

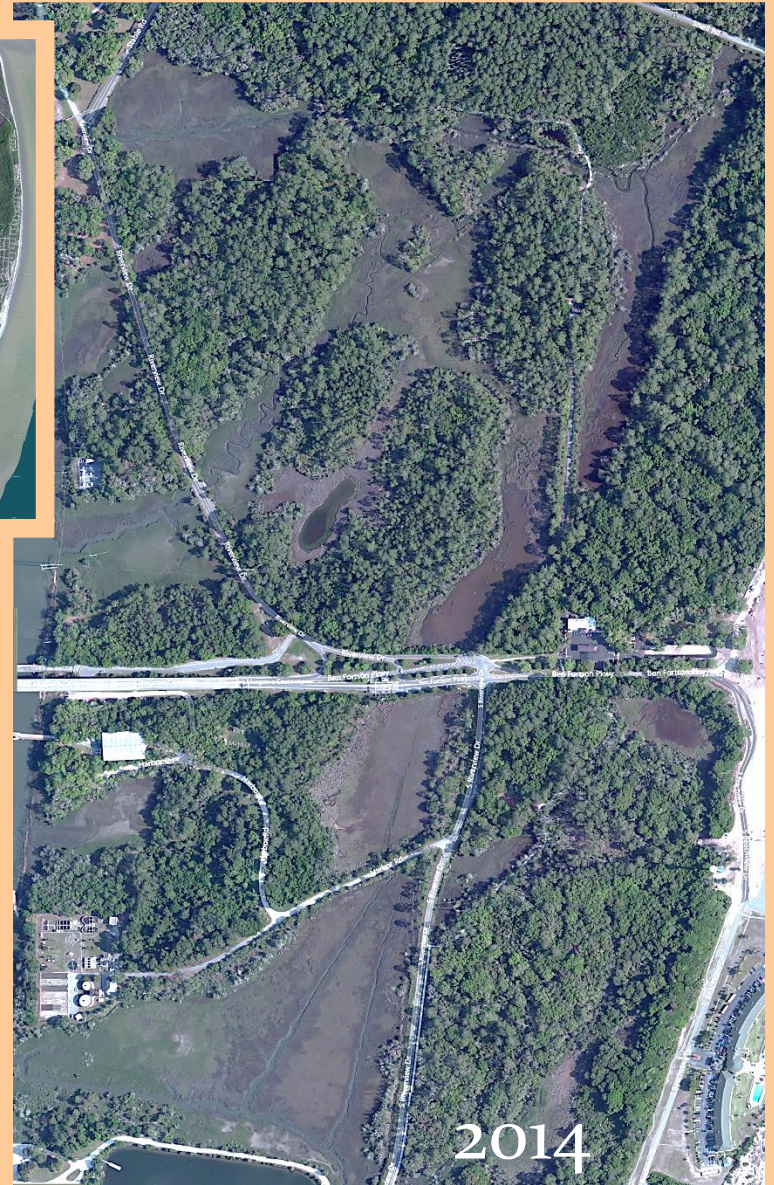
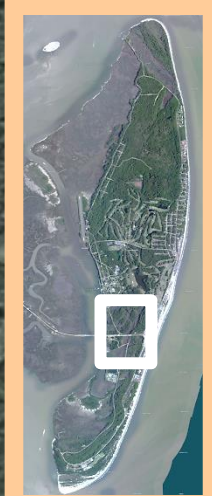
Jekyll Island marsh fragments: Assessing ecological function and health for restoration planning



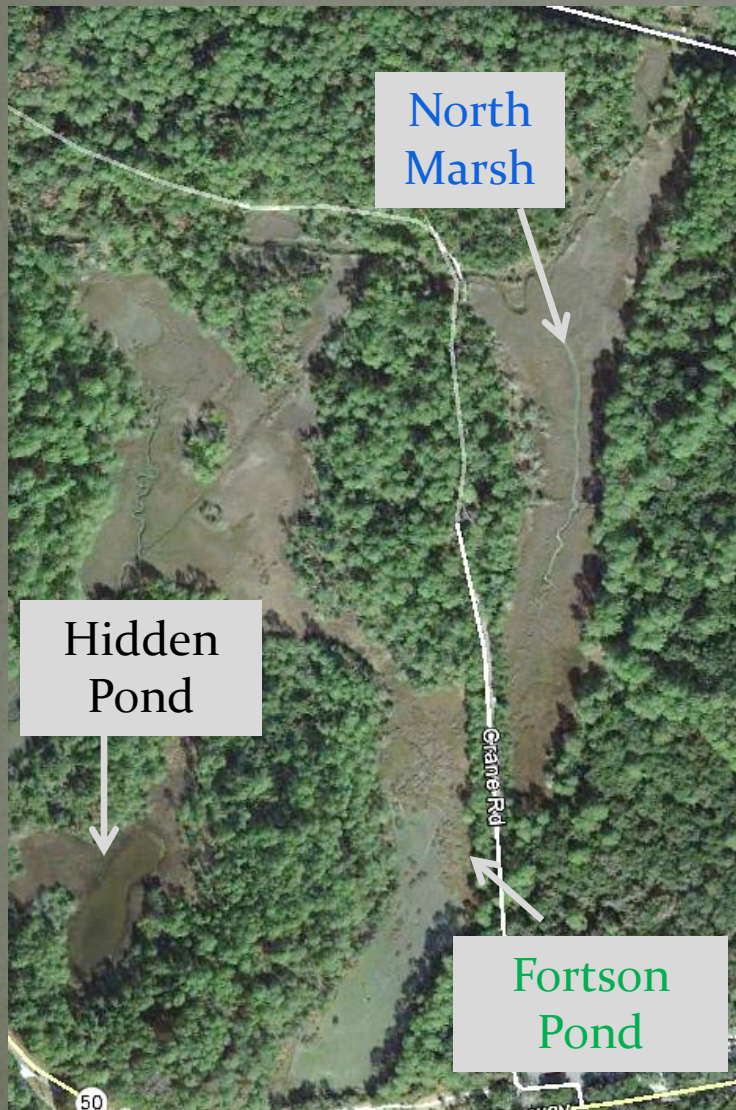
Site Overview and History



Site Overview



Study Fragments and Reference Ponds



Fortson Pond (a.k.a problem pond)

