New York Bight Passive Acoustic Monitoring Workshop Report

MARCH 31, 2021

WILDLIFE CONSERVATION SOCIETY, OCEAN GIANTS PROGRAM

WCS

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Executive Summary

This report provides a summary of the outcomes from the New York Bight (NYB) Passive Acoustic Monitoring (PAM) Data Synthesis Workshop convened by the Wildlife Conservation Society (WCS), with support from the New York State Energy Research and Development Authority (NYSERDA), on October 19th, 20th, and 22nd 2020. The workshop brought together local, state, and regional research and government organizations to explore a collaborative initiative for establishing coordinated and optimal PAM research priorities. These priorities would have the potential to inform the development of a regional framework on PAM efforts in the NYB and surrounding Mid-Atlantic region. The discussions focused on: 1) outlining and establishing commonalities in current NYB PAM data resources and identifying opportunities for collaboration and data synthesis; 2) exploring the importance of data collection and analysis standardization across projects; and 3) identifying PAM research priorities and opportunities to collaborate moving forward, both within the NYB, as well as across the Mid-Atlantic region.

Overall, the workshop was successful in meeting stated objectives, and all major data holders are interested in further coordination and collaboration so that datasets can be maximized and integrated across areas within the NYB. However, as a number of PAM projects are either now finished or due to be completed in the next 1–2 years, the lack of dedicated funding to support any collaborative PAM projects was identified as a potential barrier to moving forward. Nonetheless, a number of priorities for collaboration and synthesis using currently available data were identified, that, if funded, have the potential to provide an important foundation for both local and regional-scale PAM coordination for monitoring and mitigation.

The development of reporting standards and a shared data repository (ideally on a regional level) was identified as key for maximizing data resources and facilitating data sharing across projects and would essentially provide the framework for coordinated PAM projects moving forward. Other projects that could be initiated with moderate amounts of funding would involve synthesizing all available PAM data and integrating and contrasting with other data sources (visual surveys and environmental data) to establish a baseline understanding of cetacean distribution and interaction with environmental variables in the NYB. All participants supported the need for a project focused on investigating ship strike risk and shipping noise-related impacts to cetaceans. Although a project on ship strike risk and noise impacts may require substantial resources, it is vital information for mitigation and management decisions for the heavily trafficked NYB and particularly as offshore wind (OSW) development expands in the region in coming years.

Moving forward, there are a number of recommendations to further the workshop discussions and create momentum for NYB and even regional scale PAM data coordination and collaboration. Development of local and/or regional PAM data standards and a shared data repository are key aspects and would provide a foundation for collaboration across both local and regional projects. The other priority projects identified through the workshop could be further developed and refined in a working group composed of interested workshop participants, that could identify and pursue potential funding sources for synthesis efforts. The final recommendation, to develop a NYB (and ideally regional) PAM network with standardized data collection and reporting standards, so that long-term, broad-scale questions could be answered and used to inform mitigation and best practices, would

require more significant resources but may be possible within the context of forthcoming OSW activities and funding in the NYB.

BACKGROUND/PURPOSE

As large whales are documented with increasing frequency in the New York Bight (NYB) in recent years (Muirhead et al., 2018), concerns over impacts from increasing industrial activities such as shipping, commercial fishing, and offshore renewable energy (e.g., Blake et al., 2013; BOEM 2016a, 2016b) have required an urgent need for research efforts to better inform conservation and management in the region. Impacts such as ship strikes, entanglement in fishing gear, and increased ocean noise can cause serious harm to whales; from communication masking to habitat loss, and hearing damage to injury (Jensen & Silber 2003; Southall et al., 2007; Clark et al., 2009; Henry et al., 2013; Weilgart 2017).

Not only are these anthropogenic pressures increasing in the NYB, an already heavily human-dominated area, but forthcoming offshore wind (OSW) development[1] has the potential to add to the overall potential impacts on whales and other cetaceans through increased risk of ship strikes, habitat modification, and increased ocean noise. Additionally, impacts on whales can act synergistically and are cumulative over space and time (Crain et al., 2008; Maxwell et al., 2013). These cumulative impacts can be difficult to monitor and assess, especially for whales which spend a majority of time underwater, and were the focus of the New York State Energy Research and Development Authority's (NYSERDA) 2020 State of the Science Workshop and current working groups. Passive acoustic monitoring (PAM) is one valuable tool, in a suite of tools, required to collect the baseline data needed to inform conservation and management efforts.

While there are a growing number of local research and government organizations actively responding to these threats in the NYB, there is a lack of coordination to ensure compatibility and efficiency across PAM projects. This includes aspects such as standardized data collection, analysis methods, and the variability in spatial and temporal coverage of projects. Thus, projects are often conducted in isolation and over limited geographic areas. Coordinated efforts would provide a valuable path to more effective use of the resources dedicated towards these acoustic monitoring projects and will help to establish baselines for marine mammal (and other vocal species) distribution and habitat use, as well as ocean noise, that will in turn, inform management and mitigation actions.

With support from NYSERDA, the Wildlife Conservation Society (WCS) convened the workshop to explore a collaborative initiative to establish coordinated and optimal PAM priorities that have the potential to inform the development of a regional framework on PAM efforts in the NYB and surrounding Mid-Atlantic region. The workshop was organized and hosted by WCS, and brought together local, state, and regional research and government organizations (Participant List and Detailed Agenda shown in Appendix I). Though originally planned as an in-person workshop at the Bronx Zoo or New York Aquarium, it was held via Zoom due to the Covid-19 pandemic. This workshop report summarizes key discussions and highlights aspects of these discussions that could form the basis of future efforts, which will help ensure that the outcomes of this workshop are most relevant and effective for guiding OSW leasing and development moving forward.

Workshop objectives:

1. Summarize PAM data availability (species detections and ocean noise) over temporal and spatial scales for the NYB and identify gaps in existing data sets
2. Summarize the state of current knowledge on NYB ambient noise levels and contributing noise sources
3. Outline acoustic recording and analysis methodologies used by workshop participants and identify, where possible, optimal methodologies for PAM in the NYB
4. Map previous, current, and planned PAM locations
5. Identify any points of collaboration now and how we can work towards more cohesive data collection efforts in the future
6. Discuss developing an optimal data collection and analysis framework and how this could facilitate collaboration and be used as a model across the region

SESSION 1: PUBLIC AND PRIVATE INTERESTS IN PAM IN THE NYB

This session provided an overview of previous and ongoing acoustic monitoring efforts in the NYB and broader Mid-Atlantic. Presentations were given by NYSERDA, NYSDEC, and NOAA who shared their interests and views on OSW development, and PAM in the NYB and surrounding region. NYSERDA shared its goal to obtain 9000 Megawatts from OSW by 2035, procurement processes including ORECFRP 20-1 (www.nyserda.ny.gov), which at the time of this workshop was receiving proposals, and emphasized interest and potential funding for regional scale research. NYSDEC is prioritizing designing and implementing a monitoring program for large whales to identify areas of conservation concern within NYB, monitoring the distribution of pelagic species, and assessing the effectiveness of Best Management Practices. NOAA presented a new website which maps PAM recorders from 2004–2014 and species detections across the East Coast. This map has the potential to help inform management along with real-time monitoring and to host other contributors' data for collaborative projects.

DEVELOPER SURVEY RESULTS

In order to gain insight into how offshore wind developers in the region viewed the importance of PAM for offshore wind projects, a survey was sent to key offshore wind energy companies that participate in the NYSERDA E-TWG (Atlantic Shores Offshore Wind, Shell New Energy, Equinor Wind US, Ørsted, Avangrid, and Vineyard Wind) with questions about the use and role of PAM in current and future offshore wind projects in the NYB and broader region (see Appendix III).

All respondents expressed the importance of PAM in establishing baselines for marine mammals and the usefulness and value of more coordinated PAM data synthesis at both the NYB and regional levels. However, responses varied for different aspects such as when PAM is being used (e.g., pre- or during construction vs. throughout the duration of the project), the spatial scale at which PAM is used (e.g., project development area vs. lease area), and type of PAM equipment (see Appendix III or SurveyMonkey). Additional developer participation would be helpful, as there were only six respondents from 5 developers, but any further developers included would need to have context for the particular situation in the NYB.

Key Takeaways from Session 1 — Public and private interests in the NYB

- ⇒ NYSERDA has interest in regional scale monitoring and research for future proposals.
- ⇒ NYSDEC is prioritizing development and implementation of a NYB whale monitoring program. The current PAM program is currently completed with a Final Report expected in 2021.
- ⇒ NOAA PAM website is a developing shared platform for sharing results of species acoustic presence.
- ⇒ A shared data repository platform (e.g., building on the NOAA PAM website) would be valuable for collaboration and data synthesis.
- ⇒ Developers were in support of coordinated PAM data synthesis and regional scale efforts.
- ⇒ There were no apparent standards for how PAM was used by developers for monitoring or mitigation across projects (e.g., PAM equipment, duration, and scale of data collection efforts).

SESSION 2: OVERVIEW OF CURRENT PAM PROJECTS IN THE NYB

The recent and current PAM projects (as of October 2020) in the NYB are managed by Cornell (completed in 2020), WCS/WHOI (continuing through Q1 2022), and URI (Summer 2019–2021). Cornell has been analyzing the temporal and spatial occurrence and distribution/movement of 6 large whale species (humpback [*Megaptera novaeangliae*], fin [*Balaenoptera physalus*], sei [*Balaenoptera borealis*], North Atlantic right whale [*Eubalaena glacialis*; NARW], blue [*Balaenoptera musculus*], and sperm whales [*Physeter macrocephalus*]), and looking into ambient and anthropogenic noise, masking, and detection ranges. The final year (year 3) of Cornell's project just wrapped up and a Final Report is expected in Q1 2021 (see Fig. 1 and Appendix II for location and project information).

