



The SECAS Third Thursday Web Forum

The National Coastal Condition Assessment: Survey design and 2015 results



Agenda

- Introduction
- Monthly topic
- Q&A and discussion
- Preview of next webinar
- Staff updates



The National Coastal Condition Assessment: Survey design and 2015 results

Hugh Sullivan, U.S. Environmental Protection Agency

2-17-2022



National Coastal Condition Assessment

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Southeast Conservation Adaptation Strategy
Third Thursday Web Forum

Hugh Sullivan, US EPA Office of Water
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Standard Disclaimer: “The views expressed in this presentation are those of the author and do not necessarily represent the views or policies of the U.S. Environmental Protection Agency.”

Agenda

- Intro to the National Aquatic Resource Surveys (NARS)
- The National Coastal Condition Assessment (NCCA)
 - Intro
 - Target Population
 - Key Indicators
 - Communicating Results
 - 2015 Results and Change Over Time (Dashboard Live View)
 - Looking ahead
 - 2020 (& 21) NCCA
 - 2025 and Beyond

National Aquatic Resource Surveys

Collaborative Surveys of Our Nation's Waters



Rivers/
Streams



Coastal
Waters



Wetlands



Lakes

NARS Objectives

1. Assess the biological/recreational condition and changes over time of the nation's waters
2. Rank stressors based on the relative associations between indicators of condition and indicators of stress
3. Build/enhance state and tribal monitoring and assessment capacity

NARS Authorities:

- CWA Section 104(a)(5) – National monitoring system
- CWA Section 305(b) – Analysis of navigable waters

<https://www.epa.gov/national-aquatic-resource-surveys/>

Why a National Aquatic Resource Surveys Program?

Is Water Quality Getting Better?

 “I think so, but I can't prove it.”

William Reilly
EPA Administrator - 1989

National Aquatic Resource Surveys

Collaborative Surveys of Our Nation's Waters

National Consistency: NARS Approach

1. Randomized design to report on condition of each resource nationally and regionally
 - 1,000 randomly selected sites in lower 48
 - Rotate through waterbody types
2. Standard field and lab protocols
3. National QA and data management
4. Nationally consistent and regionally relevant data interpretation and peer-reviewed reports

Partnerships are Critical!
NARS is an EPA/State/Tribal Effort

YouTube Standardized Training

Comparable Equipment

Typical Grab Sample Measurements and Area

Grab type	Length (mm)	Width (mm)	Grab area (m ²)	Number of benthic grabs required
Elman Grab	150	150	0.02	2
Petite Ponar	152	152	0.023	2
Small van Veen	200	225	0.045	1
Standard Ponar	229	229	0.052	1
Medium van Veen	360	280	0.1	1

<https://www.epa.gov/national-aquatic-resource-surveys/>

The NARS are:

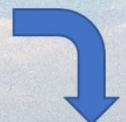


- **Cooperative** – EPA, states, tribes and other federal agencies work together to design, implement and leverage NARS
- **Continental** - national assessments for the lower 48 with comparable projects in AK, HI and territories covering all surface water resource types (coastal waters, lakes, rivers, streams, wetlands)
- **Cost-effective** – statistically representative survey for national status and trends supports strategic investments in priority areas and issues (use probabilistic site selection)
- **Consistent** - methods and indicators to assess physical, chemical and biological integrity plus indicators relevant to human health
- **Complementary** - One monitoring design does not fit all water quality management needs. NARS complements data from other scales offering insights on our collective progress toward clean water goals and providing context to inform priorities for regional and local action.

<https://www.epa.gov/national-aquatic-resource-surveys/>

When do we sample?

- NARS rotate, sampling every 5 years
 - Coastal: years ending in 0 and 5.
 - Wetlands: years ending in 1 and 6
 - Lakes: years ending in 2 and 7
 - Rivers and Streams: years ending in 3 & 4; years ending in 8 & 9
- Index Period: June 1 to September 30



<https://www.epa.gov/national-aquatic-resource-surveys/>

Survey Design

- Generalized Random Tessellation Stratified (GRTS)*
 - Probability-based design
 - Avoids “clumping”
 - Spatial density mimics the resource.
 - Can randomly select sampling locations for
 - Linear resources (Rivers and Streams)
 - Discrete units (Lakes)
 - Areal resources (Wetlands and Coastal Waters)
- Stratification
 - State (Some states request specific designs)
 - Characteristics of interest
 - Large vs. small estuary

* Stevens and Olsen, 2004 (<http://dx.doi.org/10.1198/016214504000000250>)

<https://www.epa.gov/national-aquatic-resource-surveys/>

The National Coastal Condition Assessment

National Coastal
Condition
Assessment



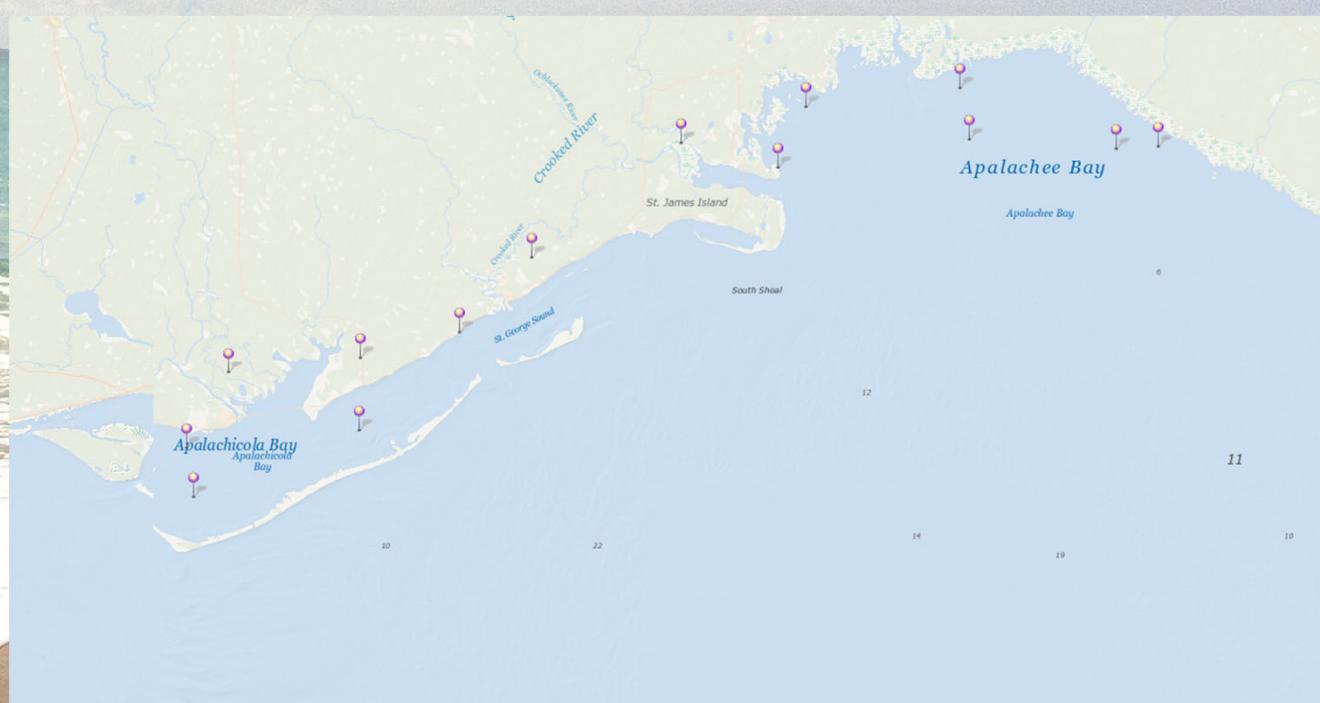
A Collaborative Survey
of the Nation's Estuaries and
Great Lakes Nearshore Waters

- Spawned from EPA's Environmental Monitoring and Assessment Program (EMAP).
- National Coastal Assessment research program conducted by EPA's ORD
- In 2010 transitioned to an Office of Water monitoring program under the NARS. ORD continues to provide extensive support.
- Coastal assessments are conducted every 5 years (2010, 2015, 2020...)