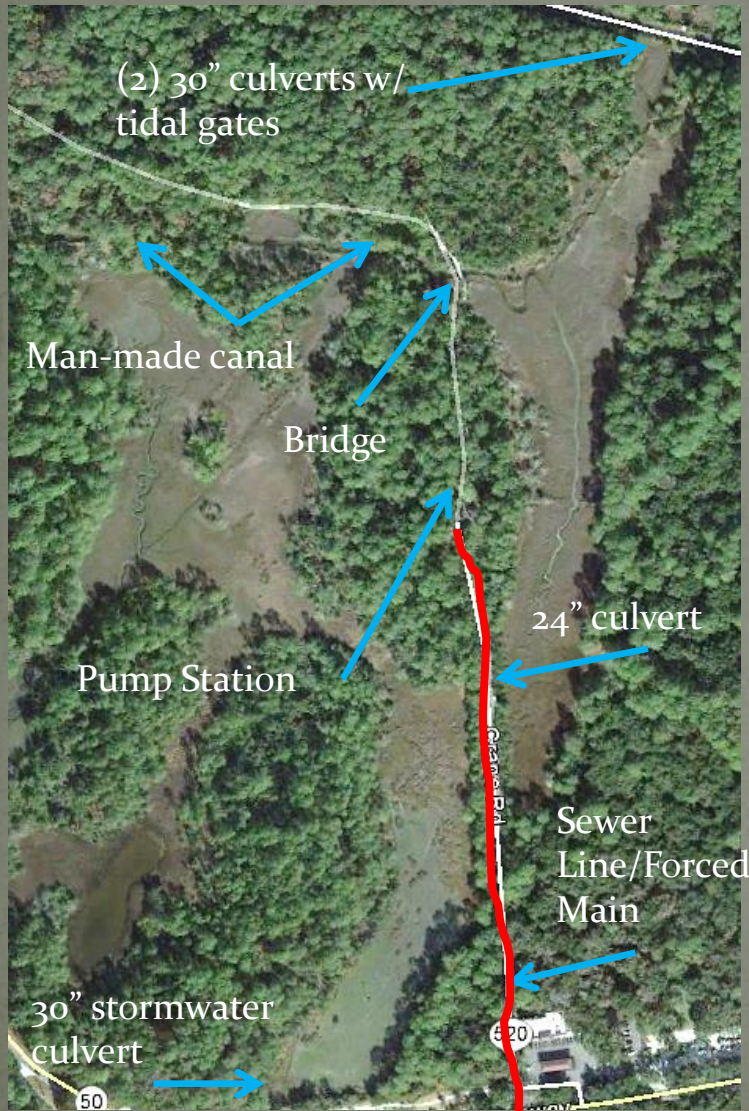


Fortson Pond Time Lapse

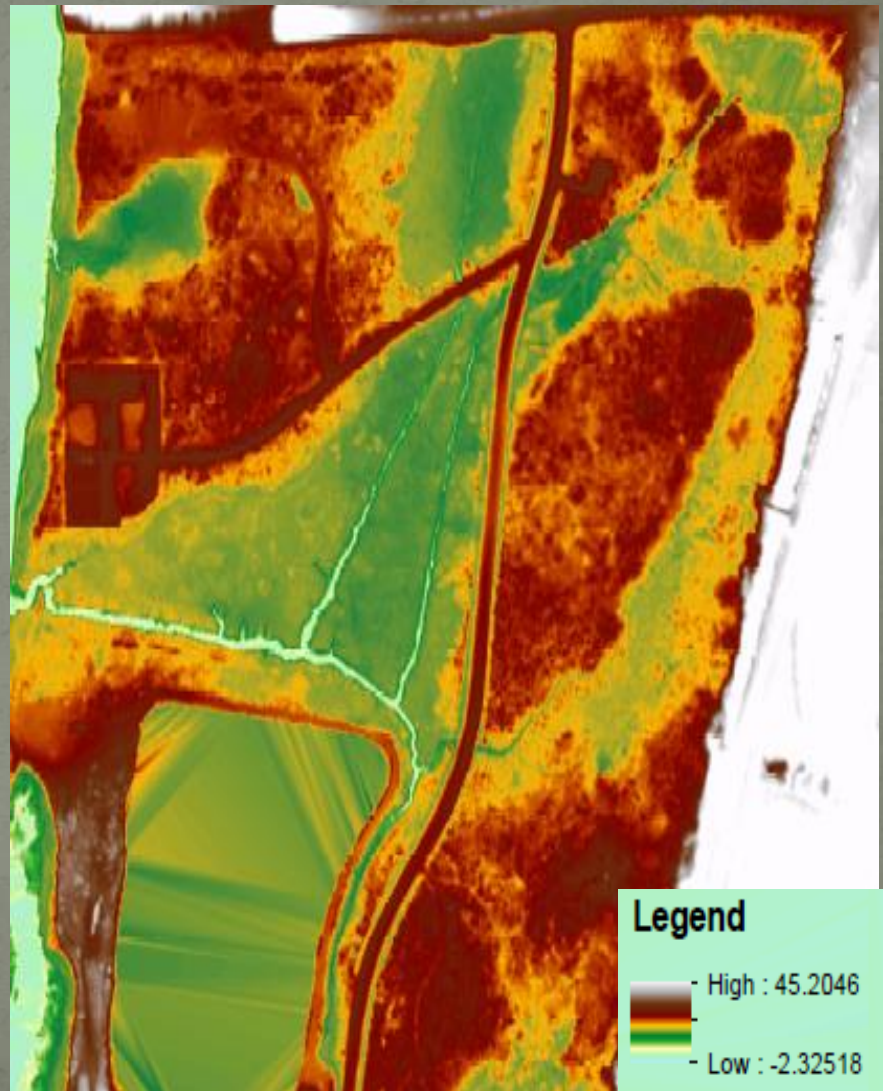
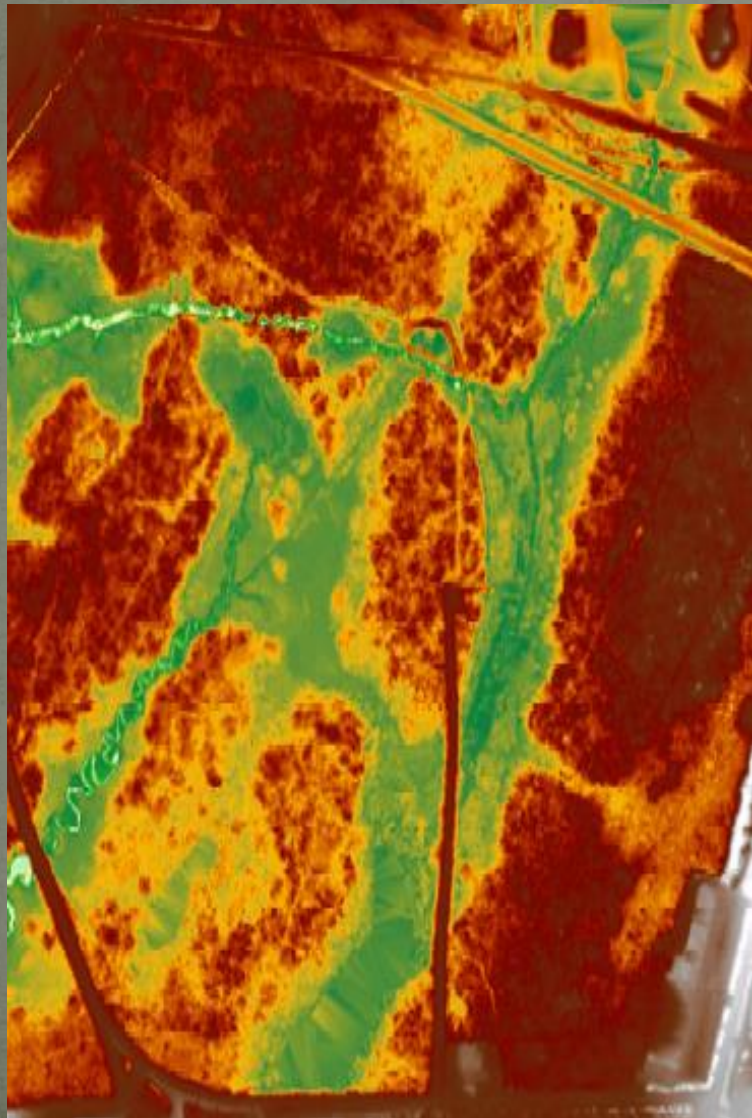


	AM High		PM High	
	Time	Height	Time	Height
6/18/2015	11:02	6.5	23:23	7.6
6/19/2015	11:48	6.3		
6/20/2015	12:05	7.3	0:33	6.2
6/21/2015	12:46	6.9	1:16	6.1

