



**SouthEast Acoustics Consortium
Report 2014**

**Report of the Biennial Workshop
and Consortium Activities**

**1-3 April 2014
Gulf Coast State College
Panama City, Florida**

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Executive Summary

The SouthEast Acoustics Consortium (SEAC), formed in 2012, is a regional collaboration of academic institutions, Federal and State fisheries and environmental management agencies, and private industry which focuses on advancing the use of active acoustics for studying the coastal and marine environments. The second biennial SEAC workshop was held at the Gulf Coast State College Advanced Technology Center and the NOAA NMFS Laboratory in Panama City, Florida from 1-3 April 2014. Four primary topic sessions were organized over two days of presentations and discussions, to address coastal ecosystem research and management needs for Atlantic, Gulf and US Caribbean coastal regions. Each day began with a keynote speaker, followed by a total of 19 presentations from 13 organizations. The primary topics included:

- Regional habitat mapping
- Using acoustics to survey fishes in shallow waters
- Using acoustics to survey fishes in deep/offshore waters
- Emerging technologies in active acoustics

Habitat Mapping sessions reviewed multibeam, sidescan, and lower-cost sidescan sonar technologies. Topics incorporated both identifying and quantifying underwater habitats, with common discussion themes including the mitigation of survey and equipment costs and the feasibility of addressing multiple research questions with the same data source.

The topic sessions on detecting fishes in shallow and deep water shared a common theme of identifying advantages and challenges of using active acoustics in coastal marine ecosystem assessments. Talks ranged from fine-scaled observations of fish behavior in tidal estuaries to the distribution of fish biomass on reefs at a range of spatial scales. Several presentations described combined survey approaches that paired splitbeam or multibeam echosounders and other observation methods (e.g., trawl or optical) to derive biomass estimates. Species classification methods discussed included broadband acoustic scattering at frequencies near swimbladder resonance, and high-frequency and multifrequency modeling approaches. Additionally, a review was presented on the development of a standard data management system by NOAA to archive watercolumn/midwater data from fishery sonars.

Presentations on emerging technologies provided updates and new technologies available from manufacturers. Wideband echosounder and sidescan advancements were discussed, as well as novel data processing techniques for fisheries acoustics and sidescan data.

The SouthEast Acoustics Consortium continues to grow membership, interest, expertise and advance in research and development in acoustic technologies to achieve coastal ecosystem management needs.

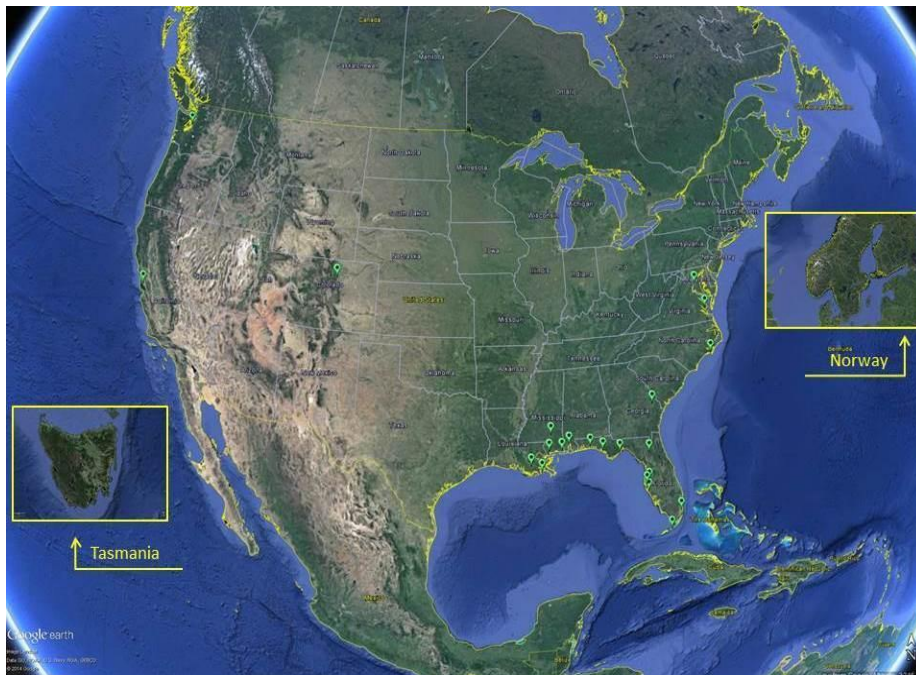
Workshop Participation

1. Opening of the 2014 Workshop

The 2014 SEAC Workshop began with a welcome from the organizing group and the hosting organization, Gulf Coast State College. The organizers noted the generous contributions of the sponsors and explained the schedule and primary goals of the workshop. The first day opened with 43 participants from 25 different organizations, from 10 different states and three countries.



Group picture of SEAC 2014 participants.



Map of participants for the 2014 SEAC Workshop

2. Topic Session Themes with Abstracts:

2.1 Keynote Address: Rick Love - Biological Scattering from a Naval Perspective

TITLE: A Very Brief, Very Biased Description of Biological Scattering from a Naval Perspective

AUTHOR: Rick Love

AFFILIATION: BayouAcoustics

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ABSTRACT: Acoustic scattering by fish can interfere with the detection and classification of man-made targets by Naval active sonars. Hence, the Navy has been interested in scattering from fish; both dispersed and schooled fish. Although the Navy and fisheries researchers have similar interests, the perspectives of the two groups differ significantly. This presentation describes the Navy's perspective on scattering from fish and briefly describes Navy research on scattering since the mid-20th century. Examples of several aspects of this research will be illustrated with work done by the speaker.

2.2 Habitat Mapping

Topic summary - Habitat Mapping

Habitat mapping was a new topic session in the 2014 workshop. But as was recognized during four 2014 presentations, acquiring quantitative information about underwater habitats is a critical component of fisheries survey design, stock assessment, ecological research, and marine spatial planning that is gaining importance. Here SEAC members bridged aspects of hydrography and biology, demonstrating the use of four active acoustic technologies in environments ranging from coastal rivers to coral reefs. Common discussion themes included the mitigation of survey and equipment costs, and addressing multiple research questions with the same data source.