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Target Population

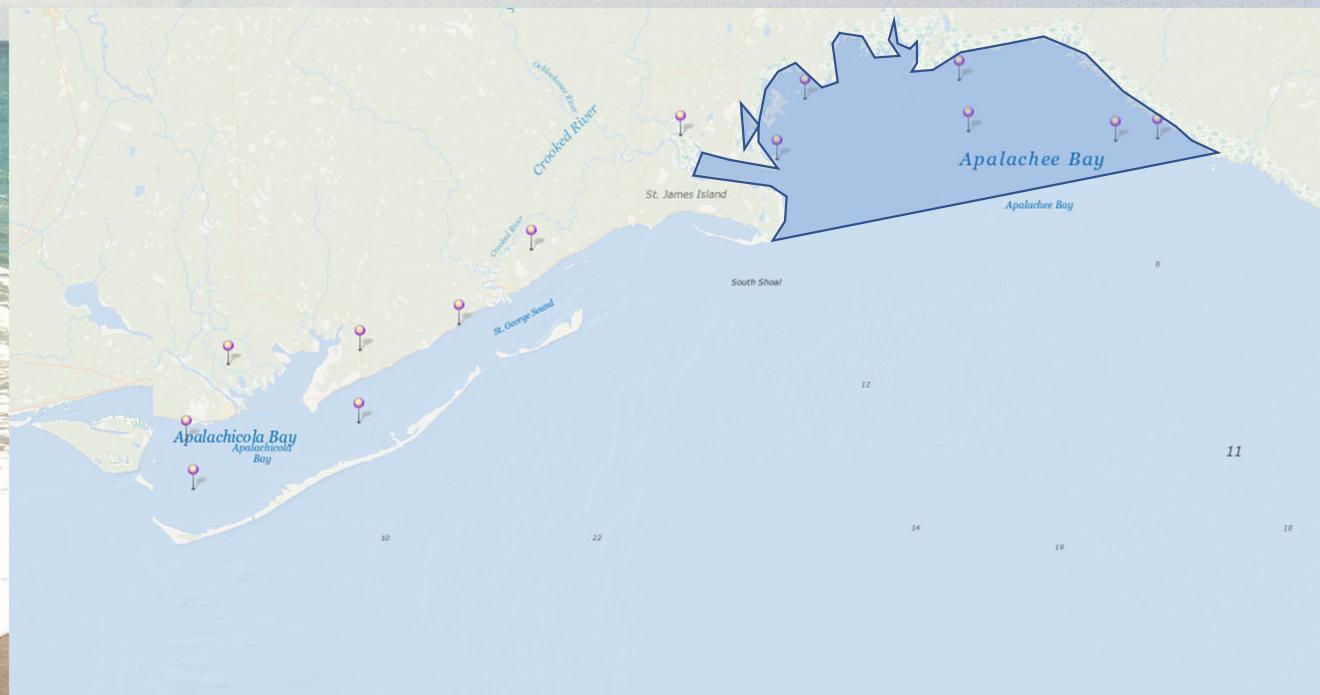
- Estuarine target population:
All brackish waters



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Target Population

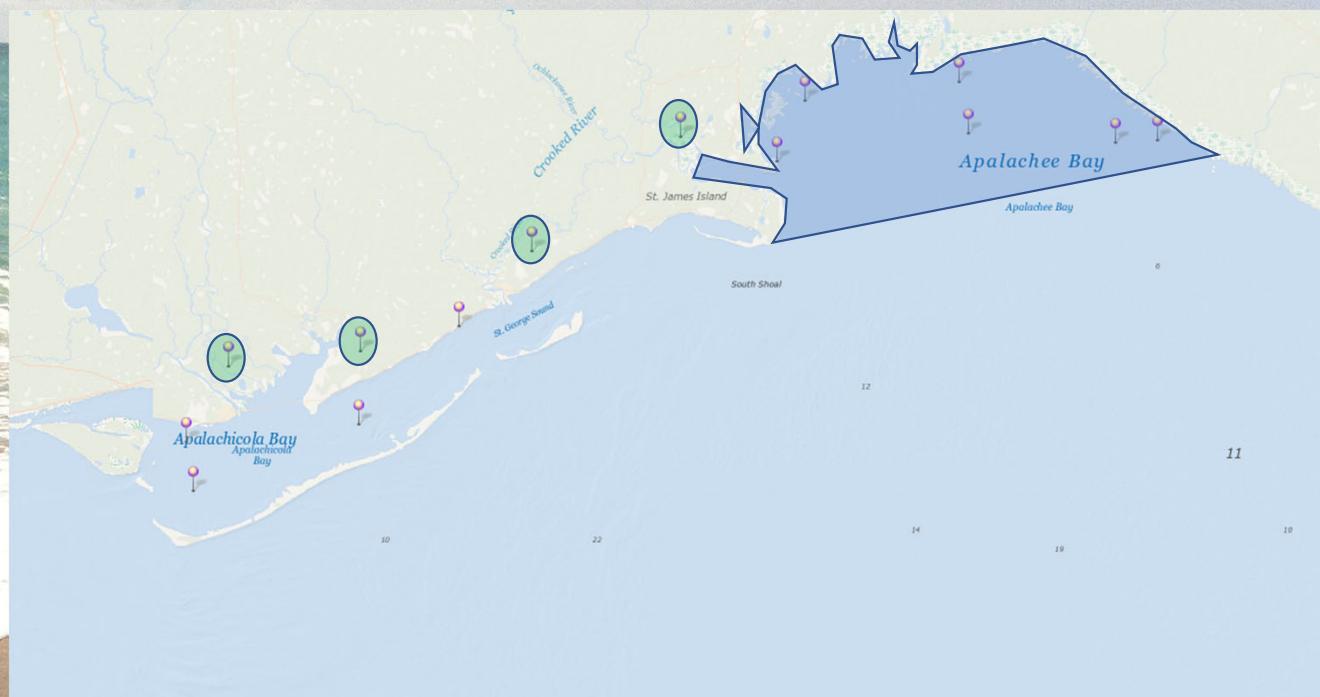
- Estuarine target population:
All brackish waters
 - Between shoreline and
confluence with the open
ocean.



