

Using Partnerships to Facilitate Oyster Restoration in the Charlotte Harbor National Estuary Program

*DEO Waterfronts Florida Workshop
May 30, 2013 – San Carlos Island*

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Purpose: Share approach & goals for oyster habitat restoration in Charlotte Harbor NEP.

Topics:

- What the CHNEP is**
- Why restoring oyster habitat is important**
- How oyster habitat restoration is being accomplished within the CHNEP**
- Where to go for more information**

What & Where is Charlotte Harbor NEP?



- 1 of 28 NEPs
- Implement Clean Water Act
- Located in SW FL
- Watershed = 3,008,000 acres
- 3 Major Rivers
- Estuaries = 224,000 acres

CHNEP Estuaries are Diverse, Productive & Complex



Photo: FDEP/Repenning



Photo: FDEP/Laakkonen



Photo: ICIR/Miller

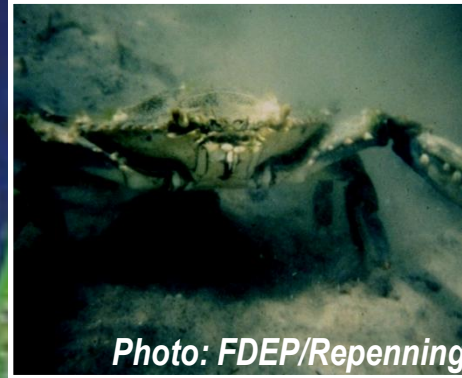


Photo: FDEP/Repenning

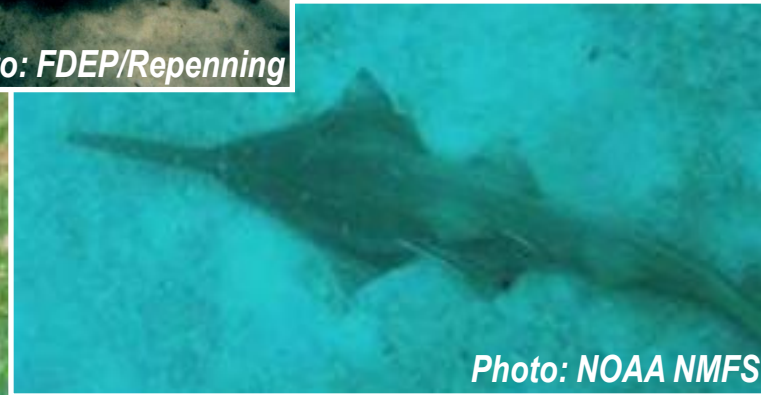


Photo: NOAA NMFS



Photo: FSU/De Maria

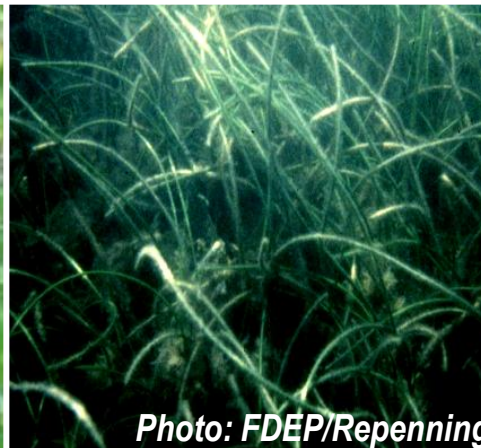
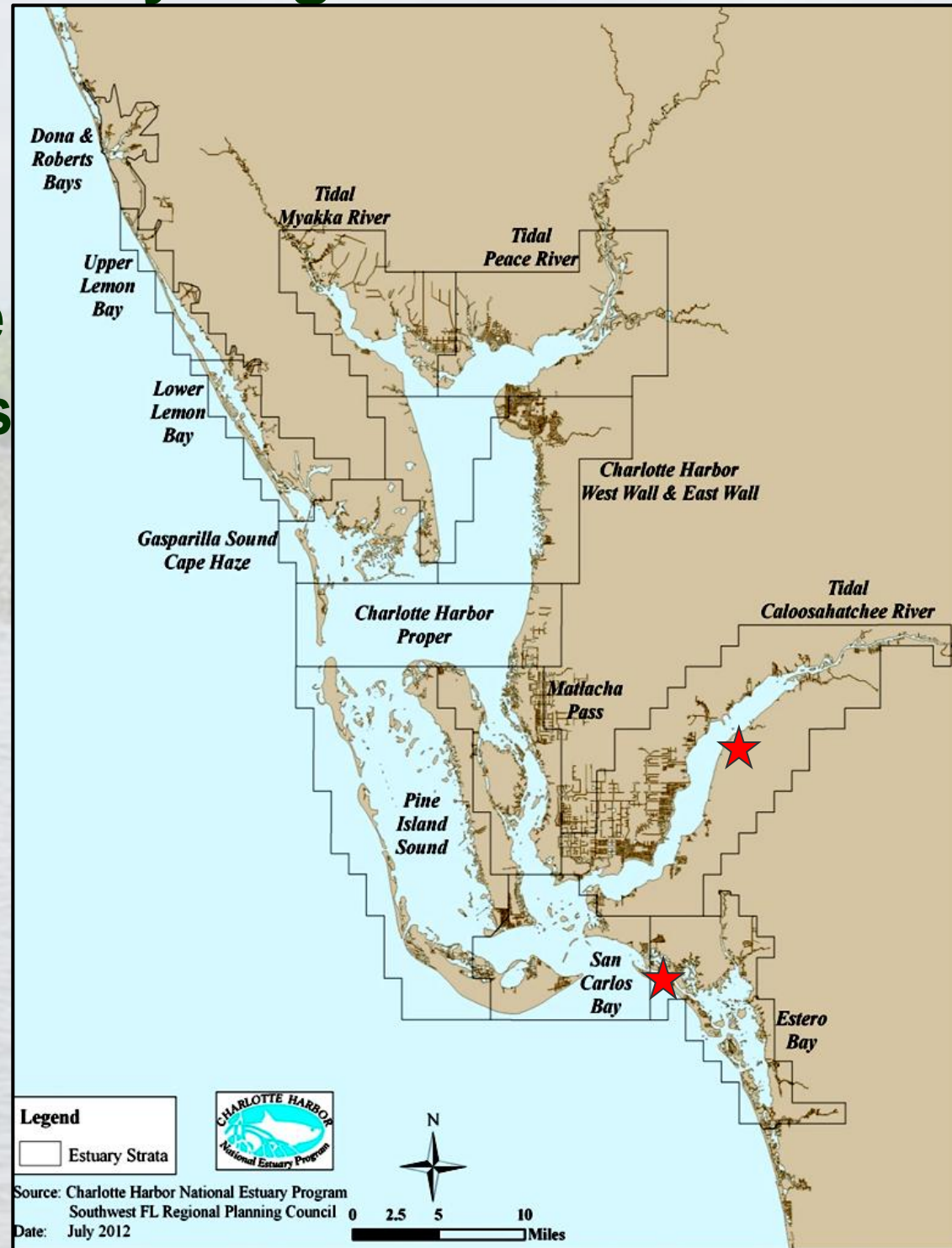


Photo: FDEP/Repenning

CHNEP Includes 14 Estuary Segments

- Dona & Roberts Bays
- Lemon Bay Upper & Lower
- Gasparilla Sound/Cape Haze
- Tidal Myakka & Peace Rivers
- Charlotte Harbor West Wall, East Wall & Proper
- Pine Island Sound
- Matlacha Pass
- San Carlos Bay
- Tidal Caloosahatchee River
- Estero Bay

