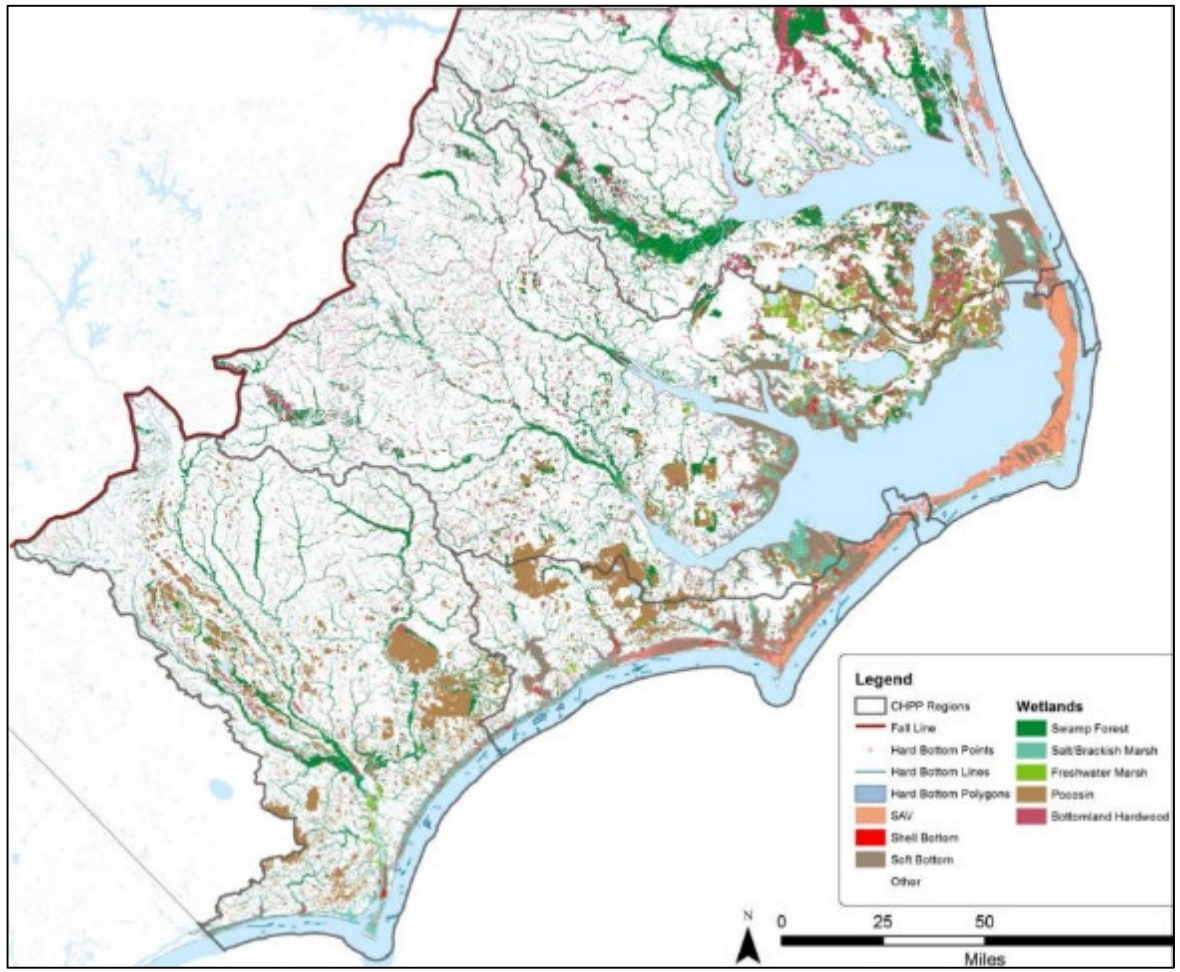
Coastal Wetland Mapping and Monitoring



Pre-survey Results

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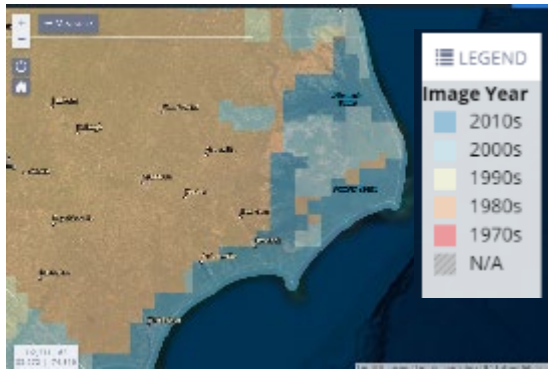
Coastal Wetland Mapping: Mapping Efforts

