

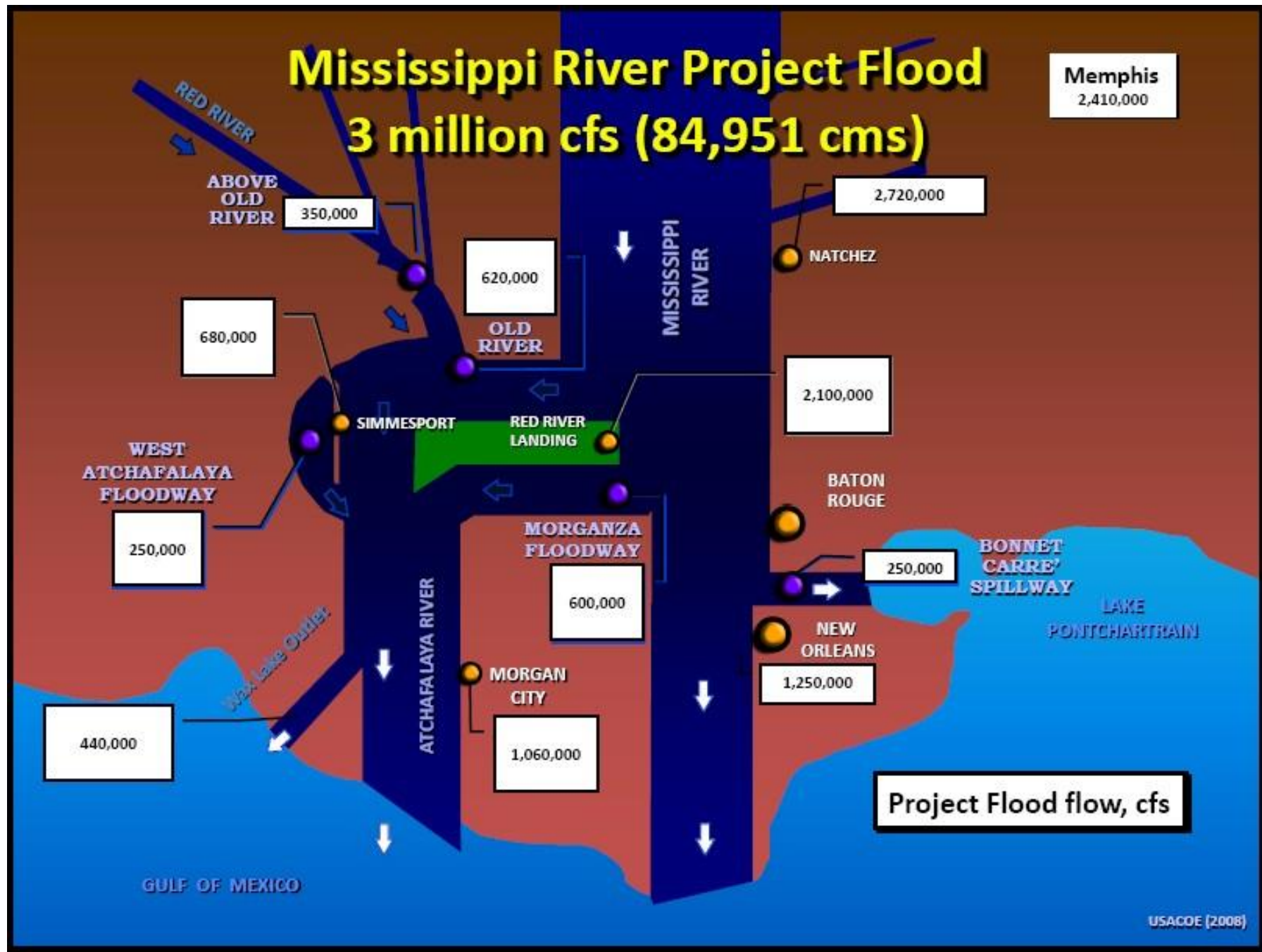


Utilizing Upper Diversions in River Water Management Case Study: 2019 Mississippi Flood Event

Summary

- Bonnet Carré Spillway (BCS) used to manage and reduce flood risk
- Fresh water, sediment, and nutrients are directed into Lake Pontchartrain:
 - Not an optimal use of vital resources and;
 - May induce water quality issues
- Consider Union and Ama diversions to address some of the challenges
- Use 2019 flood events to examine altering the operation plans for Bonnet Carré

Mississippi River Project Flood 3 million cfs (84,951 cms)