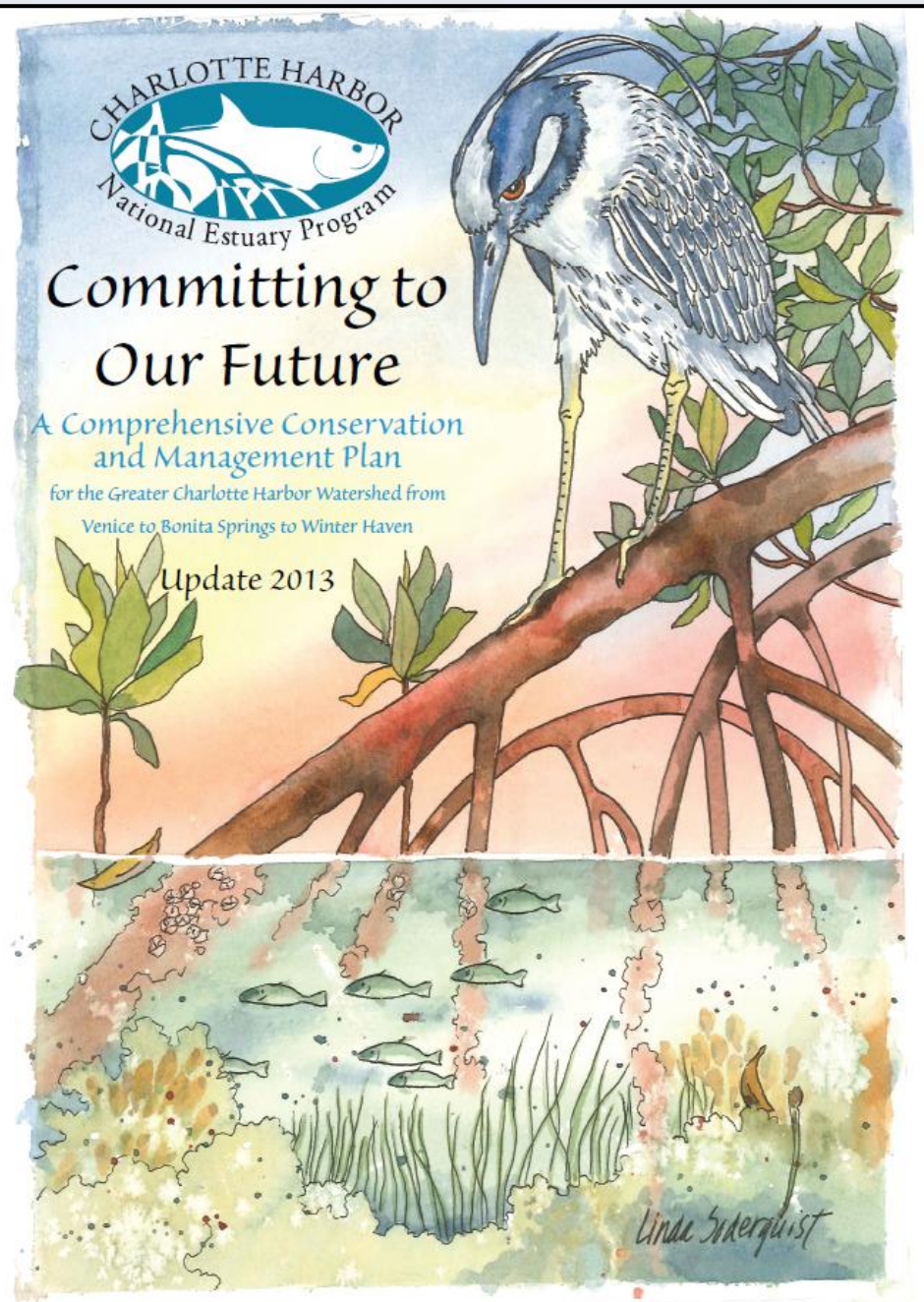


CHNEP Is a Partnership that Makes Cooperative, Scientifically Sound, Consensus Based Decisions



Photos: CHNEP

CHNEP Actions are Guided by the Comprehensive Conservation & Management Plan (CCMP)



4 CHNEP Priority Problems are:

- **Hydrologic Alterations**
- **Water Quality Degradation**
- **Fish & Wildlife Habitat Loss**
- **Stewardship Gaps**

Oyster restoration addresses all 4 Priority Problems & implements 10 Objectives & Actions.

Why is Restoring Oyster Habitat Important?

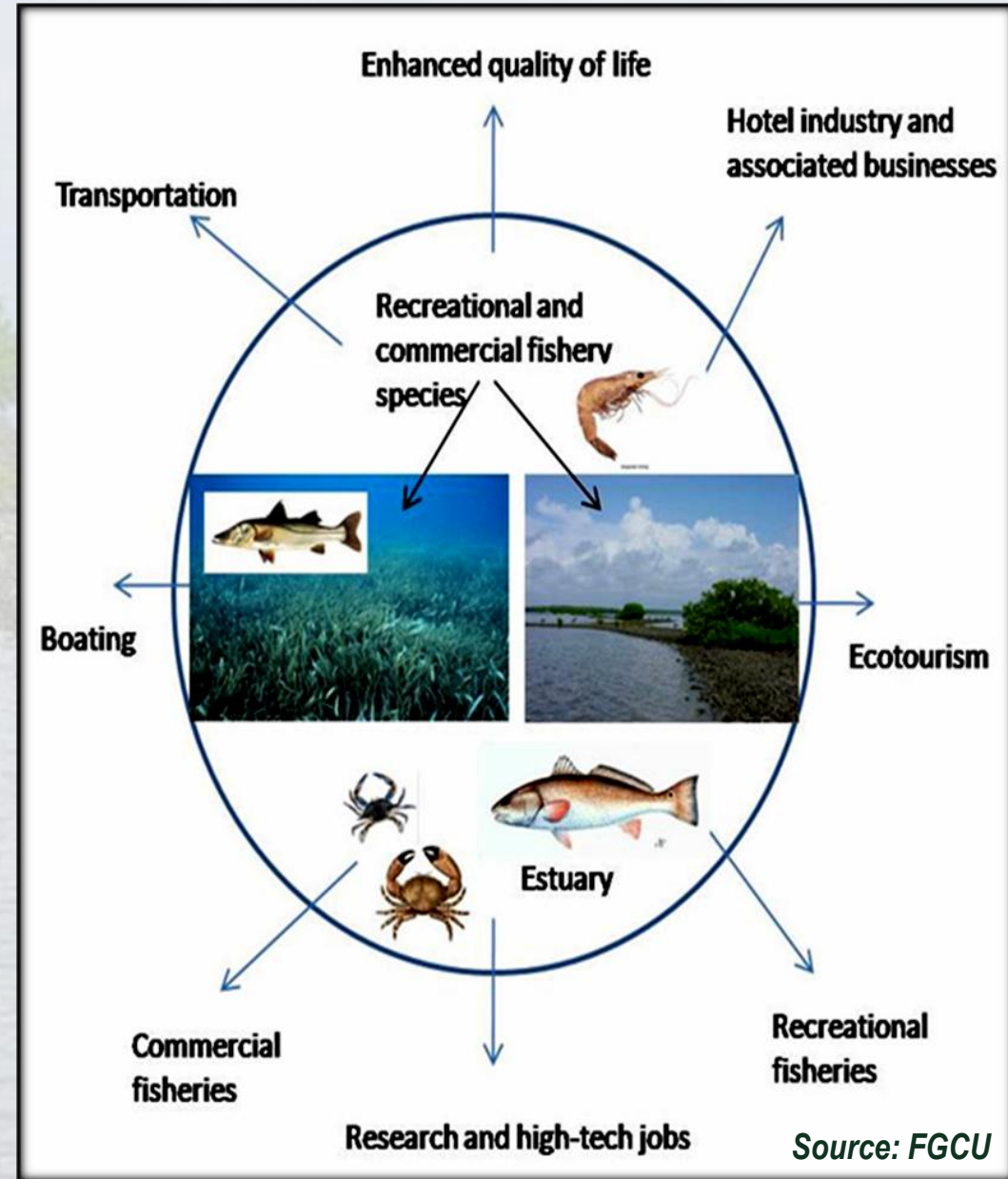
Oyster Habitats have Declined Dramatically

