Michael A. Bollinger

CSS Inc., under contract to NOAA National Centers for Coastal Ocean Science
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PROFESSIONAL PREPARATION

Highlights: *Earned B.S. from Pennsylvania State University followed by environmental education and outreach at a nonprofit organization.Completed M.S. from University of Texas Rio Grande Valley. Worked in restoration ecology of the tropical marine environment at Florida Fish and Wildlife - Fish and Wildlife Research Institute. Current Marine Geospatial Scientist with CSS Inc. under contract to NOAA National Centers for Coastal Ocean Science.*

EDUCATION

2015	M.S. – Biology, University of Texas - Rio Grande Valley, Brownsville, TX Title: Validating side scan sonar as a fish survey tool over artificial reefs. Advisor: Dr. Richard Kline
2012	B.S. – Biology, Pennsylvania State University, University Park, PA Specialization: Ecology and Marine Science Advisor: Dr. Jennifer Miksis-Olds

PROFESSIONAL POSITIONS*

***** Summarized duties and work performed are described in this section. Detailed descriptions of duties and work performed for paid professional positions are in the separate 'DETAILED DUTIES AND WORK PERFORMED' section below. ****

2018 - pres. **Marine Geospatial Scientist**, CSS Inc. under contract to NOAA National Centers for Coastal Ocean Science, Marine Spatial Ecology Division, Seascape Ecology and Analysis Branch, Habitat Mapping Team, Beaufort, NC.

- Dates: November 2018 – present
- Hours: 40 hours per week, full time
- Supervisor: Dr. Chris Jeffrey
- Salary: $75,000 per year
- Duties and work performed: Conducted research and produced products related to habitat mapping of coastal ocean ecosystems. Provide technical guidance on underwater photography, photogrammetry, uncrewed maritime systems and their use for ground validation of habitat models. Coordinate project and field effort logistics. Convey scientific findings to diverse stakeholders. *See "detailed duties and work performed" section below.*

2018 **Biological Scientist I**, Florida Fish and Wildlife Commission, Fish and Wildlife Research Institute, Mollusk Team, St. Petersburg, FL.

- Dates: May 2018 – October 2018

- Hours: 40 hours per week, full time
- Supervisor: Dr. Jennifer Granneman
- Salary: $29,000 annual salary
- Duties and work performed: Conducted research on bay scallops on the west coast of Florida. Led field operations for stakeholder interviews and fishery independent sampling. Convey scientific findings to diverse stakeholders. *See "detailed duties and work performed" section below.*

2016 - 2018 **Biological Scientist II**, Florida Fish and Wildlife Commission, Fish and Wildlife Research Institute, Restoration Ecology Team, Marathon, FL.

- Dates: May 2016 – June 2018
- Hours: 40 hours per week, full time
- Supervisor: Mr. William Sharp
- Salary: $39,000 annual salary
- Duties and work performed: Led and conducted research on tropical marine ecosystems and coral and sponge restoration. Designed and executed experiments to improve viability and production from sponge and coral nurseries. Analyze data and write technical reports and manuscripts. Provide technical guidance for partnering restoration institutions. *See "detailed duties and work performed" section below.*

2013 - 2015 **Graduate Research Assistant**, University of Texas Rio Grande Valley, Brownsville, TX.

- Dates: August 2013 – December 2015
- Hours: 40 hours per week, full time
- Supervisor: Dr. Richard Kline
- Salary: $19,000 annual salary
- Duties and work performed: Led and conducted research on marine ecosystem dynamics on artificial reefs using sonar and visual data collection techniques. Coordinated regular sampling of fish and invertebrate communities on south Texas artificial reefs. Conveyed scientific findings to diverse stakeholders. *See "detailed duties and work performed" section below.*

2013 **Marine Science Educator**, Chincoteague Bay Field Station, Wallops Island, VA.

