

COURTNEY NICOLE KLEPAC, Ph.D.

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EDUCATION

- 2014 – 2020 Old Dominion University (ODU), Norfolk, VA
Ph.D. Ecological Sciences, Thesis: Not too hot, not too cold, but moderately variable: the influence of environmental variability on coral thermal tolerance
- 2012 – 2014 Florida Atlantic University at Harbor Branch Oceanographic Institute (HBOI), Ft. Pierce, FL
M.S. Biological Sciences, Thesis: Characterization of symbiotic algae, genus *Symbiodinium* in corals at St. Lucie Reef, Florida
- 2004 – 2008 Texas A&M University at Galveston (TAMUG), Galveston, TX
B.S. Marine Biology, Minor: Art

PUBLICATIONS

- Klepac C.N.**, Beal J., Kenkel C.D., Sproles A., Polinski J.M., Williams M.A., Matz M.V., Voss J.D. (2015) Seasonal stability of coral-*Symbiodinium* associations in the subtropical coral habitat of St. Lucie Reef, Florida. *Marine Ecology Progress Series* 532:137-151. <https://doi.org/10.3354/meps11369>
- Klepac, C.N.**, Barshis D.J. (2020) Reduced thermal tolerance of massive coral species in a highly variable environment. *Proc. R. Soc. B* 287: 20201379. <http://dx.doi.org/10.1098/rspb.2020.1379>
- Fifer, J., Bui, V., Berg, J.T., Kriefall, N., **Klepac, C.N.**, Bentlage, B., & Davies, S.W. (2022) Microbiome structuring within a coral colony and along a sedimentation gradient. *Frontiers in Marine Science*, 2071. <https://doi.org/10.3389/fmars.2021.805202>
- Klepac, C.N.**, Barshis, D.J. (2022) High-resolution in situ thermal metrics coupled with acute heat stress experiments reveal differential coral bleaching susceptibility. *Coral Reefs* 1-13. <https://doi.org/10.1007/s00338-022-02276-1>
- Klepac, C.N.**, Eaton, K.R., Petrik, C.P., Arick L., Hall E.R., Muller, E.M. (2023) Symbiont composition and coral genotype determines the performance of restoration massive coral species under end-of-century climate scenarios. *Frontiers in Marine Science*. <https://doi.org/10.3389/fmars.2023.1026426>
- Hoadley, K., Lockridge, G., McQuagge, A., Pahl, K.B., Lowry, S., Wong, S., Craig, Z., Petrik, C., **Klepac, C.N.** and Muller, E. (2023) A phenomic modeling approach for using chlorophyll-a fluorescence-based measurements on coral photosymbionts: a step towards bio-optical bleaching prediction. *Frontiers in Marine Science* 10:1092202. <https://10.3389/fmars.2023.1092202>
- Evensen, N.R., Parker, K.E., Oliver, T.A., Palumbi, S.R., Logan, C.A., Ryan, J.S., **Klepac, C.N.**, Perna G., Warner, M.E., Voolstra, C.R., Barshis, D.J. (*in review*) The Coral Bleaching Automated Stress System (CBASS): a low cost, portable system for the standardized empirical assessment of coral thermal limits. *Limnology and Oceanography Methods*.

RESEARCH & PROFESSIONAL EXPERIENCE

- 02/2021 – 03/2023 **Coral Resilience Postdoctoral Researcher**, Mote Marine Lab-International Center for Coral Reef Research and Restoration, Summerland Key FL
Project manager and lead for multiple-length (22hr, 1-mo, 2-mo) fully factorial stress experiments of ocean warming and/or acidification on nursery coral species; constructed 8 closed-system experimental aquaria outfitted with Arduino temperature controllers (CBASS); large-scale coral ramet sampling for genetic analyses; restoration trial monitoring; coral holobiont respirometry and photosynthesis measurements; coral and algal physiological trait (photosynthetic

pigment concentration, photochemistry, host total soluble protein, host carbohydrate, skeletal growth) measurements and analyses; managed and trained interns and staff on DNA extractions, experimental system construction, coral sample processing; field experiment outplanting sexual recruits with tolerant symbionts to inshore patch reef; management of multi-year large-scale resilience screening phenotype data; grant, report, and manuscript writing