- **Worldwide: most imperiled marine habitat (Brumbaugh et al 2010)**
- **Worldwide: 85% loss (Beck et al 2011)**
- **US: 60% area & 85% biomass loss (zuErmgassen 2012)**
- **South Florida: 90-99% of historic reefs (Beck et al 2009)**
- **West Florida: depletion of reefs from 1876-1898 (Smeltz 1898)**

- **Southwest FL: dominant feature since 470 ybp (Savarese et al 2004)**
- **Charlotte Harbor: 39% from 1945-1982 (Harris et al 1983)**
- **CHNEP: 1950s aerials = 2,679 acres (PhotoScience 2007)
1999 aerials = 247 acres (Avineon 2004)**
- **Best Estimate = 90% loss since mid-1900s**
- **Causes = dredging, oyster mining for road beds, sedimentation, hydrologic changes, coastal development & over harvesting.**

Oysters Provide Essential Ecosystem Services

- Provide structure for complex biological communities, including permanent & transient species.
- Improve water quality by filtering water, reducing turbidity & nutrients & transferring energy.
- Stabilize sediments, shorelines & adjacent habitats.
- See CHNEP Oyster Habitat Restoration Plan Table 1 for details & references.



Oysters Also:

- Serve as indicators of estuarine health in CHNEP.
- Are basis for TNC Charlotte Harbor Marine Priority Area.
- Act as “charismatic mega-fauna” which link scientists, citizens & resource managers & enhance stewardship.

Environmental Indicators Update



Charlotte Harbor National Estuary Program
Technical Report 08-1
May 19, 2008



1926 Victoria Avenue
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www.CHNEP.org



Photo: FGCU



Photo: SCCF

Estimated Economic Value of Natural Resources:



Charlotte Harbor National
Estuary Program

Estimated Economic Value of Resources

Report
March 5, 1998



Artwork by Diane Pierce
"Edge of the Wild", Lake Wales, Florida

HAZEN AND SAWYER
Environmental Engineers & Scientists

- **CHNEP Study of Total Direct & indirect Income from Natural Resources 1995**
- **SWFRPC Study of Ecosystem Services Values of Habitats in SW FL - 2013**
- **Total Ecosystem Services = 1995 Dollars = \$5 Billion
2013 Dollars = \$7.6 Billion**
- **Tourism & Recreation = \$2.2 Billion (2012 Dollars)**
- **>80% of commercially & recreationally harvested marine species depend on healthy estuaries**

How is Oyster Habitat Restoration Being Accomplished in CHNEP?

CHNEP Shellfish Restoration Workshop – Feb 2011

- with TNC Oyster Restoration Collaboration Workshop
- Reviewed available scientific & permitting information
- Agreed to establish scallop & oyster working groups



CHNEP Received TNC Support to Develop Oyster Habitat Restoration Plan – Spring 2012

Formed the Southwest FL Oyster Working Group

- Met 5 times from April – Sept 2012
- >40 participants from >26 organizations & agencies
- Provided technical assistance & review for CHNEP Oyster Habitat Restoration Plan

Clarified the Purpose of the Plan:

Provide a technically sound, consensus-based approach for oyster habitat restoration in the CHNEP estuaries.

Defined Oyster Habitat for this Plan:

Substrate upon which a self-sustaining native oyster (*Crassostrea virginica*) community develops, providing habitat for commensal flora & fauna.

Utilized TNC's Conservation by Design Approach:

- Plan, design & select sites for successful restoration**
- Identify priorities through data compilation**
- Develop strategies to restore to fullest functionality**
- Implement strategies**
- Measure effects of implemented restoration**
- Select & monitor goal-related success criteria**

SW FL Oyster Working Group Discussed:

- **Essential & limiting conditions for oyster restoration**
- **Data availability - GIS, published &/or local knowledge**
- **Oyster habitat restoration methods & success criteria**
- **Oyster monitoring & mapping needs**
- **Federal, state & regional regulatory requirements**

CHNEP Developed GIS Based Oyster Habitat Restoration Suitability Model:

- **Assumes larvae are plentiful & substrate is limiting**
- **Includes relevant factors that quality spatial data**
- **Creates categories of percent suitable for restoration**

Prepared CHNEP Oyster Habitat Restoration Plan:

- **Includes long term goals & short term actions**
- **Was approved by CHNEP Management Conference**
- **Will be updated regularly - at least by 2020**

What are the CHNEP Oyster Restoration Goals?

Charlotte Harbor National Estuary Program Oyster Habitat Restoration Plan



Charlotte Harbor National Estuary Program
Technical Report
Final Draft: 10/3/2012



1926 Victoria Avenue, Fort Myers FL 33901
(239) 338-2556 www.CharlotteHarborNEP.org

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- Background
- Local Context
- Permitting Considerations
- Planning for Success
- Restoration Suitability Model
- Other Spatial Considerations
- Restoration Goals
- Restoration Strategies
- Success Criteria
- Monitoring & Mapping Needs
- Steps to Attain Goals
- Cost Estimates
- Funding Opportunities
- Community Stewardship

Summarizes Regulatory Requirements (Table 2):

Authority	Statute	Agency	Role
NWP 27 or Individual Permit	Sec 10 RHA; Sec 404 CWA	USACE	Lead agency, reviews applications & determines if NWP 27, individual permit &/or Sec 7 consultation is required
	Endangered Species Act	NMFS	Sec 7 consultation if USACE determines may affect smalltooth sawfish & sea turtles or their habitat
		USFWS	Sec 7 consultation if USACE determines may affect threatened or endangered species other than fish & sea turtles
ERP & Sovereign Submerged Lands Approval	Chapt 373 FS (ERP); 18-20 FAC	FDEP	Reviews applications for oyster habitat restoration projects for consistency with state statutes
	(Aquatic Pres); 18-21 FAC (State Lands)	SWFWMD or SFWMD	Reviews permit applications for oyster habitat restoration projects when FDEP is applicant or if part of larger project being reviewed by the district

Summarizes Resource Management Considerations

Aquatic Preserves (Fig. 3)

Sawfish Habitat (Fig. 5)

Aquatic Preserves & Water Management Districts in CHNEP

Critical Smalltooth Sawfish Boundary & Habitat in CHNEP



Oyster Habitat Restoration Suitability Model (RSM):

- Uses best spatial (GIS) data to identify areas suitable for restoration
- Provides regional map of potential & priority restoration areas in each estuary
- Directs partners to potential restoration sites for more site specific monitoring & evaluation

How the RSM Works:

- Identify Factors – relevant & regional GIS data available
- Set value scale for each factor = 0-1 where 0 is not suitable & 1 is highly suitable
- Multiply each factor X scale value (in attribute table)
- Calculate end RSM score = factor 1 score X factor 2 X...
- Final RSM scores = 0-1 = 0% - 100% suitable
- Resulting scores are displayed geographically on maps

Restoration Suitability Model Factors (Table 4):