- Dates: February 2013 – August 2013
- Hours: 40 hours per week, full time
- Supervisor: Dr. Anne Armstrong
- Salary: $7,200 annual salary + housing and meals
- Duties and work performed: Conducted education programs on coastal marine ecosystems for children and adults (ages 5-99). Drove school buses with CDL-B to transport programs to different habitats.

2010 - 2012 **Sonar Analysis Technician**, Pennsylvania State University, Applied Research Lab, University Park, PA

- Dates: September 2009 – June 2012
- Hours: 10 hours per week, part time
- Supervisor: Dr. Jennifer Miksis-Olds
- Salary: $11/hour

- Duties and work performed: Processed and analyzed multi-frequency sonar data from diverse ecosystems. Isolated fish and zooplankton echo returns for backscatter analyses.

2010 **Habitat Management Intern**, Pennsylvania Fish and Boat Commission, Pleasant Gap, PA.

- Dates: June 2010 – September 2010
- Hours: 40 hours per week, seasonal
- Supervisor: Mr. Benjamin Page
- Salary: Unpaid
- Duties and work performed: Supported deployment of artificial structures in Pennsylvania lakes and impoundments. Received introduction to Computer Aided Design and design of structures to support fish reproduction and production.

RESEARCH PORTFOLIO

Highlights: *Led marine and fisheries ecology research projects in diverse ecosystems: rocky reefs, coral reefs, artificial reefs, shipwrecks, mesophotic reefs, shallow hardbottom, and seagrass habitats. Recently shifted into the uncrewed systems realm working in fabrication and retrofitting of systems for research purposes. Part of a team that secured a $50,000 innovation award and annual funding for UXS.*

PEER-REVIEWED PUBLICATIONS

Edwards, C. B., Viehman, T. S., Battista, T., **Bollinger, M. A.**, Charendoff, J., Cook, S., Combs, I., Couch, C., Ferrari, R., Figueira, W., Gleason, A. C. R., Gordon, S., Greene, W., Kuester, F., McCarthy, O., Oliver, T., Pedersen, N. E., Petrovic, V., Rojano, S., Runyan, H., Sandin, S. A., and Zgliczynski, B. J. (2023). *Large-area imaging in tropical shallow water coral reef monitoring, research and restoration: A practical guide to survey planning, execution, and data extraction.* NOAA National Ocean Service, National Centers for Coastal Ocean Science. NOAA Technical Memorandum NOS NCCOS 313. https://doi.org/10.25923/5n6d-kx34

Cook, S., Rojano, S.G., Edwards, C.B., **Bollinger, M. A.**, Pierce, J., Viehman, T.S. (2023). Standard operating procedures for the use of large-area imaging in tropical shallow water coral reef monitoring, research, and restoration: *Applications for Mission: Iconic Reefs restoration in the Florida Keys National Marine Sanctuary*. NOAA NCCOS Technical Memorandum 320. 166 pp. doi: https://doi.org/10.25923/w8h9-4z75

Roa, C., Pederson, G., **Bollinger, M.,** Taylor, J.C., and Boswell, K. (2022). Taxonomical classification of reef fish with broadband backscattering models and machine learning approaches. Journal of the Acoustic Society of America. 152, 1020. https://doi.org/10.1121/10.0012192

Granneman. J., Baxley, C., **Bollinger, M.**, Heil, A., LaGanke, M., Levine, E., Pearson. W., Pudlak, E., Williams, K. (2021). Evaluating the Impact of Recreational Harvest and Management Strategies for Bay Scallops *Argopecten irradians concentricus* in a Florida Gulf Coast Management Zone. Mar Coast Fish, 13: 413-432. https://doi.org/10.1002/mcf2.10161

Bollinger, M.A. and Kline, R.J. (2017). Validating side scan sonar as a fish survey tool over artificial reefs. *Journal of Coastal Research*. Coconut Creek (Florida), ISSN 0749-0208. https://doi.org/10.2112/JCOASTRES-D-16-00174.1

