

Hampton Seabrook Estuary Collaborative Survey Results

Prepared by



Who took the survey?

33 People from... (red = invited but NR)

Community engaging orgs

1. Seabrook-Hamptons Estuary Alliance
2. Piscataqua Region Estuaries Partnership
3. NH Sea Grant Extension
4. Great Bay NERR
5. Rachel Carson National Wildlife Refuge
6. The Nature Conservancy
7. New Hampshire Audubon
8. Hampton Falls Conservation Commission
9. Rockingham County Conservation District
10. Rockingham Planning Commission

Private sector orgs

1. Milone & MacBroom
2. Horsley Witten Group
3. Normandeau Associates, Inc.
4. FB environmental
5. Truslow Resource Consulting

State/Regional orgs

1. New Hampshire Fish and Game
2. NH Natural Heritage Bureau
3. NHDES: Coastal Program, Watershed Management Bureau
Water Quality Planning Section
4. University of New Hampshire: Main & Jackson Estuarine Lab
5. Northeastern Regional Association of Coastal Ocean Observing Systems (NERACOOS)
6. New Hampshire Natural Resources Conservation Service

Federal orgs

1. NOAA: Office for Coastal Management & Restoration Center, Greater Atlantic Regional Office Habitat and Ecosystem Services Division
2. USFWS: Gulf of Maine Coastal Program, ACJV, Central New England FWCO
3. US Army Corps of Engineers: NAE
4. US Environmental Protection Agency, Region 1

29 respondents want to stay in
touch with webinars
(4 did not respond to the Q)

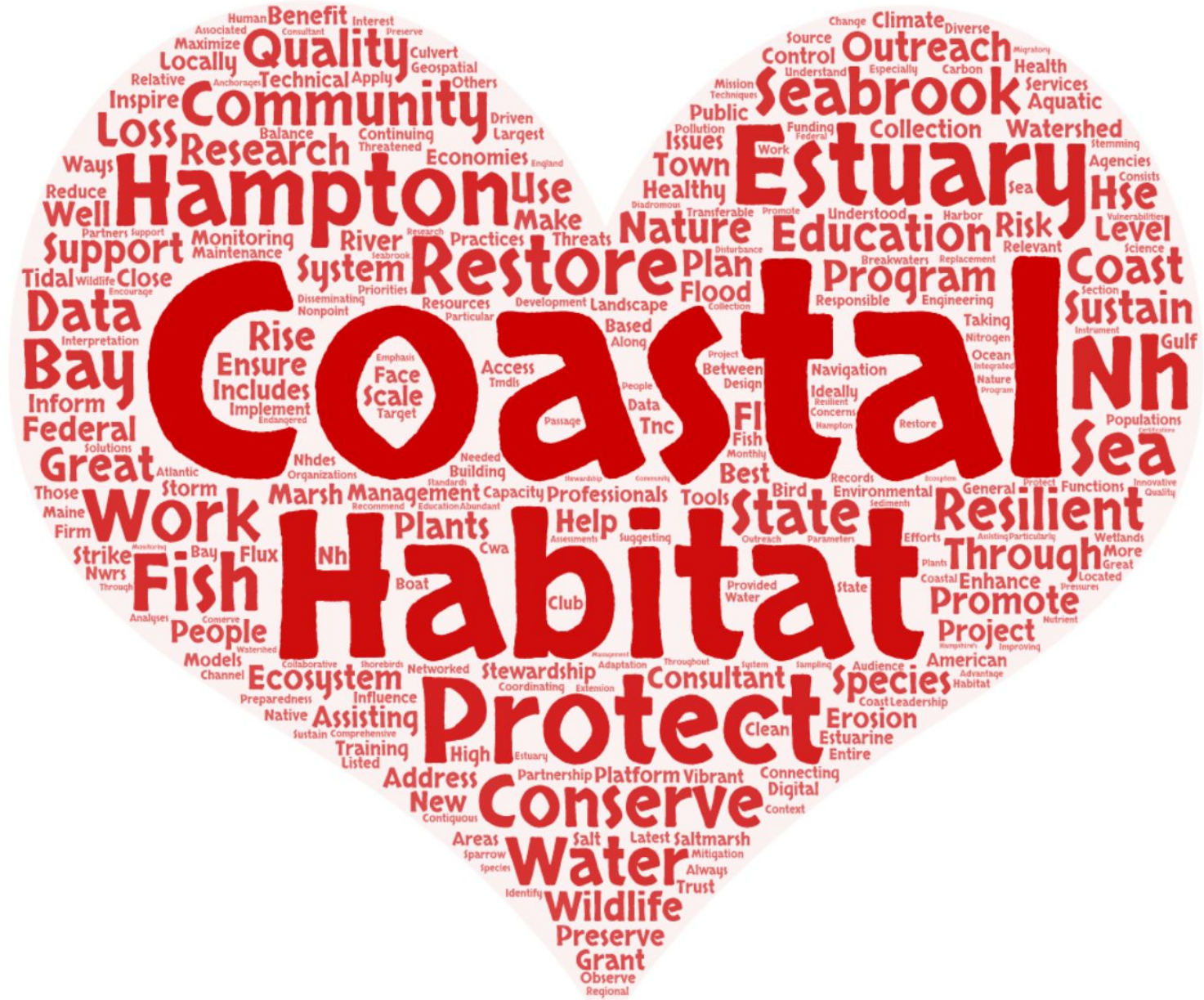
HSE Related

Missions & Priorities

Informally coded according to ...

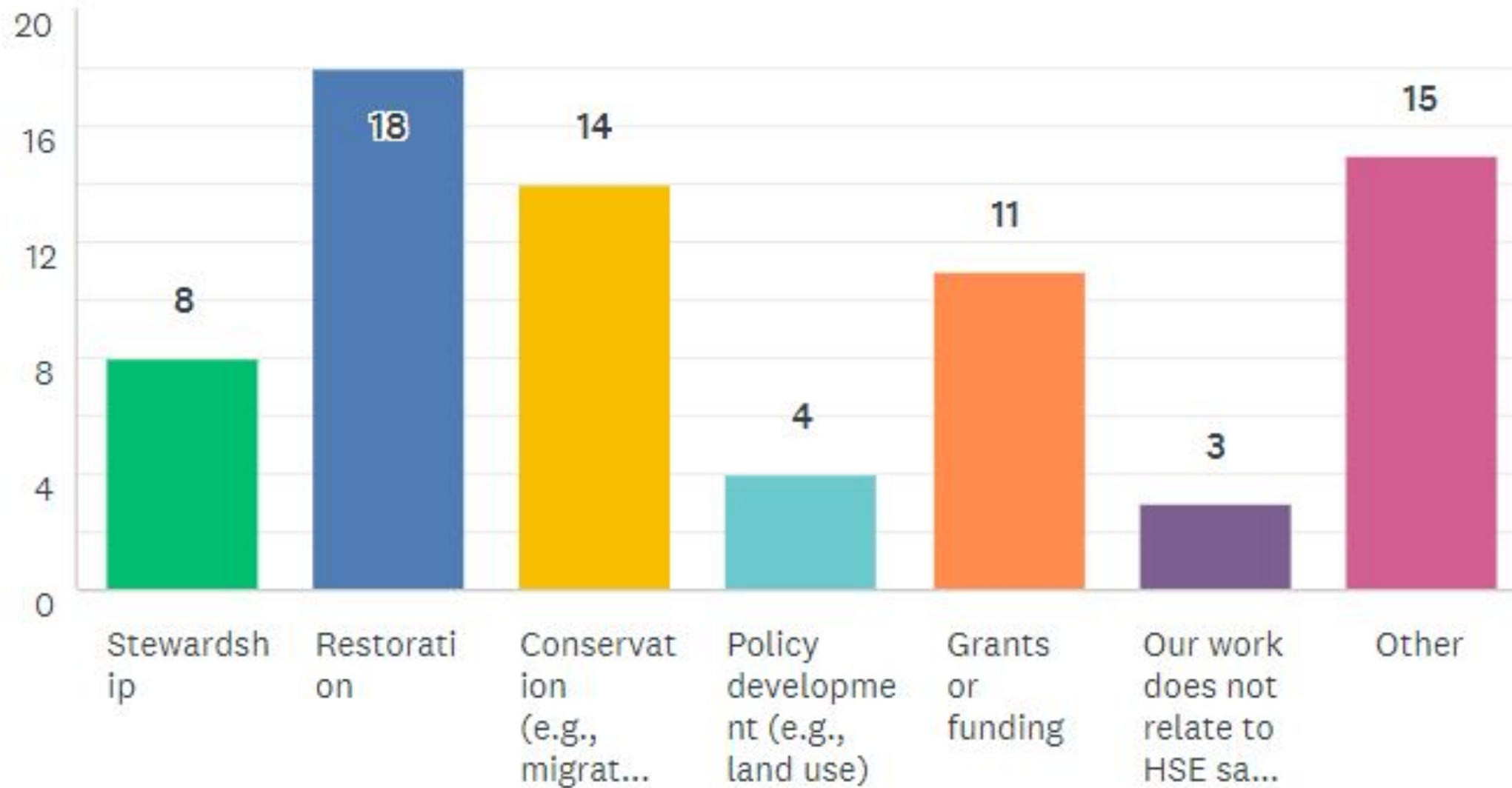
- Conservation: **9**
- Restoration: **8**
- Stewardship: **10**
- Fish and wildlife: **6**
- Resilience: sea level rise, storm surge, erosion, flooding: **9**
- Research: **6**
- Monitoring: data collection, data synthesis, data analysis: **7**
- Education: schools and general public: **6**
- Community engagement: municipal (technical assistance, policy & regulatory support) & public outreach: **7**

Restoring & protecting coastal habitat is my favorite!



Salt Marshes

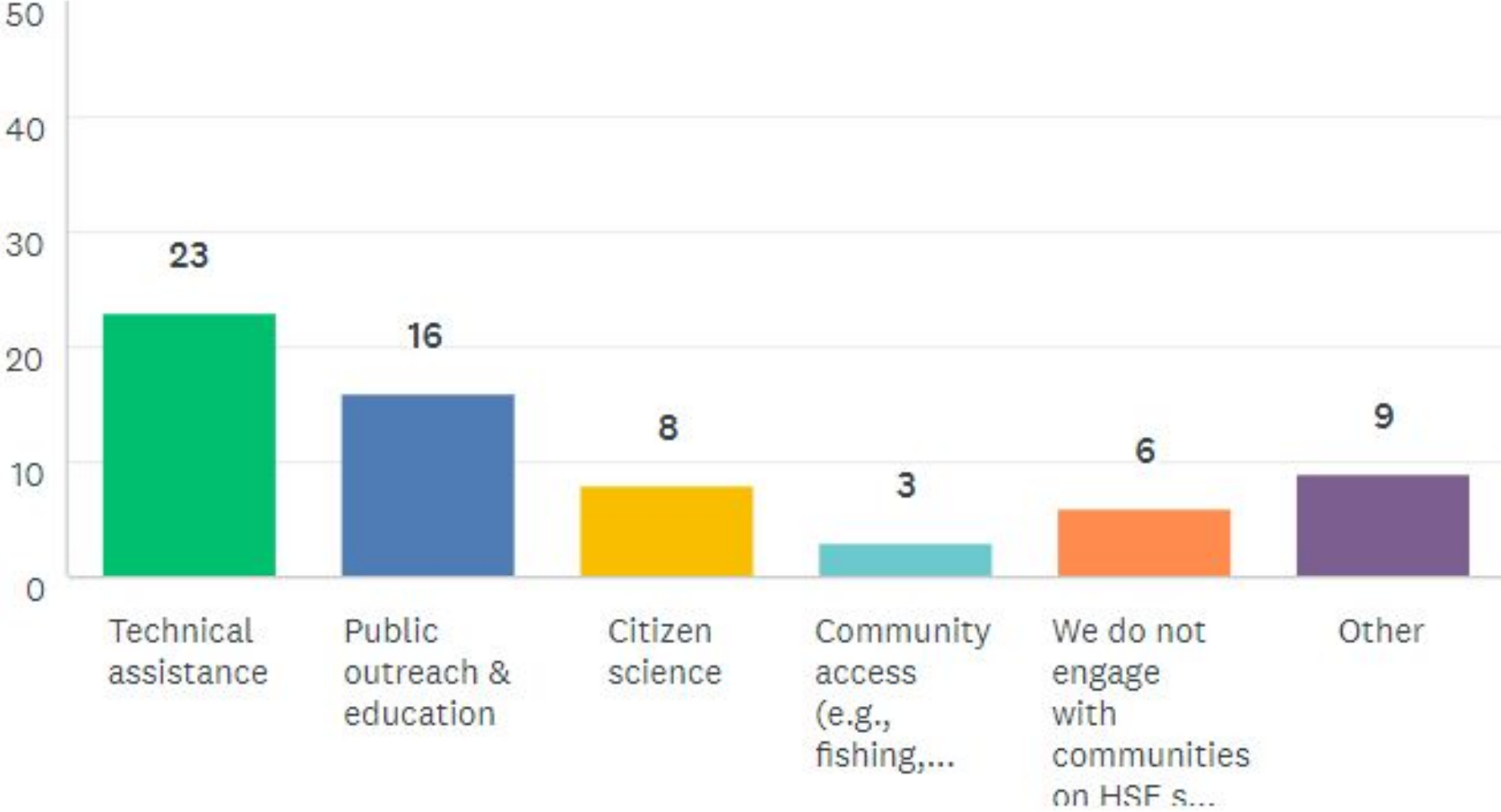
Which of the following best describe your organization's work with regard to salt marsh management in the HSE? Check all that apply.