Component	Factor	Metric	Source	Model Scoring
Avoidances	Seagrass Habitat	Seagrass Persistence 1999, 2001, 2004 2006 & 2008	SWFWMD, SFWMD, Janicki 2009	SAV Absent = 1 SAV Present 1-4 yrs = 0.5 SAV Present 5 yrs = 0
	Aquaculture Leases	Lease Area + 30' buffer	FDACS	Lease Absent = 1 Lease Present = 0
	Boat Channels	Official Boat Channels	WCIND, NOAA Bathymetry	Channel Absent = 1 Channel Buffer (75') = 0.2 Channel Present (150') = 0
Biological, Chemical & Physical	Depth	Depth at MLW	NOAA Bathymetry	0-3' = 1 3-6' = 0.8 > 6' = 0 dredged or spoil = 0
	Tidal River Salinity Isohalines	Wet Season 3 psu isohaline	SWFWMD, PRMRWSA, SFWMD	Downstream of Isohaline = 1 Upstream of Isohaline = 0

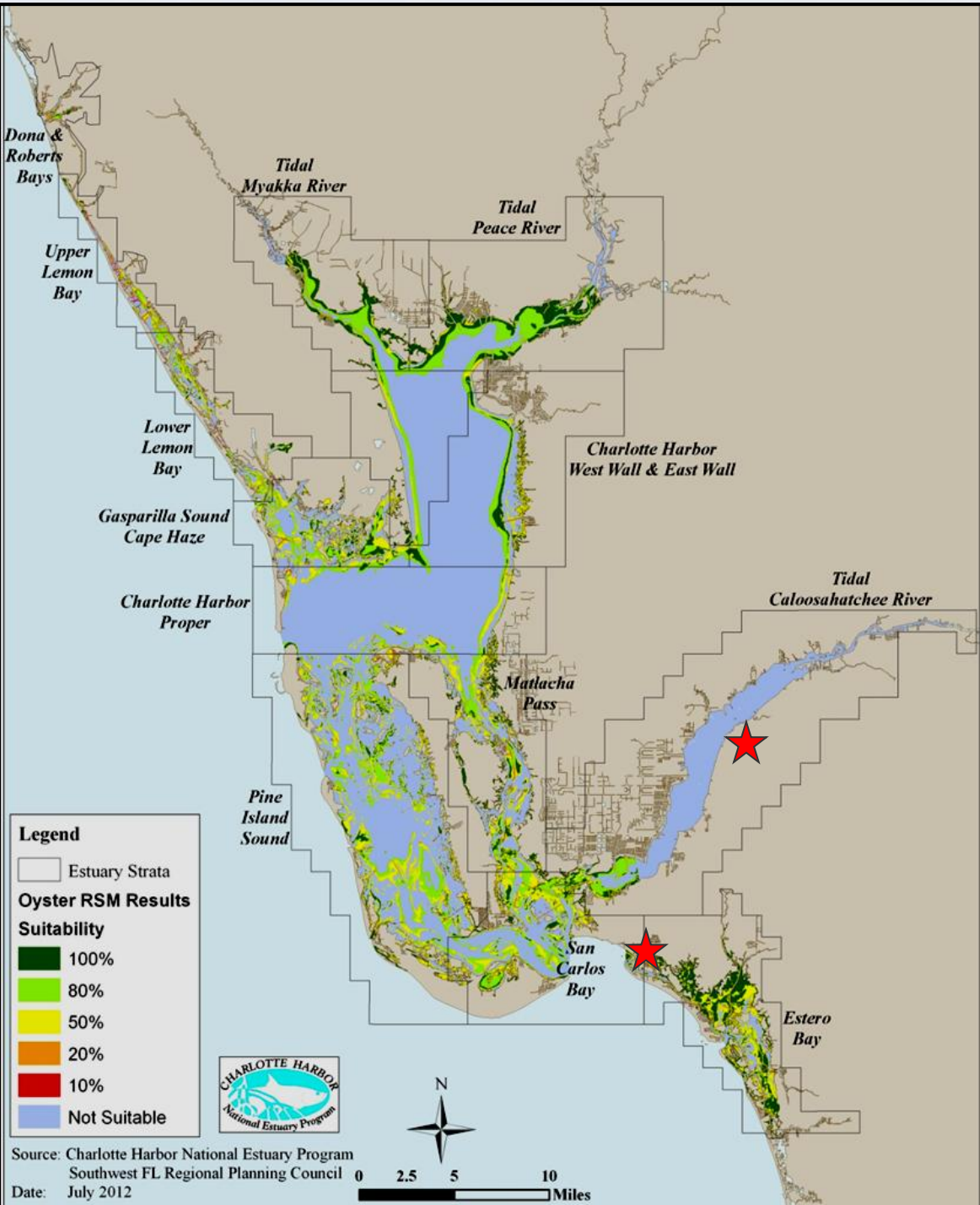
Factors Evaluated but Not Included in RSM (Table 3)

includes metric, source, evaluation & future action for each:

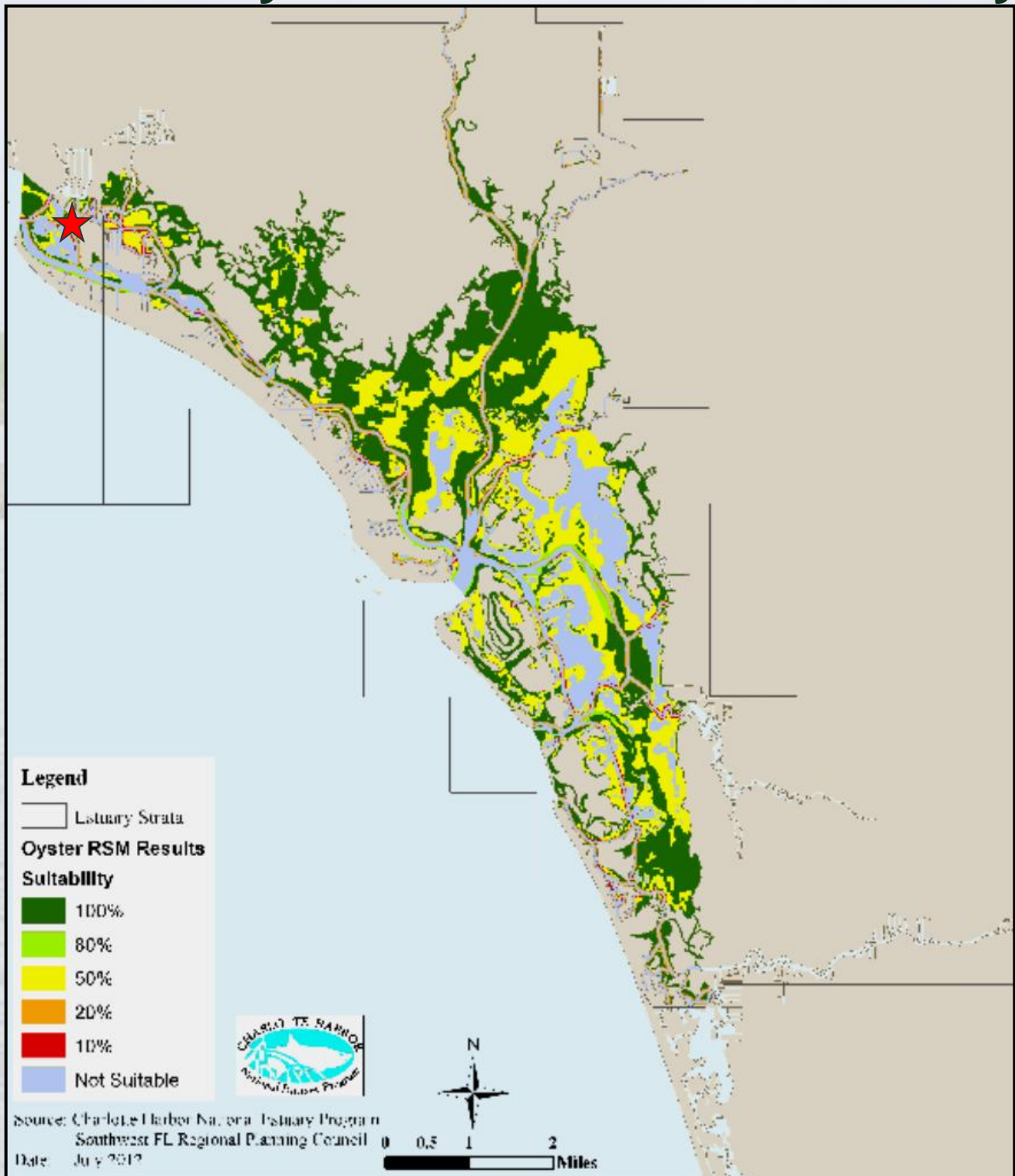
- **Dissolved Oxygen**
- **Salinity – Ave. Annual**
- **Salinity – Wet Season**
- **Temperature**
- **Sediment Type**
- **Larval Distribution**
- **Water Flow**
- **Disease**
- **Current Oyster Locations**
- **Shellfish Harvesting Areas**
- **Historic Oyster Locations**
- **Managed Areas**
- **Shoreline Type**
- **Identified Climate Change Habitat Migration Shorelines**
- **Sea Level Rise**
- **Sawfish “hotspots”**
- **Aquaculture Lease Buffers**