Abstracts

TITLE: Hard bottom habitat mapping in the Northeast Gulf of Mexico using side scan sonar

AUTHOR: Chris Gardner, Patrick Raley

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ABSTRACT: The west Florida shelf (WFS) supports some of the most valuable reef fish fisheries in the U.S. Gulf of Mexico. However, very little of its area has been mapped with sufficient resolution to accurately locate and quantify the hard/live bottom habitat these fisheries are so strongly tied to. Such maps are essential for designing an efficient fishery independent survey of reef fishes, enabling pre-stratification by habitat, and thereby minimizing variance and optimizing survey resources. In support of a recently expanded fishery independent reef fish survey, the Panama City NMFS lab began mapping cross-shelf transects on the northern WFS using side scan sonar. An inexpensive geo-referenced live video drop camera, stationary video camera array, and occasionally an ROV were used for visual ground truthing. Over three

thousand new reef sites have been discovered and analyzed in detail from cross-shelf side scan sonar transects totaling 276 km². Physical attributes (area, relief, rugosity, and proximity to neighboring reefs) of each reef were measured and categorized into a relative, standardized score to provide a repeatable, quantifiable measure to use in a weighting scheme when randomly selecting sites for sampling. Information on habitat associations will be invaluable for increasing precision and accuracy of survey abundance estimates by revealing important strata for both survey design and data analysis.

TITLE: What is low-cost sonar habitat mapping?

AUTHOR: Adam Kaeser, Thom Litts

AFFILIATION: US Fish and Wildlife Service

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ABSTRACT: Low-cost sonar habitat mapping is a method developed by Adam Kaeser (U.S. Fish and Wildlife Service) and Thom Litts (Georgia Department of Natural Resources) for producing high resolution maps of physical habitat features in navigable systems using inexpensive, off-the-shelf sonar and GPS equipment. Associated tools and techniques enable the generation of rectified image mosaics from sonar image snapshots obtained with the Humminbird® Side Imaging system. Physical habitat elements are manually digitized via interpretation of sonar imagery within a GIS. Sonar habitat mapping can be used to quantify the distribution and extent of habitat, investigate terrestrial-aquatic linkages, study patterns of habitat use by resident organisms, and monitor change over time. By providing a unique, rapid, and flexible means to visualize and characterize the underwater environment at the landscape scale, this method can be used to fill critical information gaps in a wide variety of aquatic systems.

TITLE: FWC's benthic habitat mapping program: Two years later

AUTHOR: Luke McEachron

AFFILIATION: FWC

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ABSTRACT: FWC is expanding acoustic data holdings on the east coast of Florida and in the Florida Keys primarily for benthic habitat mapping purposes. We are integrating benthic habitat information into seamless maps for the Florida reef tract. These maps support a variety of research projects, including two projects that are starting this year: 1) constructing species distribution models to predict priority coral restoration areas and 2) assessing emergent patterns in reef fish communities due to matrix and edge effects.

TITLE: Using multibeam sonar to inform the spatial extent of fisheries surveys: a case study using the Simrad ME70

AUTHOR: Warren Mitchell

AFFILIATION: NOAA NMFS SEFSC Beaufort, NC

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ABSTRACT: The operators of fisheries surveys should confirm that the spatial extents of a sampling area, and the density of sampling within the area, are continually appropriate for scientific uses. Historical sampling stations and data sources, then, should be methodically

evaluated alongside evolving technological methods to add spatial information. During 2011-2013, a Simrad ME70 in 'fisheries mode' was used to rapidly expand a reef fish survey off the southeastern U.S. Atlantic coast. Costs and benefits have been repeatedly evaluated regarding the best uses of financial resources, at-sea operational time, office research time, and the quality of end products; numerous trade-offs exist. For example, quickly-produced, low-quality maps have enabled real-time fisheries sampling in unknown areas. Alternately, intense processing of high-quality mapping data has enabled statistical methods to identify large-scale geomorphic features that may predict the presence of economically important reef fish. Depth soundings from the ME70 have also been submitted as potential updates to NOAA charts. This presentation will discuss the recent use of a multibeam sonar to inform the spatial extent of a fisheries survey, and attempt to frame the benefits of potential future research according to a pragmatic set of trade-offs.

2.3 Detecting Fishes in Shallow Water

Topic summary - Detecting Fishes in Shallow Water

The session on detecting fishes in shallow water and in deep water shared a common theme of identifying advantages and challenges of using active acoustics in coastal marine systems. This group of talks began with a presentation on the use of DIDSON imaging sonars and the ability to make fine-scaled observations of fish behavior in very shallow, tidal estuaries, lending insights into the use of productive marsh creeks by fishes and other nekton. Morley et al. and Zenone et al. then took us into deeper water and discussed approaches for understanding how reef fish use nearshore reefs, with a particular focus on advantages of using fishery echosounders to cover large areas and map the distribution of fish biomass on reefs at a range of spatial (and temporal) scales. The afternoon session concluded with a presentation by Wall et al. on the development of a standard data management system by NOAA to archive watercolumn/midwater data from sonars.

TITLE: Evaluating fine-scale nekton dynamics in shallow-estuarine ecosystems using multi-beam acoustics

AUTHOR: Kevin Boswell¹, M.E. Kimball², G. Rieucan³, D. Allen²

AFFILIATION: ¹Florida International University, ²Baruch Marine Laboratory, ³Institute of Marine Science

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ABSTRACT: Fine-scale habitat use and partitioning by fishes is difficult to observe in dynamic estuarine and coastal ecosystems with most studies relying on direct biological capture techniques for inferring organismal distributional dynamics. Additionally, the temporal domain of nekton movement and behavior remains largely undescribed as traditional observational techniques (i.e., optical methods) are impeded by physical characteristics of estuarine ecosystems (e.g., suspended load). We report on advances in the application of multi-beam imaging sonars to elucidate behavioral and fine-scale habitat use patterns of nekton in shallow turbid systems. Specifically, we address the applied and analytical approaches that offer

quantitative metrics to provide insight into important ecological processes: from individual behavior and energetics, to trophic interactions, to community and population dynamics. We highlight the use of advanced technologies in estuaries and coastal ecosystems and offer examples from both fixed and mobile platforms to describe fine-scale temporal and spatial patterns of nekton habitat use and behavior at scales not previously described.