Question: Briefly list any efforts you or your organization are currently undertaking to map and/or monitor NC's coastal wetlands (estuarine and freshwater in the coastal plain).

NOAA C-CAP

FWS NWI



Survey Respondents Mapping Efforts

- NC NERR Sampling
- PKS Aquarium & Teddy Roosevelt Natural Areas
- Trent River Watershed
- Natural Heritage Program Mapping
- Drones to Delineate Salt Marsh Upland Boundary (location unspecified)
- Marine Robotics and Remote Sensing Lab Using Drones, Satellite Imagery, and Deep Learning to Map Wetlands Along NC Coast

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Coastal Wetland Mapping: Mapping Efforts

Question: Briefly list any efforts you or your organization are currently undertaking to map and/or monitor NC's coastal wetlands (estuarine and freshwater in the coastal plain).

Survey Responses: Lack of spatial specificity.

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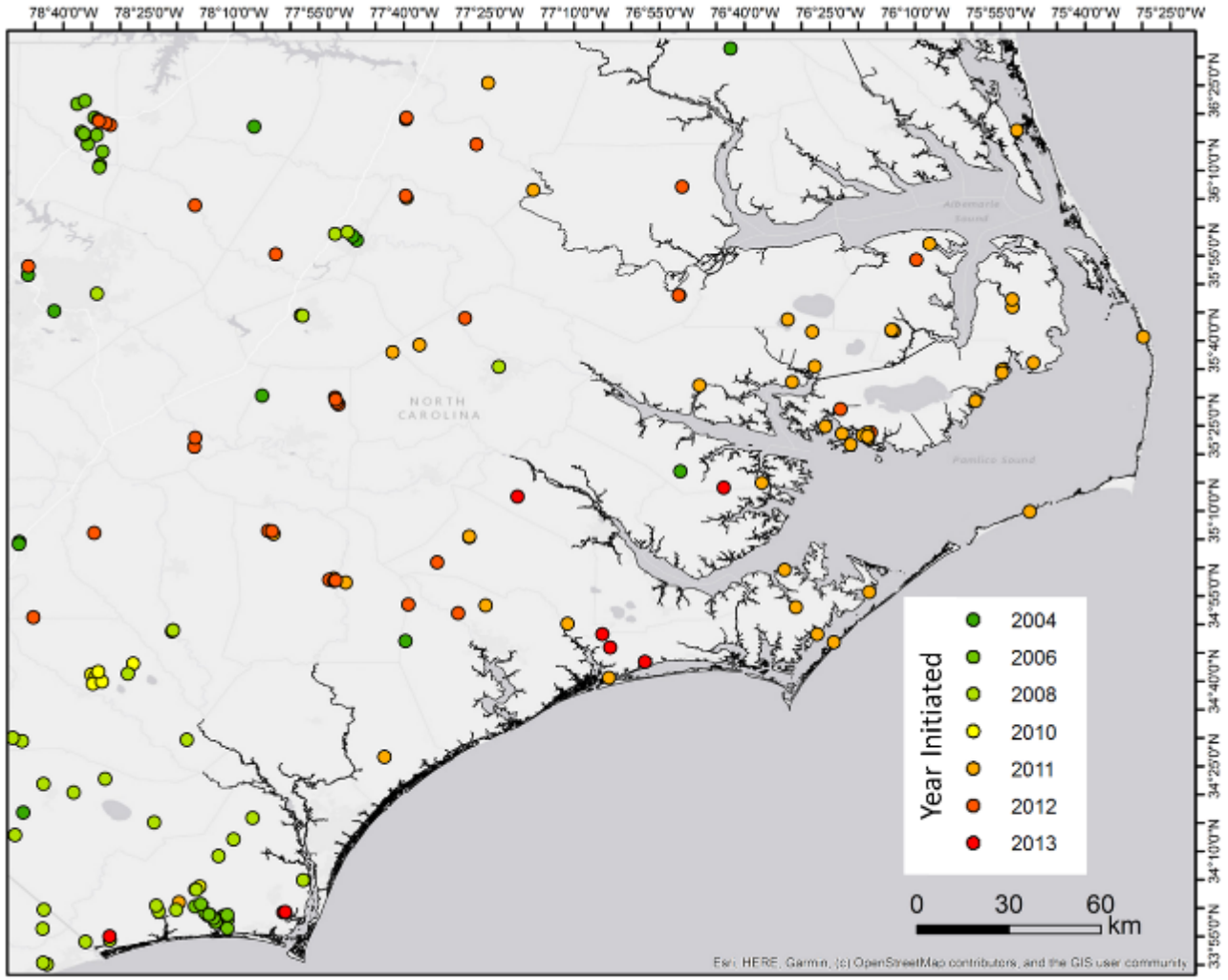
DWR Wetlands Monitoring Projects 2004-2015