Restoration Suitability Model Results (Fig. 6):

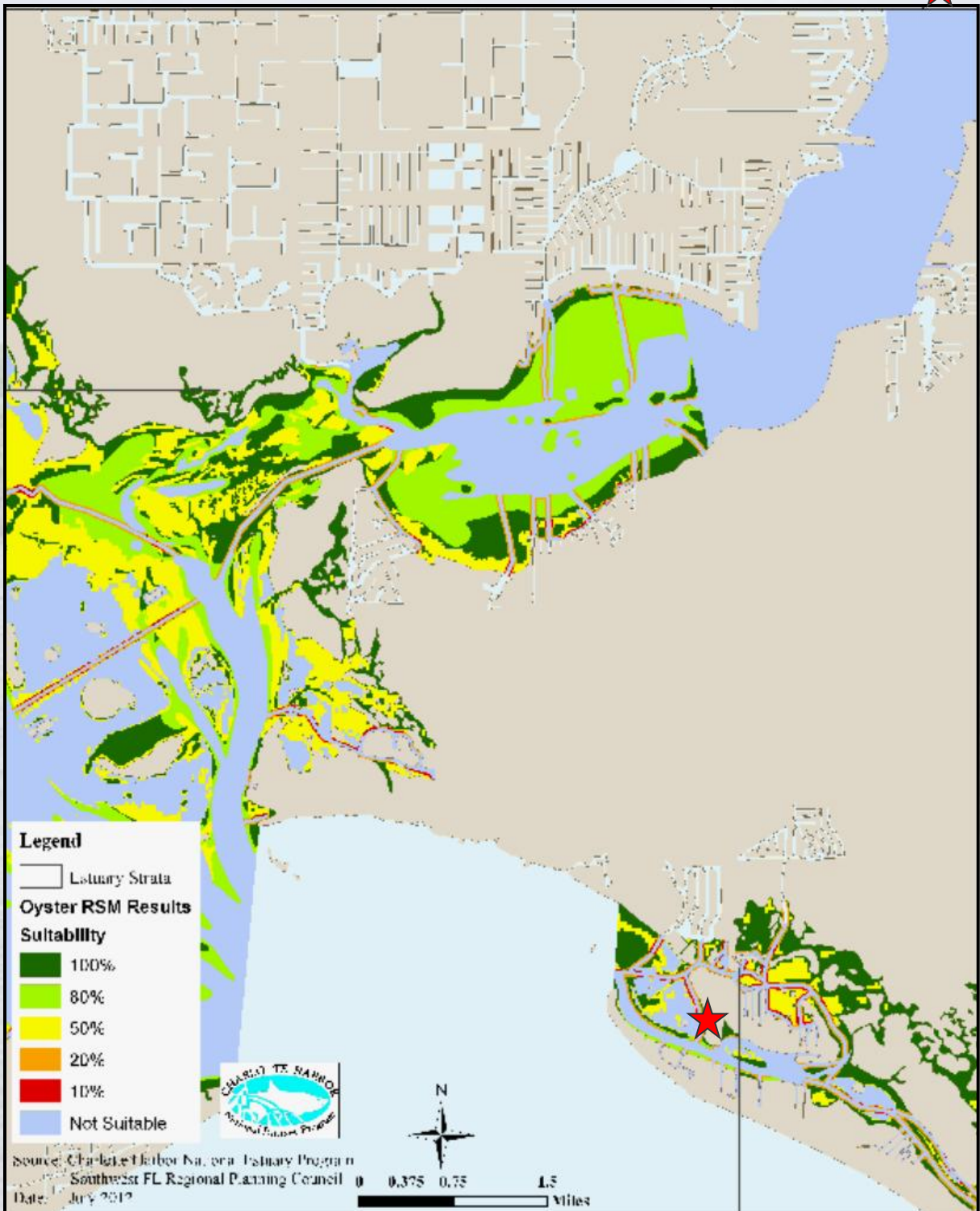
- 100% suitable in CHNEP = 22,172 ac (10% of estuary area)
- 80% Suitable in CHNEP = 20,428 ac
- maps & acres included for each estuary



