Mississippi River Hydrodynamics and Delta Management Study
Basin-Wide Model Development

Delft3D Production Runs: 2020 – 2070

Vegetation Changes

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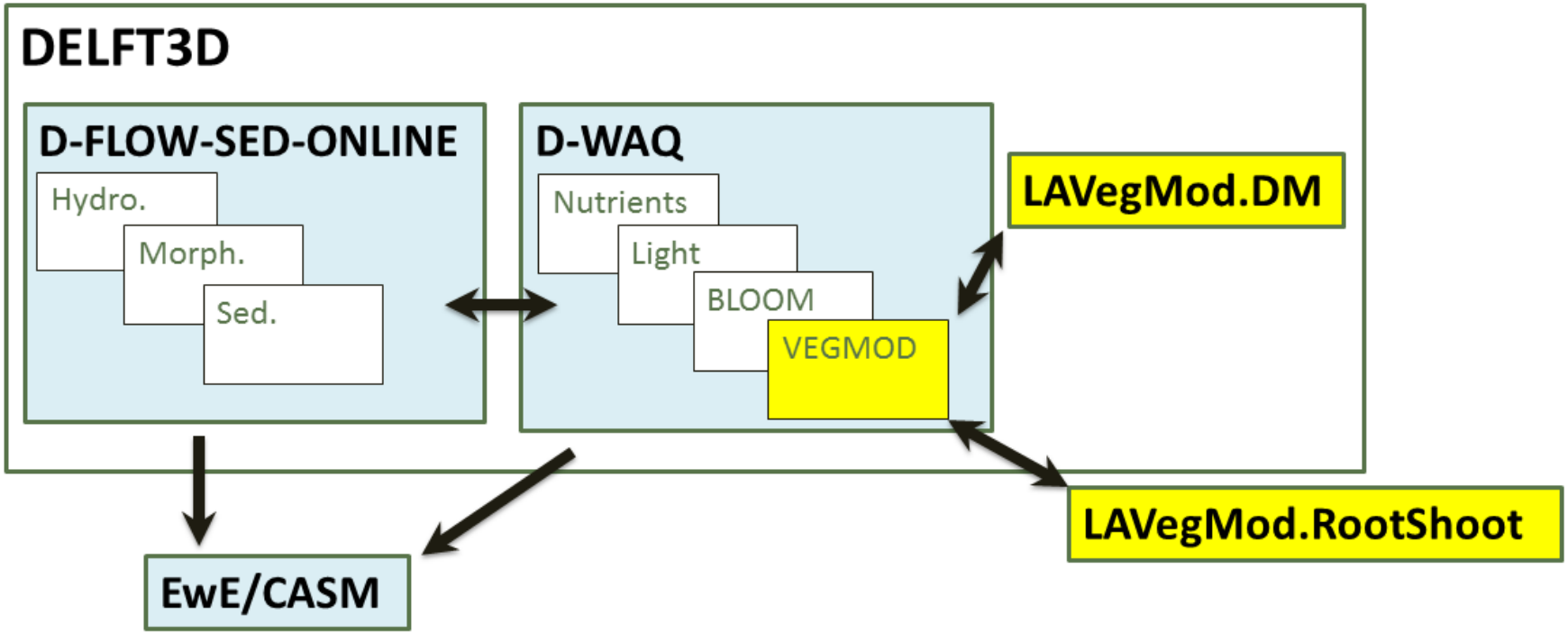
2. The Water Institute of the Gulf

October 27, 2015 Divertion Panel Meeting

Vegetation Models



Herbaceous Vegetation Models

Order of Events:

1. Spatial Distribution
   - Based on species niche (flood and salinity tolerance)
   - Model: **LAVegMod.DM**
2. Biomass Production
   - Based mainly on nutrient availability but has inundation mortality
   - Model: **VEGMOD**
3. Allocation of Biomass
   - Based on porewater nitrogen
   - Model: **LAVegMod.RootShoot**

LAVegMod.DM

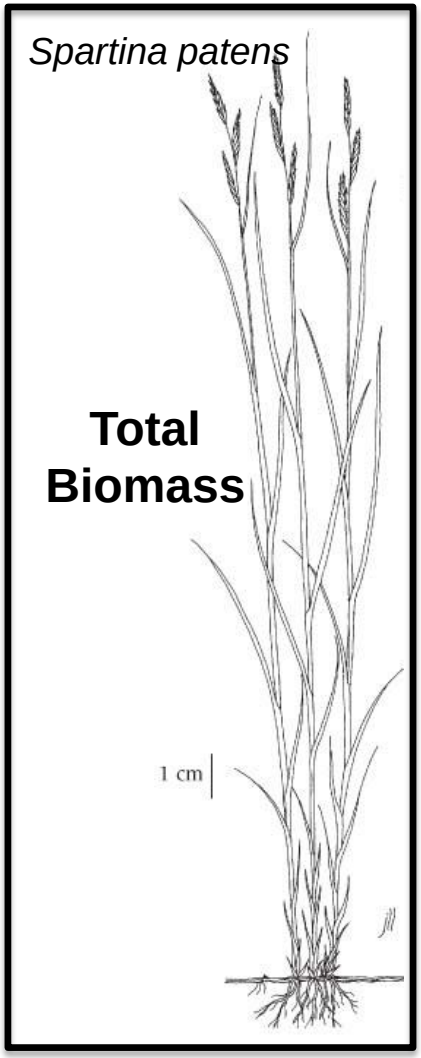
Water Level Variability (standard deviation of water level, meters)

Salinity (annual median, ppt)

	0.00	0.04	0.08	0.12	0.16	0.20	0.24	0.28	0.32	0.36	0.40	0.44	0.48	0.52	0.56	0.60	0.64	0.68	0.72	0.76	10.00
0.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
0.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.2	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.4	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.6	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
1.8	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
3.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
4.0	1.00	1.00	1.00	0.90	0.90	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
5.0	1.00	1.00	1.00	0.75	0.75	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
6.0	1.00	1.00	0.90	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
7.0	1.00	1.00	0.75	0.45	0.45	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00
8.0	1.00	1.00	0.60	0.30	0.30	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00
9.0	1.00	0.85	0.45	0.15	0.15	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90
10.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
12.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
14.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
16.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
18.0	1.00	0.70	0.30	0.00	0.00	0.00	0.05	0.10	0.15	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75
20.0	1.00	0.90	0.50	0.20	0.20	0.20	0.25	0.30	0.35	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95
22.0	1.00	1.00	0.70	0.40	0.40	0.40	0.45	0.50	0.55	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00
24.0	1.00	1.00	1.00	0.60	0.60	0.60	0.60	0.65	0.70	0.75	0.80	0.85	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
26.0	1.00	1.00	1.00	0.80	0.80	0.80	0.90	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
28.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
100.0	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

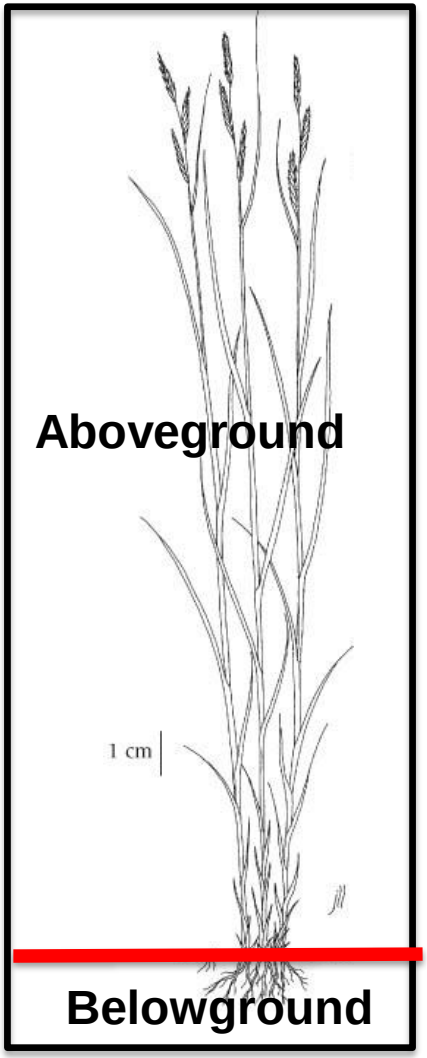
S. alterniflora

LAVegMod.Rootshoot and VEGMOD



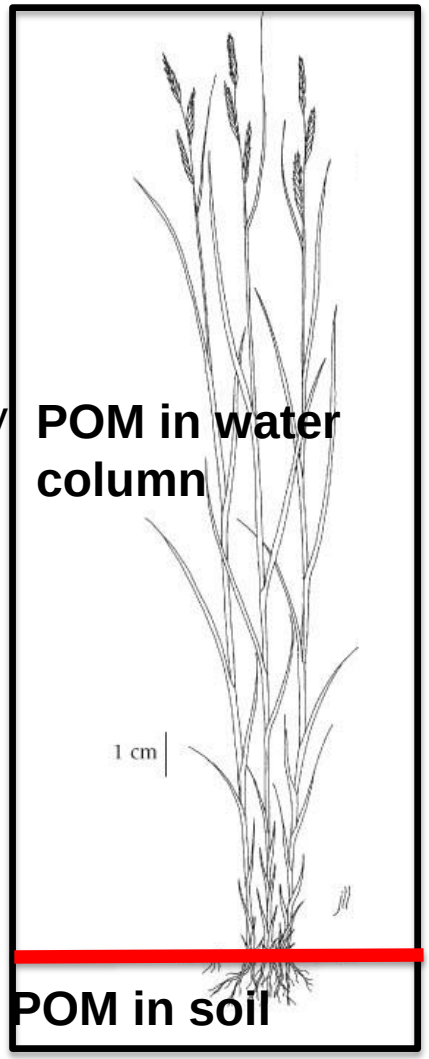
(VEGMOD)

Biomass Allocation



(LaVegMod.RootShoot)

Mortality



(VEGMOD)

LAVegMod.DM & Marsh Types

Focus on 7 emergent marsh taxa:

Fresh:	*Sagittaria latifolia* (arrowhead)
	Zizaniopsis miliacea (giant cutgrass)
Intermediate:	*Sagittaria lancifolia* (bulltongue)
	Phragmites spp. (common reed)
	Typha spp. (cattail)
Brackish:	*Spartina patens* (wiregrass)
Saline:	*Spartina alterniflora* (oyster grass)

Submerged Aquatic Vegetation (SAV)

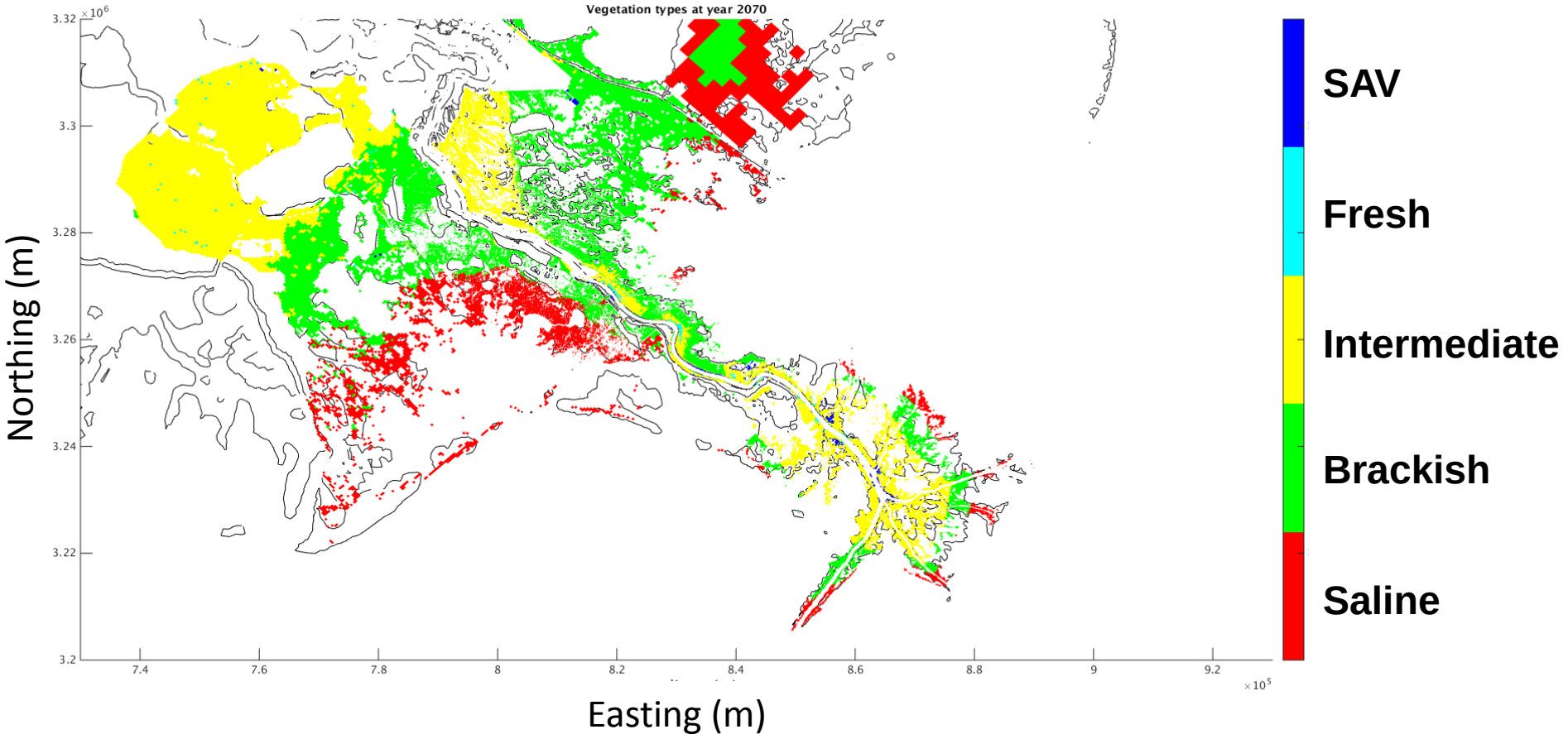
- Generically modeled

Sediment Diversion Production Runs (PR)

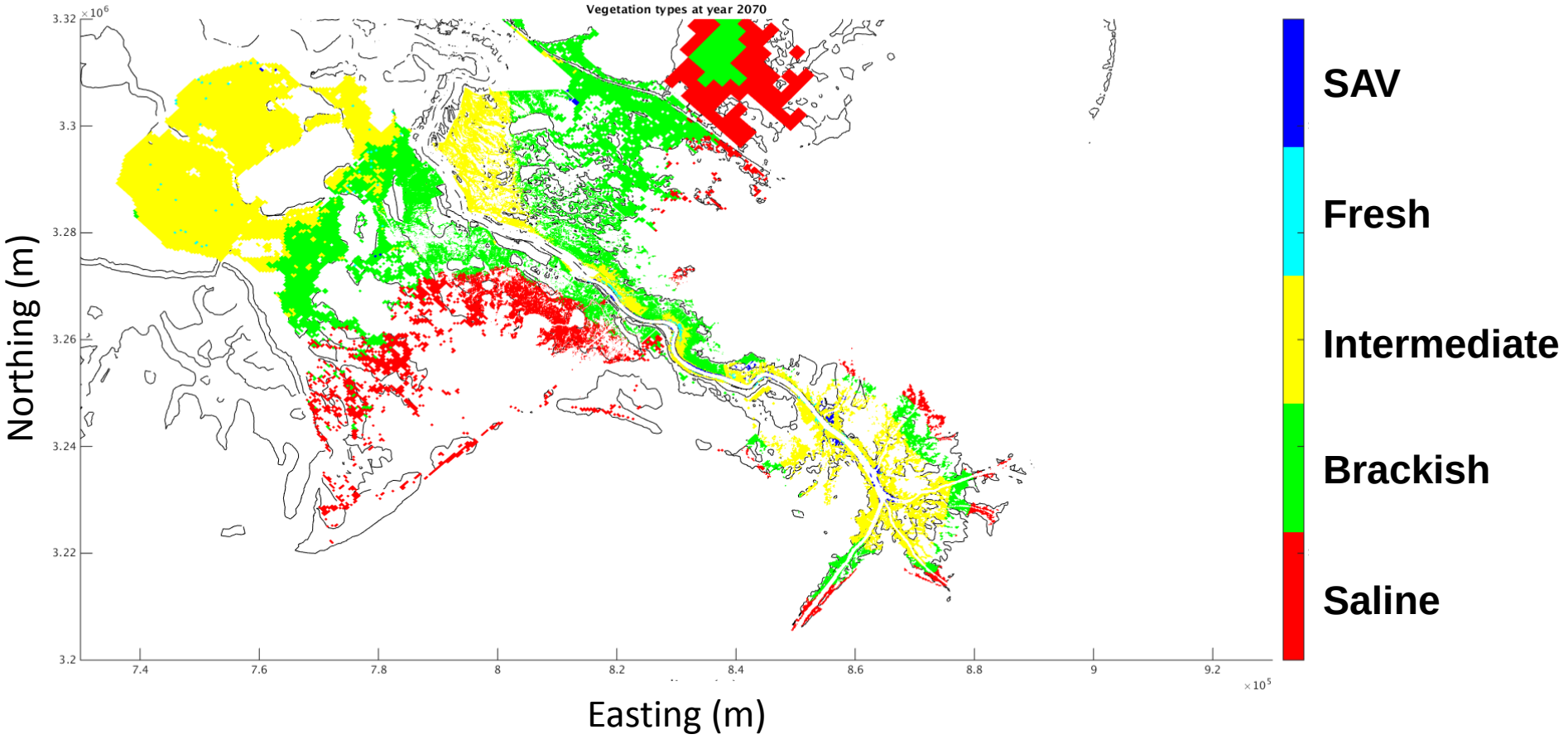
PR ID	Description	Operating Plan	Design Discharge (cfs)	Sea Level Rise	Subsidence Rate
PR1	Mid-Barataria	Less Aggressive	75K	Intermediate	20% into range
PR2	Future Without Project	N/A (No Diversions)	N/A (No Diversions)	Intermediate	20% into range
PR3	Mid-Breton	Less Aggressive	35K	Intermediate	20% into range
PR4	Lower-Breton	Less Aggressive	50K	Intermediate	20% into range
PR5	Lower-Barataria	Less Aggressive	50K	Intermediate	20% into range
PR6	All Four Diversions	Less Aggressive	35K,50K,50K,75K	Intermediate	20% into range
PR7	All Four Diversions	Aggressive	35K,50K,50K,75K	Intermediate	20% into range
PR8	Marsh Creation/Dredge Only	N/A (No Diversions)	N/A (No Diversions)	Intermediate	20% into range
PR9	No Vegetation (20 yrs)	Less Aggressive	35K,50K,50K,75K	Intermediate	20% into range

