SEACAR Northeast Meeting Summary and Outcomes
March 28–29, 2017
Guana Tolomato Matanzas National Estuarine Research Reserve

Prepared For

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Acronyms and Abbreviations

AP	Aquatic Preserve
BGA	Blue-green Algae
BMAP	Basin Management Action Plan
CDOM	Colored Dissolved Organic Matter
CHIMMP	Coastal Habitats Integrated Mapping and Monitoring Program
Chl a	Chlorophyll a
DBHYDRO	SFWMD's Water Quality and Hydrological Database
DO	Dissolved Oxygen
FCO	Florida Coastal Office
FDACS	Florida Department of Agriculture & Consumer Services
FDEP	Florida Department of Environmental Protection
FIM	Fisheries-Independent Monitoring
FIT	Florida Institute of Technology
FL	Florida
FLUCCS	Florida Land Use Cover Classification System
FWC	Florida Fish and Wildlife Conservation Commission
GIS	Geographic Information Systems
GSAA	Governors' South Atlantic Alliance
GTM	Guana Tolomato Matanzas
HAB	Harmful Algal Bloom
IRL	Indian River Lagoon
LRD	Loxahatchee River District
ML	Mosquito Lagoon
NCB	Northern Coastal Basin
NE	Northeast
NEFRC	Northeast Florida Regional Council
NERR	National Estuarine Research Reserve
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NTU	Nephelometric Turbidity Unit
OIMMP	Oyster Integrated Mapping and Monitoring Program
PAR	Photosynthetically Active Radiation
PPT	Parts Per Thousand
SAV	Submerged Aquatic Vegetation
SEACAR	Statewide Ecosystem Assessment of Coastal and Aquatic Resources
SECOORA	Southeast Coastal Ocean Observing Regional Association
SFWMD	South Florida Water Management District
SIMM	Seagrass Integrated Mapping and Monitoring Program
SJRWMD	St. Johns River Water Management District
SSER	South Shore Estuary Reserve

STORET	STORage and RETrieval database
SWMP	System-Wide Monitoring Program
TMDL	Total Maximum Daily Load
TSS	Total Suspended Solids
UCF	University of Central Florida
UF	University of Florida
USGS	U.S. Geological Survey
WMD	Water Management District
WQ	Water Quality

1 SEACAR Facilitation Overview

SEACAR (Statewide Ecosystem Assessment of Coastal Aquatic Resources) meetings were facilitated by Normandeau Associates, Inc. during the months of March and April 2017. The SEACAR Northeast Region meetings were held on 28 and 29 March 2017 at the Guana Tolomato Matanzas National Estuarine Research Reserve, 505 Guana River Rd, Ponte Vedra Beach, FL 32082. On 28 March, the meeting times were 9:10 a.m. to 4:00 p.m. On 29 March, the meeting times were 9:00 a.m. to 2:00 p.m. A list of meeting participants for both days is provided in Appendix A.

At the start of both days, the project lead, Cheryl Parrott Clark, provided an overview of the SEACAR pilot study to give the project background. This was followed by presentations by regional Florida Coastal Office (FCO) staff describing resources at each FCO managed area in the region. Finally, Mrs. Clark provided a description of the indicator selection process.

1.1 SEACAR Meeting Goals

1. Resource Assessment Teams will establish ecological indicators, using current knowledge, for habitats in the Florida Coastal Office’s managed areas (including APs, NERRs, etc.)
2. Resource Assessment Teams will work cooperatively to provide consensus on indicators and product format
3. An analysis of the statuses and trends of coastal resources will be conducted at a locally relevant scale, to support state and local programs, planning and decision making
4. Relevant statuses and trends will be communicated to local and state decision makers and provide the best available science
5. Data will be integrated into a Decision Support Tool that promotes resource management

1.2 SEACAR Indicator Selection Criteria

1. Show statewide and site specific trends over time
2. Allow comparisons between sites and across the state
3. Illustrate habitat change over time driven by biotic and abiotic factors which define community structure
4. Allow data/results to directly inform and/or be utilized in local and state natural resource management decisions, submerged land planning and/or restoration
5. Allow for site and/or regional specific environments and conditions (while being comparable statewide)

1.3 NE Region Potential Habitats and Indicators

The following list of potential indicators was compiled based on indicators identified by the Resource Assessment Data Teams from all regions statewide prior to the in-person SEACAR meetings.

Table 1-1. Habitats and Potential Indicators Determined in Previous Webinars

Oyster/Oyster Reef	Submerged Aquatic Vegetation	Water Column	Coastal Wetlands
• Acreage • Density • % Cover • % Live • Age Class • Ambient Water Quality • Species Composition • Algae	• Acreage • % Cover • Species Composition • Shoot Count • Algae • Ambient Water Quality • Clarity	• Nekton • Algae • Ambient Water Quality • Clarity • Nutrients	• Acreage • Biomass • % Cover • Species Composition • Clarity • Nutrients

o % Cover: Measured in the field using quadrat sampling methods
o Acreage: Calculated remotely through aerial imagery
o Algae: BGA, Chl a, Macro Algae, HAB, Epiphytes, etc
o Ambient Water Quality*: Dissolved Oxygen, Temperature, Salinity, pH*
o Clarity: *(turbidity, color, TSS, sediment, Chl a, light attenuation, Secchi)*
o Species Composition: identity of organisms that make up a community within the defined habitat

2 Day 1 Meeting

The purpose of the Day 1 meeting was to collect Data Team recommendations for priority indicators to be considered for inclusion in the NE Region Habitat index.

