A Tidal Creek Condition Index for Sarasota County Florida

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Introduction

In recent years the importance of tidal creeks has come to the forefront of watershed management. Tidal creeks are very unique ecosystems that function as a vital link between uplands and estuaries, and two crucial roles they play as that link are to deliver freshwater and nutrients to marsh and estuarine systems and to transport and deposit sediment, the most essential natural processes occurring in watersheds. Regrettably, they also transport pollutants from multiple sources; therefore, their response to watershed stressors has allowed them to be recognized as early indicators of adverse anthropogenic impacts.

Monitoring these unique ecosystems to document and understand those responses aids watershed managers in making responsible decisions for their management, enhancement, and protection. While other methods of monitoring the health of tidal creeks (based on chemical or physical properties) are widely used, no method of measuring their ecological health had been developed.

In 2004 Sarasota County and Mote Marine Laboratory began a collaboration to develop a biological index using rapid survey methods for tidal creeks which in 2007 culminated in the development of a Tidal Creek Condition Index for Sarasota County creeks. Sixteen creeks are surveyed annually during the spring dry season when conditions are most consistent and comparable among them.

What is a Tidal Creek Condition Index?

❖ An assessment tool that employs rapid survey techniques using various biological indicators to assess the ecological health of the tidal creek ecosystem.

Tidal Creek Metrics

Indicator Species:	Live *Tagelus*, % Live Oysters
Longevity:	Live *Tagelus* Cohorts, Largest Live Oysters
Benthic Infauna:	Burrow Counts, Live Other Mollusks
Pelagic/Epibenthic Fauna:	Fish, Crab, Shrimp, Other Mollusks
Pollution Indicators:	% Periphyton, % Filamentous Algae

Materials and Methods

1.0 m2 % Cover Quad

0.04 m2 Burrow Quad

0.5 mm fine box sieve 2-mm coarse sieve

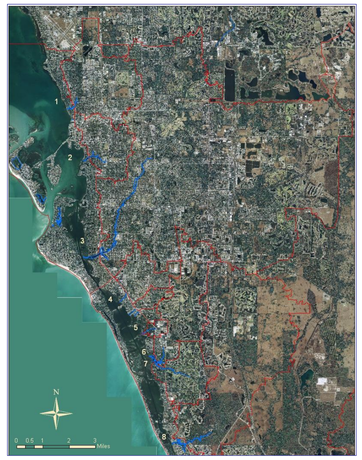
0.25 m2 Quad for Oysters Caliper for Oyster Ht.

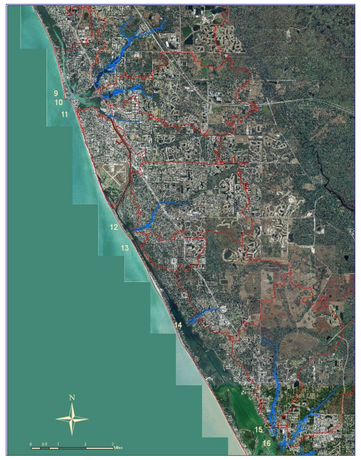
Dip Net for Pelagic/Epibenthic Fauna

10 x 10 cm2 Box Corer

Tidal Creeks

1 Whitaker Bayou
2 Hudson Bayou
3 Phillippi Creek
4 Matheny Creek
5 Clower Creek
6 Catfish Creek
7 North Creek
8 South Creek
9 Shakett Creek
10 Curry creek
11 Hatchett Creek
12 Alligator creek
13 Woodmere Creek
14 Forked Creek
15 Gottfried Creek
16 Ainger Creek



