


Anne Hansen

California State University, Monterey Bay — Undergraduate Researcher

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EDUCATION

California State University, Monterey Bay (CSUMB), Seaside CA

May 2025

College of Science, B.S., Marine Science Major, Computer Science Minor

GPA: 3.84/4.0

RESEARCH INTERESTS

Arctic Surface Mixing - turbulence within the Upper-Ocean of the Arctic, the sources of that turbulence, and how the resulting energy transfer affects ice melt

Seagrass Ecology - investigating the processes that affect the health and distribution of seagrass, expanding the accessibility of seagrass management

Marine Sensor Networks - developing sensor systems to measure parameters in submerged environments, focusing on unique methods of data transmission

RESEARCH PROJECTS

Seagrass Ecology and Modeling — *Biological Oceanography Lab*

June 2022 - Present

California State University, Monterey Bay, Seaside CA

Principal Investigator: Sherry Palacios, Ph.D.

Funded by the US Department of Education Hispanic-Serving Institution Grant (#P031C160221)

Project 1: *Translation of Grasslight: A Seagrass Population Model*

- Translating an existing computer program designed to analyze and predict seagrass populations from Fortran to Python
- Updating the software to explore further parameters like Carbon Dioxide Levels, Calcium Carbonate Solubility, and Alkalinity to increase accuracy of predictions
- Organizing Subroutines to optimize memory and performance
- Increasing the accessibility of seagrass ecology, removing previous monetary barriers

Outcome: Open-source and accessible submerged canopy model that can improve current seagrass management protocol

Project 2: *Fortran to Python Source-to-Source Compiler*

- Research compiler structure
- Design a source to source compiler
- Optimize program for Object-Oriented Programming
- Prioritize Sustainability and Affordability of the Software

Outcome: Compiler that can translate ecological modeling software from Fortran to Python to increase its accessibility

Project 3: *Measuring Irradiance and Productivity of Zostera Marina Canopies*

- Construct an environmental data logger with Arduino products and low-cost sensors
- Use epoxy and 3D printed housing to water and pressure-proof sensors
- Design a series of surveys complying with the needs of sensitive estuarine habitat

Anne Hansen

- Program mobile-based software to access real-time data from logger in the field
- Model relationship between turbidity, light, temperature and depth in seagrass meadows

Outcome: Provide research institutions and coastal management with low-cost instrumentation to survey seagrass meadows, increasing overall access and spatial resolution of surveys

California Subtidal Community Surveys — *Marine Biogeography Capstone*

Aug 2024 - Dec 2024

California State University, Monterey Bay, Seaside CA

Principal Investigator: James Lindholm, Ph.D.

Project 1: *Latitudinal Changes in California's Subtidal Communities*

- Execute fish video, invertebrate swath, and Universal Point Count (UPC) transects in several central and Southern California survey sites
- Wrangle, analyze and visualize data to determine latitudinal and temporal shifts in species and habitat composition
- Collaborate with Intertidal researchers to create a holistic view of warming impacts on the coastline

Outcome: Annual report on latitudinal changes in fish, invertebrate, and habitat composition and abundance, with additional oral dissemination to CSUMB community at Fall Capstone Festival

Arctic Mixing Visualization and Analysis — *Ocean Mixing Research Group*

June 2023 - Aug 2023

Oregon State University, Corvallis OR

Principal Investigator: Brodie Pearson, Ph.D.

Funded by the National Science Foundation (#2242815)

Project 1: *Visualization of Wave-Driven Surface Mixing in the Arctic*

- Characterize the relationship between waves and sea-ice in the Arctic
- Visualize nondimensional parameters like stokes drift and Langmuir Number to quantify Langmuir Circulation both on the edges and within the ice sheet
- Define the Wave-Shear Ratio, which better displays variation within wave-driven mixing

Outcome: Series of visualizations and non-dimensional parameters that map wave-driven mixing in the Arctic Circle to improve accuracy of current climate models

COURSE-BASED UNDERGRADUATE RESEARCH PROJECTS

Arctic Mixing Geospatial Mapping — *ENVS 332: Intro to GIS/GPS*

Fall 2023

California State University, Monterey Bay, Seaside CA

Course Instructor: Joshua Beasley

Spatial Analysis of the Effect of Wave, Shear, and Convection-Driven Surface Mixing on the Arctic Ice-Sheet