Sampling Duration (yrs)	Number of Sites	Percentage of Sites
1	147	59%
2	27	11%
3	50	20%
4	10	4%
8	8	3%
10	6	2%

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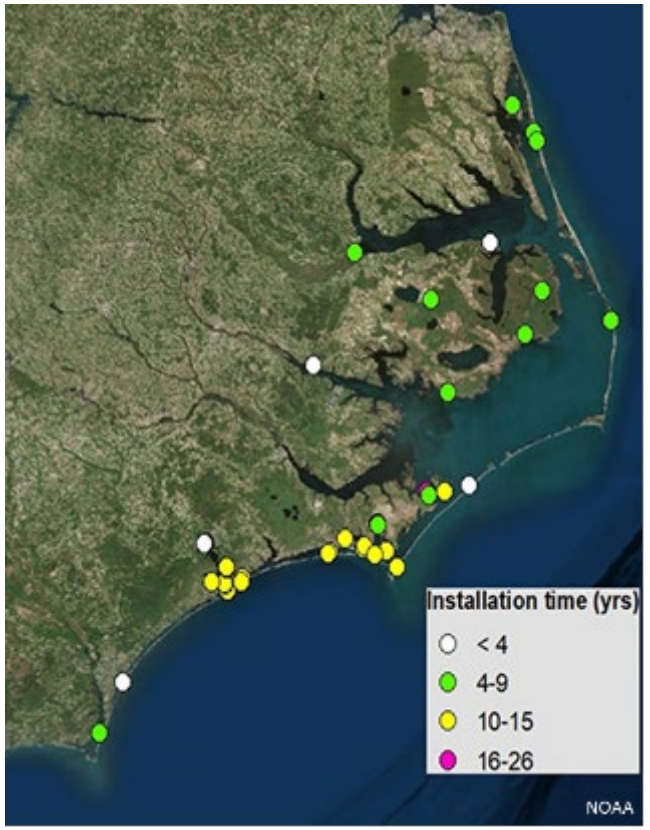
NC Sentinel Site Cooperative – Surface Elevation Tables