TITLE: Assessing Reef Fish Aggregations in the Florida Keys

AUTHOR: Danielle Morley¹, Todd Kellison², Chris Taylor³, Alejandro Acosta¹, Benjamin¹ Binder

AFFILIATION: ¹Florida Fish and Wildlife Conservation, ²NOAA National Marine Fisheries Service - SEFSC, ³NOAA National Ocean Service - CCFHR

E-MAIL: Danielle.Morley@myfwc.com

ABSTRACT: Fish spawning aggregations (FSAs) are a vital part of the life cycle of many commercially and recreationally important reef fish species. A dearth of knowledge regarding the location of FSA sites prevents their protection and effective management. In the Florida Keys, a multi-agency cooperative effort has been underway for 5 years to assess reef fish aggregations using different technologies and survey methods. This multi-tiered approach is used to determine both the reef fish utilization patterns of these sites as well as any geomorphological characteristics present. This study is focused on providing managers with data that will allow them to make informed decisions to ensure the successful continuation of reef fish aggregations in the Florida Keys.

TITLE: Development of acoustic survey approaches for application in a shallow reef ecosystem

AUTHOR: Adam Zenone, Kevin Boswell, Chris Taylor, Geir Pedersen, Deron Burkepile

AFFILIATION: Florida International University

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ABSTRACT: Spatial utilization of reef habitat by associated fish communities is structured in part by abiotic factors of the reef (e.g. depth, reef complexity, season, etc.) and biotic (e.g. live coral cover, macroalgal cover, etc.). The reefs of south Florida are located adjacent to one of the most heavily urbanized coastlines in the country, which could have significant impacts on these factors. Understanding the role of these factors requires data that span multiple scales in both space and time. Despite the high level of urbanization and human use of this coastal ecosystem, available data are rather limited and do not offer sufficient resolution to discern structuring factors on reef-associated fish biomass. Recent efforts have focused on the integration of acoustic and limited diver survey approaches to develop non-invasive indices of abundance across the coastal reef scape. While acoustics have been adopted as an integral survey component in many regions, much work remains in order to develop the application in heterogeneous reef complexes. Thus we present initial observations from reef complexes in South Florida and parallel experimental and modeling work to improve the accuracy and confidence in acoustic survey data.

TITLE: Development of an accessible national archive of water column sonar data for fisheries management

AUTHOR: Carrie C. Wall¹, Charles Anderson¹, and Susan J. McLean²

AFFILIATION: ¹University of Colorado at Boulder, Cooperative Institute for Research in Environmental Sciences, Boulder, CO ²NOAA National Geophysical Data Center, Boulder, CO

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ABSTRACT: Active acoustic technology is of increasing importance for studies examining fish populations and biological abundance in the water column. Multibeam echosounders are employed routinely on NOAA fishery vessels to estimate biomass, conduct trophic- and species-level identification, measure school morphology and behavior, and characterize habitat for commercially important species. These surveys deliver valuable information for ecosystem-based fisheries management but they also produce massive amounts of data that are costly and difficult to maintain. With its ability to store and preserve large datasets, NOAA's National Geophysical Data Center is acquiring and archiving acoustic data collected from NOAA and academic fleets. Through these efforts, an accessible archive of acoustic water column data will be made available to researchers and the public around the world. A web-based search engine will allow anyone to identify where data were collected, what instrument was used, and access the raw data and associated products. Years of decreasing funding for the sciences have necessitated our ability to get more information and more users out of data currently collected. This globally-accessible archive is a large step in that direction. Of most importance is identifying how best to tap the archive to benefit current and future fisheries research and management.

2.4 Keynote Address: Alex DeRobertis - Fisheries Acoustics Perspectives from up North

TITLE: Applications of fisheries acoustics: a perspective from up north

AUTHOR: Alex De Robertis

AFFILIATION: NOAA NMFS AFSC – Seattle, WA

E-MAIL: alex.derobertis@noaa.gov

ABSTRACT: There has been substantial development in acoustic-trawl (AT) survey methods in the last decade, which makes this an exciting time to practice fisheries acoustics. This presentation will provide a case study of this by reviewing AT surveys and examples of research related to AT surveys conducted at the Alaska Fisheries Science Center. Acoustic-trawl (AT) surveys have been an important source of information for fisheries management in Alaska for decades. In recent years, there has been an active effort to expand the applications of AT surveys and reduce uncertainty in the survey results by developing new methods and testing the assumptions inherent in the methodology. These efforts have focused on data collection from fishing vessels, techniques for improved species identification, quantification of the impacts of fish behavior on survey abundance estimates, and studies of fishes in untrawlable habitat. Although the work described is largely from low-diversity subarctic ecosystems rather than the more tropical waters where members of the southeast acoustics consortium are active, many of

basic principles described will be applicable when applying fisheries acoustics in these more diverse ecosystems.

2.5 Detecting Fishes in Deep Water

Topic summary - Detecting Fishes in Deep Water

Presentations in this session covered similar topics as the session on detecting fishes in shallow water with each highlighting the advantages of active acoustics in rapidly surveying large areas. Several of the presentations described a combined survey approach that used mid or high-frequency splitbeam or multibeam echosounders to derive biomass estimates, but then relied on other observation methods (e.g., trawl or optical) to identify species. In contrast Thompson reminded the group of the past work (and reemerging research) on the use of low- and mid-frequency broadband sonars that can be used to classify fishes relying on the resonant frequency of the swimbladders. Discussion among the group agreed that further research needs to be done in multifrequency signal processing in conjunction with new ways to combine acoustic and optical survey methods to improve methods to classify organisms to species or groups.