The following goals were accomplished during the meeting:

1. Get collaborative agreement on regional indicators
2. Confirm the best measurement units for the indicators
3. Identify existing data sources for priority indicators
4. Confirm which indicators have already been analyzed
5. Assess data gaps

2.1 Day 1 Collaborative Agreement on Regional Indicators

The following process was followed to reach collaborative agreement on indicators for the NE Region:

1. Data Team members listed their top 5 indicators for each habitat index
2. Data Team members discussed the list resulting from the previous activity in order to clarify and condense the indicator list
3. Data Team members listed pros and cons of the refined indicators from the previous activity
4. Data Team members discussed pros and cons of the refined indicators so they would be able to make a more informed vote on their top indicators
5. Data Team members voted on their top 5 indicators

2.1.1 Data Team Initial List of Top Indicators for Each Habitat Index

Tables 2-1 through 2-4 list the indicators provided by the Data Team for each habitat index. The first column is a list of all indicators originally presented by the Data Team, and the second column is the revised list of indicators after discussion to clarify, condense, or add to the list.

Data Team members initially specified indicators for the entire region, GTM/NE APs, or IRL, but in the revised list and for the purpose of the pro/con activity decided to consider the entire region for all indicators and habitats except for SAV, which is specific to IRL.

Table 2-1. Data Team Initial List of Top Indicators for SAV

Submerged Aquatic Vegetation ***Preliminary Indicators***	**Submerged Aquatic Vegetation** ***Revised Indicators***
% Cover[123]	% Cover[3]
Acreage[23]	Acreage[3]
Clarity[23]	Clarity (light attenuation)[3]
Density[3]	Shoot Biomass[3]
Shoot Biomass[1]	
Macro Algae[3]	Macro Algae[3]
Species Composition[13]	Species Composition[3]

[1]Listed for Entire Region
[2] Listed for GTM/NE AP
[3] Listed for IRL

Table 2-2. Data Team Initial List of Top Indicators for Water Column

Water Column ***Preliminary Indicators***	**Water Column** ***Revised Indicators***
Algae[1]	*Algae removed*
Ambient Water Quality[2]	Water Quality (DO, salinity, temp., pH) *(Hypoxic Events captured in DO)*
DO[1]	
Frequency/Duration of Hypoxic Events[1]	
pH[1]	
Salinity[1]	
Chl a[13]	Chl a
Clarity[12]	Clarity
Turbidity[1]	
Frequency/Duration of HABs[1]	Frequency/Duration of HABs
Nekton[3]	Nekton
Nekton/Fisheries[3]	
Nutrients[12]	Nutrients
Phyto/Phytoplankton[13]	Plankton

[1]Listed for Entire Region
[2] Listed for GTM/NE AP
[3] Listed for IRL

Table 2-3. Data Team Initial List of Top Indicators for Oyster/Oyster Reef

Oyster/Oyster Reef ***Preliminary Indicators***	**Oyster/Oyster Reef** ***Revised Indicators***
% Cover[12]	% Cover
% Live[123]	% Live
Acreage[12]	Acreage
Ambient Water Quality[2]	Ambient Water Quality
Salinity[2]	
Chl a[2]	Chl a
Density[123]	Density
Recruitment[1]	Recruitment
Recruitment on Spat Trees[1]	
Size Class[13]	Size Class
# Adults[1]	

[1]Listed for Entire Region
[2] Listed for GTM/NE AP
[3] Listed for IRL

Table 2-4. Data Team Initial List of Top Indicators for Coastal Wetlands

Coastal Wetlands ***Preliminary Indicators***	**Coastal Wetlands** ***Revised Indicators***
% Cover[12]	% Cover
Acreage[123]	Acreage
Expansion of Dead Zones[1]	
Density[1]	Density (stem density)
Plant Species Composition[3]	Species Composition
Species Composition[12]	
Biomass[2]	Biomass
	Sediment Elevation Change*

[1]Listed for Entire Region
[2] Listed for GTM/NE AP
[3] Listed for IRL
*Sediment Elevation Change added in discussion

2.1.2 Data Team List of Indicator Pros and Cons for Each Habitat Index

To inform indicator prioritization, the Data Team provided pros and cons for the list of revised indicators.

