Welcome to the 2022 Northeast Regional Environmental Acoustics Symposium

Hosted by the Center for Acoustics Research and Education (CARE)
University of New Hampshire

May 2-3, 2022

Memorial Union Building Granite State Room, 2nd Floor

University of New Hampshire

SCHEDULE AT A GLANCE

Monday, May 2 (Symposium)
8:30-9:00: Breakfast (provided)
9:00-9:15: Introductions
9:15-10:00: Keynote Speaker Ian Agranat
10:00-10:15: Break
10:15-12:00: Oral Presentations
12:00-13:30: Lunch (provided)
13:30-14:15: Oral Presentations
14:15-15:00: Keynote Speaker Dr. Tom Drake
15:00-15:15: Transitional Remarks
15:15-15:30: Break
15:30-16:30: Poster Session
16:30- End: Happy Hour @ Hop + Grind

Tuesday, May 3 (Career Workshop)
8:30-9:00: Breakfast (provided)
9:00-9:15: Introductions
9:15-10:15: Career Representative Introductions
10:15-10:30: Break
10:30-12:00: Round Robins
12:00- 12:15: Closing Remarks
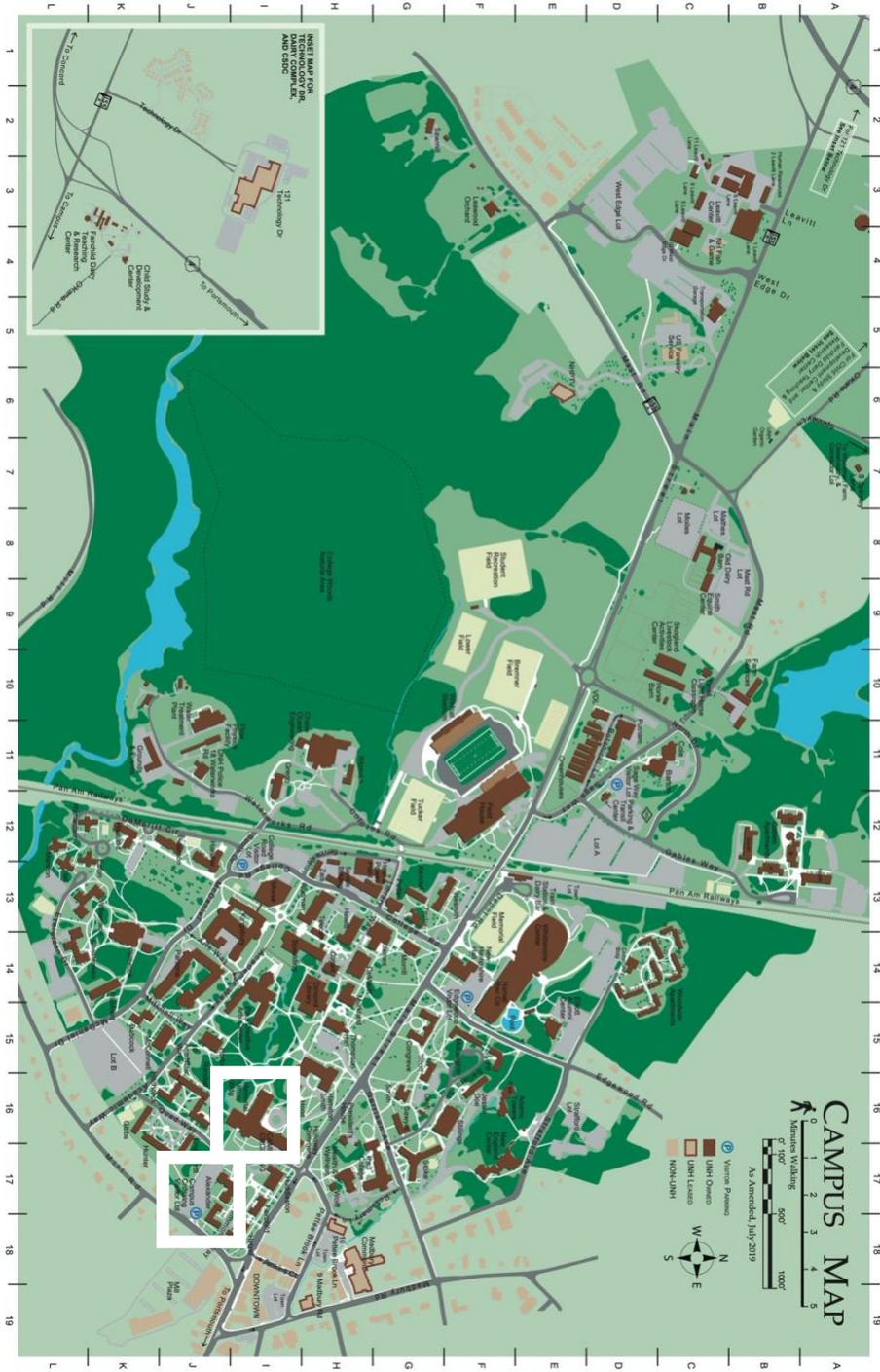12:15-13:00: Lunch/Posters

PARKING

All workshop participants can park at no cost to you at the Campus Crossing Visitor Lot
(Formerly known as "Mill Road Visitor Lot", or "C-Lot."). The lot is located at Mill Road across
from the Durham Market Place plaza (set GPS for 8 Mill Road).

Your parking code was sent to you via email. If you are having trouble finding it please email
Michelle.Fournet@unh.edu and she will provide it for you.