TECHNICAL REPORTS AND DOCUMENTS

Bollinger, M. A., Ebert, E., and Taylor, J. C. (2025). Mission Report for BOEM - Carolina Long Bay: UNCW R/V Seahawk SH-24-01 and SH-24-02: June 9-21 2024. National Oceanic and Atmospheric Administration. https://doi.org/10.25923/yw8k-mj04

Bollinger, M. A., Ebert, E., and Taylor, J. C. (2025). Mission Report for BOEM - Carolina Long Bay: NOAA Ship Nancy Foster NF-24-06: June 9-21 2024. National Oceanic and Atmospheric Administration. https://doi.org/10.25923/s0yj-2c82

Bollinger, M. A., Ebert, E., and Taylor, J. C. (2025). Cruise Report: MDBC Expedition R/V Oracle, March 11-15, 2024. National Oceanic and Atmospheric Administration. DWH MDBC Cruise Report YYYY-XX. https://doi.org/XXX

Bollinger, M.A., Coogan, J.S., Ebert, E.F., and Taylor, J.C. (2025). Data Report: MDBC Expedition NOAA Ship Pisces, AUV-VOYIS, June 27- July 6, 2024. National Oceanic and Atmospheric Administration. DWH MDBC Data Report YYYY-XX. https://doi.org/xxx

Ebert, E.F., **Bollinger, M.A.**, Coogan, J.S., and Taylor, J.C. (2025). Data Report: MDBC Expedition NOAA Ship Pisces, AUV-SAS, June 6- June 16, 2024. National Oceanic and Atmospheric Administration. DWH MDBC Data Report YYYY-XX. https://doi.org/xxx

Paxton, A.B., Ebert, E.F., **Bollinger, M.A.,** and Taylor, J.C. (In Prep, 2023). Maximizing ecological benefits of artificial reef enhancement by harnessing advanced technologies to quantify fish community patterns and develop a decision-support tool. NC Coastal Recreational Fishing License Grant: Final Report.

DETAILED DUTIES AND WORK PERFORMED*

*Detailed duties and work performed are described for each paid job and respective research projects.

Current

NOAA, NCCOS, Ground Validation in Carolina Long Bay, 2024-Present. Lead the micro UUV (uUUV) portion of the data collection for the project where the team's objective is to improve methods and identify best practices for defining and delineating low-relief hardbottom Essential Fish Habitat in wind energy areas – case study in Carolina Long Bay. Co-lead logistics with NOAA ship *Nancy Foster*'s operations, deck and survey departments. Lead data annotator and coordinating logistics on setting up an integrated software and AI annotation tool with developers.

NOAA, NCCOS, Misson: Iconic Reefs, 2021-Present. Trained M:IR field team staff in SfM diver based data collection (12/2021). Created a framework for data management and progress tracking of SfM processing. Trained dedicated M:IR SfM staff on SfM processing in Agisoft Metashape. Helped to author two NOAA tech memos on large area imaging and SfM workflows. Lead on the micro UUV (uUUV) SfM data collection part of the project.

NOAA, NCCOS, Mesophotic and Deep Benthic Communities, 2022 - Present. Lead the AUV team during the SALT3 R/V *Point Sur* mission and worked closely with Chief Scientist to optimize data collection by both the ROV team and the UUV team. Helped with preliminary data processing from the Synthetic Aperture Sonar (SAS) and data management. Served as AUV imagery lead and developed processing workflows for annotation and photogrammetry.

Completed

NOAA NCCOS, Ground Truthing in CNMI, January 2022 - July 2022. Designed and fabricated a modular drop camera (Drop-e) to be used in ground truthing and habitat map creation in the Commonwealth of the Northern Marianas Islands (CNMI). Acted as field team lead in the Saipan portion of the project. Trained Guam team in how to use and maintain the drop camera.

NOAA NCCOS, North Carolina Artificial Reefs Mapping, January 2020 - November 2023. Helped in project planning for NC Artificial Reef mapping. Acted as lead for the stereo video collection and video data manager. Processed the stereo video for fish abundance, length and fish height off seafloor. Contributed stereo video methods and diver data analysis and plots to the final report.