Less Aggressive = operation for 5 months
Aggressive = operation all year
PR8 = PR6 diversion footprints with sediment from 11 river bars

PR2 : Future Without Projects
Year 50



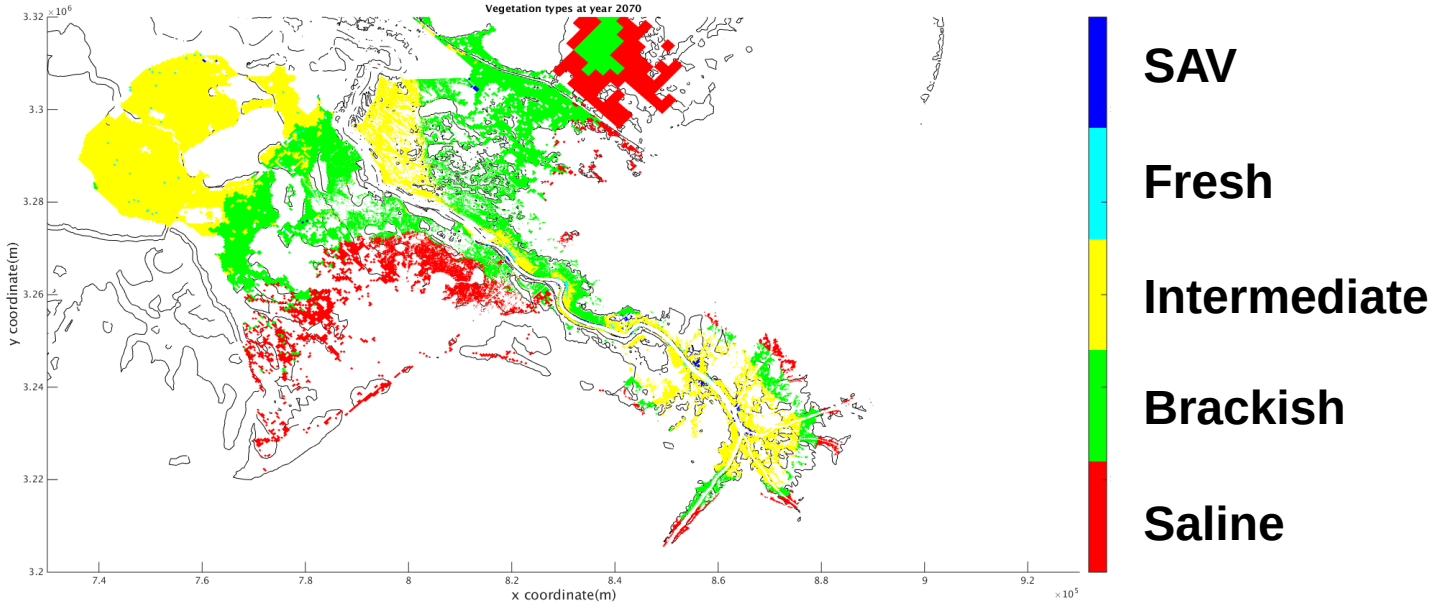
PR2 : Future Without Projects
Year 50



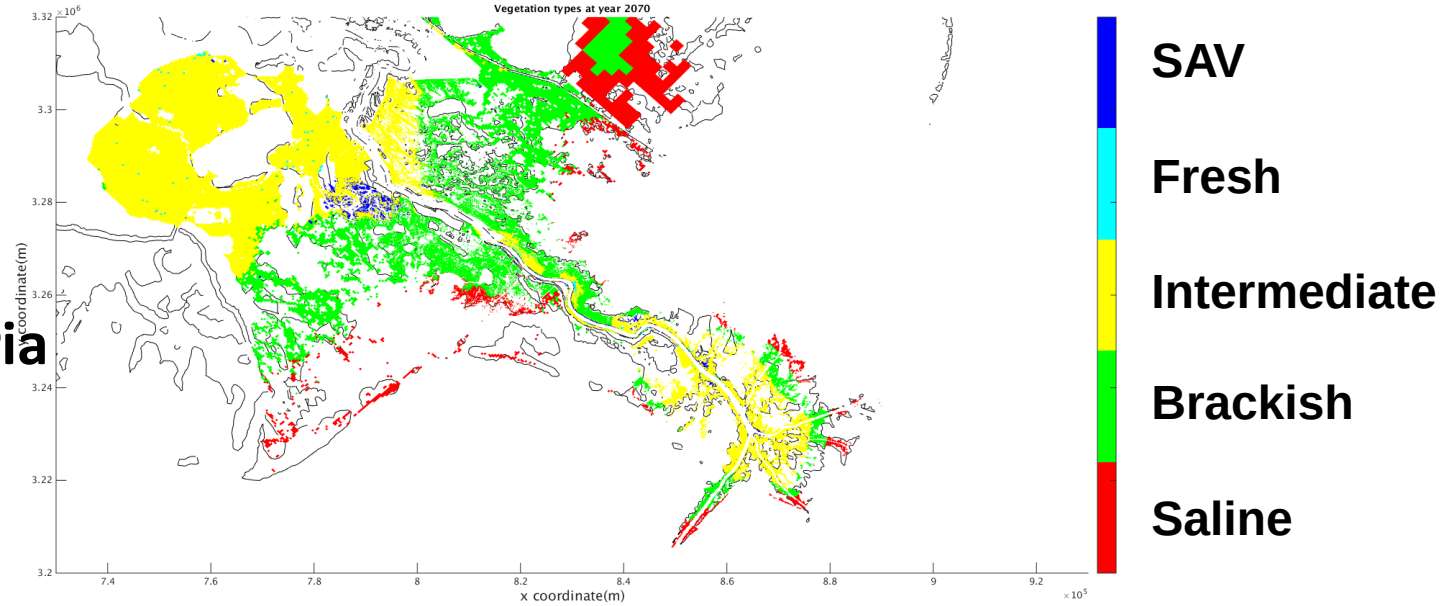
Zones represent dominance, not complete replacement