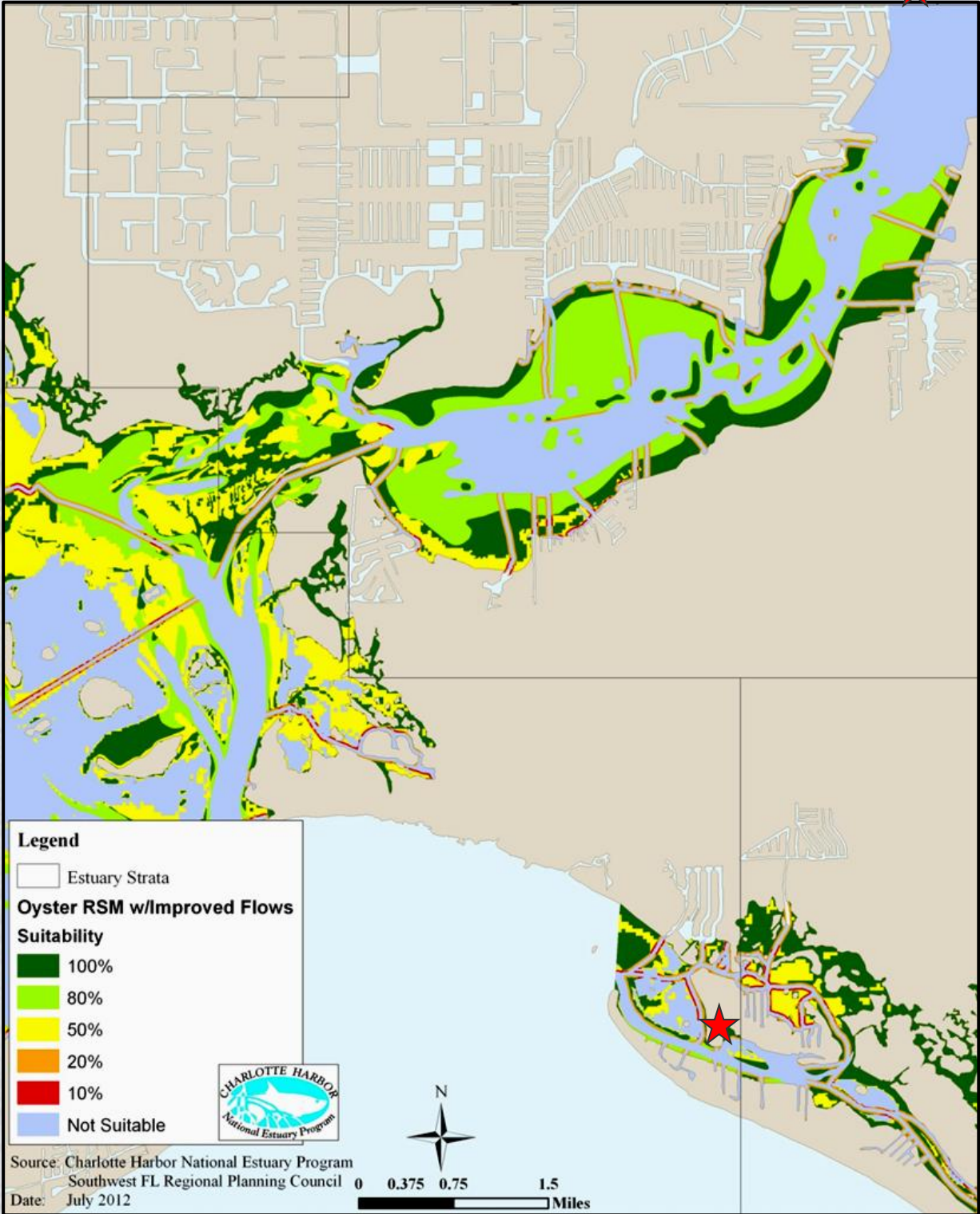
Restoration Suitability Model Results - Estero Bay (Fig. D14):



RSM Results - Caloosahatchee with Current Flows (Fig D12)



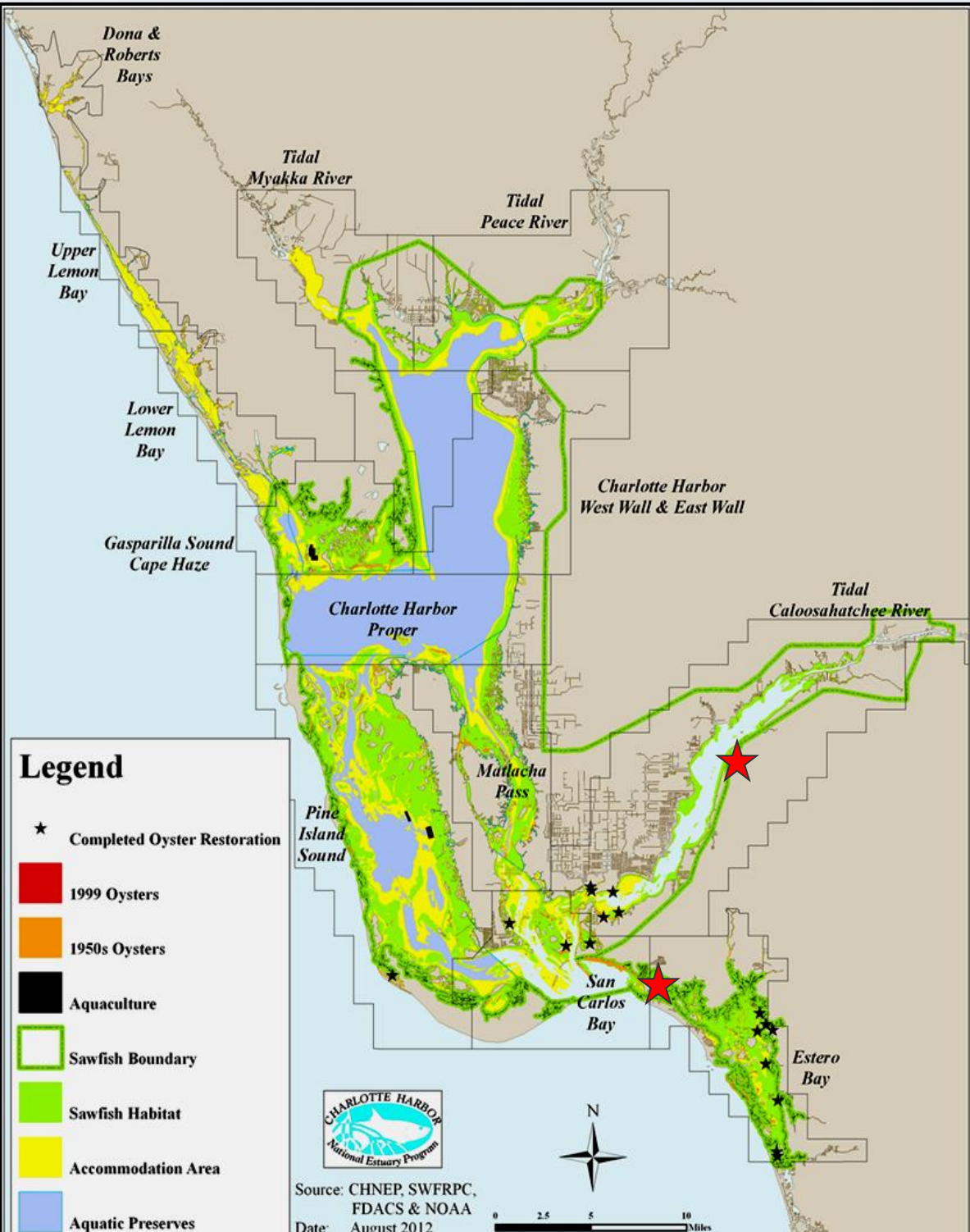
RSM Results - Caloosahatchee with Improved Flows (Fig D13):



RSM Results for Each Estuary (Table 6):