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Target Population

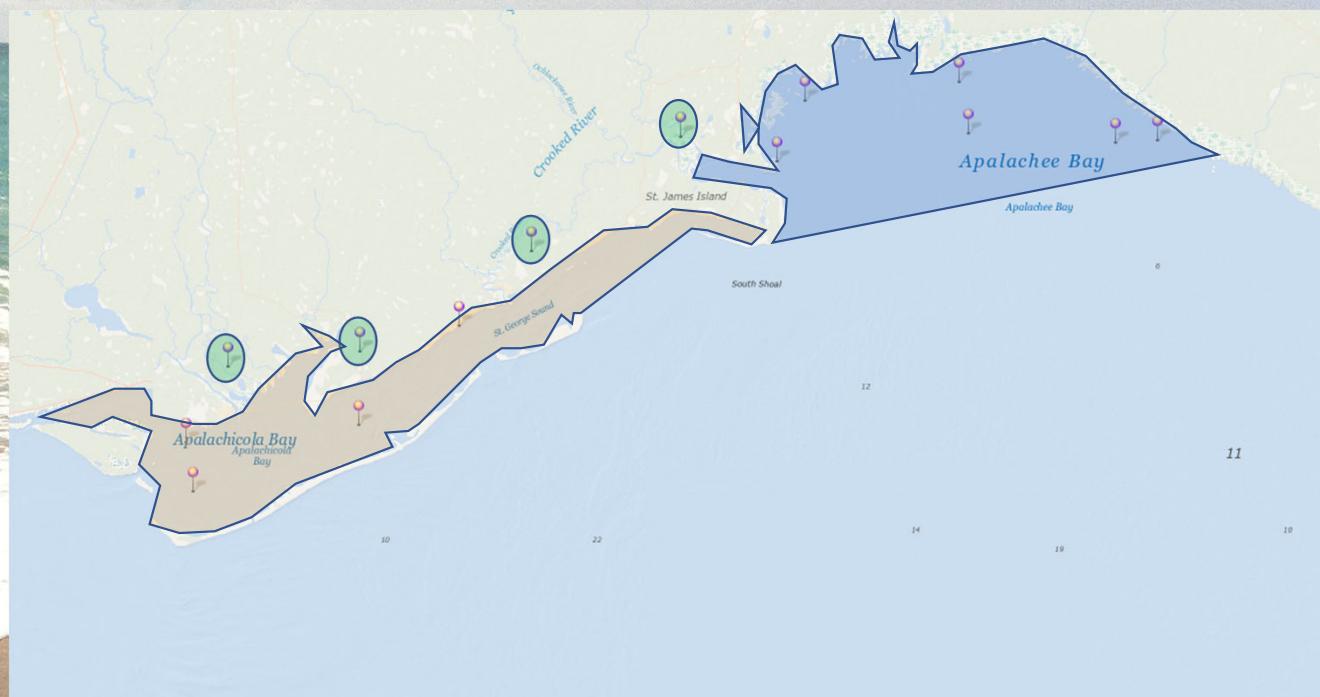
- Estuarine target population:
All brackish waters
 - Between shoreline and confluence with the open ocean.
 - Upstream in tributaries to the head of salt (0.5 ppt)



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

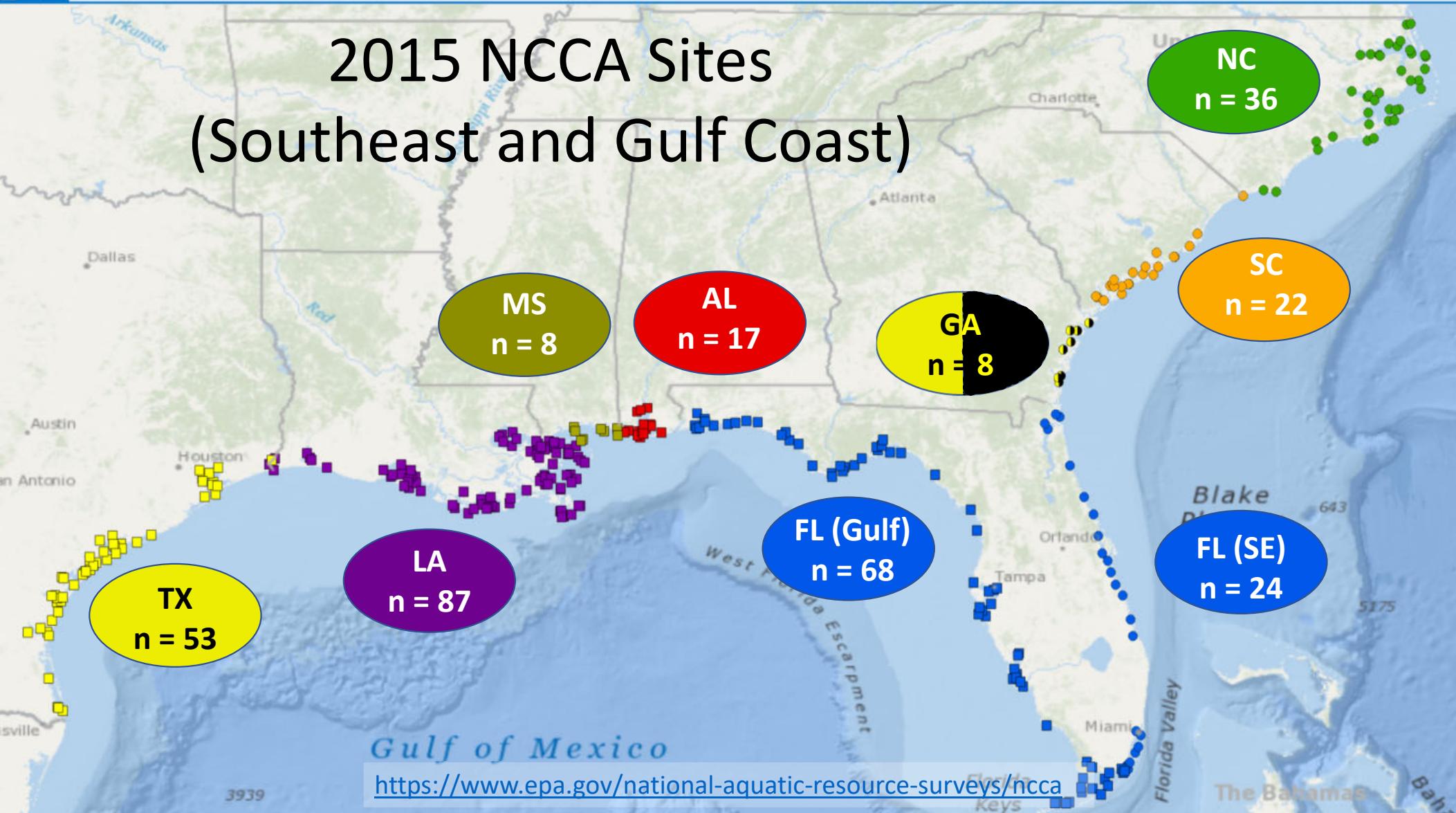
Target Population

- Estuarine target population:
All brackish waters
 - Between Shoreline and confluence with the open ocean.
 - Upstream in tributaries and tidal creeks to the head of salt (0.5 ppt)
 - Barrier island-lagoon systems
 - Intracoastal waterways (no sites drawn in this view)



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

2015 NCCA Sites (Southeast and Gulf Coast)



National and Regional Consistency

- Survey-wide manuals
 - All participants agree to follow protocols.
- Consistent field training
- Uniform Sampling Supplies
- iPad app for field data collection
- Strict QA protocols

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>



United States Environmental Protection Agency
Office of Water
Washington, DC
EPA # 841-F-19-005

National Coastal Condition Assessment
2020
Field Operations Manual



April 2020

National and Regional Consistency

- Survey-wide manuals
- Consistent field training
 - 3-day in-person training
 - Protocol demonstration
 - COVID contingencies for 2020-21
- Uniform Sampling Supplies
- iPad app for field data collection
- Strict QA protocols