125 SETs in coastal North Carolina

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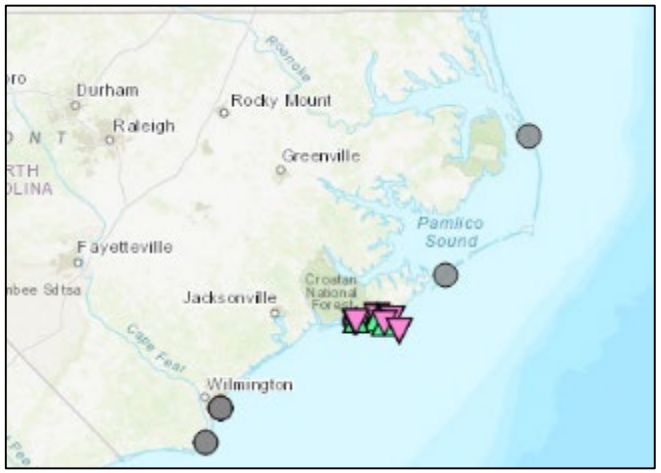
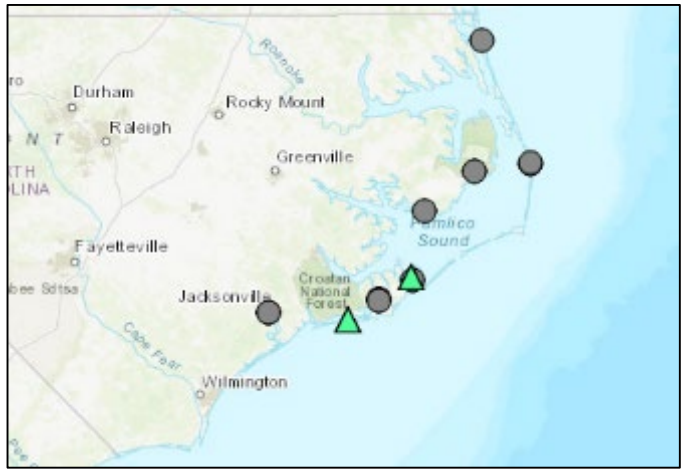
NC Sentinel Site Cooperative – Surface Elevation Tables

Back-Barrier Lagoon Marsh

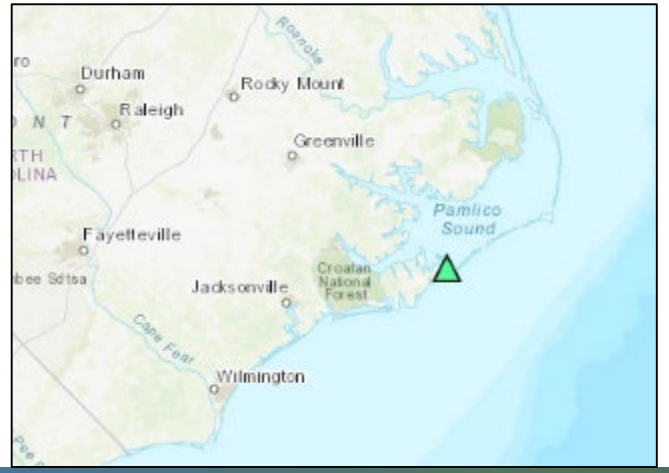


Estuarine Embayment Marsh

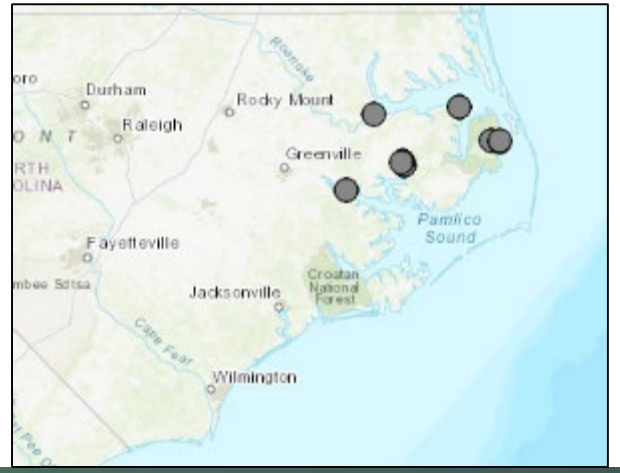
Estuarine Brackish Marsh



Non-tidal Brackish Marsh



Non-tidal Forests



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Pre-Survey Results

Coastal Wetland Mapping: Barrier/Shortcomings & Solutions

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Coastal Wetland Mapping: Barriers & Shortcomings

Question: Barriers or shortcomings to estuarine and freshwater wetland mapping include: *insufficient frequency, accuracy, funding, imagery resolution to differentiate habitat type, delineating edge, and identifying species*. Are there other barriers you are aware of?