Table 2-5. Data Team Pros and Cons for SAV

Submerged Aquatic Vegetation	
General Pros •	**General Cons** • In situ measurements are labor intensive
% Cover Pros • Can relate to shoot counts and density • Ecosystem services • In situ measure gives good bed info	**% Cover Cons** •
Acreage Pros • Only way to get large spatial coverage • Best for overall footprint of seagrass and can be universally collected • Commonly quantified and easily communicated	**Acreage Cons** • Mapped every two years but changes faster • Info too late at a landscape scale
Clarity Pros •	**Clarity Cons** • May have a range of "good"/"bad" values in different sections of the region
Species Composition Pros • Species composition can include macro algae • In situ measure gives good bed info	**Species Composition Cons** • Very difficult to manage for species diversity
Macro Algae Pros • Macro algae can be an indicator of nutrients – acts as a sponge	**Macro Algae Cons** • Macro algae can also act as a source for internal nutrients
Shoot Biomass Pros •	**Shoot Biomass Cons** • Very labor intensive

Table 2-6. Data Team Pros and Cons for Water Column

Water Column	
General Pros •	**General Cons** • Very difficult to view as a habitat
Water Quality (DO, salinity, temp., pH) Pros • Long-term data available • Indicates conditions are good/bad for species to exist or not • Can use data logger datasets to get duration of hypoxia • Captures several different data parameters	**Water Quality (DO, salinity, temp., pH) Cons** •
Chl a Pros •	**Chl a Cons** •

Water Column	
Clarity Pros • Long-term data available for turbidity, TSS, Chl a, secchi • Easy for the public to support • Good indicator of overall water condition	**Clarity Cons** • May be driven by both natural and anthropogenic
Frequency/Duration of HABs Pros •	**Frequency/Duration of HABs Cons** •
Nekton Pros • Gives information about size/composition of organisms using the habitat • Documented by multiple agencies/organizations through a variety of methods • Even if don't have consistent long-term data, have some • Commercially and economically important • Need to be inclusive for all swimming megafauna	**Nekton Cons** • Data spotty • Mammals? Fish species? • Could be difficult to compare datasets that use different collections methods or focal species
Nutrients Pros • Might be able to be traced back to a point-source emitter • Long-term data available	**Nutrients Cons** • Some systems are N limited, some are P limited • May be very site specific
Plankton Pros • Important to relate to IRL HABs • Driver of proactive management strategy • Indicates there is enough clarity to grow and could support fisheries • Fish larvae	**Plankton Cons** • Sampling taxonomy • Do we have long-term data • Metric for measuring HABs

Table 2-7. Data Team Pros and Cons for Oyster/Oyster Reef

Oyster/Oyster Reef	
Density Pros • Related to condition • Best measure • A "universal metric" in the oyster monitoring handbook - should be standard across state • Established widespread measurement in literature • Will cover live/cover • Respond to natural drivers predation/age of reef	**Density Cons** • Predation/age of reef (might make trends harder to detect over shorter periods of time) • Density and % Cover can be redundant but not indicate health (% Live) - needs definition

Oyster/Oyster Reef	
Chl a Pros • Food source • Long-term data available	**Chl a Cons** • Uncertainty in representation of data in an open highly flushed system and association with reefs • Doesn't capture phytobacteria • Too much is bad but so is too little (straight trend not meaningful)
Recruitment Pros • Important to determine potential for reef habitat • Assess fitness • Indication of reproductive stock for restoration • Indicate predator, H_2O quality stressors • Best measure • Can measure easily using spat trees or on restored reefs for year one	**Recruitment Cons** • In situ measure (labor intensive, time consuming) • Recruitment vs survival • Shows availability but would not show a lack of substrate • Difficult to measure in existing clusters • Careful with timing of data collection
Acreage Pros • Easy to understand • Good overall target • Photo interpreted from several years of photos	**Acreage Cons** • Responds slowly • Need to separate dead from live shell • Historic maps may have confused dead shell or reef • Landscape scale too late to do anything • Doesn't tell health • No indication of condition or gradient of degradation • Static measurement - footprint of reefs unlikely to change • Inconsistent mapping methods - cannot measure change • What is minimum size/What constitutes a reef • Patches, clumps, oysters on mangroves? • Artificial vs natural • Mapping methods

<table>
<tr><th colspan="2">Oyster/Oyster Reef</th></tr>
<tr><td>% Cover Pros
Even dead oysters (reefs) have beneficial physical properties, % cover captures this trait</td><td>% Cover Cons
New measurement - little representation in the literature
Not measured across state
Dependent on reef structure - high variable - via geography and hydrodynamics
Not widespread collection in the field
Does not indicate how much of the reef is alive - could be alive reef % cover but mostly is dead reef
Not determined to be a good indicator of condition yet</td></tr>
<tr><td>Size Class Pros
Related to condition
Good indication of stressors
May show stressors
Can give info (inferred) about population sustainability and fisheries value
Well documented method in literature</td><td>Size Class Cons
Respond to natural drivers
May not be able to tease out natural and anthropogenic drivers to get a management solution
Age of reef</td></tr>
<tr><td>Ambient Water Quality Pros
Applicable to another habitat
Long-term data available</td><td>Ambient Water Quality Cons
What will trends in a combo of these metrics tell us?
Uncertainty in representation of data in an open highly flushed system and association with reefs</td></tr>
<tr><td>% Live Pros
Best measure
Gives a direct indication of the health of the reef
Gives better indication of living/growing/filtering habitat than just % cover</td><td>% Live Cons
In situ measure
Not determined to be a good indicator of condition yet
Not measured across state
No baseline; not a widespread variable collected in field
Not well represented in literature
Define and differentiate between acreage, density, % cover
Do we measure just to substrate or how far into substrate
Dead oysters under substrate will give ≠ % live
Dead shell still provides some habitat benefits - may be underrepresented
Dependent on age of reef</td></tr>
</table>