Approach any kiosk in the lot assigned. Press "Coupon" Button enter code provided above and
hit enter, the machine will verify the code, once the code is verified, press the green button and
receipt will print out. Receipt must be displayed on driver's side dash face up to avoid ticketing

CAMPUS MAP

CAMPUS MAP

As Amended, July 2019

MEMORIAL UNION MAP

Granite State Room

Patio

203

207

EXIT

Grafton Lounge

233

237

Strafford Room

Union Court

236

To Holloway Commons Dining Hall

ID Office

Level 2

Postal Center

Computer Store

EXIT

NH | Memorial Union and Student Activities

Monday, May 2

INTRODUCTIONS: 9:00-9:15

KEYNOTE SPEAKER: 09:15-10:00

Ian Agranat, Wildlife Acoustics, Inc.
Ian Agranat is the founder and CEO of Wildlife Acoustics, Inc., the leading global supplier of bioacoustics technology including sonic and ultrasonic recorders and analysis software for the automated monitoring of wildlife such as birds, frogs, bats and other vocal animals for government agencies, scientists, and environmental consultants worldwide.

BREAK 10:00-10:15

ORAL PRESENTATIONS: 10:15-12:15

Oral Presentation, 10:15-10:30
Identification and Quantification of Mixed Biological Aggregations at the New England Shelf Break

Scott Loranger, Woods Hole Oceanographic Institution

At the New England shelf break, cold, less saline shelf water collides with warmer saltier slope water to form a distinct oceanographic front. During the Office of Naval Research Sediment Characterization Experiment in 2017 (SBEX17) acoustic backscattering from narrowband (18 and 38 kHz) and broadband (70-280 kHz) shipboard echo sounders was used to map the front. Aggregations of biological scatterers were identified near the location where the front meets the seafloor. Bottom trawl net surveys conducted by the New England Fisheries Science Center, in conjunction with acoustic backscatter measuremens, were used to identify the most likely scatterers in the aggregation as longfin squid (Doryteuthis pealeii) and mackerel (Scomber scombrus). A mixed population scattering model, capable of acoustically identifying the length distribution of each species was developed. The acoustically determined length distribution for squid was narrower than the trawl distribution, however the means differed by only 1 cm. The trawl estimates of length distribution overcounted the largest mackerel resulting in a smaller mean length (20.3 cm) for each of the ten transects compared with the trawl distribution (22.8 cm). The acoustically determined biomass was a factor of 1.64 times larger when using the acoustically determined length distribution compared to the trawl distribution of lengths.

Oral Presentation, 10:30-10:45
Spatial Bioacoustics: Improving Soundscape Analysis with a Co-located Microphone Array

Irina Tolkova, Harvard University

The integration of passive acoustic sensors with machine learning enables large-scale, low-cost, non-invasive monitoring of vocal animals. A remaining challenge to the successful deployment of such monitoring systems is low classification accuracy over complex real-world soundscapes composed of overlapping calls and variable noise patterns. In this talk, I will present an algorithmic pipeline for using a co-located microphone array to (1) estimate acoustic direction-of-arrival, (2) distinguish individual sound sources in the environment, and (3) approximate their frequency- and time-domain signals. To evaluate this approach, I analyze recordings collected at two wildlife refuges during the dawn chorus in late spring, when birds are most vocally active. I significantly improve species-level performance metrics by applying source separation to the recordings prior to classification with the BirdNET network. Furthermore, this approach opens possibilities for additional spatiotemporal analysis of soundscapes, including the ability to visualize movement and perform directional filtering.

Oral Presentation, 10:45-11:00
Quantifying fish abundance in a regularly-occurring, tourist-attracting sardine school in Moalboal, Philippines

Joseph Warren, Stony Brook University

The nearshore region of Moalboal, Philippines is home to a large school of fish that appears regularly enough that it supports multiple snorkel- or dive-with-the-fish companies. These fish are also fished by locals for sale or sustinance. Social media accounts report that the school contains 1 million fish, but that estimate is not based on any data. We used diver surveys, a split-beam 120 kHz echosounder to estimate the size of the school and the numerical density of fish contained within it. Our collaborators also researched the economic value of these fish as a fishery and as a tourist attraction which can provide guidance to local communities, businesses, and fishery management agencies.

Oral Presentation, 11:00-11:15
Bayesian Ocean-Bathymetry-Seabed inversion using Gaussian Mixture Models and Dynamically Orthogonal Parabolic Equations

Wael Ali, Department of Mechanical Engineering, MIT

Accurate underwater acoustic propagation in shallow water requires precise knowledge of the ocean physics, bathymetry, and seabed geoacoustic parameters. However, in realistic ocean applications, such information is typically incomplete due to the complex ocean physics and the expensive, and often laborious, measurement procedures required for direct sampling of the vertical and lateral variability of the ocean and the seabed. Reliable acoustic predictions thus require efficient techniques for quantifying these uncertainties and extracting all the pertinent information about the ocean-bathymetry-seabed environment using the available ocean-acoustic measurements. In this work, we present stochastic partial differential equations (PDEs) that predict stochastic acoustic waves and their probability distributions resulting from the ocean-bathymetry-seabed environmental uncertainties. This is done by extending our optimal range-dynamic uncertainty quantification methodology, the Dynamically Orthogonal Parabolic Equations, for the stochastic parabolic equation with arbitrary fluid and elastic sediment layers.

We also present our nonlinear Bayesian learning algorithms that use Gaussian Mixture Models to jointly infer the ocean physics, bathymetry, and the seabed geoacoustic parameters (e.g. number of sediment layers, density, sound speed, attenuation). We showcase the developed techniques for a collection of benchmark problems proposed for geoacoustic inversion and learning, highlighting their advantages in realistic ocean examples.

Oral Presentation, 11:15-11:30
Quantifying and modeling the effects of internal waves on synthetic aperture sonar

Nicholas La Manna, University of New Hampshire Center for Coastal and Ocean Mapping

Synthetic aperture sonar (SAS) beamforming often operates under the assumption of constant sound speed, or more rarely a constant sound speed profile. Water column features such as internal waves or boluses have a three dimensional spatial sound speed structure different than that assumed. The assumption of an incorrect 3D sound speed field will affect the precise timing required to produce a well-focused and sharp image during the beamforming process. The defocusing caused by such water column features manifests as a degradation of the sonar's optimal resolution, the magnitude of which can be quantified using an estimate of the point spread function (PSF). Utilizing data collected by the Norwegian Defence Research Establishment (FFI), a point scatterer detection scheme was applied in conjunction with an ellipse fitting technique to yield an approximation of the PSF. In an effort to model the observed effects of internal waves on SAS resolution, two methods were applied including ray tracing and beamforming over artificial echo data. It is hoped that the modeling can be utilized in conjunction with collected SAS data to invert for water column properties via estimates of the effects on the PSF.