Fragmentation & Restrictions



Elevation - LIDAR



Study Objectives

Measurement	Function	Schedule
Water Level	Hydrological Regime	Continuous (5min)
Wildlife Observations	Habitat Utilization	Bi-weekly
Salinity	Water Quality and Hydrological Regime	Bi-weekly
Dissolved Oxygen Concentration	Water Quality	Bi-weekly
Water Chemistry Nitrogen, Phosphorus, Chlorophyll	Water Quality	4x per year
Algal Community	Algal and Cyanobacterial Community Structure	4x per year
Sediment Elevation	Accretion or Erosion	3x per year
Vegetation	Plant Community Structure	3x per year
Invertebrate Concentration	Invertebrate Community Structure	3x per year
Bacterial Concentration	Water Quality	1x per year

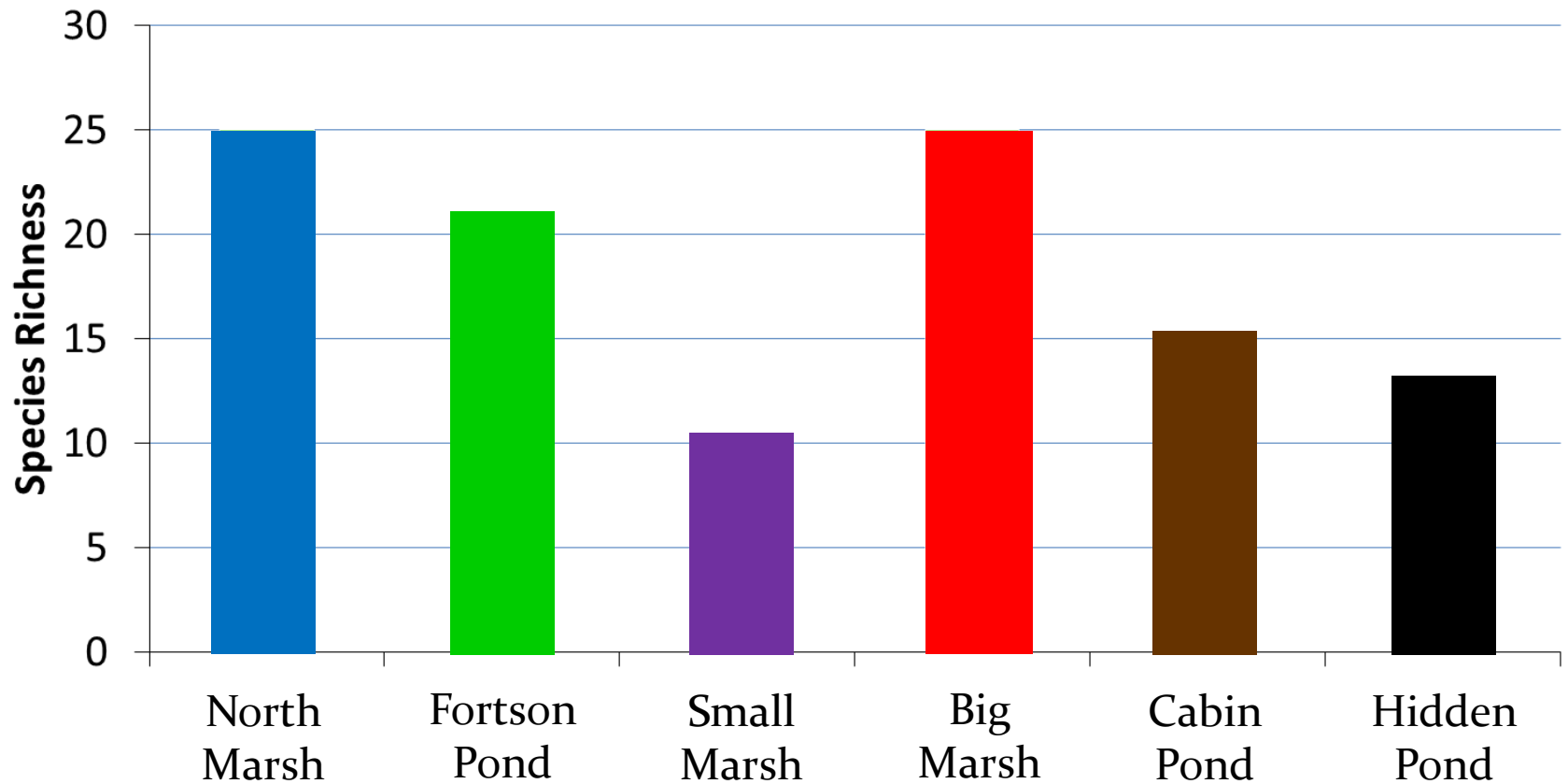
Avian Diversity



Wildlife Observation Locations



Species Richness



Species Richness across all marsh and reference sites. Our initial assumption that Fortson Pond offered little utility for wildlife may have been incorrect in relation to neighboring marshes. This finding does not however lead us to conclude that Fortson pond's utility for wildlife is at its full potential.