The WCS/WHOI collaboration has been looking at the acoustic presence of 4 large whale species (humpback, fin, sei, and NARW) since 2016 through manual and automatic detector review. This project is ongoing with a second buoy deployed in 2019 that will allow for more information on species distribution and ocean noise in the Empire wind lease area (see Fig. 2 and Appendix II for location and project information).

WCS (with technical contributions from Rice and Southall) also had a project focused on the occurrence and distribution of delphinid species, humpback whales, and sound levels, in the heavily trafficked area of the New York Harbor from 2018–2020 (see Fig. 1 and Appendix II for location and project information). WHOI is establishing a network of real-time and gliders (equipped with Vemco receivers) along the Atlantic, including planned buoys off New Jersey (current one deployed off Atlantic City in 2020), Maryland, and North Carolina.

URI, in collaboration with Normandeau Associates and Ocean Tech, just began their analysis on one of two recorders (deployed in 2019). They are analyzing all vocalizing and echolocating marine mammals and planning to look into vessel noise, diurnal/seasonal trends, and would like to compare their acoustic data with visual sightings in the future.

Key Takeaways from Session 2 — Overview of current PAM projects in the NYB

- ⇒ A number of the current projects are almost complete/will be completed in 2021 with no funding/plans to re-deploy units (NYSDEC/Cornell NYB monitoring project, WCS New York Harbor monitoring project). Others involving the near real-time PAM and archival aspects (e.g., WCS/WHOI) are scheduled to continue through 2021 and early 2022.
- ⇒ Current projects have overlapping and complementary aspects and there is interest in collaboration to facilitate multi-use datasets (e.g., multi-taxa and integrating different data types), reduce redundancy, and increase cost-efficiency.
- ⇒ Different reporting standards (e.g., species focus, frequency bandwidth and analysis resolution) across the different projects and lack of funding were identified as possible limitations to a data synthesis collaboration; however, a number of possible data integration and data synthesis projects could be achieved using data collected throughout the NYB over common time periods.

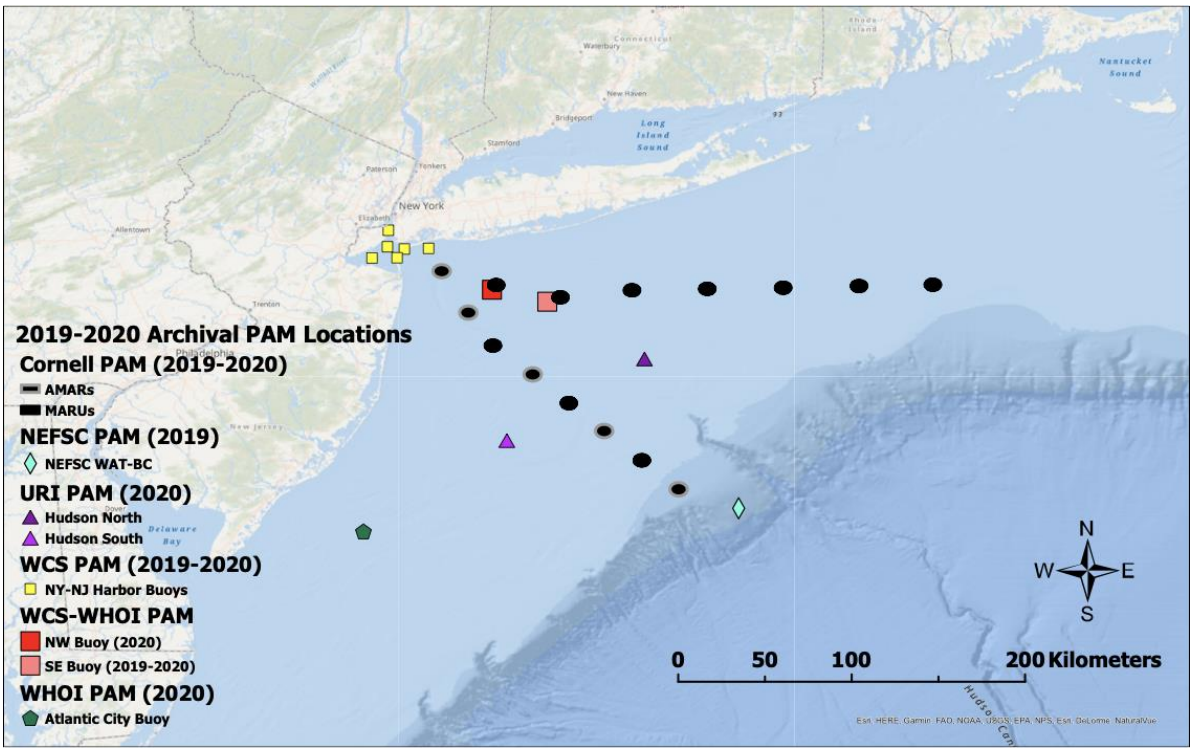

Figure 1. Locations of Archival PAM Recorders

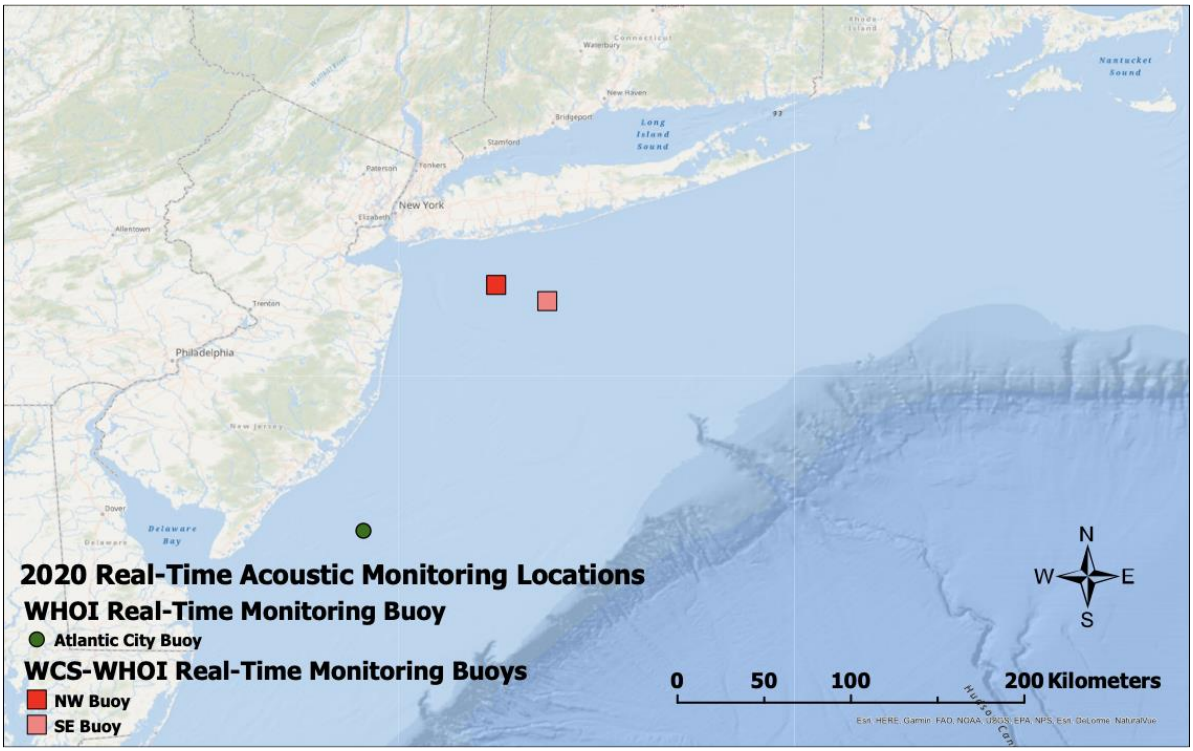

Figure 2. Locations of Real-Time PAM Recorders

SESSION 3: EVALUATING THE EFFECTIVENESS OF PAM IN THE NYB AND IDENTIFYING RESEARCH OBJECTIVES USING EXISTING PAM DATASETS.

With NYSERDA's interests in regional approaches and any future funding (e.g., RFQL), there was fruitful discussion on how the group can collaborate, both with data that is currently available and opportunities in the future.

The group reviewed maps of past and current PAM recorder locations (Figs. 1 and 2), noting that there are opportunities for cross-validating and comparing datasets across a large area of the NYB. There are some overlaps in spatial and temporal coverage (particularly the WCS/WHOI and Cornell projects), as well as notable gaps in coverage of the wider NYB (Fig. 1). While discussing the PAM data exploration matrix (Appendix II), a few aspects were identified for further discussion in relation to data that has already been collected:

1) Data standardization (e.g., analytical methods, automatic detectors used)
2) Potential collaborative projects (e.g., low-frequency vocalizations analysis across all recorders, noise analysis/detection ranges, analysis beyond daily presence)

Further discussion into these aspects identified a number of differences in recording parameters and analysis methods across projects, so some standardization would be needed before datasets can be compared/integrated. There were also a number of commonalities and efficiencies across current projects, and discussions focused on outlining potential research ideas based on these commonalities with initial timeframe, cost estimates, and other considerations. Participants shared their thoughts on potential research ideas, which ranged from those with shorter timeframes and lower cost such as developing a call library and central data repository, to more involved projects with longer time frames and higher cost, such as a comprehensive analysis of all species detections across the NYB (Table 1). A common theme that emerged from the potential research projects was the scale at which they would be done, as this would have a big impact on timing and cost.