Oral Presentation, 11:30-11:45
Experimentally validated target strength models for northwest Atlantic mesopelagic fish

Brandyn Lucca, School of Marine and Atmospheric Sciences, Stony Brook University

Mesopelagic fish are a crucial trophic link between epipelagic primary production and deeper-dwelling organisms. Active acoustic surveys provide synoptic measurements of abundance and/or biomass of marine organisms at fine-scale spatiotemporal scales. The target strength (TS) of an organism can be used to convert acoustic measurements to numerical densities of organisms, and in some cases may provide information on scatterer-type such as fish with or without swim bladders. Few studies have measured the TS and TS model input parameters (e.g. material properties) from individual mesopelagic fish. We captured mesopelagic fish (n = 2645) from IKMT midwater net tows (n = 69) over five cruises in the northwest Atlantic aboard the R/V Neil Armstrong and R/V Endeavor between 2017 and 2020 consisting of primarily Gonostomatidae (n = 2275) and Myctophidae (n = 1019). We measured fish flesh density contrasts (n = 208), length (n = 1260), external body shape (n = 917), swimbladder morphology (n = 4), as well measuring experimental TS from tethered individuals (n = 80) in a scientific aquarium. We compared theoretical TS predictions parameterized for individual fish with the tethered TS measurements to assess model performance and sensitivity across frequencies.

Disagreement between measured and model TS was highest between 50 and 75 kHz for swimbladdered fish where backscatter resonance peaks were predicted. Conversely, swim bladderless fish had greater TS variability at 130-210 kHz where sensitivity to changes in tilt angle greatly increases. Validated models provide better information to classify backscatter measurements from hull-mounted narrow- and broadband echosounders which can improve estimates of mesopelagic organism abundance.

Oral Presentation, 11:45:12:00
Exploring relationships between sound pressure and particle motion of deep-water soundscapes

Ian Jones, Center for Acoustics Research and Education, University of New Hampshire

Underwater soundscapes are typically quantified using sound pressure, which mammals and some fishes detect. Yet most sound-sensitive aquatic species, including all fishes, detect particle motion, the back-and-forth vibratory component of acoustic fields. Acoustic studies in deep water often assume particle motion and pressure scale directly with each other, but empirical measurements validating these relationships are rare. I leveraged passive acoustic data from the Atlantic Deepwater Ecosystem Observatory Network (ADEON) to investigate relationships between pressure and particle motion soundscapes, across six deep-water sites (300–900 m) on the U.S. Mid- and South Atlantic Outer Continental Shelf. I analyzed data obtained between November 2017 and June 2018 from stationary hydrophone arrays attached to bottom landers. I quantified pressure and particle motion of 60 s averages of ambient sound (times without anthropogenic sounds) and at times of vessel noise. Most time windows of ambient sound and vessel noise had an approximately 1:1 relationship between pressure and measured particle motion. Particle motion in some time windows far exceeded levels expected based on pressure; potential causes for this will be discussed. Differences of median sound levels across sites were similar for pressure and particle motion. Pressure and particle motion levels across frequencies were further compared with hearing sensitivity curves of several fish species known or suspected to overwinter in the ADEON study region. These analyses suggested that fishes might only be able to detect particle motion of rare, transient sounds above median sound levels. Even when predictable relationships between pressure and particle motion exist, reporting both metrics together is useful to place soundscapes in context with fishes' hearing abilities.

LUNCH: 12:00-13:30 (Provided)

ORAL PRESENTATIONS: 13:30-14:15

Oral Presentation, 13:30-13:45
A geometrical spreading correction for acoustic waves propagating through a water-sediment interface

Shannon-Morgan Steele, Kraken Robotic Systems, Inc.

The sonar equation is a valuable tool for sonar design and development, particularly for predicting the signal to noise ratio (SNR) as a function of range. While there have been plenty of studies modeling sonar performance at the seabed interface and through the water column, there has been very little work focused on modeling down looking mid to low frequency (<50 kHz) sound propagation through a seabed sub-bottom, which is applicable to sensors such as sub-bottom profilers or the PanGeo Acoustic Corer (AC). We have developed a sonar performance model to predict the performance of down looking sonar sensors that includes the standard components of the sonar equation as well as performance parameters specific to synthetic aperture sonars (SAS) and sub-bottom imaging systems such as SAS processing gain and frequency dependent sediment attenuation. We have found our model underpredicts the SNR observed in data collected by the AC. We propose this discrepancy relates to the geometrical spreading term, which is typically assumed to be spherical. Spherical spreading assumes the medium is homogeneous. For the case of sub-bottom imaging this assumption is violated as our problem is effectively a half space with the water-sediment interface acting as a boundary. Alternative geometrical spreading terms (such as cylindrical spreading) have been developed for sound propagation constrained with two boundaries through some combination of sea surface reflection, seabed reflection, or refraction from a sound speed gradient. However, there has been no such treatment for waves propagating through the seabed sediment where the sediment interface acts as a baffle, constraining the wave propagation. Here, we will demonstrate a theoretical basis for a geometrical spreading term for acoustic waves bounded by the seabed. Additionally, preliminary results comparing the performance predicted utilizing this new geometric spreading term to results collected in the field will be presented.