“Others” comments, affirming not different ...

- Flood mitigation, habitat protection. Planning for the future, designing projects to implement.
 - Habitat mapping, conservation planning and outreach
 - Conservation planning (e.g., developing and promoting online/GIS tools to help prioritize and guide salt marsh conservation efforts.
-
- SMARTeams (Salt Marsh Adaptation & Resiliency Teams) collaborative effort among FWS and partners to provide assistance to organizations/partnerships engaged in salt marsh restoration that may be beyond that group's capacity such as training, technical assistance, design/review, monitoring frameworks etc.
 - Seek/ provide funding for monitoring/research to support salt marsh conservation
-
- Standards, Assessments, TMDLs, 401s, WQ Certs
 - Limited role in management (although we do own some salt marsh parcels), but the data we collect hopefully informs prioritization of marsh areas for conservation or restoration.
 - Our Coastal Training Program has worked in this region with decision makers.

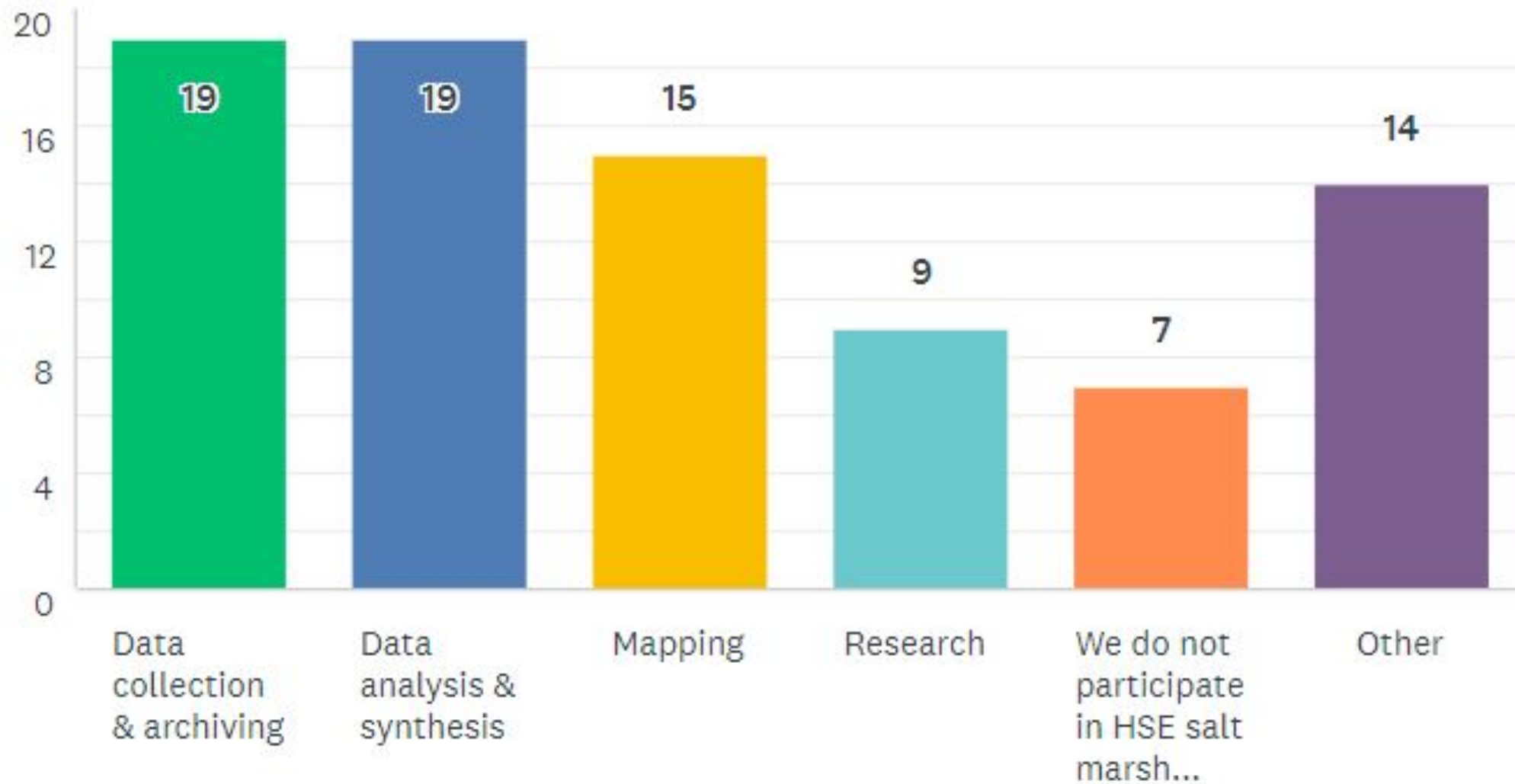
Which of the following best describe your organization's work to related community interaction with HSE salt marshes? Check all that apply.



“Others” comments affirming & different ...

- SHEA: advocate for Estuarine system and liaison other groups and agencies looking to connect and work with municipal staff and residents in 3 communities surrounding the estuary.
 - When it comes to technical assistance, help facilitate/make the connection between those with skills and knowledge that can help a community address certain concerns or interests.
-
- Info as permitted to conservation agencies on rare plant/ exemplary natural community data.
 - Work in maintenance dredging field, coordinate with locals and public as needed to provide maintenance dredging and repairs to the federal structures in Federal Navigation Project.
-
- We're not participating at this time, but through SMARTeams could provide advice and in the future, the possibility of social media assistance
 - Currently we do not work in HSE, however these are activities we do elsewhere.
 - Nott in HSE (Great Marsh & Great Bay).
 - These answer reflect our work in salt marshes and rivers and not HSE specifically.

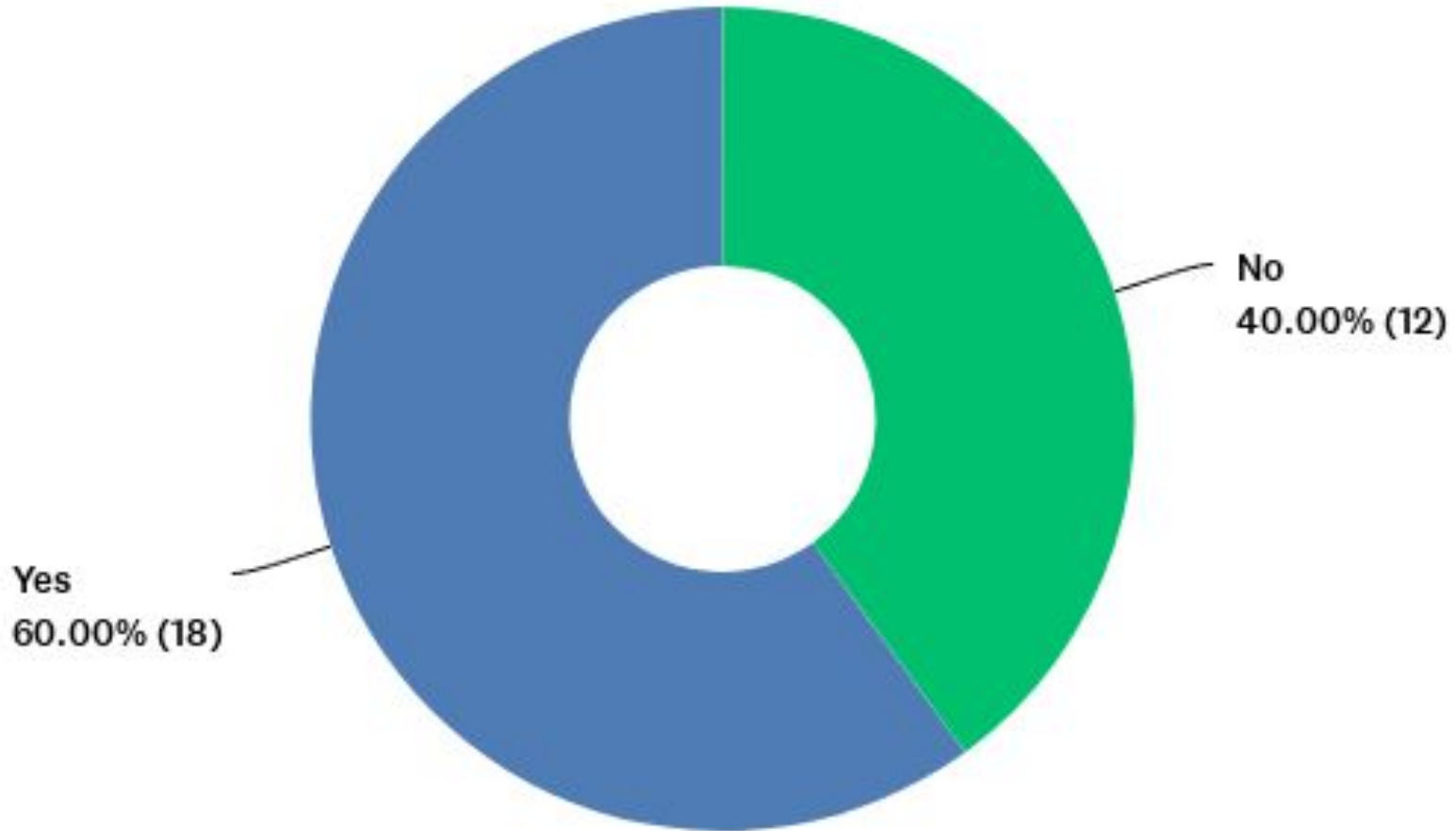
Which of the following best describe your organization's work related to research and monitoring focused on HSE salt marshes? Check all that apply.



“Others” comments affirming & different ...

- Periodic water quality assessment
 - Data collection/ analysis to evaluate alternatives to reduce flooding and protect habitat.
 - Related to maintenance dredging of the federal navigation project, collect surveys/data as needed for environmental coordination and development of plans and specifications.
 - Environmental Monitoring Database (EMD), takes in data from >150 different projects and programs into consistent framework. The 305(b)/303(d) Assessments use that data & Water Quality Standards to determine which waters are in attainment for goals of designated uses.
 - modeling and design
-
- Fund others to do most activities checked, do little to none of it ourselves as a program.
 - Not directly, partners like TNC at the Lubberland Creek Preserve, we have help fund
 - Work in salt marshes and rivers in the Gulf of Maine and not HSE specifically.
-
- None yet. Marsh monitoring in Great Bay could be beneficial to establish in HSE
 - Not now: SMARTeams could provide advice, monitoring plans, future data management, etc.

Does your organization collect data to advance the understanding and/or management of HSE salt marshes?



Research & Data Work from Comments ...

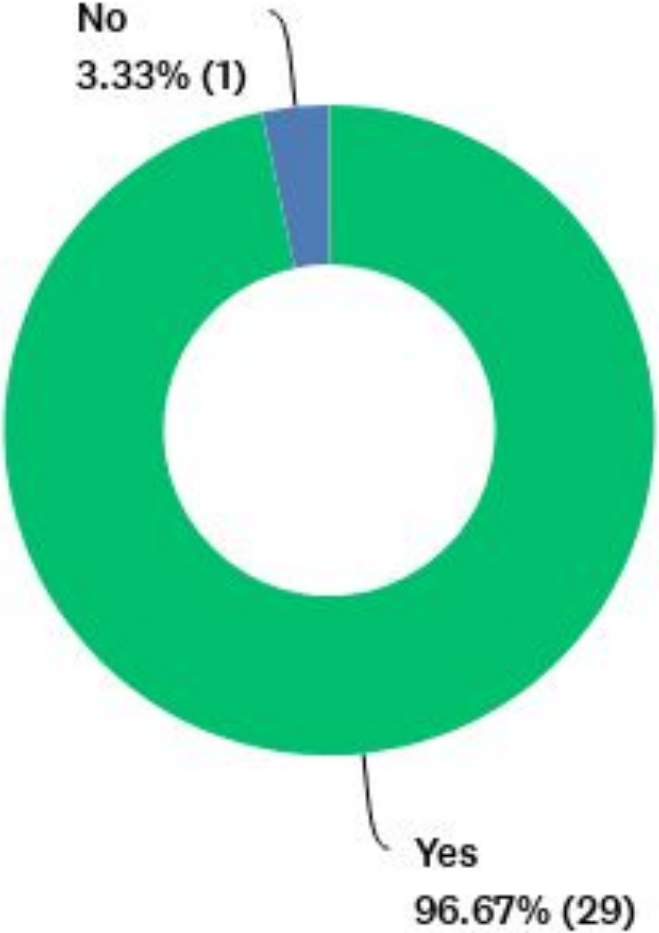
- Fund sea level rise mapping, analyzed tide gauge data. Pay others to collect water level information, conduct SETs, collect social/resident data on preferences related to marsh management. Collaborate to collect data on salt marshes and mapping (SLAMM/high resolution salt marsh mapping) & NH salt marsh plan (which we funded). Mapped shoreline protection structures and evaluated living shoreline site suitability based on available data.
 - Collected topographic/bathymetric survey data & 2 months tidal data at 4 locations in Seabrook.
 - 2013 UNH JEL: 6 SET tables and marker horizons to understand salt marsh response to SLR. 2020 study to understand overwash and the contribution of overwash to supplying the marsh with inorganic sediments. Since 2015 our team piloting projects to correct legacy effects of agriculture and mosquito control in Great Marsh with a goal to apply techniques to HSE in the future.
 - W/UNH, set up water level monitoring. Created hydraulic model. Using water surface boundary conditions from WHOI includes sea-level rise predictions, storms, and changing tides
 - 2020 we launched an effort to design a resilient tidal crossing replacement in Seabrook. Our engineering team collected baseline tidal data to inform the design.
 - Collect condition surveys of harbor and federal jetties, part of the Federal Navigation Project
-
- Tried to figure out ways to work with NHCP, SHEA and others to replicate marsh monitoring protocols so it is done same way across state. Helped out with invasive species monitoring as well?
 - lots of trend data and restoration techniques piloted at PKR to address marsh symptoms.

