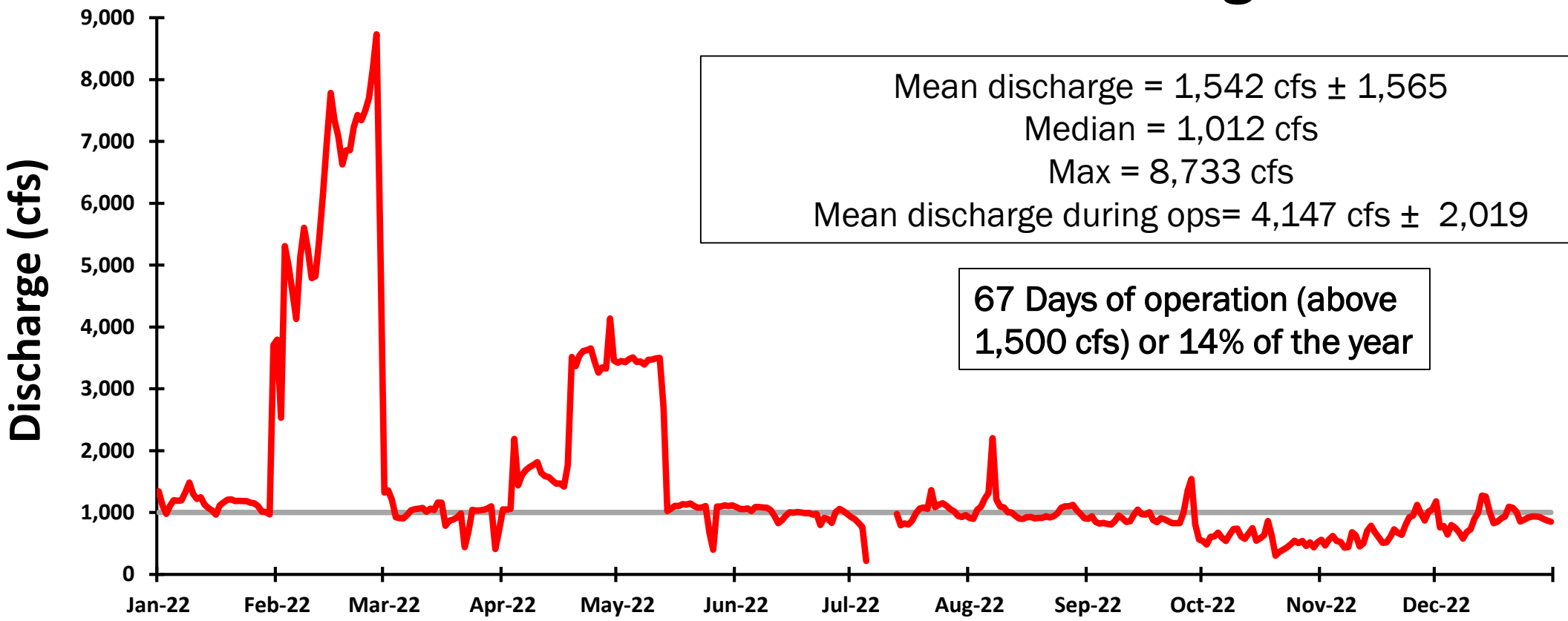
15 PPT Isohaline



5 PPT Isohaline



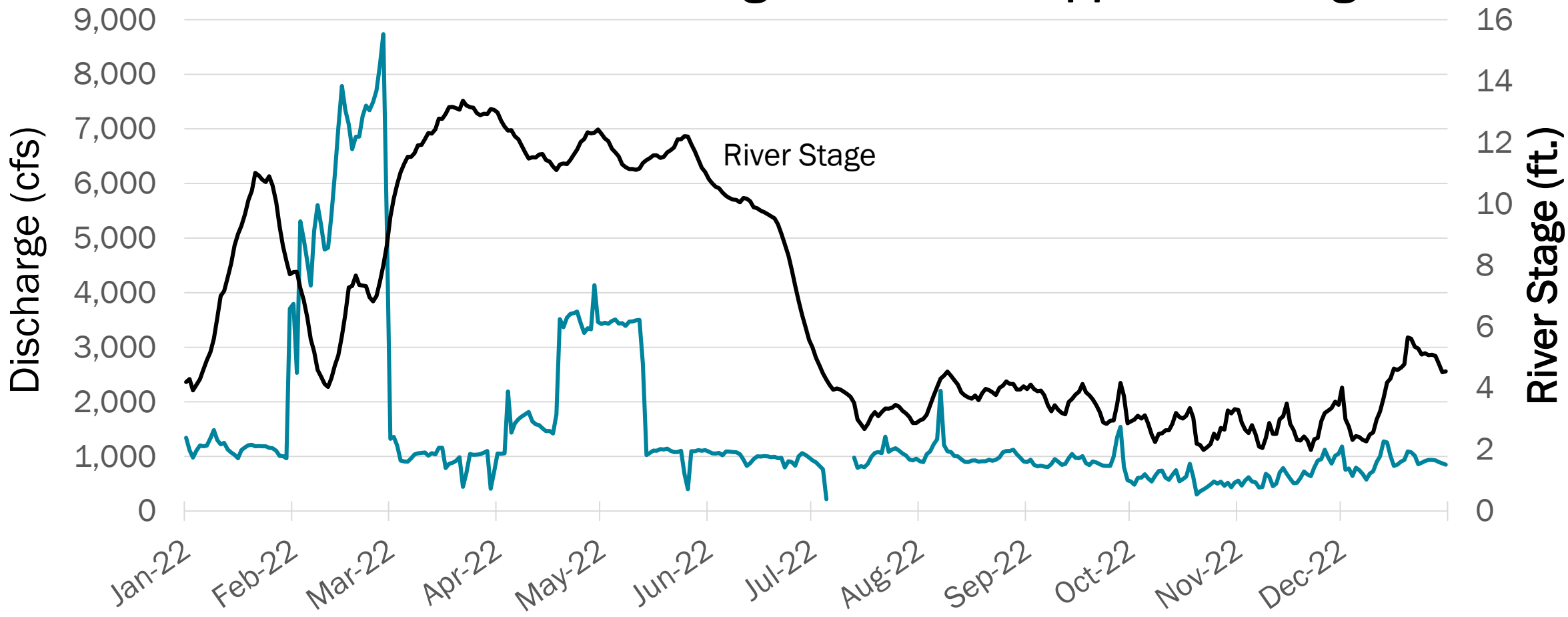
2022 Davis Pond Discharge



Mean discharge = 1,542 cfs ± 1,565
Median = 1,012 cfs
Max = 8,733 cfs
Mean discharge during ops= 4,147 cfs ± 2,019

67 Days of operation (above 1,500 cfs) or 14% of the year

2022 Davis Pond Discharge and Mississippi River Stage

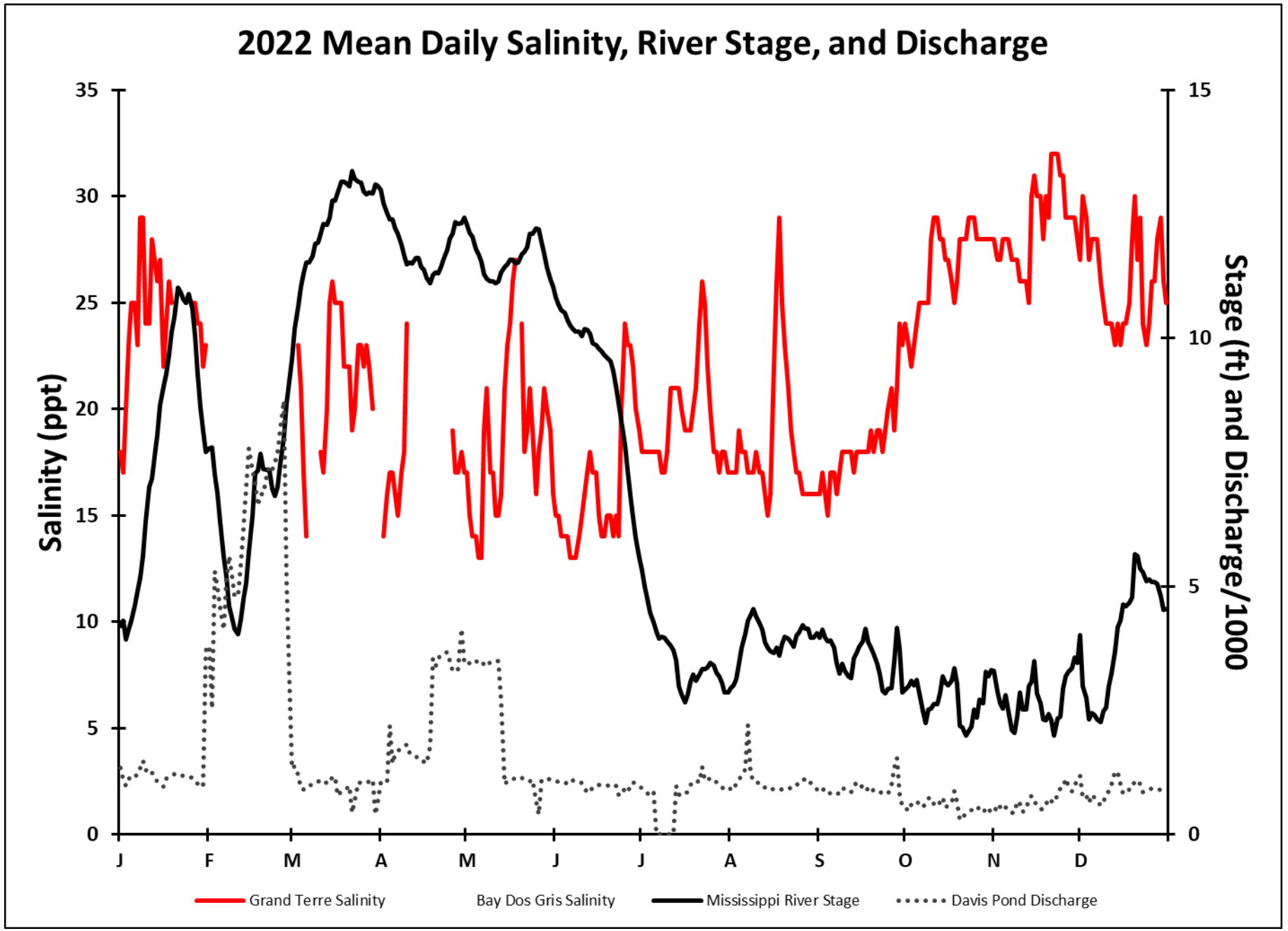


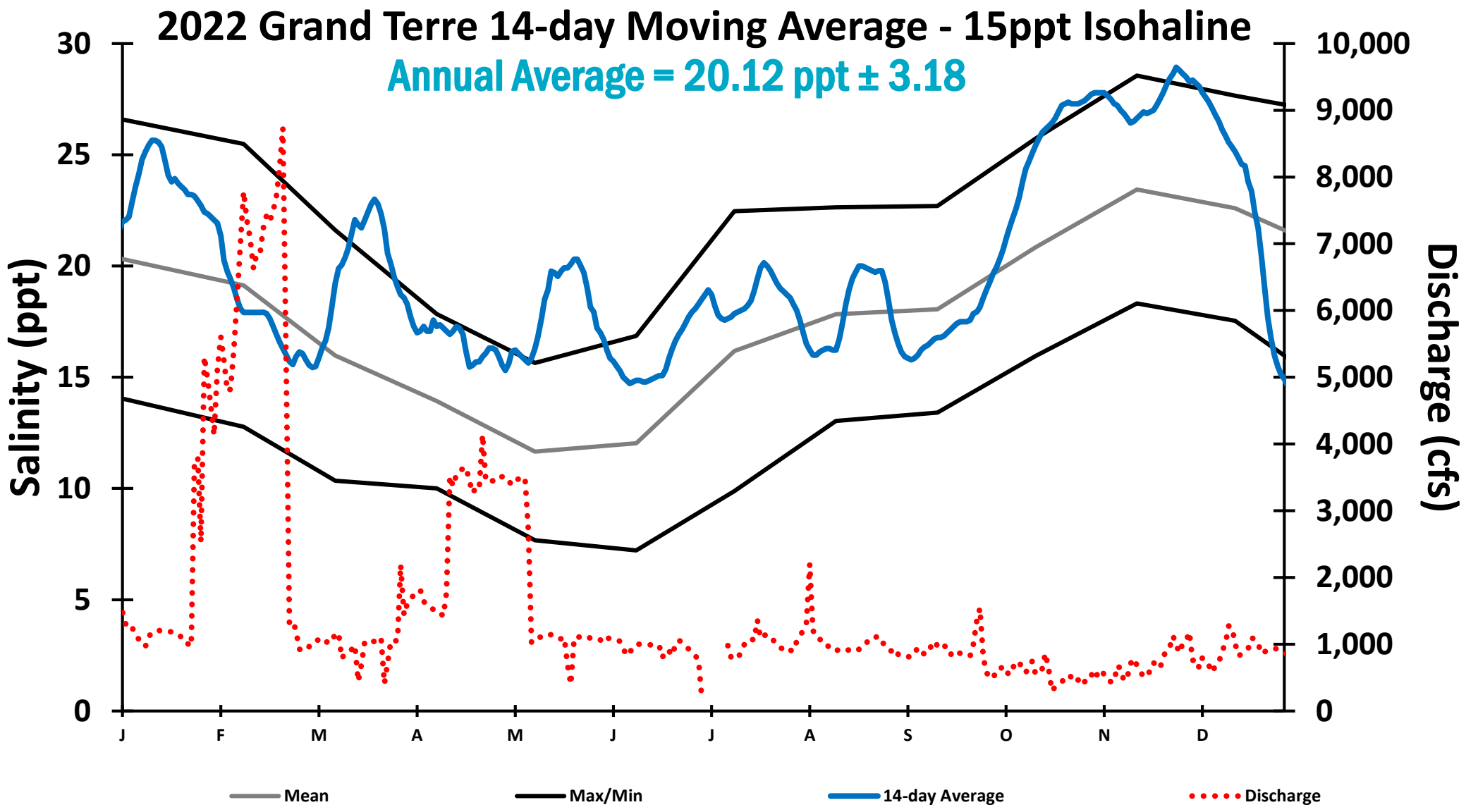
- Grand Terre gage at 15 PPT isohaline

- Daily fluctuation can be large (e.g., tides for cold fronts)

- Bigger pattern = weak influence of MR and diversion on salinities

- Diversion pulses = marginal impacts, if any



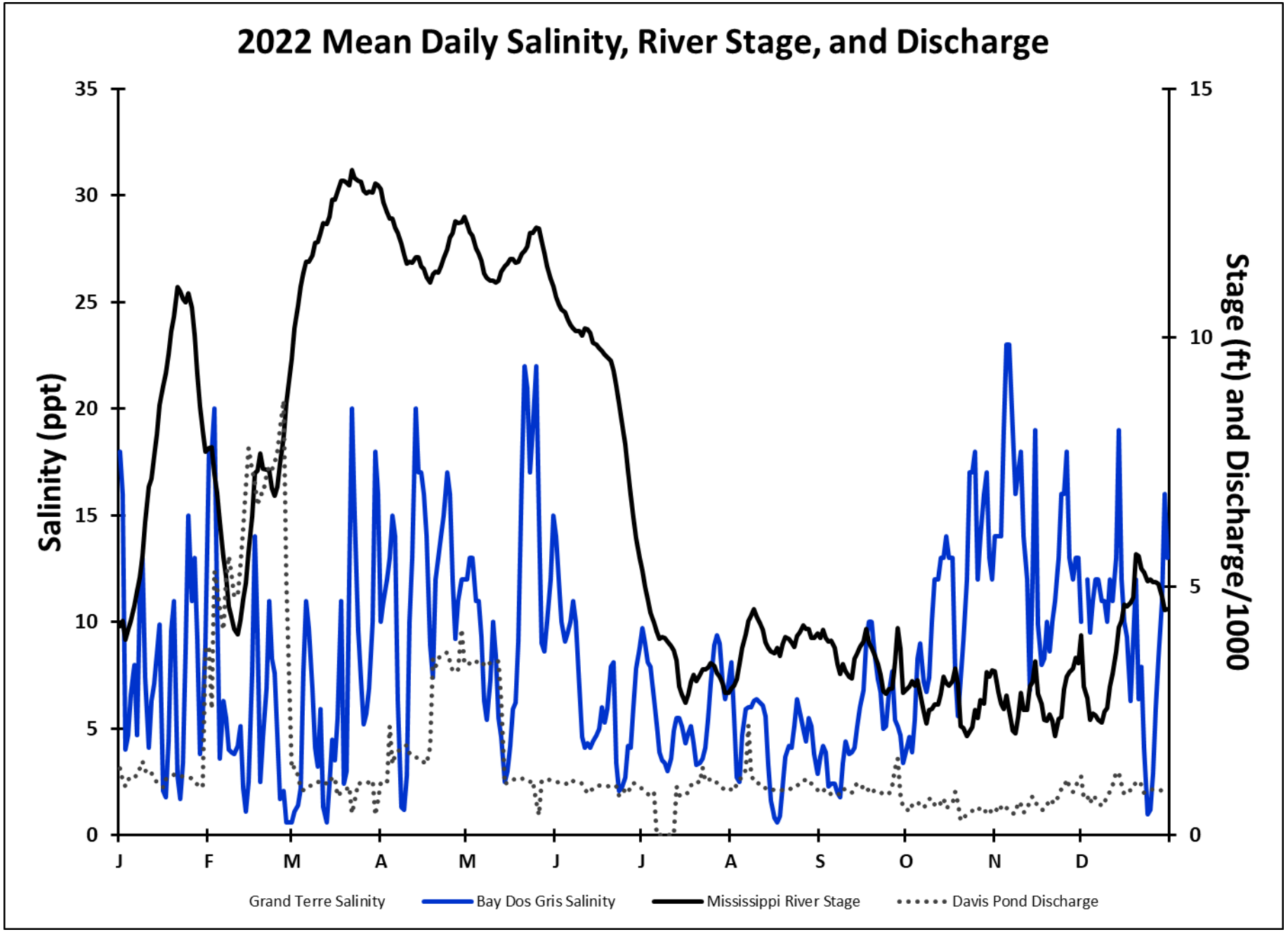

2022 Grand Terre 14-day Moving Average - 15ppt Isohaline
Annual Average = 20.12 ppt ± 3.18
Salinity (ppt)
Discharge (cfs)
30
25
20
15
10
5
0
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
J
F
M
A
M
J
J
A
S
O
N
D
Mean
Max/Min
14-day Average
Discharge