Oral Presentation, 13:45-14:00
Weathering the storm: impacts of hurricane-induced noise on the probability of detecting cetaceans

Aditi Tripathy, University of New Hampshire

Hurricanes Dorian (Category 5; 2019), Florence (Category 4; 2018), and Humberto (Category 3; 2019) impacted the soundscape as observed at the Atlantic Deepwater Ecosystem Observatory Network (ADEON) locations in the US Mid- and South Atlantic Outer Continental Shelf. Passive acoustic data obtained from bottom-mounted hydrophones at the ADEON locations were examined to assess changes in ambient sound before, during, and after hurricane presence. Ambient sound level increased up to 25 dB in the 0.1-7 kHz band which could impact the detectability of cetaceans vocalizing at those frequencies. The probability of detection of fin whales, minke whales, and pilot whales was estimated using empirical ambient sound levels, modelled propagation loss, and pre-defined detection parameters. Detection area, as defined by range of minimum detectability of the cetacean from the receiver, was estimated before, during, and after hurricane presence at each ADEON location. Detection area changed considerably during hurricane presence with site-specific impacts for each of the cetaceans, which may affect estimates of their abundance from passive acoustic recordings. [Study concept, oversight, and funding were provided by ONR Award N00014-16-1-2594 and BOEM under contract Number

M16PC00003, in partnership with ONR and NOAA. Funding for ship time was provided under separate contracts by ONR, Code 32.]

Oral Presentation, 14:00-14:15
Marine Mammal Monitoring on Navy Ranges (M3R) program

Stephanie Watwood, Naval Undersea Warfare Center

The Marine Mammal Monitoring on Navy Ranges (M3R) program uses the Navy's instrumented ranges to monitor the health of populations of marine species that are impacted by Navy training and testing. The M3R program develops algorithms to use passive acoustics to better understand abundance, distribution, behavior, and response to anthropogenic disturbance. The program currently operates on five Navy ranges: the Atlantic Undersea Test and Evaluation Center in the Bahamas, the Jacksonville Shallow Water Training Range off Florida, the Southern California Anti-submarine Warfare Range off California, the Pacific Missile Range Facility off Hawaii, and the Canadian Forces Maritime Experimental and Test Ranges off Vancouver. Recent research and ongoing monitoring results will be discussed.

KEYNOTE SPEAKER: 14:15-15:00

Dr. Thomas Drake, Office of Naval Research
Dr. Drake heads the Office of Naval Research (ONR) Ocean Battlespace and Expeditionary Access Department—one of six science and technology (S&T) departments at ONR. The Ocean Battlespace Sensing Department is responsible for Navy and Marine Corps S&T in ocean and meteorological science, undersea warfare, mine warfare, space technology and marine mammals.

TRANSITIONAL REMARKS: 15:00-15:15

BREAK: 15:15-15:30

POSTER SESSION: 15:30-16:30

Poster 1. Comparing stationary and mobile acoustic backscatter measurements in a shelf-break ecosystem

Hannah Blair, Stony Brook University

Moored echosounder systems are becoming more widely used as tools to study pelagic ecosystems continuously over long time periods. To properly extrapolate these point data sources

to larger areas, one must understand the spatial and temporal variability in both physical and biological processes in the region, particularly for marine habitats. We used the advection of water column scatterers to project temporal backscatter measurements into space to directly compare their correlation patterns. Bottom-mounted, upward-looking echosounders collected duty-cycled 38 kHz backscatter data at three locations along the Mid-Atlantic and southeastern US shelf break from 2017 to 2020. Ship-based surveys (7-10 km2) centered on the stationary echosounders measured 38 kHz backscatter and ADCP current data 1-2 times per year during the study. Virtual "backscatter transects" were created from the moored echosounders for each day or night (6-12 hrs, excluding the hour before and after sunrise and sunset) for a two-week period centered on the ship surveys. Moran's I coefficients calculated for each transect found significant spatial autocorrelation for a similar proportion of both day and night transects, and that autocorrelation was more common at the two Mid-Atlantic sites relative to the southeastern site. There was high variability in similarity between the spatially-derived versus temporally-derived autocorrelation values, and time series analyses indicated larger-scale temporal patterns that may be more dominant. These results demonstrate which spatial and temporal signals are most important for water column scatterers in this highly variable region, over multiple scales. This provides insight into what biological and physical processes drive these patterns, and can increase precision and efficiency of sensor placement and data collection for future studies of pelagic ecosystems in this or similar shelf-break habitats.

Poster 2. Navy Acoustic Effects Model – NAEMO

Cassandra DePietro, US Navy

NAEMO is an advanced modeling and simulation software tool used for assessment of sonar and explosives effects on marine mammals and turtles. It provides a standardized and repeatable process that is used to simulate real world conditions in a virtual ocean environment. Data for environmental conditions, animal placement and movement, and activity requirements are gathered from Navy and non-Navy sources as input to NAEMO. Operational, environmental, and biological inputs combine in the simulation space to re-create the scenario, estimate sound exposures on marine species and predict the number of animals exposed.

Poster 3. Changes in piping plover (*Charadrius melodus*) call rates due to aircraft noise at beach nesting sites in Southampton, New York.

Melissa Leone, School of Marine and Atmospheric Sciences, Stony Brook University

New York's ocean and bay beaches are home to numerous animals including protected shorebirds such as the piping plover (*Charadrius melodus*). Passive acoustic data were collected using SWIFT recorders near plover nesting sites in Southampton, NY during the summers of 2020 and 2021. Overhead aircraft noise (from helicopters, prop and jet planes) were common occurrences in the soundscape of nesting piping plovers. We measured piping plover call rates (calls per minute) before, during, and after aircraft noise events. The highest call rates occurred shortly after the aircraft passed at the majority of nesting sites. Additionally, aircraft type and

occurrence were monitored for three separate weeks throughout the summer to understand daily variability in anthropogenic activity and noise. Aircraft occurrence was typically higher on weekends and during holidays. While piping plovers are typically protected from direct human interactions through fencing off portions of the beach used as nesting areas, these results suggest indirect human activities producing noise may also be affecting these animals.