Research & Data Work from Comments ...

- PREP coordinates to collect data on salt marshes and water quality that gets analyzed and reported on in annual PREP reports and State of Our Estuaries Report, comes out every 5 years.
- NOAA/Digital Coast provides access to imagery, topobathy lidar data, land cover, salt marsh habitat, and socioeconomic data, tools, and related training for HSE and the surrounding areas.
- High resolution tidal mapping with colleagues at NOAA (available on CoastalViewer). NH marsh plan. Starting a saltmarsh sparrow monitoring project with PREP, UNH, NH Fish and Game and ASNH.
- Periodic water quality monitoring
- Water quality work can inform salt marsh research
- As far as the Water Quality Planning section goes, we have not personally collected data. Note that as part of NHDES, NHDES has provided funding and the Shellfish Program (Chris Nash) has done other work.
- Potential models of nutrient fluxes from watersheds to estuary, not previously applied to HSE
- Data on rare plants and exemplary natural communities.
- 2006-07 comp. survey nesting birds shorebird migratory use. Renewed shorebird surveys 2018-20.
- Species presence absence, model land use, current condition assessments
- Train/coordinate volunteers who collect photos from stations at 2 marshes (Depot Road, Hampton Falls, Causeway St, Seabrook). Collected data (vegetation, water quality, nekton) in salt marshes.

- Miss anything big?
- Best way to organize this info for future reference?

In your opinion, are there critical gaps in the data or science needed to understand and support your organization's work related to HSE salt marshes?



What We Need: Big Picture, Synthesis, Access

- Synthesis of existing data to assess ecosystem health
- I think it would be helpful to have all the different sources of data and research compiled into a database/library to help build our overall understanding of the HSE health and identify management priorities.
- Re current health of the estuary, doesn't appear to be a single comprehensive baseline assessment that enables us to know what data is available and what is needed. Helping the communities and residents to better understand the importance of the eco-services is an ongoing gap/need. Residents living along or adjacent to the salt marsh view the system as the threat as opposed to our biggest line of defense against flooding.
- Quantify amount and variability of flux of nitrogen, carbon, sediments from watersheds to estuaries (storm event, seasonal, interannual), and how conditions in the estuary responds.
- i think a lot of the data from Great Marsh is transferable; but site specific marsh assessment will be needed. I can help with remote (maps) assessment
- Almost a complete lack of marsh monitoring...ironically in a marsh-dominated estuary
- Local water level data and data quality metrics, elevation and land cover quality metrics, and ecosystem service assessments should be developed and tested.

What We Need: Data to Address SLR/Water levels

- Detailed elevation data (soon to be released LiDAR hopefully will solve), understanding of impacts of catastrophic storm events - hard to research / model because stochastic.
- big picture impact of sea level rise and practicality to restore marsh habitat
- Most of the gaps lie in a lack of coordination and responsibility/authority among many players working in HSE. But in terms of data/science, we need to know more about how to protect salt marshes from sea level rise in HSE.
- More data on how marshes are responding to sea level rise, more data on approaches to assist marshes in responding to sea level rise (i.e., approaches that help build low marsh e.g. mud motor), more data on marsh use by higher trophic levels such as fish, more data on extent and control of invasive species
- Data such as the "unvegetated to vegetated ratio" or proportion of the marsh above MHW are likely not available currently, and could be helpful to guide conservation implementation. Sediment levels, accretion rates, and tidal datum would also be valuable, and I'm not sure which (if any) of those are available and at what scale or level of precision.
- We need more water level information. System is now set up to collect that. Should keep it running for some time.
- Regular gaging of water levels and freshwater in-flows. A dedicated tide gage in the Harbor would be useful. Same goes for stream gages for some of the major tributaries.

What We Need: Habitat Data

- Do not have enough background information about the HSE to answer this question with certainty, but when we have met with partners there seems to some consistent confusion about 1) the extent of marshland that needs to be conserved/ restored for significant impact on the marsh and trust species, and 2) ownership of parcels in area.
- NHFG perspective: gaps in salt marsh sparrow info
- Many previously documented rare plant species and exemplary communities with outdated records.
- For some shorebirds, we still don't know details on important roosting sites throughout the annual cycle. There has not been a comprehensive survey of marsh-nesting Common Terns (state threatened) for over a decade
- Additional focused studies at a very detailed level (i.e., quadrat or transect scale) would be helpful, both related to plant communities and soil elevation but also to salt marsh sparrows.

What We Need: Data for Restoration

- NHFG perspective: 1) data to evaluate best way to keep marshes healthy as SLR occurs (trend data about the marsh to info about specific restoration techniques); 2) info about other key habitats like shellfish beds that may have relationship with the marsh habitat; 3) I think there are lots of questions about if/how dredge material could be used in restoration efforts; 4) I think any marsh question that is important to NH really should be asked both in the HSE and GB- so anything from sediment dynamics that may be impacting accretion rates, to burrowing crab impacts, to invasive species impact on ecosystem function.
 - Through SMARTeams we should be able to provide training for the collection of information and aerial imagery analysis to facilitate the development of conceptual salt marsh restoration designs.
 - How do coarse grained sediments from inlets become incorporated in salt marsh sediments? Will salt marshes accrete more rapidly where densely ditched areas are restored through ditch remediation? Where are the farming embankments in the HSE and what are the most appropriate methods to remove their negative impacts? What techniques should be used to help protect salt marsh sparrows from nest flooding and loss?
-
- High resolution bathymetry, and utilities mapping in 3 dimensions
 - Water quality data has, historically, been a bit scarce. The recent addition of a datalogger station is a good first step.

- Categories resonate?
- Best way to organize this info for future reference?
- Cross-reference what we need with what people do?

Briefly describe any projects related to HSE salt marshes that your organization is planning, is engaged in, or has recently completed. Please include project name, start year, and status.
<p>2018 - Consensus Building Institute Grant in partnership with NH Coastal Program - Hired Planning Consultant prepared a "Situation Assessment" to better understand flooding impacts, costs, concerns, and experiences in Hampton. The Situation Assessment was based on the results of an extensive survey completed by 69 Hampton residents and property owners, plus select one-on-one interviews. 2019-2020: NH Charitable Foundation Grant allowed SHEA to begin laying the foundation for an Estuary Management Plan. The work under this grant includes a comparative analysis of the Master Plan sections and zoning ordinances in each of the three surrounding communities that relate to the Estuary. 2019-2020: NH Coastal Program Technical Assistance Grant. SHEA worked with an independent municipal planning consultant to create the Coastal Hazards Adaptation Team (CHAT) to assess and recommend appropriate flooding adaptation strategies for the Town of Hampton. This effort is ongoing and a draft list of strategies and recommendations have been developed and feedback is being obtained from municipal boards, commissions and the general public. From a public outreach perspective SHEA holds at least 4 general outreach projects on topics ranging from birds of the estuary and the history of salt marsh haying. SHEA also holds at least quarterly Flood Smart Roundtables. Each roundtable meeting is focused on different aspects of flooding that is impacting local residents. Using an informal format, there was usually a presentation and lots of candid informal discussion. Topics of these meetings included elevating structures, how FEMA's Hazard Mitigation Grant Program Works, and an introduction to and training for a citizen science project for mapping October's King Tide at Hampton Beach. 2019-2020: NH Coastal Program Technical Assistance Grant. SHEA provided the conservation commissions of the three communities that surround the Estuary with a list parcels adjacent to or near the Estuary that might be good candidates for acquisition or conservation easements to provide for salt marsh expansion as sea levels continue to rise. The list included pertinent information about each parcel like size and assessed value in order to help each conservation commission to prioritize which parcel owners to approach in which order.</p>
<p>I defer to GB NERR on this.</p>
<p>OCM recently mapped salt marsh habitats through NH and the HSE. The source imagery was from 2013. This was conducted in partnership with NH DES, GBNERR, and PREP. The data are available here: https://coast.noaa.gov/digitalcoast/data/ccapsalthabitat.html OCM recently completed a salt marsh resilience assessment in partnership with GBNERR. GBNERR has since extended this work with additional partners, many of whom are responding to this survey.</p>
<p>1. Hampton Flood Mitigation Study. 2. NFWF Habitat Protection Project</p>
<p>saltmarsh monitoring with picture posts - ongoing coastal flooding lending library - 2020-2022 Eradication of Perennial Pepperweed on the Northern New England Coast - start in 2021</p>

Briefly describe any projects related to HSE salt marshes that your organization is planning, is engaged in, or has recently completed. Please include project name, start year, and status.
Mentioned above - habitat mapping and NH marsh plan.
NH Marsh Plan- this started in 2018 (I think), and the next round of funding starts in January. GBNERR led (Rachel Stevens) and funded by Coastal Program (and Kevin has been huge part of the effort). GBNERR has been involved in the Living Shoreline work led by Coastal Program (so site suitability analysis done by fellow, and the two NROC grants). Ongoing- I think there have been attempts to bring the salt marsh monitoring protocols that GBNERR uses to the HSE. This would be really great- Chris is getting good at analyzing saltmarsh trend data (is now leading second project with Burdick analyzing data from different NERRS, so they are well equipped to do this for different marshes in NH)
NH Salt Marsh Plan, entering Phase II NH Living Shoreline Site Suitability Assessment, completed in 2018 Remapping sea-level rise maps when new LiDAR data is released (spring 2021) NH Tidal Shoreline Protection Structures Inventory (completed 2016) Hampton National Fish and Wildlife Foundation grant (ongoing, through 2021) to complete 50-60% designs for 2-3 habitat-friendly adaptation projects, based on ongoing flood study work (which has highlighted alternatives that include dredging all of Meadow Pond to building a seawall along the entire back marsh of Hampton, to road and home elevations, drainage improvements, and salt marsh ditch restoration.) We fund work that several partners do related to HSE salt marshes, including SHEA and UNH, but they will probably mention their projects, including SETs and identifying parcels for purchase/conservation. We also run the NH King Tide Photo Contest every year which brings awareness to high tide flooding of the salt marshes, and conduct other outreach, fund master planning, and coordinate local leaders.
None at this time (funding).
2020 South Main Street Tidal Crossing Replacement Design. Currently in preliminary design phase but will transition to final design and permitting in early 2021
South Main Street culvert replacement . started 2020. currently in design.
Hampton Harbor maintenance dredging was completed in 2019. Approx. 175,000 cy was dredged and placed on adjacent beaches in Salisbury and Hampton

Briefly describe any projects related to HSE salt marshes that your organization is planning, is engaged in, or has recently completed. Please include project name, start year, and status. (cont.)
only in Great Marsh.
Nothing in the past few years.
I work in the watersheds of the Plum Island (Ipswich and Parker River), part of the PIE LTER (2001 to present), as well as the watersheds draining to Great Bay and the Piscataqua (2013 to present).
Site Assessment and Preliminary Designs to Mitigate Flooding in Hampton, NH Neighborhoods by Restoring Hampton-Seabrook Estuary Salt Marsh, 2019 ongoing
Others from Jackson Lab will be able to provide this info
None currently, though we are working north and south of there, mostly facilitating grant funding for salt marsh restoration implementation.
Only been involved with projects in the Great Bay area.
Planning to establish in 2021 one or more Sentinel Sites in HSE with GBNERR. Funding is needed. Role of Dune overwash . . . (UNH Sea Grant), delayed in 2020 Leveraging Natural Resources for Resilience 2019-2021 (NH DES)
Engaged in the "new" datalogger station.
Recently completed field work on shorebird stopover (Falls of 2018-20 plus spring of 2019). Report in preparation.

- Miss anything big?
- Best way to organize this info for future reference?
- Cross-reference what we need with what people do?

Current & Potential partners ...

Town of Hampton, Hampton Beach Area Commission
Rockingham Planning Commission
Town of Seabrook
Coastal Research Volunteers
Horsley Witten Group

SHEA
GBNERR
PREP (RAMP and TAC helpful)
The Nature Conservancy, Audubon, Ducks Unlimited
Pease Development Authority

NH DES: Coastal Program, CZMA, Wetlands Bureau
New Hampshire GRANIT
NH State Parks, DOT, FG, GBRRP (bird nesting)
ASNH likely in the future.