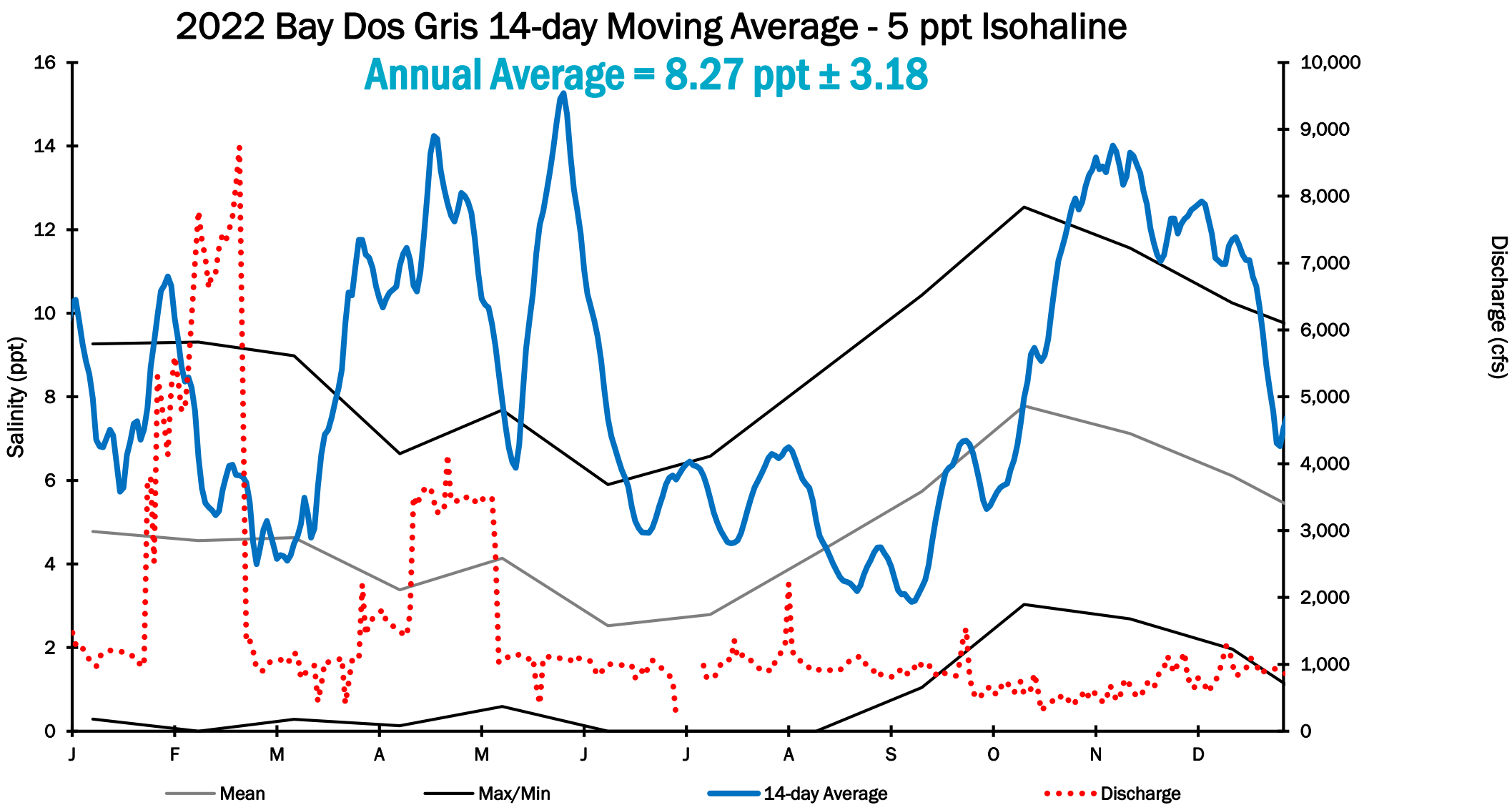
- Bay Dos Gris gage at 5 PPT isohaline

- Daily fluctuation pretty strong

- Big picture = when river discharge is high salinities are low (and opposite)

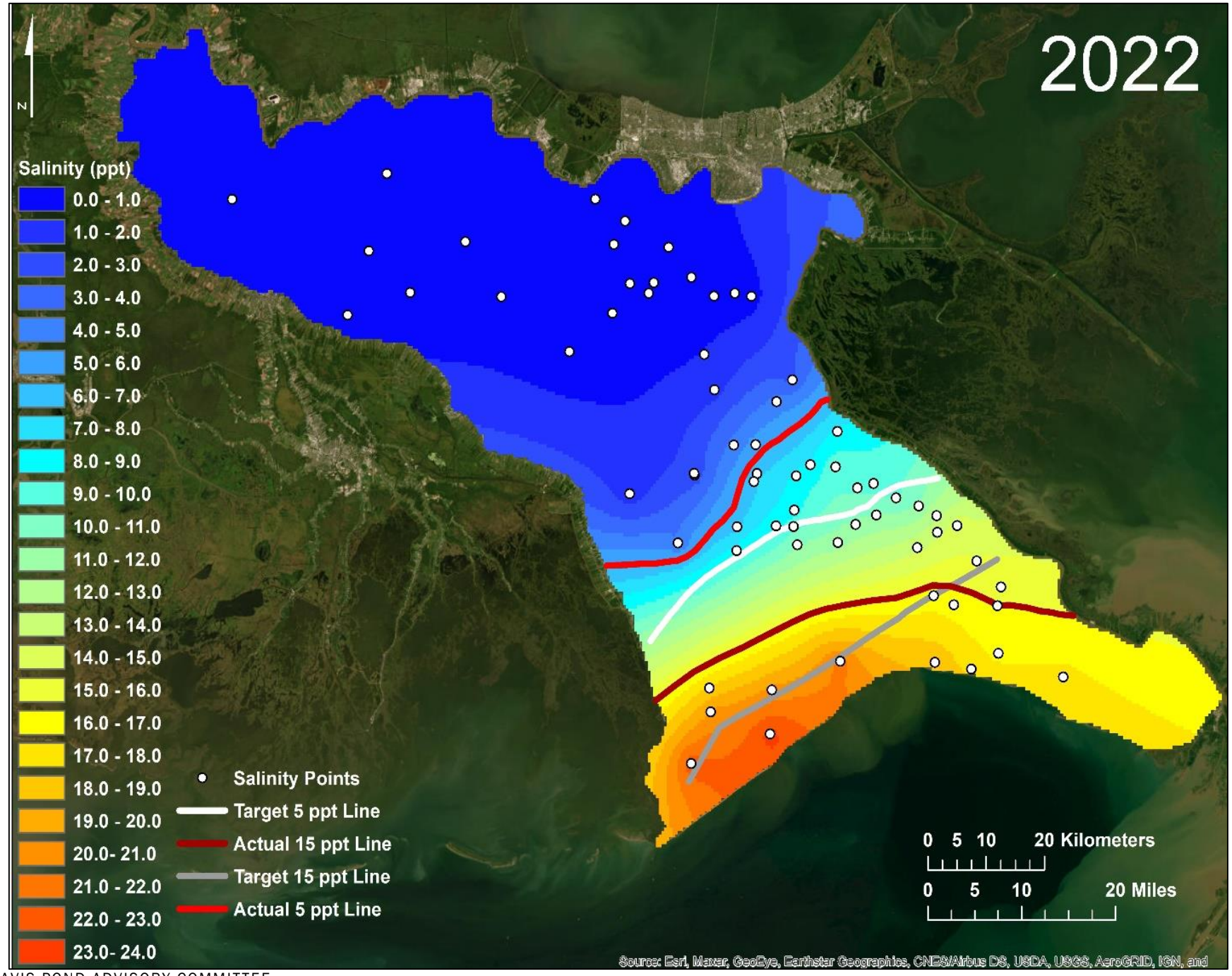
- Diversion pulses = marginal impacts, possibly temporary depression of salinity down basin




2022 Bay Dos Gris 14-day Moving Average - 5 ppt Isohaline
Annual Average = 8.27 ppt ± 3.18
Salinity (ppt)
Discharge (cfs)
16
14
12
10
8
6
4
2
0
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
J
F
M
A
M
J
J
A
S
O
N
D
Mean
Max/Min
14-day Average
Discharge

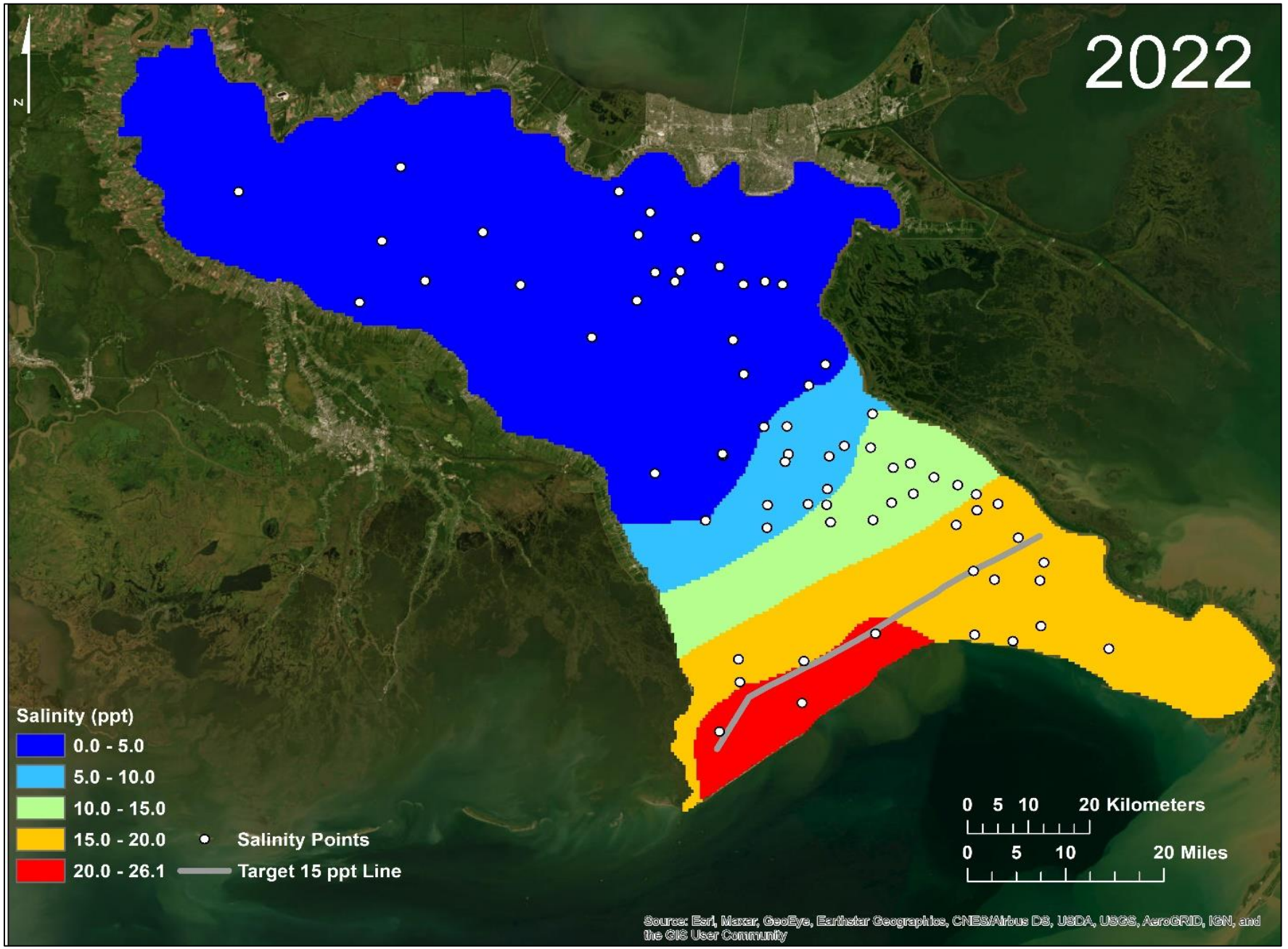
- Annual isohalines 2022

- Short of goals, but not bad.
- Could have operated more



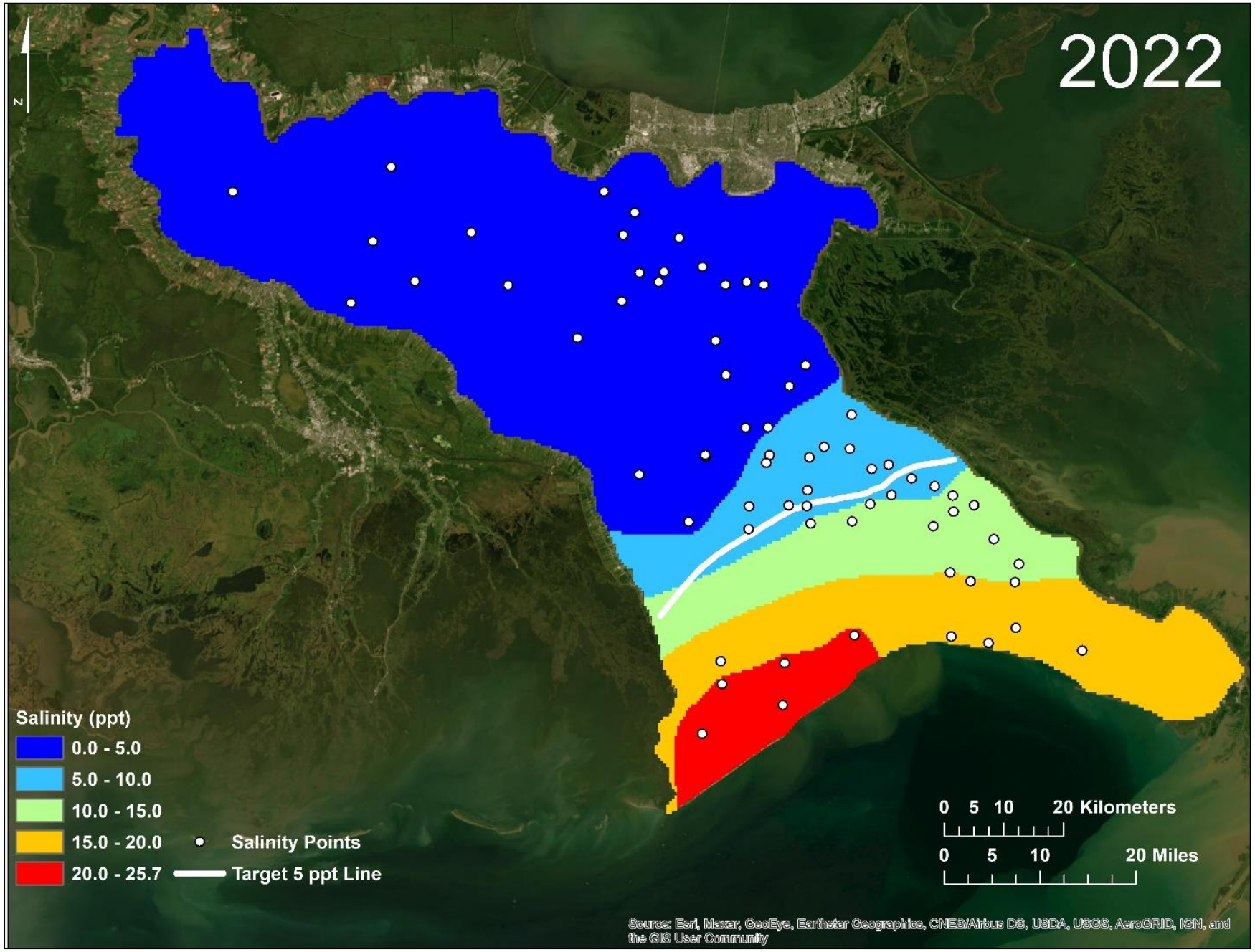
Seasonal Target
15 ppt line

December – May



Target 5 ppt isohaline

June - November



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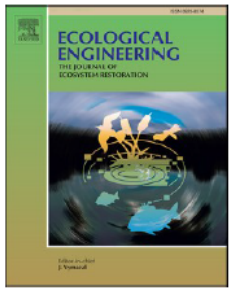