- Leverage nondimensional parameters to quantify surface mixing in the upper-ocean
- Design models in ArcGIS Model Builder to apply same spatial analysis over time scales
- Compute and assign custom Geographic and Projected Coordinate Systems to data in the NetCDF file format

Terrestrial Hemiparasite Analysis — *BIO 211: Ecology, Evolution and Biodiversity*

Fall 2023

California State University, Monterey Bay, Seaside CA

Course Instructor: Erin Stanfield

Anne Hansen

Exploring the correlation between Castilleja latifolia populations and potential favored hosts

- Collect terrestrial plant data using point transect method
- Investigate correlations between several terrestrial species by programming tests in R
- Create accurate and easy-to-interpret visualizations including bar and correlation plots

ORAL PRESENTATIONS

Hansen, Anne (2023) Mapping the Influence of Wave-Induced Ocean Surface Mixing in the Arctic through Non-Dimensional Parameters. *College of Earth, Ocean, and Atmospheric Sciences (CEOAS) Summer REU Symposium 2023*, Oregon State University.

Hansen, Anne (2023) Increasing Accessibility of Seagrass Ecology through Source-to-Source Compiling. *Undergraduate Research Opportunities Center (UROC) Spring Showcase*, California State University, Monterey Bay.

Hansen, Anne (2024, *Upcoming*) Annual Latitudinal Survey of Subtidal Communities Along the California Coast. *Marine Science Fall Capstone Festival*, California State University, Monterey Bay, Seaside, CA.

POSTER PRESENTATIONS

Hansen, Anne (2022) Introducing Open Source Programming to Seagrass Ecology — Do Paywalls Belong in the Fight for our Climate?. *Undergraduate Research Opportunities Center (UROC) Summer Symposium*, California State University, Monterey Bay, Seaside, CA.

Hansen, Anne (2024) Shining a Light: Measuring Light Absorption and Irradiance through Eelgrass, *Zostera Marina*, meadows. *Undergraduate Research Opportunities Center (UROC) Spring Showcase*, California State University, Monterey Bay, Seaside, CA.

Hansen, Anne (2024) Applications of Low-cost Sensors in Shallow Underwater Sensor Networks for Monitoring Submerged Canopies. *Undergraduate Research Opportunities Center (UROC) Summer Symposium*, California State University, Monterey Bay, Seaside, CA.

Hansen, Anne (2024) Mapping the Influence of Wave-Induced Ocean Surface Mixing in the Arctic through Non-Dimensional Parameters. *2024 Goldwater Symposium*, Remote Conference.

Hansen, Anne (2024) Shining a Light: Measuring Light Absorption and Irradiance through Eelgrass, *Zostera Marina*, meadows. *Council for Ocean Affairs, Science, and Technology (COAST) Annual Meeting*, California State University (CSU) Chancellor's Office, Long Beach, CA.

Hansen, Anne (2024) Shining a Light: Measuring Light Absorption and Irradiance through Eelgrass, *Zostera Marina*, meadows. *Western Society of Naturalists (WSN) Conference*, Hilton DoubleTree, Portland, OR.

CLASSROOM PUBLICATIONS

Hansen, Anne (2022) "Walking the Fishing Line," *Writing Waves*: Vol. 4, Article 24. Available at: <https://digitalcommons.csumb.edu/writingwaves/vol4/iss2/24>

Hansen, Anne (2022) "Running Out of Spoons," *Writing Waves*: Vol. 4, Article 14. Available at: <https://digitalcommons.csumb.edu/writingwaves/vol4/iss2/14>

Anne Hansen

HONORS AND AWARDS

Undergraduate Field Experiences Grant , CSU Council on Ocean Affairs, <i>Science & Technology (COAST)</i>	<i>October 2024</i>
Travel Scholarship , 2024 NDiSTEM Conference	<i>October 2024</i>
Runner-up Best Poster , 2024 Goldwater Symposium	<i>August 2024</i>
Scholar , Barry Goldwater Scholarship	<i>March 2024 - Present</i>
Research Scholar , CSUMB Undergraduate Research Opportunities Center	<i>Fall 2022 - Present</i>
CSU Louis Stokes Alliance for Minority Participation (LSAMP) , Monterey Bay	<i>Spring 2022 - Present</i>
Dean's List , CSUMB College of Science	<i>Fall 2021 - Present</i>