06/2015 – 08/2019

Research Assistant, ODU, Norfolk, VA

Constructed 8 closed-system experimental aquaria and three 200-500 gallon coral husbandry aquaria; logistics for four field research trips to American Samoa; large-scale coral ramet sampling and/or transplantation effort in American Samoa and Red Sea; coral taxonomic and bleaching surveys; conducted 25 acute (22hr) and two chronic (14 day) bleaching stress experiments; pulse amplitude modulated (PAM) fluorometry measurements; coral holobiont respirometry and photosynthesis measurements; processed coral samples for chlorophyll and soluble protein quantification; extraction of genetic material; sample library preparation for MiSeq, Sanger, and mRNASeq sequencing; bioinformatics pipelines of ITS2 amplicon, mtDNA, and 100bp paired-end RNA sequences; statistical analyses with biological, physiological, and environmental datasets

06 – 08/2018

Survey Diver, NOAA NMFS/PIFSC/ESD, Honolulu, HI

NOAA survey diver and field technician for the 2018 American Samoa Rapid Assessment and Monitoring Program (ASRAMP) as a NOAA diver for the Ocean & Climate Change team; deployed and retrieved the following climate station instruments: subsurface temperature recorders (STR), calcification accretion units (CAU), bioerosion monitoring units (BMU), acoustic Doppler current profiler (ADCP), ecological acoustic recorder (EAR), programmable underwater collector (PUC) and Autonomous Reef Monitoring Structures (ARMS); collected water samples for total alkalinity and dissolved inorganic carbon; CTD casts; conducted habitat rugosity, complexity, and photoquadrat surveys; assisted with photo mosaic surveys

2014

Research Assistant, FAU-HBOI, Ft. Pierce, FL

Collected coral, mucus, and disease samples at various Florida reefs; NCRMP coral monitoring surveys along the Florida Keys reef tract; conducted a closed-system factorial disease and heat stress experiment; processed Symbiodiniaceae for density and chlorophyll quantification; DNA extraction and targeted amplicon sequencing of coral-associated Symbiodiniaceae; bioinformatics pipelines; MCMCglmm, PERMANOVA, and PCA analyses of genetic data; generated and analyzed water quality data; calibrated equipment

08/2010 – 10/2011

Field Technician, Cardno ENTRIX, Houston, TX

Participated in 7 research cruises spanning 2 weeks to 2months in response to the Gulf of Mexico Deepwater Horizon event; offshore water quality, zooplankton, ichthyoplankton, and nekton sampling using net-based (MOCNESS, Bongo, Neuston) and/or imaging (in situ ichthyoplankton imaging system) instruments; CTD casts; current measurements; site and sample data reporting, management, and transfer for legal purposes on behalf of BP Exploration and Production; shoreline assessment of weathered oil media

08/2009- 08/2010

Eco-Art Educator, The Artist Boat, Galveston, TX

Instructed and led eco-tour kayak excursions through coastal wetlands; implementation of 10 acres of coastal prairie restoration; citizen science-based water quality measurements; organized and managed public kayak and volunteer

programs; delivered Eco-Art workshops; installed large-scale student artwork at school campuses