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

National and Regional Consistency

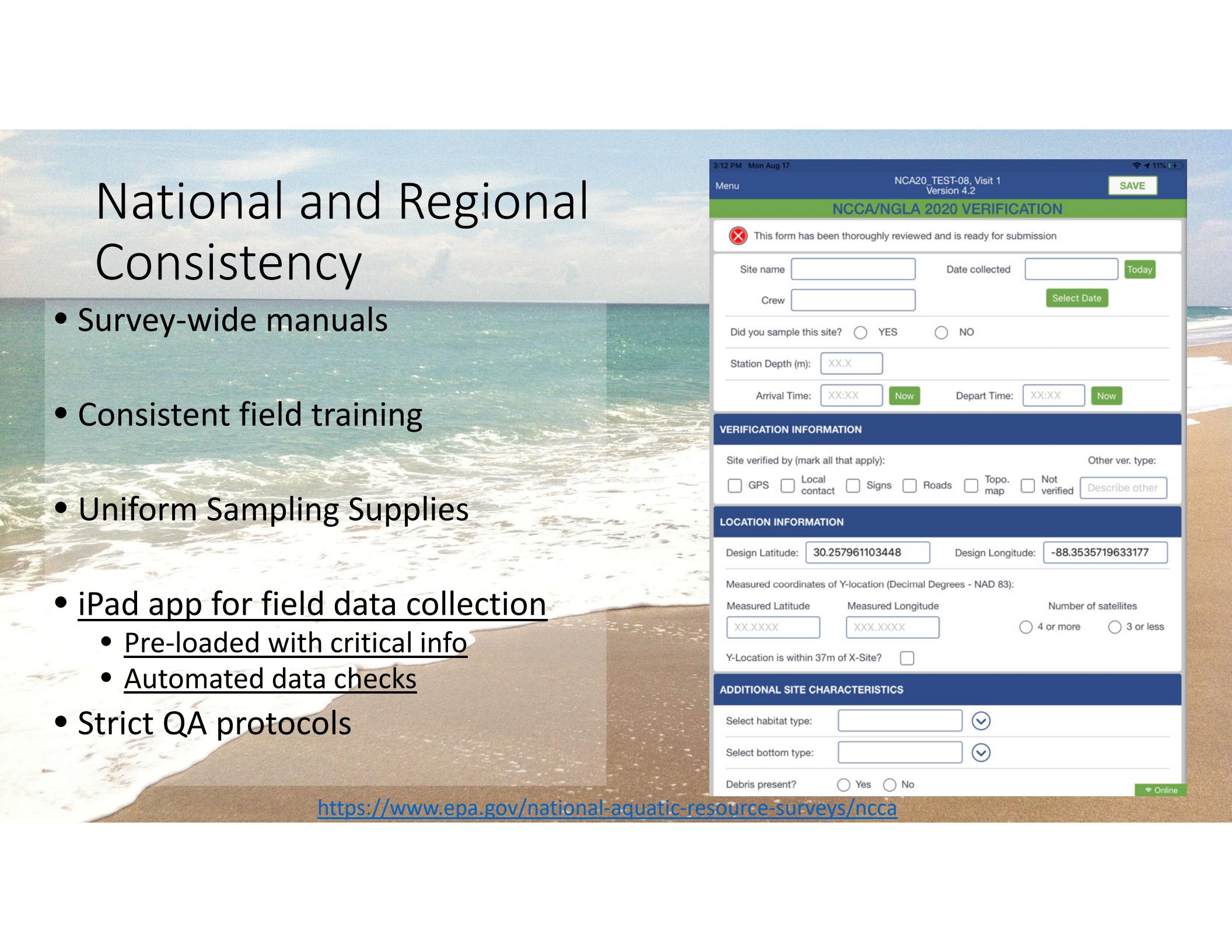
- Survey-wide manuals
- Consistent field training
- Uniform Sampling Supplies
 - All crews receive the same base kits and site kits
 - Critical consumables supplied by EPA
- iPad app for field data collection
- Strict QA protocols



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

National and Regional Consistency

- Survey-wide manuals
- Consistent field training
- Uniform Sampling Supplies
- iPad app for field data collection
 - Pre-loaded with critical info
 - Automated data checks
- Strict QA protocols



3:12 PM Mon Aug 17 NCA20_TEST-08, Visit 1 Version 4.2 SAVE

Menu NCCA/NGLA 2020 VERIFICATION

This form has been thoroughly reviewed and is ready for submission

Site name _____ Date collected _____

Crew _____

Did you sample this site? YES NO

Station Depth (m): XX.X

Arrival Time: XX:XX Depart Time: XX:XX

VERIFICATION INFORMATION

Site verified by (mark all that apply): Other ver. type:

GPS Local contact Signs Roads Topo. map Not verified Describe other

LOCATION INFORMATION

Design Latitude: 30.257961103448 Design Longitude: -88.3535719633177

Measured coordinates of Y-location (Decimal Degrees - NAD 83):

Measured Latitude _____ Measured Longitude _____ Number of satellites
 4 or more 3 or less

Y-Location is within 37m of X-Site?

ADDITIONAL SITE CHARACTERISTICS

Select habitat type: _____

Select bottom type: _____

Debris present? Yes No

Online

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

National and Regional Consistency

- Survey-wide manuals
- Consistent field training
- Uniform Sampling Supplies
- iPad app for field data collection
- Strict QA protocols
 - Field crew assistance visits (AV)
 - Lab capabilities review
 - COVID contingencies for 2020-21



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Coastal Parameters

Core Parameters

- Benthic Macroinvertebrate
 - Biological Condition
- Eutrophication-related
 - Total and dissolved nutrients
 - Chlorophyll *a*
 - Water Clarity (PAR)
 - DO
- Sediment
 - Toxicity
 - Contaminants
- Whole Fish Contaminants
 - Ecological Fish Tissue Contaminant Index

Supplemental Parameters

- Algal Toxins in water
 - Microcystin (2015 onward)
 - Cylindrospermopsin (2020 onward)
- Enterococci (2015 onward)
- Mercury in fillet tissue (2015 onward)
- Selenium in whole fish (2015 onward)
- Sediment TOC & grain size
- Secchi depth
- Hydrographic profile

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Assessing the Data

- Benthic Macroinvertebrates
 - Multivariate AMBI (M-AMBI)
 - AZTI Marine Benthic Index – an abundance-weighted, tolerance index
 - Shannon Wiener diversity index
 - Species richness
 - Adjusted for salinity
 - Pelletier, et.al. 2018



NCCA Technical Support Document: <https://www.epa.gov/national-aquatic-resource-surveys/national-coastal-condition-assessment-2015-technical-support>

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Assessing the Data

- Eutrophication index
 - Surface PO₄ (DIP)
 - Sum of surface NO₂, NO₃, NH₃ (DIN)
 - Surface Chlorophyll *a* (WCHL)
 - Water clarity (PAR)
 - Bottom dissolved oxygen (DO)
- Regionally-relevant benchmarks for good, fair or poor.
- Ratings for each parameter are combined into a eutrophication index score of good, fair or poor