2070

PR2
FWOA

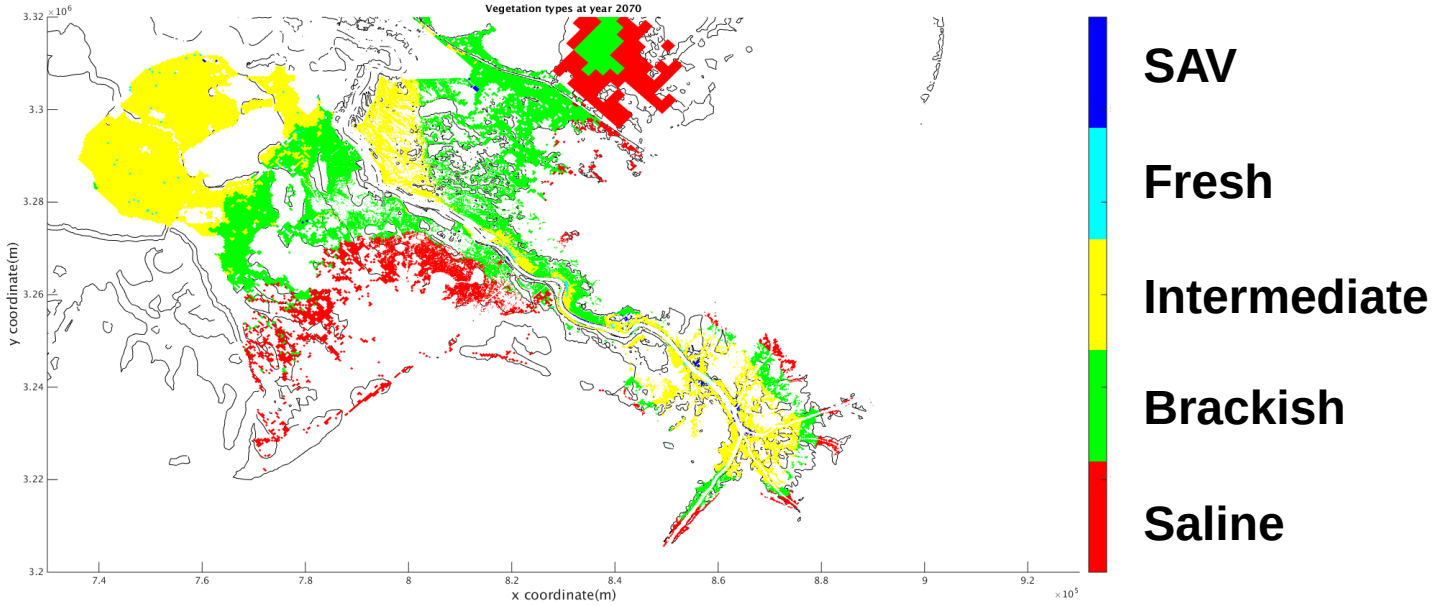


PR1
Mid-Barataria

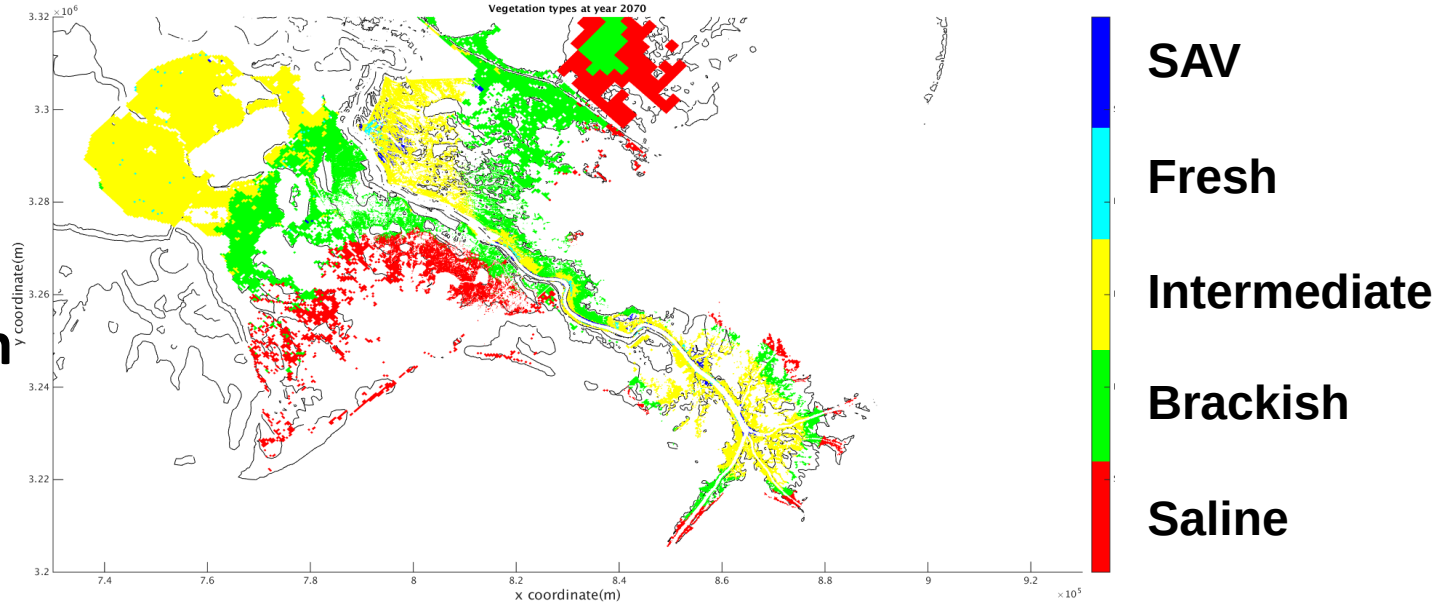


Year 50

PR2 FWOA

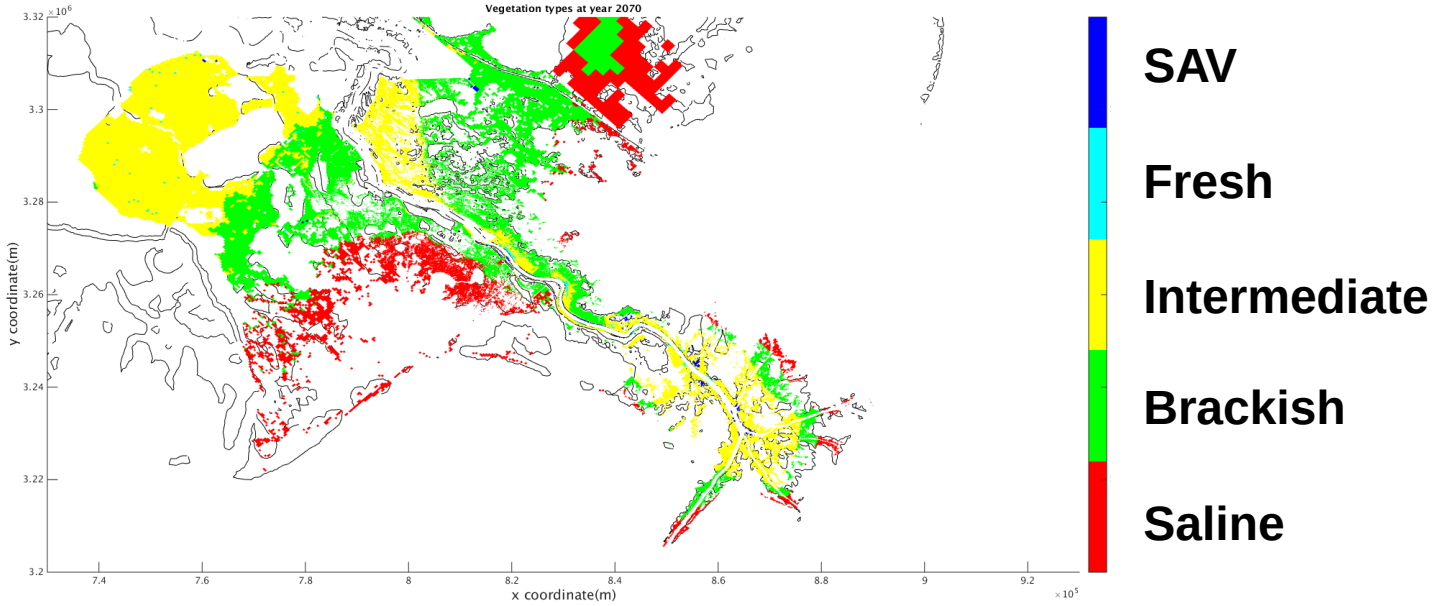


PR3 Mid-Breton

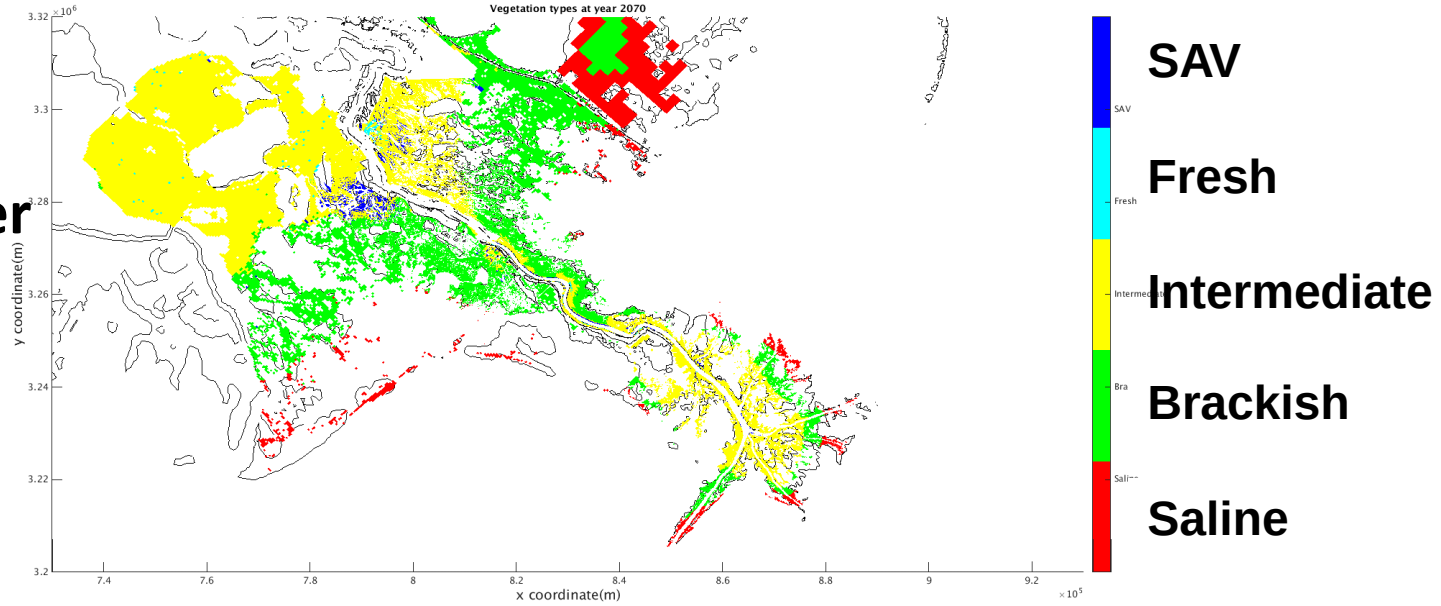


2070

PR2
FWOA

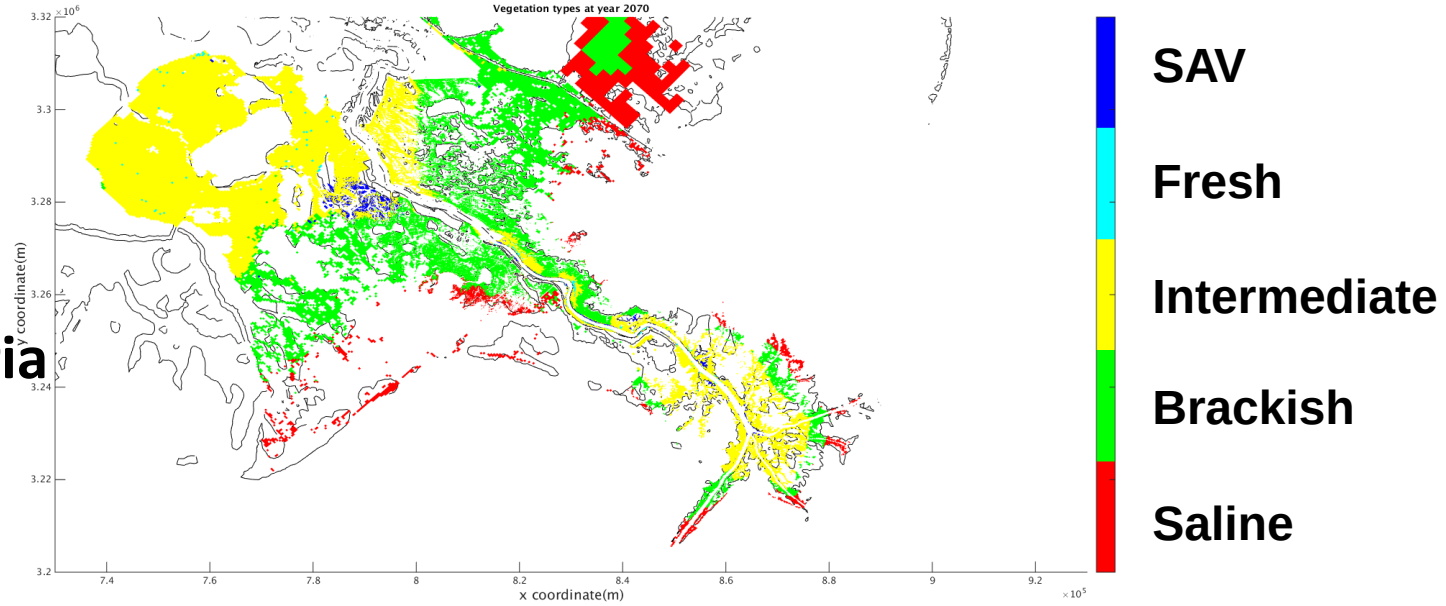


PR6
Mid & Lower
Diversions

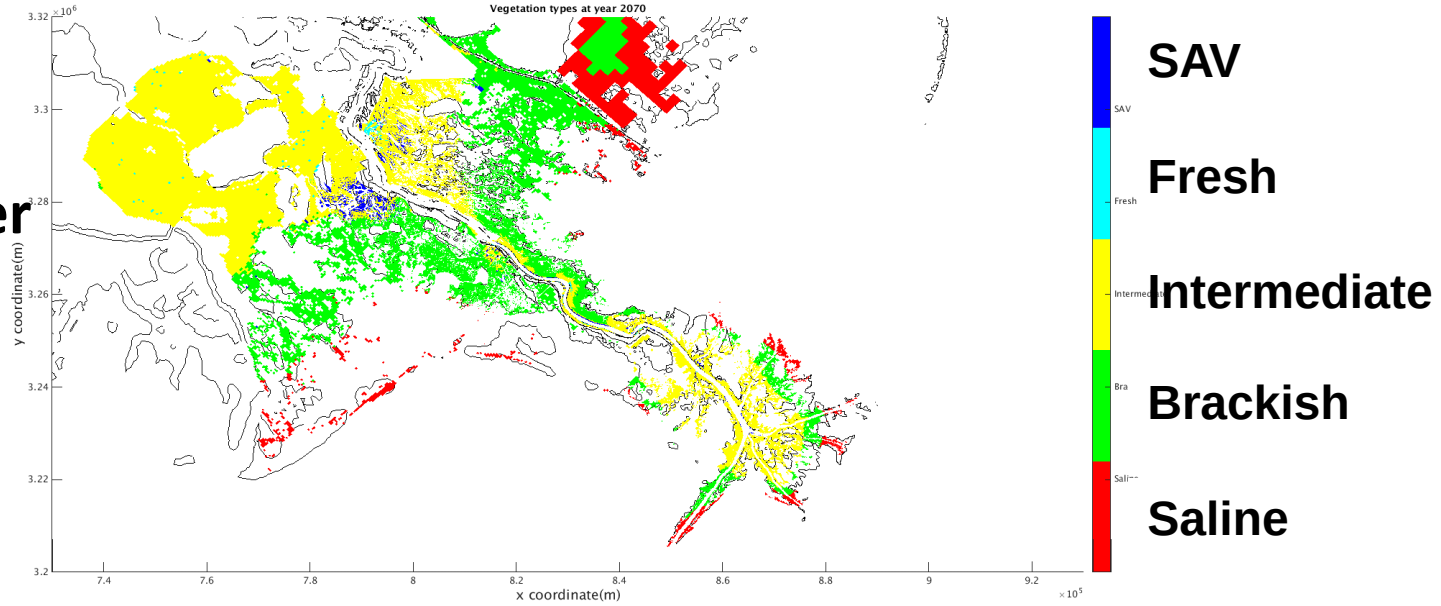


Year 50

PR1
Mid-Barataria

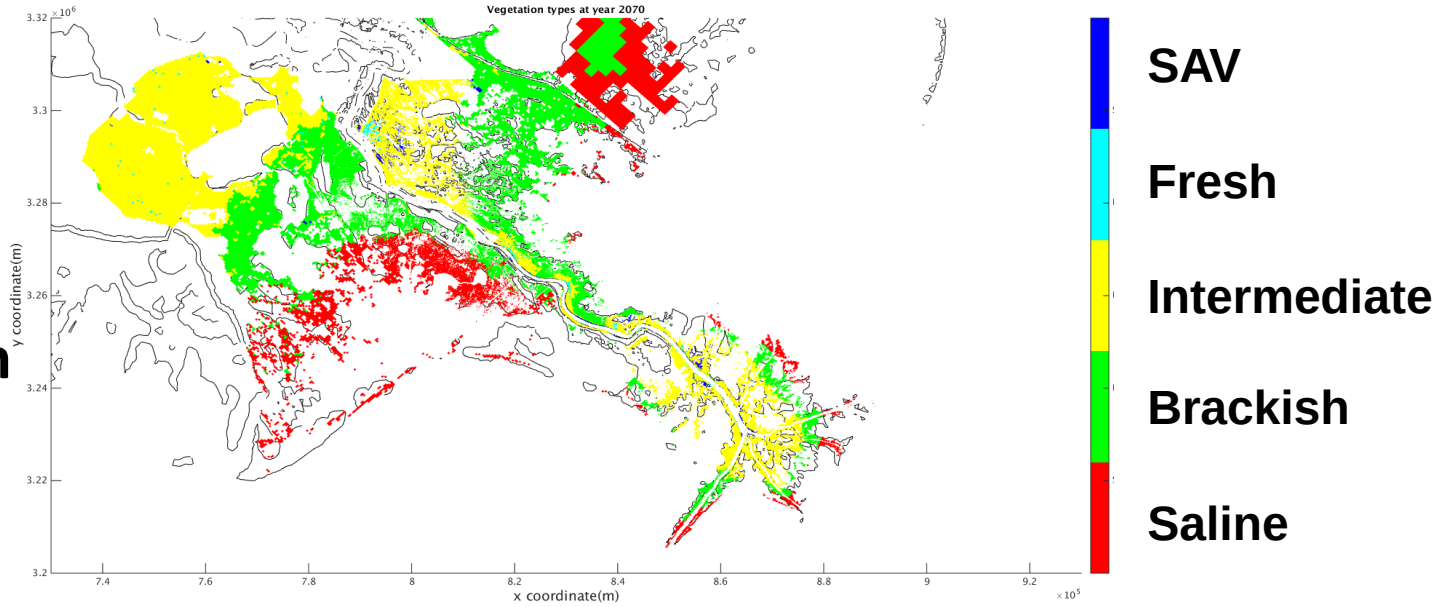


PR6
Mid & Lower
Diversions

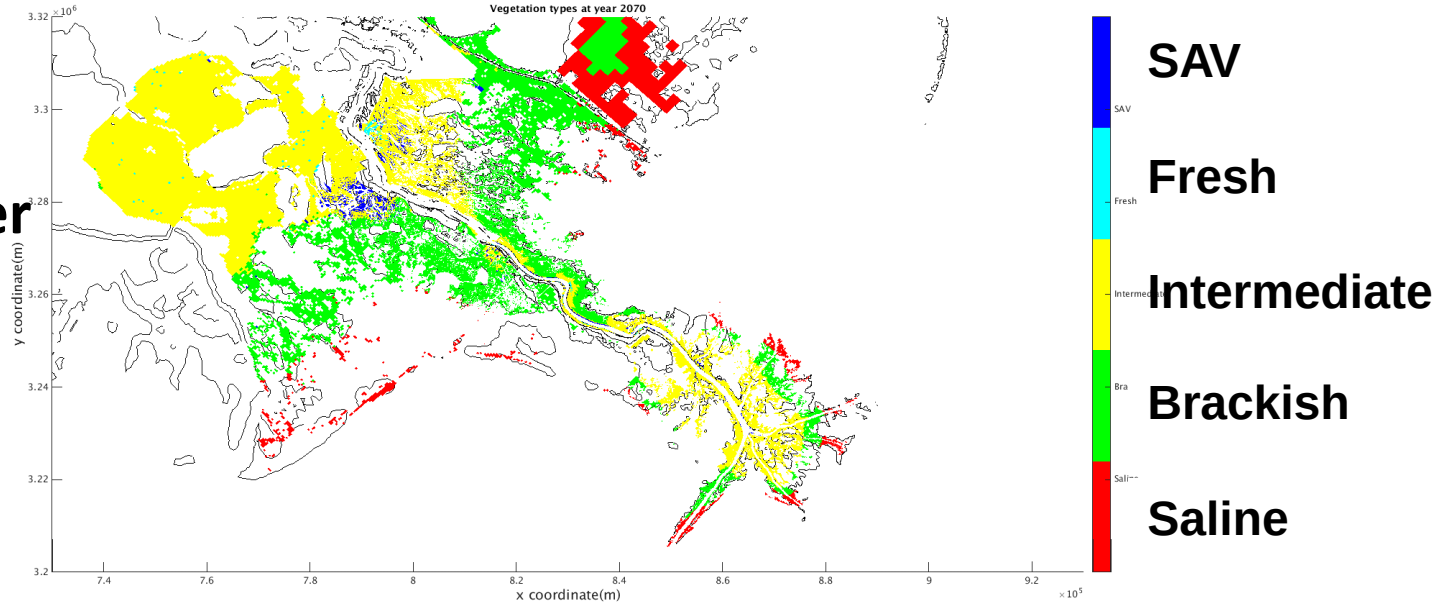


2070

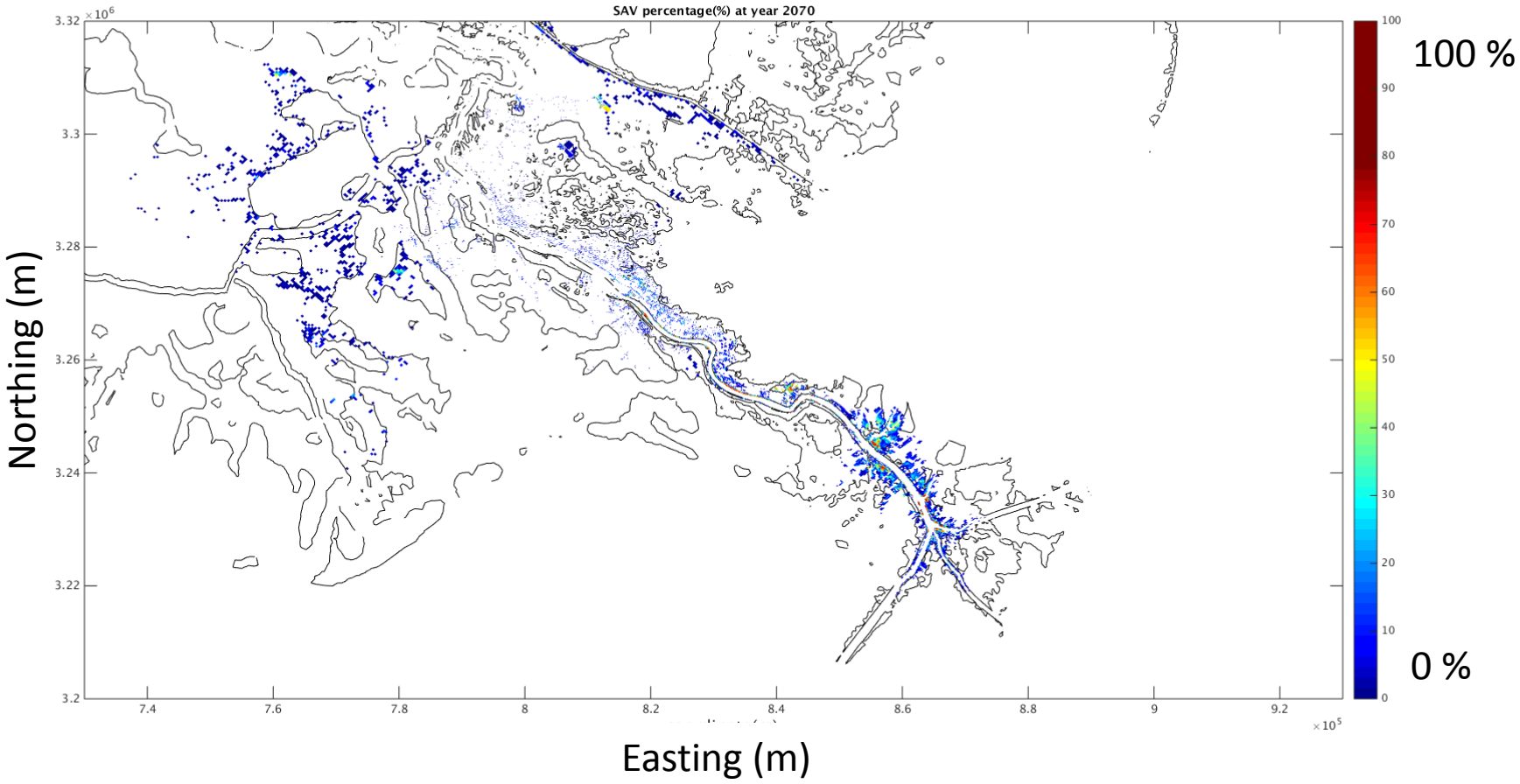
PR3
Mid-Breton



PR6
Mid & Lower
Diversions

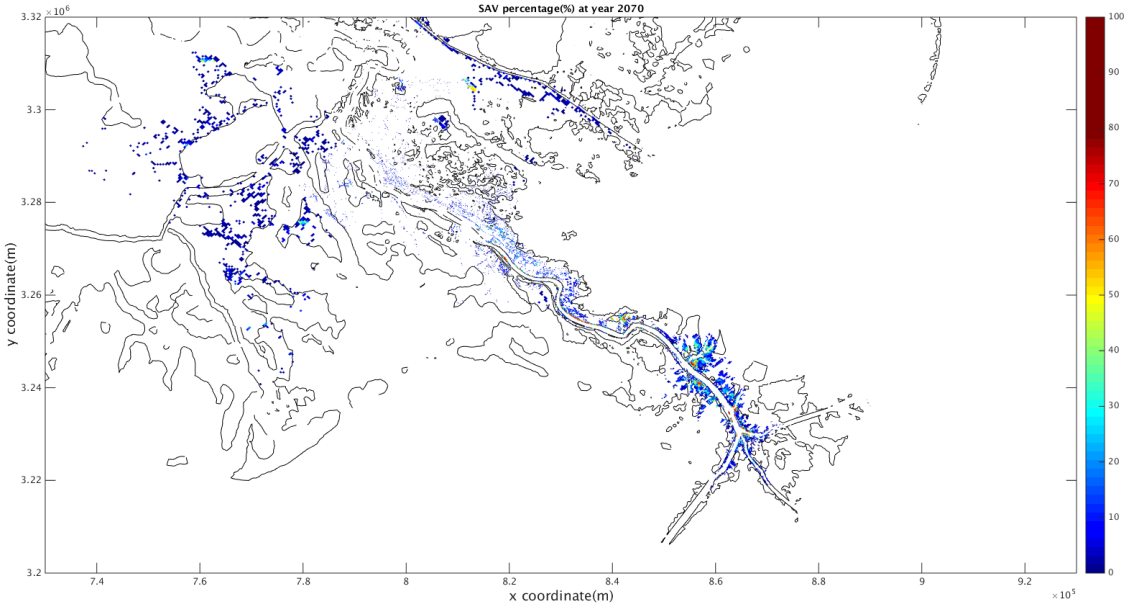


PR2: Future Without Action
Year 50



Year 50

PR2
FWOA



100 %

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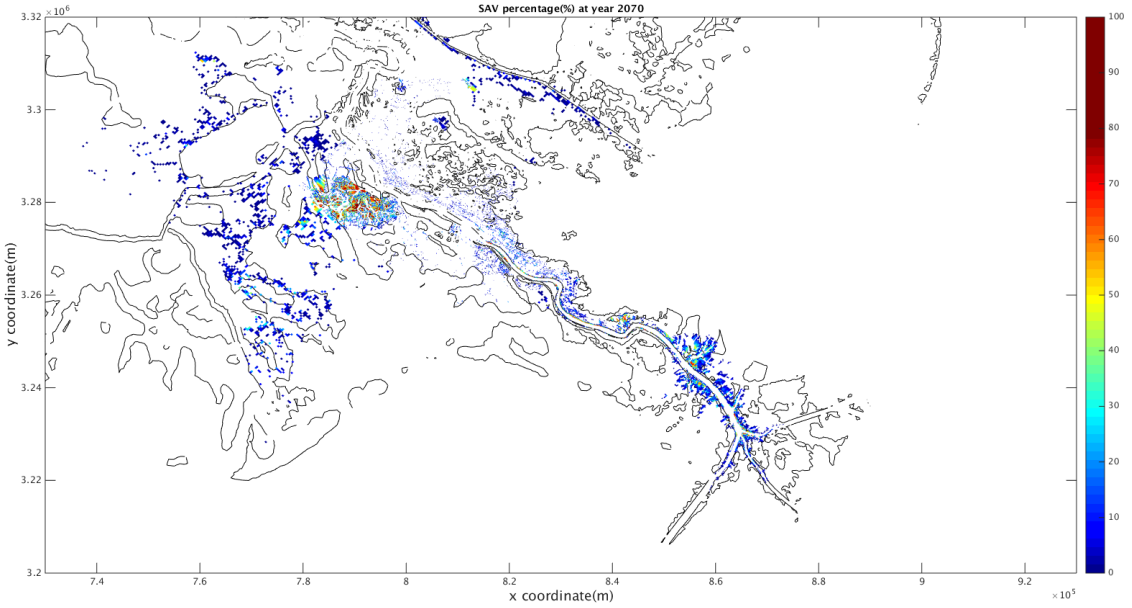
PR1
Mid-Barataria