Responses:

- Challenges remote sensing salinity
- Challenges remote sensing hydrological regime
- Impediments to remotely sensing soil thickness
- Impediments to mapping wetland function
- Accurate tide level information during image acquisition
- Insufficient field validation
- Lack of standard mapping protocol
- Insufficient DEQ staffing to conduct mapping and compile data
- Lack of centralized repository
- Insufficient collaboration between groups conducting mapping

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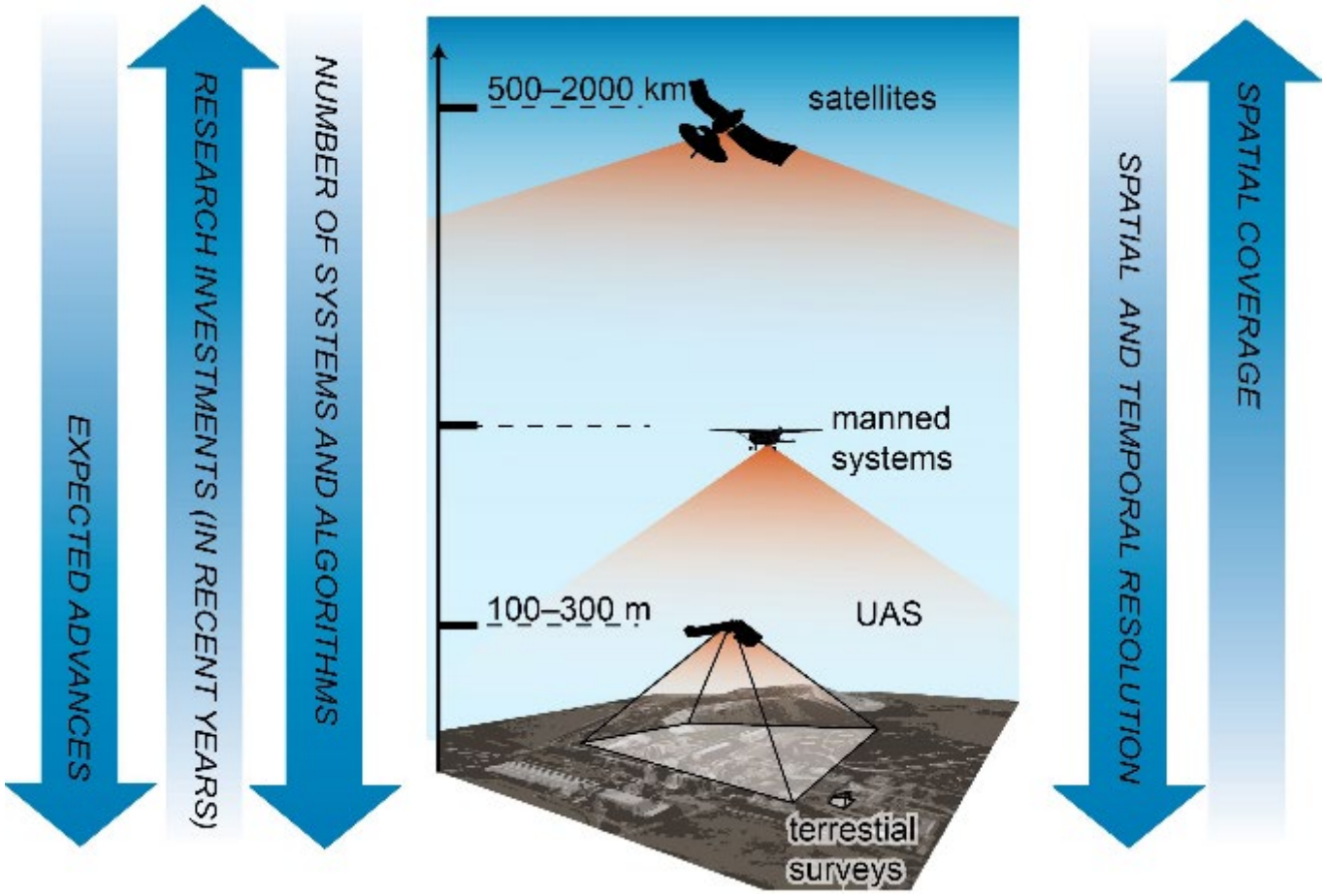
Coastal Wetland Mapping: Barriers & Shortcomings Poll (Q1)



Jeziorska 2019

Please Select Your Top 3 Impediments to Coastal Wetland Mapping

Please Focus on Shortcomings that Hinder Effective Management of Coastal Wetlands

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Coastal Wetland Mapping: Barriers & Shortcomings
Poll Answers (Q1)

Please select the three (3) greatest barriers to, or shortcomings of, estuarine and freshwater wetland mapping?