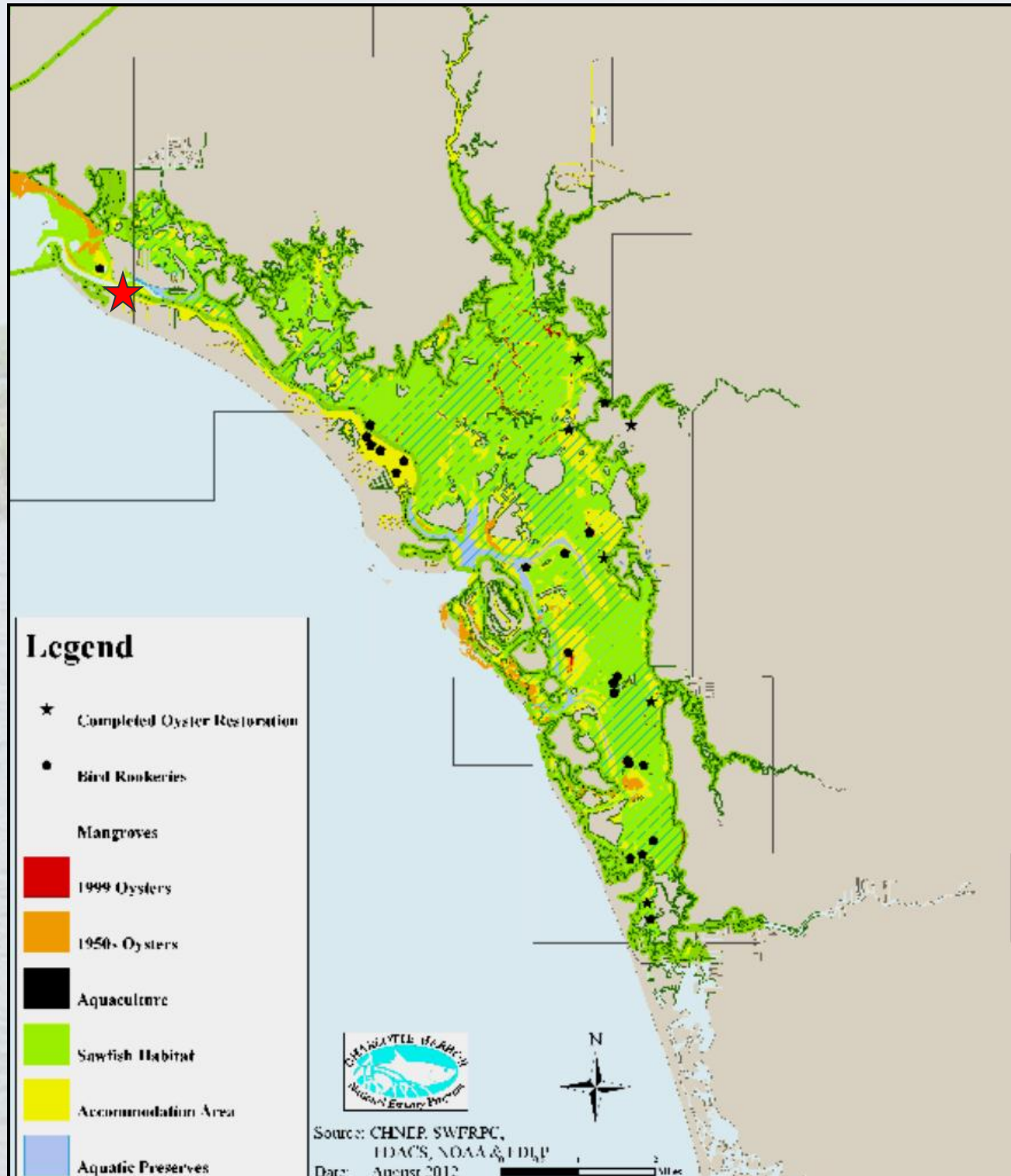
RSM Score Suitability % Strata	1.0 100% (acres)	0.8 80% (acres)	0.5 50% (acres)	0.2 20% (acres)	0.1 10% (acres)	0.0 0% (acres)	Subtotal
Dona & Roberts Bays	108	40	34	170	22	432	807
Upper Lemon Bay	163	220	461	190	187	1,278	2,499
Lower Lemon Bay	514	582	1,062	256	140	2,797	5,351
Gasparilla Sd Cape Haze	1,321	1,526	3,237	69	48	6,675	12,875
Tidal Myakka River	2,231	1,778	298	314	1	2,513	7,136
Tidal Peace River	3,834	3,371	343	431	2	5,422	13,402
Charlotte Harbor West W	455	1,332	780	7	1	14,453	17,029
Charlotte Harbor East W	1,482	1,363	1,247	30	16	18,252	22,390
Lower Charlotte Harbor	360	1,027	1,709	69	65	30,271	33,502
Pine Island Sound	2,481	4,171	8,471	267	182	34,606	50,177
Matlacha Pass	2,271	1,265	3,252	134	100	6,940	13,962
Tidal Caloosahatchee R	728	977	340	140	11	15,082	17,278
San Carlos Bay	1,563	2,663	3,802	197	83	8,585	16,892
Estero Bay	4,660	114	2,982	492	99	2,807	11,154
Total	22,172	20,428	28,016	2,766	956	150,114	224,453

Additional Spatial Considerations (Fig. 7):

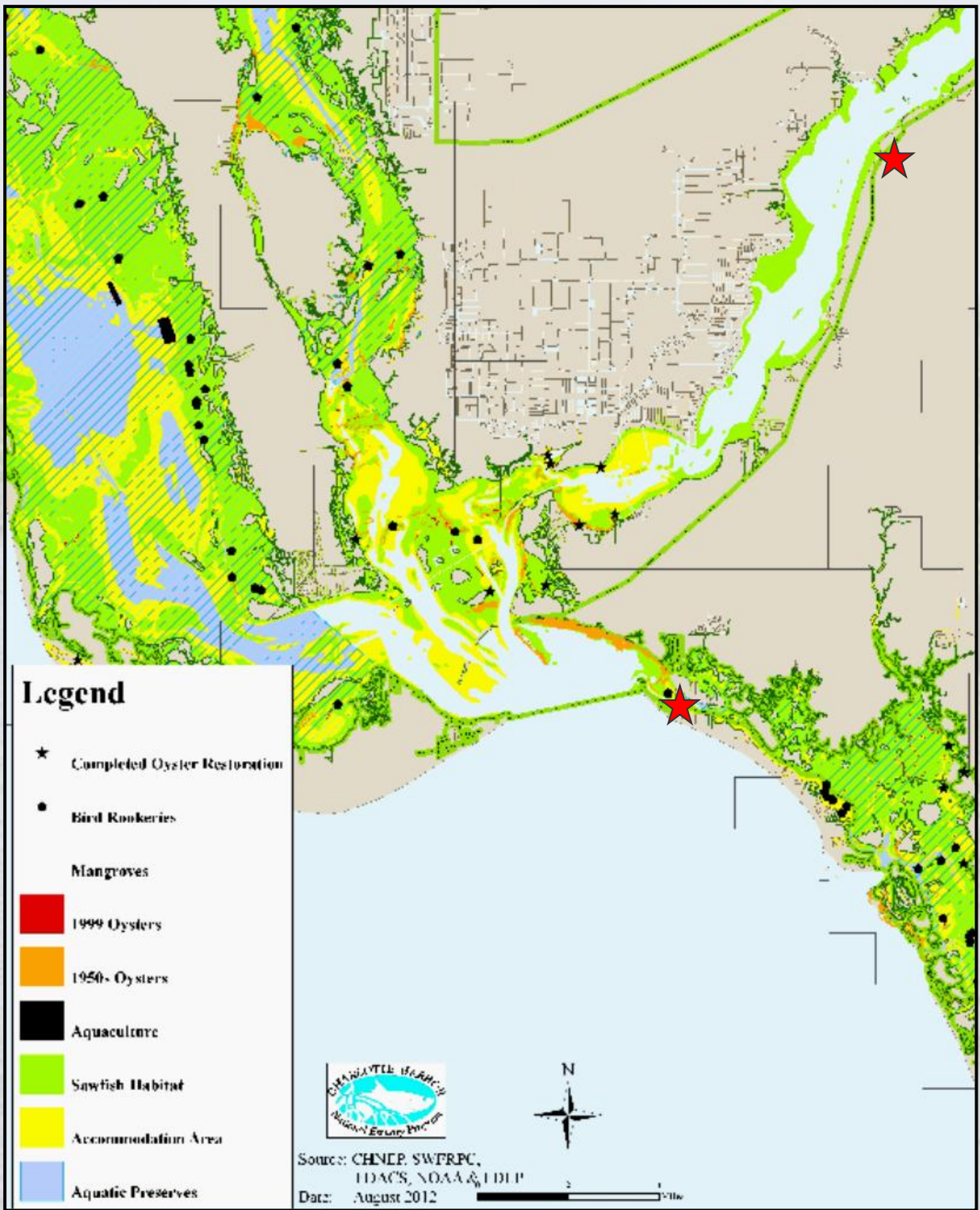


- Sawfish Habitat
- Accommodation Area
- Aquatic Preserves
- Shellfish Harvest Areas
- Aquaculture Leases
- Previously Mapped Oysters
- Completed Oyster Restoration
- Bird Rookery Islands
- Mangroves

Additional Considerations – Estero Bay (Fig. E13):



Additional Considerations – Tidal Caloosahatchee (Fig. E12):



CHNEP Oyster Habitat Restoration Goal:

Enhance & restore self-sustaining oyster habitat & related ecosystem services throughout the estuaries & tidal rivers & creeks in the CHNEP.