Coastal wetland area change for two freshwater diversions in the Mississippi River Delta

John R. White [a,*], Brady Couvillion [b], John W. Day [a]

[a] Department of Oceanography & Coastal Sciences, College of the Coast & Environment, Louisiana State University, Baton Rouge, LA 70803, United States of America
[b] U.S. Geological Survey, Wetland and Aquatic Research Center, 700 Cajundome Blvd, Lafayette, LA 70506, USA

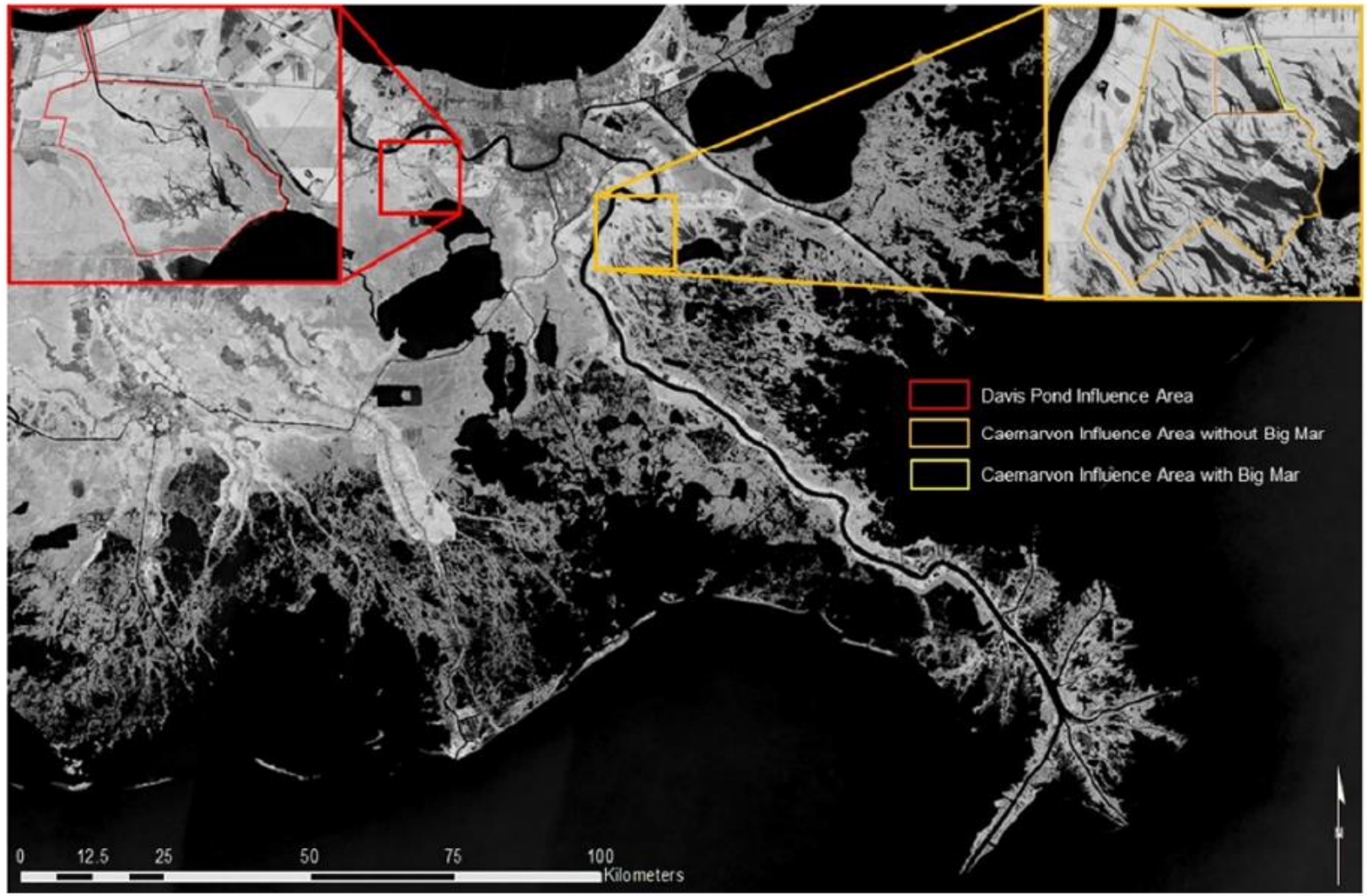


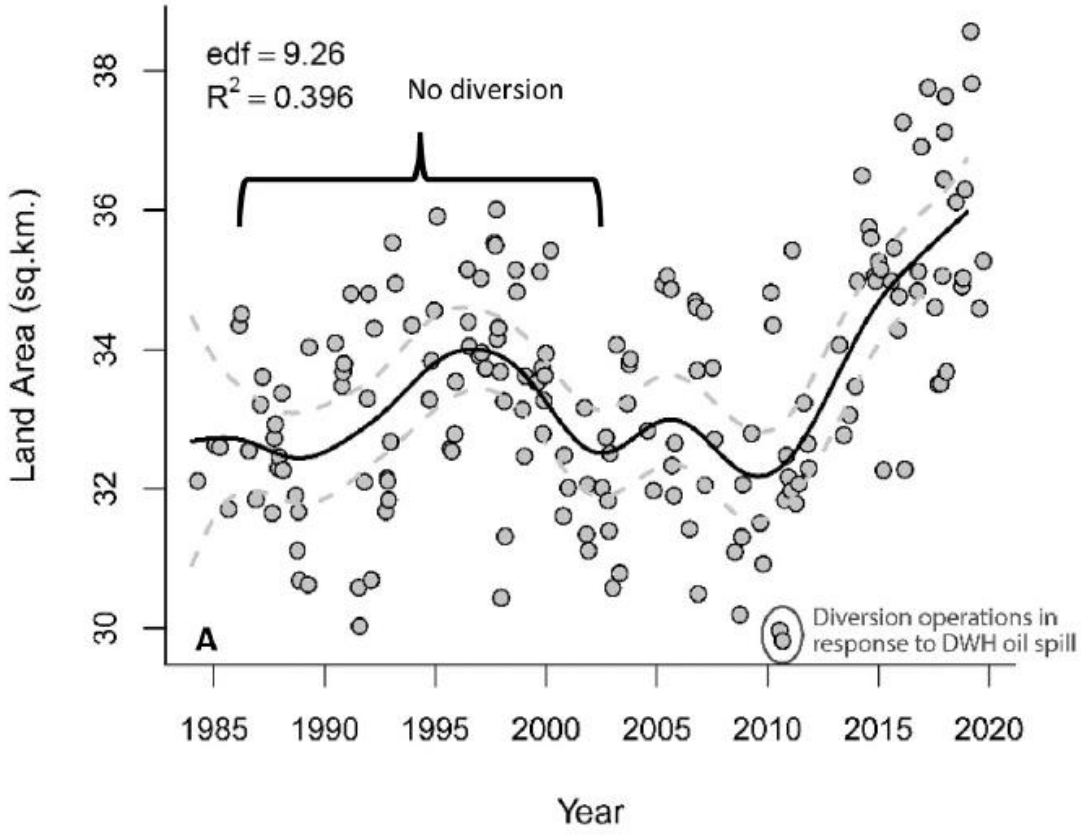
Fig. 1. Location of the Davis Pond diversion (red outline) and the Caernarvon diversion (yellow outline) in the Mississippi River delta. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)

Davis Pond land area change 2002 – 2019:

494 to 998 acres

(confidence interval)

**statistically significant gain*



Diversion Operations – average monthly discharge

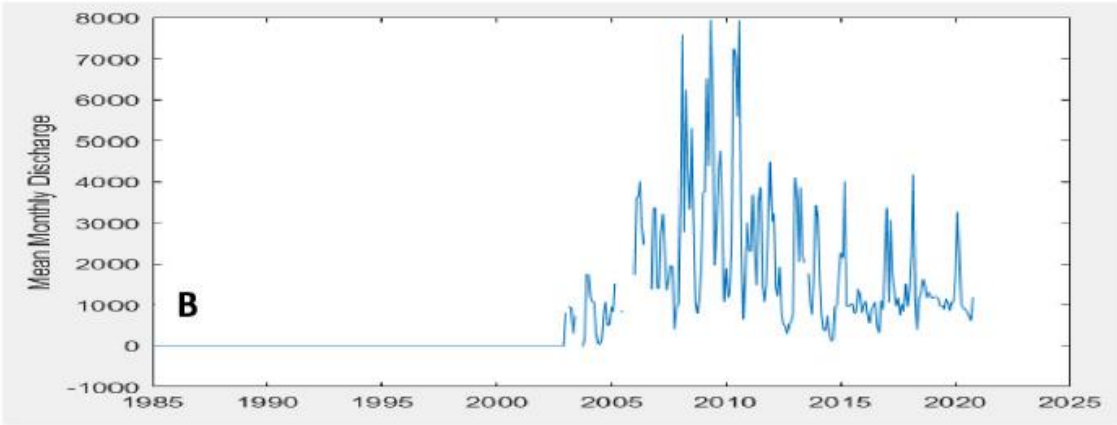


Fig. 4. A) Mean land area change in the influence area of Davis Pond Diversion with plotted uncertainty. The bracket indicates the land change prior to the operation of the diversion B) mean monthly discharge of the Mississippi River into the Davis Pond Diversion wetlands aligned with time axis for Fig. 4A.

Spera et al. 2020 Spatial and temporal changes to a hydrologically-reconnected coastal wetland: Implications for restoration

Study Area: Davis Pond

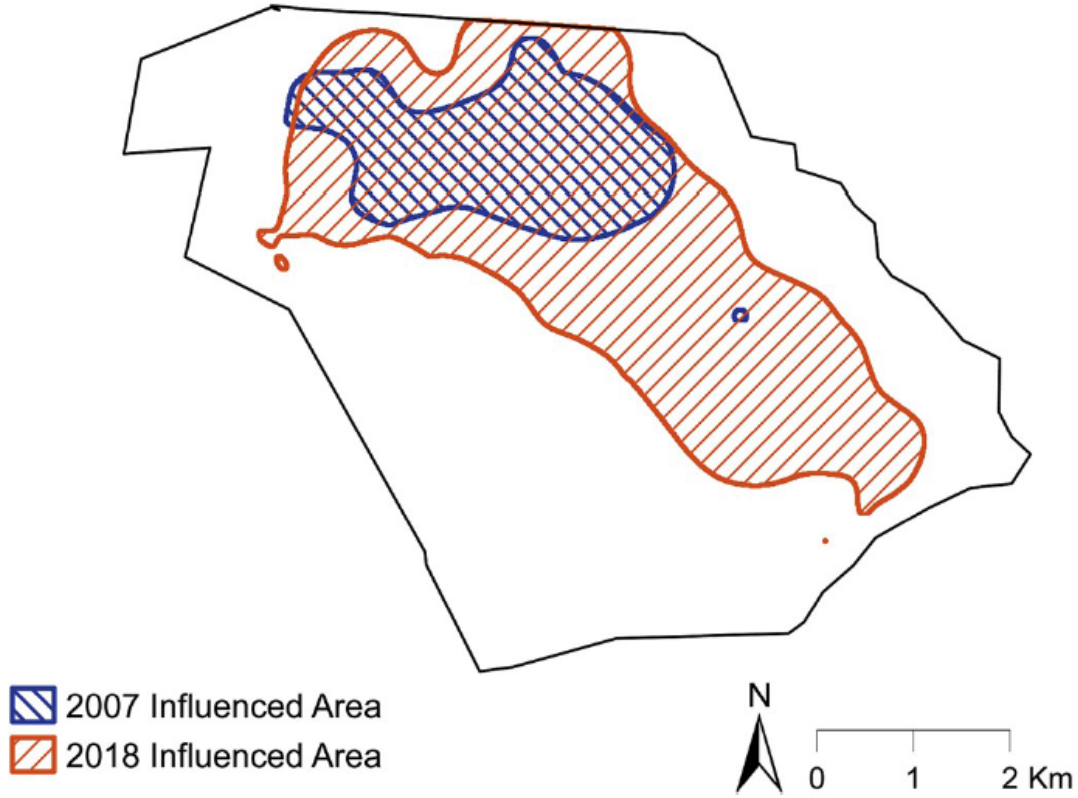


Fig. 4. Map of sediment influenced zone from 2007 (blue, back facing shading) and 2018 (orange, front facing shading) defined by mixture model from mineral content (%) dataset. (For interpretation of the references to color in this figure legend, the reader is referred to the Web version of this article.)

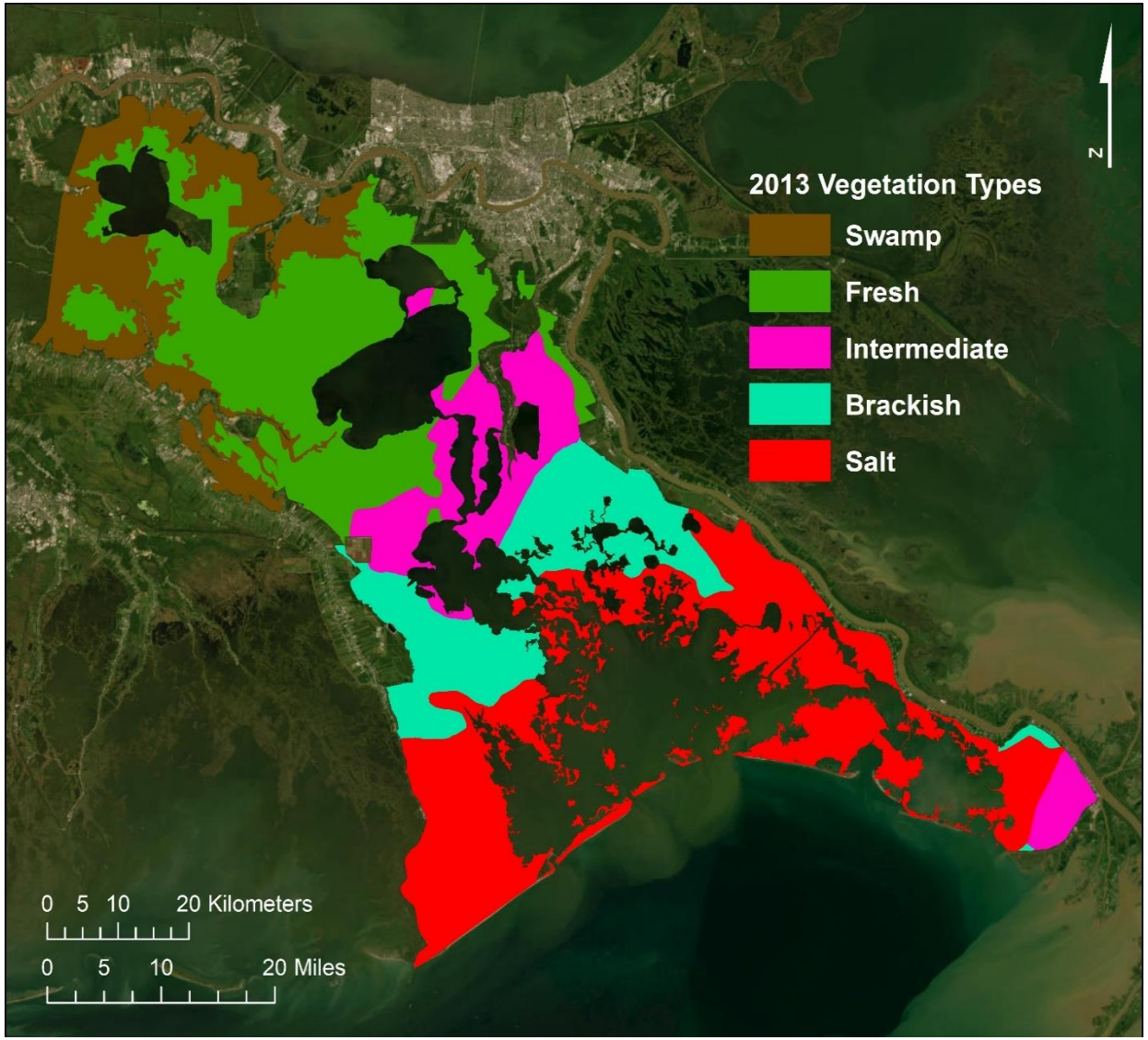
- Compared 2018 sampling to a 2007 study
- 140 soil samples in - top 10 cm
- Over this time soils increased in bulk density (on average) by 58%
- 100% increase in mineral density
- Effects greater closer to the diversion outfall and less with distance, but expanded area from 2007 to 2018


Destrehan
Waggaman
Image © 2023 Maxar Technologies
Imagery Date: 3/11/2022 29°53'18.15" N 90°16'29.87" W