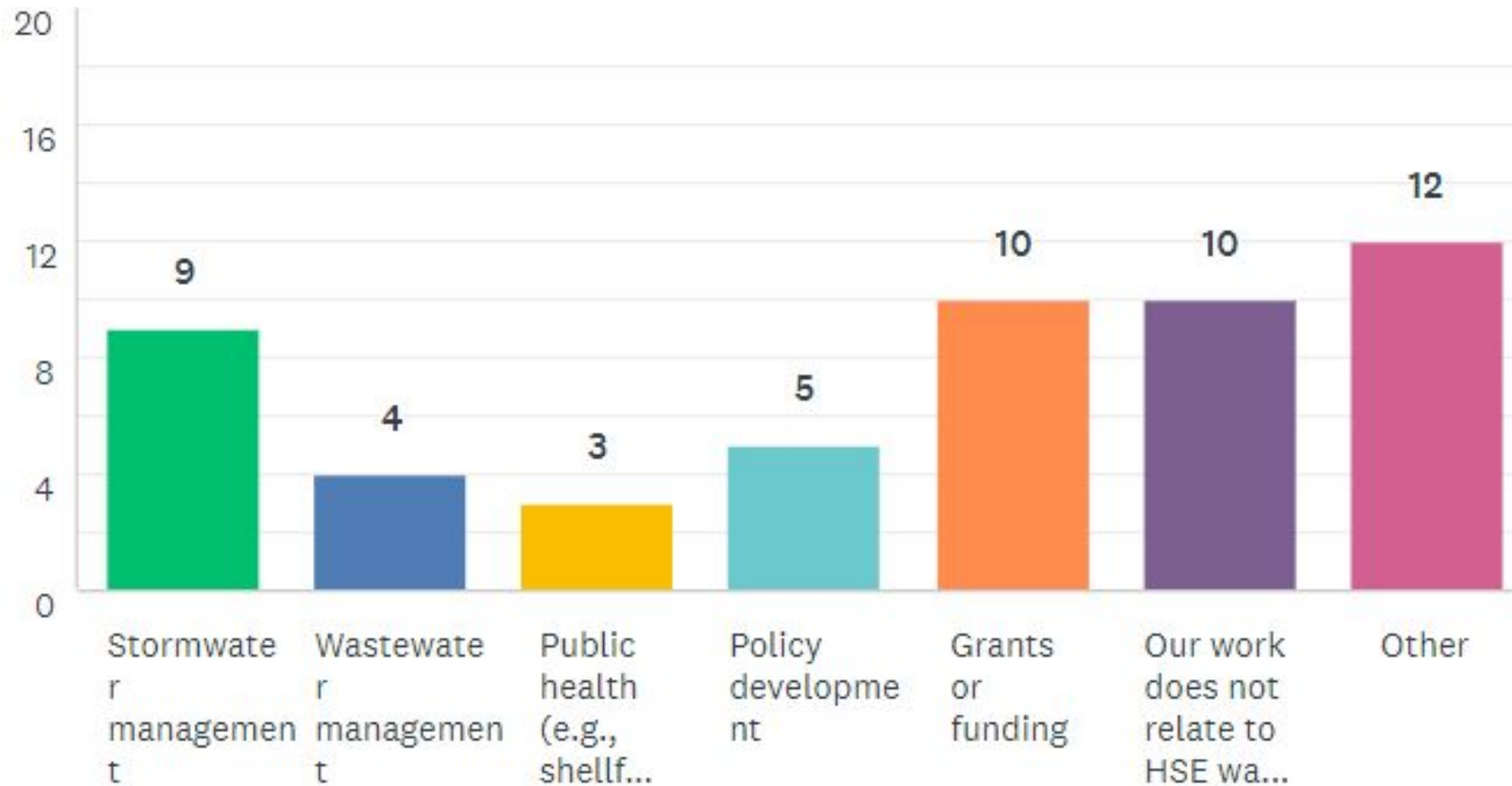
UNH JEL
UNH Extension and NH Sea Grant
UNH Coastal Habitat Restoration Team (Eberhardt,
Moore, Ballestero, Ashcraft)
UNH (Adrienne Kovach) bird nesting
UNH Earth Systems

Woods Hole Group
PIE LTER

NOAA: tide gage data
NRCS, USGS, NP

Water Quality

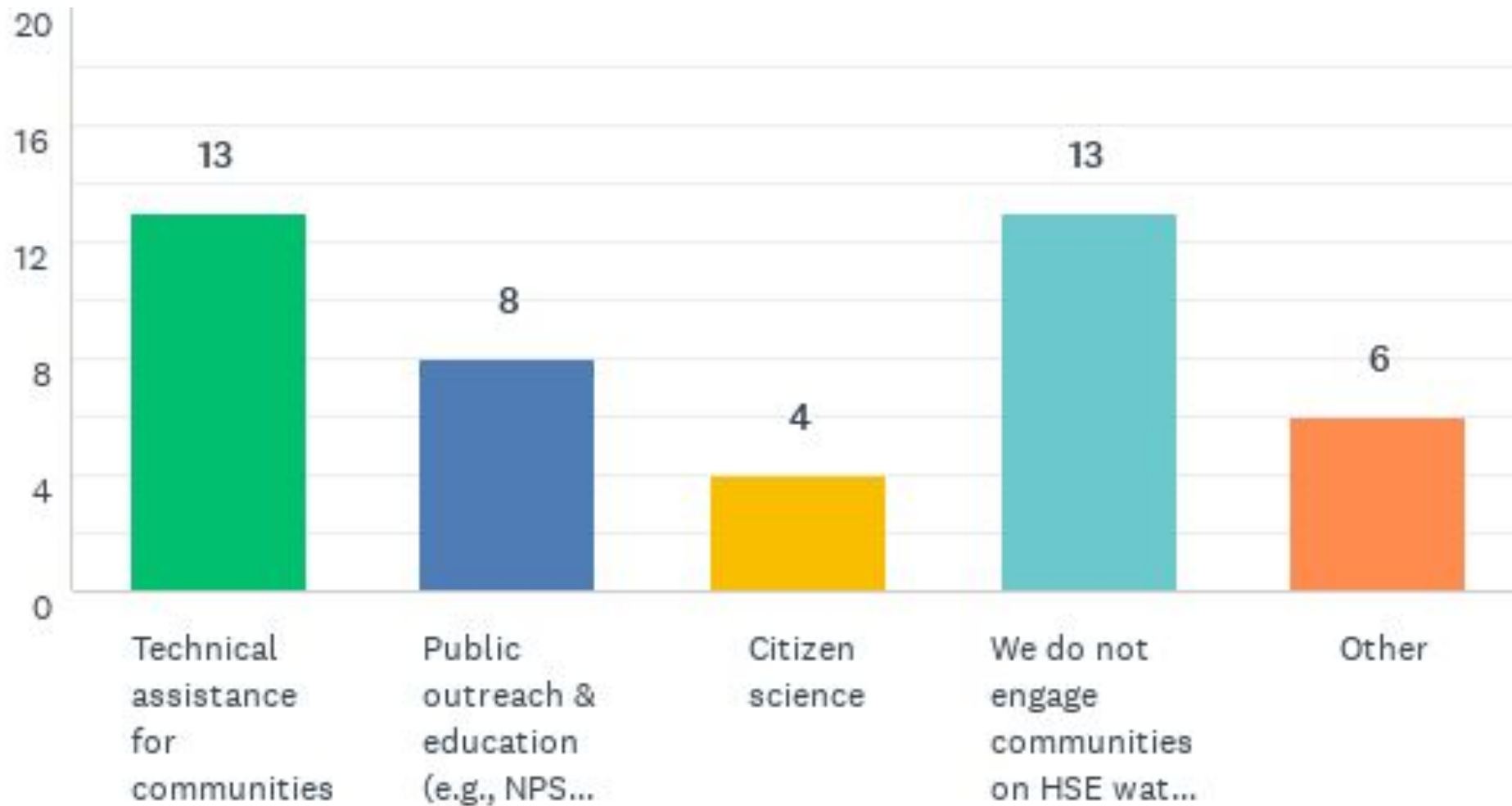
Which of the following best describe your organization's work related to management of water quality in the HSE? Check all that apply.



Comments, affirming

- Partner with Normandeau Associates to assess abundance/ health of clams in HS Harbor.
- Flood mitigation
- Function of Coastal Training Program coordinator in the past. Currently in hiring process.
- GBNERR work on buffers and stormwater has had state-wide focus. (Jay is so helpful that he is often pulled into being on advisory committees for this type of work. Steve worked with Jay on the Coastal Conservation Commission roundtable to talk about these issues.) CTP focused on stormwater with UNHSC. Hope is buffer and credit for going green projects were useful.
- Salt marsh restoration is indirectly a water quality management technique. But we have not to date done any WQ specific projects in HSE (though hundreds in other locations)
- Collection of water quality monitoring data
- We collect some WQ data (temp, DO) and conduct the annual softshell clam survey.
- my specific work with USACE involves maintenance to federal navigation projects. other sections within USACE that do other types of work and they would be better to answer this question.
- These answer reflect our work in salt marshes and rivers and not HSE specifically.
- I'm only responding for the NHDES Coastal Program, not including the Shellfish Program and mostly focused on the NHDES Coastal Resilience Program
- My work does not include WQ, but Jones and Gregory focus on WQ

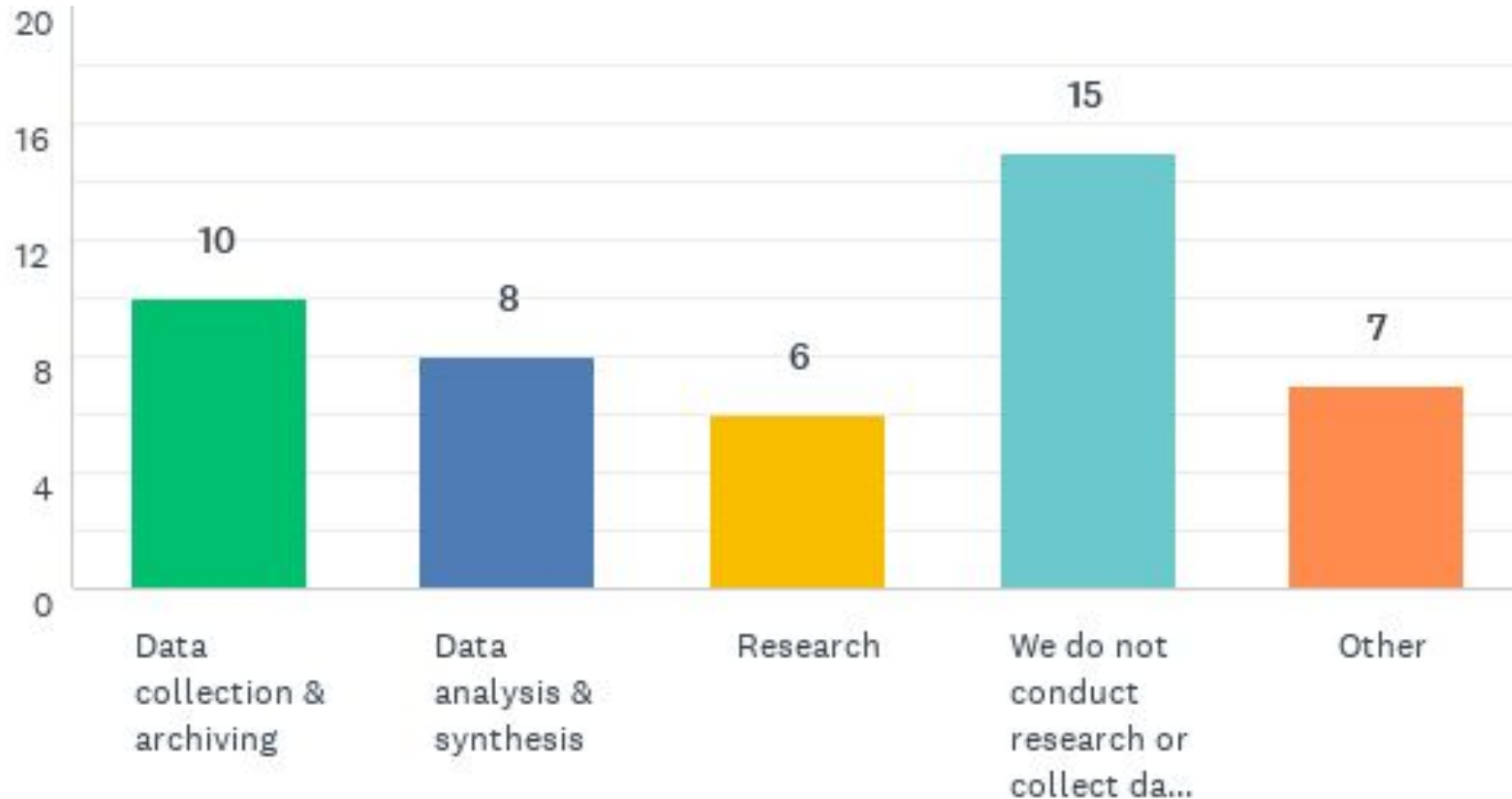
Which of the following best describe your organization's work engaging with communities on HSE water quality? Check all that apply.