Oyster/Oyster Reef	
	• Not clear indication of what "healthy" live cover is

Table 2-8. Data Team Pros and Cons for Coastal Wetlands

Coastal Wetlands	
Acreage Pros • Good for management if specifically count dead zone and eroding shorelines • Could encompass loss to sea level rise • Could capture erosion losses • Easy to interpret from aerials • Good for gross comparison with land use/development acreages • Shows large scale loss/gain • Picks up ecotones & shifts in habitat (e.g., northward expansion of mangroves) • Shows important large-scale trends • Already done a lot of work with CHIMMP	**Acreage Cons** • Too late • May be insensitive
Species Composition Pros • Good indicator of inherent biodiversity in a system. • Good for tracking mangrove/salt marsh transition • Can show expanding ranges/succession/competition • Can detect invasions or potential invasions • Could capture inland migration due to sea level rise • Capture structural changes from mangrove <-> salt marsh • Can show inundation (sea level rise)	**Species Composition Cons** •
% Cover Pros • Lots of data	**% Cover Cons** • May overestimate density (depends on minimum unit and what is considered continuous coverage)
Biomass Pros • Good measurement of wetland productivity (health)	**Biomass Cons** • Not directly measured at permanent monitoring sites because you can't harvest • Not widely collected data • Project-specific examples (students) • Hard to measure

Coastal Wetlands	
Density Pros • Good indicator of marsh condition (was listed in cons)	**Density Cons** • Labor intensive • Small scale • May not have a lot of data
Sediment Elevation Change Pros • Relate sea level rise and coastal erosion	**Sediment Elevation Change Cons** • Different methods – shallow vs. deep rods • Interpretation issues with distinguishing marsh subsidence/upheaval vs. erosion/accretion

2.1.3 Data Team List of Top 5 Indicators for Each Habitat Index

Following discussions of indicator pros and cons, members of the Data Team voted on their top five indicators for each habitat index. Data Team members only voted for habitat indices for which they were familiar. Only one vote was allowed per indicator. Indicators below are prioritized by the number of votes received, with only the top five indicators listed.

Submerged Aquatic Vegetation

1. % Cover
2. Acreage
3. Clarity (light attenuation)
4. Species Composition
5. Macro Algae

Water Column

1. Water Quality (DO, salinity, temp., pH)
2. Nekton
3. Plankton
4. Nutrients
5. Clarity

- Fecal Coliform added after voting

Oyster/Oyster Reef

1. Density
2. % Live
3. Recruitment
4. Size Class
5. Acreage

Coastal Wetlands

1. Acreage
2. Species Composition
3. % Cover
4. Sediment Elevation Change

2.2 Measurement Units and Analyses for Indicators

The Data Team assembled the following list of measurement units for each of their top 5 indicators, as well as a list of locations where the data had been analyzed or summarized.

Table 2-9. Data Team Units of Measure and Analyses for SAV

Submerged Aquatic Vegetation			
Indicator	**Unit of Measure**	**Analyzed Y/N**	**Comments**
% Cover	• Percentage per m^2	Y (in SIMM)	There is a conversion for g rams dry weight per m^2 to get biomass
Acreage	• Acres, Hectares	Y (in SIMM)	Every two to three years in IRL
Clarity (light attenuation)	• PAR • K per m • Secchi (m) • Turbidity (NTU) • CDOM	Y (SSER, SFER)	Some data taken at transects and some at permanent WQ sites
Species Composition	• Percent per m^2 • Presence absence		Summarized where there is SAV, in a database
Macro Algae	• % cover • Gram dry weight per m^2 • Metric tons (deep)	• Y (Super Bloom Report IRL) • Y (Nova SE University reports)	May not be analyzed to full extent for the region

Table 2-10. Data Team Units of Measure and Analyses for Water Column

Submerged Aquatic Vegetation			
Indicator	**Unit of Measure**	**Analyzed Y/N**	**Comments**
Water Quality (DO, salinity, temp., pH)	• DO (mg/l) • Salinity (PPT and conductivity) • Temp °C • pH	Y (NPS report, WMD)	NPS also measures turbidity, readily available from WMDs, data available in STORET and DBHYDRO, GTM has summarized and analyzed for trends
Nekton	• Presence absence • Catch per unit effort • Number species per m^2	Y (FIM/FWC)	Not complete coverage, North and Central IRL and St. Mary's, Nassau River, Lower St. Johns, North Loxahatchee. GTM one published paper (McGinley et al 2016). USGS report (Tutora & Schotman 2010)

Submerged Aquatic Vegetation			
Plankton	• Number cells per ml (phytoplankton) • Bio volume • Grams dry weight (zooplankton) • Number individuals per ml (zooplankton)	Y (Super Bloom Report, UF reports for IRL, FIT, GTM two published papers)	IRL: see lots of Phlips and Badylak papers; GTM: Hart et al. 2015, Dix et al. 2013 (CHL)
Nutrients	• mg/l	Y (SSER, SFER, Super Bloom Report IRL)	GTM has summarized and analyzed for trends
Clarity	• PAR • K per m • Secchi (m) • Turbidity (NTU) • CDOM	Y (SSER, SFER, Super Bloom Report IRL)	GTM has summarized and analyzed trends for turbidity, SJRWMD status and trends report; simple trends might not be easy to take out of reports
Fecal coliform	• CFU	Y (FDA annual and tri-annual reports, GTM geospatial over time)	NOAA NCCOS has analyzed geospatial data for GTM