TITLE: Use of Hydroacoustic Technology within the Fisheries Independent Monitoring (FIM) program of the Florida Fish and Wildlife Conservation Commission

AUTHOR: Eric Weather, Keith Fischer

AFFILIATION: Florida Fish and Wildlife Research Institute

E-MAIL: eric.weather@myfwc.com

ABSTRACT: The Florida FIM program has been using split beam hydroacoustic technology since 1994 for the assessment of baitfish and other small coastal pelagic species off the central West Coast of Florida. Annual spring sampling is conducted from Sanibel Island north to Tampa Bay in water depths of 6 to 27-m using a 20-m trawl and hydroacoustic technology. The acoustics provide density and biomass estimates along each survey, while the trawls help determine species composition. This monitoring effort provides a synoptic examination of the status of baitfish stock distributions and abundance in relation to the traditional commercial fishing grounds located off Anna Maria Island and to describe other fish distributions in terms of species assemblages.

Beginning in 2008, the Florida FIM program began developing a survey focused on assessing reef-fish populations along the west Florida shelf. Side-scan sonar surveys were implemented to provide a cost-effective and timely method for providing detailed habitat information within shelf waters. These surveys are conducted using a Klein 3900 side-scan sonar system operating at 445 kHz. Post-processing of these data includes creating a mosaic of the surveyed area and characterizing the habitat using west Florida shelf specific habitat criteria derived from NOAA's Coastal and Marine Ecological Classification Standard. Incorporating detailed habitat data into survey design has improved overall survey efficiency and will increase the utility of these fisheries-independent data for population assessments of managed reef fishes.

TITLE: Estimating areal densities and size distributions of fish using broadband low frequency acoustic scattering

AUTHOR: Charles Thompson

AFFILIATION: NOAA NMFS SEFSC Stennis Space Center

E-MAIL: charles.h.thompson@noaa.gov

ABSTRACT: Broadband acoustic scattering at frequencies near fish swimbladder resonance can potentially provide valuable information for fisheries research and stock assessment. Measurements in this frequency range, in conjunction with a swimbladder scattering model, can be used for species classification more easily than measurements at higher frequencies. Given an estimate of size distribution, they can be used to estimate areal densities of fish, or, using a matrix inversion technique can be used to estimate numbers of fish in different size classes. Analysis results for measurements of near-resonance scattering from a number of different species will be presented.

TITLE: Advanced survey technologies for Gulf of Mexico reef fish - Efforts in 2013

AUTHOR: Ed Hughes, Jennifer Brizzolara, Steve Murawski, David Naar

AFFILIATION: University of South Florida

E-MAIL: ehughes@conshelf.com

ABSTRACT: We have been utilizing active acoustic sonar instrumentation and multibeam sonar data products in supporting rapid fishery and habitat assessment efforts using the newly developed Camera-Based Assessment Survey System (CBASS). Three offshore surveys conducted from FIO's Weatherbird II took place in 2013 that allowed testing and combined data collection efforts with the towed CBASS and a hull-mounted Simrad EK60 scientific echosounder (38 kHz) in marine reserve areas on the West Florida Shelf – Madison-Swanson MPA, Florida Middle Grounds HAPC, and Steamboat Lumps MPA, in depths ranging from 40m to 210m. Over the course of the surveys, we have cumulatively collected over 360 hours of EK60 data (over 2600 km) and 50 hours of CBASS video data. A real time navigation method was also developed during these cruises by feeding GPS data into the ArcGIS software that displays the high resolution multibeam bathymetry and backscatter data. This method proved useful for real time cruise planning and was also invaluable (coupled with real time feed from the EK60) in anticipating rapid changes in depth to avoid potential CBASS collisions with the seafloor. The real time EK60 depicted potential schools of reef fish as well as individuals on an echogram prior to the CBASS potentially filming them. In addition, previously collected multibeam data of the different marine reserves were employed using a GIS in real-time to assist with CBASS navigation while CBASS camera views of the seafloor were used to groundtruth backscatter signatures within the multibeam data. We will provide some imagery and updates from these efforts.

TITLE: Application of classification procedures for the identification of small pelagic fish species in the Central Mediterranean

AUTHOR: Marta D'Elia, B. Patti, A. Bonanno, I. Fontana, G. Giacalone, G. Basilone, P.G. Fernandes

AFFILIATION: Florida International University

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ABSTRACT: Acoustic surveys provide valuable information on the abundance and distribution of many fish species of commercial importance. In the Mediterranean Sea sardine and anchovy stocks are monitored annually with acoustics to produce biomass estimate and understand the dynamic of the populations. However to allocate acoustic data to a particular species the technique still requires corroboration with trawl data, a subjective judgment that can affect the precision of abundance estimates. In this study we employed a multifrequency approach to detect and classify schools of sardine, anchovy and horse mackerel. The method used incorporates a multifrequency school filter, image analysis to isolate echotracers and finally classification models (classification tree, random forest) relying on multifrequency features, as well as bathymetric and morphometric parameters, to allow for discrimination among these species. According to the classification methods, school depth was found to play an important role in the identification of the pelagic species, especially for anchovy and horse mackerel. Moreover the classification models, with only energetic or morphometric parameters, were able to classify sardine schools reasonably well, but not so well anchovy and horse mackerel.