TEACHING EXPERIENCE

- 2017 – 2020 **Teaching Assistant – Invertebrate Zoology Lab**, ODU, Norfolk, VA
 Instructed two sections on major invertebrate phyla identification and comparative physiology; organized two field excursions to observe local invertebrate fauna; designed assignments and exams; managed grades
- 08/2014 – 05/2015,
 01 – 03/2018 **Teaching Assistant – General Biology Lab**, ODU, Norfolk, VA
 Instructed three lab sections on fundamental biology concepts in a comprehensive framework; managed grades
- 2012 **Teaching Assistant – Biological Principles Lab**, FAU, Boca Raton, FL
 Instructed two sections on fundamental biology concepts; developed weekly lab practicals; managed grades
- 08/2009 – 08/2010 **Eco-Educator – The Artist Boat**, Galveston, TX
 Taught grammar school students and public participants about local ecology, stewardship, habitat restoration, kayaking, and naturalist art techniques; TAKS and TEKS curriculum development

SKILLS & CERTIFICATIONS

- Field** AAUS Scientific Diver 100' (162 dives), NOAA diver (74 dives), NAUI SCUBA Open Water, PADI SCUBA Advanced & Rescue; ACA Level 2 kayaker; Trimble and Garmin; coral reef ecosystem surveys; line, quadrat, and radial transect percent cover assessment; Bongo, Neuston, MOCNESS (1m, 3m, 10m), and Otter trawling; SOP of sediment, plankton, water, and oil/oiled media sampling; water quality testing; pneumatic coral coring and coral biopsy sampling; underwater photography; wetland delineation; dune, coastal prairie, salt marsh restoration; epifauna recruitment traps
- Laboratory** 3D scanning and photogrammetry; microbial culturing; Pulse Amplitude Modulated (PAM) fluorometry; oxygen electrode measurements; large-scale sample processing and preservation, photosynthetic pigment and soluble protein extraction and quantification; DNA & RNA isolation and purification; qPCR, LHPCR, gradient PCR; gel electrophoresis; MiSeq, Sanger, and RNA-Seq, sequencing library preparation; stock reagent production; image analysis
- Computational** Linux/Unix, Terminal, R, SPSS, SAS, MatLab, CPCe, Geneious, Sequencher, PopART, Microsoft Office package, Adobe Lightroom, Photoshop, Illustrator; Computing Languages: unix shell, python, R
- Miscellaneous** DAN First Aid and CPR, and Emergency O₂; boat trailering and piloting; on-campus installations of large-scale student artwork; coral tank construction including PVC plumbing and electrical wiring; Arduino board temperature controller assembly

GRANTS, AWARDS, & FELLOWSHIPS

- 04/2022 Protect Our Reefs Grant; \$30,000
- 06/2021 NOAA SBIR Phase II Grant; \$500,000
- 11/2019 ODU 3-Minute-Thesis "People's Choice" Award; \$500
- 04/2019 ODU Graduate Research Day Poster Award; \$300

08/2018 – 05/2019	Virginia S. Bagley Scholarship, ODU; \$4,000
08/2016 – 05/2017	Dominion Graduate Scholarship, ODU; \$18,000
01/2016	Women Divers Hall of Fame Scholarship; \$2,000
08/2015 – 12/2017	NOAA Coral Reef Conservation Program – Domestic Coral Reef Conservation Grant; \$65,000
02/2014	Graduate Student Poster Award, Indian River Lagoon Symposium
08/2013 – 05/2014	Graduate Fellowship of Academic Excellence, FAU; \$2,000
08/2013 – 05/2014	President's Challenge Award, FAU; \$20,000
11/2012 – 05/2013	Dr. G. Alex & Carla Marsh Scholarship, FAU; \$5,000
01/2012 – 05/2014	FAU Graduate Grant, FAU; \$2,000