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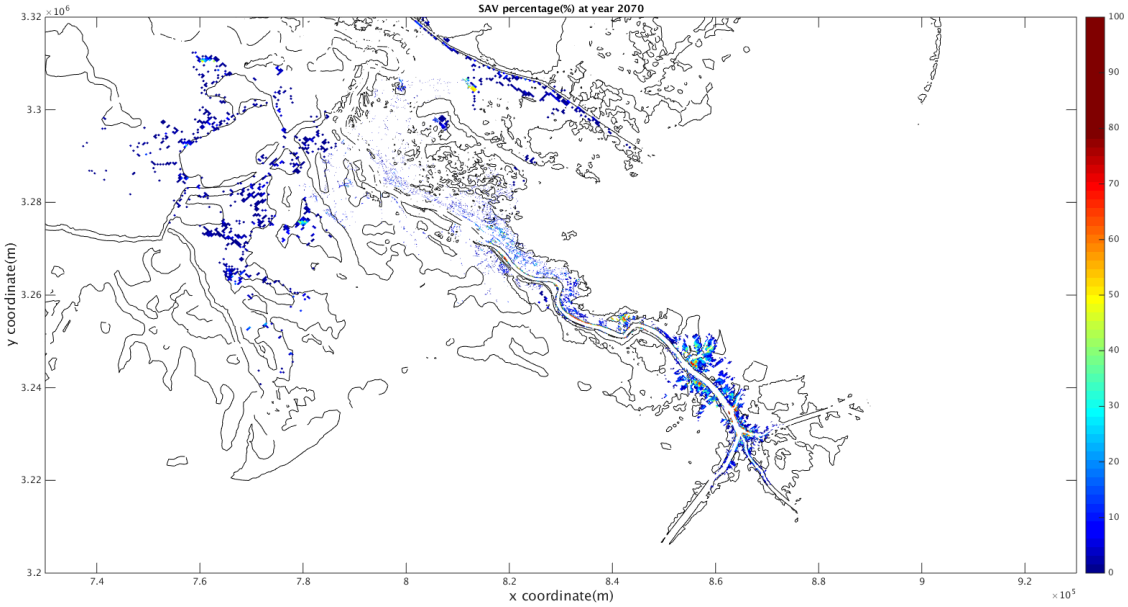
Year 50

PR2
FWOA



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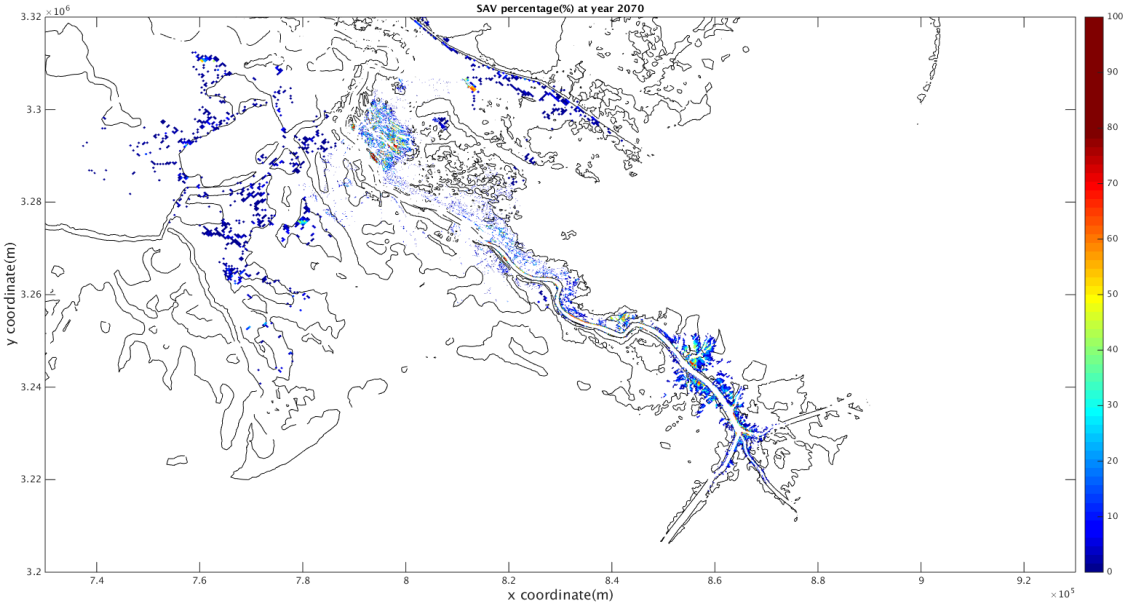
PR3
Mid-Breton



100 %

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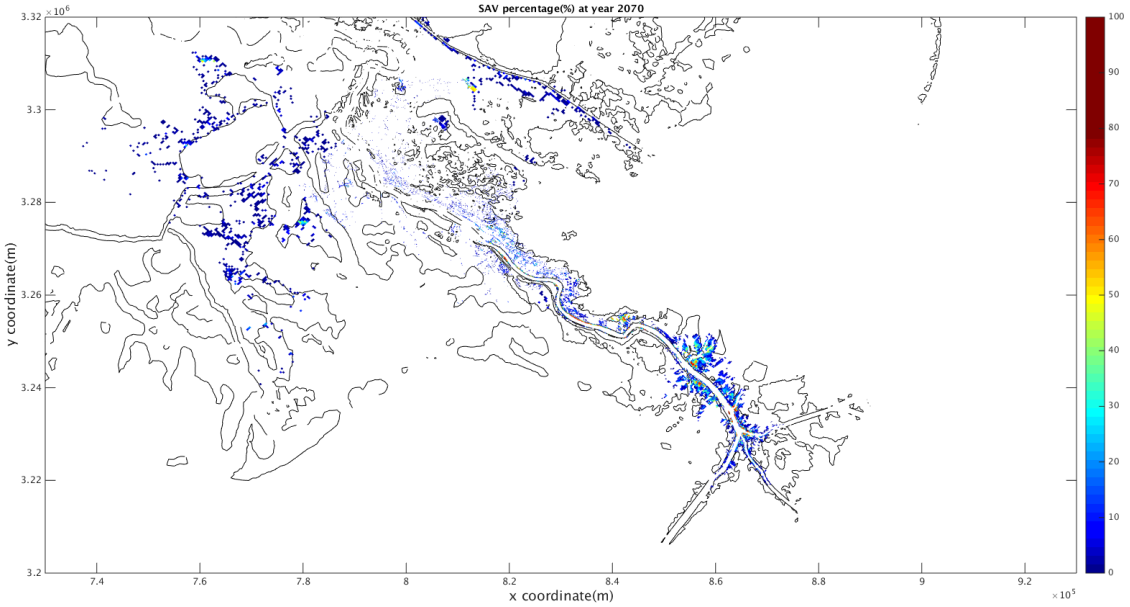
Year 50

PR2
FWOA



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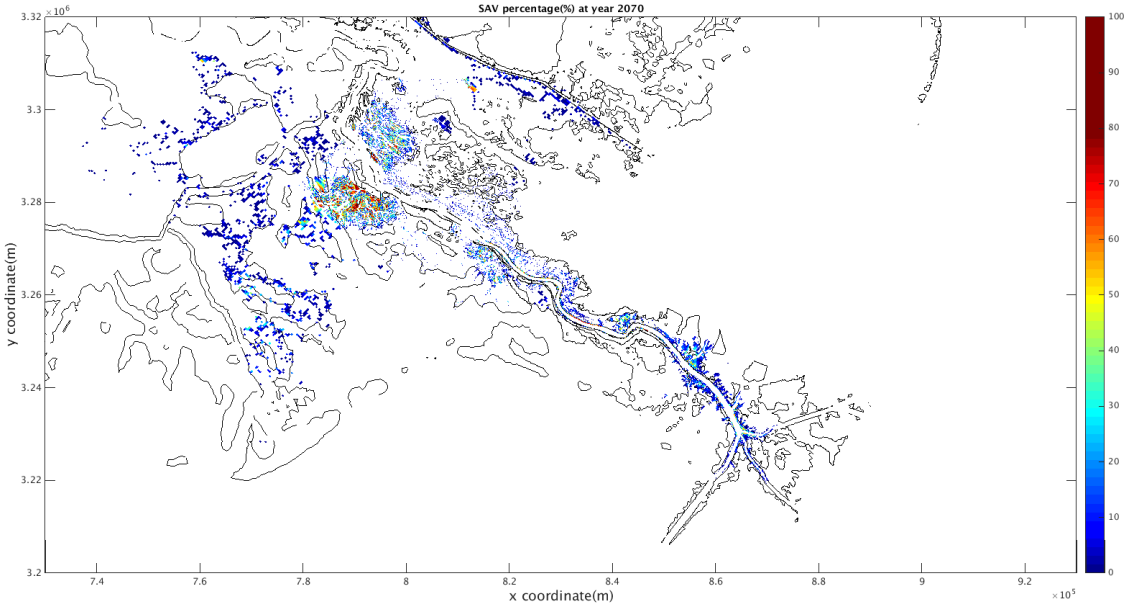
PR6
Mid & Lower
Diversions



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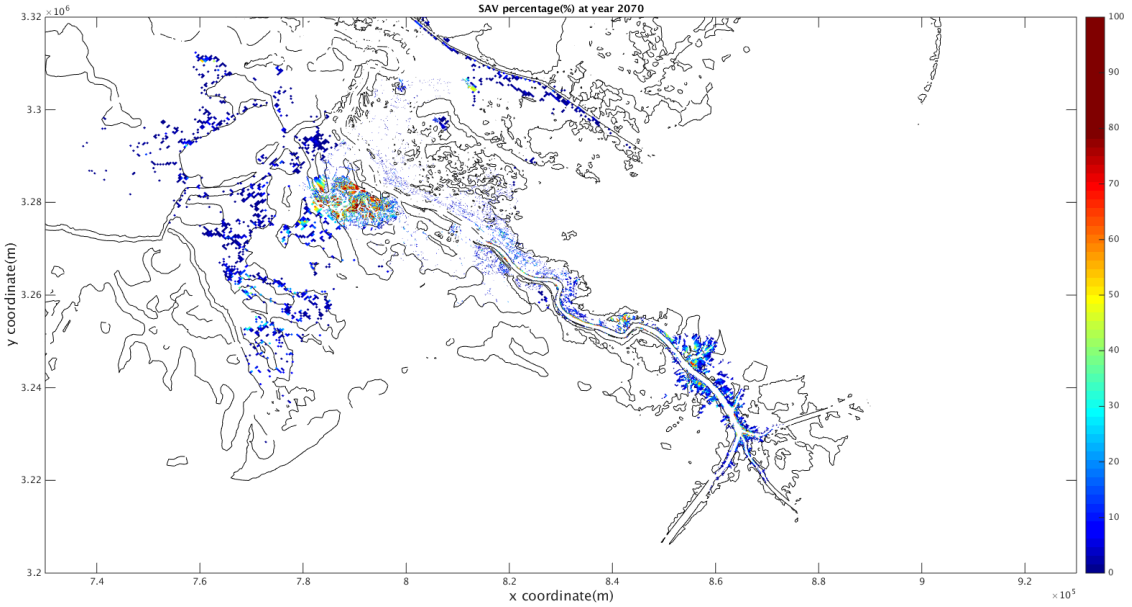
Year 50

PR1
Mid-Barataria



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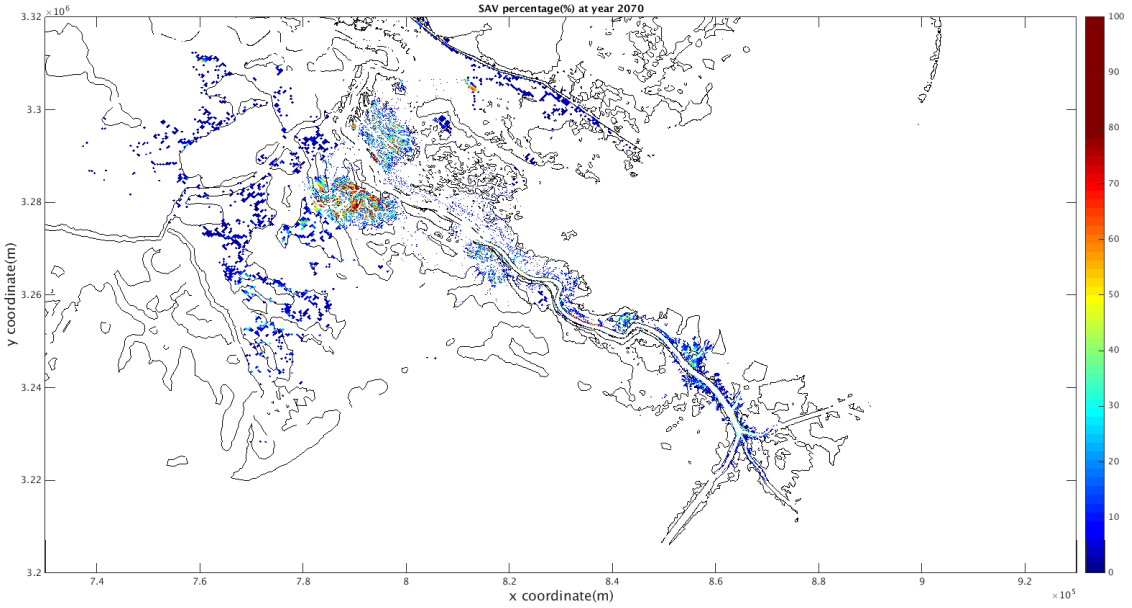
PR6
Mid & Lower
Diversions



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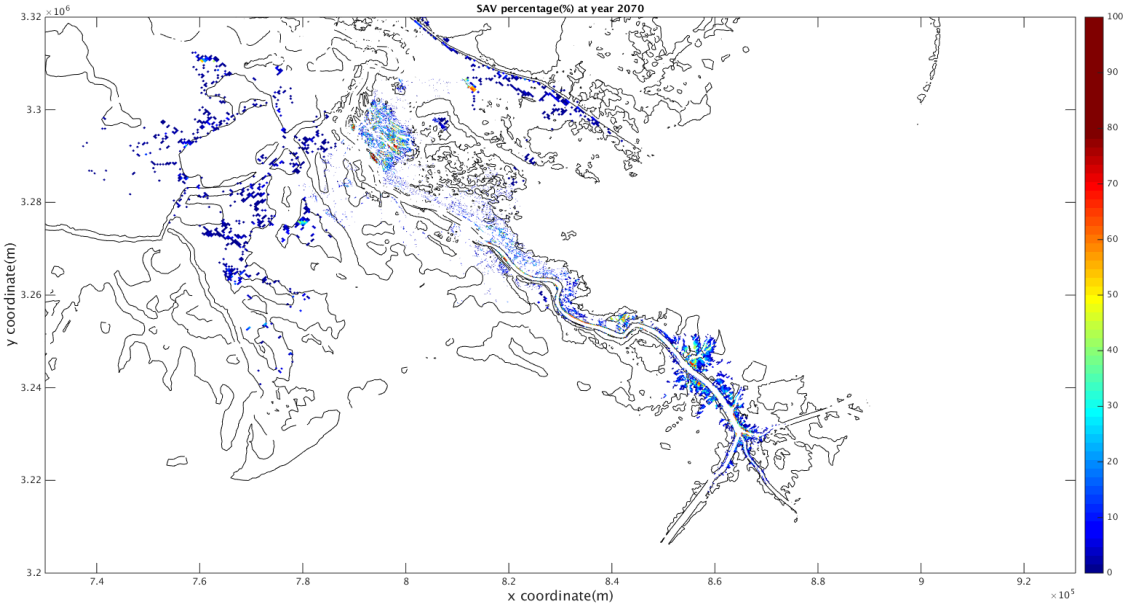
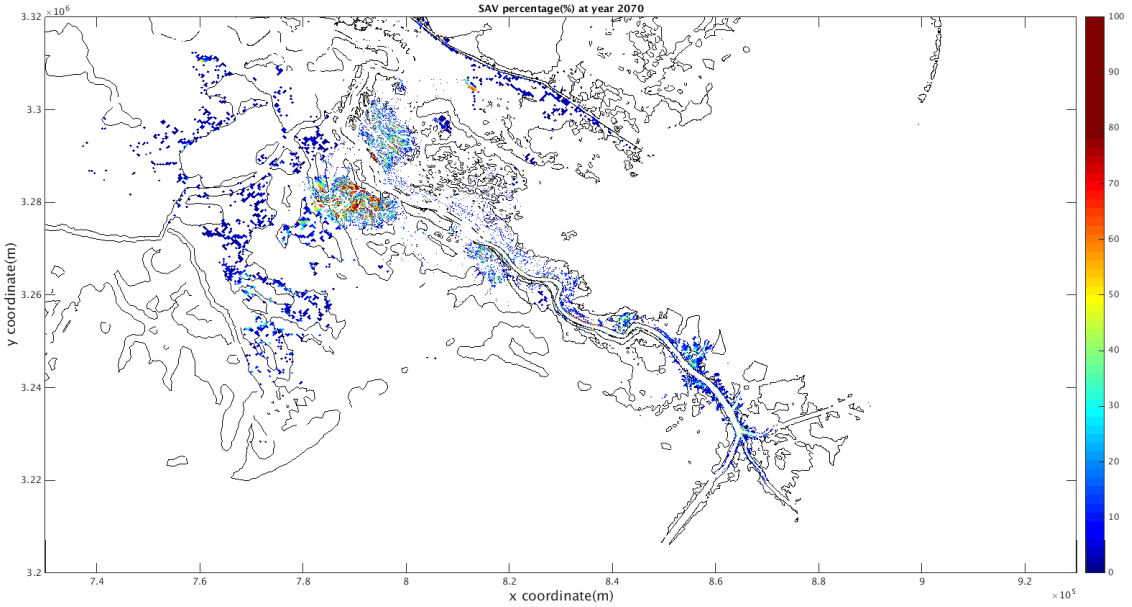
2070