TITLE: Mapping reef fish schools and aggregations using multibeam and splitbeam fishery echosounders

AUTHOR: Chris Taylor

AFFILIATION: NOAA NOS CCFHR Beaufort, NC

E-MAIL: chris.taylor@noaa.gov

ABSTRACT: Mapping living marine resources in coral reef ecosystems forms the foundation of fishery and ecosystem management and research. Narrow beam, split-beam sonars can detect fishes throughout the water column and in close proximity to reef interface and provide precise estimates of target strength. But the narrow beam (typically $<15^\circ$ beam diameter) limits the sampling volume and cannot provide three-dimensional characteristics of large fish schools and aggregations. Accurate estimates of school shape and volume would lead to more accurate estimation of densities and biomass of fishery resources. Here we show results of surveys using split-beam fishery and hydrographic multibeam sonar in coral reef ecosystems of the U.S. Caribbean and Gulf of Mexico in the western North Atlantic. Using both systems in concert, we can accurately estimate fish size using target strength estimates from the split-beam echosounders, while simultaneously resolving school size and structure using the wide-swath multibeam. We will also show some recent results of surveys using fishery multibeam (Simrad ME70) and inexpensive swath multibeam systems for imaging fish schools. Integrating fishery sonar surveys with large-scale hydrographic multibeam surveys increases the efficiency of integrated ecosystem assessments. Combining bottom topography, reflectivity and composition with watercolumn imaging further enhances interpretation and visualization of fishery resources and habitat maps in coral reef ecosystems.

2.6 Emerging Technologies

Topic summary – Emerging Technologies

As offered at the 2012 workshop, the session on Emerging Technologies featured recent developments in both data acquisition and data processing. Presentations on SIMRAD wideband echo sounder technology and Marine Sonic side-scan models paired well with dataprocessing advances presented by Echoview and Chesapeake Technology. Lively discussions followed the presentations, including: the calibration of new technologies, documenting equipment changes via processing software, and balancing the advancement of technology with the requirements of the scientific method (e.g., replication of results).

Abstracts

TITLE: Broad Band Acoustics - practical applications for fisheries research

AUTHOR: Jeff Condiotty

AFFILIATION: Simrad Fisheries, Seattle WA

E-MAIL: jeff.condiotty@simrad.com

ABSTRACT: Some comments on SIMRAD EK80 functionality: (1) The EK80 will be able to provide almost all the existing functionality of the EK60 and much more. (2) EK80 software will work with a combination of EK80 wideband transceivers (WBT's) and EK60 GPT's to allow smooth transition. (3) The EK80 is able to use split beam to determine single target position when operating with wideband, and will correctly compensate for the beam pattern according to target position and the wideband frequencies. (4) The EK80 will be able to display Sv(f) and TS(f) in real time; each WBT has 4 channels and each channel can be configured independently. This allows for support of new transducers with new configurations (e.g. split beam using 3 sectors and one single beam).

TITLE: What's new in Echoview 6

AUTHOR: Toby Jarvis

AFFILIATION: Echoview (Myriax) Tasmania

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ABSTRACT: Echoview 6 brings with it three major new features for processing your acoustic data: bottom classification, platform-depth compensation (e.g. heave, towed body) and multibeam/imaging-sonar data cleaning - plus a host of other lovely tweaks and improvements. I'll provide a demonstration of these new features and leave time for questions and general discussion.

TITLE: New advancements in side scan sonar technology, products, & developments.

AUTHOR: Regan Lipinski

AFFILIATION: Marine Sonic Technology

E-MAIL: rlipinski@marinesonic.com

ABSTRACT: A presentation of Marine Sonic Technology's Side Scan Sonar Products and possible applications, including the Sea Scan HDS Digital Side Scan Sonar, ARC Explorer Side Scan Sonar with Adaptive CHIP Technology and Sea Scan Survey Software.

TITLE: SonarWiz: A single application suite supporting all manufacturers, for acquiring and processing SSS, SBP, bathymetric, and magnetometry data.

AUTHOR: John Gann

AFFILIATION: Chesapeake Technology

E-MAIL: jgann@chesapeaketech.com

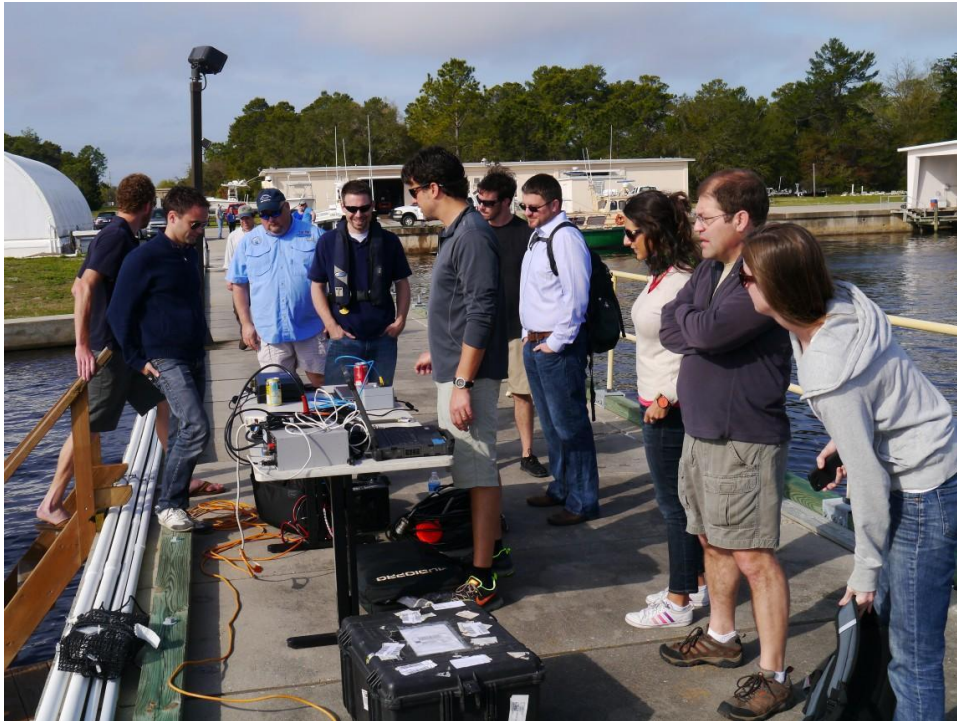
ABSTRACT: SonarWiz is an all-in-one suite of programs for the real-time acquisition of sonar data, designed to meet sonar mapping needs, save time, and minimize training costs.