Poster 4. Investigating Soundscape Attributes and Genetic Material as Sentinel Indicators of the Acoustic Propagation Environment

Grant Milne, University of New Hampshire

Rapidly changing conditions in the Gulf of Maine could create variation in the underwater acoustic propagation environments of coastal habitats. Knowledge of the propagation environment is essential for quantifying uncertainty in the performance of active remote sensing technologies, as well as for maintaining effective communication for marine life that depend on acoustic communication signals. The use of passive acoustic monitoring (PAM) and genetic metabarcoding of seawater samples, separately and combined, provide an opportunity to identify soundscape attributes and genetic signals to serve as sentinel indicators of the propagation environment. A sentinel indicator is a variable that can be measured and monitored that represents a system, process, or key component of the ecosystem that is sensitive to environmental pressures. By identifying sound sources, detecting biota, and predicting substrate composition which contribute to the ambient sound level or attenuation of sound waves, it may be possible to predict the acoustic propagation environment associated with particular coastal habitats. As part of a pilot study over the summer of 2020, sound recordings and water samples were collected and analyzed to determine if PAM and metabarcoding have potential for identifying sentinel indicators of the propagation environment. Analysis of genetic samples collected from Portsmouth Harbor and near the Jackson Estuarine Lab dock revealed that metabarcoding was capable of detecting a broad array of organisms in coastal areas but that larger water sample sizes (>1 L) are required for adequate taxa detection in future research. Soundscape recordings were obtained using a hydrophone deployed in Portsmouth Harbor. Recordings were analyzed to detect variation in the root-mean-square (RMS) sound pressure level (SPL), peak SPL, and kurtosis at different times of day. Similar methods will be applied to data collected in the 2021-2023 field seasons to identify sentinel indicators across multiple coastal habitats in the Gulf of Maine.

Poster 5. Spatial and Temporal Distribution of Possible Deep-sea Fish at AUTEC

Alexander Muniz, NUWC

The presence of deep sea fish, specifically cusk eels, at the Atlantic Undersea Test and Evaluation Center (AUTEC) have likely been detected. Using a dataset that covers a wide temporal distribution, and a spatial sampling that is representative of the entire range (1500 km2), 135 detections of possible deep sea fish were made using a two stage energy detection scheme. The observed signals appeared to be short pulse trains and an event is denoted as signal-

present if the peak signal to noise ratio exceeds a certain set threshold, and there are a set number of peaks above this threshold within a time window. Two types of sounds were detected. Type 1, had a duration of 0.882 +/- 0.227 seconds and peak pulse energy at a frequency of 927 +/- 41.7 Hertz and an inter pulse interval (IPI) of 0.026 +/- 0.005 seconds. Type 2, had a duration of 0.263 +/- 0.031 seconds and peak pulse energy at a frequency of 548 +/- 26.2 Hertz and an IPI of 0.029 +/- 0.006 seconds.

Poster 6. The layer that didn't swim away: broadband acoustic characterization of oceanic stratification structure

Elizabeth Weidner, University of New Hampshire

Much of the upper ocean can be characterized by a series of increasingly dense fluid layers, separated by stratification interfaces where medium properties (e.g. temperature, salinity) change. The intensity of the stratification between layers influences internal mixing dynamics, modulating the vertical transport of heat and dissolved constituents (e.g. nutrients, carbon, oxygen) in the water column. Active acoustic systems have been utilized in a number of studies to continuously track stratification interfaces in the upper ocean and a newly published backscattering model predicts frequency-dependent scattering intensity based on the sharpness of the stratification interface, suggesting a path to remote estimations of physical medium properties through broadband acoustic inversion. Here, we report on a recent broadband acoustic experiment in the Kattegat basin, where there is well-documented salinity-driven stratification. A suite of broadband split-beam echosounders (35-260 kHz) provided water column backscattering data. Acoustic observations were validated using high resolution in-situ observations of water column structure, collected with a CTD (Conductivity, Temperature, Depth) sensor and Moving Vessel Profiler. These data provide the means to develop a method for remote estimation of stratification intensity through broadband acoustic inversion, as well as fine-scale tracking of the spatiotemporal variability in stratification interface position in the water column.

Poster 7. Linear Discriminant Analysis Detection of Rainfall from Broadband Acoustic Signatures

Caroline Mallary, Umass Dartmouth, School of Marine Science and Technology

Rain falling on the ocean surface creates acoustic signals that can be measured by hydrophones. Ma & Nystuen [JAOT, 2005] proposed detecting rainfall events using three discriminant frequencies, then estimating the rainfall amount using the power spectrum at 5 kHz. Relying on only a few frequencies makes this algorithm very sensitive to environmental noise. We propose a rainfall detector exploiting broadband acoustic data, instead of a few discriminant frequencies. We apply order statistics and bandstop filters to mitigate environmental noise, then project the broadband data using a principal component analysis (PCA) trained on subset of the data (the training set). We then perform a Linear Discriminant Analysis (LDA) on the principal component projections to determine whether or not rain fell in a given 3-minute window. We tested our broadband detection algorithm on data recorded from July-December 2021 from

hydrophones located 1 m and 2 m below mean low tide in a noisy cove in New Bedford, MA. Our broadband LDA detector successfully detects $75 \pm 8\%$ of all rain events over 1 mm/hr, with a false alarm rate of 1%. These rain events constitute $84 \pm 9\%$ of the volume of rain which fell during the test set. By contrast, Ma & Nysteun's narrowband algorithm only detected 23% of all rain events over 1 mm/hr, for the same false alarm rate of 1%. [Work supported by ONR MUST Program]

ACOUSTICS CAREER WORKSHOP

SCHEDULE AT A GLANCE

<u>Tuesday, May 3 (Career Workshop)</u>
8:30-9:00: Breakfast (provided)
9:00-9:15: Introductions
9:15-10:15: Career Representative Introductions
10:15-10:30: Break
10:30-12:00: Round Robins
12:00- 12:15: Closing Remarks
12:15-13:00: Lunch/Career Posters

CAREER REPRESENTATIVE PROFILES (*alphabetically*)

Name: Ian Jones

What is the name of the organization that you represent?
        Center for Acoustics Research and Education (CARE), University of New Hampshire

Where are you located? Or where do your employees work?
            UNH campus, Durham, NH

What are the three technical skills that are most valuable for finding a position with your organization?
        1) experience in collection, processing, and analysis of acoustic data (passive or active);
        2) coding/programming skills; 3) ability to write research papers independently

What type of projects would an employee with a focus in acoustics work on with your organization?
        Projects can vary widely depending on funding that CARE faculty (or postdocs themselves) have, but may include: passive acoustic monitoring of aquatic or terrestrial habitats, underwater active acoustics, physical acoustic propagation, animal bioacoustics (physiology and behavior), developing automated detectors for soundscape data, and more.