Comments, affirming

- We have not been involved in engaging communities on HSE water quality but have partnered with organizations to collect water quality data in rivers in other watershed.
- Technical assistance is checked because of work CTP does or did state-wide. Typically in partnership with Stormwater Center. My involvement with PREP also means I talk about this lots. Public education is checked because of my involvement with EveryDrop.
- This could well be an opportunity for the Gulf of Maine Institute to provide citizen science. The Gulf of Maine Institute is a partnership between youth and adult mentors to engage in environmental stewardship and local action. See: <https://www.gulfofmaineinstitute.org/> for more information. This group has been very active in the Great Marsh/Parker River NWR, MA.\
- Data availability as permitted
- These answer reflect our work in salt marshes and rivers and not HSE specifically.
- unknown

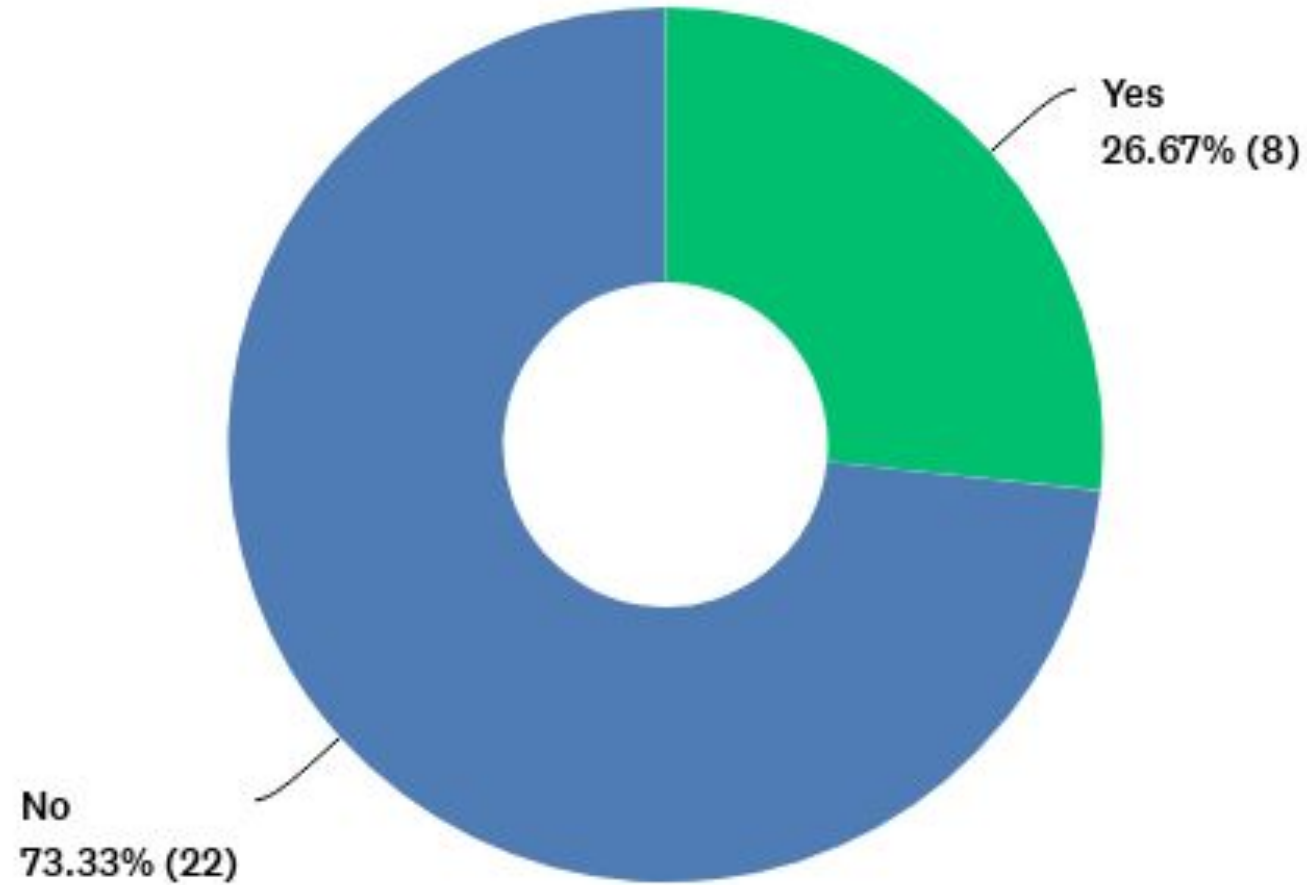
Which of the following best describe your organization's work related to HSE water quality research and monitoring? Check all that apply.



Comments, affirming

- NOAA/Great Bay NERR are part of a water quality monitoring network that includes HSE locations. NOAA/Digital Coast has resources to help communities map nonpoint source pollution, learn how to incorporate green infrastructure into planning, and consider storm water impacts to water quality.
- water levels and monitoring. not water quality parameters specifically.
- Outreach and technical assistance
- Currently our research and monitoring is primarily focuses in Great Bay but partnering with Coastal Program / PREP vegetation biomonitoring protocols might be transferred to HSE. Colleagues at UNH monitor SETs in HSE and those in Great Bay are located at two of three biomonitoring sites.
- These answer reflect our Program's work in salt marshes and river systems and not HSE specifically.
- Unsure of breadth and scope of WQ work by others at JEL (Jones, Gregory)

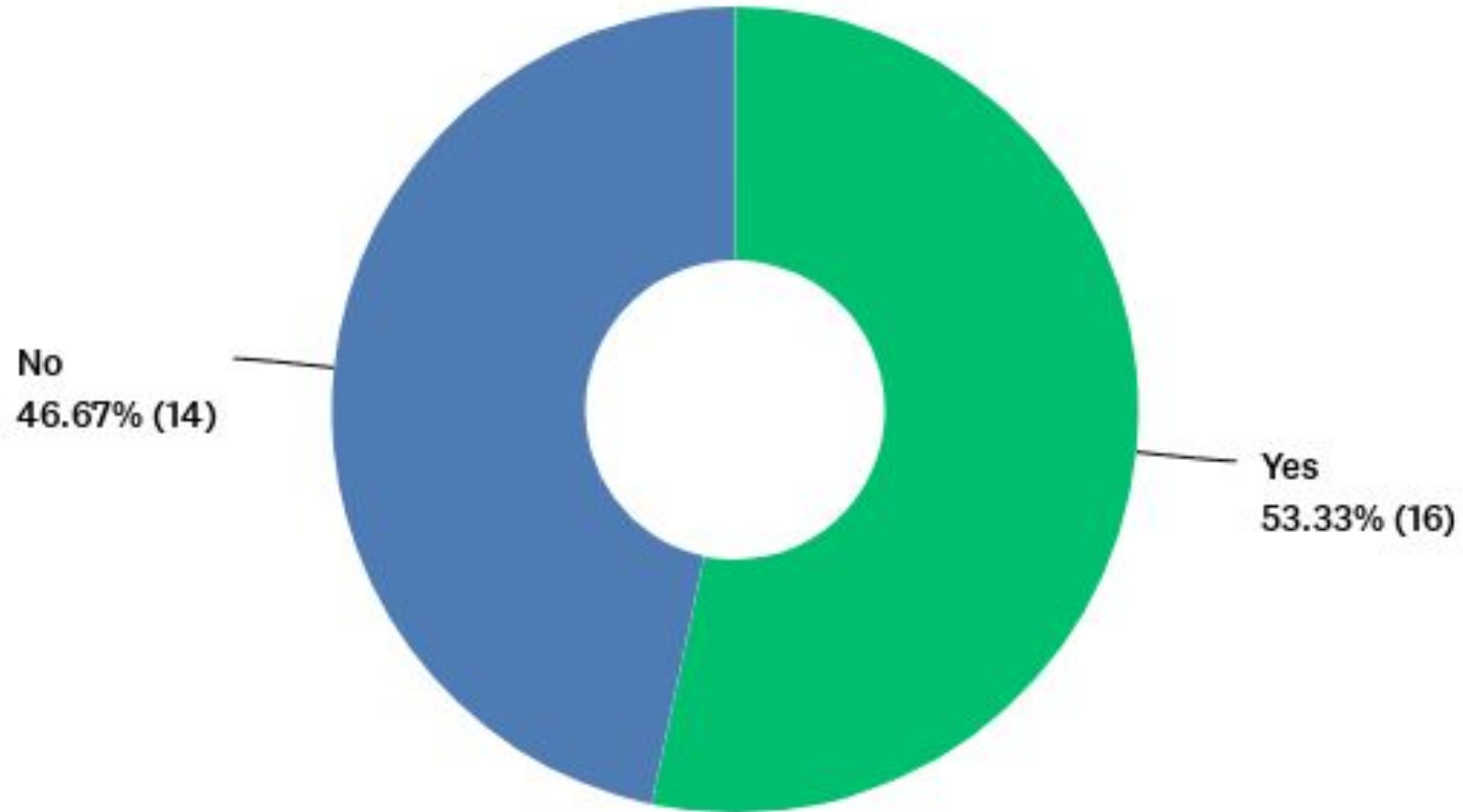
Does your organization collect data related to HSE water quality?



Research and Data Work from Comments

- PREP coordinates with NHDES & UNH JEL to manage a water quality station in Hampton River, which collects standard parameters via datasonde & grab samples (e.g., temp, salinity, DO, turbidity, TSS, etc.)
- Jones lab collects water quality samples to investigate potential and real pathogens in water and shellfish; possible collection of data from sondes in the HSE
- Analyze water samples for nitrogen and other parameters like DOC
- Beginning in 2018, water quality monitoring in Hampton River Field season duration: roughly early April through early December instrument data (measured every 15 minutes): depth, temperature, salinity, specific conductance, dissolved oxygen, turbidity, fDOM, chlorophyll, blue green algae, pH water sampling: chlorophyll, nitrate, phosphate, ammonium, total dissolved nitrogen, dissolved organic carbon, particulate nitrogen and carbon, total suspended solids, light attenuation (K_d)
- Temperature and dissolved oxygen
- Site-based monitoring data to provide standardized, quantitative measures to determine how conditions are changing in the short and long term. Three major components are focused on (1) abiotic indicators of water quality and weather, (2) biological monitoring, and (3) watershed, habitat, and land use mapping.
- Water level data hydraulic modeling

In your opinion, are there critical gaps in the data or science needed to understand and support your organization's work related to HSE water quality?



What We Need: Big Picture, Fine Scale & Long Term

- Finer-scale data. It may exist outside of online mapping tools, but I am unaware of it
 - We only have one WQ station and certain parameters (e.g., chl-a) aren't at a very high resolution.
-
- A deployment of sondes around HSE for regular monitoring would be very helpful.
 - Looking at inputs and outputs of nutrients and colored organic matter (DOC) to determine their role in ecology of the bay
 - Have yet to know the estuary system where more WQ data was not desirable.
-
- Continuing ongoing work for long term trends
 - Continued investigations into the sources of nitrogen

What We Need: Data for SLR/Water Levels, Habitat and Restoration

RED = previously mentioned in Salt Marshes
PURPLE = mentions marshes, but not in initial marsh section

SLR/Water Levels

- Study the influences of high tide flooding on water quality (the trash and road pollutants that wash out regularly may be significant).
 - Understand groundwater rise influence on water quality as sea levels rise and to help DPWs mitigate potential wastewater and stormwater impacts from vulnerable facilities and infrastructure.
 - **Marsh changes due to increases in SLR and future elevated impacts**
-

Habitat

- Data on toxic contaminants near the clam flats and how they might be impacting the clams.
 - Site conditions that maximize not just saltmarsh sparrow presence, but their reproductive success.
 - **Understanding how marshes impact the resiliency of the bay, through mitigating ocean acidification and eutrophication.**
-

Restoration

- **Restoration tools within the marsh and its migration pathways to enhance resiliency.**

Briefly describe any projects related to HSE water quality that your organization is planning, is engaged in, or has recently completed. Please include project start year and status.

In addition to the above, we are partnering with UNH Professor Liz Harvey to collect, analyze and disseminate data on plankton communities. Dr. Harvey collects data at North Beach once a week using a FlowCam and flow cytometry.

I am working with students at Seabrook Middle School on a research project that will include water quality monitoring of the Cains Brook-Mill Creek subwatershed. The following represents the work of my colleague Lisa Wise: I am currently working with Rockingham Planning Commission and Amanda to support the development of climate adaptation master plan chapters for North Hampton and Little Boar's Head. Specifically supporting Steering Committee engagement + public outreach/input opportunities. I met with the conservation commissions in Hampton, Hampton Falls, North Hampton, and Seabrook in 2018-19 to share the TNC Water Resources Supplement maps (this includes salt marsh migration, water quality protection, flood storage). Amanda then followed up with the Hampton CC on the Wildlife Action Plan maps and the idea of developing a Natural Resources Inventory.

Seabrook Wastewater Treatment Vulnerability Assessment NFWF Hampton project will likely select Kings Highway drainage improvements (with stormwater management implications) as one design alternative to pursue to 50-60% designs. All high tide flooding work has water quality implications, however we have yet to make that connection using data/science. Updated best available groundwater rise and extreme precipitation science in the 2020 NH Coastal Flood Risk Summary: Part I Science.