SonarWiz helps streamline the survey process and simplify the number of software programs needed. It operates with all major sidescan and sub-bottom sonar manufacturers. Based on feedback from our customers, we've recently added new capabilities: a High Resolution sidescan feature, Seabed Classification, and Layout Manager.

3. Demonstration Day

The final day of the workshop was used to demonstrate a selection of active acoustics and sonar technologies, both at the research dock of the NOAA NMFS Laboratory in Panama City, Florida and onboard the NOAA research vessel *Harold B*. Manufacturer representatives were available to answer questions about existing and emerging products and applications:

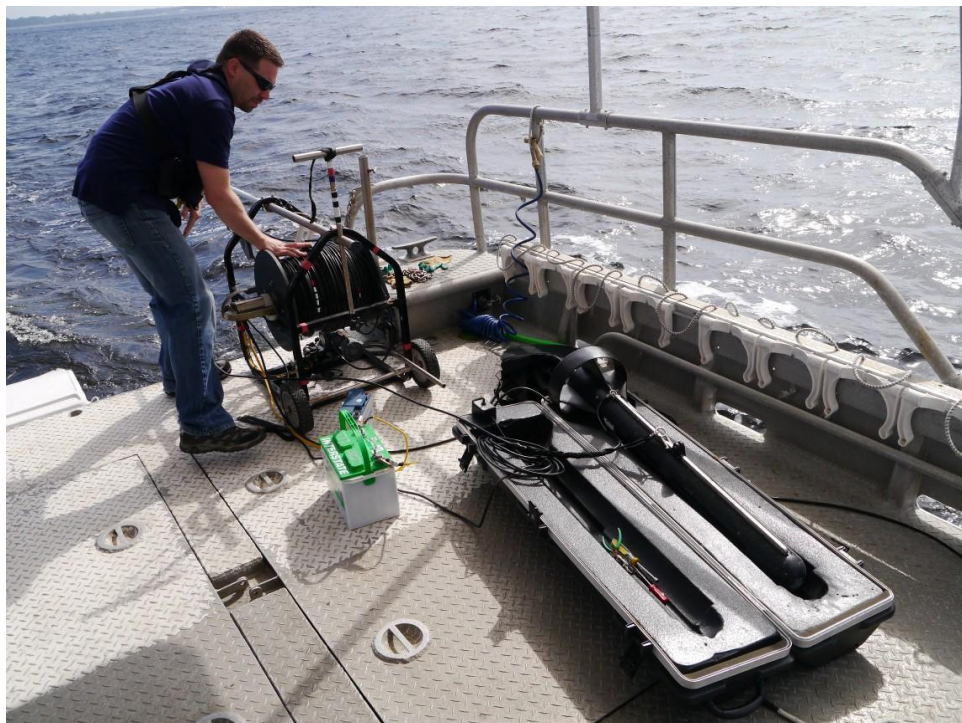
- Chesapeake Technology (www.chesapeakeotech.com/)
 - SonarWiz 5 data processing software
- Echoview (Myriax, www.echoview.com)
 - Echoview 6 sonar data processing software
- Kongsberg Underwater Technology, Inc. (Simrad Fisheries, www.simrad.com)
 - EK60 splitbeam echosounder
 - EK80 wideband echosounder
- Marine Sonic Technology (www.marinesonic.com)
 - Sea Scan HDS 900/1800kHz Chirp side-scan sonar
 - Sea Scan HDS 600/1200kHz side-scan sonar
- Sonar Metrics (www.soundmetrics.com)
 - DIDSON model 300 m dual frequency sonar



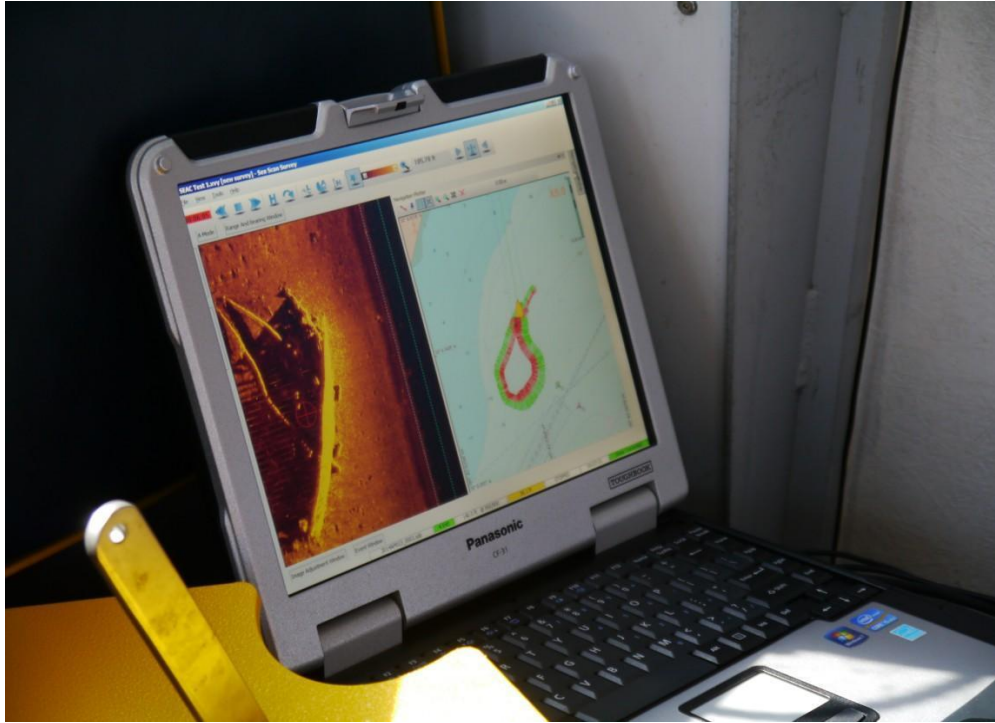
Meeting attendants discuss sonar equipment during the 2014 SEAC Workshop and Forum's gear demonstration day.