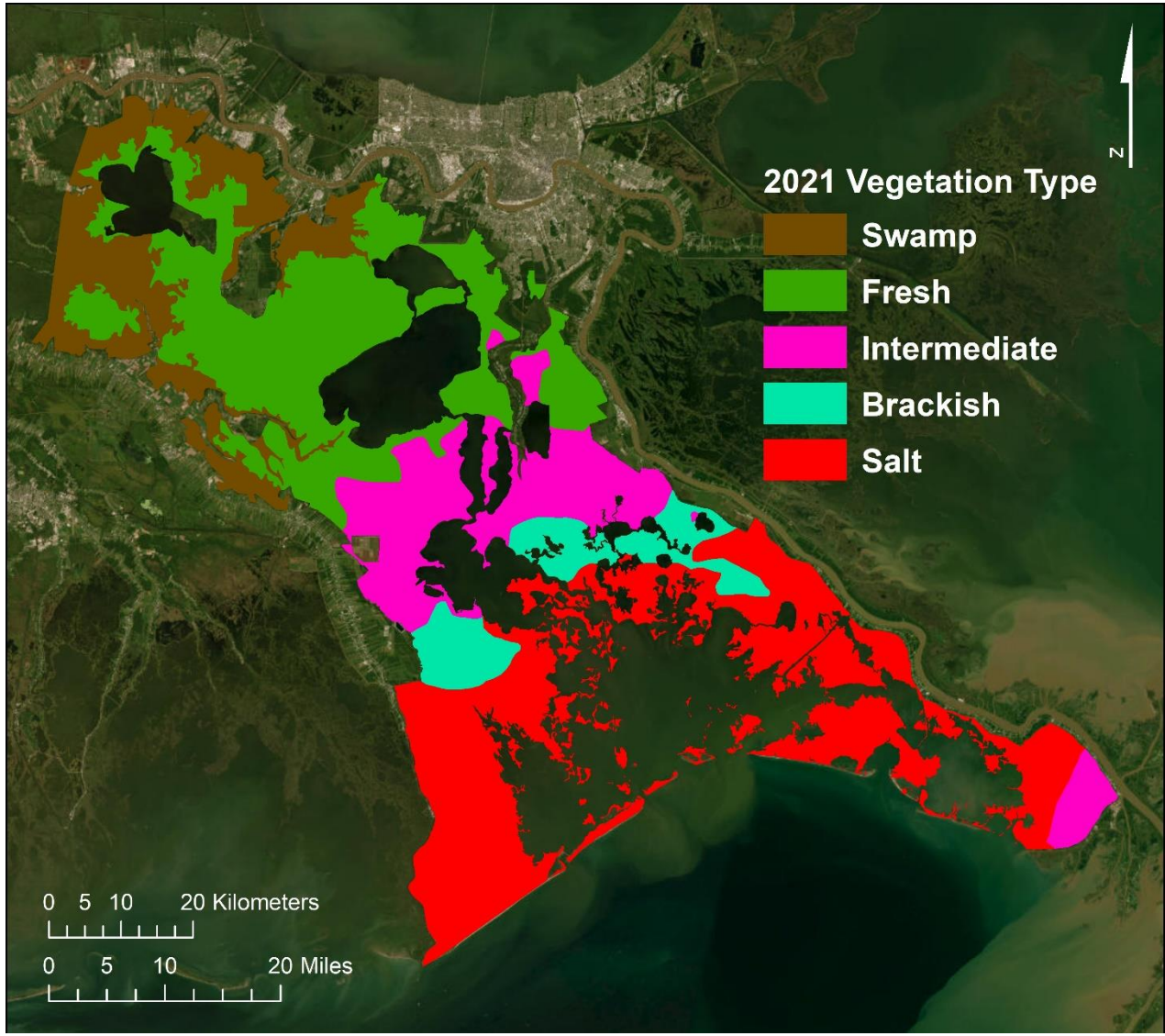
Soil core taken in the immediate diversion outfall area, showing a full profile of mineral sediment from riverine input.

Soil core taken at CRMS 3169 (2.3 miles from sample above) The top 6 inches are composed of a mineral soil, indicative of the amount of sediment deposition due to diversion input.

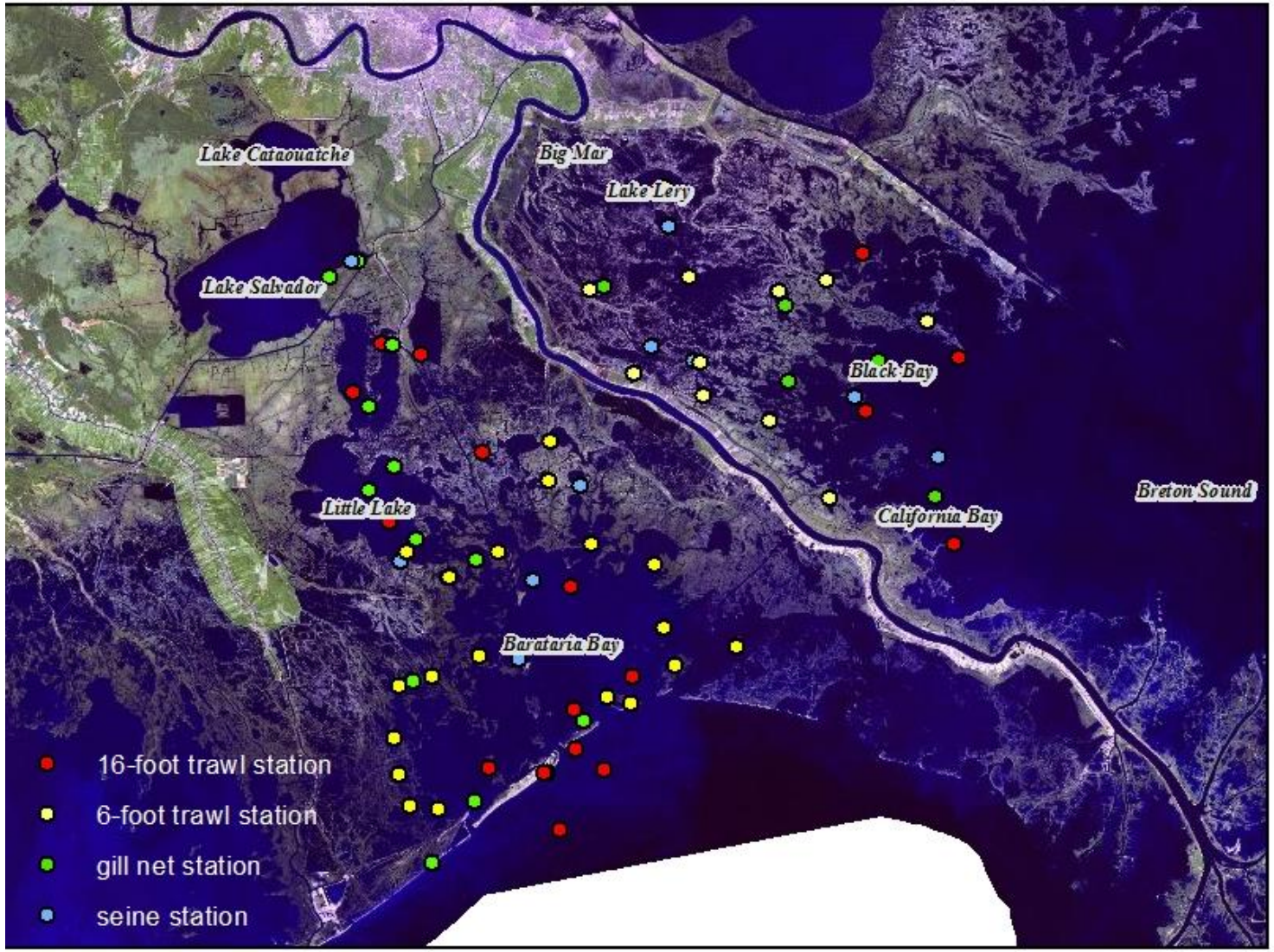
2013 Vegetation Type



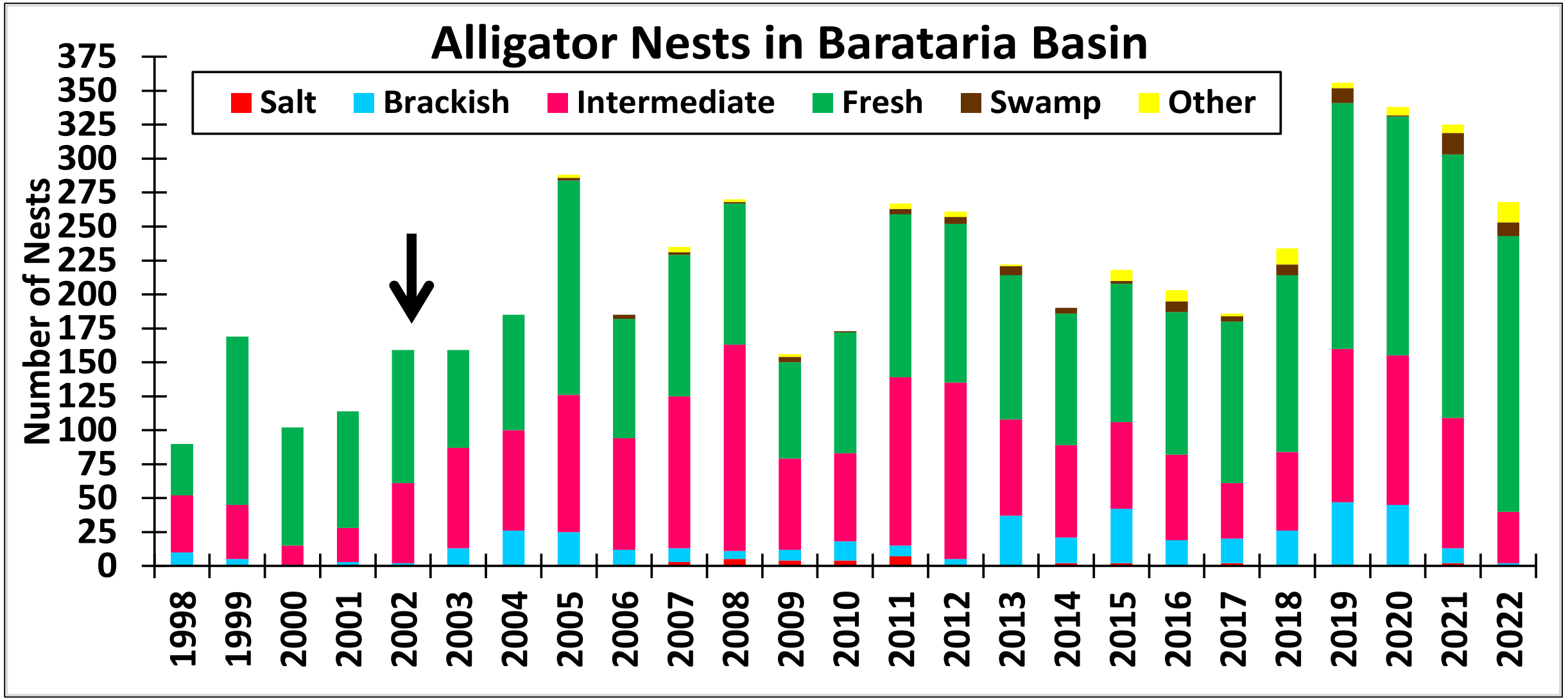
2021 Vegetation Type



Wildlife and Fisheries-independent Monitoring



- Monitoring relative to diversions began:
  - 1988 in Breton Sound estuary
  - 1998 in Barataria estuary
- Marine Finfish and Shrimp sampling occurs along the salinity gradient using a variety of gear types
- Freshwater Finfish sampling in upper basins
- Oyster monitoring (locations not shown)
  - Black Bay/California Bay in Breton Sound
  - Upper Barataria Bay
- Aerial surveys for alligator nests and ducks


Alligator Nests in Barataria Basin
Salt
Brackish
Intermediate
Fresh
Swamp
Other
Number of Nests
375
350
325
300
275
250
225
200
175
150
125
100
75
50
25
0
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
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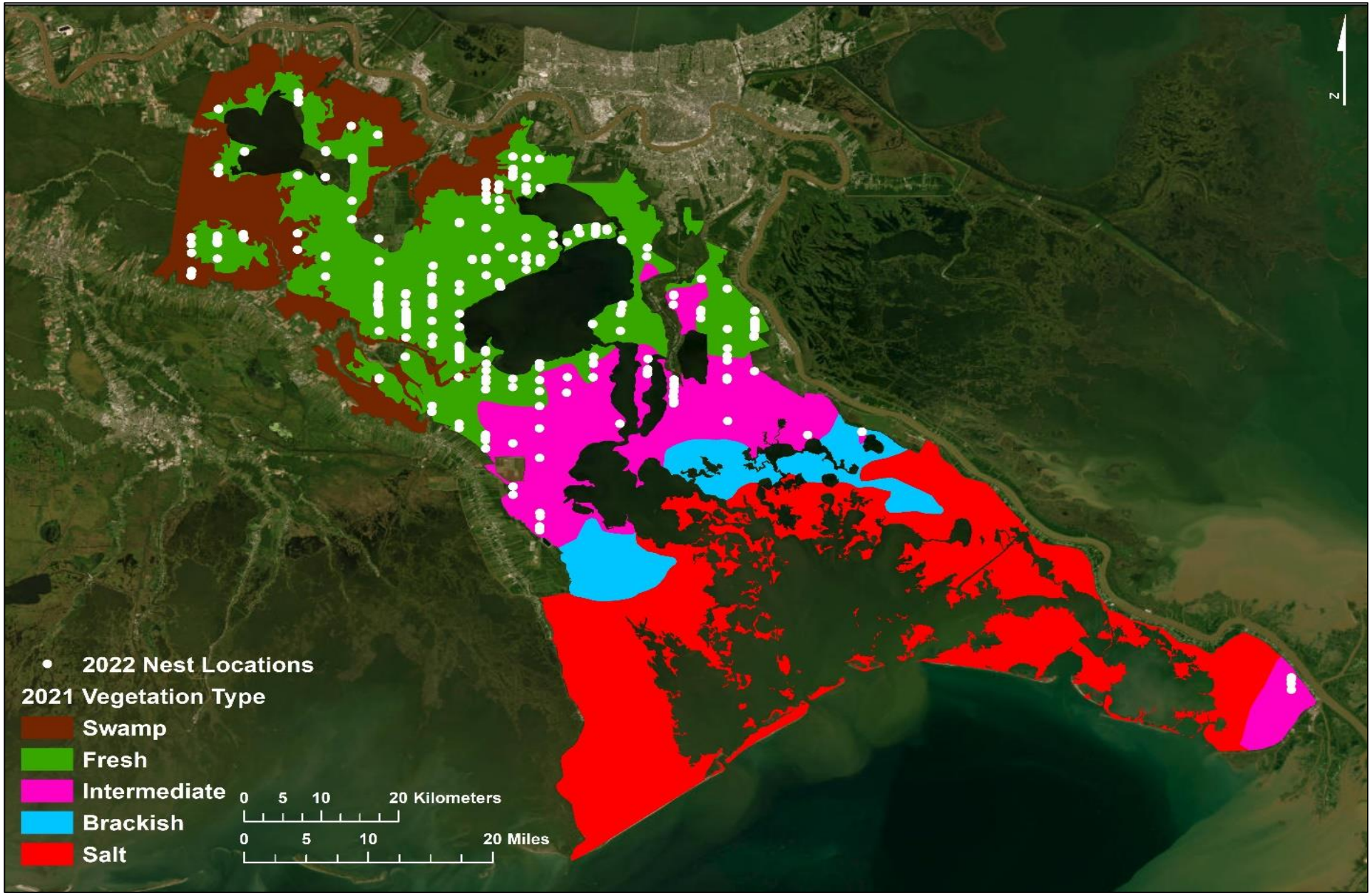
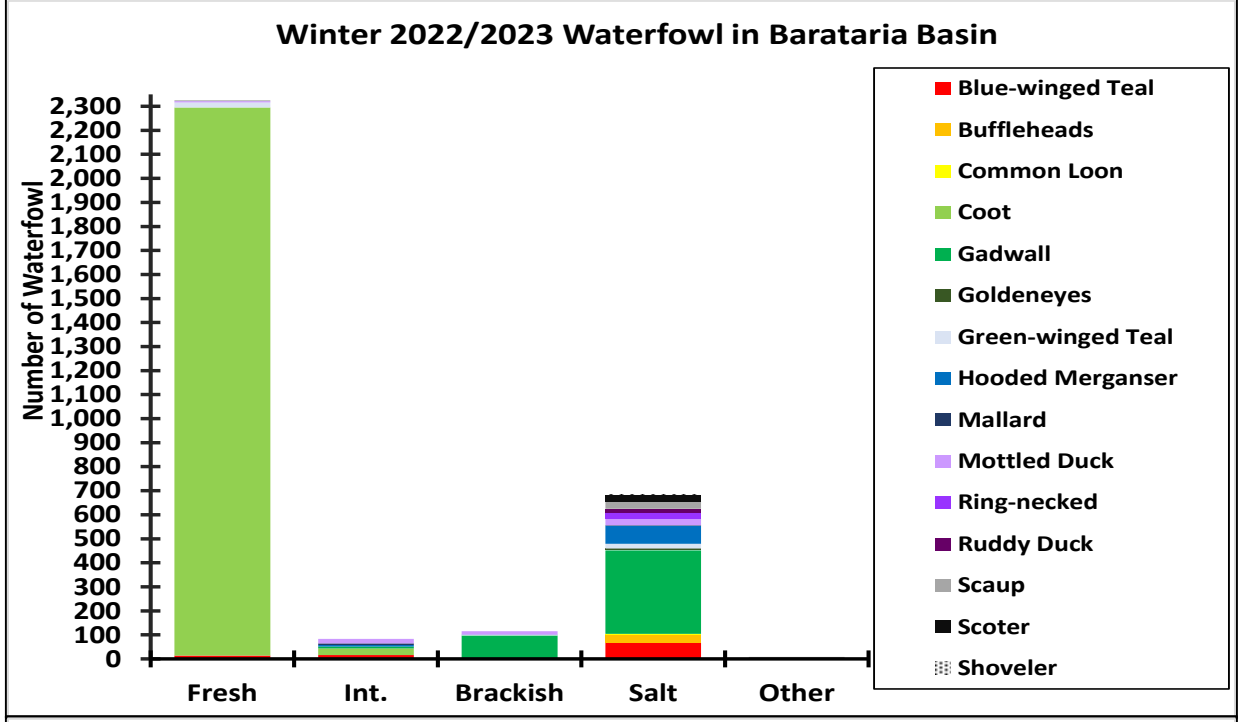
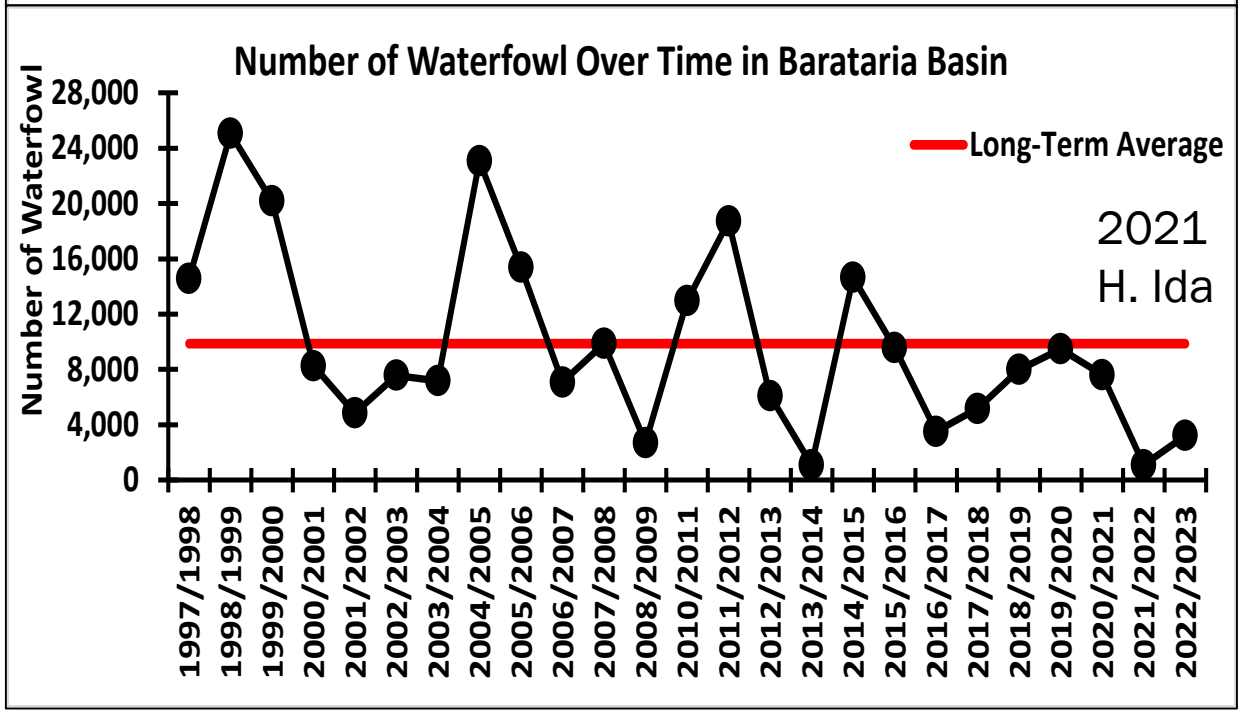
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022