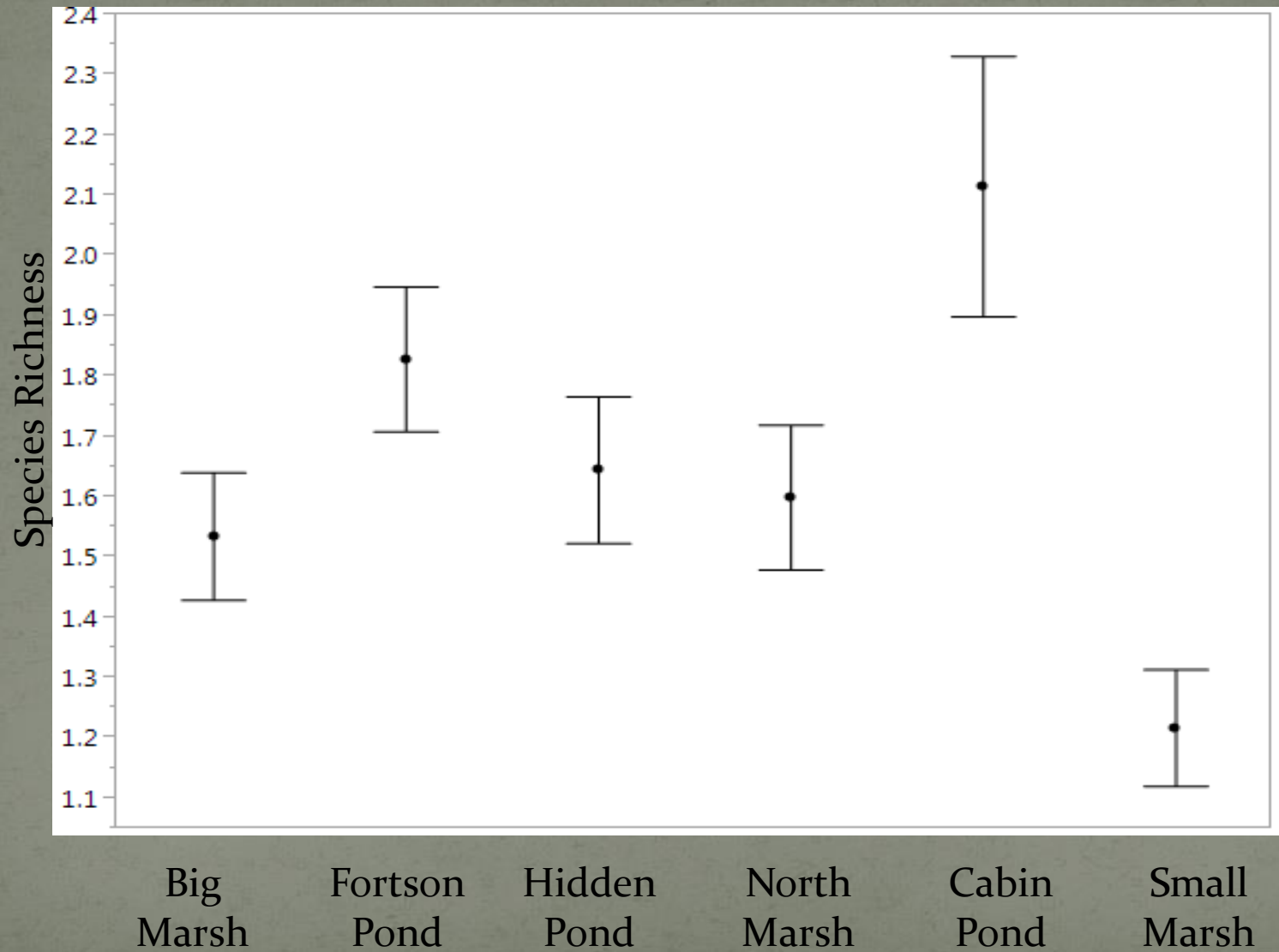
Vegetation and Invertebrates



Vegetation and Invertebrate Transects

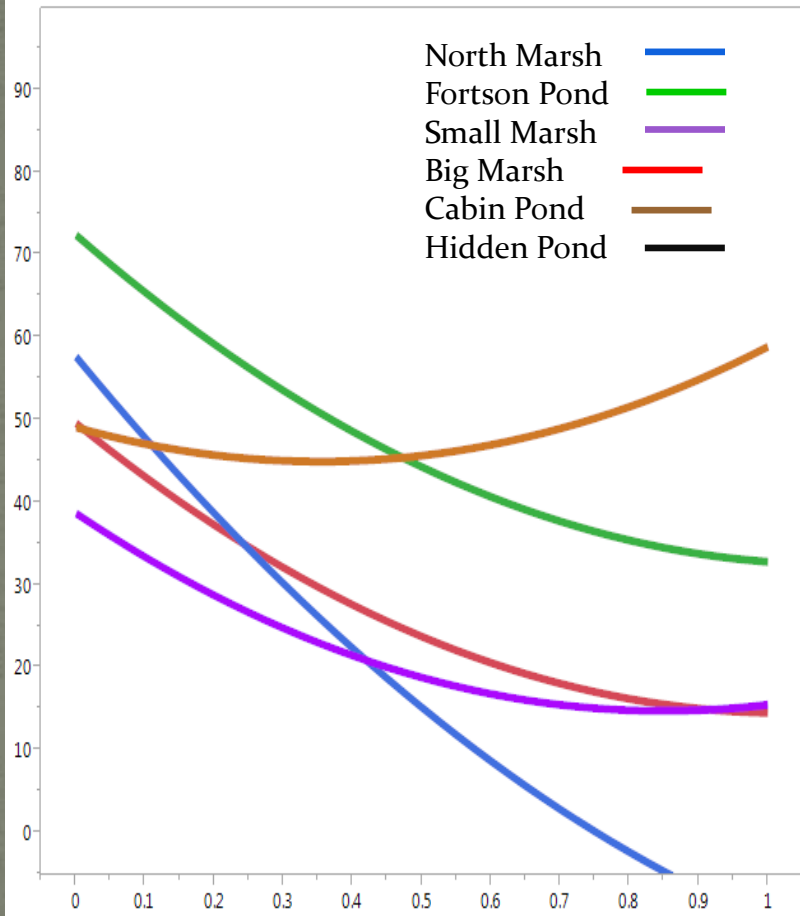


Average Vegetation Richness by Site

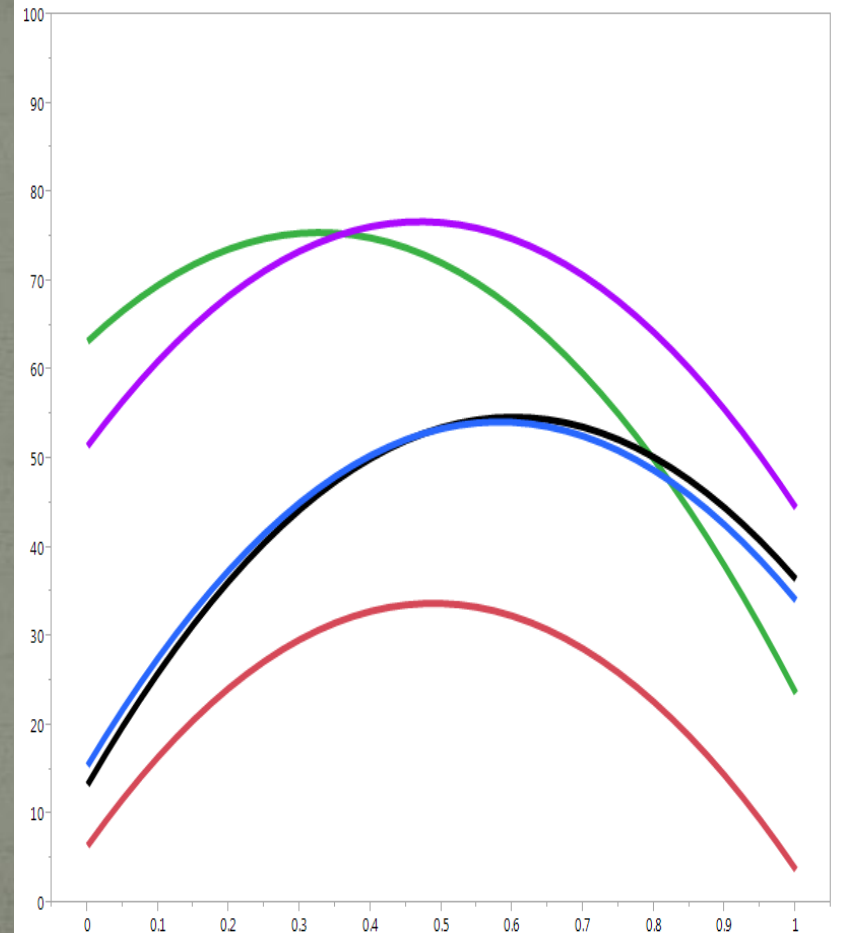


Vegetation Relative to Water's Edge

Spartina alterniflora

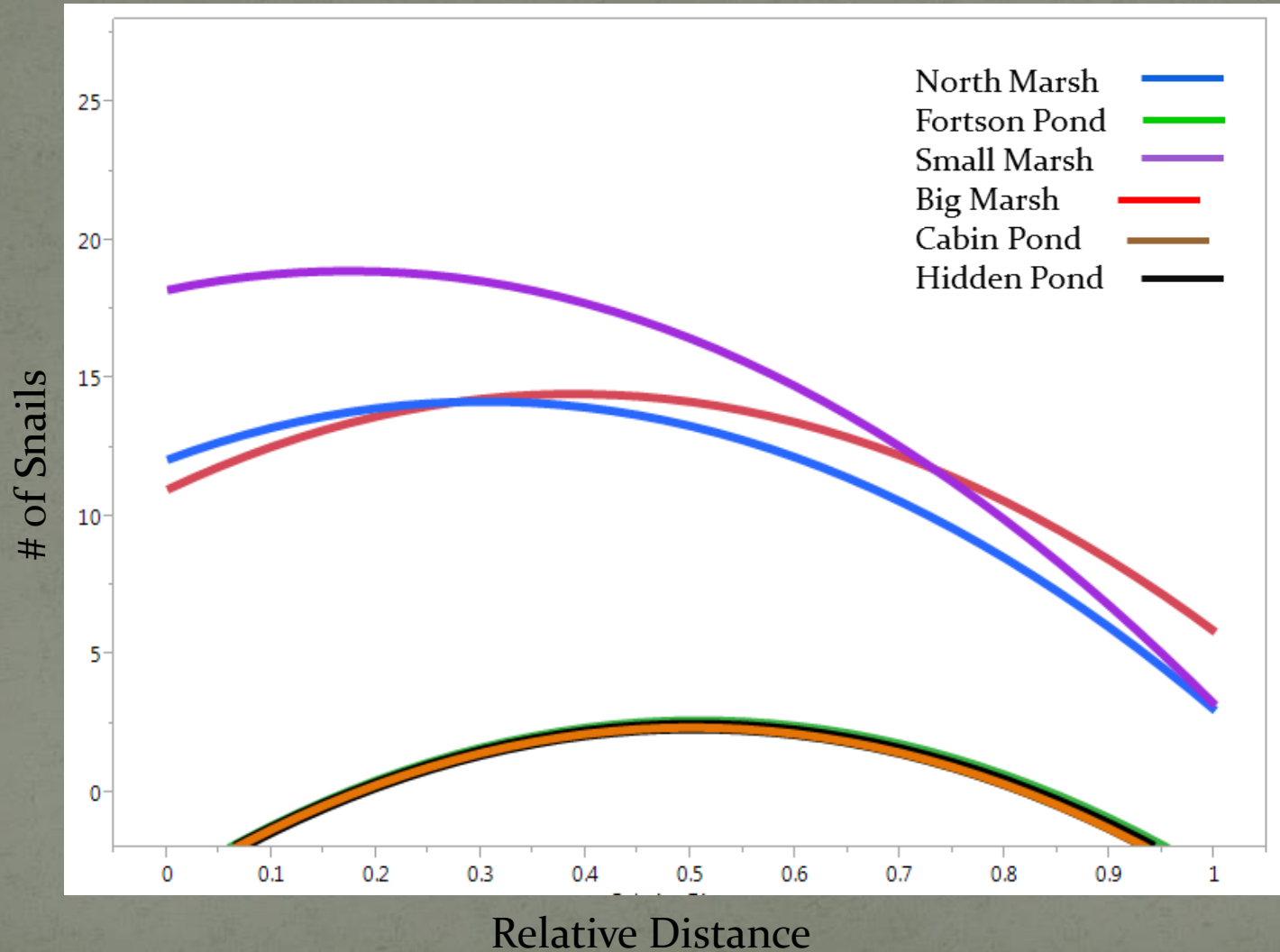


Juncus roemerianus