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Assessing the Data

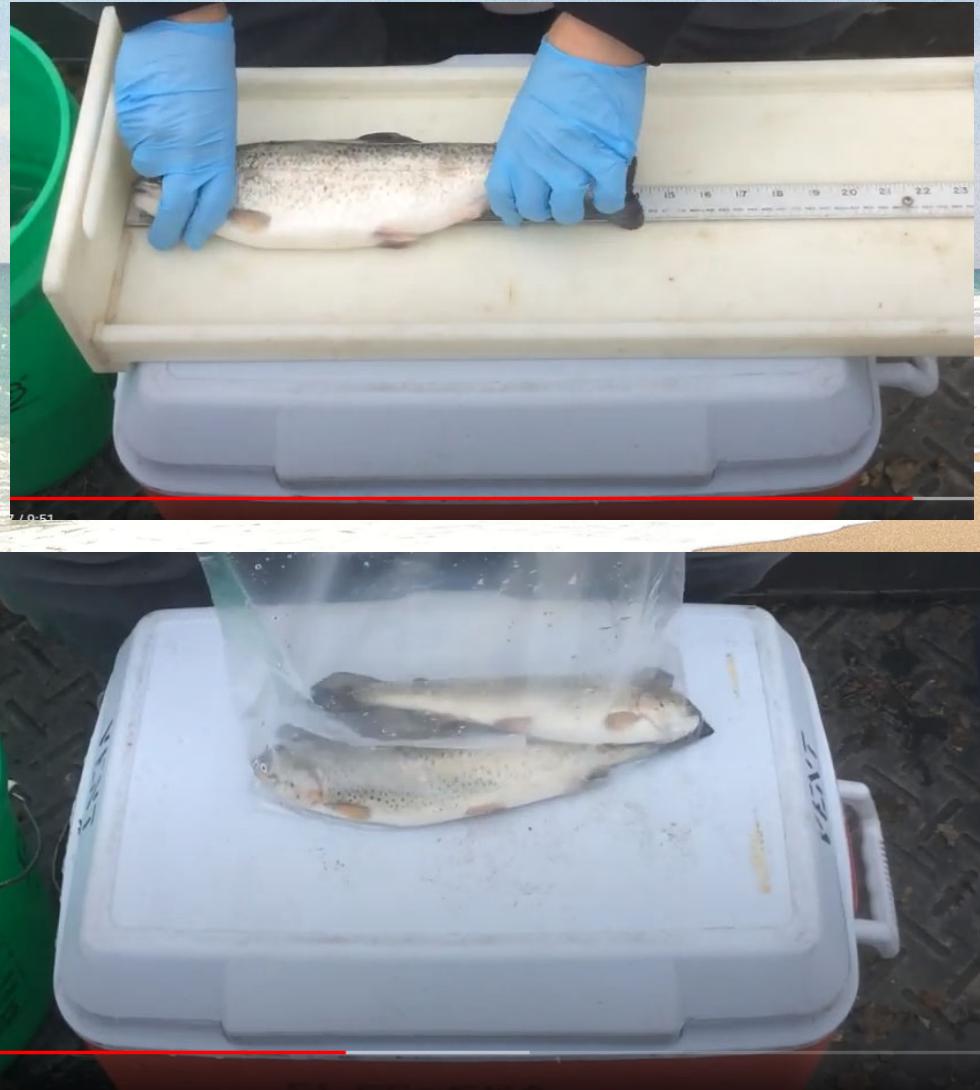
- Sediment Quality Index
 - Sediment Contamination
 - PAHs, PCBs, Pesticides, Metals
 - Mean Effects Range Median Quotient (mERM-Q; Long, et.al 2006)
 - Logistics Regression Model (Field et.al. 2002; USEPA 2005)
 - Good, fair and poor ratings represent the probability of toxicity of the sediment.
 - Sediment Toxicity
 - 10-day amphipod (*Leptocheirus plumulosus*) acute toxicity tests
 - Good, fair and poor based upon mean control-corrected survival and whether sample survival is significantly less than control.



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Assessing the Data

- Ecological Fish Tissue Contamination Index
 - Whole fish composites are analyzed for PCBs, pesticides and metals.
 - Concentrations are compared to toxicity reference values (TRV) for receptors of concern.
 - Receptor groups are Birds, Fish and Mammals
 - Good, fair or poor ratings assigned based upon number of receptor groups in which TRV exceedances occurred.
- Selenium
 - Compared to the EPA whole-body aquatic life criterion of 8.5 mg/kg dry weight



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Assessing the Data

- Algal Toxins
 - ELISA Method
 - Microcystins compared to 8 µg/L
 - Cylindrospermopsin compared to 15 µg/L

- Enterococci
 - qPCR rapid detection in water sample
 - Compared to 1,280 CCE/100 mL

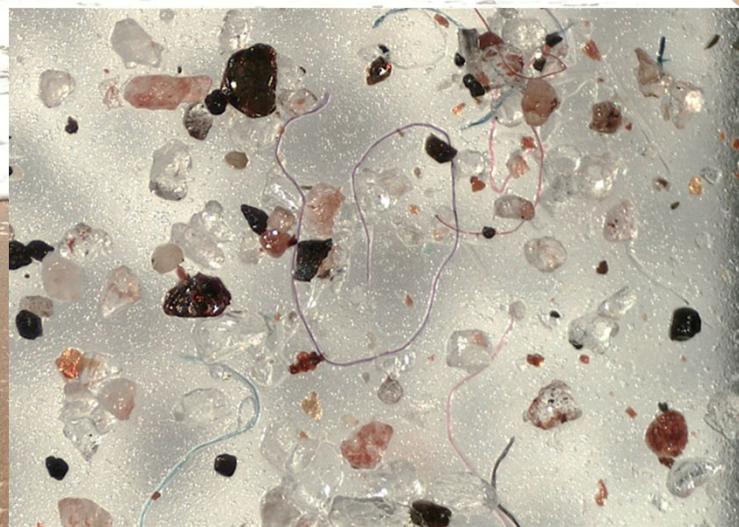
- Mercury in Fillet Tissue
 - Analysis of fish plug biopsy sample
 - Compared to 300 ppb wet weight

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>



Research

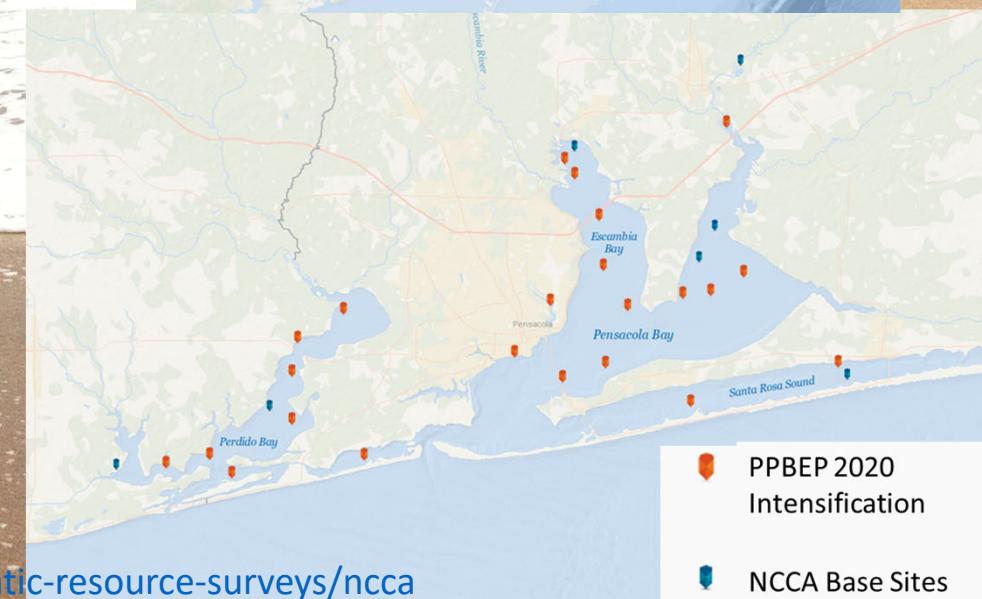
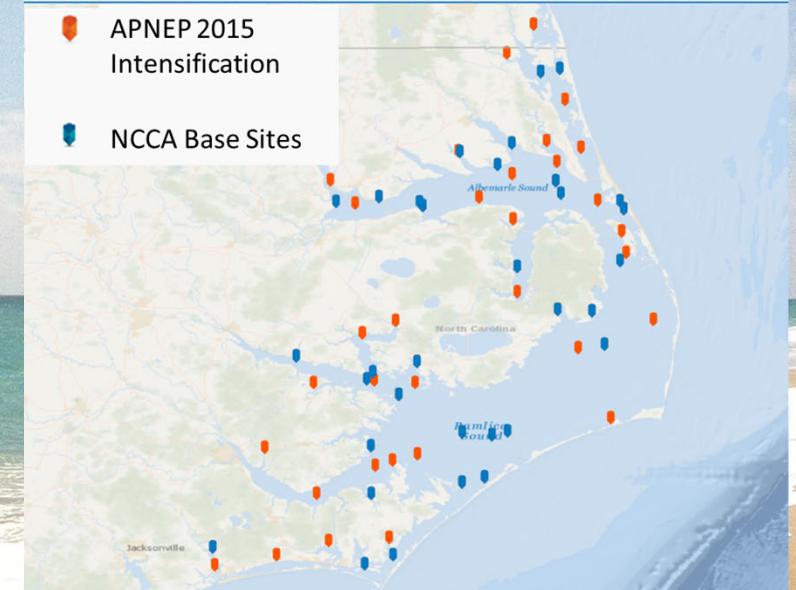
- In 2020 At all estuarine sites:
- Total alkalinity developmental indicator
 - Measure alkalinity in estuaries to assess a baseline and assess patterns in buffering capacity against acidification.
- $\delta^{15}\text{N}$ in benthic organic matter
 - Evaluate $\delta^{15}\text{N}$ as a cost-effective indicator of anthropogenic impacts in estuaries.
- Microplastics in sediment at limited sites in Maine and New Hampshire.
 - Evaluate and refine methods for analysis of microplastics in estuarine sediment.
 - Expense of analysis limited this research to a very small pilot



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Special Studies

- Population Intensification Studies
 - More sites in an area already being surveyed add to statistical power.
 - Albemarle-Pamlico National Estuary Program
 - Added 33 sites, doubling 2015 draw to 66.
 - Pensacola-Perdido Bay Estuary Program
 - In 2020 added 23 sites to 7 base sites for baseline
- Population Enhancement Studies
 - Sites added in area not in normal target population.