Table 1. Potential Research Ideas and Priorities *(Time Frame: S – short (1–2 years); M – medium (2–5); L – long (5+); and Cost: L – low (<100k); M – medium (100-500k); H – high (500k+)).*

Research Ideas	*Time Frame*	*Cost*	*Notes*
Validating acoustic data from two nearby sensors	S	L	
Investigating ambient noise during COVID-19 shutdown	S	L-M	May be federal funding
Behavior of vocal species at finer temporal resolution	S-M	L-M	
Spatial mapping of ambient noise	S-M	L-M	Coordination and standards required
Improve multi-sensor moorings	S-M	L-H	Depends on moving from short-comings assessment to deployment
Assessment of self-noise of different PAM systems	S-M	L-M	
Development of a call library for all vocal species	S	M	
Comparison of low frequency data across projects	S-M	M	
Integrating and comparing to non-PAM datasets (e.g, aerial and vessel surveys)	S-M	M-H	Consider scale and data standardization
Central repository for raw and analyzed data	M	M	
Fine-scale analysis of species-specific calling behavior	M	M-H	Time/cost dependent on scope and scale
Density/abundance estimation of vocal species	M	M-H	Challenging with many components
Ship strike risk and shipping related noise impacts	M	M-H	Data rich and heavy, complex analysis
Comparison to other time series to look at change over time	M	L-M	
Standards for PAM reporting	M	L	
Comprehensive look of species detections across NYB/projects	M-L	M-H	
Ecosystem based approach to understanding drivers of species distribution	M-L	M-H	

SESSION 4: IMAGINING A COLLABORATIVE FRAMEWORK FOR PAM EFFORTS IN THE NYB AND PLAN FOR FUTURE RESEARCH PRIORITIES

In order to explore whether there is a way to optimize PAM data resources in the NYB, participants were asked to identify the specific research questions that have the potential to drive a NYB-scale collaborative project now and into the future. There were many discussions centered around distribution and occurrence, mitigation and risk, and baselines and risk related to OSW. Participants were all generally supportive of the idea of developing a PAM network across the NYB so that long-term, broad-scale questions could be answered, and also as a platform to implement mitigation techniques and real-time sensors to inform best practices. However, there were a number of barriers to project development also identified which centered on a lack of time and resources for collaborative efforts.

A number of specific research questions were outlined and those discussed as high priority with a focus on feasibility given a current lack of resources, included 1) Comparison and synthesis of PAM data with other data sets, 2) Spatial mapping of ambient noise (with potential focus on noise during the Covid-19 shutdown), 3) A comparison of low frequency data (species and noise) across all projects, 4) Development of reporting standards, and 5) Development of a call library and data repository. However, because of the overwhelming input and the number of research project ideas (from Table 1), projects that had commonalities were consolidated and participants were polled on their top research priorities for a NYB PAM collaboration.

Research ideas receiving the most votes are described in Table 2 below and viewed as higher priority projects. These were discussed in further detail, including 1) Ship strike risk and ambient noise impacts, 2) PAM data synthesis (species and ambient noise) and integration/comparisons to other data sets (e.g., vessel surveys, aerial surveys and environmental data), and 3) Developing or implementing PAM data collection and reporting standards, which BOEM and NYSERDA also highlighted as priorities; aligning with current national and international data standard initiatives should be considered for regional efforts. The research ideas identified as the highest priority were selected around former/existing projects that could be used as a basis for the efforts discussed in the workshop, challenges, and key items.

Table 2. Potential NYB Wide Research Ideas – Voting and Discussion

Research Idea	*Discussion*	*Votes*
Ship strike risk and ship/ambient noise impacts	Learn from/build on Block Island and Bering Strait projects Potential basis for predictive risk Non-trivial, need to identify many specific questions (e.g., goals; scale; role of prey and other ecological parameters; risk for marine mammals; speed reduction zones adequacy) Spatial mapping of ambient noise	**5**
Comparing to other non-PAM datasets	Could be a comprehensive look across NYB and methods, or standalone/integration of just one other dataset Interest in looking at both NYSDEC and NYSERDA aerial surveys and comparing methods Outstanding questions: Who would do the comparison? How would it be funded?	**3**
Comprehensive look at marine species detections across NYB/projects		**3**
Low-frequency data comparison across projects		**3**
Reporting standards	Examples of existing reporting standards to use/build upon: Atlantic Deepwater Ecosystem Observatory Network (ADEON); Realtime Opportunity for Development Environmental Observations (RODEO); Gulf of Mexico Research Initiative (GoMRI); NOAA Sanctuary System Sound Monitoring; International Quiet Ocean Experiment (IQOE); NOAA National Centers for Environmental Information (NOAA NCEI) Needs a leader with physics expertise Standards should include sound pressure level	**3**
Comparison to other time series		**2**
Common data repository and unified call library		**2**

Key Takeaways from Sessions 3 & 4 — Identifying research priorities for current data resources and future PAM efforts in the NYB

⇒ The current PAM recorder location maps showed spatial and temporal overlap (particularly the WCS/WHOI and Cornell projects, which is near real-time PAM and other archival recorders), good coverage across a large area of the NYB, as well as gaps in coverage (e.g., nearshore coastal waters of Long Island).

⇒ There were differences in recording bandwidth, duty cycle, and some analysis methods across projects so some standardization would be needed before datasets can be compared/integrated.

⇒ 17 research project ideas (Table 1) that could form the basis of a NYB collaborative project were outlined based on current PAM data. There were a number of projects identified as feasible for collaboration with the available datasets; however, lack of resources (time and funding) were identified as barriers to project development.

⇒ The research project ideas listed in Table 1 were consolidated and participants voted for the priority projects (Table 2) for both current and future NYB PAM collaboration. The priority projects included:

1) Investigating ship strike risk and shipping noise related impacts to cetaceans, which could incorporate an analysis of existing data and AIS data, and integrate additional monitoring and field efforts (e.g., suction cup tags)
2) Synthesizing PAM data and integrate, compare, and contrast with other data sources (aerial and vessel surveys, oceanographic data) to establish a baseline understanding of cetacean distribution, ambient noise, and interaction with environmental variables in the NYB
3) Development of PAM data collection and reporting standards to ensure future PAM projects in the NYB are compatible for data synthesis efforts

⇒ Of these identified projects, 1 and 2 would be invaluable for continued efforts to establish baseline data for the NYB and 3 critical for the development of both local and regional-scale PAM initiatives.

⇒ All participants agreed that developing a coordinated and standardized PAM network, particularly with both real-time and archival capabilities, across the NYB would be invaluable to inform best practices for mitigation and monitoring.

SESSION 5: EXPLORING THE DEVELOPMENT OF AN OVERARCHING REGIONAL FRAMEWORK FOR PAM EFFORTS

The final day of the workshop consisted of discussions on the draft regional framework (Table 3) which emphasized:

1) Standardization of baseline data (recognizing that data collection should occur throughout each OSW phase)
2) Coordination of ecological research and monitoring to ensure optimal spatial and temporal scales for monitoring, and understanding of basic distribution/occurrence and risk areas of the animals (NYSERDA again highlighted future funding for regional work)
3) Enhanced mitigation using real-time monitoring to mitigate the two main concerns with OSW: pile driving and ships/vessels (noise and ship strikes)
4) Environmental risk assessments

While the potential for OSW funding related to PAM efforts seemed promising in the near-term (e.g., NYSERDA procurement, Regional Wildlife Science Entity (RWSE) potential, U.S. Department of Energy's Wind Energy Technologies Office (WETO), at the time of the workshop there was not a specific FOA or RFP that might have helped further prioritization of these four objectives. With the remaining time, the workshop concluded with next steps to form a working group to further develop the potential collaborative projects, a wider regional Eastern Seaboard approach, and plan to reconvene after NYSERDA's State of the Science on Cumulative Impacts.

Table 3. Regional Framework Discussion

Broad Focus	*Project Focus*	*Questions*	*Considerations/Barriers*	*Spatial Scale*
PAM Data Standards	A common framework of data standards, data repository, and shared coordination and learning	Timeline of OSW construction?	Funding	Regional
Coordinated Ecological Research and Monitoring	A sufficient monitoring network to obtain a baseline of data to understand presence, habitat use, and behavior, as well as track patterns/changes over time with climate change, shipping, and OSW	What are the seasonal and multi-year impacts to habitat use on different species groups from OSW and other human activities?	Funding	Regional
		Are species displaced by OSW?	Time to obtain baseline before OSW construction starts	
		What species are resident, population size, and habitat preferences?	Researcher's and developer's needs may differ and should be clearly stated	
			Scale at which we monitor shifts/changes	
			Continuous temporal scale across OSW phases	
Enhanced Mitigation	Real-time mitigation against vessel strike risk reduction/assessment and development activities (i.e., pile-driving)	What is ship strike risk to large whales in NYB?	Early warning system and localization of animal presence is ideal	NYB and lease areas (note: if localizing around a specific project, need extensive network of detectors)
		Can the increased ship activity associated with OSW be detected acoustically? If so, is it biologically significant?	Additional methods: gliders, Protected Species Observers	

			Monitoring costs	
Environmental Risk Assessment	Conduct cumulative risk assessments for Environmental Impact Statements (EISs) and other regulatory processes for marine mammals	Are marine mammals displaced by OSW projects? If so, where, to what effect, extent, degree, and species? What are the consequences?	Pile-driving cannot stop once a certain depth is reached	Regional
		How do soundscapes change over time as settlement occurs on the turbine foundations?	Risk assessments should be more comprehensive (e.g., different species, species vulnerability, behavior, hearing thresholds, sound source) Finer resolution needed	

Key Takeaways from Session 5 — Regional-scale PAM collaboration

- ⇒ Participants supported the idea of regional scale PAM project; however, a regional scale approach would be logistically challenging and require significant coordination and financial support.
- ⇒ An informal working group would be useful to gauge interest in advancing project ideas and identifying possible sources of funding (e.g., NYSERDA solicitation in 2021, potential for BOEM funding).