NOAA NCCOS, Photogrammetry/Structure from Motion, February 2019 - March 2020. Designed and executed field sampling method for deep diver based photogrammetry/ structure from motion (SfM). Processed SfM in Agisoft Metashape. Calculated small scale site characteristics from SfM products in R and ArcGIS. Completed Photogrammetry/Agisoft Metashape training in March 2020.

NOAA NCCOS, Fishery Independent Stereo Video, November 2018 - 2022. Conducted chevron trap and video trap field deployments, and processed fish samples for otoliths, gonads, weights and lengths. Designed processing workflow for fishery independent stereo video surveys. Workflow calculated fish heights and angle relative to the seafloor for novel comparison with fishery acoustics methods.

NOAA NCCOS, NPS Coral Conservation and Management Dashboard, July 2020 – March 2021. Adapted and created workflows for integrating geospatial data on coral disease and bleaching in Florida and USVI to interactive ArcGIS Online Dashboards. Created R and Python scripts for semi-automation of updating the dashboards. Trained NPS staff on operation and management of workflows as management transitioned away from NCCOS. Presented this project in a OneNOAA Seminar (3/11/21).

FWC, Bay Scallop Fishery Independent and Dependent Monitoring, June 2018 - August 2018. Conducted shallow water, fishery independent, pre- and post- recreational season surveys for bay scallops off the west coast of Florida. Conducted fishery dependent boat ramp interviews during recreational scallop season. Co-authored journal manuscript: "Evaluating the recreational harvest of Bay Scallops in a Florida gulf coast community."

FWC, Coral Restoration Long-Term Monitoring, Nursery Management, May 2016 - June 2018. Worked as part of the coral nursery maintenance team. Designed sampling methodology for a site level census of restored *Acropora cervicornis* as part of a long term restoration monitoring program. Calculated statistics related to coral survival and spatial distribution, and co-authored journal manuscript: "No Coral Left Behind: Improving monitoring methodology of long-term *Acropora cervicornis* outplant sites and identifying drivers of restoration success within a five year study." Created poster of 2017 outplant site-level comparison on Pre-Post Hurricane Irma at the 2018 Benthic Ecology Meeting.

FWC, Stony Coral Tissue Loss Disease response team, November 2017 – June 2018. Our team was one of the first to document Stony Coral Tissue Loss Disease (SCTLD) in the Florida Keys and started a disease response monitoring effort to track SCTLD progression through the Keys. Established small plots to document spread of disease between neighboring corals. Monitored all plots biweekly. Developed visualizations in R to view spread of disease within and between corals in plots. Participated in histological and tissue slurry sampling in effort to determine cause of SCTLD.

FWC/FDEP, Sponge Restoration, Nursery, Outplanting, May 2016 – June 2018. Coordinate and carry out field activities for sponge restoration of Florida Bay. Designed and executed experiments focusing on ecological optimization of sponge production and increasing success of sponge restoration. Co-author of Florida Department of Environmental Protection (FDEP) grant extending experiments on ecological function: "Restoration of Florida Bay's sponge community: Evaluating how current restoration techniques affect sponge ecological function."

TPWD ARP, Side scan sonar as a monitoring tool for artificial reefs, August 2013 – December 2015. Completed my Master's thesis on project for Texas Parks and Wildlife Department (TPWD) Artificial Reef Program (ARP). Developed a novel method to use a relatively inexpensive Humminbird side scan echosounder to survey fish communities at artificial reefs. Wrote reproducible Python code to automate the processing of the side scan sonar data. Rewired, soldered and created water-tight seals on the side scan sonar to extend the transducer cable and connect to the towfish. Used SPSS and Primer-e for statistical analyses. Prepared and gave presentations in both professional and public venues. Wrote reports and published a peer reviewed journal manuscript: "Validating side scan sonar as an artificial reef survey tool." Awarded travel assistantship to attend the 2014 Bioacoustics Summer School (SeaBASS) in Leesburg, VA.