- Considered RSM results & additional spatial factors.**
- Considered limitations of historic mapping of oysters.**
- Considered “Accommodation Area” = proper salinity & < 3’ deep & 1-5% suggested by literature.**
- Based on current data & understanding & 1-5% of the Accommodation Area, a range of *1,000 – 6,000 acres* of oyster habitat is appropriate for CHNEP.**
- Short term actions will be steps towards this goal until region-wide mapping is completed & the Plan is updated in 2020.**

CHNEP Short Term Oyster Habitat Restoration Actions:

- Map oyster habitats by type within CHNEP by 2020.
- Design, implement & monitor success of pilot oyster habitat restoration projects in a variety of habitats in 50% of 14 CHNEP estuary segments by 2020.
- Increase public awareness of ecosystem value of native oyster habitats by including community stewardship components in each oyster habitat restoration projects.
- Assist partners in seeking state, federal & organizational funding to support oyster habitat restoration projects.



Photo: CHNEP/Ott

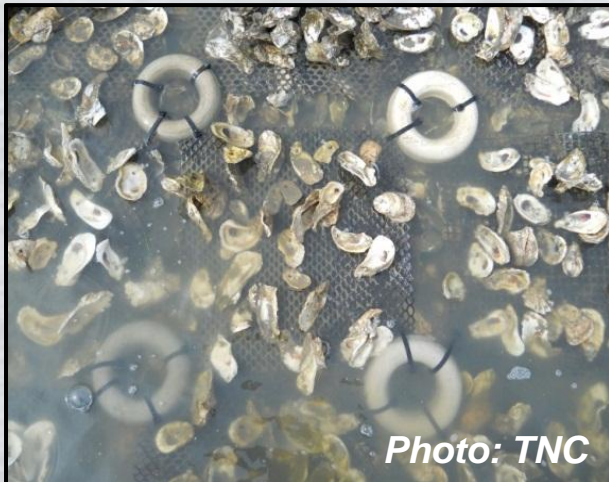
Oyster Restoration Strategies:

Methods – depth, pros & cons, entanglement (Table 8)

- Bagged*, caged or loose* cultch
- Oyster mats*
- Reef balls
- Vertical stakes & experimental

Materials – source & success (Table 9)

- Fresh, fossilized & other shell
- Sandstone, limestone & cement
- Spat sticks & experimental



Oyster Restoration Success Criteria:

Region-Wide – measures & references (Table 10)

- **Important to evaluate specific project goals**
- **Primary – determine if oysters are self-sustaining & increasing or decreasing, including area, density, size & recruitment**
- **Secondary – provide additional information, including resident species, condition index & gonadal condition**

Goal-Specific – measures & references (Table 11)

- **Provide consistency between projects**
- **Based primarily on local research & monitoring**
- **Include reef stability, growth & recruitment, provision of habitat, water quality improvement & adjacent habitat protections**
- **Include Primary & Secondary measure**

Monitoring & Mapping Needs:

Site Suitability – metrics, timing & other (Table 12)

- **Substrate**
- **Recruitment**
- **Temperature**
- **Salinity**
- **Water Depth**
- **Boat Traffic**
- **Water Flow**
- **Predators**
- **Disease**
- **Wave Energy**
- **Food Availability**
- **Dissolved Oxygen**
- **Adjacent Habitats**
- **Sedimentation**

Restoration Success – methods & guidance (Table 13)

- **Include Before-After-Control-Restoration (BACR)**
- **Funding Dependant**
- **Consistency between Projects**

Long Term Monitoring & Mapping

- **Need Oyster Habitat Mapping throughout CHNEP**
- **Need consistent monitoring throughout CHNEP**

Cost Estimates for Attaining CHNEP Oyster Habitat Restoration Goals:

Cost Estimates of Supplies (Table 15)

- Estimated from existing restoration projects in FL**
- Based on 7 project types, including bagged & loose cultch & shell, oyster mats, reef balls & concrete grates**
- Includes cost of materials**
- Estimates range from \$3,000/acre - \$605,000/acre**
- Ave. cost for conventional methods = \$54,500/acre**

Funding Opportunities for Oyster Habitat Restoration in CHNEP:

Oyster Habitat Restoration Funding (Table 16)

- Encourages partnerships**
- Based on ecosystem restoration goals**
- Includes examples of 14 federal, agency & organizational grant opportunities**
- Includes amount available, purpose, eligibility & contact information**
- Plus RESTORE funding & coordinated effort in SW FL by 3 NEPs to develop comprehensive Gulf restoration approach**

What Restoration Steps Have Occurred So Far?

- **Presentations:**
 - Gulf Estuarine Research Society – Nov. 2012**
 - Charlotte Co BOCC – Feb. 2013**
 - Punta Gorda City Council – March 2013**
- **Draft General Permit Language for Restoration, Establishment & Enhancement of Low Profile Oyster Habitat to incorporate into recent ERP Rule Changes – Feb. 2013**
- **RESTORE SW FL Shellfish Restoration Proposals – April 2013**
- **TNC Oyster Restoration Project in Punta Gorda – field visit April 2013, currently design & permit**
- **TNC NOAA CHNEP Sawfish Critical Habitat Regulatory Staff Discussions – May 2013**

What are the Next Steps towards CHNEP Oyster Restoration Goals?

- Strengthen partnerships & continue SW FL Oyster Working Group.
- Continue restoration permitting discussions & design & secure permits for projects.
- Enhance community stewardship opportunities & raise awareness – work with community groups & leverage volunteer hours.



Photos: SCCF

Next Steps Continued:

- **Secure funds using partnerships & regional approach, including regional RESTORE project.**
- **Fill knowledge gaps with targeted research & monitoring:**
 - ~ **historic & current distribution of oysters**
 - ~ **Intertidal vs. subtidal restoration**
 - ~ **biodiversity & relationships with key species**



Where is More Oyster Restoration Information Available?

- www.chnep.org
- www.chnep.wateratlas.org
- TNC – Florida’s Oyster Reef Restoration
- Judy Ott, Charlotte Harbor National Estuary Program
jott@swfrpc.org
- Anne Birch, The Nature Conservancy
abirch@tnc.org
- Jaime Boswell, Independent Contractor
jaimeboswell@live.com

Thank You to Our Many Partners:

- **FAU – Loren Coen**
- **FDACS – Mark Berrigan & Paul Zaijek**
- **FDEP - Lucy Blair & Heather Stafford**
- **FGCU - Greg Tolley & Aswani Volety**
- **FFWCC - Sarah Stephenson & Steve Geiger**
- **Fort Myers Beach – Keith Laakkonen**
- **Sarasota Co - Kathy Meaux & Jon Perry**
- **Mote marine Lab – Jim Culter & Ernie Estevez**
- **NOAA - Sean Meehan & Shelly Norton**
- **Sanibel – Holly Downing**
- **SBEP - Jay Leverone/SBEP & TBEP - Ed Sherwood**
- **SCCF - Eric Milbrandt & Rick Bartleson**
- **TNC – Andrea Graves & Laura Geselbracht**
- **UF Sea Grant - Betty Staugler, John Stevely, Joy Hazell**
- **SW FL Oyster Working Group & Many Others**

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