INVITED LECTURES, OUTREACH, & SERVICE

2022	Master's Thesis External Committee Member for Louis Scheckler, Smith College
2022	Coral Resilience Research, College of Florida Keys, Key West, FL, and Mote Volunteers, virtual
2021	Mote's OceanFest, Islamorada, FL
2019	Career Day & World Oceans Day, Virginia Aquarium, Virginia Beach, VA
2015 & 2019	Scorekeeper – National Ocean Sciences Bowl, VIMS, Gloucester, VA
2016 – 2018	Earth Day Booth, St. Patrick's Catholic School, Norfolk, VA
2018	Invited speaker, Northhampton High School, Eastville, VA
2017	Marshfest, Chincoteague Bay Field Station, Chincoteague, VA
2017	Curiosity Cart, Virginia Aquarium, Virginia Beach, VA
2016	Invited speaker, American Samoa Community College & National Park of American Samoa, Tutuila, AS

PROFESSIONAL MEETINGS & WORKSHOPS

2022	Klepac, C. , Koch, H., Bartel, E., Walter, C., Muller, E.M. Can Florida's inshore reefs be restored by tolerant corals? Investigating symbiont dynamics as a mechanism of increased thermal resilience. Reef Futures, Key Largo, Florida
2022	Klepac, C. , Petrik, C., Muller, E.M. Phenotypic and genotypic responses of restoration <i>Acropora cervicornis</i> under long-term and rapid thermal stress. ICRS 15 th International Coral Reef Symposium, Bremen, Germany
2021	Klepac, C. Biological Response: Sensitivity and the adaptive capacity to ocean acidification. 2021 SOCAN Virtual Workshop
2021	Klepac, C. , Barshis, D.J. At the tipping-point: high-frequency temperature variability exceeds upper thermal limits of tolerant corals. ICRS 14 th International Coral Reef Symposium, Virtual
2020	Klepac, C. , Barshis, D.J. Decreased thermal tolerance in corals from high-frequency variable environments. Society of Integrative and Comparative Biology Meeting, Austin, TX
2019	Klepac, C. , Barshis, D.J. Shifting Baselines in coral bleaching resilience (poster). Society of Integrative and Comparative Biology Meeting, Tampa, FL
2017	Klepac, C. , Barshis D.J. Physiological Evidence of Local Adaptation in the Massive Corals <i>Porites lobata</i> and <i>Goniastrea retiformis</i> from Ofu Island, American Samoa.

- Haymaker C., Barshis D.J., **Klepac C.**, Baker A. Algal endosymbiont diversity in the common reef-building coral *Goniastrea retiformis* ten years after experimental bleaching.
Benthic Ecology Meeting, Myrtle Beach, SC
- 2016 **Klepac, C.**, Barshis D.J. The timeline of thermal acclimatization in American Samoan corals: how long does it take to gain bleaching resistance?
ISRS International Coral Reef Symposium & Coral Bleaching Working Group
Honolulu, HI
- 2015, 2017 **Klepac, C.**, Barshis, D.J. Assessing resilience to climate change in American Samoa corals.
Biology Graduation Student Organization Symposium, Norfolk, VA
- 2015 IGS Transcriptomics Analysis Workshop, University of Maryland Baltimore, MD
- 2015 **Klepac, C.**, Voss J., Beal J. Seasonal stability of coral-*Symbiodinium* associations in the subtropical coral habitat of St. Lucie Reef, Florida.
Symbiosis Workshop, Yosemite, CA
- 2014 **Klepac, C.**, Voss J., Beal J. Coral and zooxanthellae responses to seasonal fluctuations and freshwater discharge
Benthic Ecology Meeting, Jacksonville, FL
- 2014 Society of Integrative and Comparative Biology Conference, Austin, TX
- 2013 Art of Gene Expression and Analysis, Mote Marine Laboratory, FL
- 2012 – 2014 **Klepac, C.**, Voss J., Beal J. The effects of stormwater runoff and seasonal fluctuations on zooxanthellae populations in host corals at St. Lucie Reef, FL (2014)
Indian River Lagoon Symposium, HBOI, Ft. Pierce, FL

PROFESSIONAL AFFILIATIONS

Benthic Ecology Meeting Society, Society of Integrative and Comparative Biology, International Coral Reef Studies, Divers Alert Network