Alligator nest locations 2022



Waterfowl Winter 2022/2023



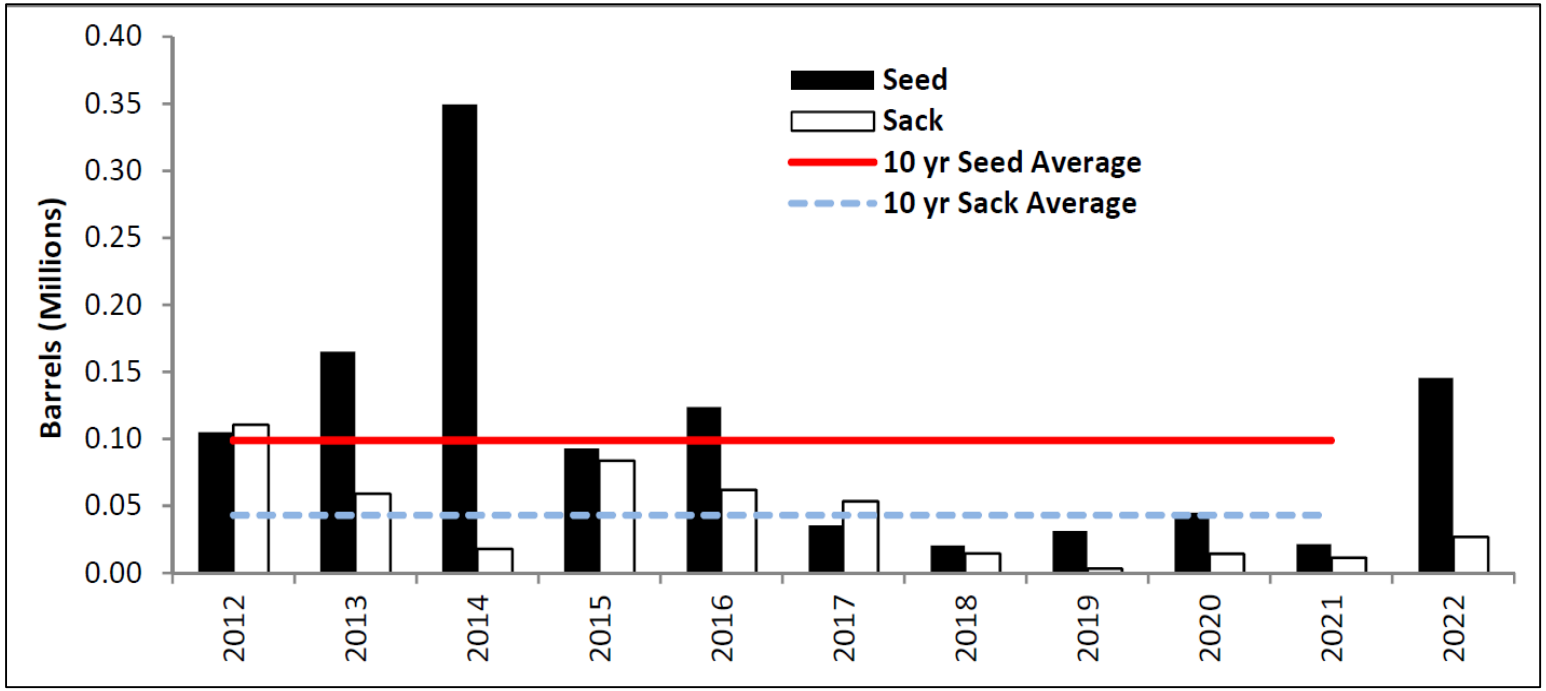


Oysters

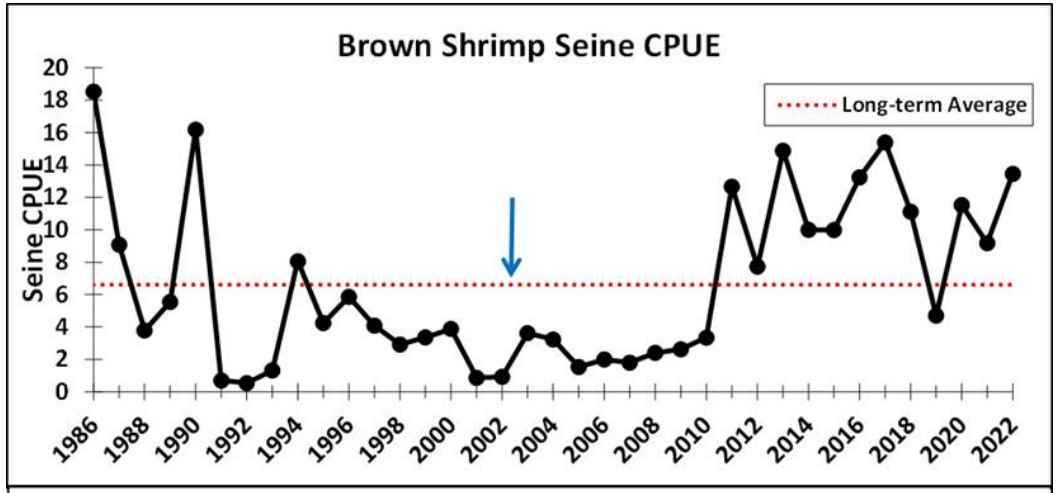
*CSA	Basin	Seed	Market-sized	Total Stock	Total % Change
1 – North	Lake Borgne/MS Sound	25,175	7,960	33,135	-40.4
1 – South	East of MS River, South of MRGO	46,144	11,648	57,792	260
3	Hackberry Bay	14,558	2,698	17,256	427
5 – East	Lake Chien/Felicity	0	0	0	n/a
5 – West	Sister Lake/Bay Junop	72,385	30,873	103,258	-29
7	Calcasieu - East Side	15,034	12,296	27,330	35.5
7	Calcasieu - West Cove	29,716	203,894	233,610	76.7
Statewide Totals		**203,011**	**269,368**	**472,381**	**27.6**

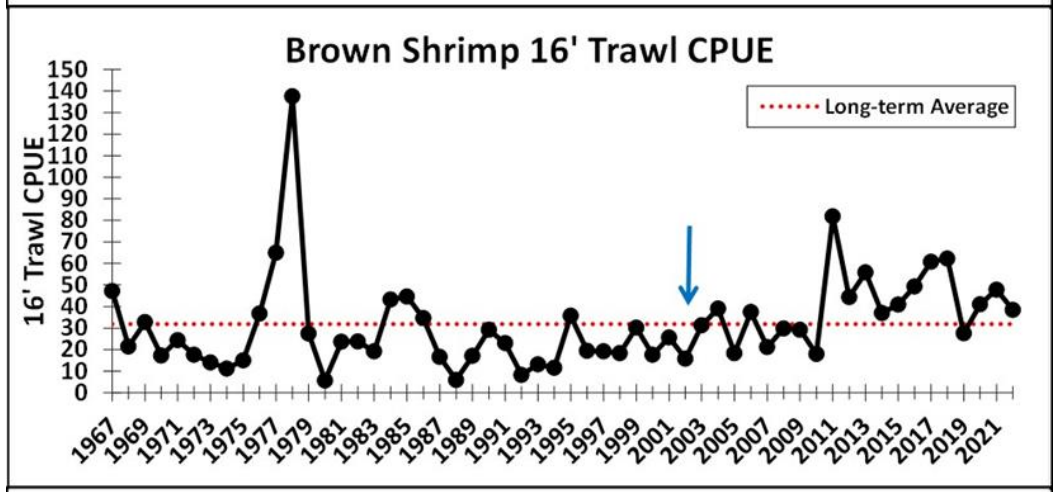
* CSA 6/Vermilion/Atchafalaya areas are omitted due to unknown reef acreage.

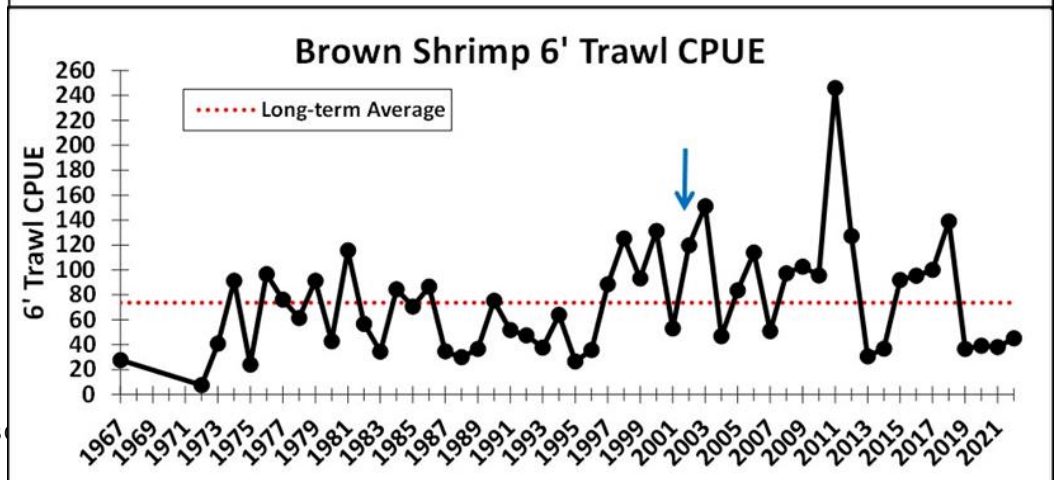
** Sabine Lake (CSA 7) not assessed in 2022.