LEADERSHIP AND COMMUNITY IMPACT

Service Learner , Habitat Stewardship Project, Monterey Bay	<i>Feb 2024 - May 2024</i>
<ul style="list-style-type: none">- Plant native species to increase biodiversity and ecological resilience- Clean and restore local watershed through clean-up and waste sorting events- Instruct middle and high school volunteers on effective environmental stewardship through community outreach	
Service Learner , Everyone's Harvest	<i>Sep 2023 - Dec 2023</i>
<ul style="list-style-type: none">- Teach children about wildlife native to Monterey with activities provided by the Pacific Grove Museum of Natural History- Complete Electronic Benefit Transfer (EBT) Transactions to provide customers with easy access to affordable fruits and vegetables through certified farmers' markets	
President , CSUMB Alpha Lambda Delta Honors Society	<i>Aug 2022 - May 2023</i>
<ul style="list-style-type: none">- Compile and advertise educational resources for members- Plan and lead bi-monthly membership meetings- Present on career opportunities at campus events including Freshman Convocation and Outstanding Otters	
Peer Mentor , CSUMB Mentor Collective	<i>Aug 2022 - May 2023</i>
<ul style="list-style-type: none">- Introduce research-related resources and support to mentees- Acclimate First-Year students to the coursework and requirements- Alert collective to socioeconomic barriers mentees are facing at CSUMB	
Room Leader , National Ocean Science Sea Lion Bowl	<i>Dec 2021 - Feb 2022</i>
<ul style="list-style-type: none">- Leading meeting by maintaining strict procedure- Attending required training sessions to ensure event runs smoothly- Creating an engaging online environment for attendees	

TECHNICAL SKILLS

Programming and Software Development

- Languages (in order of decreasing proficiency): Python, R, C++, Java
- Integrated Development Environments (IDEs): Visual Studio Code, RStudio, IntelliJ
- Version Control System(s): Git, Github

Anne Hansen

Spatial Visualization and Analysis

- Programs: Python, ArcGIS, QGIS, NASA Panoply
- File types: NetCDF, Esri Shapefiles, GeoTIFF, ArcGIS Geodatabases
- Special Skills: ArcGIS Modelbuilder

Fieldwork and Data Collection

- Terrestrial: Auto-level Survey, Total Station Survey, Real Time Kinematic GNSS, Universal Point Count Transect, Behavioral Scan and Focal Survey
- Subtidal: Universal Point Count Transect, Universal Visual Census Transect, Quadrat Sampling, Video Transects

TRAINING AND CERTIFICATIONS

Data Science and Machine Learning , <i>Massachusetts Institute of Technology Institute for Data, Systems, and Society</i>	<i>In-progress</i>
Diving First Aid for Professionals , <i>Divers Alert Network</i>	<i>Nov 2024</i>
Scientific Diver , <i>American Academy of Underwater Sciences</i>	<i>May 2024</i>
Master SCUBA Diver , <i>National Association of Underwater Instructors</i>	<i>May 2023</i>
Nitrox SCUBA Diver , <i>National Association of Underwater Instructors</i>	<i>May 2023</i>
Rescue SCUBA Diver , <i>National Association of Underwater Instructors</i>	<i>Dec 2022</i>
Advanced Open Water SCUBA Diver , <i>National Association of Underwater Instructors</i>	<i>Dec 2022</i>
Responsible Conduct of Research , <i>Collaborative Institutional Training Initiative (CITI)</i>	<i>June 2022</i>
Open Water SCUBA Diver , <i>National Association of Underwater Instructors</i>	<i>Dec 2021</i>
Learn the Command Line , <i>Codecademy</i>	<i>Dec 2021</i>
Learn Statistics with Python , <i>Codecademy</i>	<i>Dec 2021</i>
Learn Python 3 , <i>Codecademy</i>	<i>Nov 2021</i>