Table 2-11. Data Team Units of Measure and Analyses for Oyster/Oyster Reef

Oyster/Oyster Reef			
Indicator	**Unit of Measure**	**Analyzed Y/N**	**Comments**
Density	• Number per m^2 • Standardized protocol	N	Summarized for some sites (GTM, southern IRL, St Lucie River, Mosquito Lagoon)
% Live	• Percentage	N	No standard in literature; Summarized in GTM
Recruitment	• Number spat per shell	N	Summarized for some sites (GTM, southern IRL, St Lucie River, Mosquito Lagoon, Loxahatchee)
Size Class	• Millimeters	N	First 50 shells in random sample; # per m^2 per size class; summarized for GTM

Oyster/Oyster Reef			
Acreage	• Acres • Historical harvestable acres change over time	N	OIMMP looking at acreage and likely a data gap

Table 2-12. Data Team Units of Measure and Analyses for Coastal Wetlands

Coastal Wetlands			
Indicator	**Unit of Measure**	**Analyzed Y/N**	**Comments**
Acreage	• Acres, Hectares	Y (CHIMMP/FWC)	In draft but data is finalized - entire state
Species Composition	• Acres • Percent cover at site scale • Presence absence	Y (CHIMMP)	Mapping - mangroves, salt marsh; GTM has summarized
% Cover	• Percent		GTM has summarized
Sediment Elevation Change	• Millimeters per year	N	Non-continuous coverage; length of data collection extremely variable; GTM has summarized

2.3 Existing Data Sources for Priority Indicators

Mrs. Clark, NE Region staff, and others presented information about existing data sources for various habitats in the region to inform meeting participants. These presentations are available by contacting DEP. After these presentations, meeting attendees were asked to list additional data sources that had not been mentioned in the presentations or earlier in the meeting.

Table 2-13. Additional Data Sources for Priority Indicators

Habitat	Indicator(s)	Data Owner	Contact	Years Data Available	Data Format	Location of Data	Is it Spatial?
SAV, SFWMD region	% occurrence, cover	SFWMD	adickens@sfwmd.gov	15+	Various; field mapping, quads, occur(?)	SFWMD	Y
Mangrove, Marsh, Wetland	Aerial mapping and field mapping	SFWMD	?	15+?	Various, SFWMD	SFWMD region	
SAV	% occurrence, cover	Lox River District (Jerry Merz) & SFWMD (Kahn Dickens)		5+	GIS files, spreadsheets, SFWMD	Loxahatchee	Y
Water Quality	Chl a, DO, pH, turb, sal	Lox	LRD, Jerry Metz	10+	Various format	LRD website	? I think so
Water Quality	Chl a, DO, pH, turb, sal	Lox and North Fork St. Lucie River	SFWMD adickens@sfwmd.gov	20+	Various formats DBHYDRO		Y
Water Quantity	Input, model, flushing time	Lox River	SFWMD	?	various		
Benthos (GTM)	Macroinverts - 10 years crab data; Shellfish? Don't know of any besides mussels inc. in oyster reef monitoring						
Mangroves/Marshes (GTM)	Not field mapping or photo points; health/biomass?						
Coastal Wetlands	Species composition, density, % cover, Nekton	FWC	Annie.Roddenberry@myfwc.com	2014-present (biannual collection)	Excel spreadsheet	New Smyrna Beach – Volusia	No. One restored salt marsh site.

Habitat	Indicator(s)	Data Owner	Contact	Years Data Available	Data Format	Location of Data	Is it Spatial?
Water Column	Salinity, DO, temp, pH, clarity	Marine Discovery Center (Volusia County)	Jessy Wayles jessy@marinediscoverycenter.org	2014-present	Google docs spreadsheet (~Excel), *Citizen science data collected by trained volunteers	Marine Discovery Center (Volusia County)	Not yet, but lat/long is part of data collected.
Coastal wetlands / oyster	Biodiversity, species comp, recruitment, size class, nekton	UCF	Melinda.Donnnelly@ucf.edu	2014-present	?	Univ. Central FL	For several sites in Volusia County and Canaveral National Seashore
Seagrass	Macro algae (deep surveys, hydro acoustic)	SJRWMD	lmorris@sjrwmd.com	2005, 2008, 2010, 2012, 2014, 2015	GIS and Excel	SJRWMD	Y
Seagrass (Transects)	% cover, macro algae, species cover, shoot counts, water clarity	SJRWMD	lmorris@sjrwmd.com	1994-present	Access and Oracle	SJRWMD	Y
Seagrass	Acreage	SJRWMD	lmorris@sjrwmd.com	1943, 1986-2015 (every 2-3 years)	GIS	On-line	Y
Mangrove/Salt marsh (coastal wetland)	Acreage, species comp.	SJRWMD	Ron Brockmeyer/District website	~5 years from 1990	Land cover mapping - GIS	Website/Palatka	Y/website - FLUCCS
Water	Residence Time/hydro model in GTM	Peter Sheng (UF); Sheng et al (2008) Jour Coastal Research	Maltane Olabarrieta (UF) (Nikki can connect if you'd like)				