Bonnet Carré Spillway Operation Record

Year	Duration	Max bays opened	Maximum discharge (cfs)
1937	01/28 – 03/16	285	211,000
1945	03/23 – 05/18	350	318,000
1950	02/10 – 03/19	350	228,000
1973	04/08 – 06/21	350	207,000
1975	04/14 – 04/26	225	110,000
1979	04/17 – 05/31	350	228,000
1983	05/20 – 06/23	350	268,000
1994	05/16 – 05/26	30	14,000
1997	03/17 – 04/18	298	243,000
2008	04/11 – 05/08	160	160,000
2011	05/09 – 06/20	330	316,000
2016	01/10 – 02/01	210	203,000
2018	03/08 – 03/30	186	196,000
2019	02/27 – 04/11	206	213,000
2019	05/10 – 07/27	168	161,000
2020	04/03 – 05/01	90	90,000

Outlets and diversions



Opening Conditions for Ama and Union

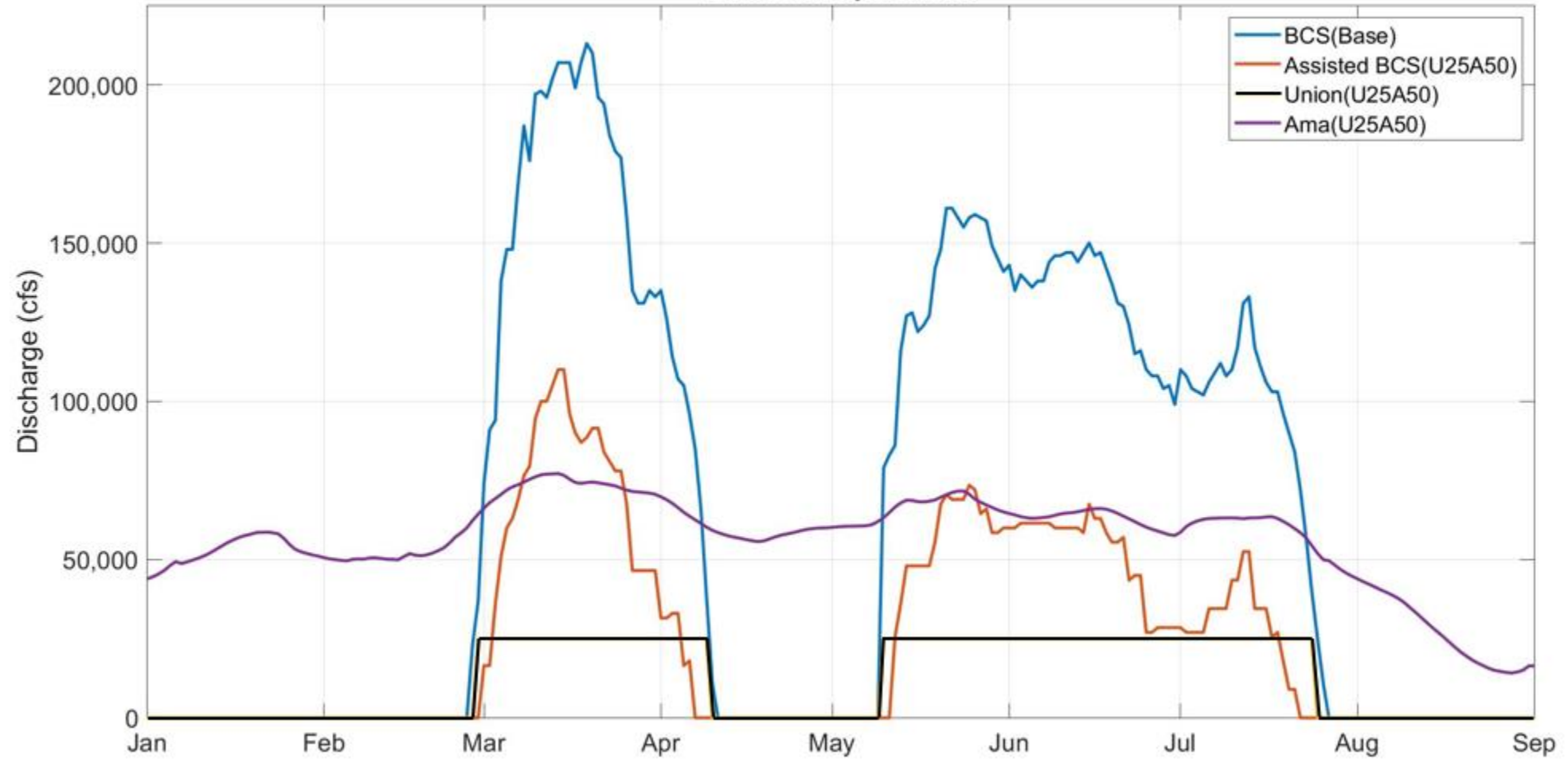
Ama or Ama North diversion opening criteria are:

- 0 cfs when $MR < 200,000$ cfs
- Linearly interpolated to 50,000 cfs when MR reaches 1 Mil cfs
- Linearly extrapolated when MR exceeds 1 Mil cfs

Union diversion opening criteria area:

- output 25,000 cfs when MR exceeds 1 Mil cfs

Diversion operations



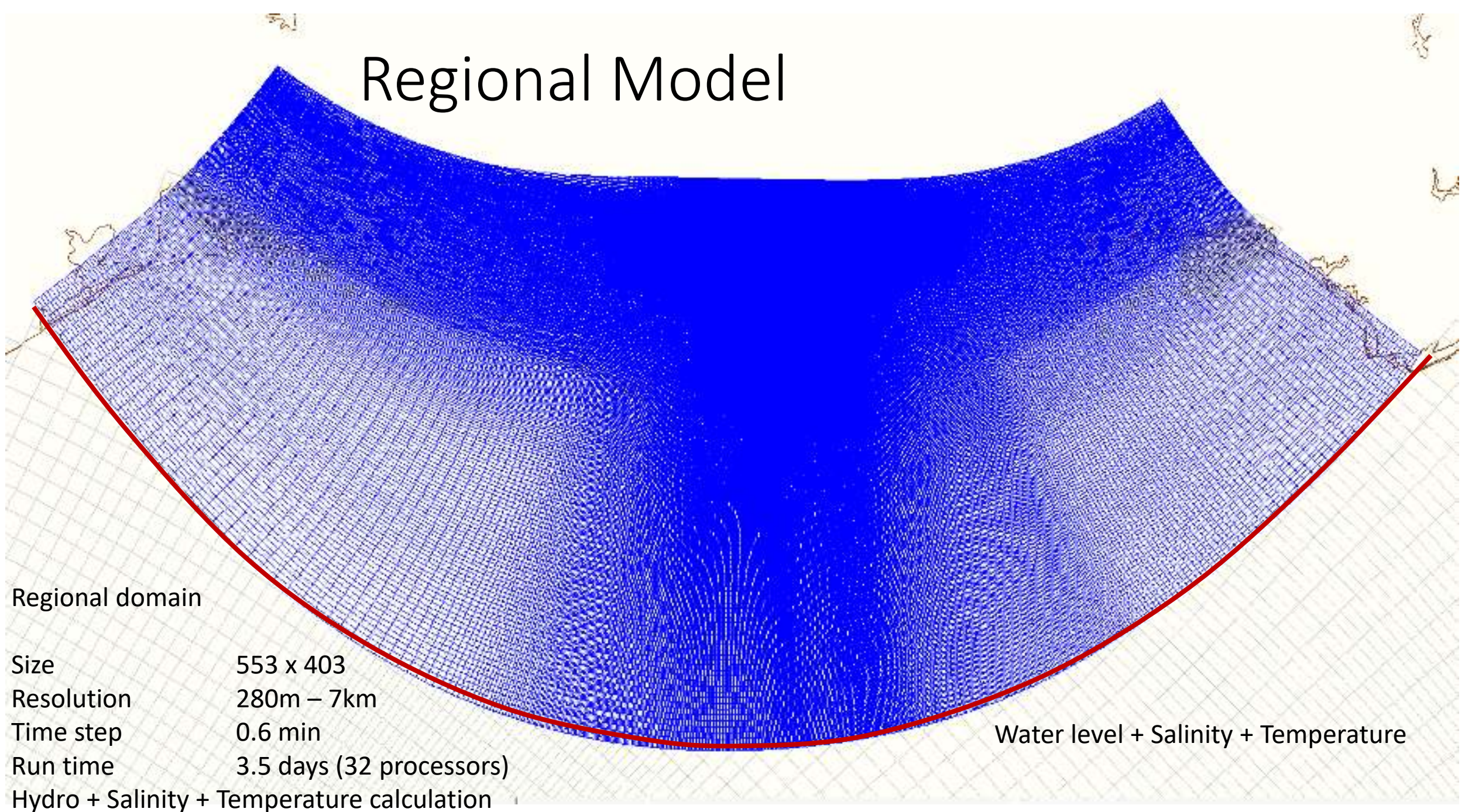
	Bonnet Carre' Spillway	Bonnet Carre' Spillway +Union+Ama
Total Days Open	121	107
Total BCS Diverted Volume ($10^{10} \times \text{ft}^3$)	13.4	5.0
Volume Reduction Percentage	-	63%