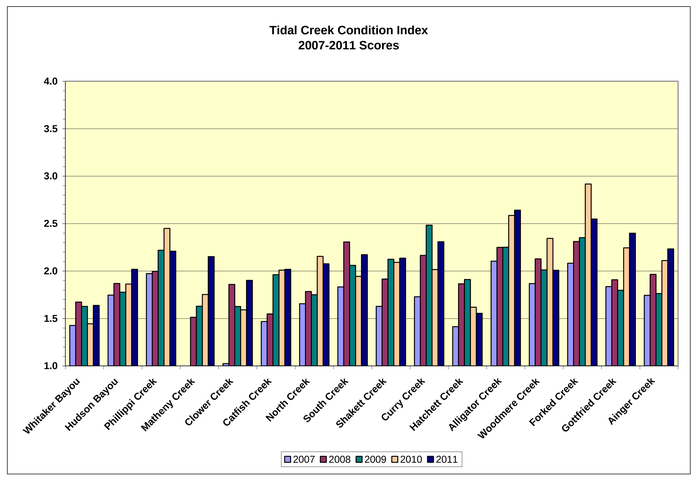


Tidal Creek Condition Index Scores

Creek	2007	2008	2009	2010	2011
Whitaker Bayou	1.43	1.67	1.63	1.44	1.64
Hudson Bayou	1.75	1.87	1.78	1.86	2.02
Phillippi Creek	1.97	2.00	2.22	2.45	2.21
Matheny Creek		1.51	1.63	1.75	2.15
Clower Creek	1.02	1.86	1.63	1.59	1.90
Catfish Creek	1.47	1.55	1.96	2.01	2.02
North Creek	1.65	1.78	1.75	2.15	2.08
South Creek	1.83	2.31	2.06	1.94	2.17
Shakett Creek	1.63	1.92	2.12	2.09	2.13
Curry Creek	1.73	2.16	2.48	2.02	2.31
Hatchett Creek	1.41	1.86	1.91	1.62	1.55
Alligator Creek	2.10	2.25	2.25	2.59	2.64
Woodmere Creek	1.87	2.13	2.01	2.34	2.01
Forked Creek	2.08	2.31	2.35	2.92	2.55
Gottfried Creek	1.84	1.91	1.80	2.24	2.40
Ainger Creek	1.74	1.97	1.76	2.11	2.23

TCCI Creek Ranks

	2007	2008	2009	2010	2011
Lowest Five					
Poor	Matheny Creek	Matheny Creek	Clower Creek	Whitaker Bayou	Hatchett Creek
	Clower Creek	Catfish Creek	Whitaker Bayou	Clower Creek	Whitaker Bayou
	Hatchett Creek	Whitaker Bayou	Matheny Creek	Hatchett Creek	Clower Creek
	Whitaker Bayou	North Creek	North Creek	Matheny Creek	Woodmere Creek
	Catfish Creek	Clower Creek	Ainger Creek	Hudson Bayou	Hudson Bayou
Middle Six					
Fair	North Creek	Hatchett Creek	Hudson Bayou	South Creek	Catfish Creek
	Shakett Creek	Hudson Bayou	Gottfried Creek	Catfish Creek	North Creek
	Phillippi Creek	Gottfried Creek	Hatchett Creek	Curry Creek	Shakett Creek
	Curry Creek	Shakett Creek	Catfish Creek	Shakett Creek	Matheny Creek
	Ainger Creek	Ainger Creek	Woodmere Creek	Ainger Creek	South Creek
	Hudson Bayou	Phillipi Creek	South Creek	North Creek	Phillippi Creek
Highest Five					
Good	South Creek	Woodmere Creek	Shakett Creek	Gottfried Creek	Ainger Creek
	Gottfried Creek	Curry Creek	Phillippi Creek	Woodmere Creek	Curry Creek
	Woodmere Creek	Alligator Creek	Alligator Creek	Phillipi Creek	Gottfried Creek
	Alligator Creek	South Creek	Forked Creek	Alligator Creek	Forked Creek
	Forked Creek	Forked Creek	Curry Creek	Forked Creek	Alligator Creek



Observations

Based on their scores over the 5-year period, the 16 creeks could be placed into 3 ranks: Poor – 5 creeks with the lowest scores; Fair – 6 creeks with middle scores; and Good – 5 creeks with the highest scores (See Table). The following observations were noted:

- Whitaker Bayou and Clower Creek ranked in the bottom all 5 years.
- Matheny Creek ranked in the bottom from 2007-2010, and moved into the middle in 2011.
- Hatchett Creek ranked in the bottom 3 out of 5 years.
- Shakett Creek ranked in the middle all 4 years and top 1 year.
- Hudson Bayou and Phillippi, Catfish, North, South, and Ainger Creeks ranked in the middle 3 out of 5 years.
- Alligator and Forked Creeks ranked in the top all 5 years.
- Curry, Woodmere, and Gottfried Creeks ranked in the top 3 out of 5 years

Consequently, Whitaker Bayou, and Clower, Matheny, and Hatchett Creeks are in the poorest condition of all the creeks; Alligator and Forked Creeks are in the best condition of all the creeks; and Shakett Creek is consistently in fair condition.

Depending upon variations among the metrics, Hudson Bayou and Catfish and North Creeks ranked in the bottom at times and ranked in the middle other times; and Phillippi, South, Curry, and Gottfried Creeks ranked in the middle at times and ranked in the top other times. Ainger and Woodmere Creeks are the only ones that ranked in all 3 categories.

Conclusions

All of the creeks have shown a net improvement since the 2007 assessment. Matheny, Catfish, and Alligator Creeks have shown marked improvement in that their scores steadily increased from year to year. The scores for Phillippi and Forked Creeks steadily rose through 2010 and then declined slightly in 2011. There was a net increase in the scores for Hudson Bayou and Shakett Curry Gottfried and Ainger Creeks after a slight decline only 1 year in the 5-year period. There was a net increase in the scores for Whitaker Bayou and North and South Creeks after slight declines in 2 of the 5 years. Although Clower Creek is one of the poorer creeks, it has improved the most with a 46% increase in its score. Hatchett and Woodmere Creeks have shown the least improvement.

The Tidal Creek Condition Index is just one of many tools that can be used to assess the health of a stream and ultimately a watershed. It was not designed to be used as a "stand alone" diagnostic tool to provide the ultimate answer as to why a particular waterbody is or isn't degraded. It was designed to be used in concert with other tools to provide a comprehensive, scientifically-based diagnosis that will allow watershed managers to direct their efforts in the most efficient and cost-effective manner.

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Further Information

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