What level of education is required for a position with your organization?
        PhD

Describe a typical day at your organization?
        Many days involve computer work coding, analyzing, or writing up acoustic data analyses into scientific papers. Other days may involve planning for, or conducting experiments or data collection either in the lab or field. Some time will be dedicated to

applying for funding, and presenting at conferences. It is difficult to define one "typical day", as tasks are highly dependent on a particular research project, and what stage of that project you are at.   "CARE is highly interdisciplinary, so if I am having trouble with facets of acoustics I am not an expert in, I have colleagues and mentors nearby I can reach for advice.

Describe some of your favorite parts of your position or organization?
UNH has many professional development resources and offices (e.g., for grant writing) that can help postdocs better prepare themselves to pursue faculty positions. "

Do you offer summer internships?
Maybe

What is your organization's website?
https://eos.unh.edu/center-acoustics-research-education

Do you intend to hire in the next year?
Maybe

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
Email current faculty to ask if they have (or will have) openings for new postdocs or faculty: https://eos.unh.edu/center-acoustics-research-education/people

Name: Laura Kloepper

What is the name of the organization that you represent?
> Academic Institution, University of New Hampshire

Where are you located? Or where do your employees work?
> Durham, NH

What are the three technical skills that are most valuable for finding a position with your organization?
> Research experience including grant funding, publication record, teaching experience

What type of projects would an employee with a focus in acoustics work on with your organization?
> Using acoustics to understand animal behavior or using acoustics to aid in animal conservation

What level of education is required for a position with your organization?
> PhD

Describe a typical day at your organization?
> I don't have a typical day! Typically my workload is split into 35% teaching, 45% research, and 20% service, but that can vary from day to day. Most of my academic year research is spent analyzing data at my computer. Summer time is typically 100% research, often with fieldwork and working closely with students and collaborators in hands-on science.

Describe some of your favorite parts of your position or organization?
> The best part about my job is that for the most part I get to decide what to do. I get to choose to teach classes I'm interested in, write grants for and pursue research that excites me, and share that excitement with students and the public. I only pursue research ideas that energize me, and I'm continually amazed that I get paid to do something I truly love to do. It never feels like work to me.

Do you offer summer internships?
> Yes

What is your organization's website?
> https://laurakloepper2.wixsite.com/ecological-acoustics

Do you intend to hire in the next year?
> Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
> Email contact

Name: Jill Lewandowski (*absent, but available by email for questions*)

What is the name of the organization that you represent?
> Bureau of Ocean Energy Management

Where are you located? Or where do your employees work?
> Washington, DC area; also offices in Louisiana, California and Alaska

What are the three technical skills that are most valuable for finding a position with your organization?
> We are a diverse organization and hire lots of technical backgrounds, such as oceanographers (bio, chemical, physical), biologists, ecologists, social scientists, archaeologists, economists, engineers, meteorologists, geologists, and specialists in climate change, historic preservation, environmental justice, tribal coordination. We also have a Center for Marine Acoustics which hires bioacousticians and physical acousticians (mainly modelers). Aside from the technical background, we also look very seriously at capabilities related to engaging positively with external parties and being part of a team.

What type of projects would an employee with a focus in acoustics work on with your organization?
> Projects depend on a person's specific background. Most everyone works on multiple projects so get variety but need good time management. Projects may range from model development (we are building our own model) to ground-truthing third party modeling; writing technical papers and peer-reviewed publications; identifying research needs and working with BOEM's Environmental Studies Program to realize these needs; working to develop and test effective mitigation and monitoring programs; and engaging with a variety of affected stakeholders (other government agencies, environmental organizations, industry, academia and research entities)>

What level of education is required for a position with your organization?
> It depends on person's experience but a masters or doctorate is highly recommended for BOEM's Center for Marine Acoustics.

Describe a typical day at your organization?
> We generally work a 40 hour week with mostly daytime hours. Staff have lots of flexibility with start/end times and also telework. A portion of the day is spent in meetings (no way around that one!) but most of the day should be project work, sometimes independent but often group work.

Describe some of your favorite parts of your position or organization?
> (1) BOEM is a small agency and the Center for Marine Acoustics is fairly autonomous. Allows for a fair amount of driving your own future and projects despite the bureaucratic nature of government. (2) BOEM is very interdisciplinary, and you get to learn from lots of other folks with differing expertise. (3) About 2/3 of BOEM staff are technical and decision depend largely on science but also consider needs and recommendations from

affected stakeholders. Federal government is an ideal spot to really affect change.

Do you offer summer internships?
> Maybe

What is your organization's website?
> https://www.boem.gov/ and https://www.boem.gov/center-marine-acoustics

Do you intend to hire in the next year?
> Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
> Check USAJObs.gov regularly. Can search for BOEM jobs. Can always reach out to Center for Marine Acoustic staff through boemacoustics@boem.gov.

Name: Meme Lobecker

What is the name of the organization that you represent?
Kongsberg Underwater Technology LLC

Where are you located? Or where do your employees work?
I am in Kittery, ME. Kongsberg has ~7,000 employees distributed globally.

What are the three technical skills that are most valuable for finding a position with your organization?
Knowledge of the scientific, military, and commercial applications of subsea acoustics and related technologies. Knowledge of designing/improving/supporting these systems to suit customer needs.

What type of projects would an employee with a focus in acoustics work on with your organization?
Designing, improving, and/or supporting subsea acoustics systems like mulitbeam and split beam echosounders, synthetic aperture sonars, and underwater positioning systems.