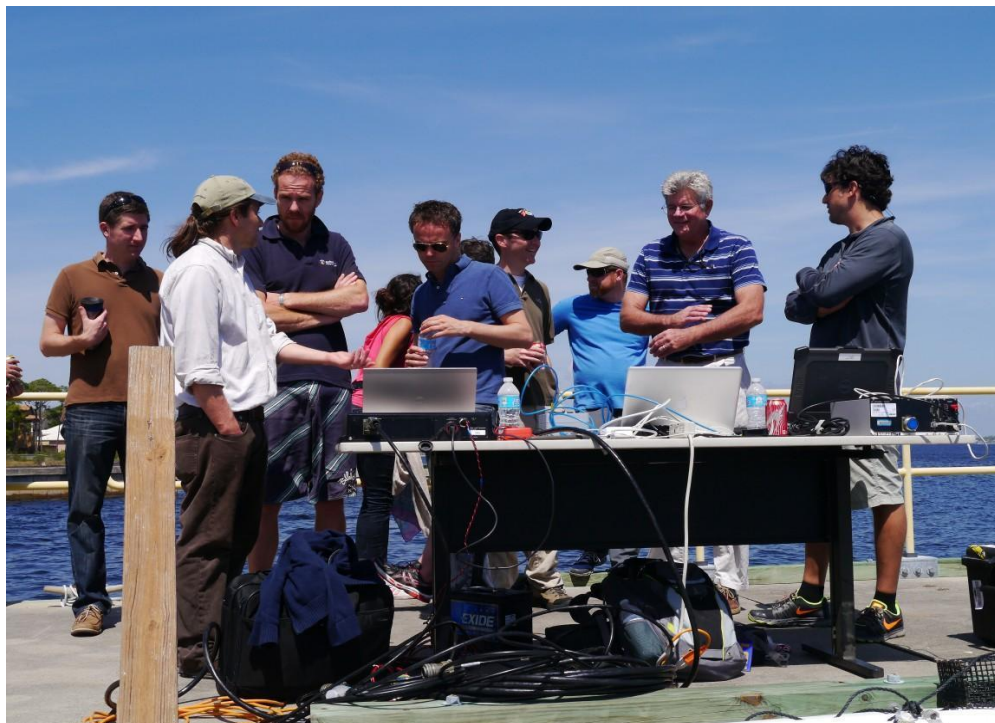
Meeting attendants deploy four, pole-mounted sonar transducers into the shallow waters of St. Andrew Bay: Two SIMRAD EK60s (200 and 333 kHz), a SIMRAD EK80 (100-150 kHz) and a Sound Metrics DIDSON model 300 m.



Regan Lipinski (Marine Sonic Technology) prepares to tow a Marine Sonic 'Sea Scan HDS' side-scan sonar (600/1200 kHz) behind the 36' NOAA research vessel *Harold B.*



Real-time display of data collected by a Marine Sonic 'Sea Scan HDS' Chirp side-scan sonar (900/1800kHz). A sailboat wreck in St. Andrew Bay served as the target of interest.



Meeting attendants observed live data acquisition from multiple sonars during 2014 SEAC Workshop and Forum gear demonstrations. The SEAC is grateful for facility support provided by the NOAA NMFS Laboratory in Panama City, Florida from 1-3 April 2014.

4. Concluding Remarks and Consortium Development

The second biennial workshop of the SouthEast Acoustics Consortium convened with a broad purpose sharing ideas, expertise (and assets) to further advance the use of active acoustic technologies to meet coastal fishery ecosystem management and research objectives. This second workshop continued to grow the membership and interest base in the region by including a focused discussion on low-cost and coordinated habitat mapping technologies, highlighting the growing need for information on the distribution of habitat resources particularly in the Gulf and SE US coast. Agencies in the NE Gulf are actively engaged in collaboration in this field, sharing resources and expertise and coordinating field surveys and missions to achieve common goals. Growth of interagency and inter-institution partnerships throughout the Gulf, SE US and Caribbean fostered by working groups like SEAC will continue to enhance the capabilities and capacities of agencies and organizations to meet mutual objectives. In this way, the second workshop continued to meet the Consortium objectives:

- ❑ To inventory activities, interest, expertise, and assets related to active acoustics
- ❑ To inform regional managers and science leads on the state of the science and emerging technologies
- ❑ To identify data gaps and management needs and the potential to fill those gaps using acoustic technologies
- ❑ To encourage education and training through academic and research opportunities.

SEAC objectives, workshop presentations and reports are archived on the SEAC website <http://seac.fiu.edu>.

Getting outside for the gear demonstrations was a pleasant conclusion to two days of talks. The outing would not have been a success without the participation of manufacturers and scientists willing to bring equipment, nor without institutional support from the NOAA NMFS Laboratory in Panama City, Florida. Captain Patrick Raley is thanked for his time spent preparing and piloting the boat-based demonstrations. Outcomes from the day such as access to manufacturers and the opportunity to operate new technologies are difficult to put a value on - and a unique aspect of the SEAC workshop and forums.

Following the workshop, the Consortium planning team polled participants to gather additional outcomes and partnerships that emerged from the SEAC workshops. The growth of regional partnerships and asset sharing persisted in 2014:

- Personal relationships between SEAC members continued to foster the sharing of expertise or assets to address technical problems such as software demonstration, analysis and technical support, systems installations, integration, and calibration
- Continued strengthening of the relationship between data acquisition and archival programs: SEAC members across NOAA are establishing cooperative agreements and providing data to NOAA NGDC's [Water Column Sonar Data](#) team in 2014.