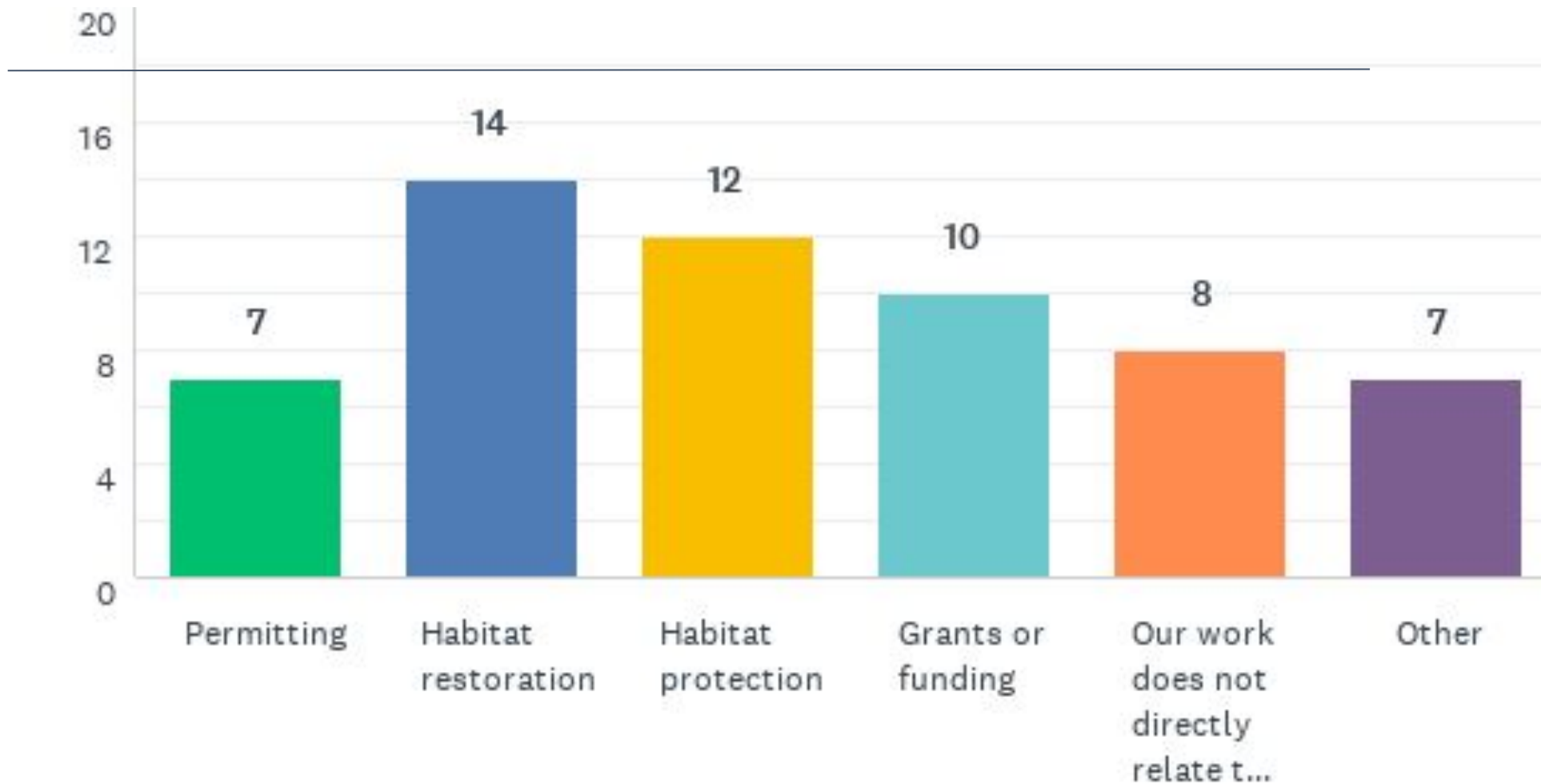
Our Reserve fellow is looking at how nutrients are being processed in Great Bay, which could be of interest to apply to HSE. 2020 ongoing continuing monitoring program described above

We have conducted long term temp and dissolved oxygen monitoring since 1980. It is ongoing.

Engaged in the "new" datalogger deployed by Tom Gregory.

Fish and Wildlife

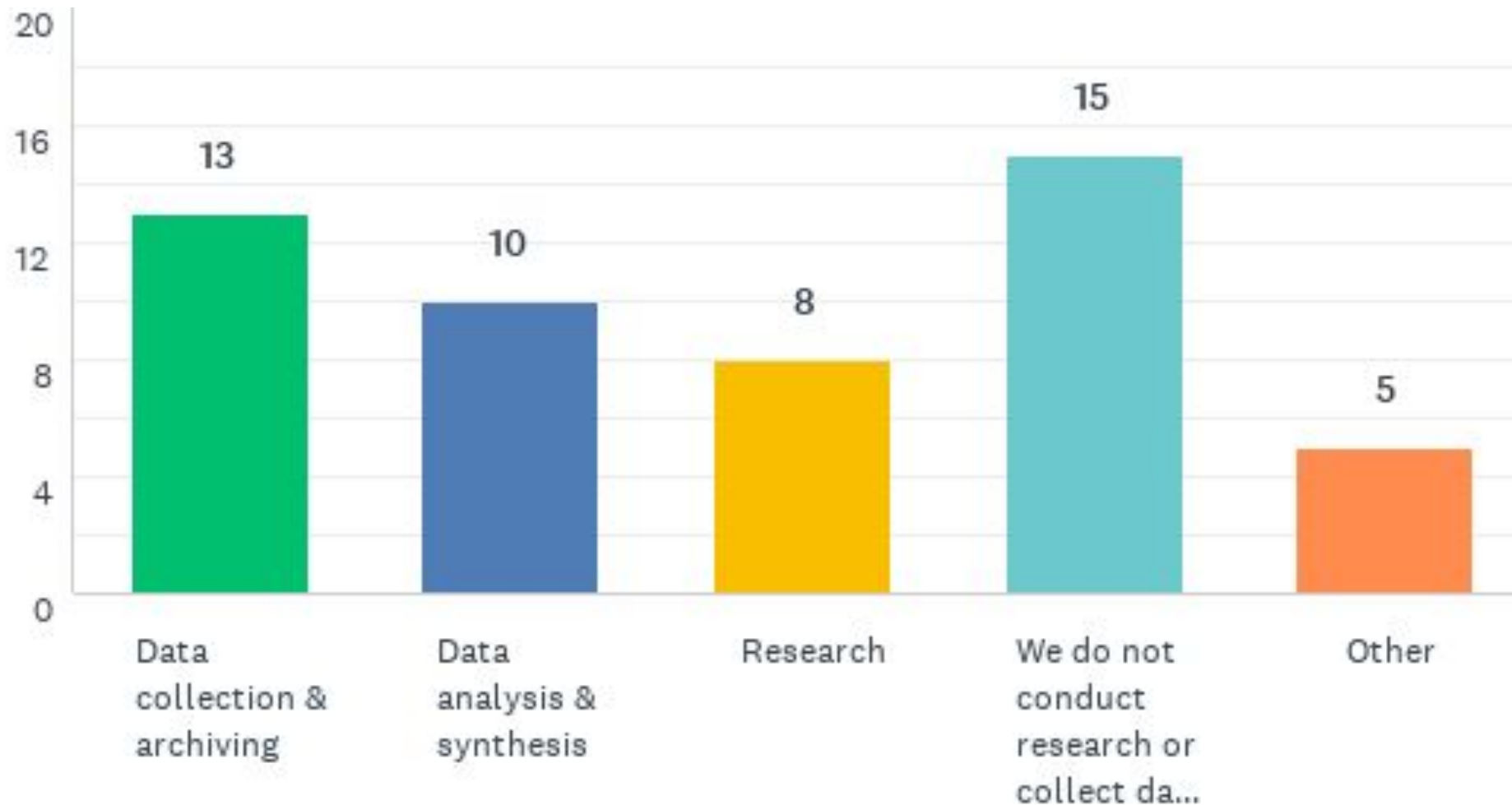
Which of the following best describe your organization's work related to management of HSE fish and wildlife species? Check all that apply.



“Others” comments affirming & different ...

- Compliance of dredging projects with fish and wildlife resources
 - We conduct the annual soft shell clam survey in HSE and the monthly seine survey for fish.
 - Working to protect and restore dunes raises some conflicts with non-game species, so finding solutions is part of the effort to restore habitat and support listed species.
 - Our work involves surveys of distribution, abundance, and habitat use of migratory shorebirds and marsh-nesting birds. **Limited role in management (although we do own some salt marsh parcels), but the data we collect hopefully informs prioritization of marsh areas for conservation or restoration.**
-
- Our organization has not completed this work in the HSE, but we have provided technical assistance for habitat restoration work in other coastal communities.
 - Largely just in assessing water quality to protect designated uses. We do interact with the wastewater permitting staff regularly and wetlands permitting staff for certain projects
 - No specific fish or wildlife work in HSE, though culvert replacement is indirectly beneficial to habitat and fish passage.
 - Not specific to the fish or wildlife work in HSE, but overall work in Gulf of Maine for fish & wildlife species.

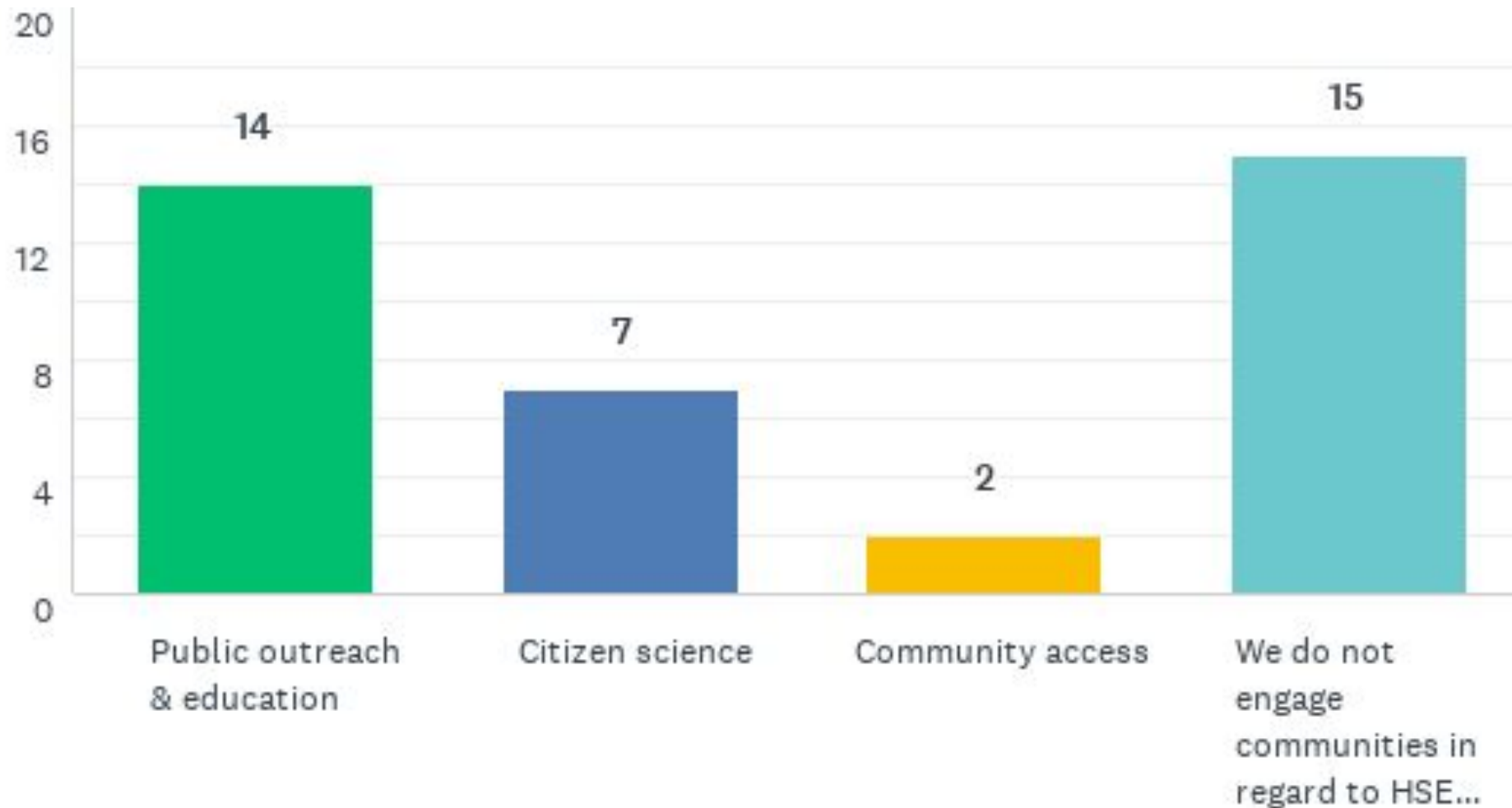
Which of the following best describe your organization's work with regard to HSE fish and wildlife research and monitoring? Check all that apply.



“Others” comments affirming & different ...