SUMMARY AND CONCLUDING REMARKS

Overall, the workshop was successful in meeting stated objectives, even while being held remotely due to the continuing Covid-19 pandemic. The NYSERDA PAM workshop brought together current PAM data holders in the NYB and surrounding region to discuss 1) the potential for collaboration on existing data, 2) whether it is valuable to develop an optimal PAM data collection framework, and 3) whether a coordinated regional-scale effort would be feasible. The discussions were productive and all major data holders are interested in further coordination and collaboration to ensure that datasets were maximized and integrated across areas within the NYB to more effectively inform mitigation and management decisions. However, the conclusion of many projects, funding for collaboration and joint activities, and the challenges of coordination were all identified as significant limitations to these efforts. Currently funded PAM projects were all focused on delivering on particular objectives that, although have overlapping components, differ somewhat in PAM recording and analysis methods and/or reporting standards. Some limitations could be addressed with modest amounts of funding to achieve goals of data integration and resulting analyses.

COLLABORATION ON CURRENTLY AVAILABLE PAM DATA FOR THE NYB

There was general consensus that local-scale PAM project coordination would take an investment of both time and financial resources, which at present, falls outside of the objectives of currently funded projects. Research organizations collecting PAM data are generally competing for funding, and particularly when funding allocations are small and efforts are de-centralized. The lack of time, funding, and incentives to collaborate make it difficult to act synergistically despite the best intentions to do so.

Nonetheless, there were a number of projects identified by participants as priorities for collaboration and synthesis of currently available data resources that could be pursued if funding could be sourced to support collaborative efforts (projects are outlined in no particular order):

1) Development of reporting standards and a shared data repository that could be pursued with less funding investment and would significantly enhance data compatibility and sharing across projects *however it would be highly beneficial to consider this across regions and not developed in isolation
2) Synthesizing PAM data for a more comprehensive understanding of species distribution and noise at a wider NYB scale
3) Synthesizing PAM data and integrate, compare, and contrast with other data sources (aerial and vessel surveys, oceanographic data) to establish a baseline understanding of cetacean distribution and interaction with environmental variables in the NYB

FUTURE COLLABORATIVE PAM PROJECT IDEAS FOR THE NYB

The three project ideas outlined for collaboration on existing data were also essentially identified as priorities for future NYB PAM efforts, with an additional focus on ship strike risk and shipping-related noise impacts. These projects encompass collection of the much-needed baseline information that will inform mitigation and monitoring decisions for OSW and other future human ocean uses, as well as setting up a standardized data collection and reporting framework that would ensure limited resources are maximized and datasets compatible at local, and potentially regional levels. There are numerous other projects that are equally as valuable and important for gaining a better understanding of impacts to species from development activities, as well as cumulative impacts. However, the projects outlined were a common theme identified by participants and were viewed as 'low hanging fruit' with wide-ranging support.

The project with the highest number of votes was a project focused on investigating ship strike risk and shipping noise related impacts to cetaceans, which could incorporate an analysis of existing data and AIS data, and potentially integrate additional monitoring and field efforts (e.g., suction cup tags). While it was acknowledged that a project investigating shipping-related impacts to cetaceans in the NYB could require significant time and resources, focusing on this issue is imperative for this heavily trafficked area and particularly as OSW development expands in the region in coming years.

LOCAL AND REGIONAL PAM COLLABORATION

One avenue that would be invaluable to consider would be the creation of a NYB-wide or regional PAM monitoring network initiative (e.g., the EU-wide ICES harbor porpoise monitoring network). Conformity to PAM data standards and data sharing across the network could, for example, be a requirement stipulated at the procurement phase for OSW development and managed by NYSERDA (for NY focus), and RWSE or other relevant agencies (e.g., BOEM) for the regional focus. Funding may also be directed towards developing and maintaining a local or regional PAM network through funds committed by developers through the procurement process to support regional monitoring of wildlife. A number of the projects outlined in this report would be a key focus for these efforts.

Specific Recommendations

⇒ Develop an informal working group of interested workshop participants, that would meet quarterly to refine project ideas for current and forthcoming data, discuss regional efforts, and identify potential funding sources for synthesis efforts.

⇒ Local and/or regional PAM data standards and a shared data repository are key aspects and would provide a foundation for collaboration across both local and regional projects.

⇒ Development of a NYB (and ultimately regional) PAM network with standardized data collection and reporting standards and with the potential for real-time sensors to inform best-practices and mitigation, so that long-term, broad-scale questions could be answered and provide information necessary for species protection in the region.

We envision that the recommendation and selection of a priority project for integration and synthesis of existing PAM data would require some modest funding but it would be possible to leverage the significant investments that have been made to collect data throughout the NYB. It would have considerable benefit to have that information published and widely available. The next recommendation of a coordinated PAM network would require more significant effort; one that has great potential provided the commensurate amount of resources that could be identified for the appropriate spatial and temporal scales related to forthcoming OSW activities in the NYB.

ACKNOWLEDGEMENTS

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APPENDIX I: PARTICIPANT LIST AND DETAILED AGENDA

Participants

Workshop participants included representatives from research organizations and state and federal agencies that are involved with PAM and OSW projects in the NYB and greater mid-Atlantic region.

1. Howard Rosenbaum, WCS
2. Melinda Rekdahl, WCS
3. Anita Murray, WCS
4. Carissa King, WCS
5. Emily Chou, WCS
6. Dana Tricarico, WCS
7. Mark Baumgartner, WHOI (Woods Hole Oceanographic Institute)
8. Aaron Rice, Cornell
9. Meghan Rickard, NYSDEC (New York State Department of Environmental Conservation)
10. Jim Miller, URI (University of Rhode Island)
11. Sofie Van Parijs, NOAA (National Oceanic and Atmospheric Administration)
12. Brandon Southall, Southall Environmental Associates, Inc.
13. Greg Lampman, NYSERDA (New York State Energy Research and Development Authority)
14. Kate McClellan Press, NYSERDA
15. Brian Hooker, BOEM (Bureau of Ocean Energy Management)
16. Mary Cody, BOEM
17. Kyle Baker, BOEM
18. Erica Staaterman, BOEM
19. Pat Field, CBI (Consensus Building Institute)

Detailed Agenda

Monday, October 19, 2020

Welcome from WCS and CBI

Introduction

- Using Zoom
- Agenda review
- Workshop purpose and objectives
- Participant introductions

Session 1. Public and private interests in PAM in the NYB

1.1 Presentations and questions
- 1.1.1 Kate McClellan Press, NYSERDA
- 1.1.2 Meghan Rickard, NYSDEC
- 1.1.3 Sofie Van Parijs, NOAA

Session 2. Overview of PAM projects in the NYB

- 2.1 Presentations and questions
  - 2.1.1 Aaron Rice, Cornell
  - 2.1.2 Mark Baumgartner, WHOI
    Howard Rosenbaum, Melinda Rekdahl, and Anita Murray, WCS
  - 2.1.3 Jim Miller, URI
- 2.2 Open discussion
  - 2.2.1 Commonalities and differences across the different projects
- 2.3 Wrap-up, any next steps for Day 2

Develop survey results

<u>Tuesday, October 20, 2020</u>

Review Day 1 and today's agenda

Session 3. Can we further the effectiveness of PAM in the NYB?

- 3.1 Comparing projects
  - 3.1.1 Use matrix to jointly and methodically walk through various elements of current projects
    - 3.1.1.1 Recording methods
    - 3.1.1.2 Species focus
    - 3.1.1.3 Recording parameters
    - 3.1.1.4 Data analysis
    - 3.1.1.5 Statistical methods
    - 3.1.1.6 Others
  - 3.1.2 Understand, in detail, the commonalities and differences among the projects
- 3.2 Finding efficiencies or effectiveness in current projects
  - 3.2.1 What would be the value of cross-project data work with current projects?
  - 3.2.2 Where may there be opportunities to integrate, synthesize, or analyze existing data?
  - 3.2.3 The barriers to doing so?
  - 3.2.4 Possible next steps if any?

Session 4. Can we imagine an overarching framework for PAM efforts in the NYB for the future?

- 4.1 Imagining a NYB regional framework
  - 4.1.1 What might an optimal data collection and analysis framework for the NYB look like for the future?
- 4.2 Wrap-up, any next steps for Day 3

<u>Thursday, October 22, 2020*</u>

Review Day 2 and today's agenda

Voting results and discussion on potential research ideas

Session 5. Can we imagine an overarching regional framework for PAM efforts?