PR3
Mid-Breton

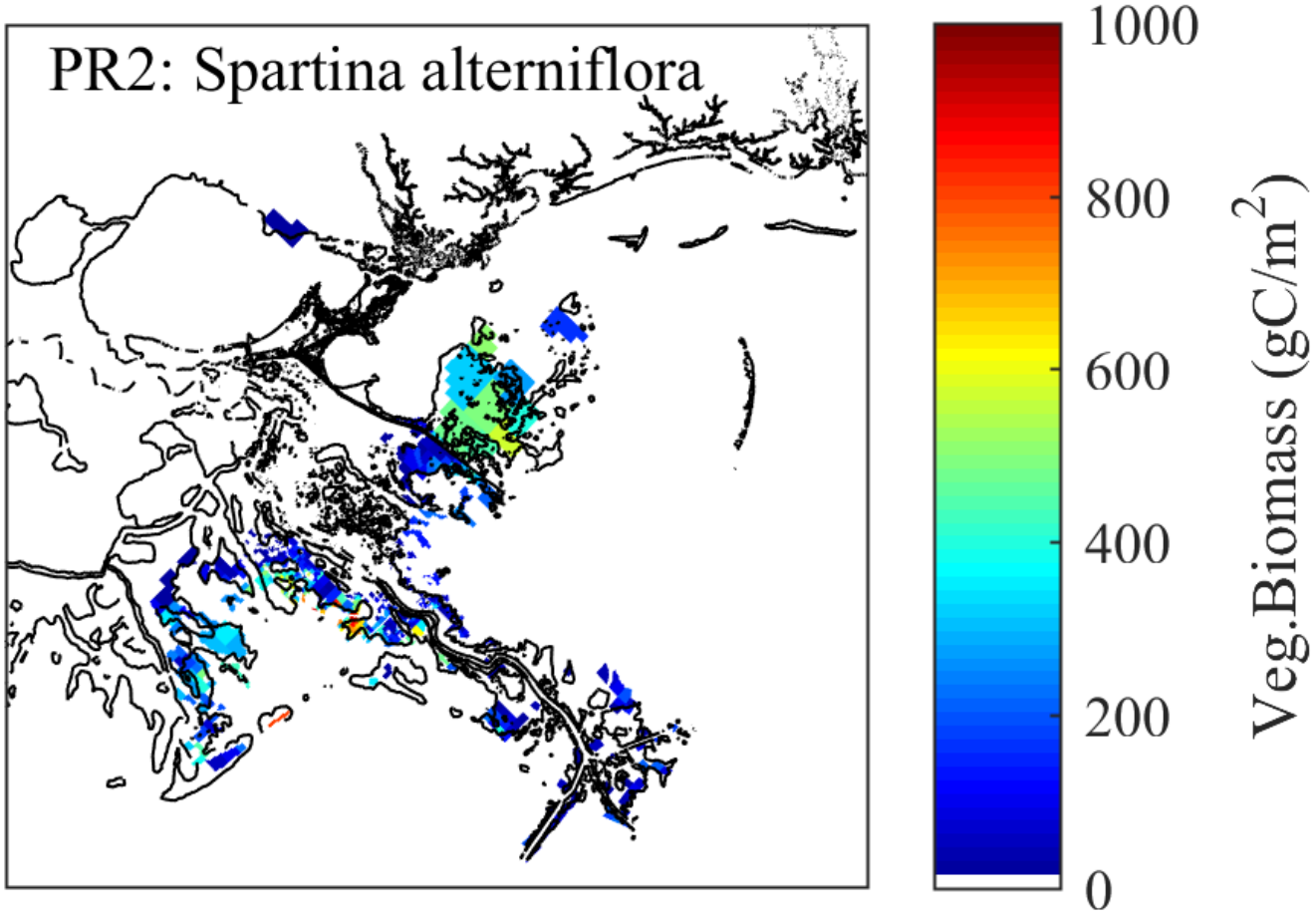


PR6
Mid & Lower Diversions



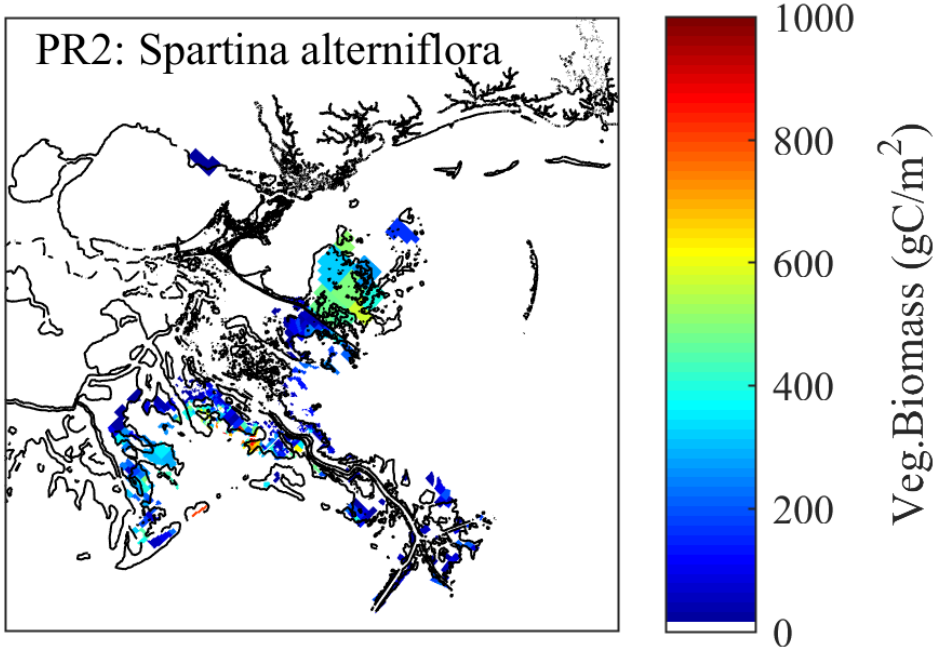
PR2 : Future Without Action
Year 50

August

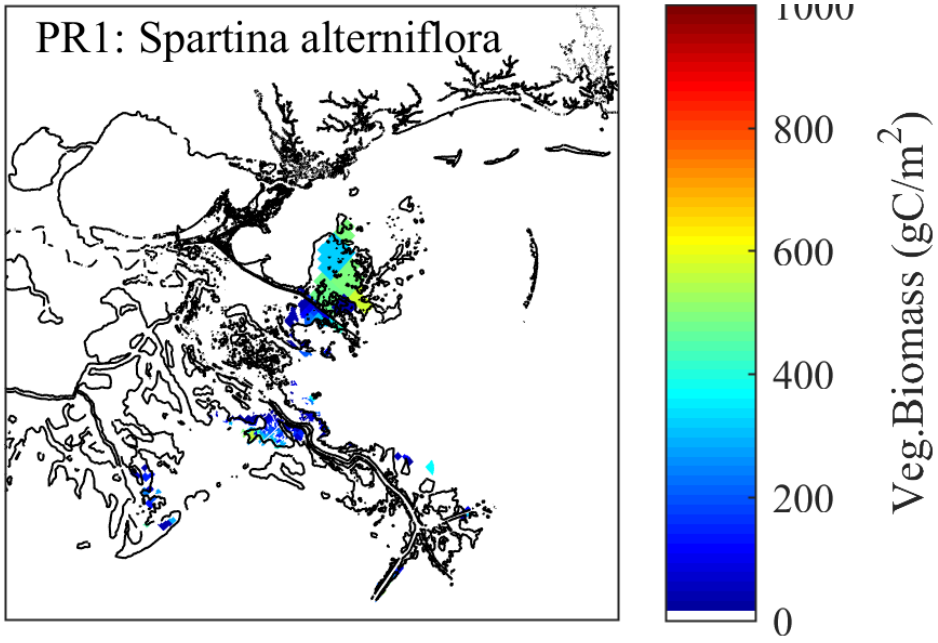


Year 50

PR2
FWOA

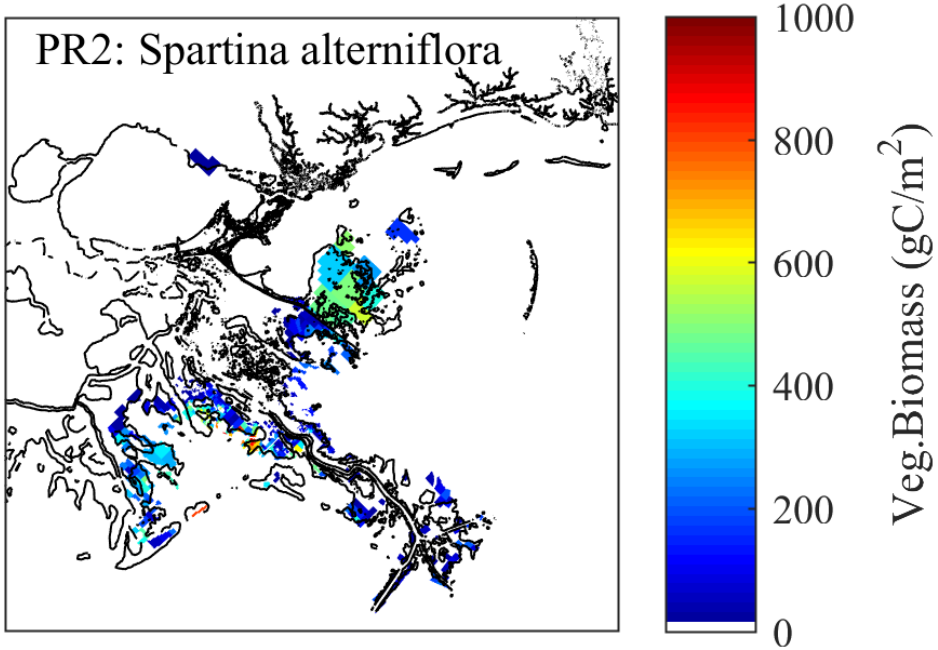


PR1
Mid-Barataria
Diversion

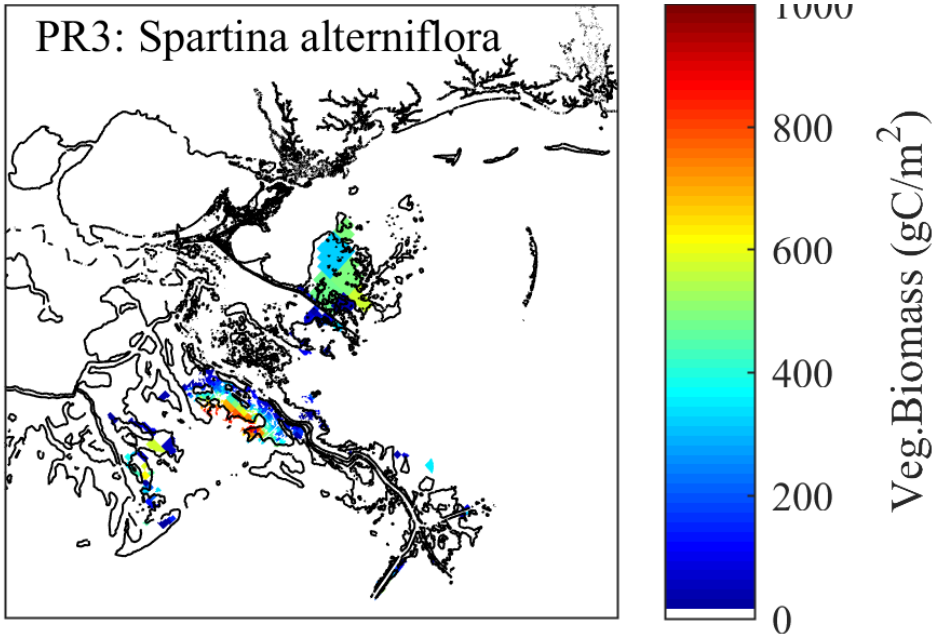


Year 50

PR2
FWOA

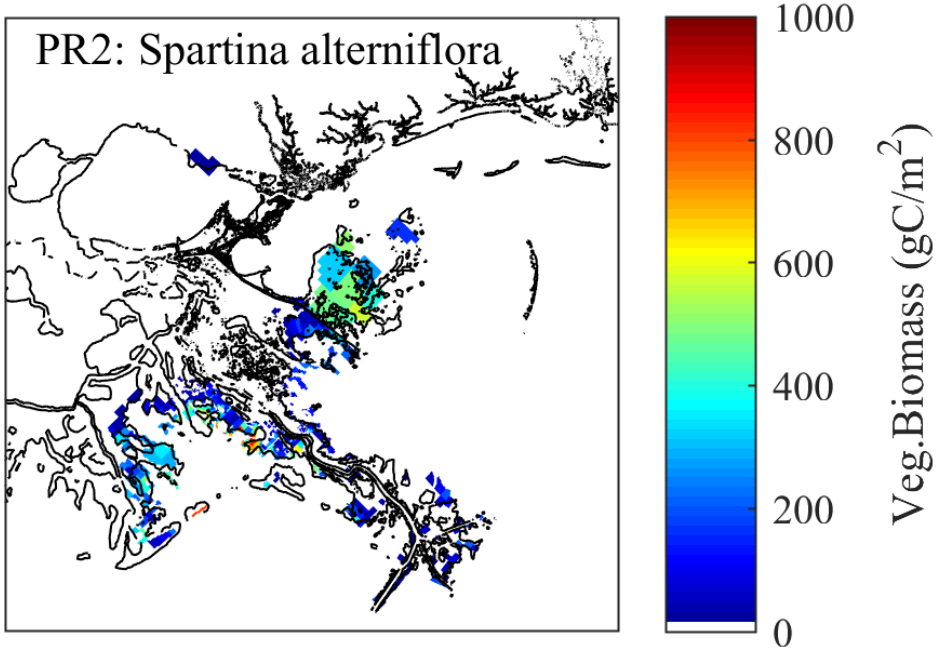


PR3
Mid-Breton
Diversion

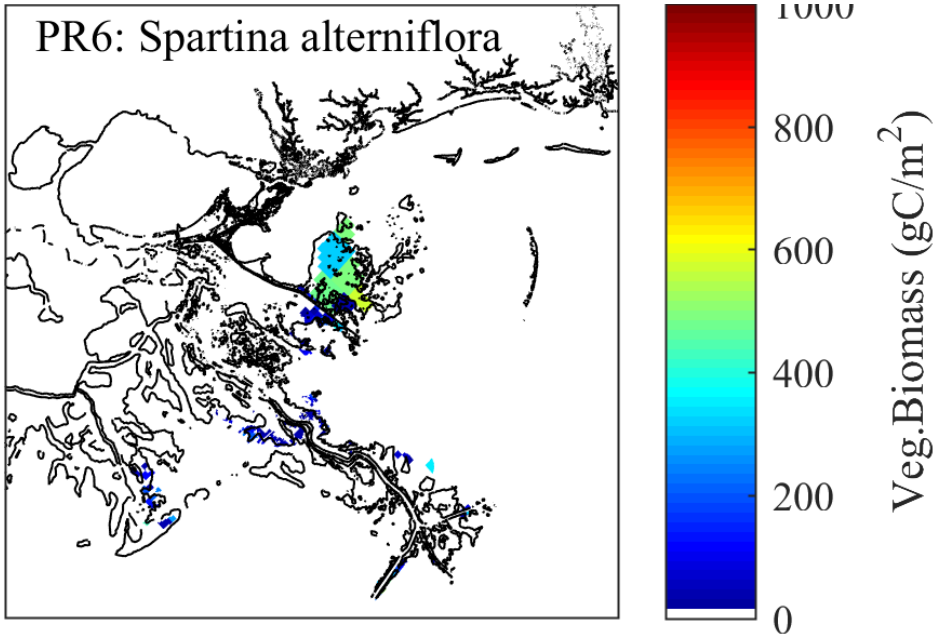


Year 50

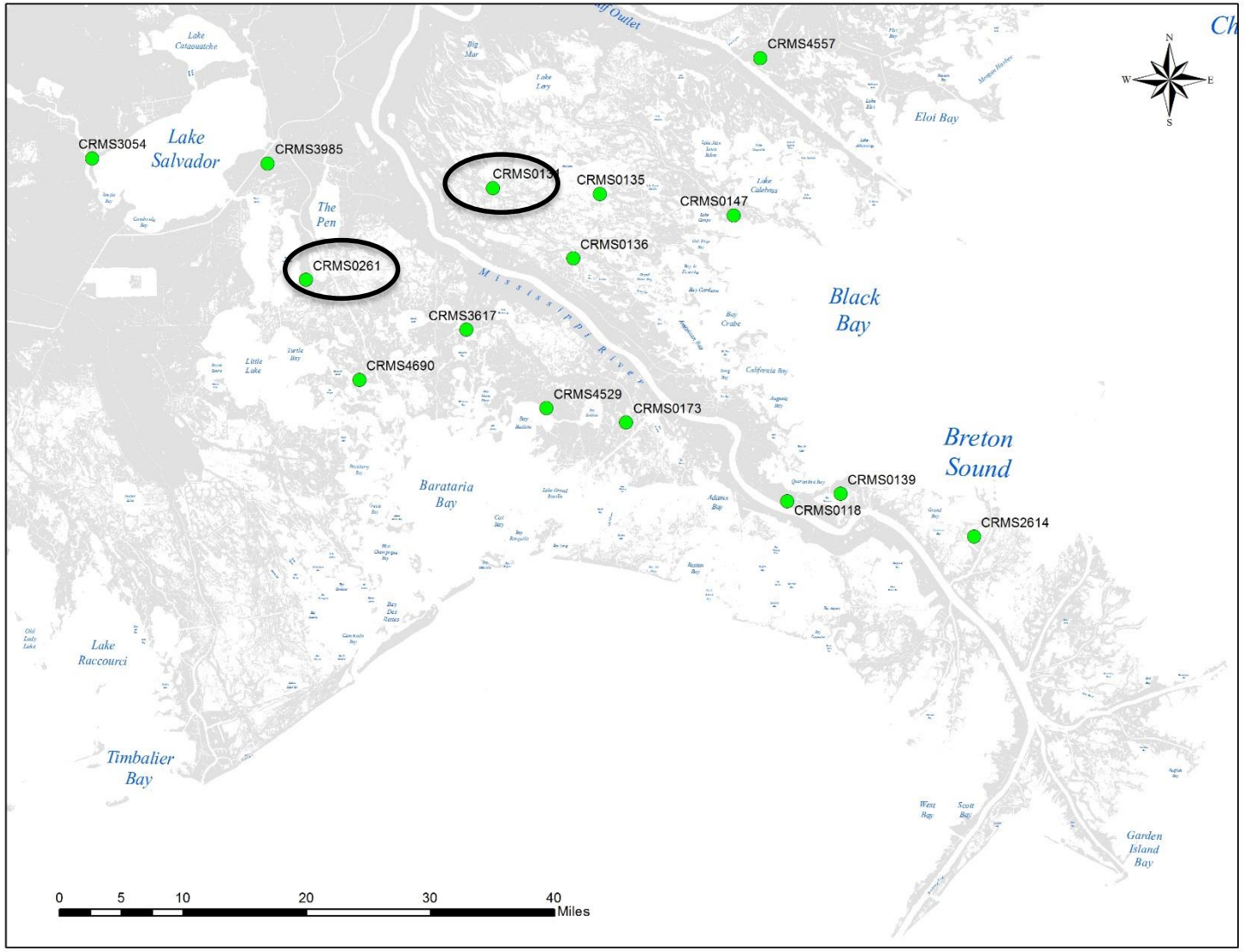
PR2
FWOA