Runs: January 1, 2019 – September 1, 2019

1. Base (Historical)
2. U25A50 (Union at 25k cfs, Ama at 50k cfs, assisted BCS)

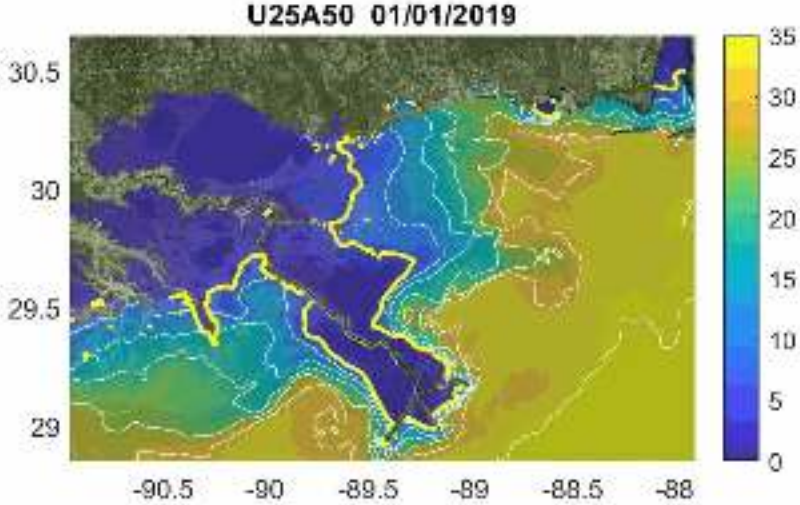
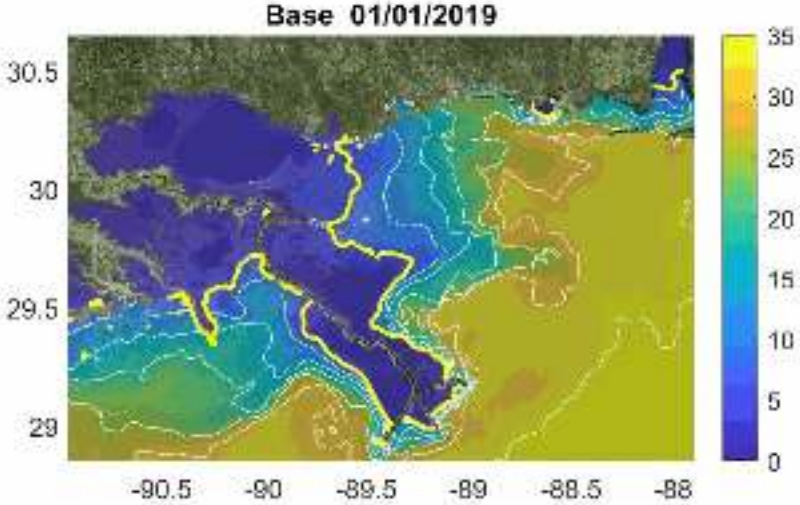
Regional Model