- 5.1 Wider regional summary
  - 5.1.1 WCS summarizes discussion on wider regional approach
    - *5.1.1.1* WCS presents a draft skeletal outline of a regional approach based on previous discussions
  - *5.1.2* Group discussion and improvement of that framework
- 5.2 Moving forward into action
  - 5.2.1 Are there low-hanging fruit we can decide on now?
    - 5.2.1.1 Actions, actors, and milestones?
  - 5.2.2 What are the actions we need to take towards better integration beyond the low-hanging fruit?
  - 5.2.3 Actions and approaches following this workshop
- 5.3 Wrap-up, any next steps

* *Following previous workshop discussions, there was flexibility in scheduling this day and the summary agenda reflects the revised agenda*

APPENDIX II: PAM DATA EXPLORATION MATRIX

Project Information (Note: details not available for NEFSC PAM or WHOI PAM)

Organization	*Name*	*Objectives*	*Funding*	*Duration*	*Deployment Start Date*	*Deployment End Date*	*Latitude*	*Longitude*
WCS	New York Harbor Acoustic Monitoring	Species presence, ambient noise	Hudson River Foundation	2 years	10/4/18	10/7/20	40.5564	-74.0509
WCS/WHOI	New York Bight Acoustic Monitoring	Species presence, ambient noise detection range	2016-2020 funding for SE buoy from G. Unger Vetlesen Foundation and Flora Family Foundation 2020-2022 funding for SE buoy from Equinor	5 years, 7 months	6/23/16	12/02/22	40.2607	-73.2198
WCS/WHOI	New York Bight Acoustic Monitoring	Species presence, ambient noise detection range	Equinor	2 years	1/15/20	12/02/22	40.3443	-73.4844
Cornell	NYSDEC Whale Passive Acoustic Survey	Species presence, ambient noise, masking	NYSDEC	3 years	10/15/17	10/15/20		
URI	Detection and Classification of Acoustic Signals	Species presence, ambient noise, detection range	Normandeau/Ocean Tech Services	2 years	10/25/19	11/1/21	39.9692 & 39.5467	-72.7166 & -73.4292

Recording Parameters (Note: details not available for NEFSC PAM or WHOI PAM)

Organization	*No. Recorders*	*Deployment Type*	*Recording Equipment Type*	*Equipment Model*	*Depth (m)*	*Sample Rate (kHz)*	*Duty Cycle (min on/ min off)*	*Covariates*
WCS	6	Archival fixed recorders	Soundtrap	300 HF	7 - 13	96	20/60	
WCS/WHOI	1	Real-time buoy	DMON		38	2	30/60	
WCS/WHOI	1	Real-time buoy	DMON		27	2	Continuous	
Cornell	15	Archival fixed recorders	MARUs/ AMARs/ AURALs		20 - 150	5/16	Continuous	
URI	2	Archival fixed recorders	Loggerhead	LS-1	~40 & ~60	96	Continuous & 5/15	Met, ocean, ship data

Analysis Information (Note: details not available for NEFSC PAM or WHOI PAM)

Organization	*Target Species*	*Other Species Documented*	*Analysis Effort (all or sub-sample)*	*Sampling Regime*	*Species Detection Method (manual, automated detector)*	*Automated Detector Used*	*Software Used*	*Species Presence Temporal Resolution (detections per hour or per day)*
WCS	Bottlenose dolphin, harbor porpoise, humpback	Unknown delphinid, fish	Both	4th hour/4th day	Both	Whistle and moan detector, custom PAMGuard detectors	MATLAB, Raven Pro, PAMGuard	Both
WCS/WHOI	Fin, humpback, sei, NARW		All		Both	LFDCS	MATLAB, Raven Pro	Both
WCS/WHOI	Fin, humpback, sei, NARW		All		Both	LFDCS	MATLAB, Raven Pro	Both
Cornell	Fin, humpback, sei, NARW, sperm, blue		All		Both	Custom detectors	MATLAB, Raven Pro	Both
URI	Any vocalizing or echolocating marine mammals		All		Both	LFDCS	MATLAB, Raven Pro	Both

Analysis Information (cont'd)

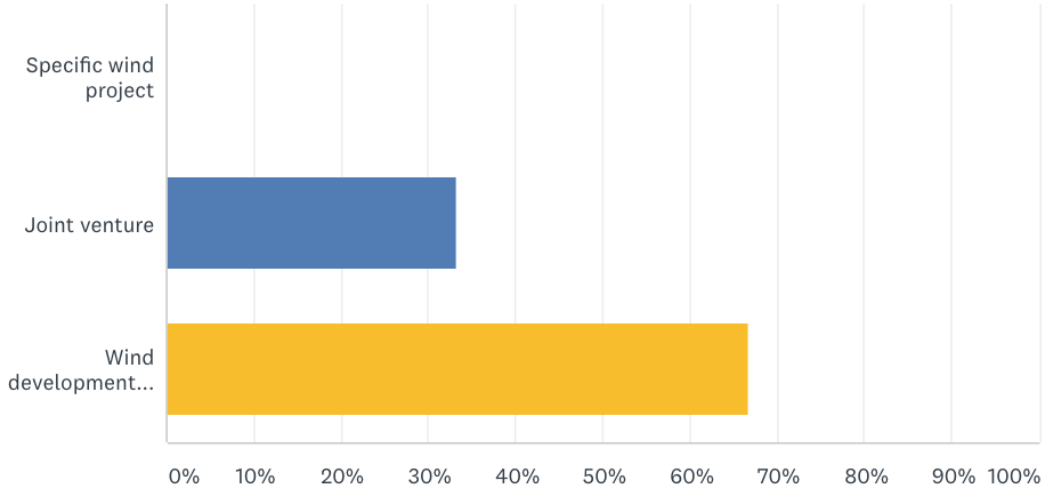
Organization	*Type of Vocalizations Documented (song, calls)*	*Anthropogenic Noise Sources*	*Planned Vocal Behavior Analysis (Y/N/Planned)*	*Planned Ocean Noise Analysis (Y/N/Planned)*	*Planned Detection Range Calculations (Y/N/Planned)*	*Planned Source Level Calculations (Y/N/Planned)*	*Planned Localization/ Tracking (Y/N/Planned)*
WCS	Both	Shipping	Y	Planned	Planned	N	N
WCS/WHOI	Both	Shipping	Y	Planned	Planned	N	N
WCS/WHOI	Both	Shipping	Y	Planned	Planned	N	N
Cornell	Both	Shipping	Planned	Y	Y	N	N
URI	Both	Shipping	Uncertain	Y	Y	Y	Range on some species

APPENDIX III: DEVELOPER SURVEY (via SurveyMonkey)

Q1

I am completing this survey on behalf of a

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
Specific wind project	0.00%	0
Joint venture	33.33%	2
Wind development company writ large.	66.67%	4
Total Respondents: 6		

Q2

If you are comfortable, please write in the affiliation

Answered: 5 Skipped: 1

Atlantic Shores Offshore Wind

11/5/2020 6:11 AM

Shell New Energy

10/29/2020 6:15 PM

Atlantic Shores

10/29/2020 7:32 AM

Vineyard Wind

10/19/2020 8:37 AM

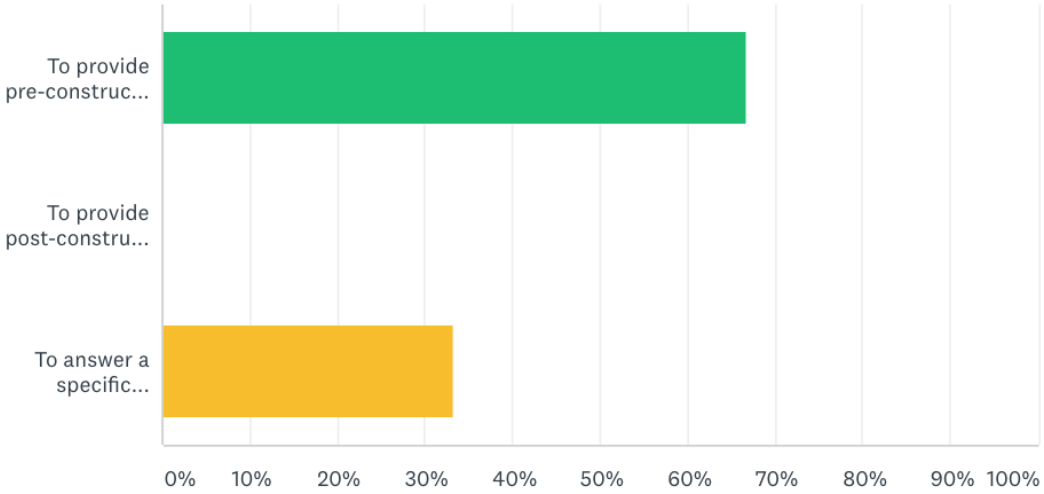
Equinor Wind

10/19/2020 5:28 AM

Q3

How are you currently using Passive Acoustic Monitoring (PAM) in your projects?

Answered: 3 Skipped: 3



ANSWER CHOICES	RESPONSES	
To provide pre-construction baseline monitoring	66.67%	2
To provide post-construction monitoring	0.00%	0
To answer a specific research question or hypothesis	33.33%	1
TOTAL		**3**

Comments (6)

We are using PAM during pre-construction surveys as a form of MM monitoring to support mitigation actions during night-time hours or periods of low visibility

11/5/2020 6:11 AM

As part of geophysical and geotechnical activities

10/29/2020 6:15 PM

We haven't instituted PAM for marine mammals yet. We are discussing how best to do that. We do have PAM for bats and soon for birds.

10/29/2020 7:32 AM

Our projects are not currently using PAM for the items listed, but PAM is used as mitigation during G&G surveys. We also intend to use it during project phases (pre- and during construction) and potentially post-construction. We are investigating how best to use PAM as a tool in a monitoring design framework to identify and monitoring marine life, hence selection 'to answer research question'

10/20/2020 3:19 PM

all of the above and survey monitoring -writing here since there aren't many other places to add text; several of the questions below only allow one option to be selected but several apply; it was also difficult to differentiate between what is currently occurring vs. planned; information specific to the NYB will mostly apply to a single developer at this point with only one active lease, so for others this could potentially be helpful for vessel transit or potentially cable routes, understanding what is occurring in the NYB is a relatively small area in a developing industry that extends along the coast and therefore a regional effort would be more beneficial; and for the baseline questions below, there are limitations on what PAM can provide outside of presence/absence at this point.

10/19/2020 8:37 AM

For clearance zone monitoring as part of offshore geophysical surveys

10/19/2020 5:28 AM

Q4

If using PAM to answer a specific research question, would you mind sharing?

