


# Anne Hansen

California State University, Monterey Bay — Undergraduate Researcher

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## EDUCATION

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**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

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**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

**Material Programming** - encoding physical materials to react to their surrounding environment, allowing for functions such as self-assembly

## RESEARCH PROJECTS

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**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

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- 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

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*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

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**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

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**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, *Upcoming*) 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

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**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>

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## HONORS AND AWARDS

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

## LEADERSHIP AND COMMUNITY IMPACT

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

## TECHNICAL SKILLS

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### 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

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## 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

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