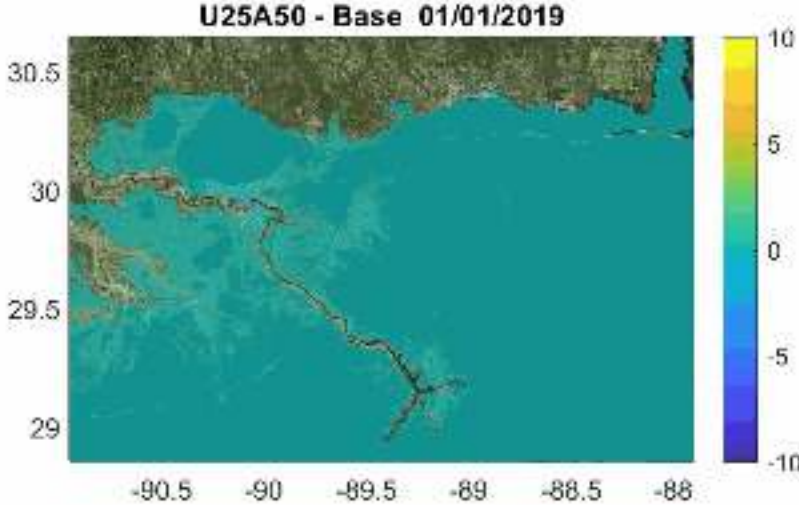
Discharge Sources



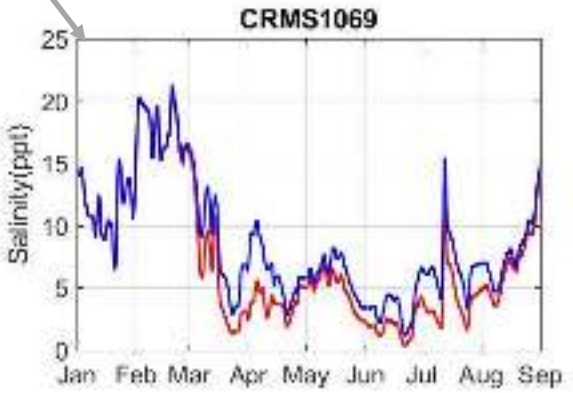
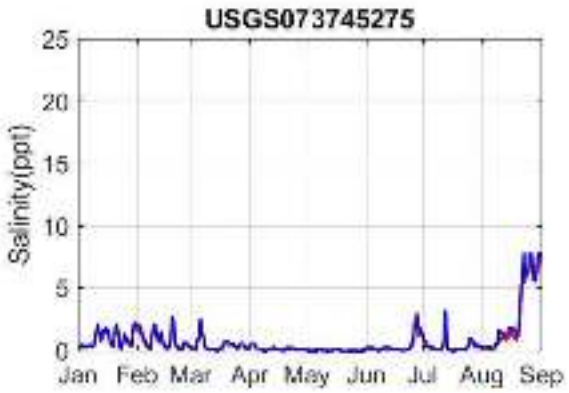
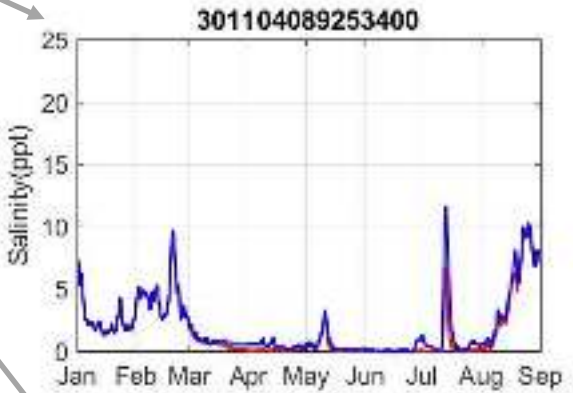
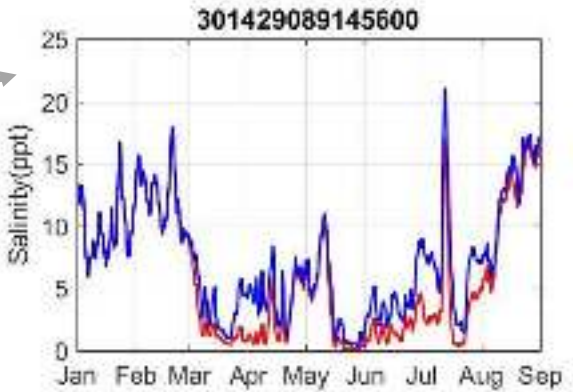
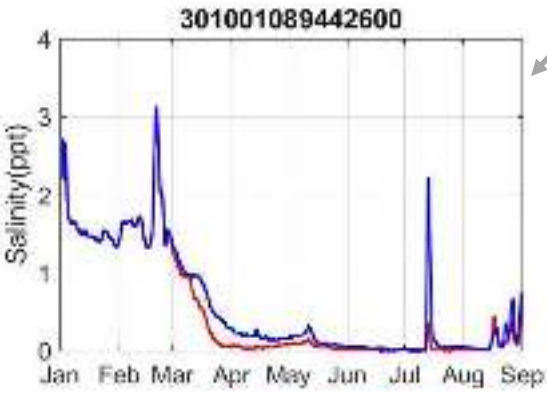
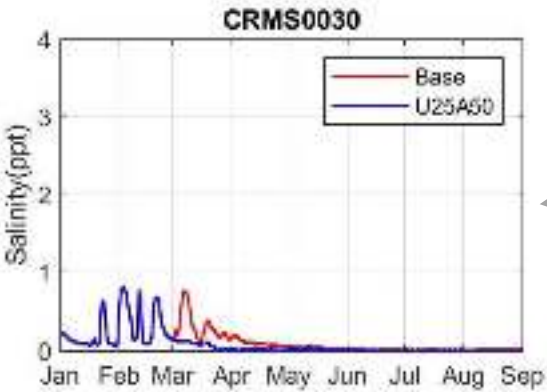
Salinity (ppt, thick yellow line: 5-ppt contour)