Answered: 4 Skipped: 2

N/A at this time

11/5/2020 6:11 AM

Presence of marine mammals close to shut-down zone

10/29/2020 6:15 PM

How PAM can be integrated as one tool in a toolbox to detect and monitor for marine life in and around project area

10/20/2020 3:19 PM

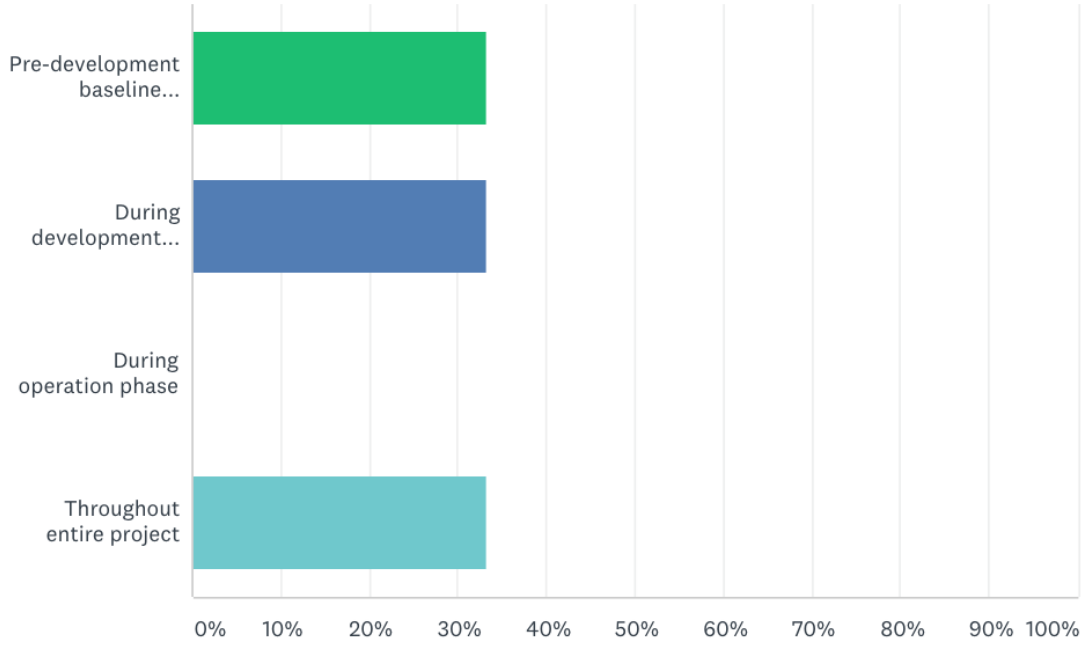
validate and confirm modeled ensonification areas

10/19/2020 8:37 AM

Q5

When are you using or intend to use PAM in your projects?

Answered: 6 Skipped: 0

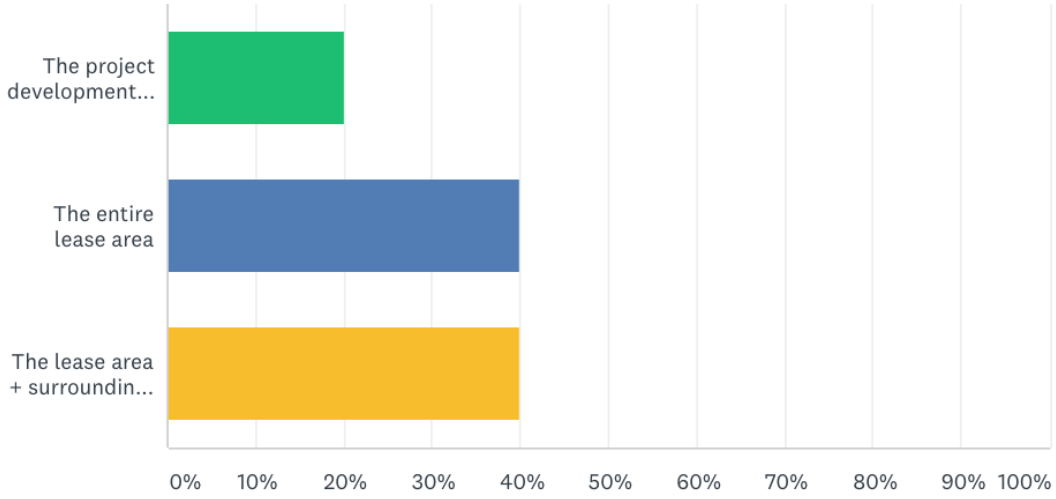


ANSWER CHOICES	RESPONSES	
Pre-development baseline monitoring	33.33%	2
During development phase	33.33%	2
During operation phase	0.00%	0
Throughout entire project	33.33%	2
TOTAL		**6**

Q6

What area are your PAM surveys covering?

Answered: 5 Skipped: 1



ANSWER CHOICES	RESPONSES	
The project development area (say Phase I of II)	20.00%	1
The entire lease area	40.00%	2
The lease area + surrounding region	40.00%	2
TOTAL		**5**

Comments (5)

Our PAM use is currently a towed system on our survey vessels that are surveying the entire lease area.

11/5/2020 6:11 AM

To be determined. Currently our plans have not been finalized.

10/29/2020 6:15 PM

The MM PAM will cover the entire lease area.

10/29/2020 7:32 AM

current work is tied to survey monitoring, planned work will occur in lease area and along transit corridors

10/19/2020 8:37 AM

For the US the PAM are the passive recordings on the WCS/WHOI buoys. We also acknowledge there are existing PAM arrays deployed outside the Lease area by other parties which will provide useful baseline data

10/19/2020 5:28 AM

Q7

If you chose "the lease area + surrounding region" for the above question what is the distance beyond the lease area?

Answered: 3 Skipped: 3

To be determined

10/29/2020 6:15 PM

Depends on regional and wind energy area coordination with fellow, neighboring developers

10/20/2020 3:19 PM

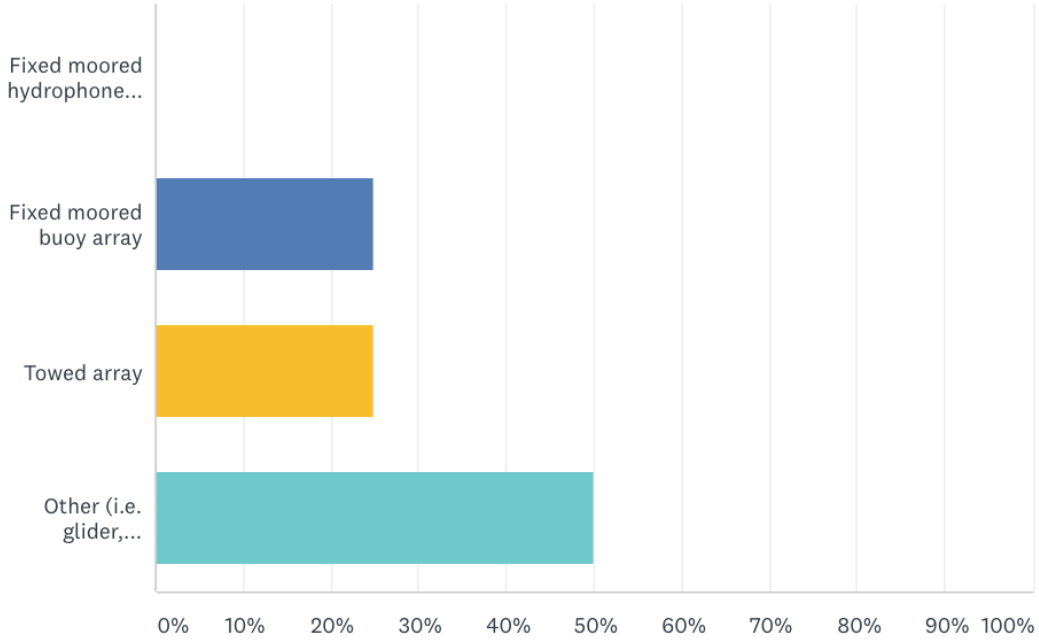
MA and RI WEAs plus vessel transit corridors, some PAM work has occurred but more is planned

10/19/2020 8:37 AM

Q8

What type of PAM systems are currently being used?

Answered: 4 Skipped: 2

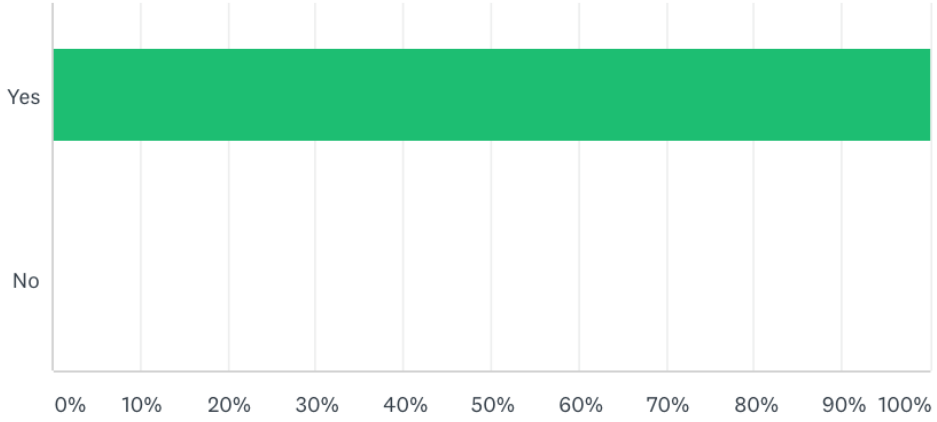


ANSWER CHOICES	RESPONSES	
Fixed moored hydrophone buoys	0.00%	0
Fixed moored buoy array	25.00%	1
Towed array	25.00%	1
Other (i.e. glider, floating array - please specify)	50.00%	2
TOTAL		**4**

Q9

Do you consider PAM data important for establishing baselines for marine mammals in your lease area or adjacent areas?