<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

Communicating Results:

- NCCA Webpage
 - <https://www.epa.gov/national-aquatic-resource-surveys/ncca>
- NCCA 2015 Results
 - <https://www.epa.gov/national-aquatic-resource-surveys/national-coastal-condition-assessment-2015-results>

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

An official website of the United States government [Here's how you know](#)

 United States Environmental Protection Agency

Environmental Topics ▾ Laws & Regulations ▾ Report a Violation ▾ About EPA ▾

NATIONAL AQUATIC RESOURCE SURVEYS

NATIONAL COASTAL CONDITION ASSESSMENT 2015 RESULTS

The NCCA 2015 reports on the quality of estuarine and Great Lakes nearshore waters in the conterminous United States.

Key Findings

Reports and Data

Regional Results

NCCA Data Dashboard

NATIONAL AQUATIC RESOURCE SURVEYS HOME

Background

Indicators

Manuals

Map of Sampled Sites

NARS Data

Journal Articles

Applying the Data

Related Studies and Tools

National Coastal Condition Assessment

National Lakes Assessment

National Rivers and Streams Assessment

National Wetland Condition Assessment

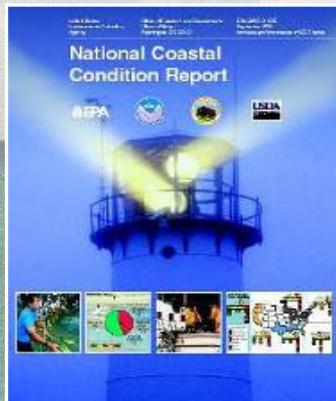
Outreach Materials

View NCCA results for the estuarine and Great Lake regions **(COMING SOON)**.

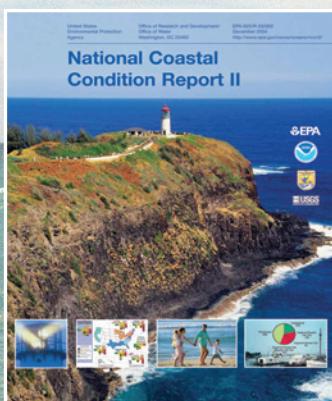
View results and download customized charts with the NCCA dashboard.

Condition	% of Coastal Area
Good*	71%
Fair	15%
Poor	7%
Not Assessed*	7%

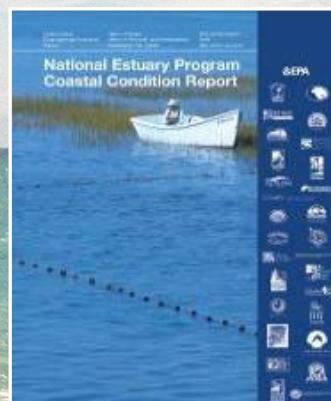
Communicating Results: NCCA Reports



1990 -1996



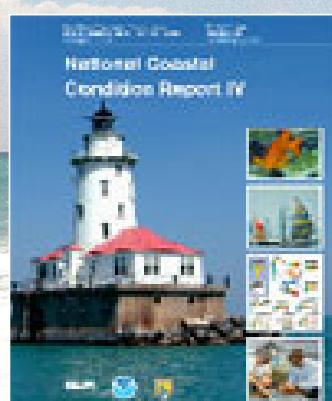
1997 -2000



1997 -2003[†]

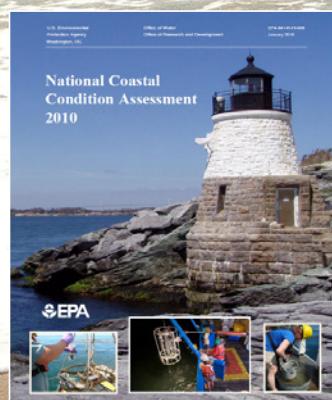


2001 - 2002

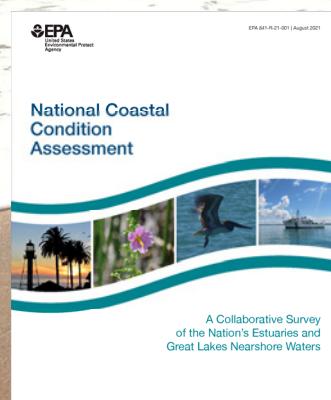


2003 - 2006

*The NCCA 2010 Report marks the transition from an ORD Research program to an OW monitoring program.



2010*



2015



2020 - 2021**

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

**The NCCA 2020 field season was extended into 2021 because of COVID-19. We don't plan for NCCA reports to cross multiple years, but... COVID

Communicating Results: NCCA 2015 Dashboard

2010 results are available on this dashboard:

<https://coastalcondition.epa.gov/>

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

U.S. EPA National Coastal Condition Assessment 2015 Percentage of Estuarine Coastal Area in Good Condition (2005-2015) 2015 Estimates and Change Over Time | All Estuaries



Condition Estimates ▾

Reset menus to default.

Select Study Population

- Estuarine Coastal Area
 Great Lakes Coasts

Select Condition

Good ▾

Select Subpopulation

All Estuaries ▾

All Estuaries

◀ NCCA Regions

◀ EPA Regions

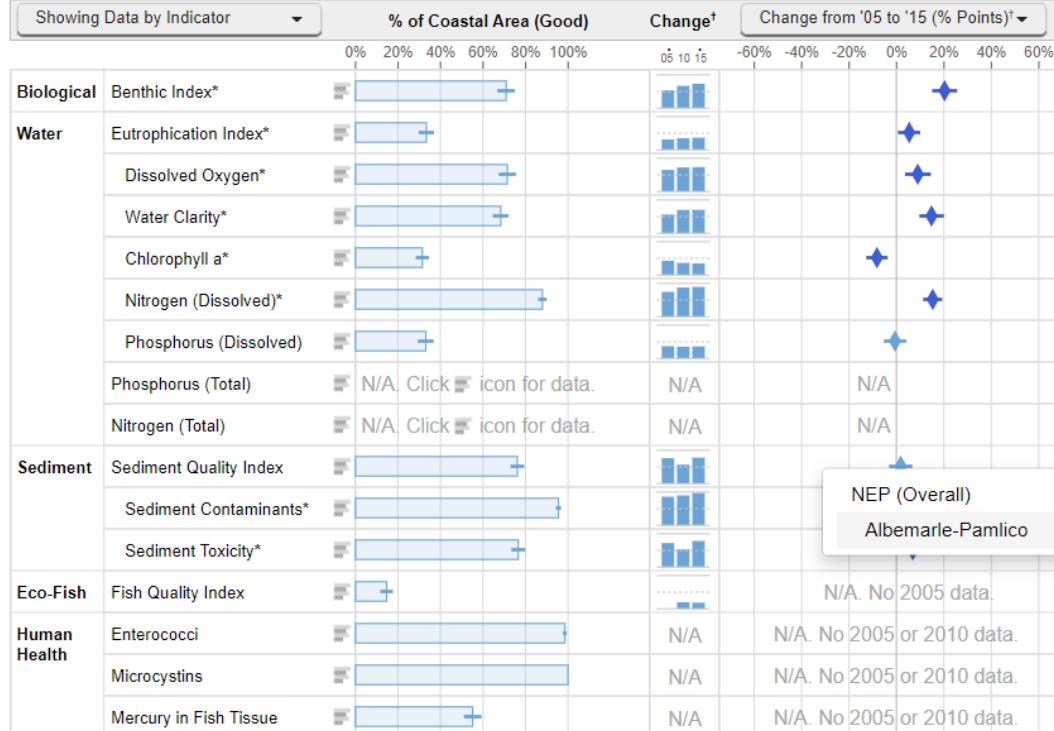
Chesapeake Bay

◀ National Estuary Program

graphs show the percentage of area in good, fair or poor condition in 2015; the direction of change; and long-term change between two time periods.^t

