

Results of imaging flow cytobot (IFCB) analysis of biovolumes of key phytoplankton taxa from waters collected near study sites along the rocky intertidal on the Oregon coast in 2023 and 2024

Website: <https://www.bco-dmo.org/dataset/994284>

Data Type: Other Field Results

Version: 1

Version Date: 2026-03-03

Project

» [RAPID: A subtle epidemic: unique mortality of *Mytilus californianus* on the Oregon coast](#) (Scattered mussel mortality)

Program

» [Partnership for Interdisciplinary Studies of Coastal Oceans](#) (PISCO)

Contributors	Affiliation	Role
Menge, Bruce A.	Oregon State University (OSU)	Principal Investigator
Rothman, Brenna	Oregon State University (OSU)	Scientist
Vinton, Audrey	University of Washington (UW)	Scientist
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract

This data set contains results of imaging flow cytobot (IFCB) analysis of biovolumes of key phytoplankton taxa from waters collected near study sites along the rocky intertidal on the Oregon coast. Study sites include: Fogarty Creek, Boiler Bay, Yachats Beach, Strawberry Hill, Tokatee Klootchman, Cape Blanco, Rocky Point, and Kibesillah Hill. Data were generated via field sampling and lab processing from 2023 to 2024. These data were collected to quantify the mortality pattern and attempt to determine the cause.

Table of Contents

- [Coverage](#)
- [Dataset Description](#)
 - [Methods & Sampling](#)
 - [BCO-DMO Processing Description](#)
- [Parameters](#)
- [Instruments](#)
- [Project Information](#)
- [Program Information](#)
- [Funding](#)

Coverage

Location: Rocky intertidal on the Oregon coast

Spatial Extent: N:44.8444 E:-124.0718 S:44.2525 W:-124.12

Temporal Extent: 2023-09-13 - 2024-06-06

Methods & Sampling

Collection and analysis of "live" (unprocessed) water samples and separate preserved water samples for assessment of potential toxin-producing phytoplankton was done monthly. Samples were processed by Dr. Eli Meyer of Aquabiomics Inc. (Junction City, OR), by Dr. Ralph Elston of Aquatechnics (Carlsborg, WA), by Dr. Maria Kavanaugh of OSU's College of Earth, Ocean, and Atmospheric Sciences (Seascape Ecology Lab), and Dr. Manuel Garcia-Jaramillo in the Department of Environmental and Molecular Toxicology at OSU.

IFCB sampling following Dr. Kavanaugh's protocol: replicate (n = 3) bottle samples were collected at each site in September and November 2023, and in January, February, and June 2024. Dataset rows are from replicate bottle samples. Live samples are allowed to settle, then processed using Image FlowCytoBot (IFCB) sampling for the presence and abundance of preservation-sensitive phytoplankton (e.g., "naked" flagellates). Hardier plankters can be examined in both live and preserved samples.

Dataset rows: Each row corresponds to an instrument run. Generally, that would be one per sample bottle, but on occasion, samples would be run in duplicate (e.g., if the instrument had an issue with the first run), in which case a single sample might be accounted for in more than one row. The date is embedded in the File ID.

BCO-DMO Processing Description

2026-03-03: These data have been received and are currently being processed.

[[table of contents](#) | [back to top](#)]

Parameters

Parameters for this dataset have not yet been identified

[[table of contents](#) | [back to top](#)]

Instruments

Dataset-specific Instrument Name	Imaging FlowCytoBot, McLane Scientific
Generic Instrument Name	Imaging FlowCytobot
Dataset-specific Description	Gain settings: PMT A: 0.65, PMT B: 0.55. PMT thresholds: PMTA: 0.15, PMTB: 0.14. Flow rate of 5 ml/20 min per sample. Subset of samples were live seawater samples with no preservative, most were fixed in paraformaldehyde (0.4% final concentration).
Generic Instrument Description	The Imaging FlowCytobot (IFCB) is an in-situ automated submersible imaging flow cytometer that generates images of particles in-flow taken from the aquatic environment. https://mclanelabs.com/imaging-flowcytobot/

[[table of contents](#) | [back to top](#)]

Project Information

RAPID: A subtle epidemic: unique mortality of *Mytilus californianus* on the Oregon coast (Scattered mussel mortality)

Coverage: Rocky intertidal shores of Oregon and northern California

NSF Award Abstract:

