

Nitrate and phosphate concentrations collected at intertidal locations in three regions on the coast of the Gulf of Maine from 2011-2013 (GOM Biodiversity project)

Website: <https://www.bco-dmo.org/dataset/527055>

Version: 2014-08-11

Project

» [Context-Dependency of Marine Biodiversity-Ecosystem Function Relationships](#) (GOM Biodiversity)

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Dataset Description

Intertidal samples collected during the spring, summer, and fall of 2011 along the coast of the Gulf of Maine at locations near Nahant, Massachusetts (42.4264 N, 70.9194 W; Boothbay, Maine (43.8920 N, 69.4773 W); and Lubec, Maine (44.8408 N, 67.0156 W). Data were collected at three sites in each of those three regions.

Related dataset: [GoM temperature](#)

Methods & Sampling

Water samples were collected using acid-washed opaque bottles, filtered, and stored on ice for transport to the lab, where nitrate (NO₃⁻, umol/L) and phosphate (PO₄[3⁻], umol/L) were determined using a Lachat nutrient analysis system. Samples were taken from the intertidal zone, reaching into the surf. Samples were collected at each location (see lat and long for each measurement) on each date.

Data Processing Description

Data have not been processed. In the few instances where samples are missing (e.g., equipment error), those missing samples are indicated with 'nd'.

DMO Notes:

- original file: gom_coast_nutrients.csv
- added conventional header with dataset name, PI name, version date
- converted lat/lon to decimal degrees
- reformatted date from d-mon-yy
- renamed parameters to BCO-DMO compatible names

- replaced spaces with underscores
- replaced missing data designated as a period with nd

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Data Files

File
nuts_region.csv (Comma Separated Values (.csv), 50.01 KB) MD5:d052a43af1e1742a7aff449050a2d540
Primary data file for dataset ID 527055

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Parameters

Parameter	Description	Units
region	geographic region of sampling	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
date	sample date	yyyy/mm/dd
replicate	replicate number	unitless
PO4	phosphate concentration	umol/L
NO3	nitrate concentration	umol/L
year	year	
month	month	
day	day	
yrday	The day of year for a specified year with Jan. 1 = yearday 1	

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Deployments

Bracken_GoM_2011

Website	https://www.bco-dmo.org/deployment/527034
Platform	Bracken_shore
Start Date	2011-05-21
End Date	2013-11-04

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Project Information

Context-Dependency of Marine Biodiversity-Ecosystem Function Relationships (GOM Biodiversity)

Coverage: Gulf of Maine rocky shorelines: Nahant, Massachusetts to Lubec, Maine

Description from NSF award abstract:

Because species mediate key biogeochemical processes and play unique ecological roles, changes in the diversity and composition of species in an ecosystem can alter how that system functions. A growing body of work has demonstrated that changes in biodiversity can have profound effects on the functioning of marine ecosystems. However, key unresolved issues remain with respect to relationships between marine biodiversity and ecosystem functioning. In particular, few studies have evaluated interactions between producer diversity and herbivore diversity, especially in the field. Furthermore, the vast majority of experiments have evaluated the consequences of biodiversity changes at only one location, so there is very little knowledge of how diversity-function relationships are modified by environmental context. This study will examine, in the field, how environmental context shapes marine diversity-function relationships and particularly the interaction between changes in consumer and producer diversity in intertidal ecosystems at three sites spanning 500 km of the New England coastline. These factorial experiments will manipulate seaweed and grazer diversity at East Point, Massachusetts; Chamberlain Point, Maine; and Quoddy Head, Maine. The research asks the following questions:

- 1) How does seaweed diversity influence key marine ecosystem processes such as primary and secondary productivity?
- 2) How does herbivore diversity affect the top-down impacts of molluscan grazers on intertidal seaweed assemblages?
- 3) What are the feedbacks between grazer and seaweed diversity in driving intertidal community and ecosystem structure and function? And
- 4) How does environmental context modify the top-down and bottom-up effects of biodiversity change on intertidal ecosystem functioning?

This study will make important intellectual contributions to marine ecology by considering feedbacks between diversity change at two adjacent trophic levels. The work will be conducted at multiple sites which span a range of nearshore oceanographic and climatic conditions, enhancing the generality of the work and allowing for evaluation of the effects of environmental context on diversity-function relationships. Biodiversity is changing at all scales, from local to global, and it is essential to understand the consequences of these changes in order to better predict and ameliorate their impacts on communities and ecosystems. This research will provide a more holistic understanding of the links between diversity, trophic interactions and ecosystem function that will facilitate more effective conservation and management strategies in marine, as well as other, ecosystems. It will provide training and research experience for students at all educational levels. The investigators will involve graduate and undergraduate students in all phases of the research and will also offer a summer research internship each year to a high school student from the Coastal Ocean Science Academy (COSA) that is taught by the Northeastern University Marine Science Center's Outreach staff. COSA students are primarily from under-represented groups in the greater Boston area. Finally, the results of the research will be communicated to the public through the outreach and public education program at the Center.

Publications produced as a result of this research:

Bracken, M.E.S. and N.H.N. Low. 2012. Realistic losses of rare species disproportionately impact higher trophic levels. *Ecology Letters*, 15, 461-467. doi:[10.1111/j.1461-0248.2012.01758.x](https://doi.org/10.1111/j.1461-0248.2012.01758.x)

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0961364

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