Answered: 6 Skipped: 0

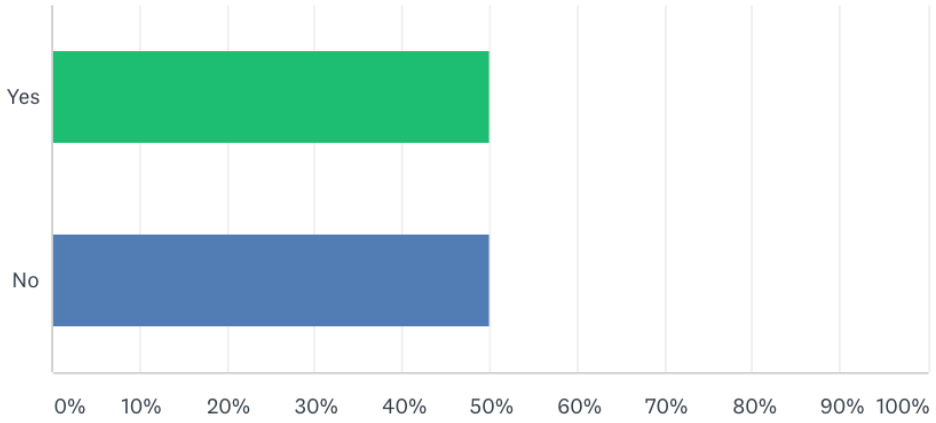


ANSWER CHOICES	RESPONSES	
Yes	100.00%	6
No	0.00%	0
TOTAL		**6**

Q10

Do you consider PAM data important for establishing baselines for other marine species in your lease area or adjacent areas?

Answered: 6 Skipped: 0

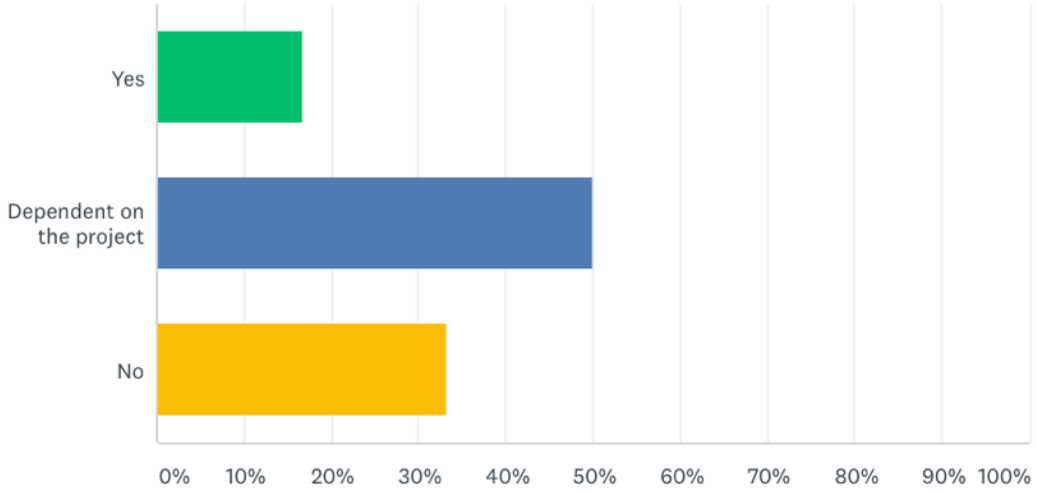


ANSWER CHOICES	RESPONSES	
Yes	50.00%	3
No	50.00%	3
TOTAL		**6**

Q11

Do you coordinate PAM efforts with other developers in adjacent areas?

Answered: 6 Skipped: 0

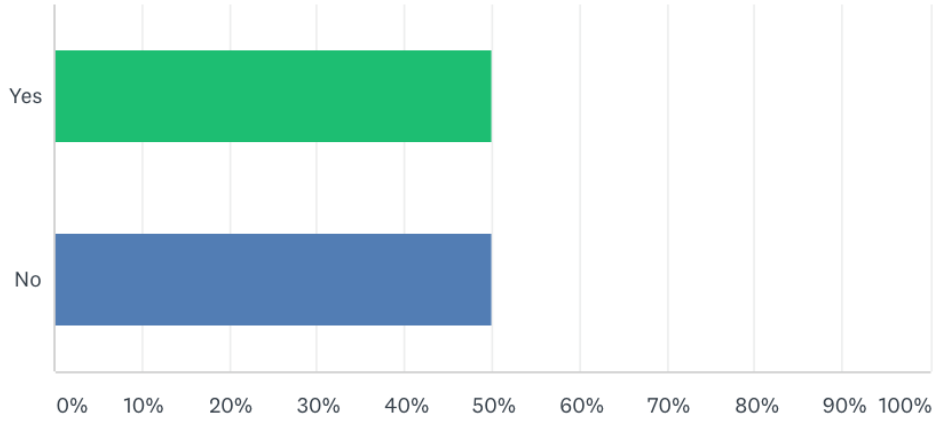


ANSWER CHOICES	RESPONSES	
Yes	16.67%	1
Dependent on the project	50.00%	3
No	33.33%	2
TOTAL		**6**

Q12

Do you have a clear sense of where you want to store, share, or provide data that is collected by you for others such as agencies, academics, or the like?

Answered: 6 Skipped: 0

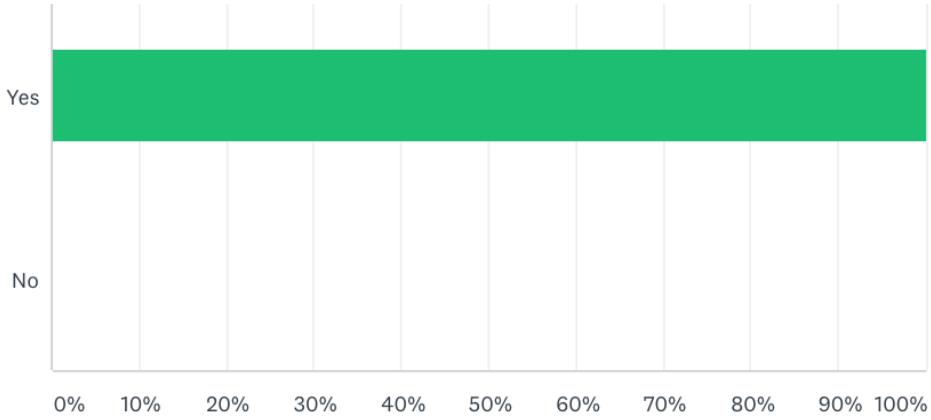


ANSWER CHOICES	RESPONSES	
Yes	50.00%	3
No	50.00%	3
TOTAL		**6**

Q13

Are there ways that data synthesis and/or integration of multiple datasets within the NYB would be helpful for your understanding of marine mammals?

Answered: 6 Skipped: 0

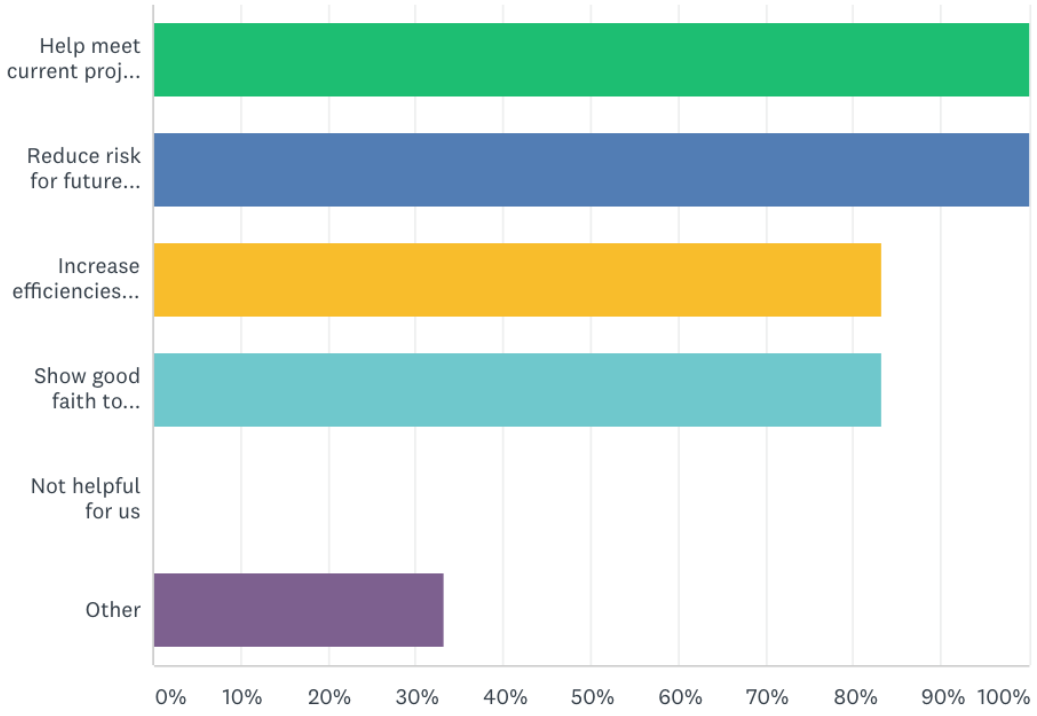


ANSWER CHOICES	RESPONSES	
Yes	100.00%	6
No	0.00%	0
TOTAL		**6**

Q14

If yes, how would data synthesis and/or integration of multiple datasets within the NYB be of value to you?