Confidence intervals are calculated at a 95% confidence level. Confidence intervals are larger for subpopulations with fewer sampled sites than those with more sampled sites.

Conditions for biological, water, sediment and ecological fish indicators are based on regionally relevant benchmarks. Human health indicators use different category names to denote that values exceed thresholds.



^t Notation of time periods for the three assessments: 2005-06 (shown as "05" here for brevity), 2010 ("10"), and 2015 ("15"). Estuaries were surveyed beginning in 2005-06. Great Lakes were surveyed beginning in 2010.

* Indicates statistically significant difference (95% confidence) between time periods compared. This difference is also represented by a darker-colored long-term change symbol.

Please see the NCCA 2015 Technical Support Document on the [NCCA website](#) for detailed information on NCCA sampling and analysis methods, including the following: information on the number of sites sampled for each subpopulation; condition thresholds for human health indicators; and regionally relevant condition benchmarks.

U.S. Environmental Protection Agency, Office of Water (2021). *National Coastal Condition Assessment: A Collaborative Survey of the Nation's Estuaries and Great Lakes Nearshore Waters*. Washington, DC. August 2021. Last modified on 08/18/2021 09:13:24.



Communicating Results:

- NARS Data Page
 - Data from all NARS surveys from 2007 – 2019
 - Preliminary NCCA 2020 data targeted for Spring 2022

<https://www.epa.gov/national-aquatic-resource-surveys/data-national-aquatic-resource-surveys>

<https://www.epa.gov/national-aquatic-resource-surveys/ncca>

The screenshot shows the EPA's National Aquatic Resource Surveys (NARS) website. At the top, there are navigation links: Environmental Topics, Laws & Regulations, Report a Violation, About EPA, and CONTACT US. Below this is a header for "National Aquatic Resource Surveys". On the left, a sidebar lists various survey categories: National Aquatic Resource Surveys Home, Background, Indicators, Manuals, Map of Sampled Sites, **NARS Data** (which is selected), Journal Articles, Applying the Data, Related Studies and Tools, National Coastal Condition Assessment, National Lakes Assessment, National Rivers and Streams Assessment, National Wetland Condition Assessment, and Outreach Materials. The main content area features a section titled "Data from the National Aquatic Resource Surveys" with a green "More Information" box containing links to Frequently Asked Questions, a Summary of Available Data, How to cite the NARS data, and Fish Tissue Contaminant Data. Below this is a "Recently added" section with links to updated NLAs and NRAs. A large table titled "Filter data by survey:" shows data for Coastal 2015, listing various indicators like Water Chemistry, Visual Assessment, Site Information, Notes, Landscape Data, and National Lakes Assessment. Each indicator has a link to download data in CSV and TXT formats. The bottom right corner of the page includes a small footer with the text "EPA / NARS Data".

NCCA 2015 Results

- Southeast
 - Showing good condition



U.S. EPA National Coastal Condition Assessment 2015

Percentage of Estuarine Coastal Area in Good Condition (2005-2015)

2015 Estimates and Change Over Time | Southeast



EPA
United States
Environmental Protection
Agency

Condition Estimates ▾

[Reset menus to default.](#)

Select Study Population

- Estuarine Coastal Area
- Great Lakes Coasts

Select Condition

Good

Select Subpopulation

Southeast

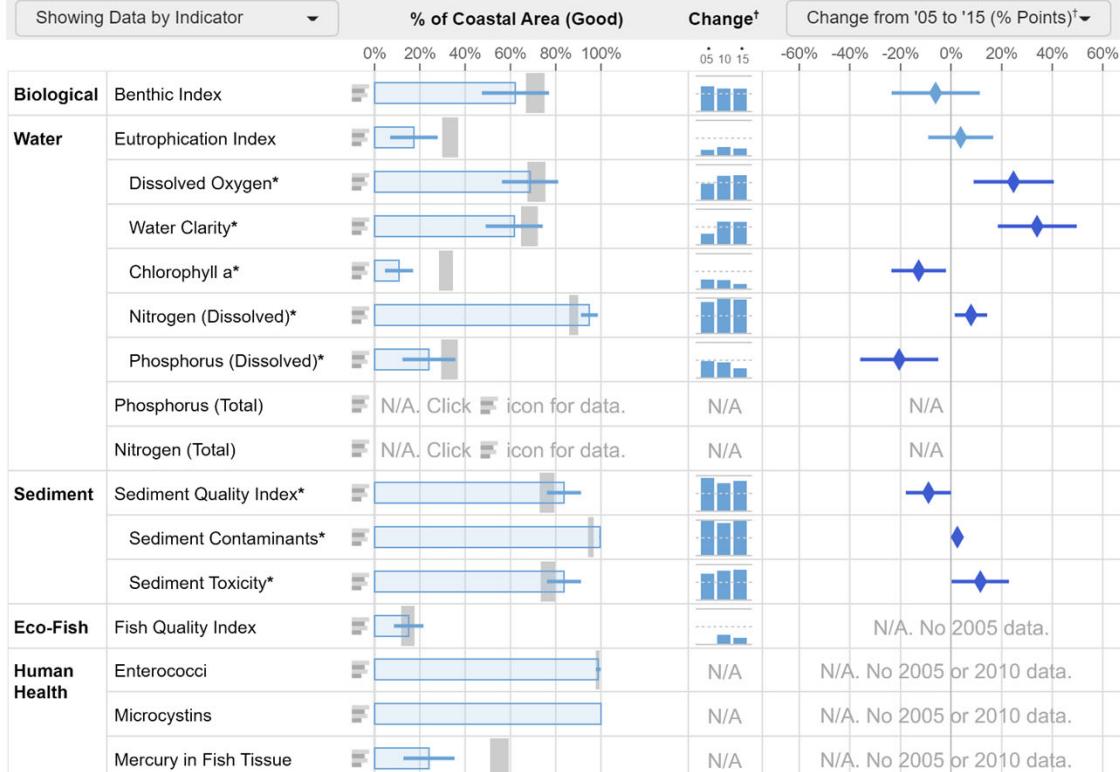
Select Label Options

None

Additional Information

This dashboard displays results from three national assessments of estuarine waters and two surveys of Great Lakes nearshore waters. From left to right, the graphs show the percentage of area in good, fair or poor condition in 2015; the direction of change; and long-term change between two time periods.[†] Confidence intervals are calculated at a 95% confidence level. Confidence intervals are larger for subpopulations with fewer sampled sites than those with more sampled sites.

Conditions for biological, water, sediment and ecological fish indicators are based on regionally relevant benchmarks. Human health indicators use different category names to denote that values exceed thresholds.



[†] Notation of time periods for the three assessments: 2005-06 (shown as "05" here for brevity), 2010 ("10"), and 2015 ("15"). Estuaries were surveyed beginning in 2005-06. Great Lakes were surveyed beginning in 2010.