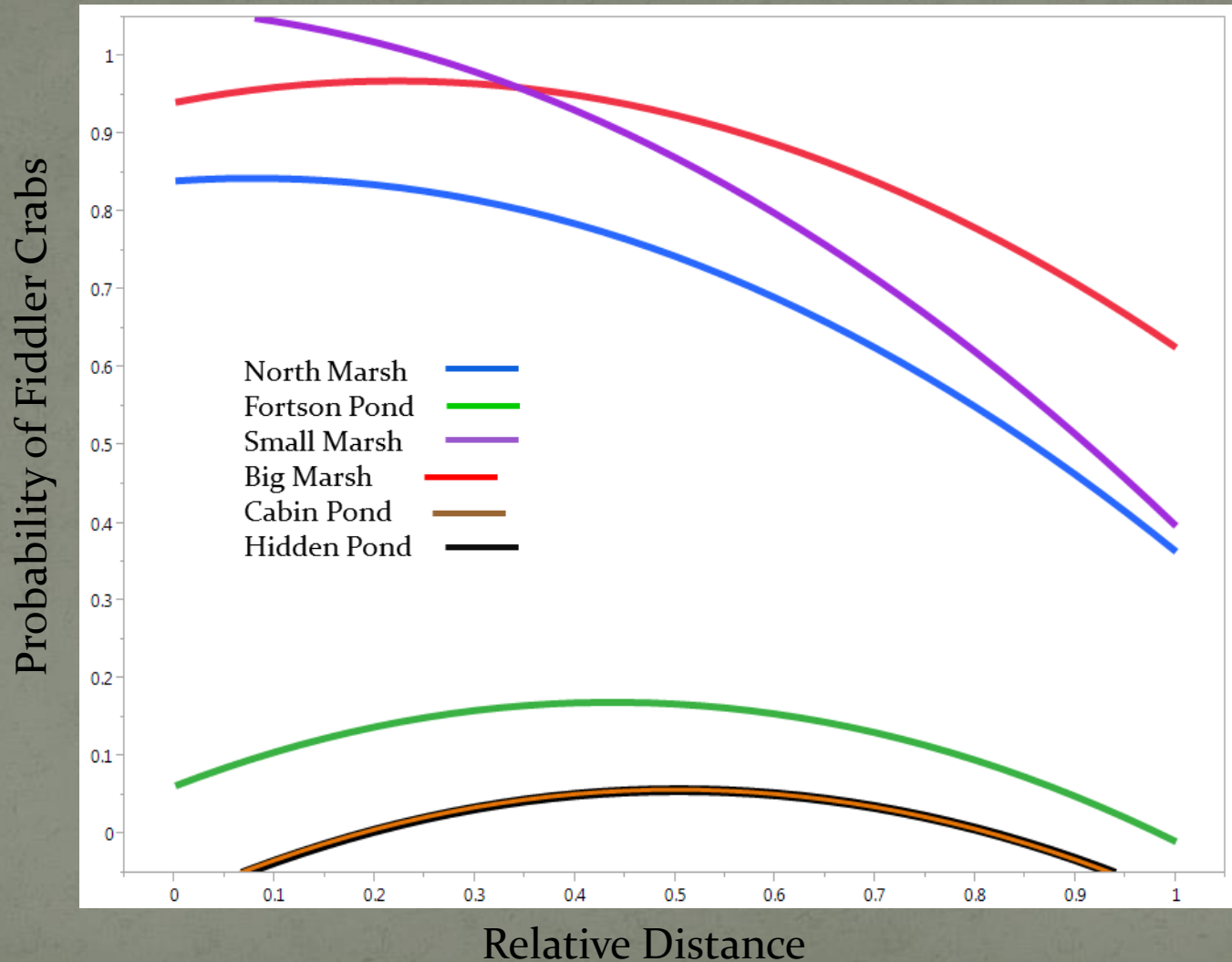


Relative Distance

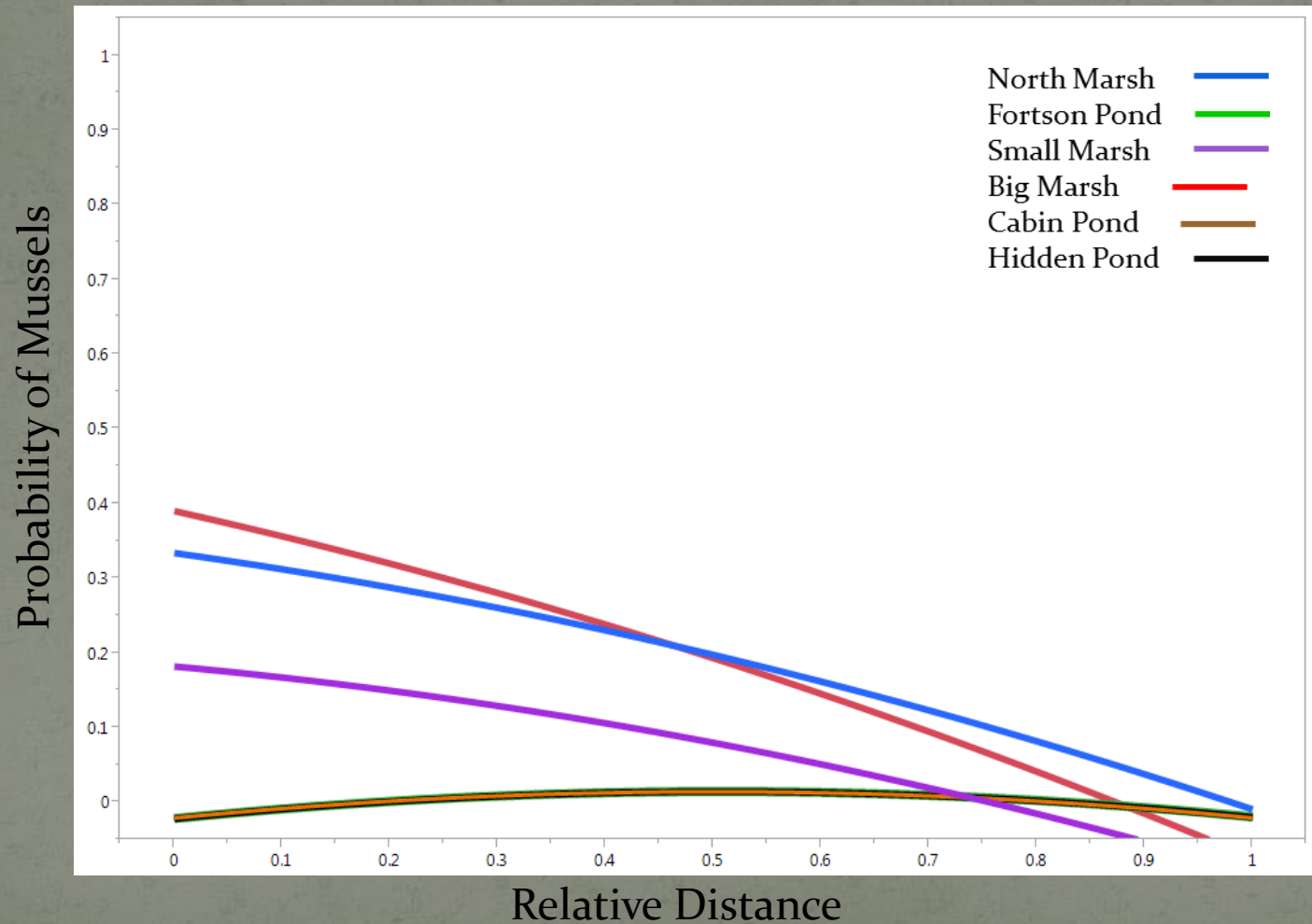
Snails Relative to Water's Edge



Fiddler Crabs Relative to Water's Edge



Mussels Relative to Water's Edge

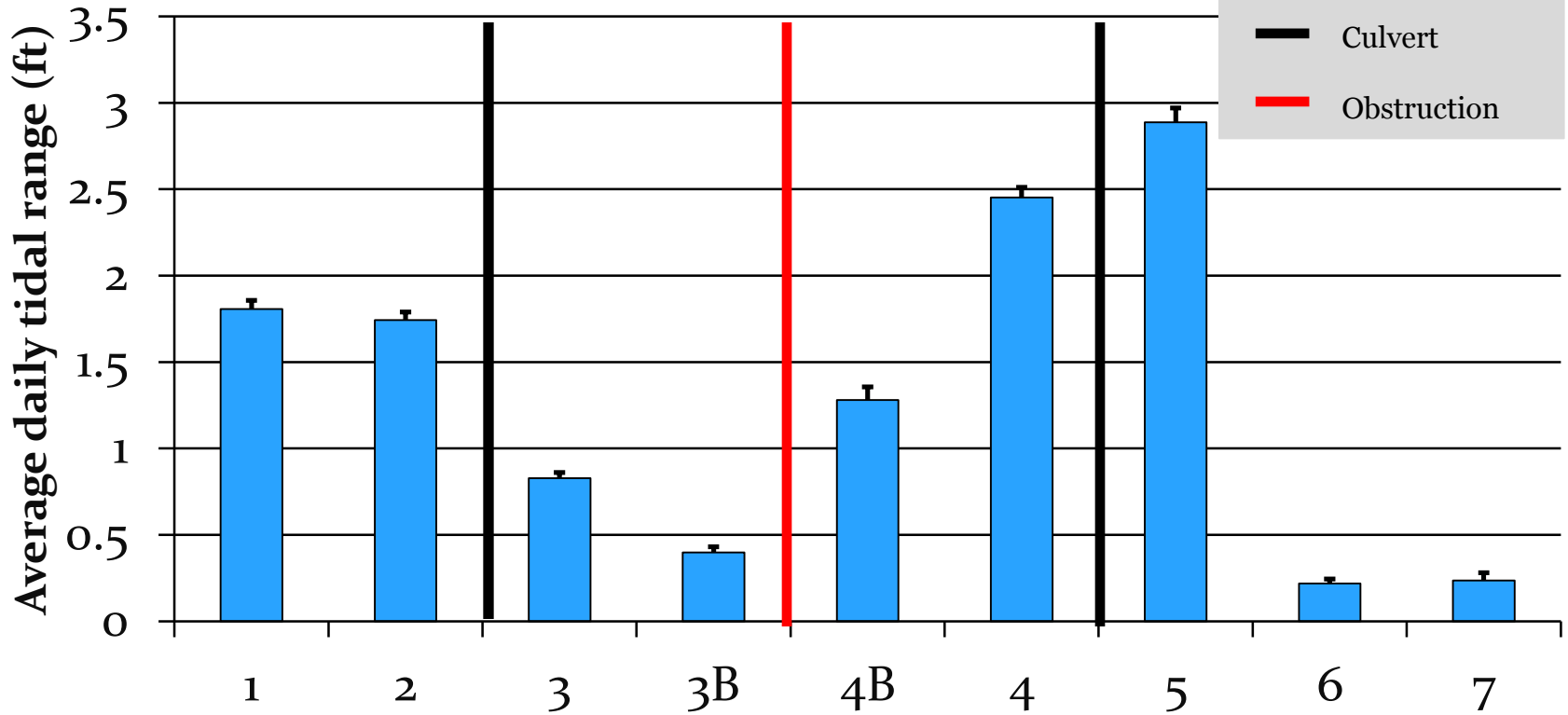


Water Level

Water Level Logger Locations



Average Daily Tidal Range

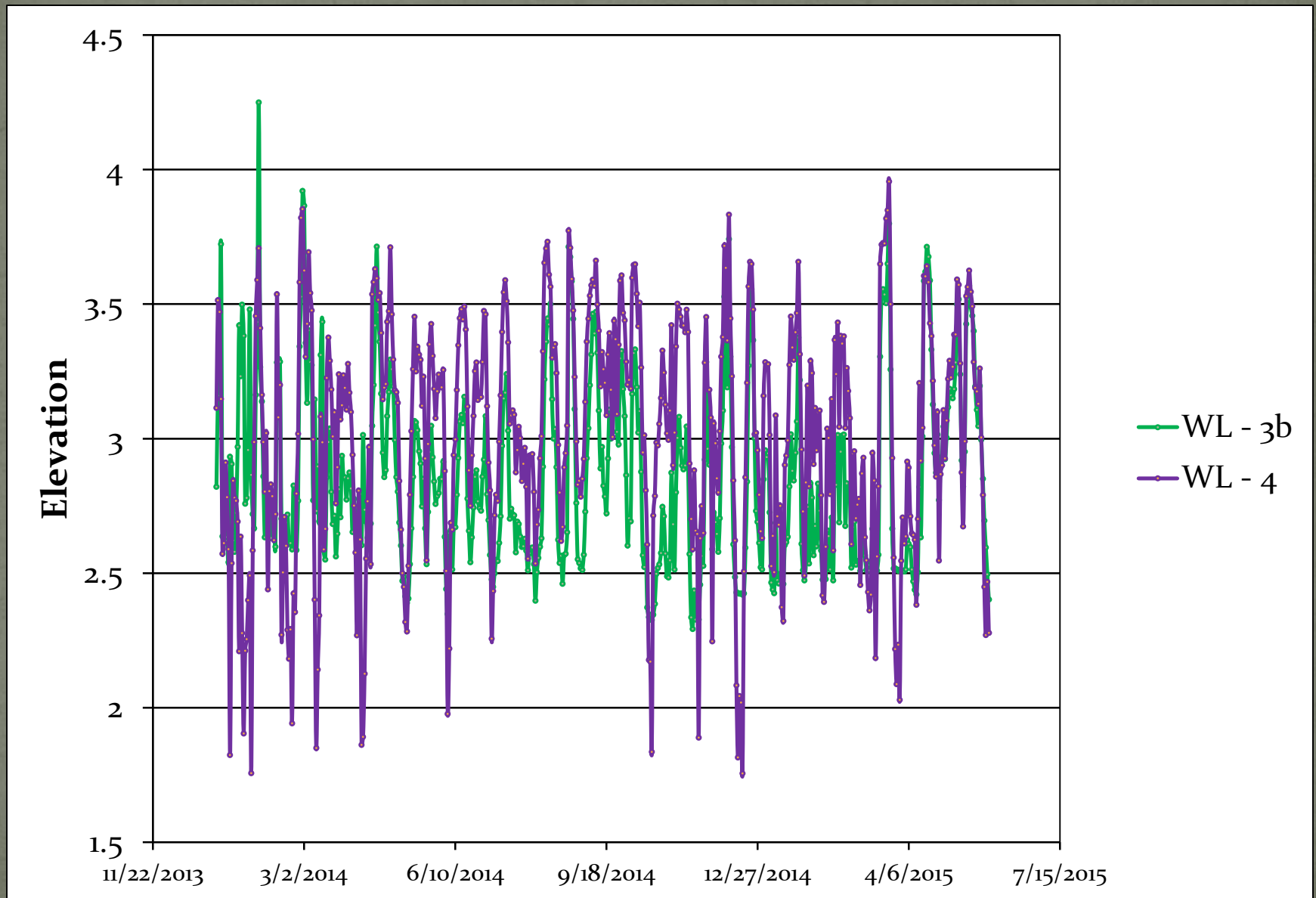