- NHFG does work in the HSE on plovers, and are starting to get more involved in saltmarsh sparrow. Marine Division monitors and does fish work
 - Support monitoring efforts for salt marsh implementation efforts with regional funding from NRCS
-
- **Planning.** Several salt marsh species included in the Wildlife Action Plan and salt marsh is identified as a habitat of concern, especially in the context of climate change.
 - I hope this survey went to Cheri Patterson too as she could answer this question in LOTS of detail
 - Our organization has not completed this work in the HSE, but we have provided technical assistance for fish and wildlife monitoring in other coastal communities.
 - We do not conduct research at this time, but there is a possibility that we could in the future related to restoration projects

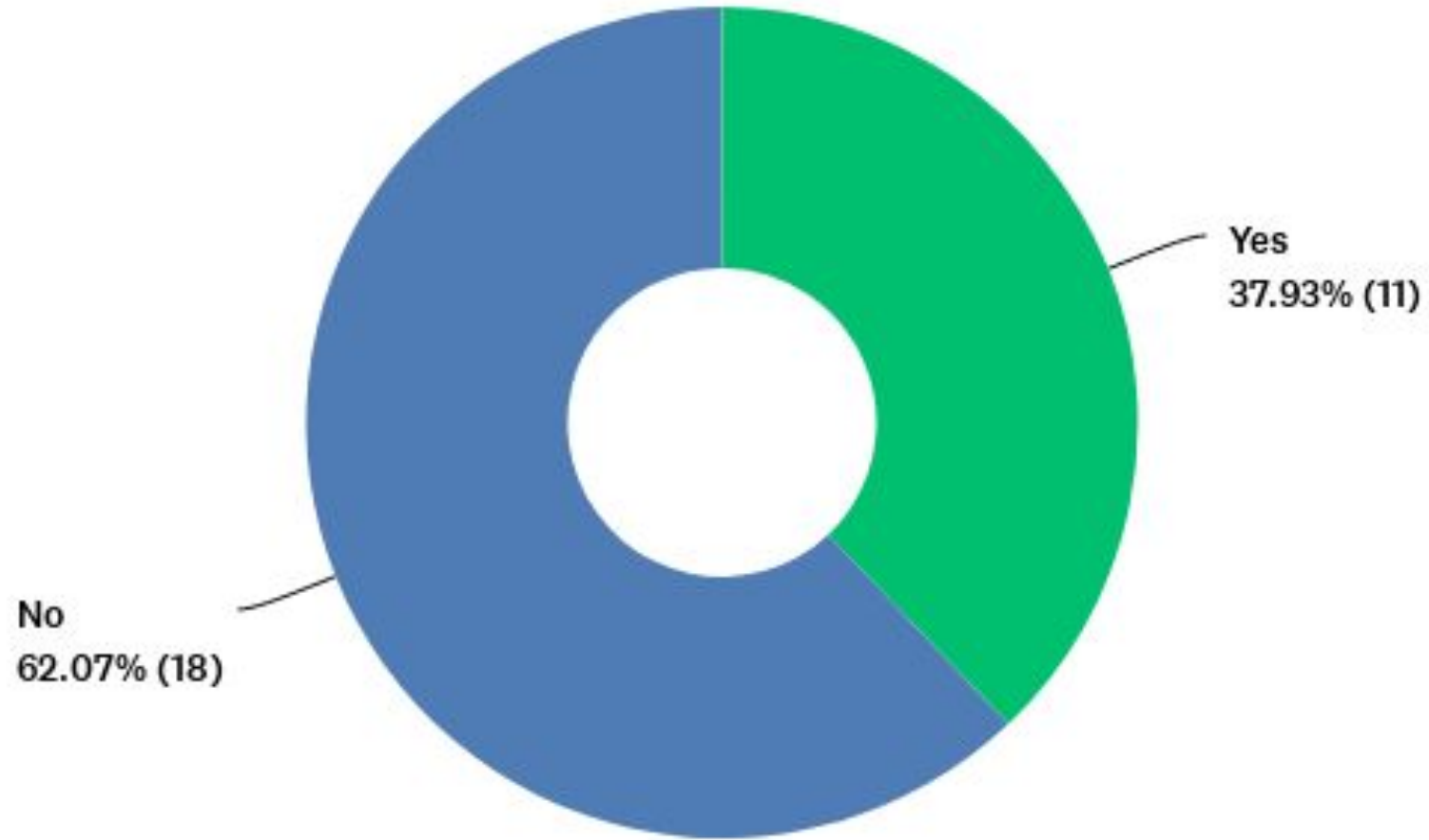
Which of the following best describe your organization's work engaging communities with regard to fish and wildlife species in the HSE? Check all that apply.



Follow up Comments

- “Other” was not an option, but a later response noted that they offer technical assistance to communities

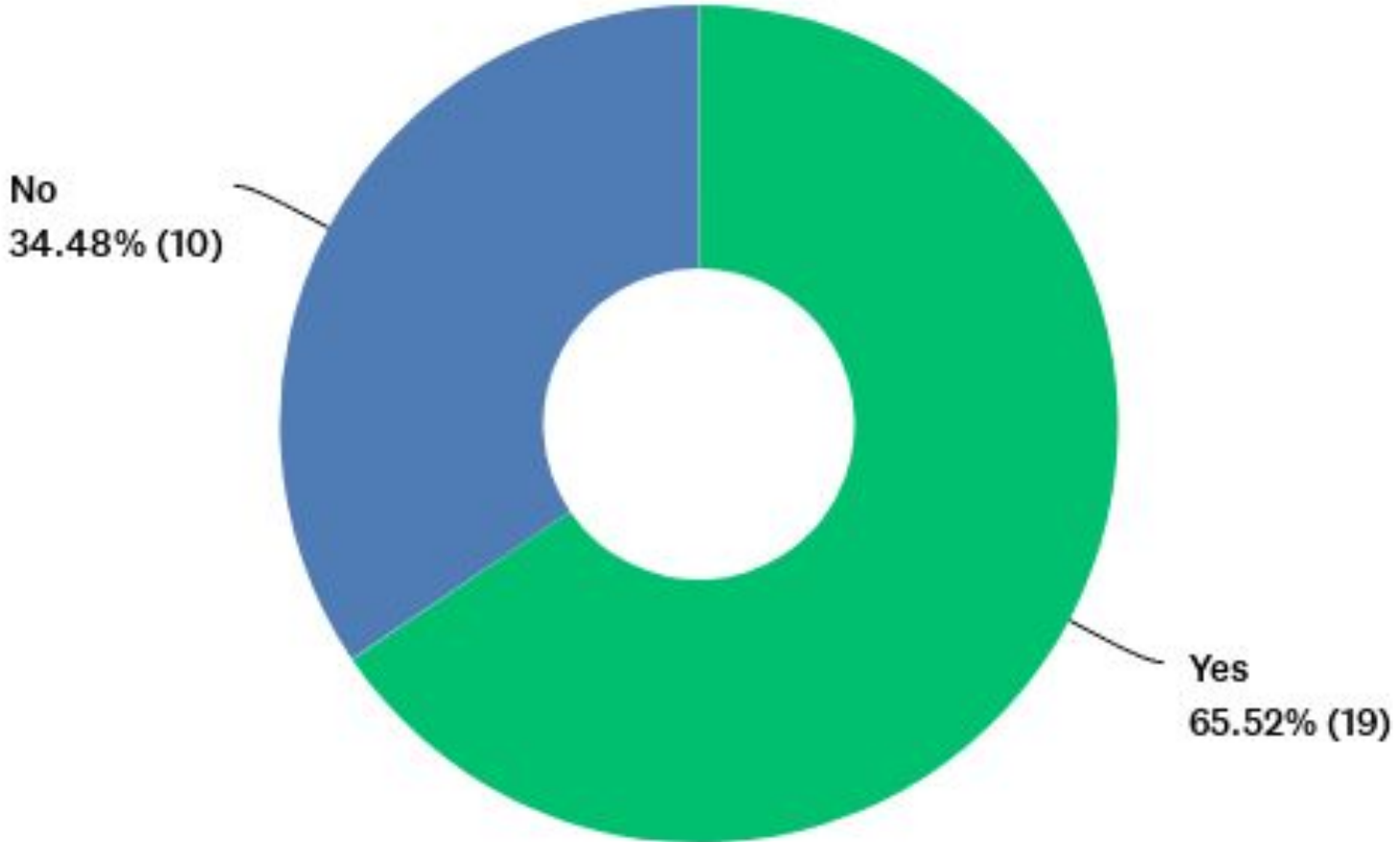
Does your organization collect data related to fish and wildlife species in the HSE?



Research and Data Work from Comments

- Monthly juvenile fish surveys using bag seines
 - Fisheries
 - We collect macrobenthic community data within the HSE Federal Navigation Project periodically
 - Water level data model predictions of hydraulics
-
- **PREP partners with Audubon, Kovach Lab & GB NERR to collect information on salt marsh sparrows.**
 - Use more than collect data, but we have developed some habitat data layers, such as a Saltmarsh Sparrow patch prioritization tool (available at acjv.org).
 - Collect soft shell clams for neoplasia analyses.
 - Collect dune profiles within plover nesting areas
 - **Distribution of Saltmarsh Sparrows across entire HSE (2007). Shorebird use (2006-07, 2018-20).** Latter includes identifying important feeding & roosting areas & their susceptibility to human disturbance.
-
- I would need to ask around NHFG to get a good answer on this.
 - We do elsewhere but not with HSE

In your opinion, are there critical gaps in the data or science needed to understand and support your organization's work related to HSE fish and wildlife species?



What We Need: Big Picture

- Hard to say if there are critical gaps at this time. Need to know more from local partners.
- **We need additional data on salt marsh sparrows.**
- Benthic community
- Understanding of present day use of the estuary by both resident and transient nekton
- **Detailed elevation data (soon to be released LiDAR hopefully will solve), understanding of impacts of catastrophic storm events - hard to research / model because stochastic.**
- It is likely that organizations (Maine Audubon, UNH, state fish & wildlife agencies, others) have already collected data on fish and wildlife species in the marsh, but coordination is needed to locate that data and make it available.
- Helpful to have all the different sources of data and research compiled into a database/library to help build our overall understanding of the HSE health and identify management priorities.

What We Need: Data for SLR/Water Levels, Habitat and Restoration

SLR/Water Levels

- Impacts of salt marsh disappearance due to sea level rise on species that use salt marshes.

Habitat

- Population dynamics for oysters and soft shell clams
- Where some shorebirds roost within the large HSE ecosystem.
- Data on marsh-nesting Common Terns (state threatened) are over a decade old.
- **Bird surveys** that contain information on Saltmarsh Sparrows and Nelson's Sparrow would be of great interest, especially if monitoring followed SHARP protocols (see tidalmarshbirds.org) and in terms of best habitat management.

Restoration

- We need additional data layers or monitoring to guide implementation efforts. Data such as the "unvegetated to vegetated ratio" or proportion of the marsh above MHW are likely not available currently, and could be helpful to guide conservation implementation. Sediment levels, accretion rates, and tidal datum would also be valuable, and I'm not sure which (if any) of those are available and at what scale or level of precision.

Briefly describe any projects related to HSE fish and wildlife that your organization is planning, is engaged in, or has recently completed. Please include project start year and status.

We are hoping to get funding for additional studies of salt marsh sparrows, to be carried out by 12/18/2020 6:46 PM Audubon and Kovach Lab, with help from GB NERR

My own research collected data on American eel in the HSE (data collection completed 2012) My current project with Seabrook Middle School is evaluating eel use of the Cains Brook Mill Creek subwatershed (2020-2022)

Sea level affecting marshes model, rest mentioned above.

As I said, others in our agency would answer this more completely. I will say that NHFG is starting to work with USFWS to talk more about efforts to keep saltmarsh sparrow off of the endangered list- I will be helping out with this so can continue to be a link between those conversations and this group.

See mention of SMARTeams assistance for salt marsh restoration projects described above. Assistance could begin immediately with increasing amounts as SMARTeams becomes more fully staffed.

Same tidal crossing project in Seabrook as previously mentioned

South Main St culvert replacement Seabrook. Started 2020. In design phase.

Dredging of HSE Federal Navigation Project - 2019 - complete Construction of middle ground erosion control wall - 2005 - complete

We have conducted the annual soft shell clam survey since 1969 and monthly seine sampling for fish since 1975. Both of these are ongoing.