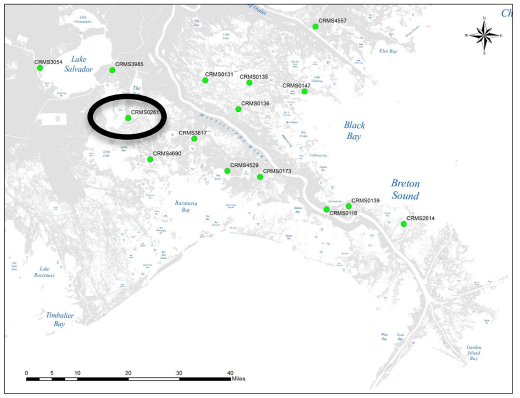
PR6
Mid & Lower
Diversions

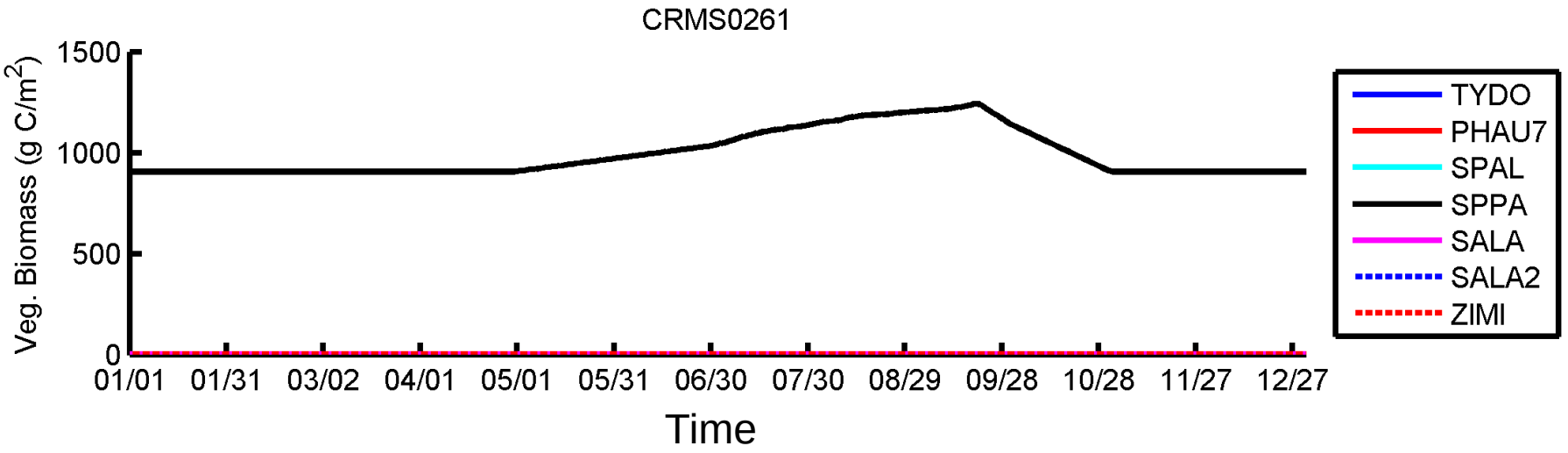


Map of CRMS Sites

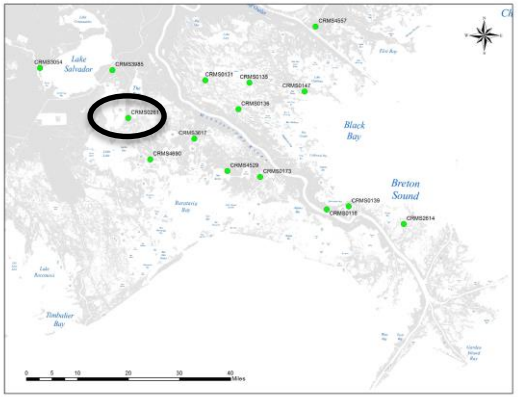


PR2 : Future Without Action
Year 50
August

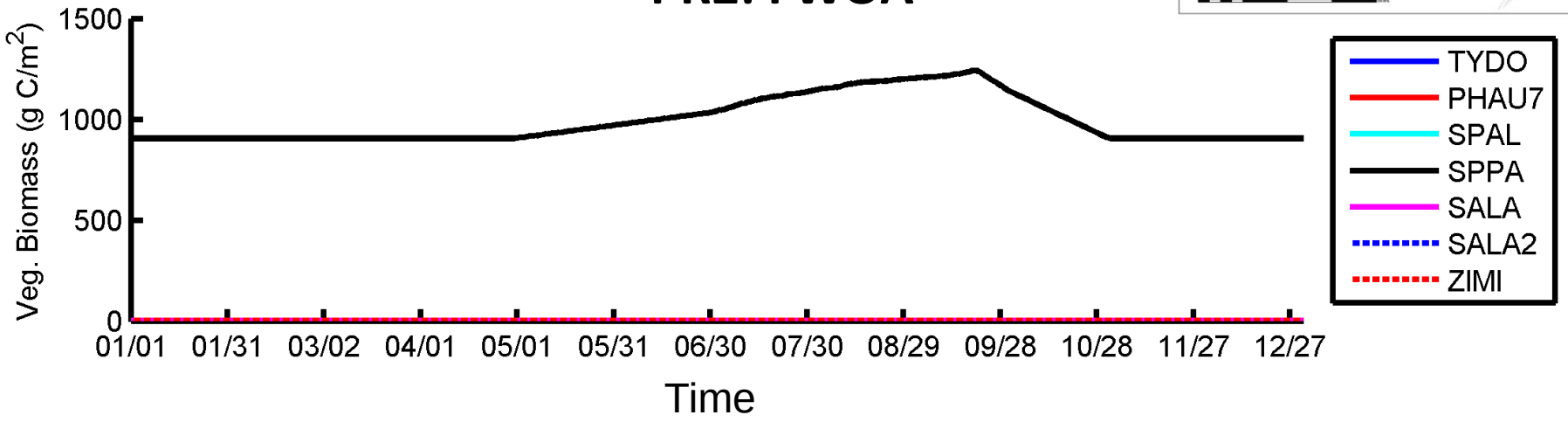




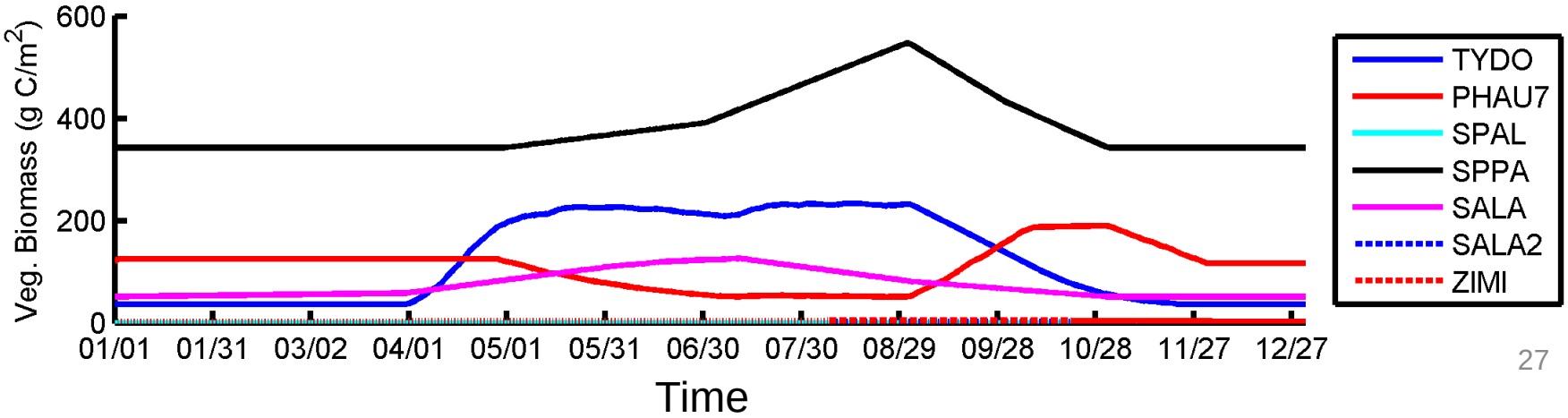
Location: CRMS0261
Year: 50
Month: August



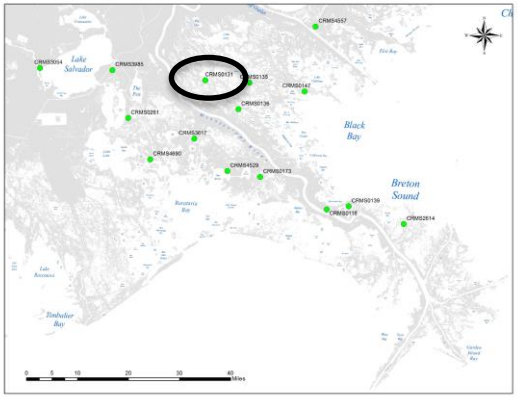
PR2: FWOA



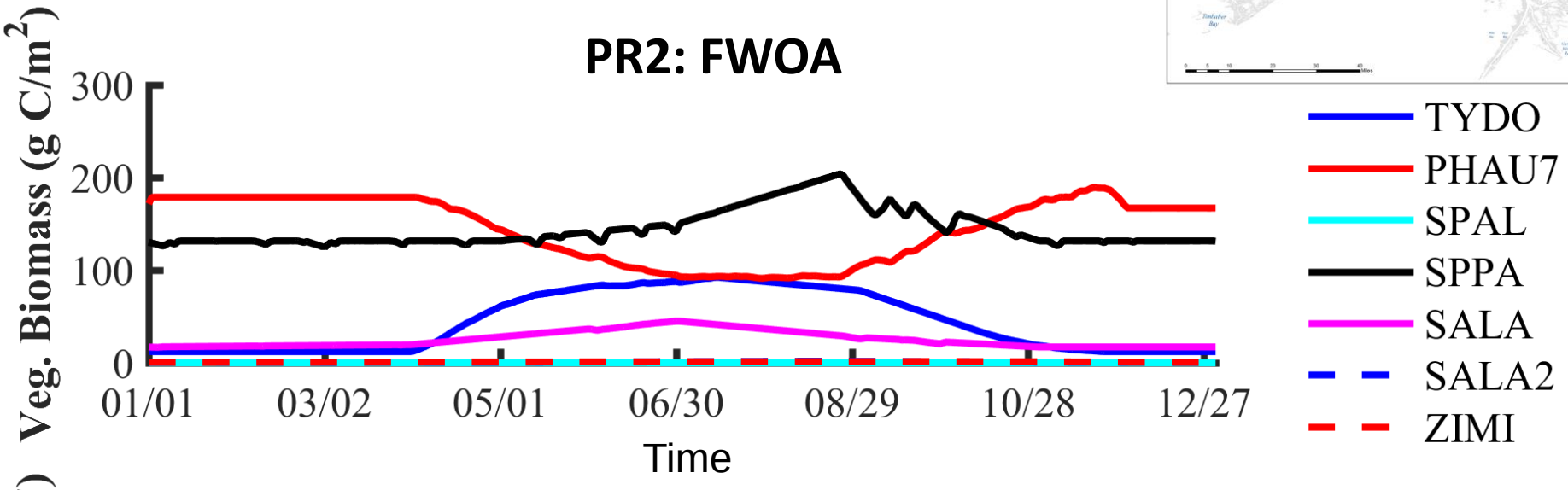
PR1: Mid-Barataria Diversion



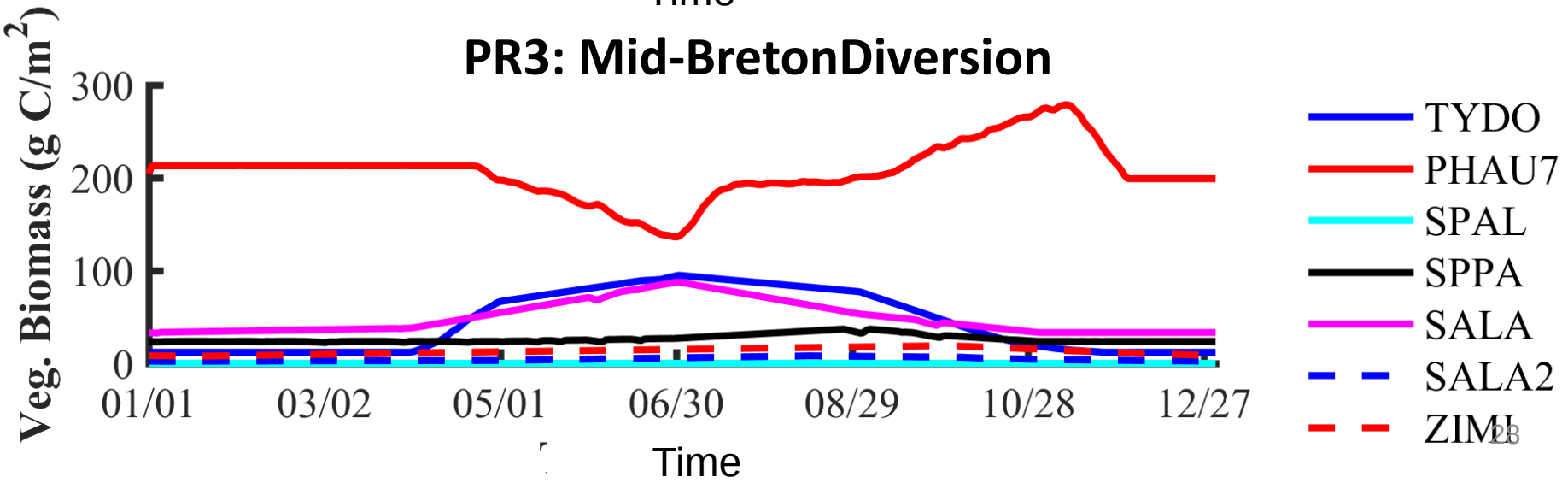
Location: CRMS0131
Year: 50
Month: August