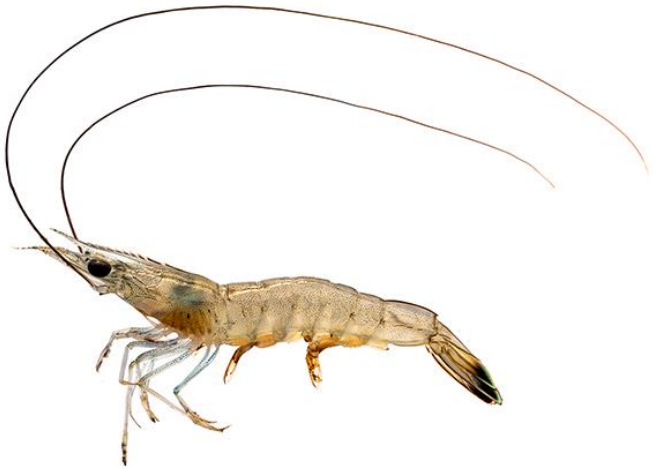
Brown Shrimp

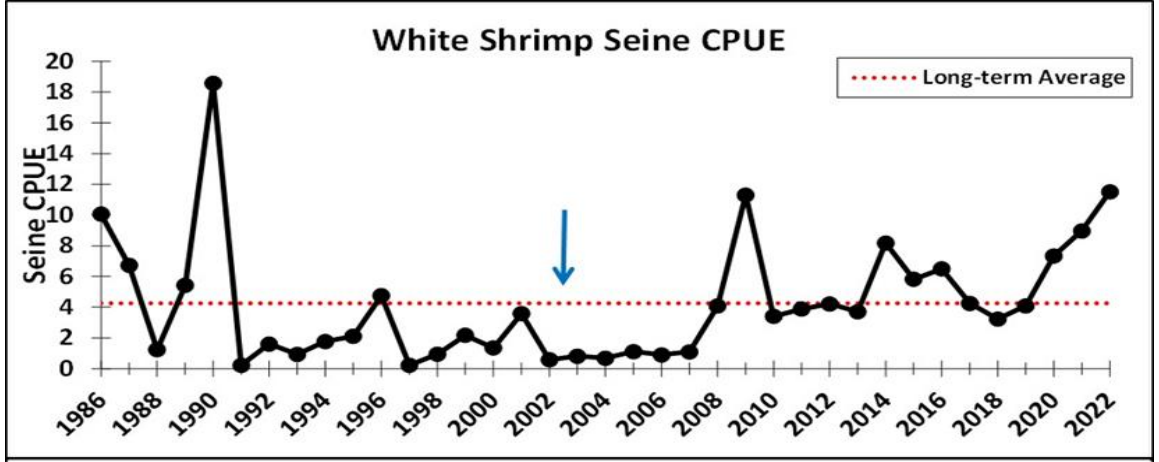


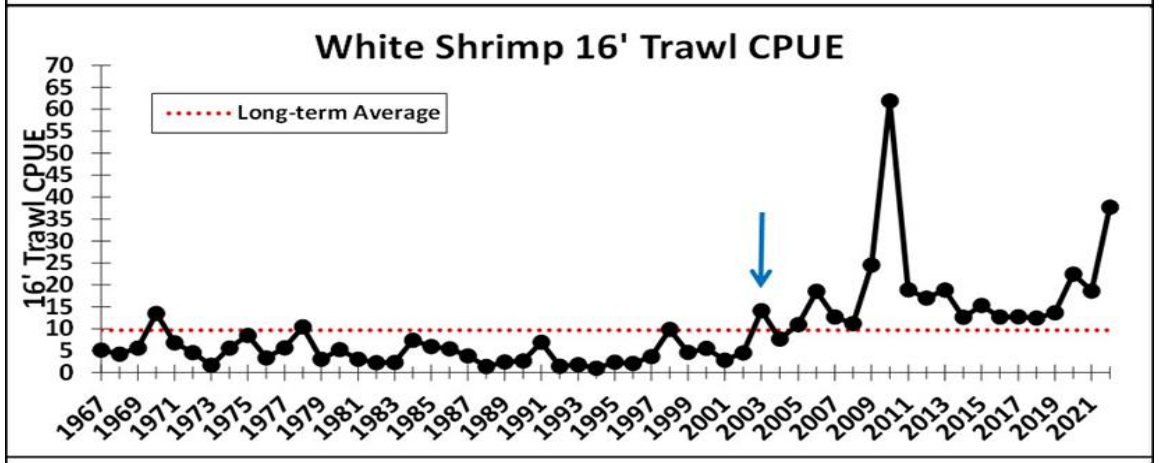


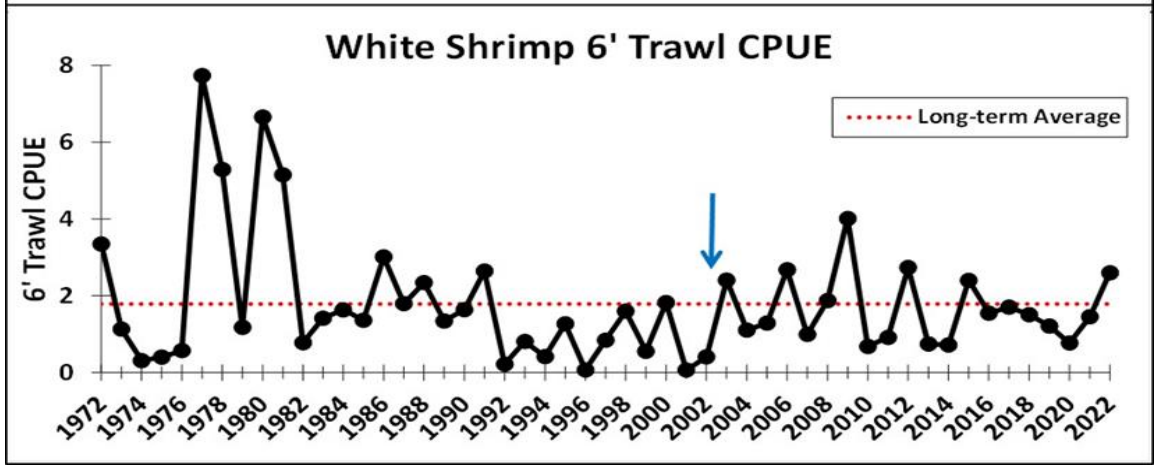


White Shrimp

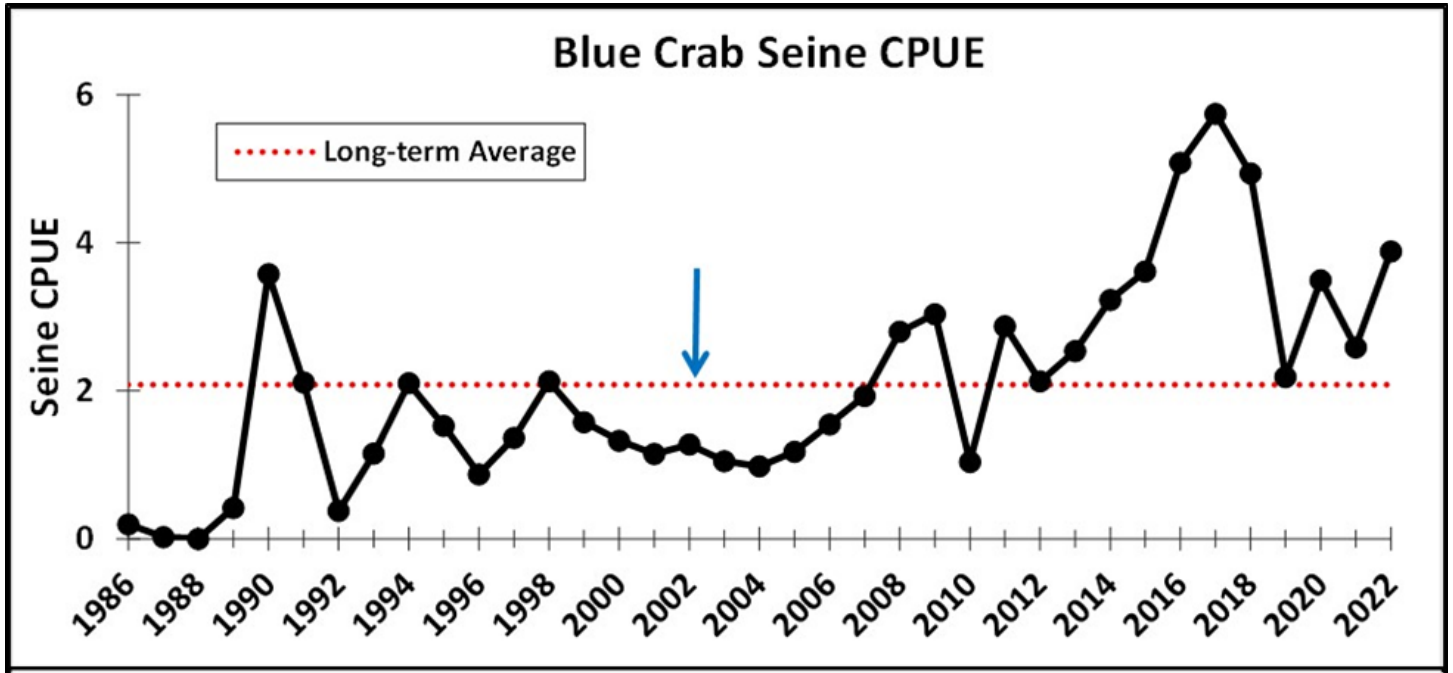


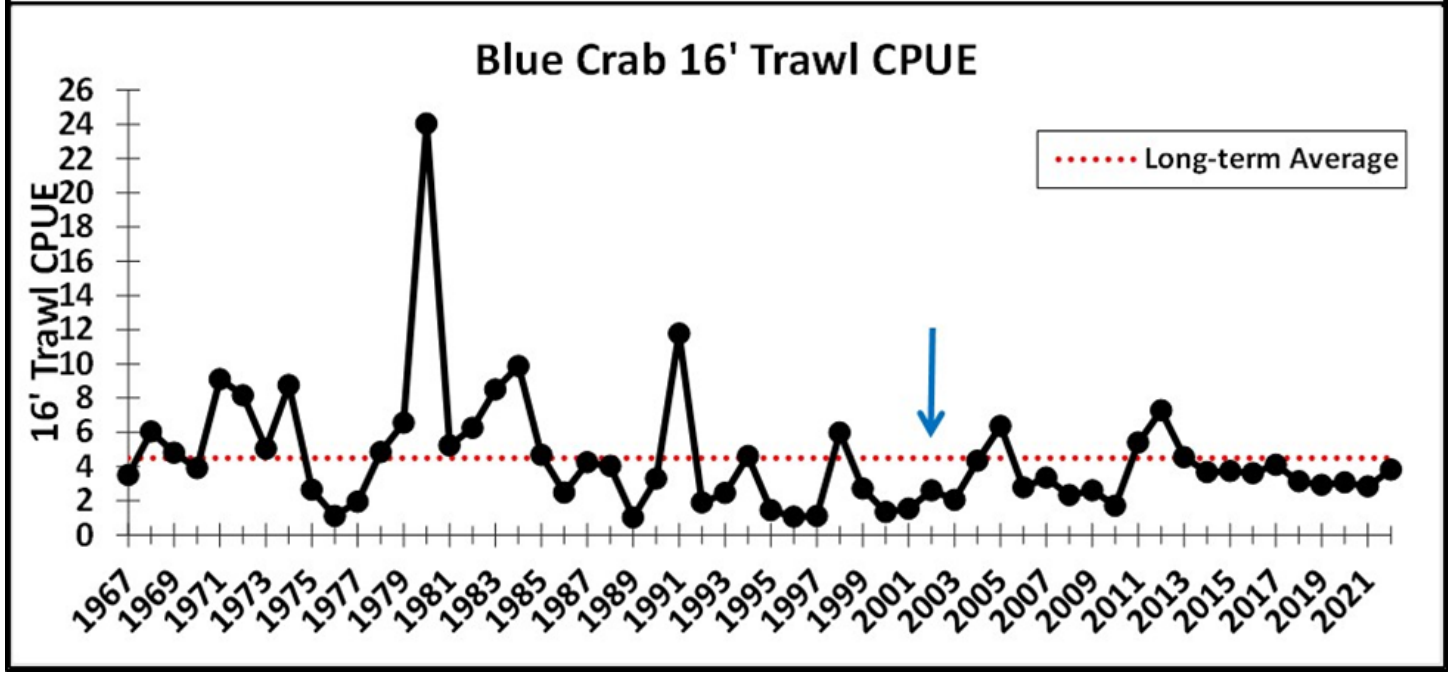






Blue Crab


Blue Crab Seine CPUE
Seine CPUE
Long-term Average
0
2
4
6
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022


Blue Crab 16' Trawl CPUE
16' Trawl CPUE
Long-term Average
0
2
4
6
8
10
12
14
16
18
20
22
24
26
1967
1969
1971
1973
1975
1977
1979
1981
1983
1985
1987
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2007
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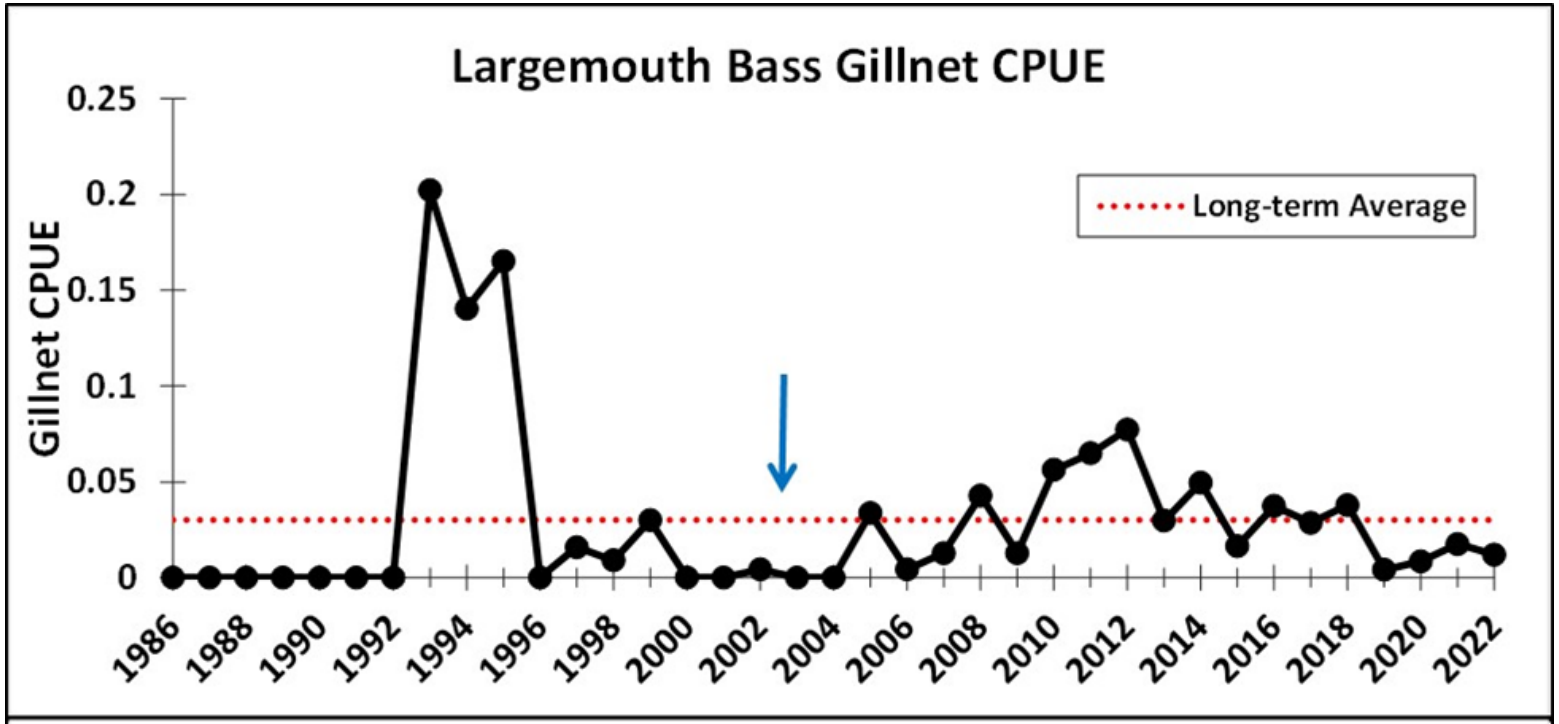
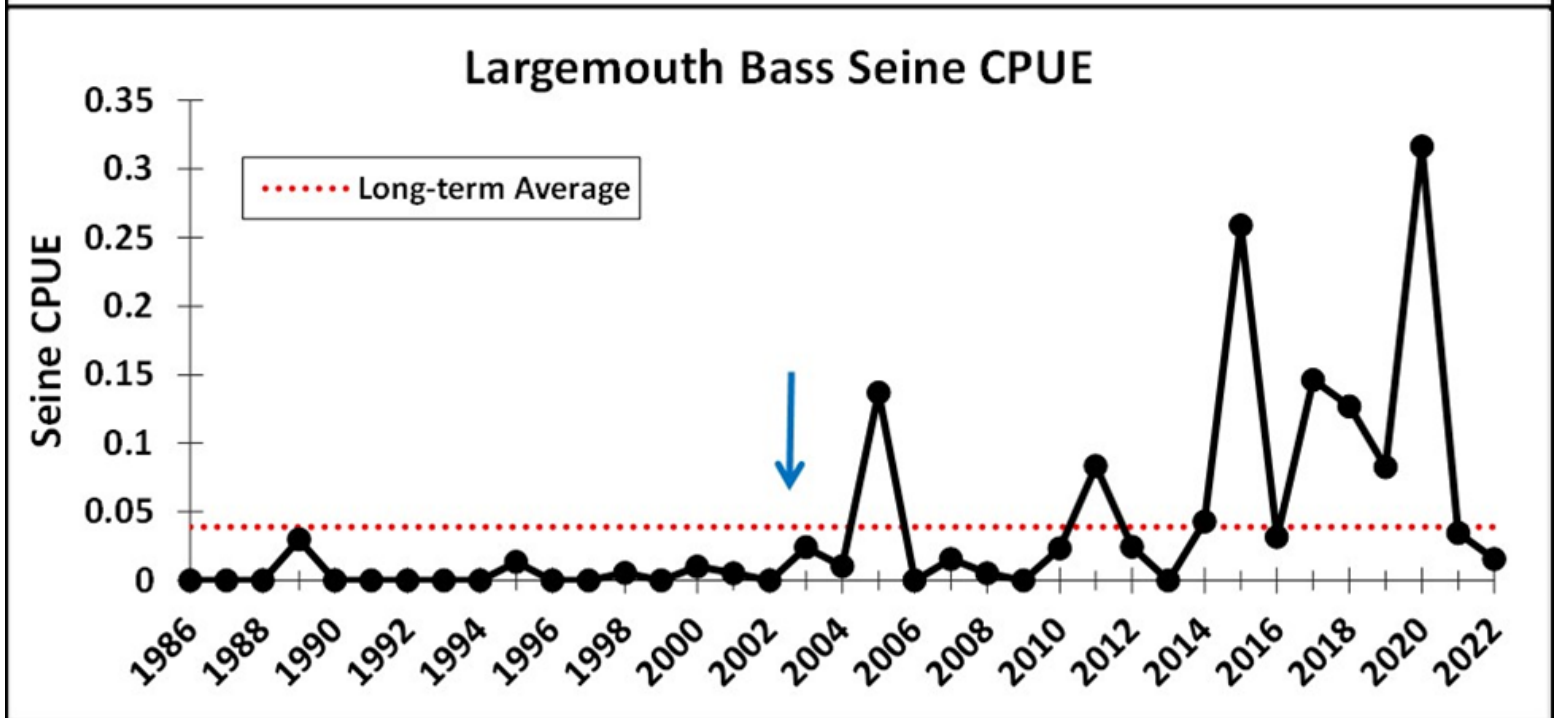
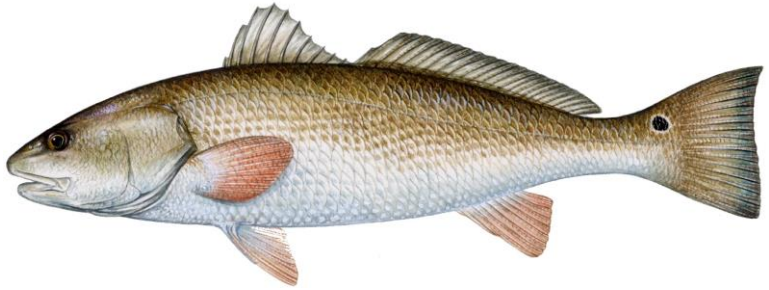
2015
2017
2019
2021