Average daily tidal range: Water-level logger sites 1 to 5 are arranged sequentially from North to South through the system, showing that tidal range is most restricted in the middle of the sequence, at the southern end of Fortson Pond (site 3B). “Cabin” and “Hidden” ponds (site 6 and 7) have lower tidal range than Fortson Pond. Error bars are 95% C.I.

Water Level Analysis

- How would culverts alter water levels in Fortson Pond?
 - Right now, water flows thru the north end every day at least once
- What would a culvert on the south end do to the water levels in Fortson Pond?
 - ???

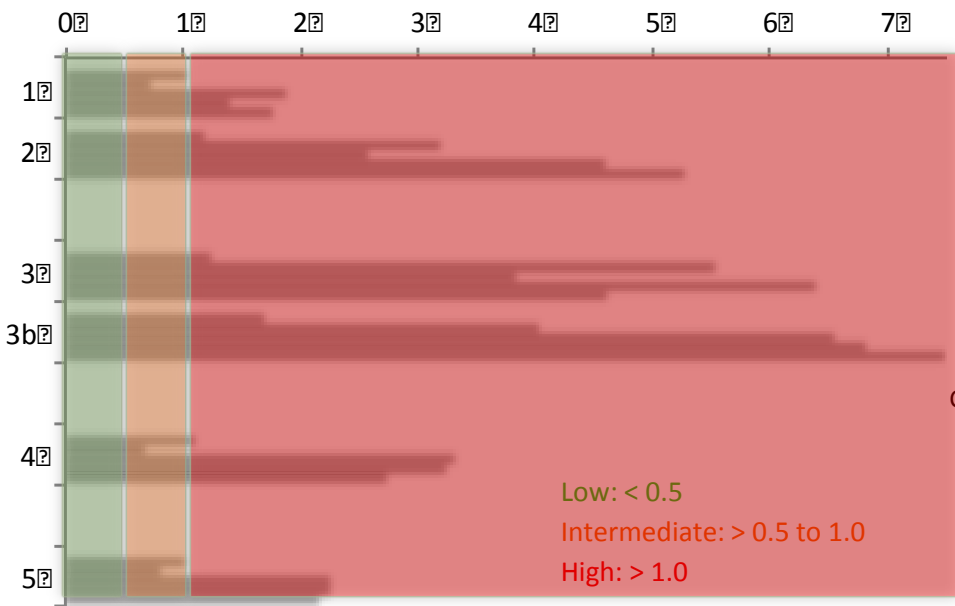
Fortson Pond & Small Marsh Daily Maxes



Water Quality and Algal Composition



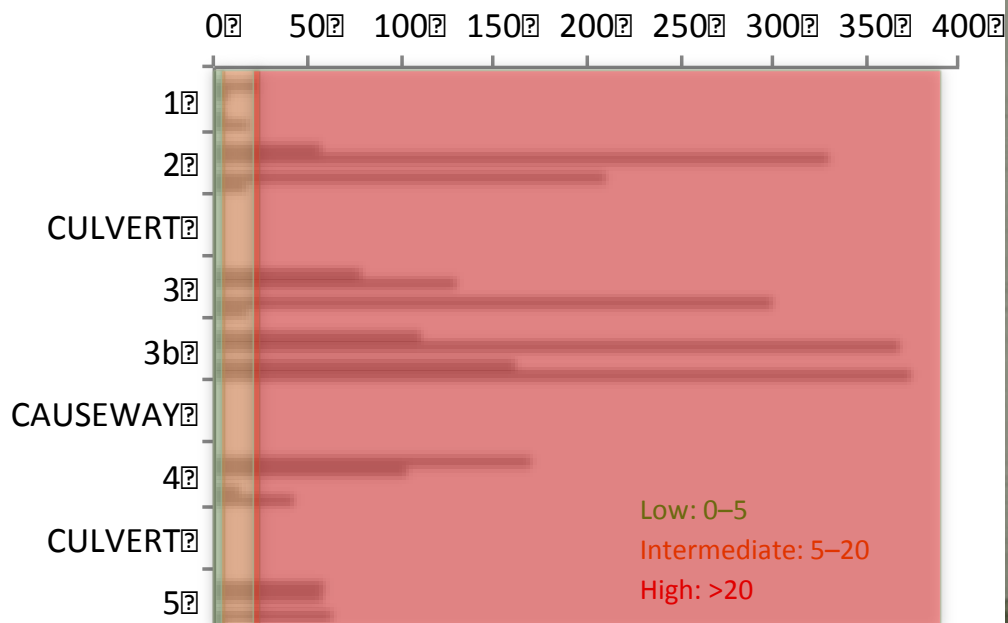
Total Nitrogen (mg/L)