Habitat	Indicator(s)	Data Owner	Contact	Years Data Available	Data Format	Location of Data	Is it Spatial?
Water	Plankton		Ed Phlips (UF), N Dix (GTM)	2004? – 2008; 2015-present (Pellicer)	Excel	Fixed sites (SWMP sites)	
SAV – Lox River Lake Worth Creek	All indices	Loxahatchee River District				Wild pines Laboratory; website	
Oysters Lox River Lake Worth Creek		Loxahatchee River District				Wild pines Laboratory; website	
Water column	Nekton	Ed McGinley@flagler	Nikki.Dix@dep.state.fl.us	2013-present		McGinley	
Oysters - Oyster Reef Condition Assessment; GTM NERR cove monitoring; Mosquito Lagoon; NCB; biotic and abiotic data	Oyster size, density, % cover		Erica Hernandez; Linda Walters Mosquito Lagoon	2014 to date			

Habitat	Indicator(s)	Data Owner	Contact	Years Data Available	Data Format	Location of Data	Is it Spatial?
Oyster map; Mosquito Lagoon; NCB			Online SJR or/and FWC, Erica Hernandez	ML – 2009, NCB - 2016	2014 to date		GIS data: dead/alive * does not denote gradients of health/ condition of live reef. Things mapped as live may be severely degraded. *Acreages – may not be accurate – may over or underestimate reef size due to remote sensing.
Coastal Wetlands	Salt Marsh elevation	NPS	lisa_baron@nps.gov				
Water + Wetlands	Estuarine Water Quality + Sediment Assessment	NPS	lisa_baron@nps.gov				
Coastal Wetlands	Vegetation Communities	NPS	lisa_baron@nps.gov				
Coastal Wetlands	Vocal Anurans	NPS					

2.4 Data Gaps

The following data gaps were identified during discussions following voting on top indicators.

Oyster/Oyster Reefs:

- Lack of good quality aerial images
    - Confidence in determining acreage lacking because of no good quality aerial images
- Lack of accessibility for good quality aerial images
- Variability in the quality of images and coverage (fringing reefs)
- Acreage data not presentable at the moment
- Acreage needs to be refined
- With lack of aerial imagery for acreage, there are historical harvestable acres that can be looked at for change over time
- Density and % Live - data is developing
    - Needs more reefs included in current monitored reefs
- All oyster metrics need more spatial data
    - Just started collecting on-the-ground data

Water Column:

- No system-wide nekton/plankton monitoring
- Megafauna using water column?
- If they are collecting data, not assessing it as a habitat indicator - more so done as population data
- Spotty nekton data
- Data gaps, geographic/spatial

3 Day 2 Meeting

The purpose of the Day 2 meeting was to collect Partner Team recommendations for priority indicators to be considered for inclusion in the NE Region Habitat index.

The following goals were accomplished during the meeting:

1. Partner Team will review the Regional Habitat Index from Day 1.
2. Partner Team will come to a collaborative agreement on regional indicators.
3. Data Team will contribute to the Partner Team discussion.
4. Partner Team will assess gaps in management needs.
5. Partner Team will identify products that are most useful for management needs.

3.1 Partner Team Review of Data Team List of Top 5 Indicators

The top five indicators for each habitat index determined by the Data Team on Day 1 were presented to the Partner Team for review. The Partner Team made no changes to the indicator list determined by the Data Team.

SAV	Water Column	Oyster/Oyster Reef	Coastal Wetlands
1. % Cover 2. Acreage 3. Clarity (light attenuation) 4. Species Composition 5. Macro Algae	1. Water Quality (DO, salinity, temp., pH) 2. Nekton 3. Plankton 4. Nutrients 5. Clarity • Fecal Coliform*	1. Density 2. % Live 3. Recruitment 4. Size Class 5. Acreage	1. Acreage 2. Species Composition 3. % Cover 4. Sediment Elevation Change

*Fecal Coliform added after voting on Day 1 by Data Team

3.1.1 Partner Team List of Indicator Pros and Cons for Each Habitat Index

To inform indicator prioritization from a management perspective, the Partner Team provided pros and cons for the list of indicators prioritized by the Data Team on Day 1.

The Partner Team added 'Classified Waters' as an indicator for Water Column, resulting from discussions of the importance of harvestable areas during the pro/con discussion of 'Acreage' for Oyster/Oyster Reef.

Table 3-1. Partner Team Pros and Cons for SAV

Submerged Aquatic Vegetation	
General Comment (neither pro/con) • Species composition and macro algae relative to specific areas and temporal scales	
Acreage Pros • Useful	**Acreage Cons** • Government board wants info on specific areas relative to management structures and a smaller time scales, e.g., large flow event → what's going on "here" one month later
Species Composition Pros • Especially native vs. nonnative	**Species Composition Cons** • → to large spatial and temporal
Clarity Pros • Useful if it leads to further testing if not clear. • Significant relationship with SAV	**Clarity Cons** • Tough data point. So many variables can lead to reduced clarity • Suspended solids? • Too much nutrients
% Cover Pros • Readily understood	**% Cover Cons** •
Macro Algae Pros •	**Macro Algae Cons** • Do we include drift algae in this?