What level of education is required for a position with your organization?
Bachelor's Degree

Describe a typical day at your organization?
Collaborate with and support sonar users, make technical visits to ships.

Describe some of your favorite parts of your position or organization?
I enjoy supporting and tracking the scientific community utilizing acoustic data in their work.

Do you offer summer internships?
Maybe

What is your organization's website?
www.kongsberg.com

Do you intend to hire in the next year?
Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
Email me to give me a heads up you have applied online.

Name: Joel MacAuslan

What is the name of the organization that you represent?
STAR Analytical Research

Where are you located? Or where do your employees work?
Lexington, MA

What are the three technical skills that are most valuable for finding a position with your organization?
Linear algebra, general mathematical analysis, MATLAB programming

What type of projects would an employee with a focus in acoustics work on with your organization?
blind source separation, coherent source removal (esp. industrial), knowledge-based+ML source classification (esp. for medical), source tracking/moving source suppression (esp. for persons or wildlife)

What level of education is required for a position with your organization?
We have uses for all levels of technical education

Describe a typical day at your organization?
Some technical reading and algo development, conversations with team members and clients (who are very savvy, BTW!), planning for future federal projects, testing and data analysis. And lunch is a high point. ;-)

Describe some of your favorite parts of your position or organization?
I work exclusively with people I like, trust, and respect. And we can get very creative for projects that benefit the outside world.

Do you offer summer internships?
Maybe

What is your organization's website?
STARanalyticalservices.com

Do you intend to hire in the next year?
Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
Email.

Name: Jessica McCordic

What is the name of the organization that you represent?
Integrated Statistics, Inc. under contract to the Passive Acoustics Research Group, NOAA/NEFSC

Where are you located? Or where do your employees work?
Woods Hole, MA, USA

What are the three technical skills that are most valuable for finding a position with your organization?
Data management, coding skills, familiarity with acoustic analysis tools

What type of projects would an employee with a focus in acoustics work on with your organization?
Long-term acoustic monitoring projects focused on behavior and distribution of marine species, anthropogenic noise impacts, and/or soundscape ecology

What level of education is required for a position with your organization?
It depends on the individual's lived experience

Describe a typical day at your organization?
Most of the work is office-based and varies greatly depending on position and project. Typical tasks could include browsing spectrograms or running automated detectors for signals of interest, reviewing output of detectors, running software or custom scripts to generate ambient noise metrics, and writing scripts in R or Matlab to analyze data and create figures based on outputs from other analysis tools. Apart from project-specific tasks, there are opportunities for other types of work including outreach events or occasional fieldwork to retrieve and/or deploy recorders.

Describe some of your favorite parts of your position or organization?
I enjoy working with such a supportive group of scientists doing a wide variety of research projects within the scope of passive acoustic monitoring. I also appreciate that we are encouraged to take ownership of projects and communicate our research, including reports, manuscripts, conferences, and outreach events.

Do you offer summer internships?
Maybe

What is your organization's website?
https://www.fisheries.noaa.gov/new-england-mid-atlantic/endangered-species-conservation/passive-acoustic-research-atlantic-ocean

Do you intend to hire in the next year?
Maybe

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?

Online application via Integrated Statistics, Inc. (current contract company for the Protected Species Branch at NEFSC), www.usajobs.gov for federal positions, or contact group members (emails available on group website)

Name: Shannon Steele

What is the name of the organization that you represent?
    Kraken Robotics

Where are you located? Or where do your employees work?
    Kraken is primarily based in Newfoundland, Canada; however, I work in our Nova
    Scotia, Canada location. We also have offices in Toronto, Germany, Brazil, Scotland, and
    individuals in the USA.

What are the three technical skills that are most valuable for finding a position with your organization?
    Strong problem solving ability (i.e., demonstrated research experience), well developed
    programming experience, and understanding of acoustic theory/ signal processing.

What type of projects would an employee with a focus in acoustics work on with your organization?
    As a sonar scientist my focus is largely in research and development. This includes
    modelling and designing new sonar systems, improving image and signal processing,
    developing computer vision techniques, attending conferences, and writing papers. I also
    act as an internal resource for the company. If the survey/field or engineering teams are
    having issues with any of our acoustic systems they can contact me to help them
    diagnose/interpret and further analyze the data. I also provide feedback and assistance
    with writing reports and proposals when sonar expertise is required.

    The survey team is also a possible career option in our company for those interested in
    ocean mapping/acoustics. Members of the survey team spend much of their time on a
    boat (both near shore and out at sea) testing our systems and conducting surveys. When
    they are in the office they focus on analyzing the collected data, writing reports, and
    preparing for future surveys.

What level of education is required for a position with your organization?
    Currently, all members of the science team have a Master's or PhD. This isn't a strict
    requirement, we value most an individual's skills and experience; however I do think the
    skill set required to join the Science team is most easily attained through graduate
    programs. For a surveyor position we typically require a degree or diploma in
    hydrography, ocean mapping, geoscience/geophysics, or another related field.

Describe a typical day at your organization?
    I spend most of my time at my work station conducting R&D. So a typical day for me is
    quiet but highly focused on technical problems. A portion of my time is often devoted to
    supervising co-op or PhD students who are contributing to projects I lead. Outside of that
    I may be communicating results at various project update meetings or conferences.

Describe some of your favorite parts of your position or organization?

My favourite part of my job is getting to do science all day every day. In general I'd say the primary advantage of working in Industry R&D is you get to focus on research instead of balancing it with the administrative and teaching duties that come along with other research focused careers such as a professor. The reason why I love being a scientist at Kraken is because I get lots of freedom to work on interesting and challenging problems at a company that highly values innovation. I really enjoy the work-life balance I've achieved at Kraken. While I do spend some of my personal time working on Kraken projects, I'm doing it because I am passionate about what I do, not because I feel obligated to.