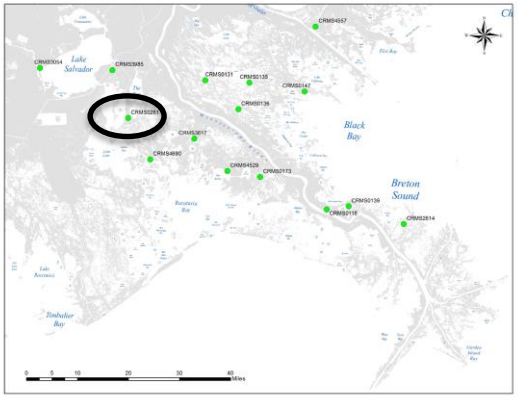
PR2: FWOA



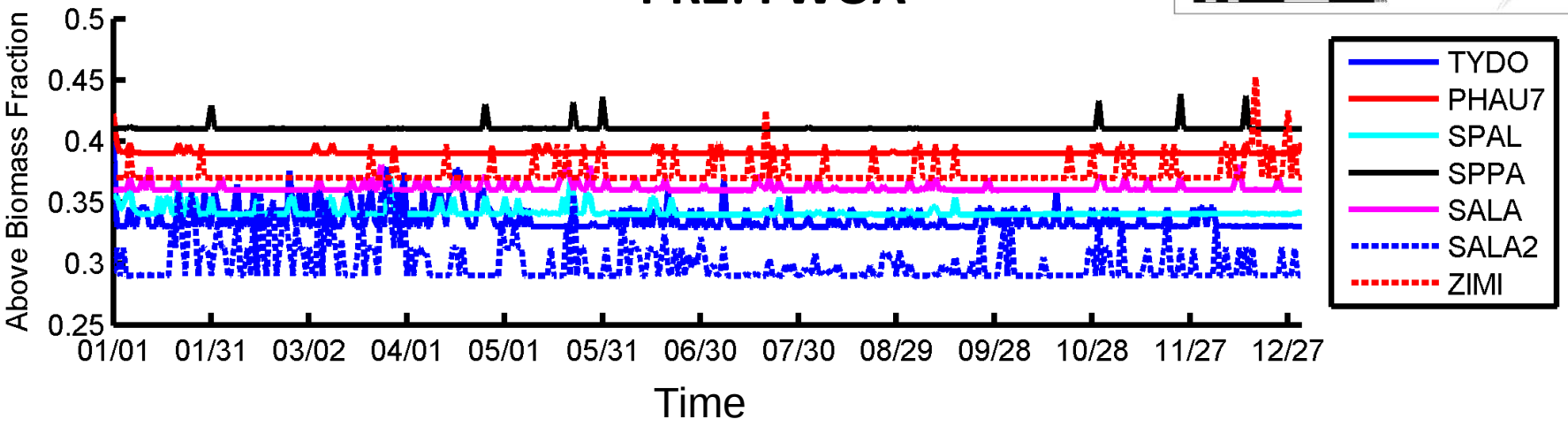
PR3: Mid-BretonDiversion



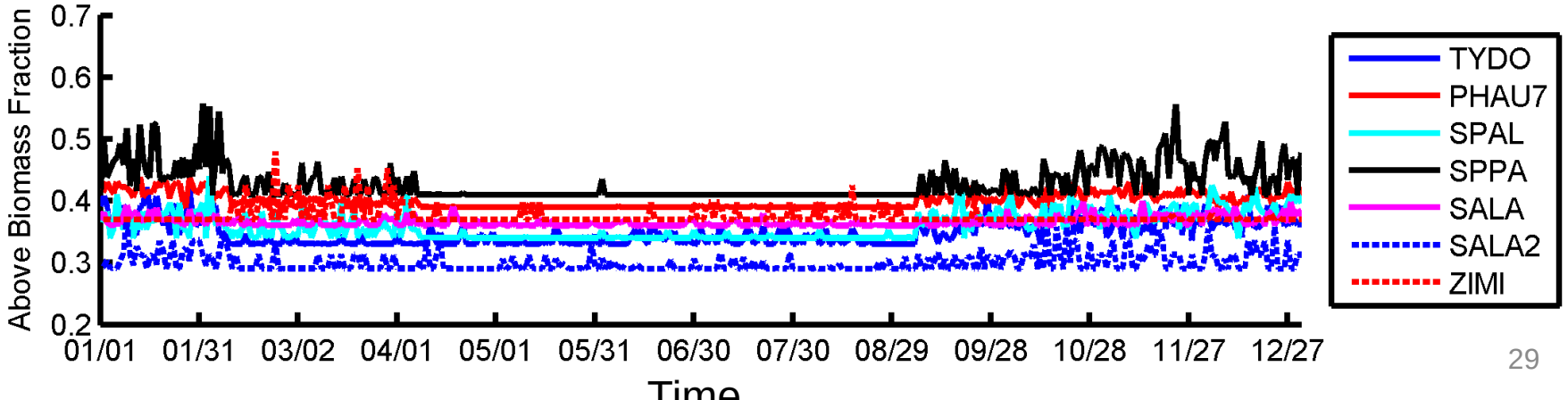
Location: CRMS0261
Year: 2070
Month: August



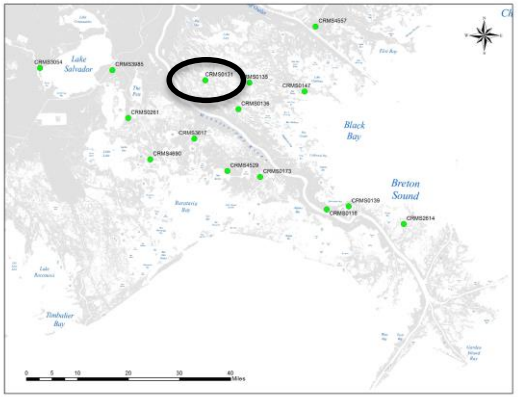
PR2: FWOA



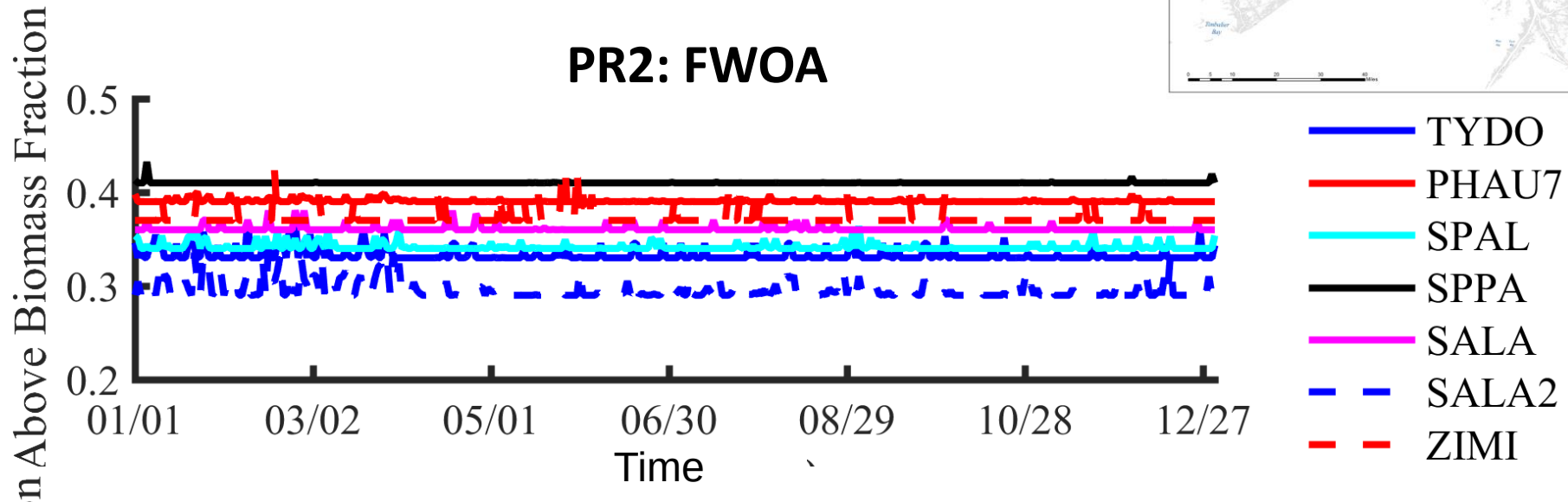
PR1: Mid-Barataria Diversion



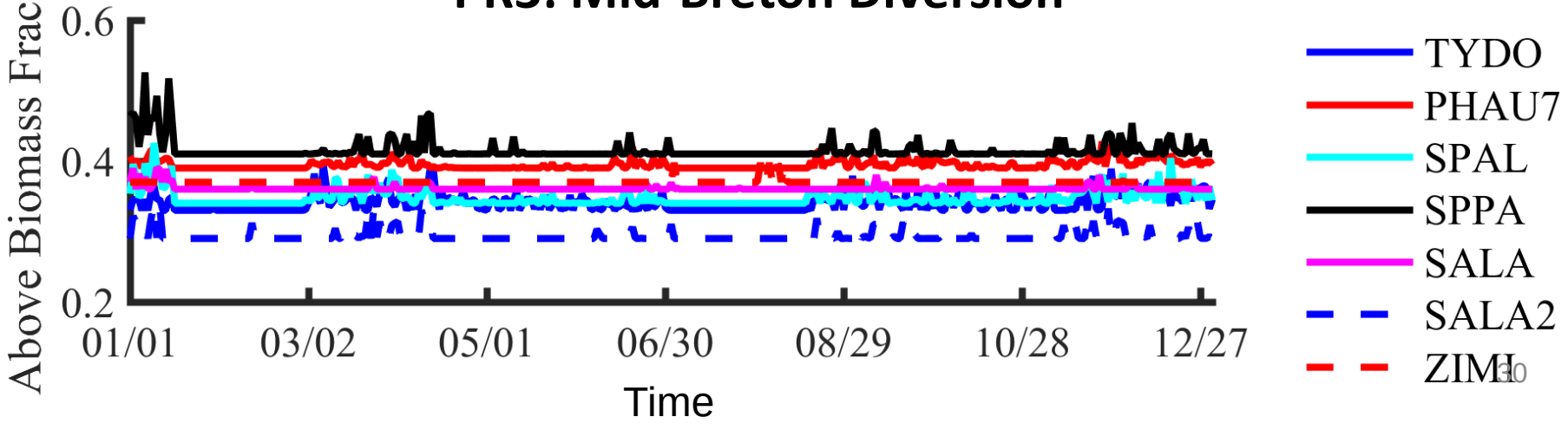
Location: CRMS0131
Year: 50
Month: August



PR2: FWOA



PR3: Mid-Breton Diversion

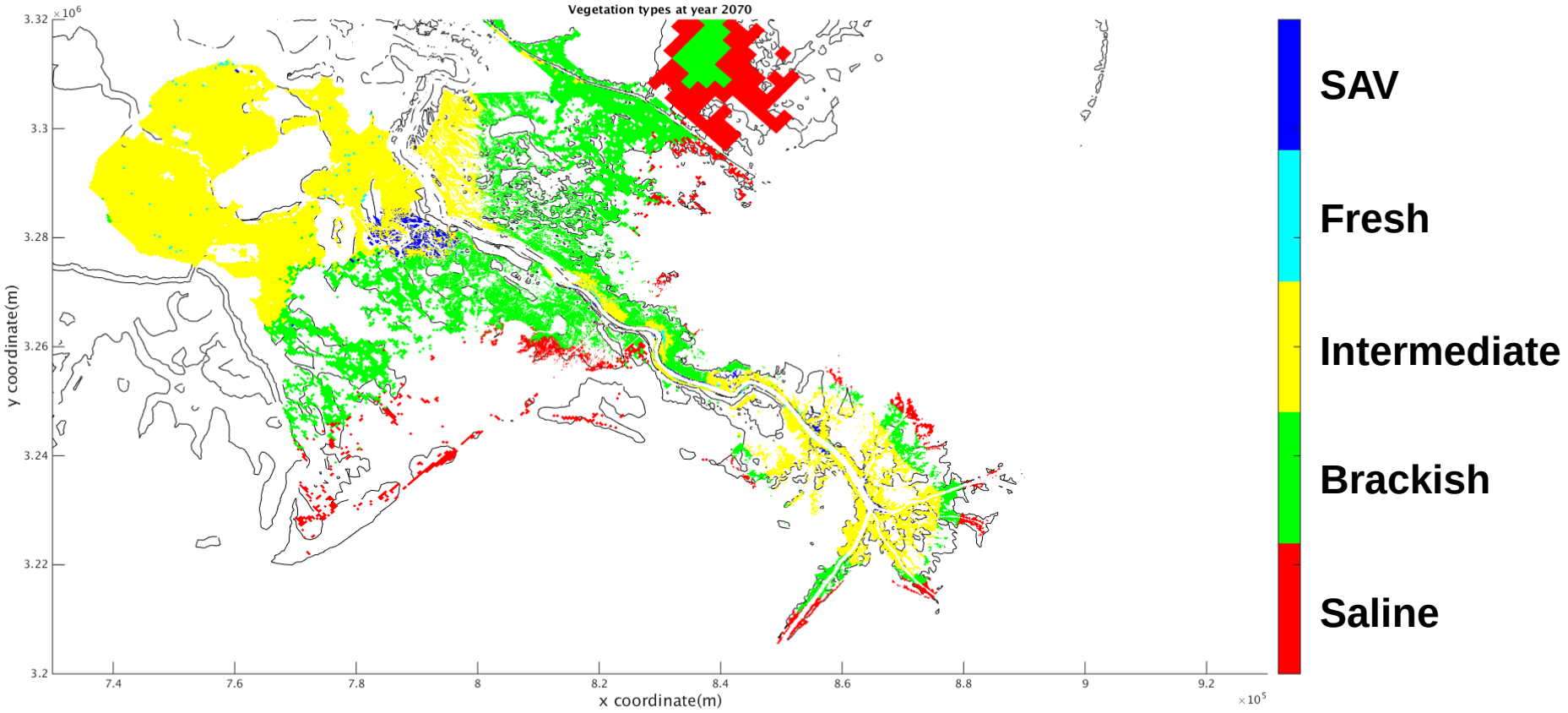


Conclusions

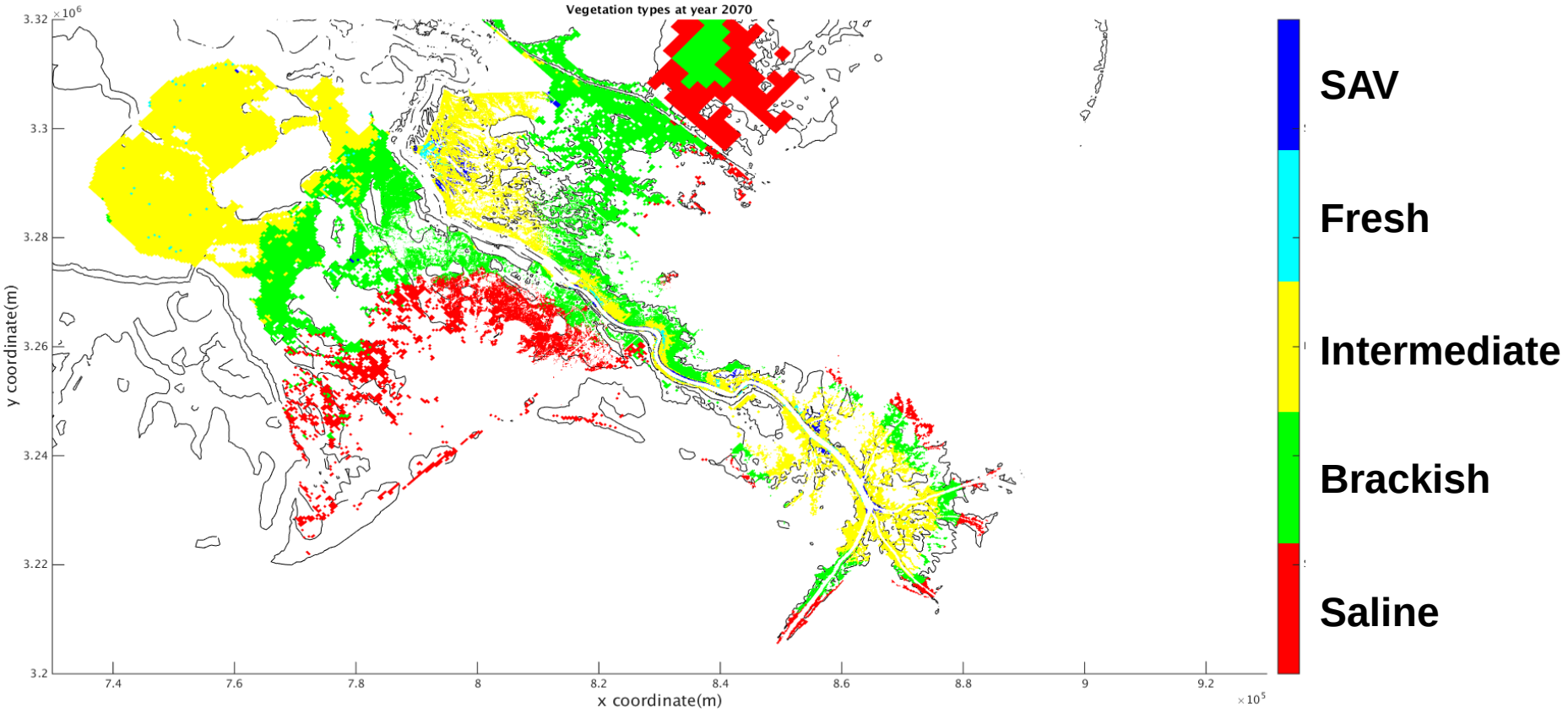
- Mid-Barataria diversion shift species composition toward fresher species
- Mid-Barataria diversion increase species richness
- Mid-Breton diversion shifts species composition toward fresher species
- Mid-Breton diversion does not change richness