Table 3-2. Partner Team Pros and Cons for Water Column

Water Column	
Chl a Pros •	**Chl a Cons** •
Water Quality (DO, salinity, temp., pH) Pros • One of the most asked about resources • Goal of Timucuan Preserve • Asked about for management but akin to "air quality" • Important to all other habitats	**Water Quality (DO, salinity, temp., pH) Cons** • Is water quality a resource? • Chlorophyll measure? • Good BUT doesn't measure enough. Should include Total Nitrogen and Total Phosphorus (BMAP/TMDL indicators) • This is measured for all habitats, right?
Nekton* Pros •	**Nekton* Cons** • Data gaps, geographic/spatial
Plankton Pros • Snook, spotted sea trout (other species) larvae • Checkmark • Community composition	**Plankton Cons** • Scientists understand importance but public only if visible (i.e. red tide) • Should specify how algal bloom "signals" fit here. Can we use this to see a bloom coming? • Data gaps, geographic/spatial
Clarity Pros •	**Clarity Cons** •
Fecal Coliform Pros • This is an issue that is relevant and taught to most people • There is a large push, that is gaining steam, to address this at local and state level • Has been a priority in this region • Has impacts that the community cares about • Harvestable water for clams/oysters • Checkmark	**Fecal Coliform Cons** •

*Partner Team discussion that Nekton includes: blue crab, Listed Species, Game Fish, manatees, dolphins, species of management concern (NOAA), invasive species

Table 3-3. Partner Team Pros and Cons for Oyster/Oyster Reef

<table>
<tr><th colspan="2">Oyster/Oyster Reef</th></tr>
<tr><td>General Pros</td><td>General Cons</td></tr>
<tr><td>Density Pros
Coverage is readily understood
Oyster reef change over time = useful
% live % cover (acreage)
Density, Timucuan Preserve</td><td>Density Cons</td></tr>
<tr><td>% Live Pros</td><td>% Live Cons</td></tr>
<tr><td>Recruitment Pros</td><td>Recruitment Cons
Can this be captured with size class info?</td></tr>
<tr><td>Size Class Pros
Important data point to highlight health of the reef
Will also show imbalances in health
Most important so we know if we have harvestable sized oysters
May inform fisheries
Size important for economic aspects can also provide some recruitment info?</td><td>Size Class Cons
Is size class only on Live oysters?</td></tr>
<tr><td>Acreage Pros
Acreage of harvestable oysters is important to show decline or increase
Large changes (opening/closing) may inform us on bacteriological contamination in a way
Useful in “big picture” presentations; trends, red flags, improvements
Acreage Timucuan Preserve</td><td>Acreage Cons
“Harvestable” acreage doesn’t quantify actual count unless combined with Density, Size, % Live AND Water Quality
<u>Any</u> pollutant (fecal/heavy metals) can make them (or clams) unharvestable from a human consumption standpoint
Acreage maybe changed to <u>Coverage</u> so we at least know where they are and are not
Think this is misleading – Don’t really care about designated area, especially if it doesn’t result in actual harvestable acreage
Not “acreage” of harvestable
Need oyster reef acreage
Move to water?
Need water quality data for harvestable (class 2) waters – goal of Timucuan Preserve</td></tr>
</table>

Oyster/Oyster Reef	
	• Acreage of water classified as harvestable is okay but does not communicate states of reef (economics) • Want to know change in large scale need over time; have historic data. This goes to habitat not just "harvestable area" to show to management/stakeholders • Does not accurately reflect size of (nor health) reefs, which is what most people/government look at

Table 3-4. Partner Team Pros and Cons for Coastal Wetlands

Coastal Wetlands	
Acreage Pros • Most people can relate to an acres • Can provide data to a large audience. • Trends over time will convey change over time. • Timucuan Preserve	**Acreage Cons** •
Species Composition Pros • Check mark • Readily understood; "this used to be salt marsh now mangroves are here." "The red mangroves are moving further inland.' • Good data source. • Will show health of community. • Will show imbalances in the ecosystem. • Important Timucuan Preserve management goal	**Species Composition Cons** •
% Cover Pros • Readily understood. • Timucuan Preserve	**% Cover Cons** •
Sediment Elevation Change Pros • Good thing for managers to know. • Can combine with other indicators to present info to others. • Best indicator of long-term survival	**Sediment Elevation Change Cons** • May be difficult for public/decision makers to understand. • Public may not understand importance as opposed to % cover species and acreage • Difficult data to sell to the general population. • People better understand change in acreage or composition

3.1.2 Partner Team List of Top 3 Indicators for Each Habitat Index

Following discussions of indicator pros and cons, members of the Partner Team voted on their top three indicators for each habitat index. Partner Team members only voted for habitat indices for which they were familiar. Only one vote was allowed per indicator. Indicators below are prioritized by the number of votes received, with only the top three indicators listed.

Submerged Aquatic Vegetation

1. % Cover by Species (including macro algae)*
2. Acreage
3. Clarity (light attenuation)

*Partner Team decided to combine 'Species Composition' votes with '% Cover' and change the indicator to '% Cover by Species (including macro algae)'

Water Column

1. Nekton
2. Plankton
3. Fecal Coliform (bacteria)

Oyster/Oyster Reef

1. Density
2. Size Class
3. % Live

Coastal Wetlands

1. Species Composition
2. Acreage
3. % Cover

3.2 Data Gaps

The following data gaps were identified during discussions following voting on top indicators.