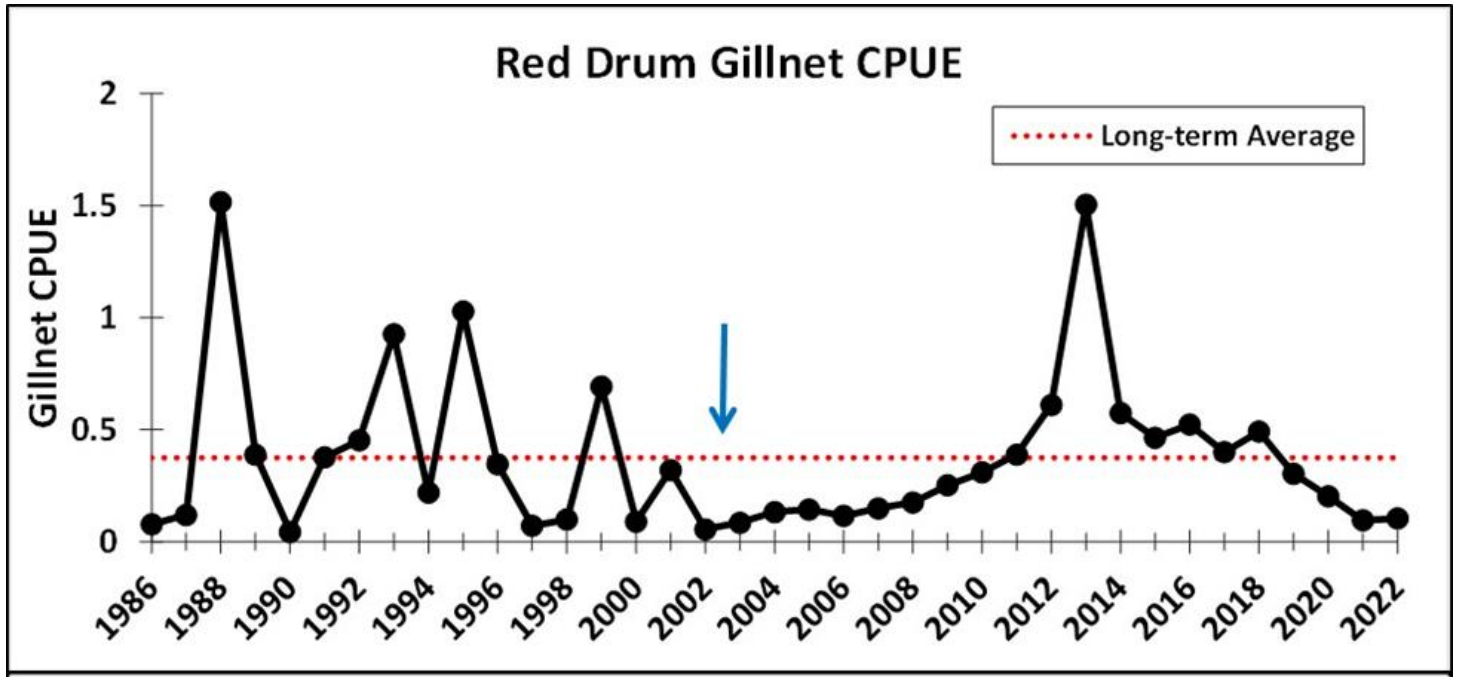
Largemouth Bass

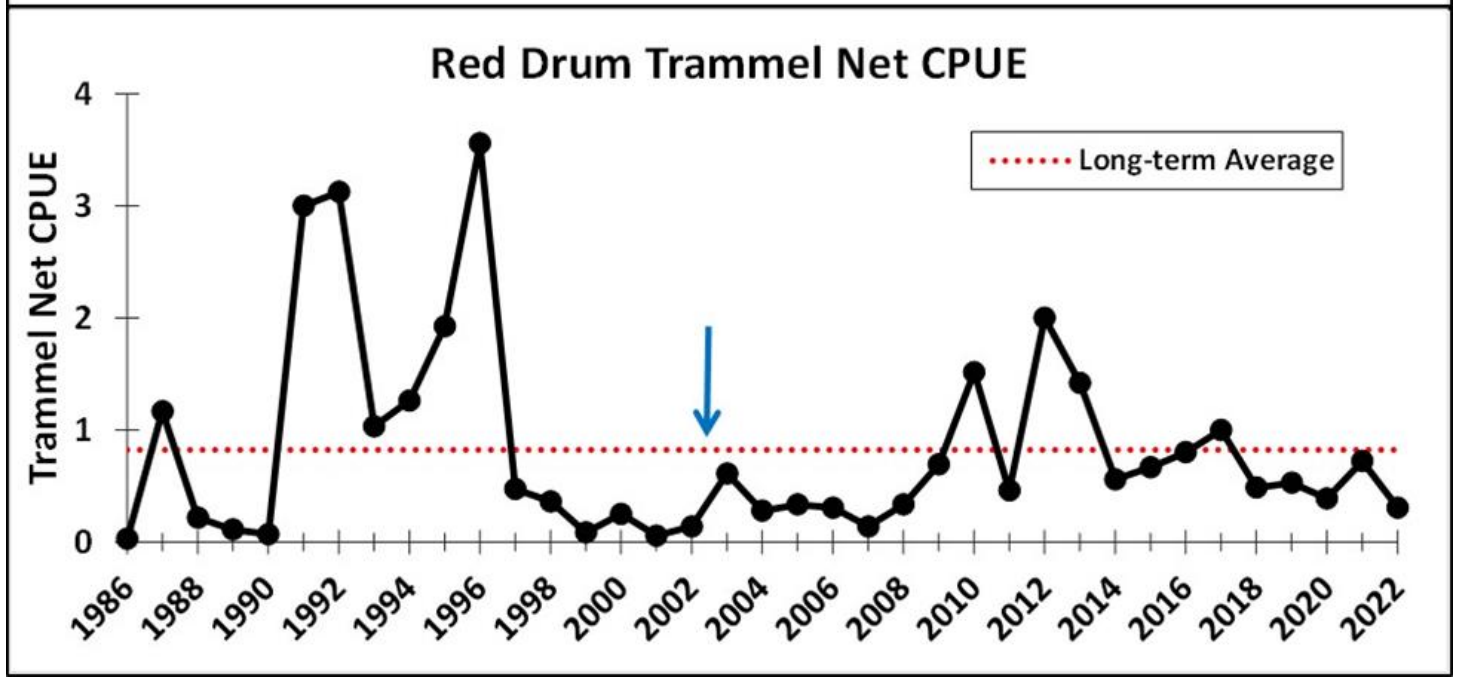




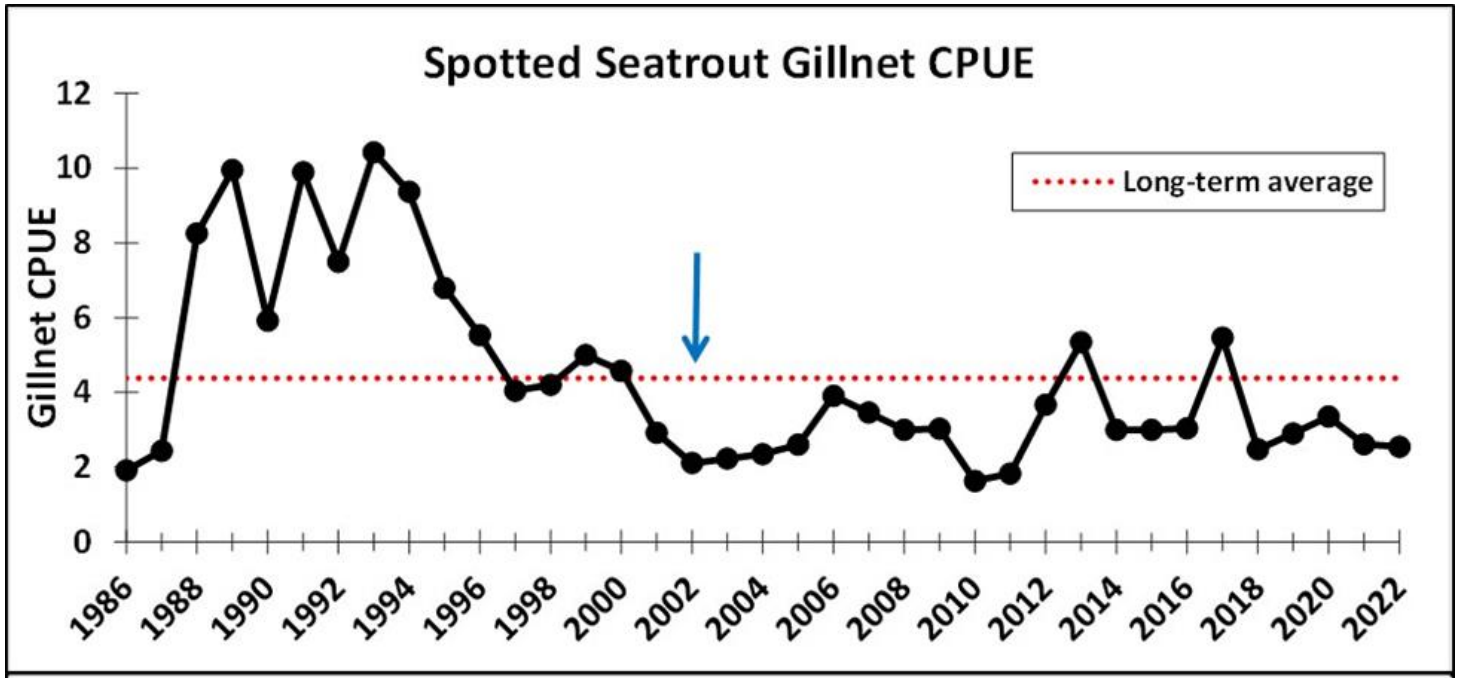
Red Drum

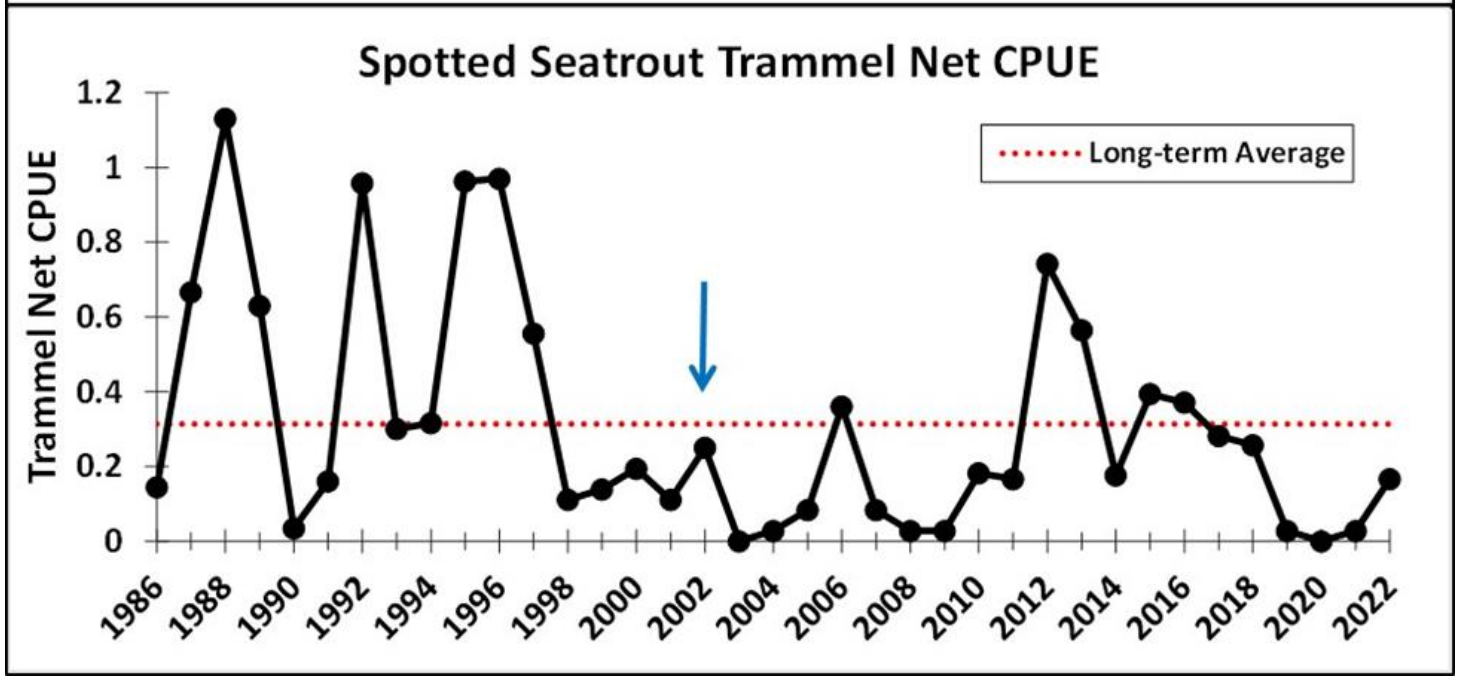



Red Drum Gillnet CPUE
Long-term Average
Gillnet CPUE
0
0.5
1
1.5
2
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022


Red Drum Trammel Net CPUE
Long-term Average
Trammel Net CPUE
0
1
2
3
4
1986
1988
1990
1992
1994
1996
1998
2000
2002
2004
2006
2008
2010
2012
2014
2016
2018
2020
2022

Spotted Seatrout





NEW REGULATIONS

LOUISIANA DEPARTMENT OF WILDLIFE & FISHERIES

NOVEMBER 20

NEW Spotted Seatrout Regulations

A "slot" limit, 13-20 inches for "keeper" trout

An allowance of two fish over 20 inches total length within the daily limit

A 15-fish daily limit per fisherman

Charter guides and/or deckhands may not keep a bag limit of spotted seatrout while conducting a for-hire trip, but may engage in fishing activity to assist passengers

For more information visit *wlf.louisiana.gov*

Summary 2022

- Mississippi River: typical flow year with a late winter rise, lasting through the spring, and dropping quickly in July. Max stage = 14 feet
- Rainfall totaled 57.6 inches, 9% below the annual average.
- David Pond was pulsed twice and in operation above 1,000 cfs baseline for 67 days. The February was large (8,000 cfs) and the pulse in April was smaller (4,000 cfs)

❖2022 salinity targets at the 15 ppt and then 5 ppt isohaline were not met – salinities were higher than the project targets. We could have operated more.

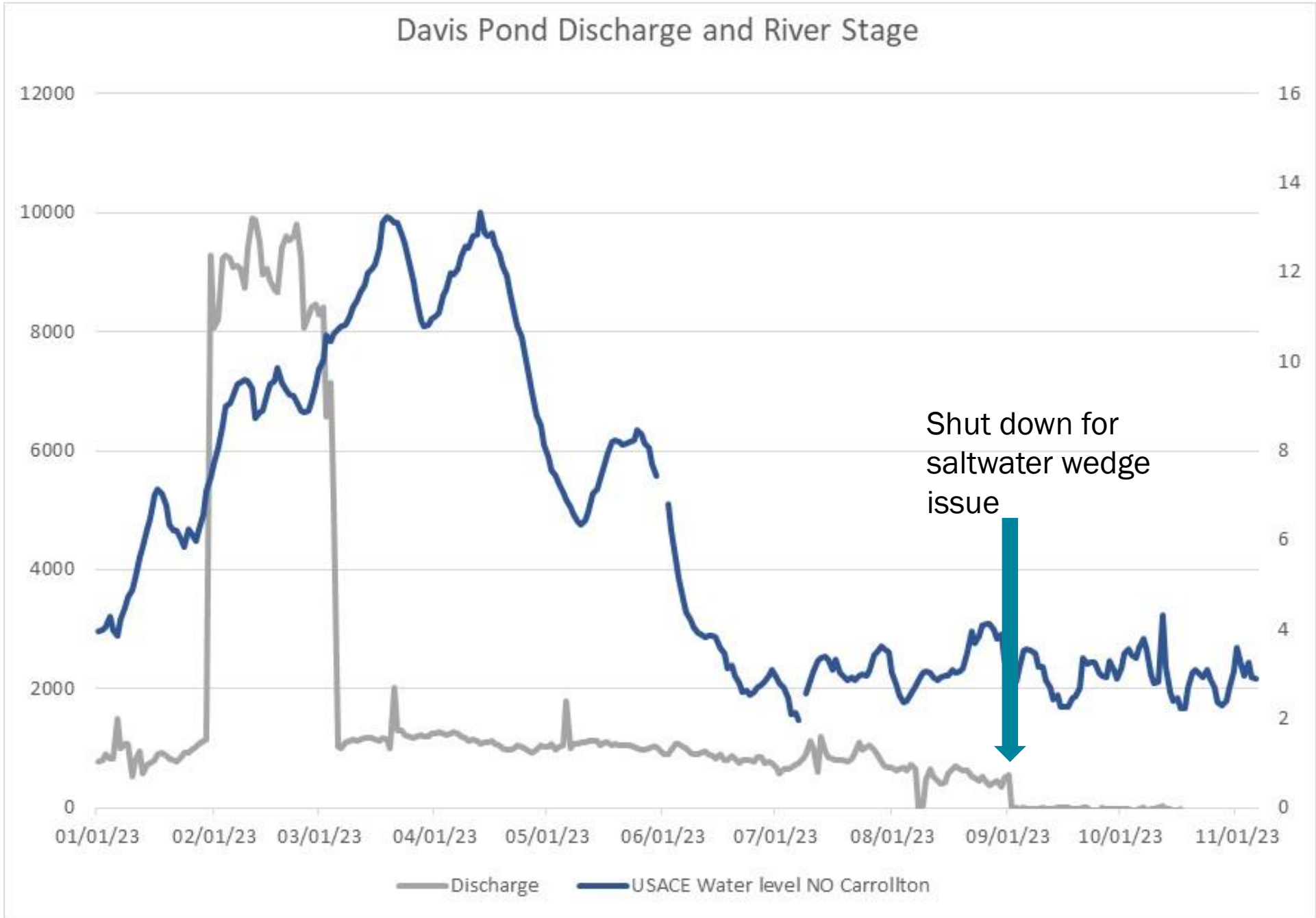
❖Overall Davis Pond appears to be either meeting intended goals or is at least not negatively impacting the basin resources.