PROFESSIONAL TRAINING, MISSIONS, SERVICE

PROFESSIONAL TRAINING

2024	36-hour RTsys NemoSens uUUV Training
2024	First Aid/CPR/AED/O2 Administration, DAN
2023	8-hour NOAA Small Boat Component Course
2023	24-hour BAE Riptide uUUV Training
2021	200-hour Unmanned Maritime Systems Certification- Univ. of Southern Mississippi
2020	4-hour US DOT Hazmat Shipping Training
2020	30-hour Agisoft Metashape Training
2020	40-hour R and Python Machine Learning, Udemy
2019	NOAA Diver Field Training

SOFTWARE PROFICIENCY

Adobe Illustrator, Adobe Photoshop, Adobe Lightroom, Adobe Premier, Agisoft Metashape, ArcGIS Pro, ArcGIS Online, CloudCompare, CVision AI TATOR, DaVinci Resolve, Endnote, FreeCAD, FormLabs PreForm, Github, Google Earth, Google Suite (Docs, Sheets, Slides, Forms, Drawings), Hypack, ImageJ, Matlab, Microsoft Suite (Access, Excel, Powerpoint, Visual Studio Code, Word), OpenCPN, Primer, Python, PyCharm, QPS Suite, R, R Studio, RTools, RTsys Cousto, SeaGIS CAL, SeaGIS Event Measure, SeaTrac PinPoint, Taglab, VCarve Pro, VOYIS View LS, Viscore

AT SEA RESEARCH MISSIONS*

2025	R/V *Expedition*: Mesophotic and deep benthic communities, July 20-29, August 11-27, September 4-12, *Imagery Analyst, SAS Analyst*
2024	NOAA ship *Nancy Foster*: Carolina Long Bay ground validation June 10-21, *AUV Lead*
2023	NOAA ship *Pisces:* Mesophotic and deep benthic communities, July 2-8
2022	R/V *Point Sur:* Mesophotic and deep benthic communities, October 2-14, *AUV Lead*
2022	NOAA ship *Nancy Foster:* NC Artificial Reefs, June 5-19
2022	*R/V JAMS Saipan*: N. Marianas Islands Ground Validation, April 14- May 9, *Field Team Lead*
2021	NOAA ship *Nancy Foster:* NC Artificial Reefs, June 18-29
2019	NOAA ship *Nancy Foster:* rocky and artificial reef assessments, September 21-29
2019	NOAA ship *Pisces*: SE Reef Fish Independent Survey, September 15-29
2019	R/V *Savannah:* SE Reef Fish Independent Survey, June 2-13
2018	M/V *Makai:* Dry Tortugas Coral Surveys, April 3-6

2017 M/V *Makai:* Dry Tortugas Coral Surveys, June 3-8
2014 M/V *Fling:* Characterization of S. Texas Banks, September 7-11
2013 M/V *Fling:* Fish and ROV surveys Flower Garden Banks, September 2-6
* multi-day, overnight research cruises; excludes day trips

REVIEWS

Methods in Ecology and Evolution, NOAA Technical Memorandums

PROFESSIONAL SOCIETIES

Southeast Acoustics Consortium

COLLABORATORS

Principal Investigators:
Bureau of Ocean Energy Management: B. Jensen
NOAA Florida Keys National Marine Sanctuary: A. Bruckner, A. Ellis, M. Lawrence
NOAA National Centers for Coastal Ocean Science: T. Battista, B. Costa, C. Menza, J.C. Taylor, P. Etnoyer, T.S. Viehman
NOAA Southeast Fisheries Science Center: N.M. Bacheler, S. Harter, G.T. Kellison, Z. Schobernd, R. Caillouet
University of Alabama and Dauphin Island Sea Lab: C. Froehlich
University of New Hampshire: Miksis-Olds, J.
University of North Carolina Wilmington: J. White, S. Flounders
University of Texas Rio Grande Valley: D. Hicks, R. Kline
Woods Hole Oceanographic Institute: G. Packard, Y. Girdhar

REFERENCES

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