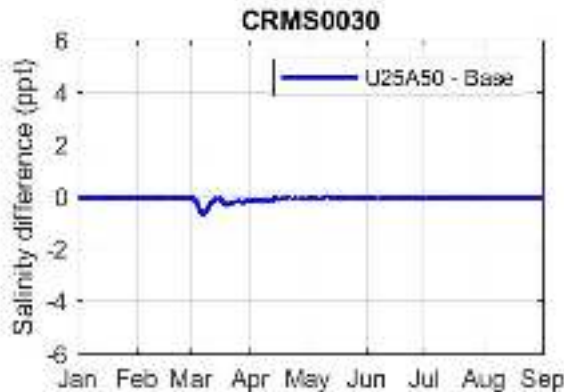
Salinity difference (ppt)



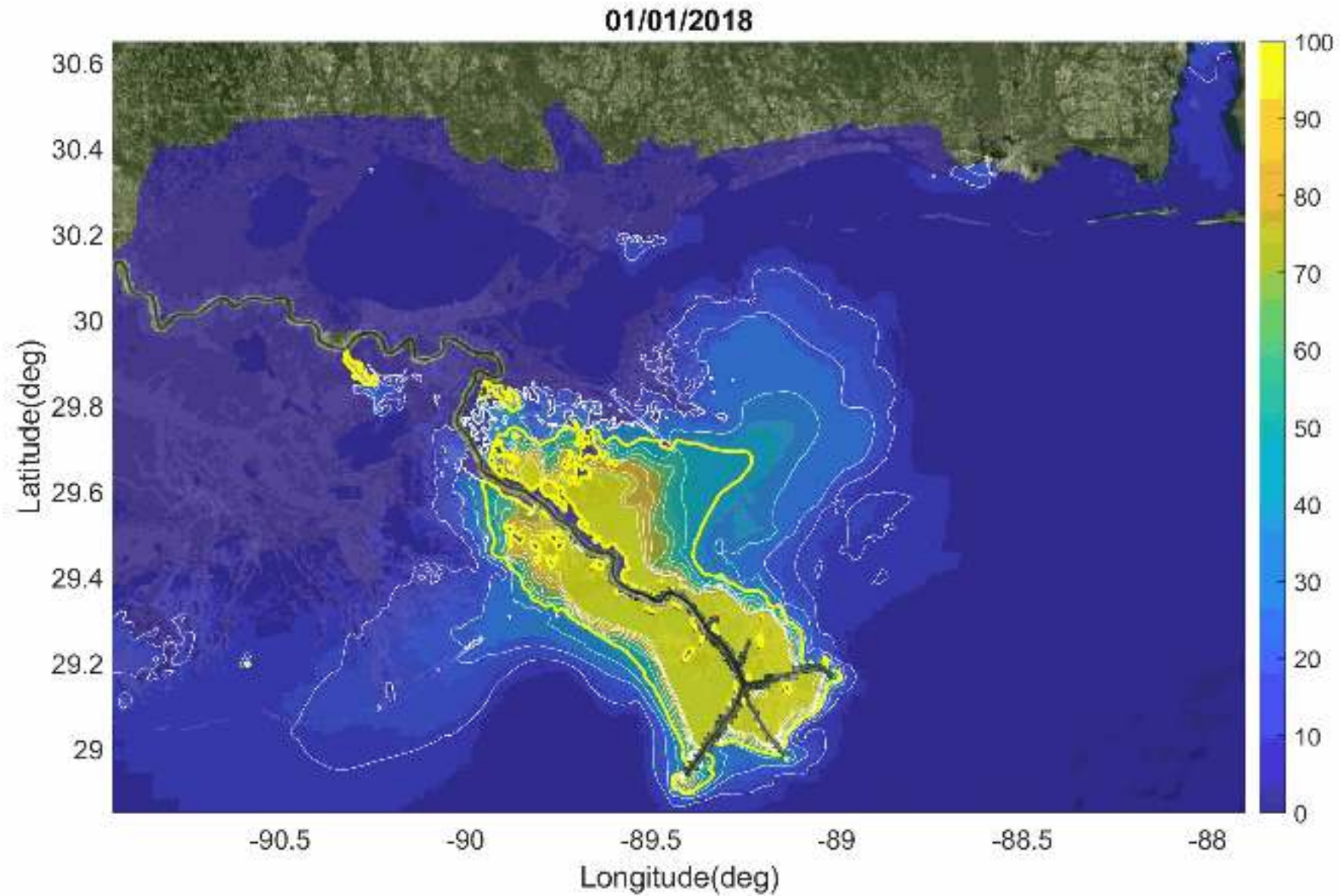
Salinity (ppt)