Do you offer summer internships?
Yes

What is your organization's website?
https://krakenrobotics.com/

Do you intend to hire in the next year?
Maybe

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
If we have applicable listings online that is the best way to pursue a position on the survey/field team. The science team doesn't typically advertise acoustics related positions, mostly because the skills required for a sonar scientist are rare and difficult to find. If you think you would make a good fit for the Kraken team feel free to email us with a cover letter and resume.

Name: Peter Stein

What is the name of the organization that you represent?
   Scientific Solutions, Inc. / Portland Applied Research Laboratory

Where are you located? Or where do your employees work?
   Portland, Maine

What are the three technical skills that are most valuable for finding a position with your organization?
   Communications, passion, self motivation

What type of projects would an employee with a focus in acoustics work on with your organization?
   All aspects of designing and implementing distributed sonar systems

What level of education is required for a position with your organization?
   It depends on the individual's lived experience

Describe a typical day at your organization?
   There is no typical day

Describe some of your favorite parts of your position or organization?
   The combination of basic and applied research conducted that covers all aspects of ocean engineering and underwater acoustics research and system implementation.

Do you offer summer internships?
   Maybe

What is your organization's website?
   www.scisol.com

Do you intend to hire in the next year?
   Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
   Talk with Dr. Peter Stein

Name: Crystal Tanguay

What is the name of the organization that you represent?
Naval Undersea Warfare Center (NUWC), Division Newport

Where are you located? Or where do your employees work?
Newport, RI

What are the three technical skills that are most valuable for finding a position with your organization?
Critical Thinking, Communication, Programming (Matlab is heavily used),

What type of projects would an employee with a focus in acoustics work on with your organization?
Analysis, System Design, Test and Evaluation, Prototyping

What level of education is required for a position with your organization?
Bachelor's Degree

Describe a typical day at your organization?
This is a tough question to answer. There are so many different types of jobs here that there is no true typical. We have some folks who will spend the majority of their time in a lab working on classified material, others who are traveling to support the fleet, there are also those who will be planning out the implementation of new software systems being installed on Navy platforms. These are just a few of the different types of jobs happening at NUWC, but there are so many more.

Describe some of your favorite parts of your position or organization?
Work life balance: Here at NUWC one of the most important things that I can't stress enough, is the work life balance. Employees are encouraged to stay within a 40 hour work schedule and will be compensated for time worked past the 40 hours. We also are encouraged to take our leave so that it doesn't go to waste.

Travel: Many of my coworkers and I have been able to travel to numerous destinations while helping the fleet. This includes trips to places such as Hawaii, Japan, Bahamas, Australia, and many other locations!

Do you offer summer internships?
Yes

What is your organization's website?
https://www.navsea.navy.mil/Home/Warfare-Centers/NUWC-Newport/

Do you intend to hire in the next year?
Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?

        email: crystal.a.tanguay.civ@us.navy.mil

Name: Joe Warren

What is the name of the organization that you represent?
Stony Brook University

Where are you located? Or where do your employees work?
Long Island, New York

What are the three technical skills that are most valuable for finding a position with your organization?
programming ability, experience with net tow analysis, at-sea or other research experience

What type of projects would an employee with a focus in acoustics work on with your organization?
At sea data collection, analysis of acoustic data

What level of education is required for a position with your organization?
Depends on position (post-doc, research technician) Depends on if at-sea or in the lab.

Describe a typical day at your organization?
Most days are pretty different. Time management (multiple concurrent tasks) is critically important.

Describe some of your favorite parts of your position or organization?
Location. Opportunity to conduct field work.

Do you offer summer internships?
Maybe

What is your organization's website?
www.stonybrook.edu

Do you intend to hire in the next year?
Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
Email contact with potential supervisor(s)

Name: Stephanie Watwood

What is the name of the organization that you represent?
Naval Undersea Warfare Center Division Newport

Where are you located? Or where do your employees work?
Newport, RI

What are the three technical skills that are most valuable for finding a position with your organization?
acoustics, program management, oceanography

What type of projects would an employee with a focus in acoustics work on with your organization?
sound propagation, sonar design and use, hydrophone range design, marine mammal bioacoustics

What level of education is required for a position with your organization?
Bachelor's Degree

Describe a typical day at your organization?
Depends on whether in the field or on base or teleworking!

Describe some of your favorite parts of your position or organization?
Ability to travel, work with scientific community all over the world, work on real world problems

Do you offer summer internships?
Yes

What is your organization's website?
https://www.navsea.navy.mil/Home/Warfare-Centers/NUWC-Newport/ (but it is not very informative or useful)

Do you intend to hire in the next year?
Yes

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
Personal email, hiring fairs held throughout the year

Name: Andrew White

What is the name of the organization that you represent?
BAE Systems, FAST Labs

Where are you located? Or where do your employees work?
 Merrimack NH, Burlington MA, Arlington VA

What are the three technical skills that are most valuable for finding a position with your organization?
 Programing experience, electronic systems experience, and mechanical hardware and packaging

What type of projects would an employee with a focus in acoustics work on with your organization?
 Component, subsystem, and system research and development

What level of education is required for a position with your organization?
 It depends on the individual's lived experience

Describe a typical day at your organization?
 This will depend on the phase of a project. I see programs with three major phases where there is planning, integration, and testing. Planning typically consists of desk work and systems design. Integration will involve new hardware on a simulation bench. Testing takes place on ocean going vessels of all sizes for varying periods of time. I work several projects a year so I see a lot of change week to week.

Describe some of your favorite parts of your position or organization?
 The resources we have available are wide reaching including the financial ability of the company to conduct internal research and developments as well as the cumulative knowledge available. Getting to do field work is always an opportunity right around the corner.

Do you offer summer internships?
 Yes

What is your organization's website?
 https://www.baesystems.com/en-us/productfamily/fast-labs--advanced-technology-and-defense-r-d?msclkid=655c0a04c57b11ec811f62669e545b7d

Do you intend to hire in the next year?
 Maybe

What is the best way to pursue a position with your organization (e.g., e-mail contact, online application)?
 https://jobs.baesystems.com/fastlabs