- Enhancing emergent vegetation – obvious land building and wetland habitat changes albeit a small footprint, mostly confined to the ponding area
- The diversion does not seem to have a discernable positive or negative impact on most fish and wildlife populations, Perhaps enhancing alligators and white shrimp

2023 Snapshot

Drought Year (88% of state experienced extreme or exceptional drought)

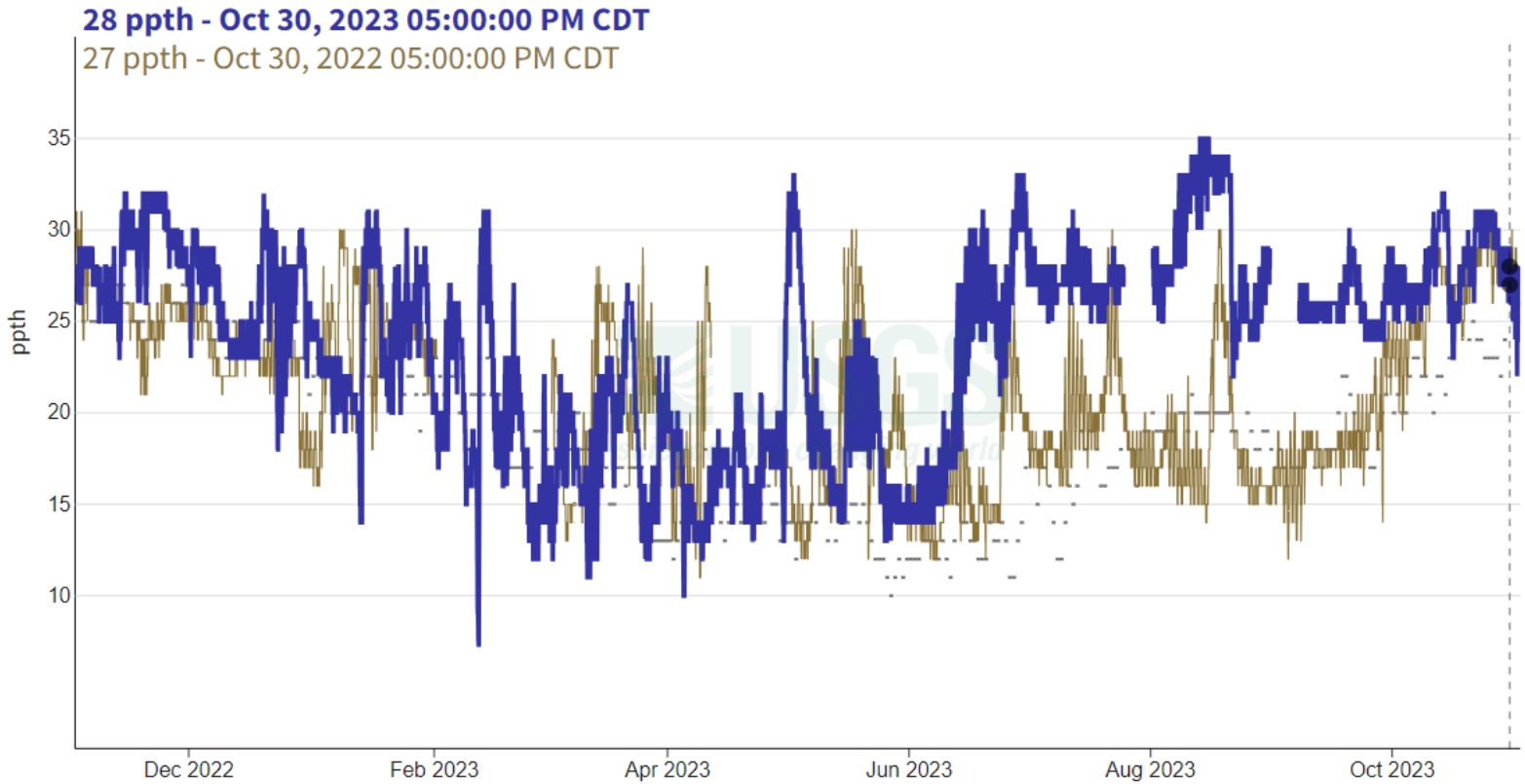
- Very low river stage in second half of the year
- With low head differential not able to operate much above minimum or even reach the minimum with gates wide open
- saltwater wedge in the river affected drinking water intakes in lower Plaquemines Parish and threatened St. Bernard, Orleans and Jefferson.
- The diversions were shut down in September to “keep every drop of freshwater in the river”


Davis Pond Discharge and River Stage
12000
10000
8000
6000
4000
2000
0
16
14
12
10
8
6
4
2
0
01/01/23
02/01/23
03/01/23
04/01/23
05/01/23
06/01/23
07/01/23
08/01/23
09/01/23
10/01/23
11/01/23
Shut down for saltwater wedge issue
Discharge
USACE Water level NO Carrollton

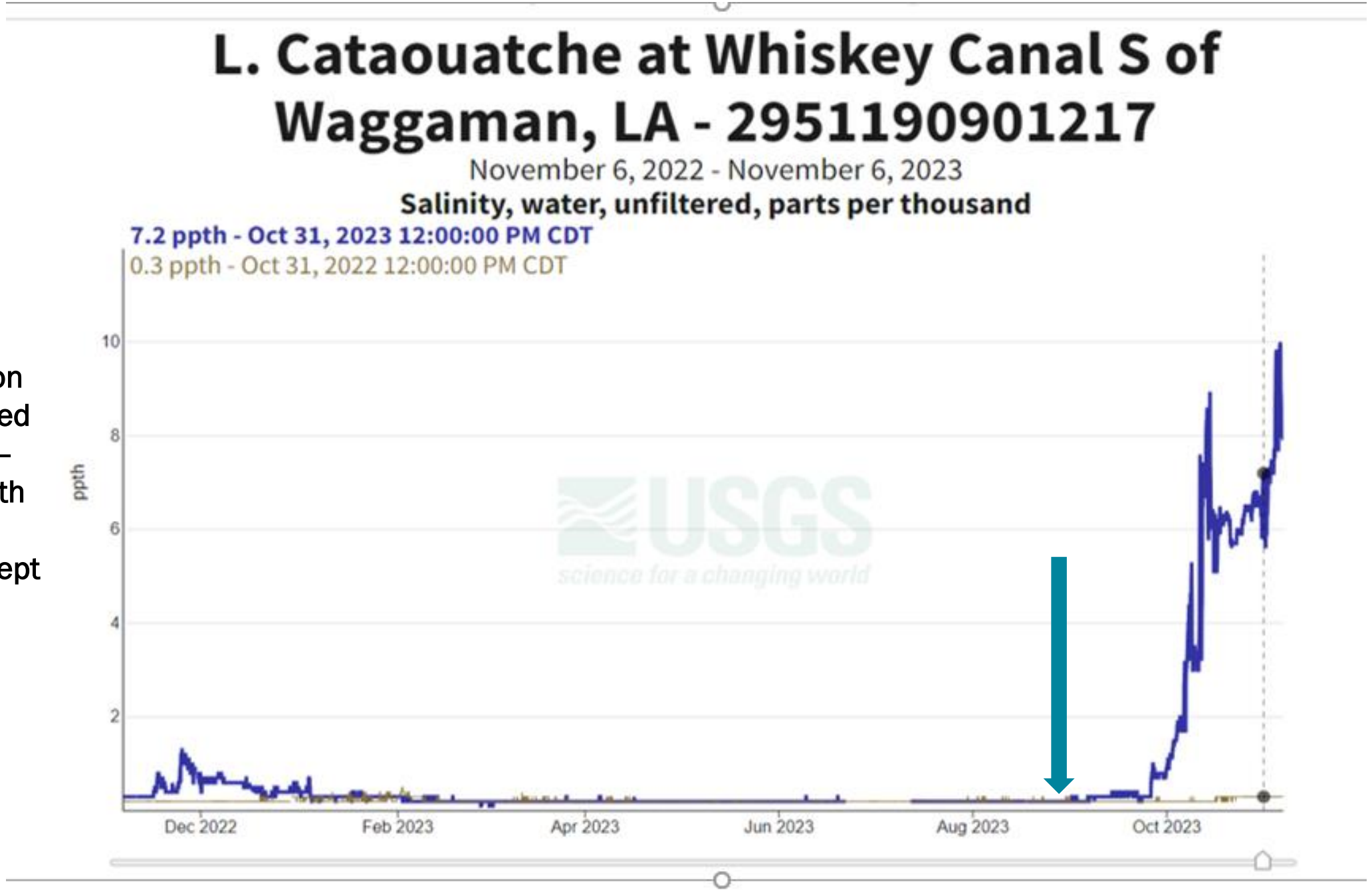
Barataria Bay Near Grand Terre Island, LA - 291929089562600

November 2, 2022 - November 2, 2023

Salinity, water, unfiltered, parts per thousand



Salinity incursion most pronounced in upper basin – corresponds with cease of operations in Sept



2024 Operations Plan (proposed by TWG)

DAVIS POND OPERATIONAL PLAN 2024

From December through May, the intent is to operate the diversion to maintain the seasonal average salinity at the 15 ppt line illustrated in the map below (Figure 1). December- May operations will be based on data from the Barataria Bay N Grand Terre gauge specified by the map (Figure 1) and graph below (Figure 2). From June through November, operations will be based on the monthly salinity range at the 5 ppt line specified by the map (Figure 1) and graph (Figure 3) below, utilizing the Little Lake Bay Dos Gris gauge as the primary gauge. Barataria Waterway at Mud Lake S of Lafitte will also be monitored, and utilized as a secondary gauge for the 5ppt line. The structure will be operated when the 14-day moving average salinity is within or above the long term data range for the gauge(s) in use. When the moving average drops below the low trigger (the greater of the long term average minus 1 SD or 5ppt) the diversion operations will be maintained at the minimum of 1,000cfs until the moving average re-enters the operational range.* Operational settings are not to exceed 10,000 cfs.

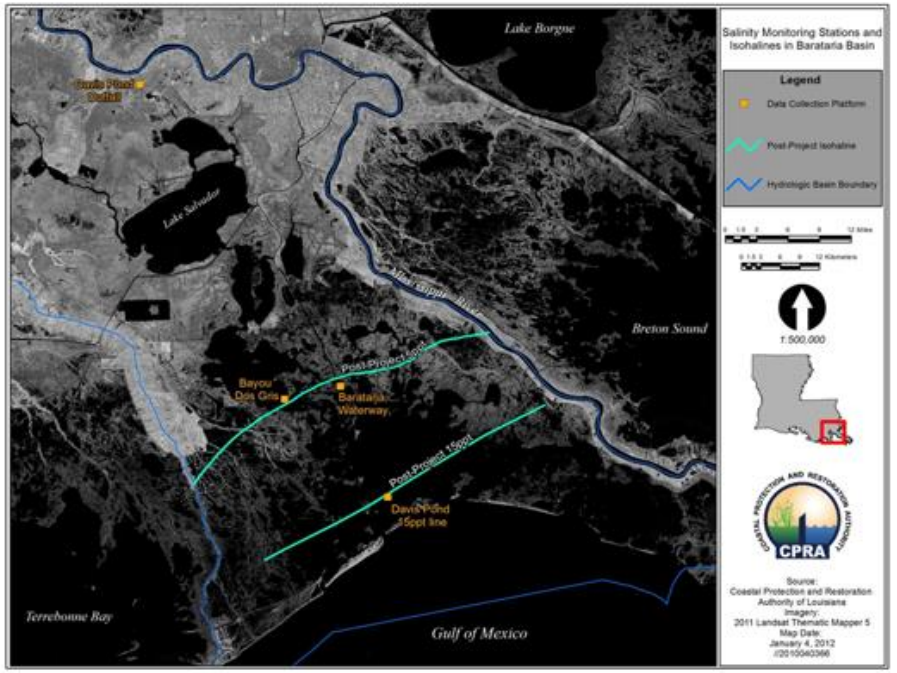


Figure 1. Map of salinity gauges and isohaline lines in Barataria Basin to be used for guidance and operation of the Davis Pond Freshwater Diversion.

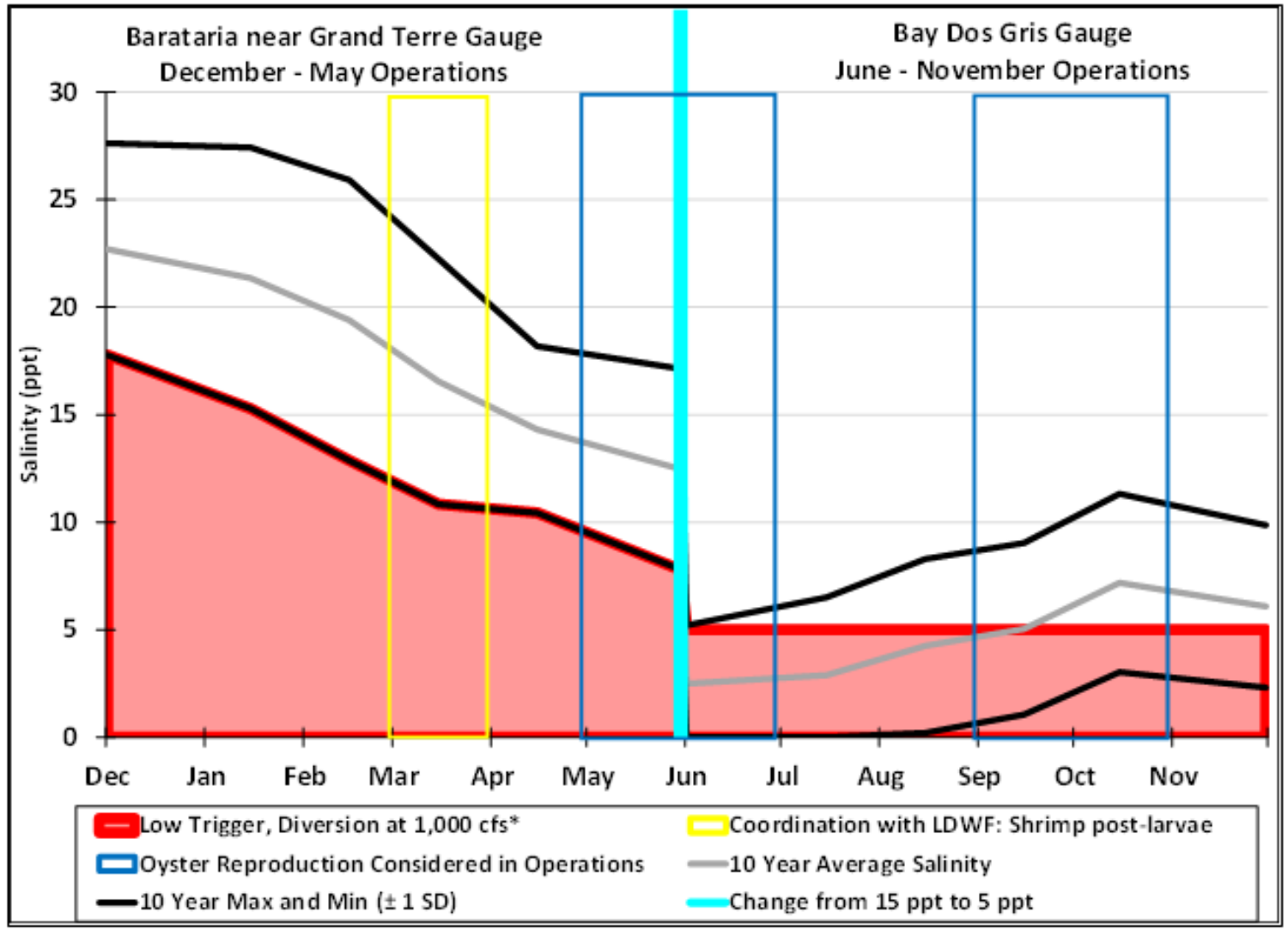


Figure 4. Ten Year average (±1 standard deviation) salinities from the Barataria Bay N Grand Terre Gauge (USGS site 291929089562600) from December through May, and the Little Lake Bay Dos Gris (USGS site 292800090060000) gauge from June through November. The Davis Pond Freshwater Diversion structure may be operated when the 14-day moving average salinity is within or above the data range. Operations will decrease to the minimum of 1000 cfs if the moving average drops below the low trigger. *