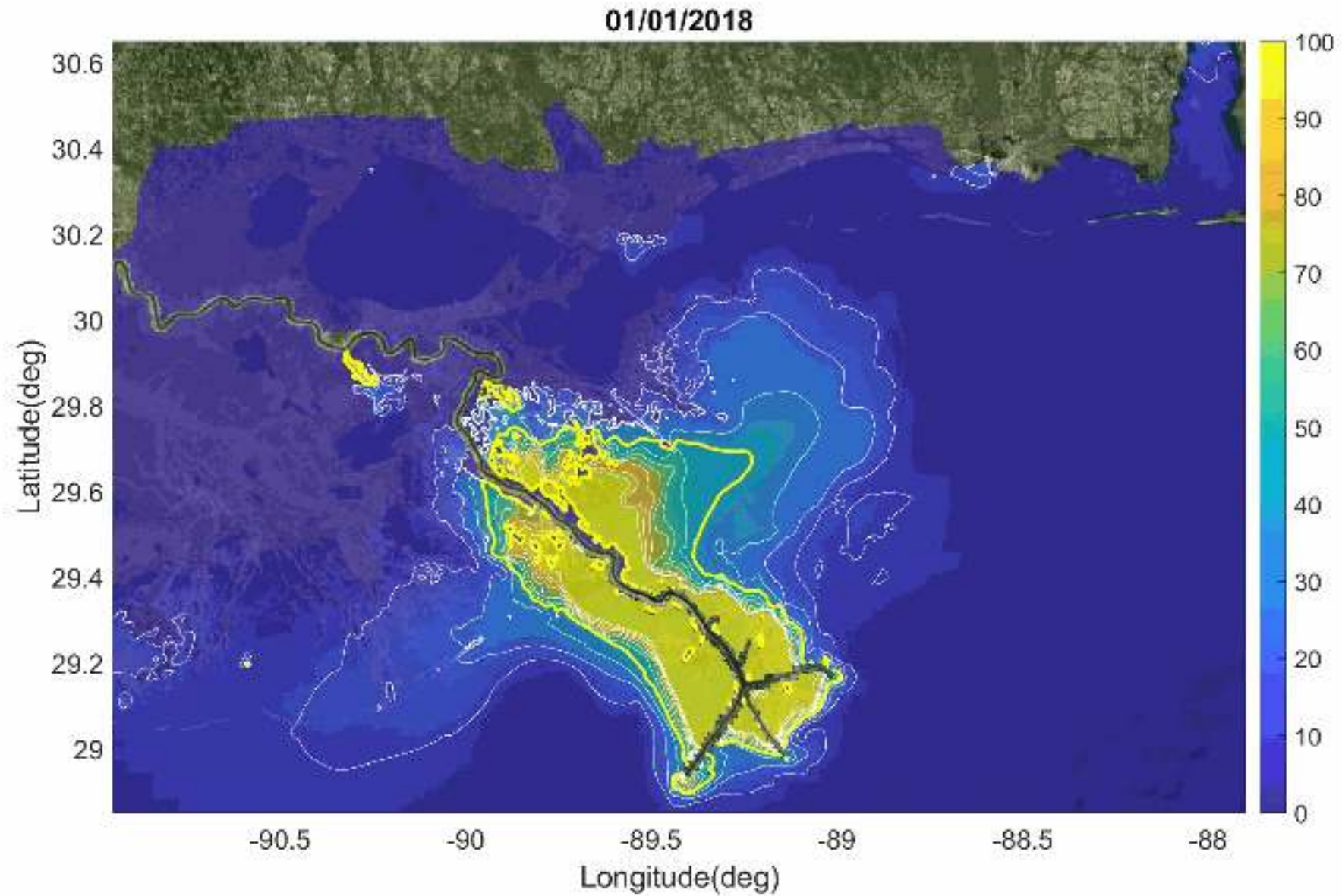
Salinity difference (ppt)