Answered: 6 Skipped: 0

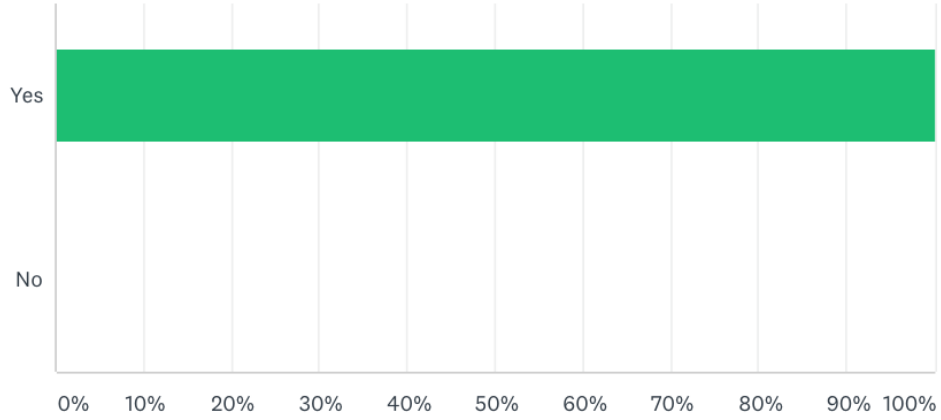


ANSWER CHOICES	RESPONSES	
Help meet current project requirements	100.00%	6
Reduce risk for future projects	100.00%	6
Increase efficiencies and potentially lower costs	83.33%	5
Show good faith to stakeholders and regulators	83.33%	5
Not helpful for us	0.00%	0
Other	33.33%	2
Total Respondents: 6		

Q15

Would you value a more coordinated PAM data synthesis effort within the NYB ?

Answered: 6 Skipped: 0

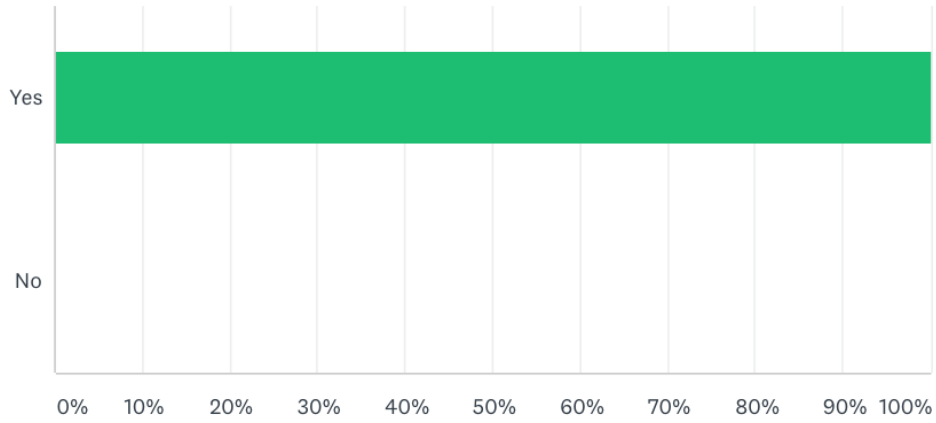


ANSWER CHOICES	RESPONSES	
Yes	100.00%	6
No	0.00%	0
TOTAL		**6**

Q16

Would you value a more coordinated PAM data synthesis effort at wider regional levels?

Answered: 6 Skipped: 0

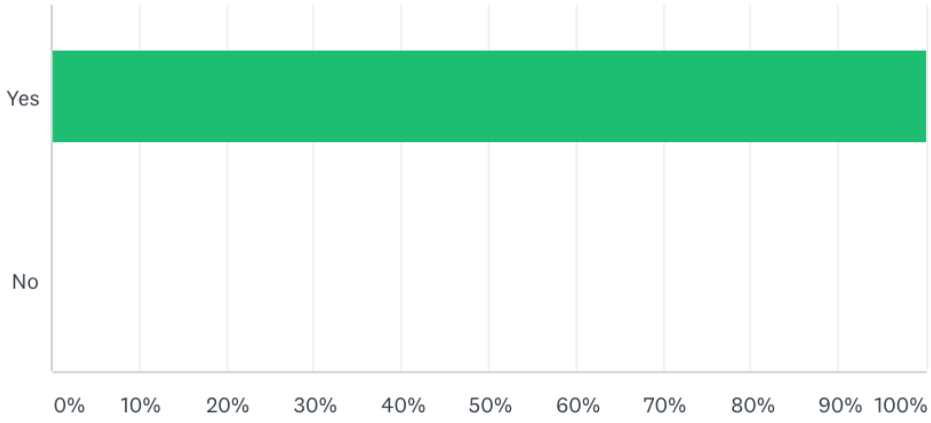


ANSWER CHOICES	RESPONSES	
Yes	100.00%	6
No	0.00%	0
TOTAL		**6**

Q17

Would you value a coordinated PAM network moving forward within the NYB?

Answered: 6 Skipped: 0

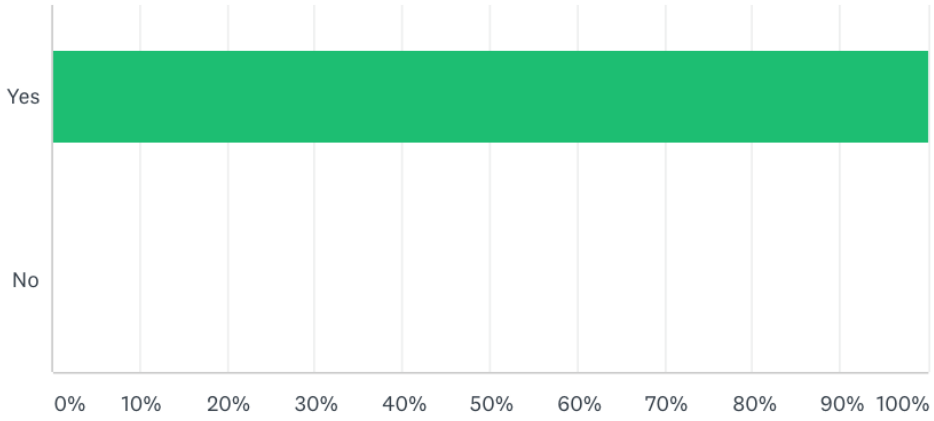


ANSWER CHOICES	RESPONSES	
Yes	100.00%	6
No	0.00%	0
TOTAL		**6**

Q18

Would you value a coordinated PAM network moving forward at wider regional levels?

Answered: 6 Skipped: 0

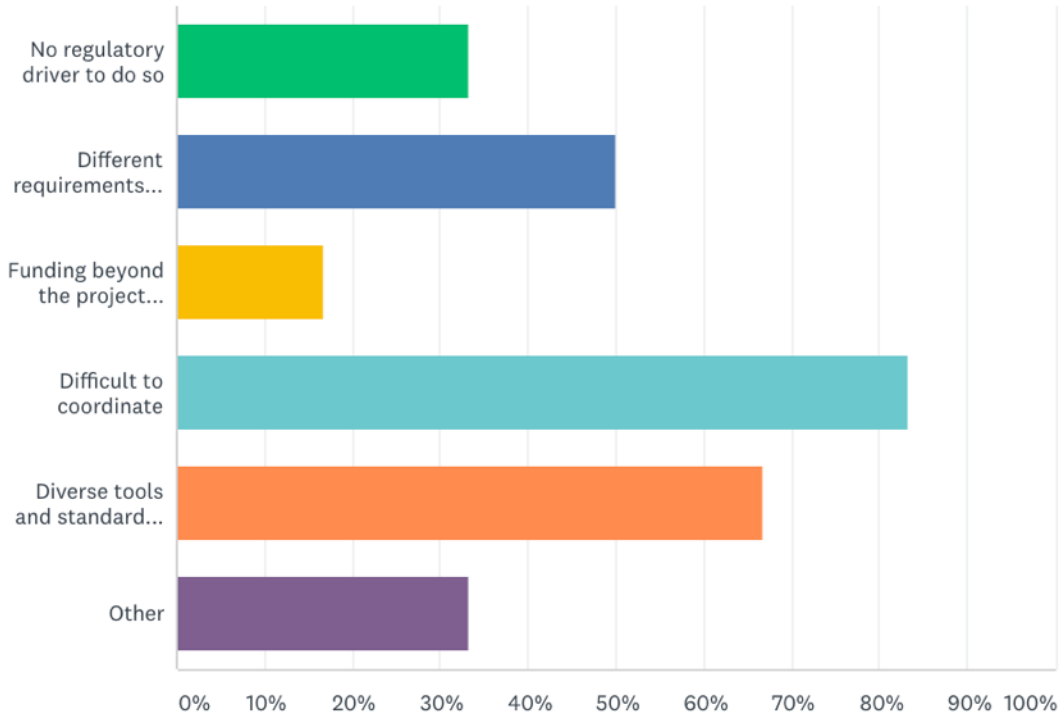


ANSWER CHOICES	RESPONSES	
Yes	100.00%	6
No	0.00%	0
TOTAL		**6**

Q19

What do you think are the barriers to a regional scale PAM project?

Answered: 6 Skipped: 0



ANSWER CHOICES	RESPONSES	
No regulatory driver to do so	33.33%	2
Different requirements by different state and federal agencies	50.00%	3
Funding beyond the project scale	16.67%	1
Difficult to coordinate	83.33%	5
Diverse tools and standards that are hard to align	66.67%	4
Other	33.33%	2
Total Respondents: 6		