Questions

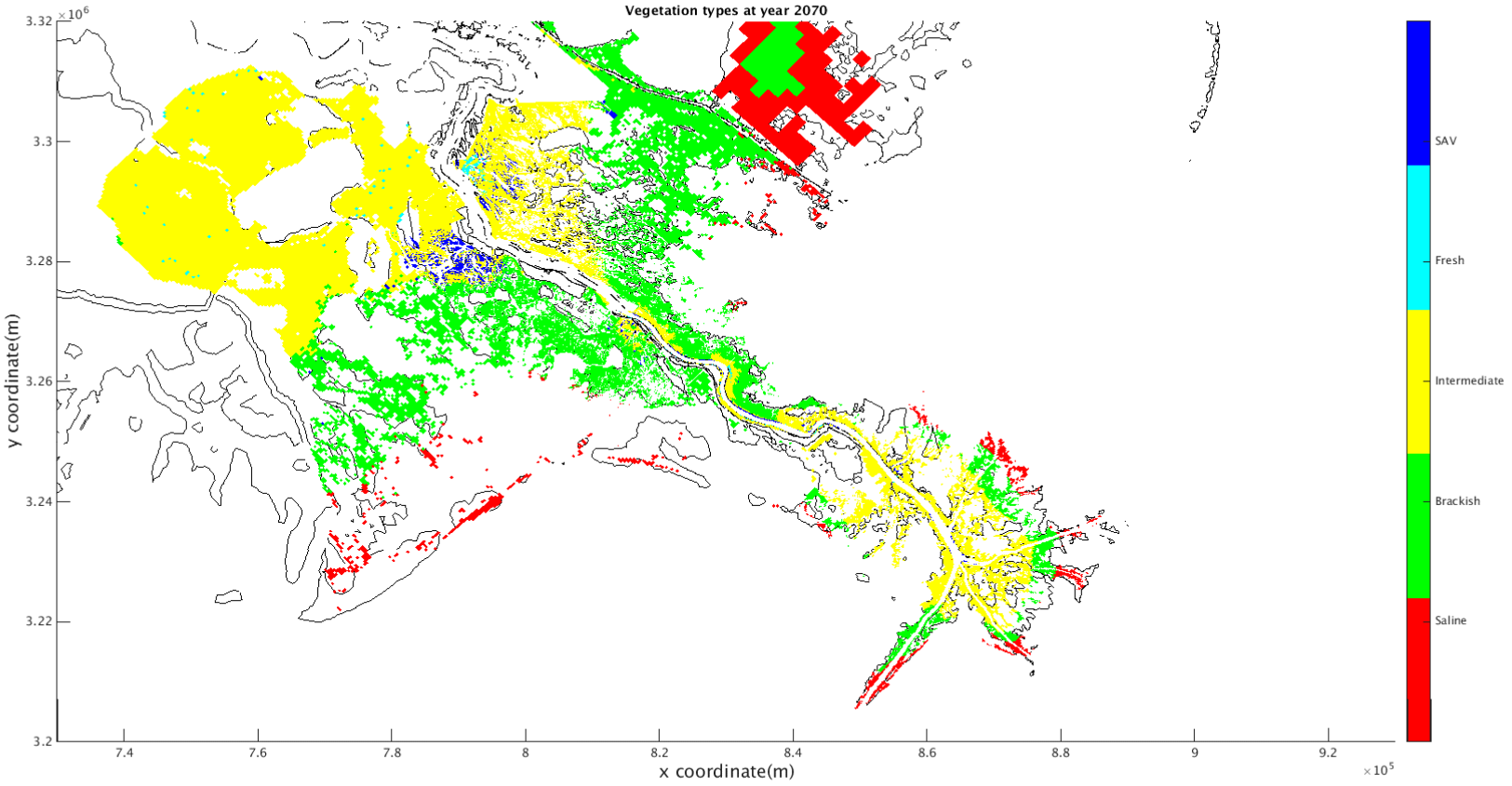
PR1 : Mid-Baritaria Diversion
Year 50



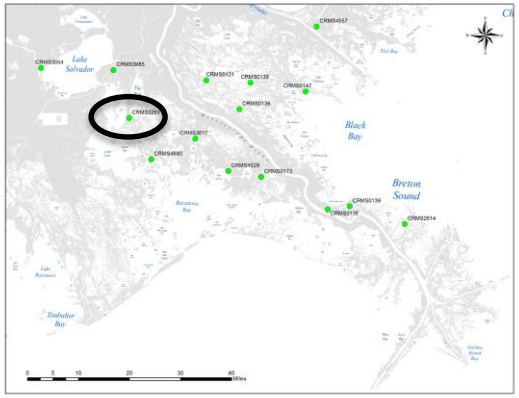
PR3 : Mid-Breton Sound Diversion
Year 50

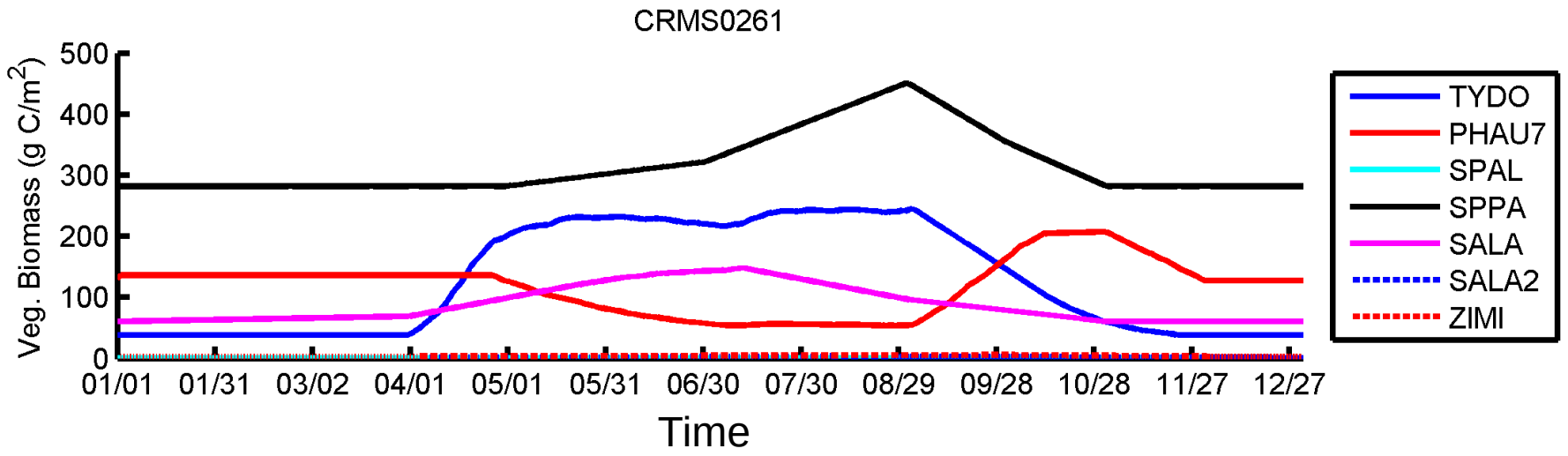


PR6: Mid & Lower Diversions 2070

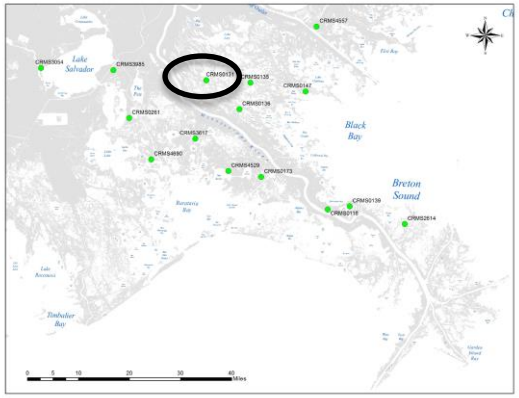


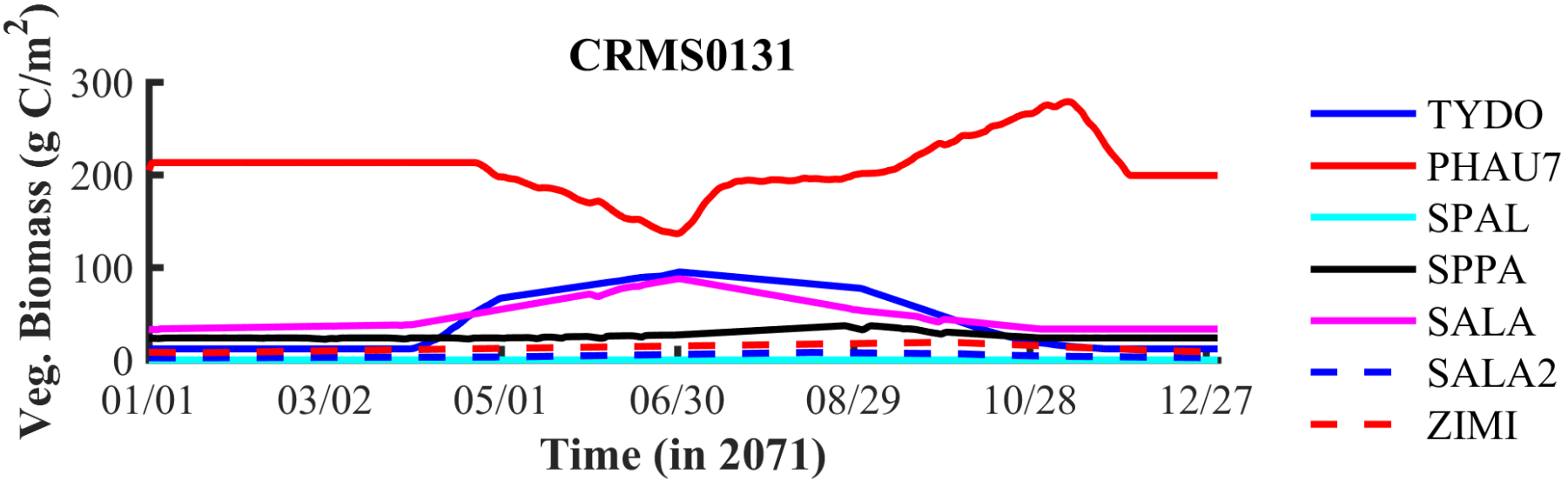
PR6 : Mid & Lower Diversions
Year 50



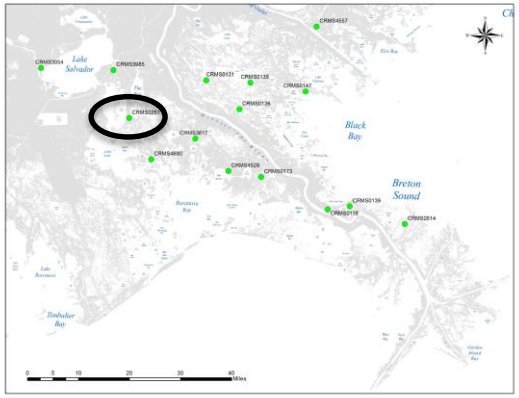


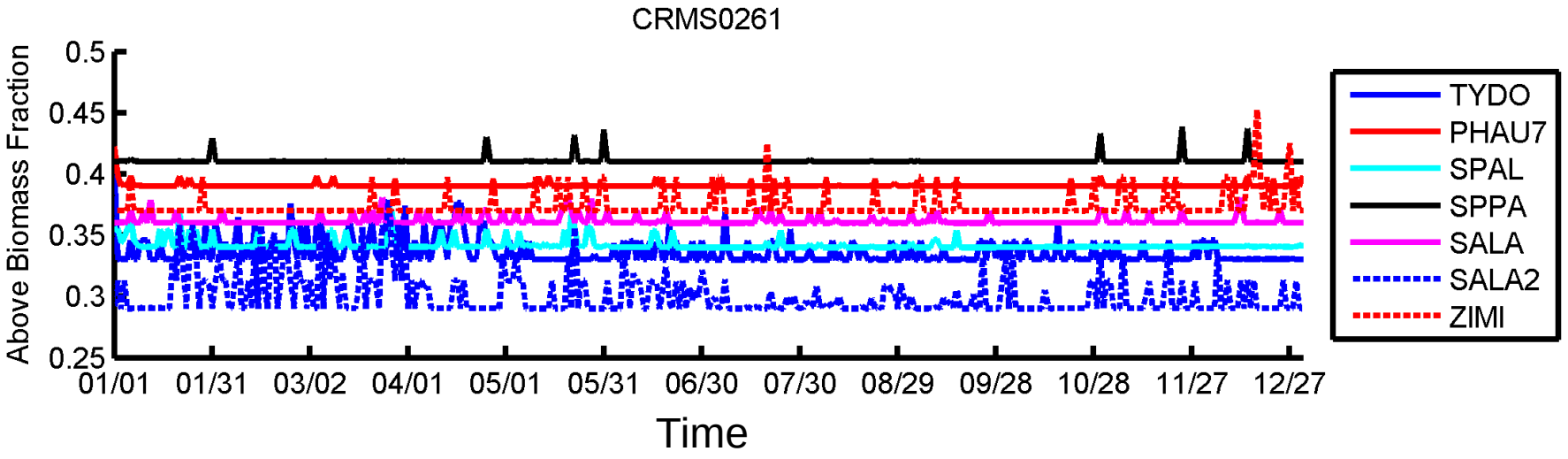
PR3 : Mid-Breton Diversion 2070



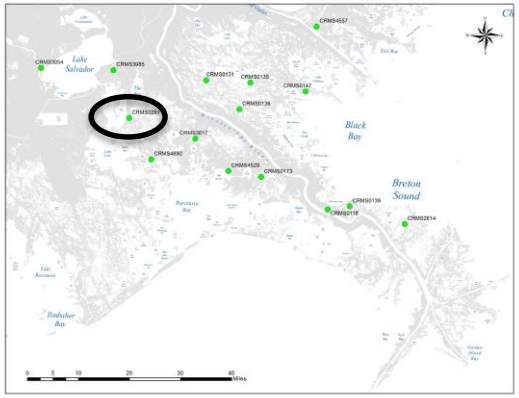


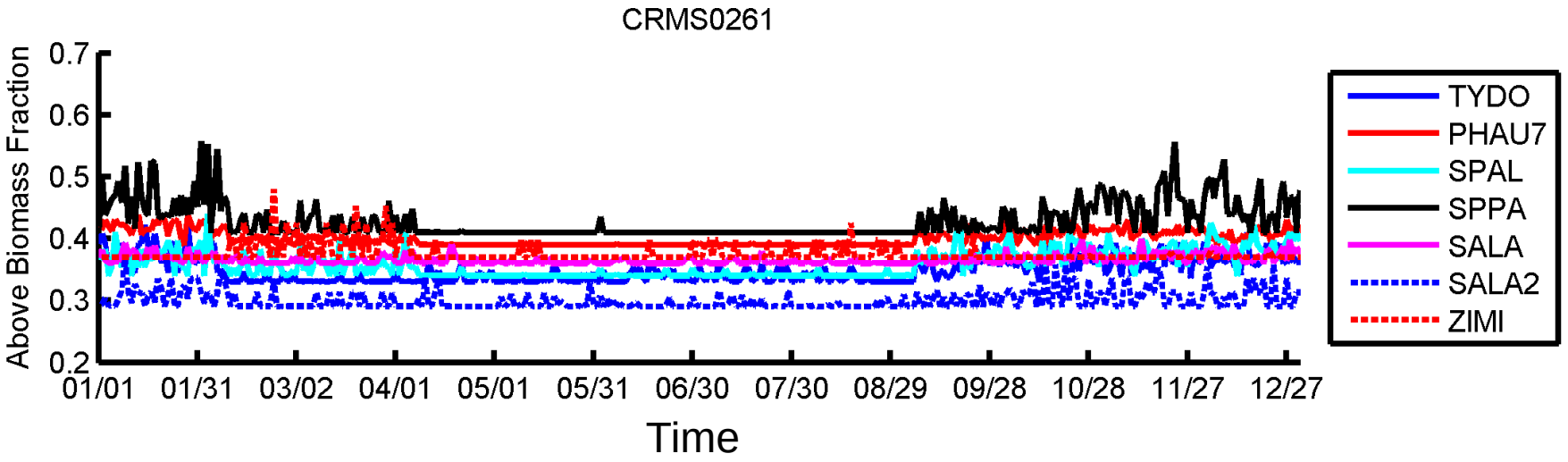
PR2 : Future Without Action
Year 50



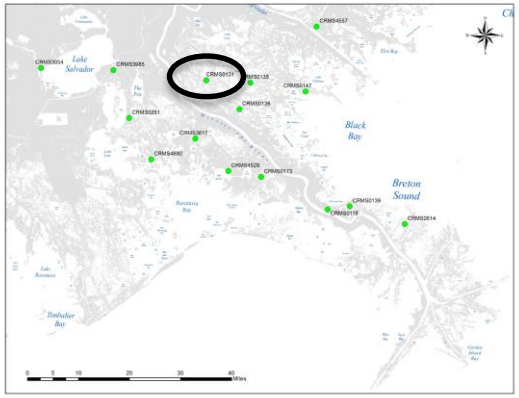


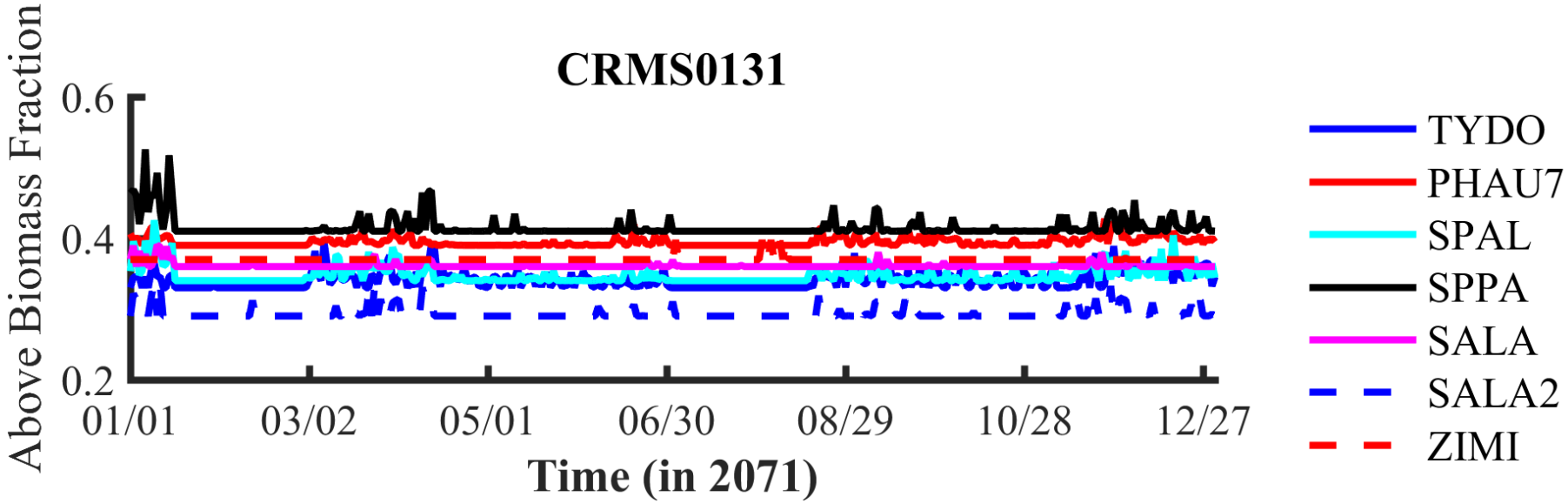
PR1 : Mid-Baratria Diversion
2070





PR3 : Mid-Breton Diversion
Year 50





PR6: Mid & Lower Diversions
2070