On temperate rocky shores, mussels are a 'foundation' species, serving as prey for multiple predators, able to filter particles out of huge volumes of water, and harboring hundreds of other species, thereby serving a central role in community function. Hence, threats to their abundance and persistence are of significant ecological and societal concern. Past research has shown that mussels are highly resilient and well-adapted to

acute, short-lived stresses such as disturbance from winter storms or short-term warming. In summer 2023, a novel pattern of mortality was discovered during routine field research: high numbers of dead mussels, many with tissue remaining in the shell were observed in a scattered pattern. That is, rather than a mass mortality (i.e., all mussels in a large area are killed), single dead mussels surrounded by live and apparently healthy mussels occurred, with multiple dead individuals per square meter. This project investigates the cause of the mortality event, which preliminary data suggests may be a harmful algal bloom. The project also builds capacity by supporting research training for several undergraduate students and informs the public and resource managers about an emerging threat to the stability of rocky intertidal ecosystems.

The hypothesis under investigation is that the 2023 'scattered' mortality event at 8 study sites along the Oregon and northern California coasts affecting the rocky intertidal dominant, *Mytilus californianus*, may be an unusual consequence of a harmful algal bloom. During this event, densities of dead mussels have ranged from 0.7 to 10.6/m². This novel pattern contrasts with typical mass mortalities of organisms where all individuals within a specific site or area die due to (e.g.) thermal stress or severe storms. The scattered mortality pattern persisted through late September 2023. Preliminary histological evidence suggests the ability of mussels to digest food is being suppressed, most likely by a water-borne toxin. To investigate the cause of the mortality event, the team is (1) collecting monthly (a) water samples for identification of dinoflagellate species and (b) mussel tissue samples for histological investigation of digestive and kidney tissues and high performance liquid chromatography and mass spectrometry analyses for the presence of algal-derived toxins; (2) continuing mussel bed surveys to determine the seasonality of the mortality event; and (3) quantifying mussel bed persistence through winter storms at sites with higher or lower rates of mortality. This research advances understanding of community responses to intense environmental stresses and how these might influence the future of rocky intertidal ecosystems.

[[table of contents](#) | [back to top](#)]

Program Information

Partnership for Interdisciplinary Studies of Coastal Oceans (PISCO)

Website: <http://www.piscoweb.org/>

Coverage: West coast of North America from Mexico to Alaska

The Partnership for Interdisciplinary Studies of Coastal Oceans is a long-term ecosystem research and monitoring program established with the goals of:

- understanding dynamics of the coastal ocean ecosystem along the U.S. west coast
- sharing that knowledge so ocean managers and policy makers can make science based decisions regarding coastal and marine stewardship
- producing a new generation of scientists trained in interdisciplinary collaborative approaches

Over the last 10 years, PISCO has successfully built a unique research program that combines complementary disciplines to answer critical environmental questions and inform management and policy. Activities are conducted at the latitudinal scale of the California Current Large Marine Ecosystem along the west coast of North America, but anchored around the dynamics of coastal, hardbottom habitats and the oceanography of the nearshore ocean – among the most productive and diverse components of this ecosystem. The program integrates studies of changes in the ocean environment through ecological monitoring and experiments. Scientists examine the causes and consequences of ecosystem changes over spatial scales that are the most relevant to marine species and management, but largely unstudied elsewhere.

Findings are linked to solutions through a growing portfolio of tools for policy and management decisions. The time from scientific discovery to policy change is greatly reduced by coordinated, efficient links between scientists and key decision makers.

Core elements of PISCO are:

- Interdisciplinary ecosystem science
- Data archiving and sharing

- Outreach to public and decision-making user groups
- Interdisciplinary training
- Coordination of distributed research team

Established in 1999 with funding from The David and Lucile Packard Foundation, PISCO is led by scientists from core campuses Oregon State University (OSU); Stanford University's Hopkins Marine Station; University of California, Santa Cruz (UCSC); and University of California, Santa Barbara (UCSB). Collaborators from other institutions also contribute to leadership and development of PISCO programs. As of 2005, core PISCO activities are funded by collaborative grants from The David and Lucile Packard Foundation and the Gordon and Betty Moore Foundation. Core support, along with additional funding from diverse public and private sources, make this unique partnership possible.

[[table of contents](#) | [back to top](#)]

Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-2346837

[[table of contents](#) | [back to top](#)]