- Finalize oyster habitat map
- Do not have complete datasets on Nekton/Plankton
- Source tracking for fecal coliform
- Small-scale species composition data (site scale)
- Ecosystem services evaluations (North FL Land Trust, IRL, NEP, USGS)
- Local-scale vegetation species composition tracking for coastal wetlands
    - Contacts: Ryan Moyer (FWC, CHIMMP), Lisa Baron (NPS), Jeremy Conrad (FWS, locations of elevation monitoring), GSAA (metadata database, set up by SECOORA)

3.3 Product Formats

The following formats were suggested Partner Team as possibly suiting their management needs.

- Local GIS data
- Geospatial information

- Interactive web tool
  - Shapefile by county
  - Assistance (human)
  - Graphs and tables
  - EASE OF USE – MUST BE USER FRIENDLY (need to export, small file size for email, under 10mb)
- DEP Map Direct (example web tool)
  - Multiple sources
  - Tables, maps
- Our FL Reefs program (example web tool)
  - Grid over reef area (planning units) – can select area and choose layers (ex hardbottom) and provides all data for that region for layer
- Vote for using same as Our FL Reefs – but have analyzed data for that area, not just raw data
- Swamprats (example web tool)
  - Output as easily consumable graphs (for PowerPoints/presentations)
- NatureServe Gulf Study – (example web tool)
- Graphs and tables
  - As interactive web tool for outreach purposes
- Statewide perspective: Portfolio of sites (example from North FL Land Trust)
- Raw data
  - Spreadsheet in Excel format
- PowerPoint library
  - Be able to share PowerPoints and slides
  - Issues with people taking other presentations and presenting that
- Want uniformity
- Summary reports - Regional reports and more watershed-based/site specific reports
  - Recommended to start regional
  - Nested
- Hi-res logo library
  - Need correct logos of people involved so if you are using their data (reference where it is from so others can contact them)
- Regional and site-specific product reports
- Data clearing house
- Regional Ocean Observing Networks

4 Appendices

Appendix A. Meeting Participants

First Name	Last Name	Email	Organization	Area of Expertise	Managed Area	Attendance
Andrea	Noel	andrea.noel@dep.state.fl.us	FL Aquatic Preserves program	Oysters, shoreline restoration	NE FL APs manager (Naussa County)	Day 1, Day 2
Annie	Roddenberry	annie.roddenberry@myfwc.com	FWC	Aquatic habitat restoration - salt marsh, mangrove, oysters		Day 1, Day 2
Barbara	Howell	barbara.howell@dep.state.fl.us	FCO Central FL APs	Generalist; education, outreach	FCO Central FL APs and Wekiva	Day 2
Daniel	Tardona	daniel_tardona@nps.gov	NPS Timucuan Preserve	Science, outreach coordinator	Jacksonville	Day 2
Eric	Anderson	eanderson@nefrc.org	NEFRC	Sea level rise, vulnerability, communities, city prepardness	Senior regional planner Nassau, Baker, Duval, Clay, Putnam, Flagler, St. John's counties	Day 2
Erica	Hernandez	ehernandez@sjrwmd.com	SJRWMD	Coastal wetlands, oysters	Port Orange to Georgia border	Day 1
Howard	Beadle	howard.beadle@freshfromflorida.com	FDACS	Aquiculture and aquiculture use, manage bacterial WQ	St. John to St. Lucie Counties	Day 1, Day 2
Irene	Arpayoglou	irene.arpayoglou@dep.state.fl.us	Indian River Lagoon APs	Seagrass cultivation and restoration, marine biology, coastal zone management	IRL APs manager	Day 1, Day 2
Jan	Brewer	jbrewer@sjcfl.us	St. John's County	Navigating local government	Director, manage environmental division for county	Day 2
Kurt	Foote	kurt_foote@nps.gov	NPS Ft. Matanzas	Generalist	325 acres of monument	Day 1, Day 2
Lori	Morris	lmorris@sjrwmd.com	SJRWMD	Seagrasses, macroalgae, benthic habitat	Indian River lagoon	Day 1
Mike	Shirley	michael.shirley@dep.state.fl.us	GTMNERR	Toxicology, habitat restoration - salt marshes	NE regional administrator, director of GTM	Day 1, Day 2
Nikki	Dix	nikki.dix@dep.state.fl.us	GTMNERR	WQ, oysters, plankton, coastal wetlands	GTM research coordinator	Day 1, Day 2

First Name	Last Name	Email	Organization	Area of Expertise	Managed Area	Attendance
Ron	Brockmeyer	rbrockmeyer@sjrwmd.com	SJRWMD	Coastal wetlands responsibilities, oysters, habitat restoration	SJRWMD	Day 1, Day 2
Tina	Gordon	tina.m.gordon@dep.state.fl.us	GTMNERR	Collaborative process, training, development		Day 1, Day 2
Shannon	Jackson	sjackson@sjrwmd.com	SJRWMD		SJRWMD (Intern)	Day 1
Amanda	Kahn Dickens	adickens@sfwmd.gov	SFWMD	Seagrass, salt marsh, oyster, WQ, phytoplankton		Day 1, Day 2