- User-manufacturer exchanges foster research and development to improve hardware and software tools and technologies. As a result of the two SEAC workshops, new Echoview software support has been developed for Furuno WASSP multibeam echosounders (image below).
- Participation by students in NOAA research cruises continues to grow as a result of agency-academic partnerships fostered by SEAC. The 2014 cruise season saw at least 3 undergraduate students on board NOAA research cruises, providing further exposure and training with acoustics systems.
- A number of projects saw collaboration between SEAC members, including a funded proposal to reduce uncertainty in stock assessment by expanding sidescan habitat mapping with AUV's.
- As of December 2014, the FIU email listserv had 59 members. Please contact Dr. Kevin Boswell (kevin.boswell@fiu.edu) if you would like to be added to the email list.

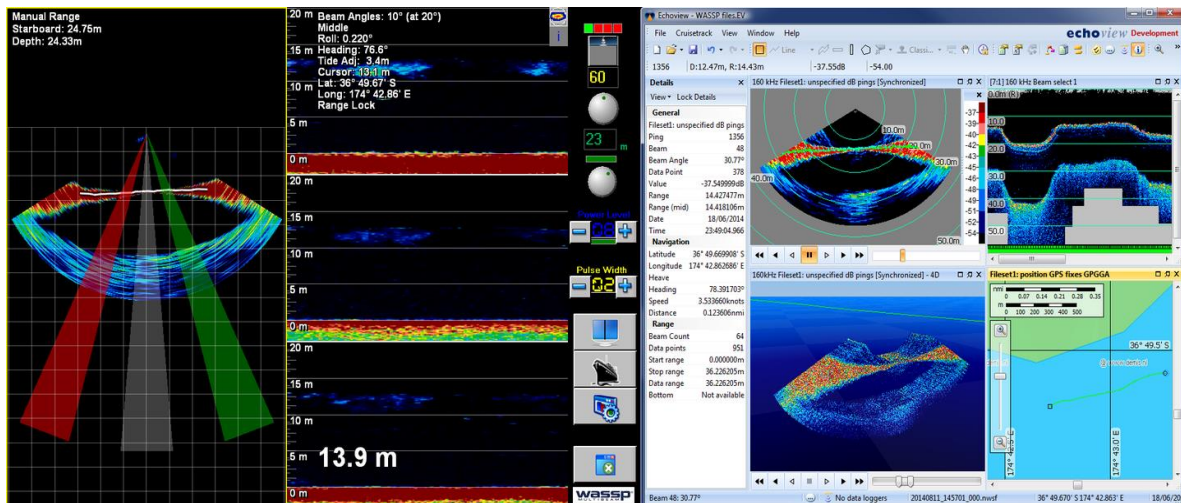


Image of a forthcoming Echoview capability to analyze WASSP fishery multibeam data.

At the conclusion of the 2014 meeting, members proposed continuing the biennial schedule of workshops. The SEAC steering committee and representatives from the Florida Fish and Wildlife Conservation Commission (St. Petersburg Laboratory, Fish and Wildlife Research Institute) committed to host the next biennial workshop in 2016. Planning is underway with updates at seac.fiu.edu. The hosts of the 2014 workshop wish to thank all participants involved, and all those that continue to support SEAC. We look forward to another successful meeting, and hope to see you all there.

5. Participants List

Name	Affiliation
Tonny Algroey	Simrad Fisheries
Charles Anderson	NOAA/NGDC
Stan Bosarge	Univ. South Alabama
Kevin Boswell	Florida International University
Brad Boykin	Leidos/USAF
Ian Church	University of Southern Mississippi
Bryan Clark	Silver Bullet
Jeff Condiotty	Simrad Fisheries
Frank Crosby	Naval Surface Warfare Center Panama City Division
Guy Davenport	NOAA NMFS SEFSC
Alex DeRobertis	NOAA NMFS AFSC
Doug DeVries	NOAA NMFS SEFSC
Brett Falterman	Louisiana Department of Wildlife and Fisheries
Ashley Ferguson	Louisiana Department of Wildlife and Fisheries
Vince Ferris	US Navy Experimental Dive Unit
Keith Fischer	FWC
Gary Fitzhugh	NOAA NMFS SEFSC
John Gann	Chesapeake Technology
Chris Gardner	NOAA NMFS SEFSC
Julia Gazagnaire	Naval Surface Warfare Center Panama City Division
Stacey Harter	NOAA NMFS SEFSC
Eddie Hughes	CSA Ocean Sciences and Univ. South Florida
Toby Jarvis	Echoview (Myriax)
Adam Kaeser	US Fish and Wildlife Service
Kelly Kingon	Florida State University

Regan Lipinski	Marine Sonic Technology, Ltd.
Richard Love	BayouAcoustics
Mike McDonough	Louisiana Department of Wildlife and Fisheries
Luke McEachron	Florida Fish and Wildlife Conservation Commission
Mark McMann	NOAA National Ocean Service
Warren Mitchell	NOAA NMFS SEFSC
Josh Mode	CARIS USA
Danielle Morley	Florida Fish and Wildlife Conservation Commission
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Mike Nunley	Leidos/USAF
Aurel Piantanida	NOAA National Ocean Service
Patrick Raley	NOAA NMFS SEFSC
Chris Taylor	NOAA National Ocean Service
Charles Thompson	NOAA NMFS SEFSC
Katherine Wakefield	Georgia Southern University
Carrie Wall	University of Colorado at Boulder
Eric Weather	Florida Fish and Wildlife Conservation Commission
Jeff Wren	Gulf Unmanned Systems

Workshop sponsors

The SEAC membership is thankful to Gulf Coast State College for providing meeting space and technical support for the workshop. The Consortium maintains a goal of hosting registration-free workshops. This can only be possible by multiple monetary and in-kind contributions from several entities. The 2014 workshop was supported by:

- Continental Shelf Associates
- Echoview, Myriax Software Pty Ltd
- Florida International University
- Gulf Coast State College
- Kongsberg / Simrad Fisheries
- NOAA National Marine Fisheries Service & National Ocean Service
- North Carolina Sea Grant



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