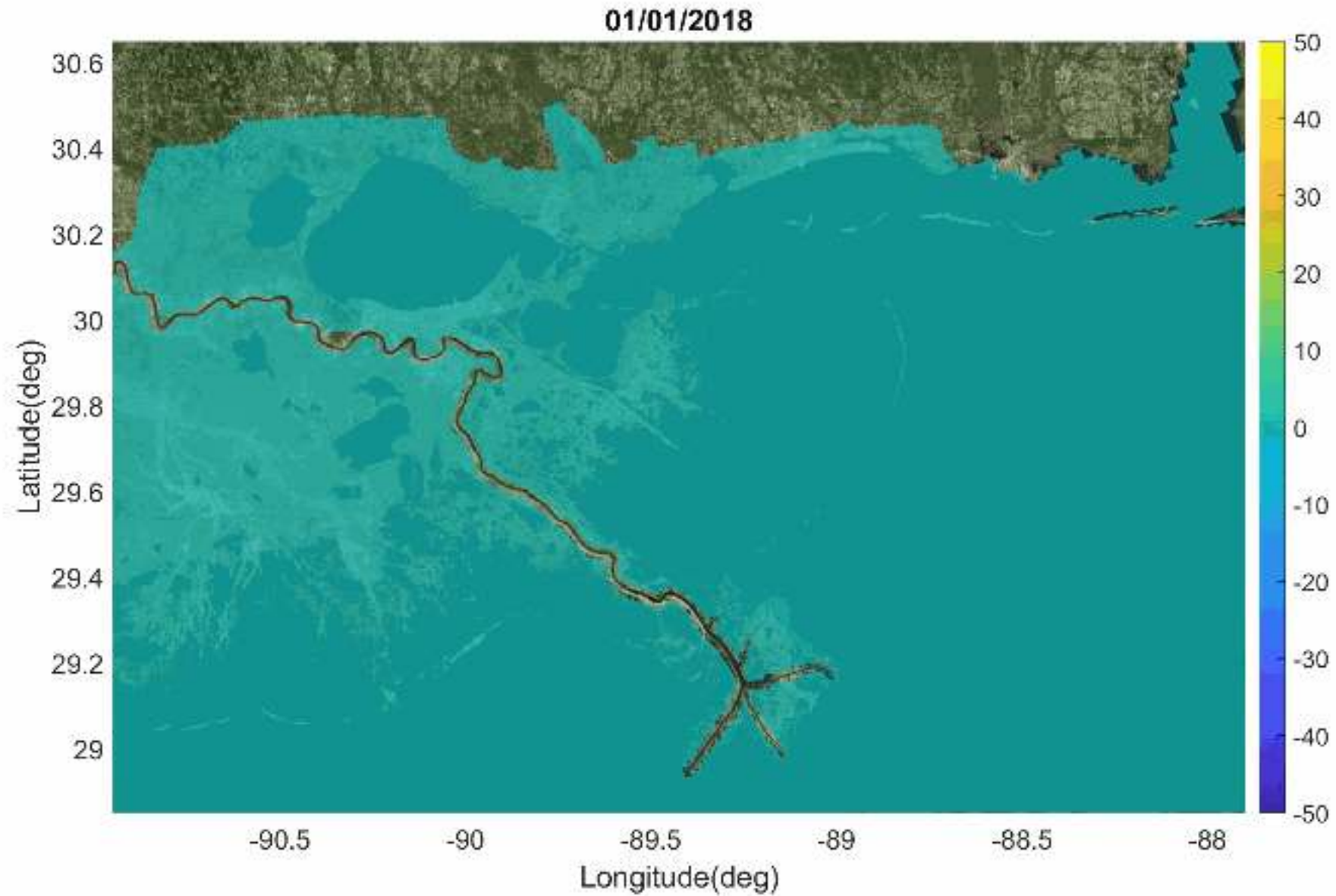
2018 SST (mg/l, thick yellow line: 40-mg/l contour)



2018 Union-diversion SST (mg/l) run with BCS and Union diversions



2018 SST (mg/l) run with diversions – 2018 SST (mg/l)



Closing Remarks

- Continue improving this vital water, sediment, and water quality model as more data and funds become available.
- Perform more scenarios to evaluate various capacities of Ama and Union
- CPRA is currently evaluating Union capacities of 25K, 50K, 75K, and 100K CFS
- Communicate with stakeholders about the efficacy of implementing upper River Diversions to capture the potential benefits and impacts on the ecosystem and local communities
- Explore the benefits of the upper river diversions in creating added protection benefits to local communities from natural hazards (hurricanes, and rainstorm flooding).