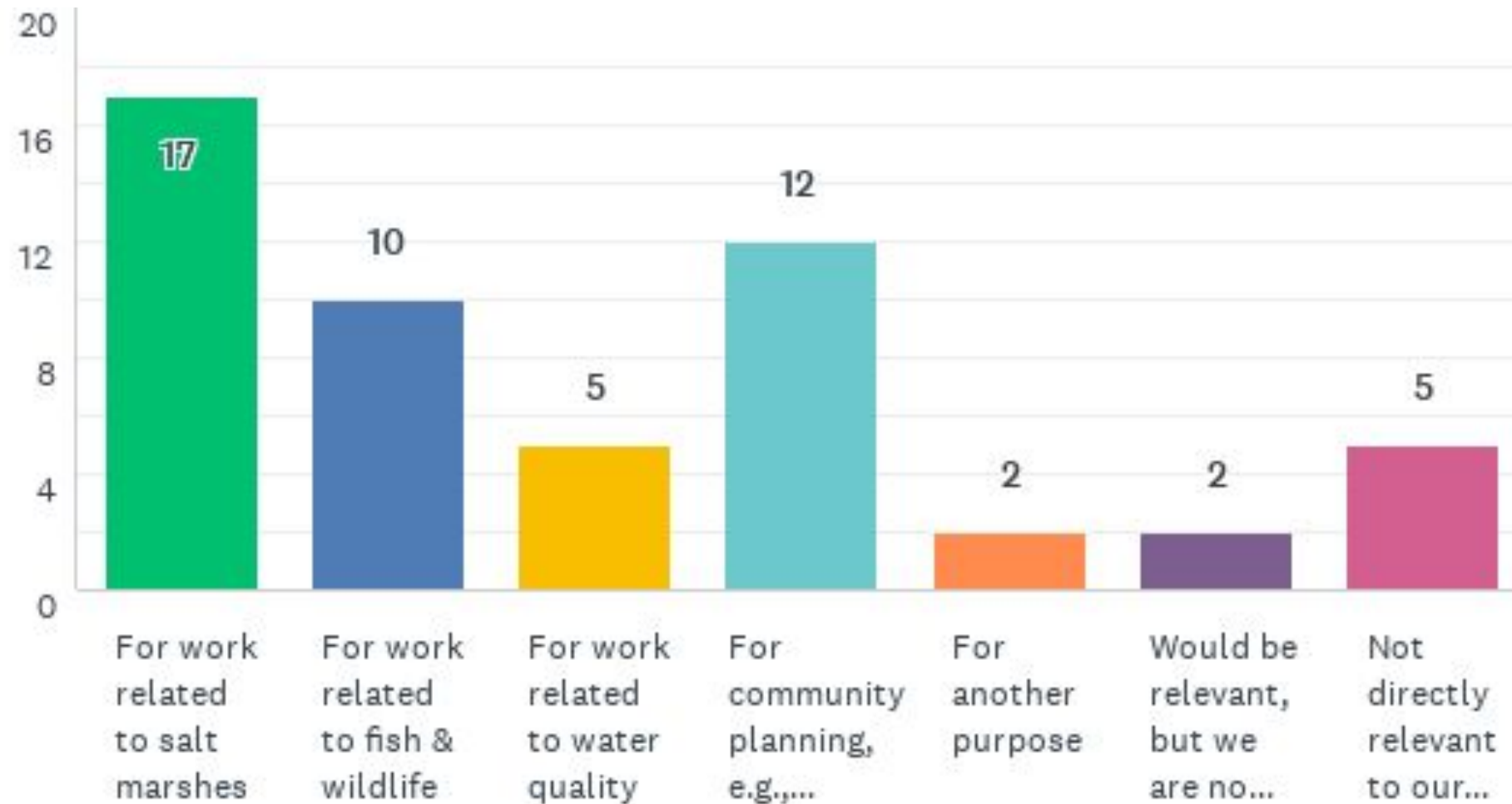
Our Saltmarsh Sparrow Patch prioritization tool covers HSE. It is available at acjv.org. It was completed in 2019.

Planning salt marsh restoration Completed dune restorations and continue profiling (2016-2020)

Recently completed survey of migratory shorebird use: 2018-20. Report in preparation.

Water Levels

Which of the following best describes your organization's use of HSE water level data relevant to its work in the estuary. Check all that apply.

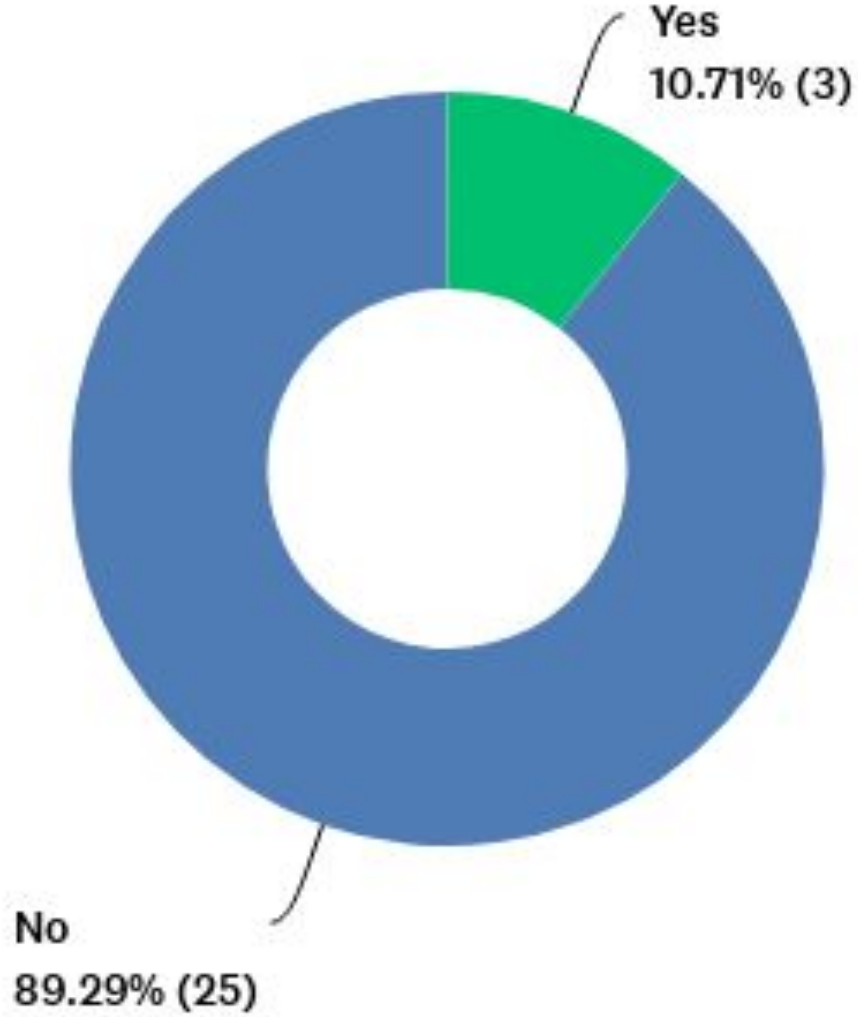


“Others” comments affirming & different ...

- SHEA could be helpful to connect the consultant/agency that might be doing this work with the appropriate municipal staff that might use this information in their daily operations/planning
- Run hydraulic models and validate results.

- It could be relevant if we were looking at marsh trends with regards to water level across the state, but we are not doing that right now. Absolutely relevant to work with communities.
- We have not engaged enough with HSE to make use of this information

Does your organization collect water level data in the HSE?

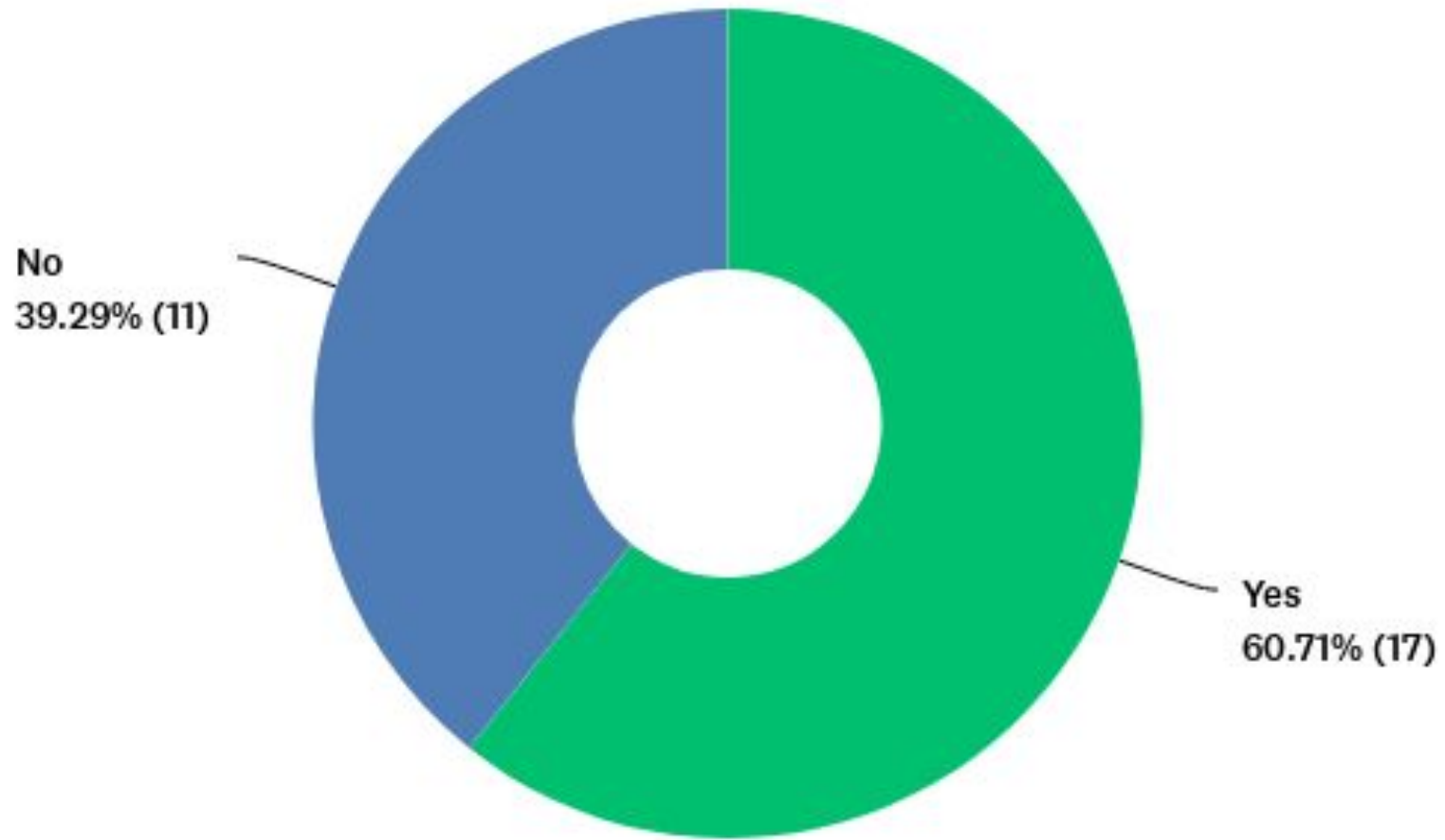


Research and Data Work from Comments

- In Great Marsh
- Follow and analyze the Hampton Harbor tide gauge that is managed by NERACOOS. Conduct the King Tide Photo Contest, which is an informal data collection effort for water levels, and piloted a more formal citizen science effort with NH Sea Grant last year. We are involved in the Hampton NH flood study work that models water levels in the HSE, using sensors.
- For a brief period, the Horsley Witten Group monitored water elevations to inform culvert design
- **tidal levels at 4 locations in Seabrook**

- Not collected this data in the HSE but have collected it in other coastal marshes for restoration planning purposes.
- Not directly, but have been working with UNH that is for our project.

In your opinion, are there critical gaps in water level data and science needed to support your organization's work related to the HSE?



What We Need: Big Picture

- SHEA identified gaps based on what was learned from Kevin Lucey
- More data are needed over a wide range of conditions

- Compilation of collected data to date in some sort of library would help identify changes within the HSE and identify management priorities.

What We Need: Data for SLR/Water Levels

- We would want to have a better understanding of the tidal datums in the HSE, including any significant deviations from background datums, as well as good connections to NAVD88. This would allow us to have a better understanding of marsh and channel inundation duration and more accurate calibrations for extreme water level analyses.
- Detailed water level data on either side of potential restrictions. Also, the relatively new Hampton tidal station does not appear to have similar stats, data utility options, or ease of access/download as NOAA gauges
- Would be great to have 60 years of WL data for HSE
- **Localized water level and tidal inundation modeling**
- Locally derived tidal datums (MLW, MLLW, MHW, MHHW, HAT etc.)
- Additional gauges further in the estuary.

What We Need: Data for SLR/Water Levels

- The NERACOOS-funded level work needs to continue
- The NERACOOS gauge is underfunded and not formally recognized as a gauge by NOAA and lacks a formal datum. A more coordinated gauge network would be helpful--much of the work being done is ad hoc and the different entities don't engage with each other (Gopal/Hampton flood study), Hampton tide gauge, King Tide monitoring, SET monitoring, etc. Sea level rise implications on the HSE are the biggest risk to this system's long-term sustainability--sea level rise and the associated management actions taken by residents and land managers in the area have the potential to devastate HSE natural systems.
- Lack of understanding about how dredging and sediment management changes water levels.
- Lack of understanding about the adaptation options available to reduce harm from changing water levels. We only recently analyzed the Hampton tide gauge record to find that 199 tides exceeded 10-foot flood levels in 2018. Hydrodynamic modeling is not easily accessible for the system, and is expensive. Several entities have done it but it is either proprietary or they don't have the time/capacity to share it, including UNH (Tom Lippmann), Woods Hole Group, Milone and Macbrook, etc.

What We Need: Data for Habitat and Restoration

- How ditching affect plant communities, marsh resiliency and adjacent upland flooding
- I assume that as with GBE, it would be useful to have finer scale water level info to do restoration planning, etc. We are going to be testing some lower cost water level gauges in GBE this year, could be useful to see them in HSE too.
- Projects often require site specific data

Briefly describe any projects related to HSE water levels that your organization is planning, is engaged in, or has recently completed. Please include project start year and status.

This information could be used by local communities as they try to plan and adapt for higher sea-levels and storm surges.

We are starting to work on mapping extreme water levels for different return periods. Also want to verify VDatum transformations at the local level.

Hampton Flood Mitigation Study

see above- not in HSE, but GBNERR is part of a project with other NERRS to test some lower cost and mobile water level gauges that could be helpful to deploy to inform projects in HSE.

I've mentioned them already in the salt marsh section.

Same project as previously mentioned, South Main Street Culvert, Seabrook

South main St Seabrook culvert replacement. start 2020. In design.

Floodplain management study on the Blackwater River. Start year: 2019. Status: Drafting final report.

Transfer of a low-cost tidal wetland water level monitoring system: hyperlocal calculations of inundation and tidal datums for understanding change and restoration planning- 2021

Measuring 6 SETs in HSE