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<https://coastalcondition.epa.gov/>



NCCA 2015 Results

- Gulf Coast
 - Showing good condition



U.S. EPA National Coastal Condition Assessment 2015

Percentage of Estuarine Coastal Area in Good Condition (2005-2015)

2015 Estimates and Change Over Time | Gulf



Condition Estimates ▾

[Reset menus to default.](#)

Select Study Population

- Estuarine Coastal Area
- Great Lakes Coasts

Select Condition

- Good

Select Subpopulation

- Gulf

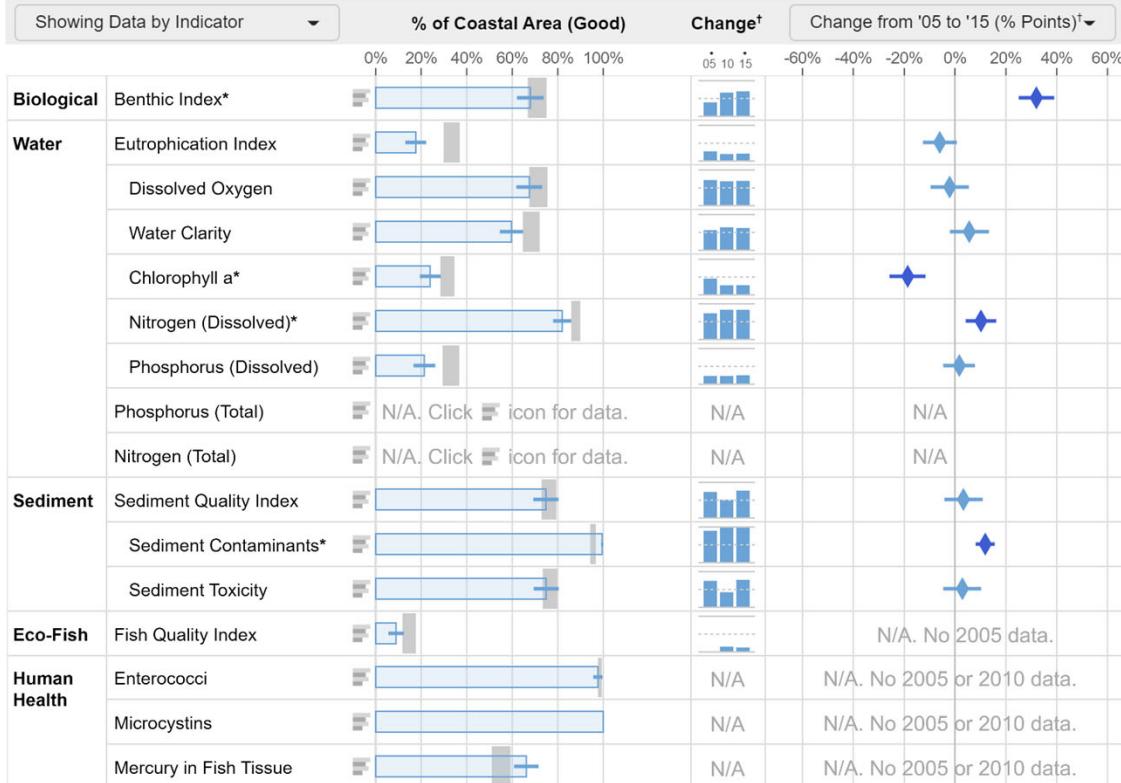
Select Label Options

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Looking Ahead

- NCCA 2020 (& 21)
 - As they become available: Preliminary 2020 data being released to partners
 - April: begin preliminary 2020 data *public* release
 - Preliminary 2021 data to partners as they become available, but target by October 2022
 - Preliminary 2021 data to public as they become available but targeting April 2023
 - Population estimates and reporting targeted Summer 2023
- NCCA 2025
 - Call for supplemental and research indicator proposals is open until October 2022
 - Population enhancement or intensification study
 - Proposals due ASAP
 - Decisions required by September 2023
 - Direct any questions to Hugh Sullivan (sullivan.hugh@epa.gov)

Questions?

Thank you for the opportunity to speak with you today!

CONTACT

Hugh Sullivan
USEPA Office of Water,
Office of Wetlands, Oceans and Watersheds
sullivan.hugh@epa.gov





Next Third Thursday
Web Forum

3-17-2022

10:00 am

Keith McKnight,
Blaine Elliott, and
Anne Mini

Lower Mississippi
Valley Joint Venture

secassoutheast.org

Forest conservation priorities for landbirds in the Mississippi Alluvial Valley

A photograph of a waterfall in a lush, green forest. The waterfall flows down several tiers of dark, layered rock, creating a misty spray at the bottom. The surrounding area is filled with dense green trees and foliage.

Staff updates

- New SECAS coordinator

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- Please welcome Amanda Sesser!

How to get involved in SECAS

- Sign up for the SECAS newsletter

secassoutheast.org

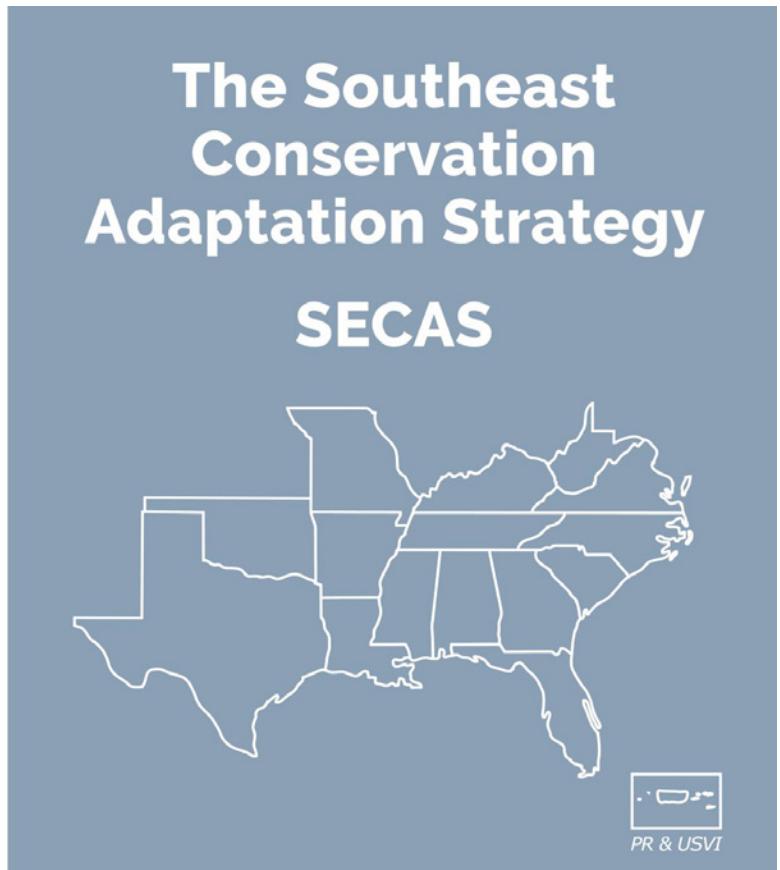
- Connect with SECAS staff or partners

secassoutheast.org/staff

secassoutheast.org/partners

- Explore the Southeast Conservation Blueprint

secassoutheast.org/blueprint



A photograph of a lighthouse at sunset. The sky is filled with warm, orange and yellow hues near the horizon, transitioning to cooler blues and purples higher up. The lighthouse, a white tower with a dark lantern room, stands on a grassy hill to the right. In the foreground, there's a dark, textured area that appears to be a path or a field of tall grass. A large, solid dark blue rectangular box is overlaid on the left side of the image, containing the text "Questions?" in a white, sans-serif font.

Questions?