Choices	Results
Insufficient temporal resolution of remotely sensed data	10/52 (19%)
Insufficient spatial resolution of remotely sensed data	14/52 (27%)
Impediments to remotely sensing (salinity, hydrology, soil thickness, etc.)	10/52 (19%)
Impediments to inferring function	0/52 (0%)
Lack of standardized mapping protocol	13/52 (25%)
Lack of centralized data repository	10/52 (19%)
Limited collaboration	14/52 (27%)
Limited field validation	9/52 (17%)
Lack of funding (grant and legislative)	27/52 (52%)
No Answer	15/52 (29%)

Coastal Wetland Mapping: Overcoming Impediments

Question: Please list any recommendations you have to address the shortcomings of current mapping efforts?

Responses:

- Increased collaboration to address duplicative and nonintegrated efforts via steering committee or Wetland Mapping Coalition
- Standardized mapping protocol
- Frequent communication of mapping needs to facilitate adaptive management
- Increased funding for mapping and ground truthing
- Leveraging citizen scientists
- Legislative mandate to reconcile and integrate collection platforms, collection systems, & datasets (Centralized repository)
- Outreach highlighting community resilience implications of impacts to wetland resources -> increased funding

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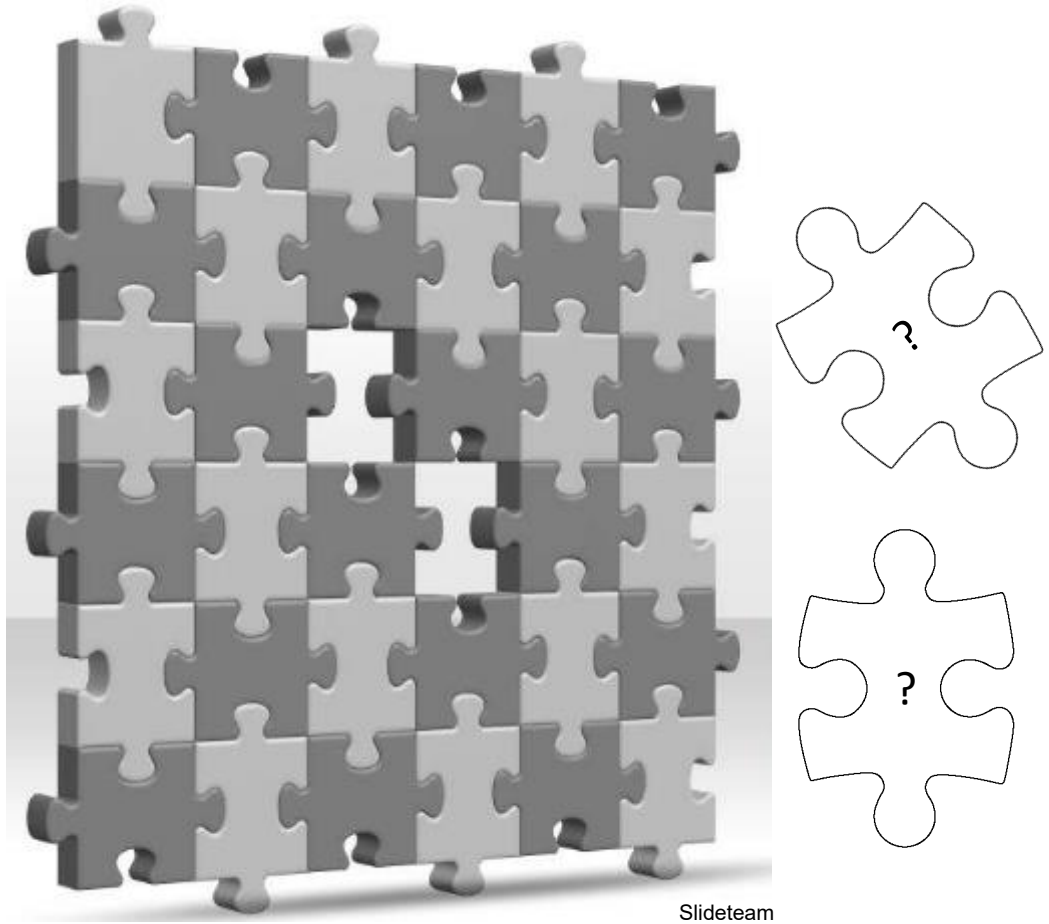
Coastal Wetland Mapping: Overcoming Impediments Poll (Q2)