Total Phosphorus (mg/L)



Chlorophyll (mg/L)



14-May-15

24-Jun-15

15-Jul-14

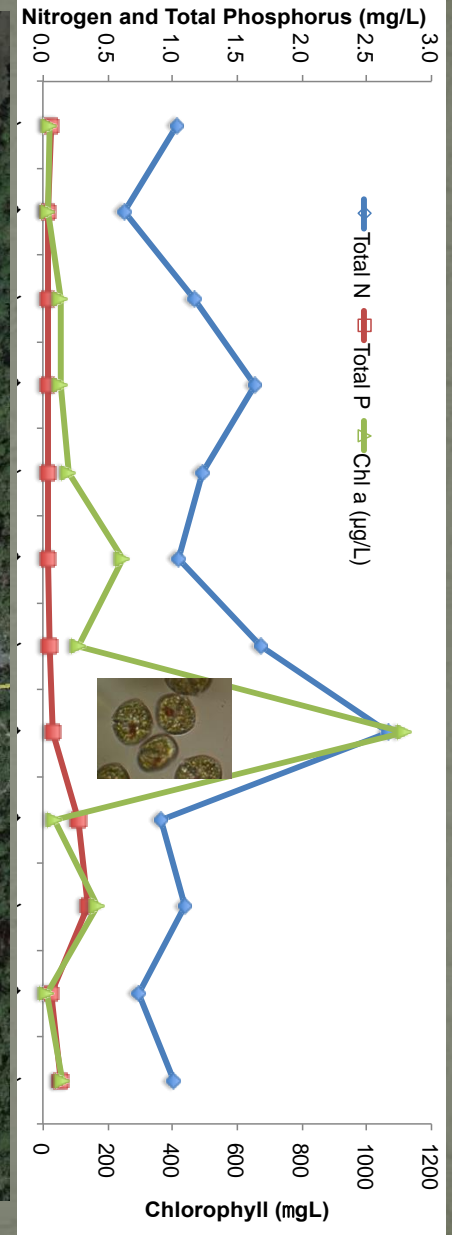
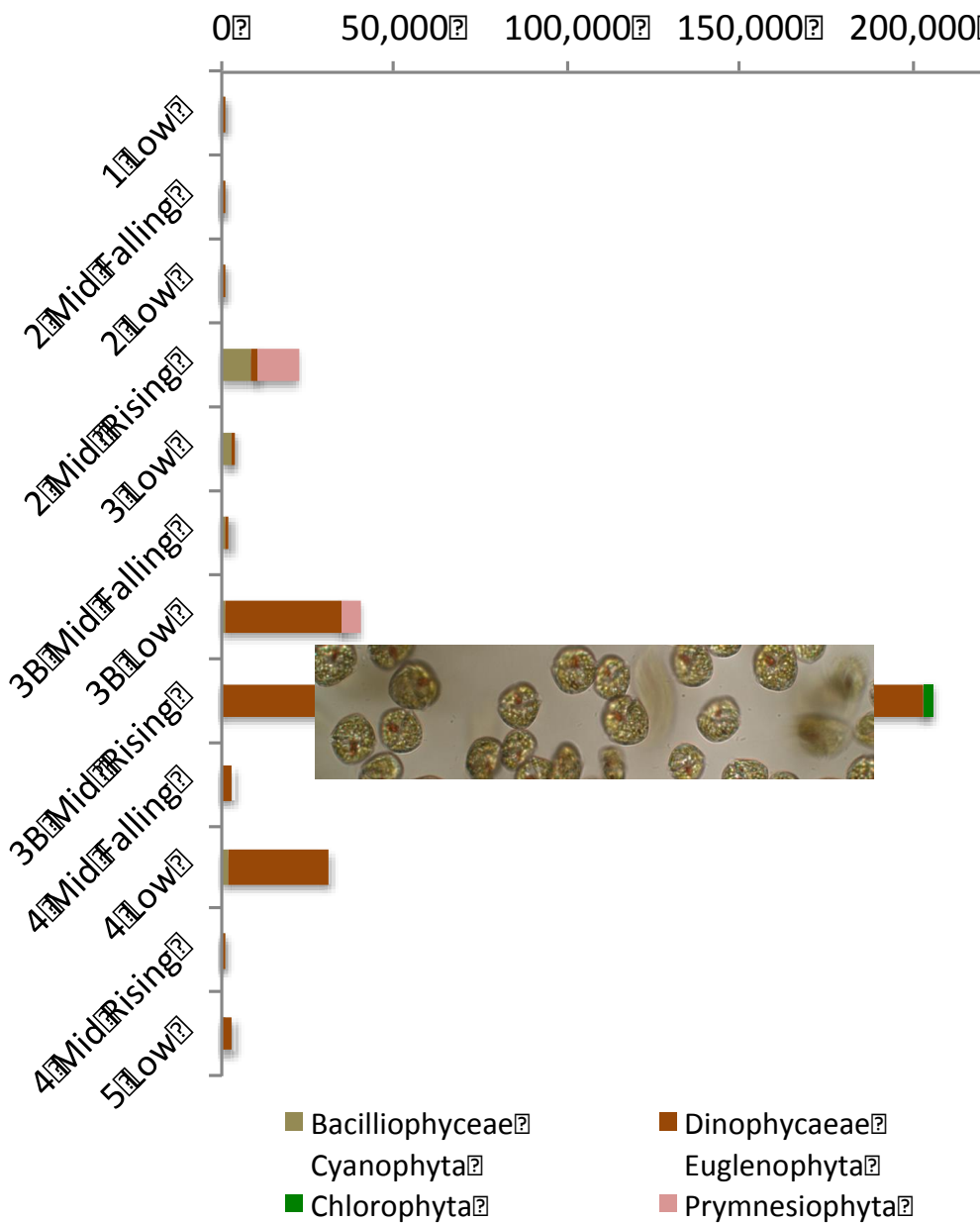
22-Sep-14

22-Nov-14

July 28, 2014



May 14, 2015 Phytoplankton and Nutrients



Fecal Bacteria - Coliforms

Site	11.26.2013	8.6.2014	
	Colonies/100mL	Colonies/1mL	Colonies/100mL
1	-	18	1800
2	-	2	200
3	400	1	100
3b	>20000	189	18900
4	4700	193	19300
5	-	23	2300
6	-	17	1700
7	60	0	0

Coprostanol measured in sediment

Site	Coprostanol mg/kg	ng/g
7 - Hidden	0.204	204
1 - North	0.108	108
2 - North	0.129	129
3 - Fortson	ND	ND
3B - Fortson	5.376	5376
4 - Small	ND	ND
5 - Big	ND	ND
6 - Cabin	3.228	3228
	Pristine	<10 ng/g
	above pristine	>10 ng/g
	indicative of sewage	>100 ng/g
	significant sewage contamination	>500 ng/g

Summary

What do we know now?

- Fortson Pond is dominated by a decaying bloom of *Aphanothece stagnina* and Cabin Pond that has a live bloom of the same nature.
- This is correlated with very high nutrient levels, low tidal circulation, relatively low salinity, and indicators of fecal contamination at both sites.
- Structured observation does not reveal differences in the bird community across the study areas
- The pond areas studied lack conspicuous macroinverts
- The installation of a culvert at the south end of Fortson Pond connecting it to Small Marsh would transmit water into Fortson from the south 88% of days

What don't we know?... Yet.

- Confirmation and source-identification of possible sewage contamination
- Hydro-dynamic outcomes of prospective restoration actions

Thank you to GADNR-CRD and NOAA



Questions?