Please Select Your Top 3 Actions To Address/Overcome Mapping Shortcomings That Hinder Effective Management of Coastal Wetlands

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Coastal Wetland Mapping: Overcoming Impediments
Poll Answers (Q2)

Please select the three (3) actions that would provide the greatest benefit to wetland mapping and its use in effective management and conservation?

Choices	Results
Increased collaboration via steering committee or mapping coalition	25/51 (49%)
Creation of centralized data repository	15/51 (29%)
Standardized mapping protocol	13/51 (25%)
Greater communication of urgent mapping needs for management	12/51 (24%)
Increased funding for mapping and ground truthing (grant and legislative)	33/51 (65%)
Leveraging citizen scientists	4/51 (8%)
Outreach highlighting community resilience implications of impacts to wetlands (justifying funding)	15/51 (29%)
No Answer	12/51 (24%)

Pre-Survey Results

Coastal Wetland Monitoring: Barrier/Shortcomings & Solutions

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Coastal Wetland Monitoring: Barriers & Shortcomings

Question: Barriers or shortcomings to estuarine and freshwater wetland monitoring include: *insufficient frequency, standardization, funding, staff, and habitat condition*. Are there other barriers you are aware of?

Responses:

- Restoration funding not contingent on standardized, quantitative monitoring and reporting
- Lack of centralized repository (funding and staff needs)
- Insufficient NCDEQ funding to conduct monitoring
- Insufficient availability of matching funds (state dollars) to leverage external funding opportunities.
- Insufficient sentinel sites coverage
- Limited access to (or time consuming to acquire access to) private land to conduct monitoring
- Lack of training and monitoring equipment for standardized monitoring technique.
- Duplicative and nonintegrated efforts
- Concerns over destructive sampling techniques and trampling wetlands to acquire data

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Coastal Wetland Monitoring: Barriers & Shortcomings Poll (Q3)

Please Select Your Top 3 Actions To Address/Overcome Monitoring Shortcomings That Hinder Effective Management of Coastal Wetlands

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Coastal Wetland Monitoring: Barriers & Shortcomings
Poll Answers (Q3)

Please select the three (3) greatest barriers to, or shortcomings of, estuarine and freshwater wetland monitoring?

Choices	Results
Insufficient temporal resolution	9/48 (19%)
Insufficient spatial resolution (too few sentinel sites)	14/48 (29%)
Limited access to private lands	6/48 (13%)
Insufficient grant funding	7/48 (15%)
Insufficient NCDEQ staffing and funding for monitoring	21/48 (44%)
Lack of centralized database	10/48 (21%)
Lack of training and monitoring equipment for standardized monitoring	8/48 (17%)
Duplicative and nonintegrated efforts (lack of collaboration/communication)	15/48 (31%)
Destructive sampling techniques and incidental sampling impacts (trampling)	1/48 (2%)
Piecemeal assessments of wetland function	7/48 (15%)
No Answer	13/48 (27%)

Coastal Wetland Monitoring: Overcoming Impediments

Question: Please list any recommendations you have to address the shortcomings of current monitoring efforts?

Responses:

- Increased use of citizen science
- Mandate and fund development of centralized repository for monitoring data
- Increased collaboration to address duplicative and nonintegrated efforts via steering committee or Wetland Mapping Coalition
- Standards/requirements for monitoring state-funded restoration: duration and methodology
- Provide training and monitoring equipment for standardized monitoring technique.
- Research and outreach highlighting social and ecological benefits of wetlands and their restoration
- Expand sentinel site network

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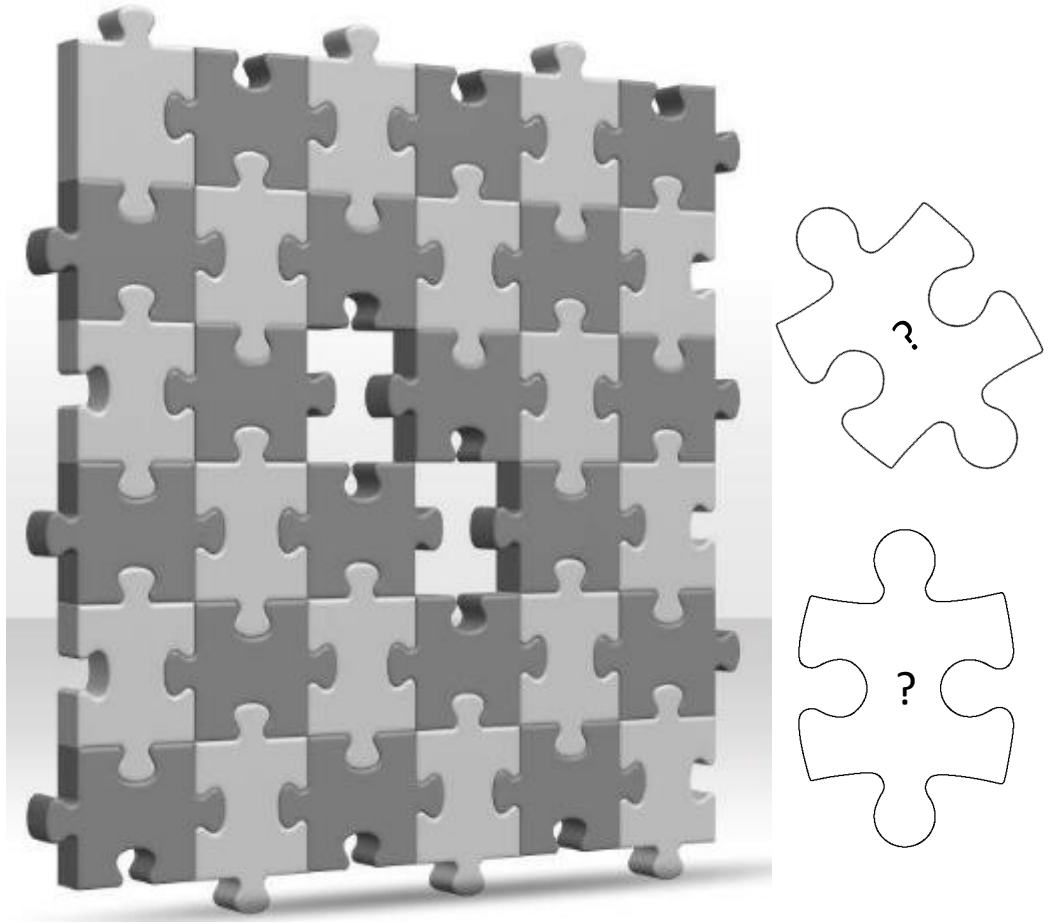
Coastal Wetland Monitoring: Overcoming Impediments Poll (Q4)



Please select three (3) actions that would have the greatest benefit to wetland monitoring and its use in effective management and conservation?

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Coastal Wetland Monitoring: Overcoming Impediments

Poll Answers (Q4)

Please select the three (3) actions that would have the greatest benefit to wetland monitoring and its use in effective management and conservation?

Choices	Results
Increased use of citizen scientists	4/44 (9%)
Increased collaboration via steering committee or mapping coalition	25/44 (57%)
Centralized data repository creation	14/44 (32%)
Development of standardized monitoring requirements for state-funded restoration	11/44 (25%)
Increased availability of training and monitoring equipment for standardized monitoring	3/44 (7%)
Increased funding for monitoring (grant and legislative)	28/44 (64%)
Expanded sentinel site network	8/44 (18%)
Outreach highlighting social and ecological benefits of wetlands (justifying funding)	14/44 (32%)
No Answer	8/44 (18%)