Feeding rates on and nutritional content of non-native algal collected from Antarctica, Fiji, and California.

Website: https://www.bco-dmo.org/dataset/743755

Data Type: Other Field Results, experimental

Version: 1

Version Date: 2018-08-20

Project

» Detecting genetic adaptation during marine invasions (Genetic Adaptation Marine Inv)

Contributors	Affiliation	Role
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Abstract

Feeding rates on and nutritional content of non-native algal collected from Antarctica, Fiji, and California.

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Coverage

Spatial Extent: **N**:38.32 **E**:-64.05 **S**:-64.77 **W**:-123.04

Temporal Extent: 1996 - 2014

Dataset Description

Feeding rates on and nutritional content of non-native alga.

Acquisition Description

These data are described in detail in Bippus et al. 2018. We offered tissue from a total of 700 Gracilaria vermiculophylla thalli from 14 native Japanese and 25 non-native sites to a North American population of the generalist amphipod Ampithoe valida. Assays were conducted from May to October 2015. Two 4 cm G. vermiculophylla apices were excised from a single thallus and placed into separate 250 mL plastic cups (30 × 24 × 18 cm). Apices were then allowed to relax for 24 h before beginning the assay to eliminate any inductive effects from excision. In one cup, we placed one amphipod, while the 2nd cup held an apex without an amphipod to account for autogenic changes in mass. Each tip was blotted dry and weighed before and after each assay. To measure dry mass, autogenic control tips were individually placed in pre-weighed foil packets in a drying oven at 65 °C. We assayed between 14 and 20 thalli per population. Assays ran for 24 h in the dark at room temperature. Consumption rates (measured as dry mass) per amphipod were standardized by amphipod length.

Processing Description

BCO-DMO Data Processing Notes:

-Changed NA to nd
-Reformatted column names to comply with BCO-DMO standards

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Related Publications

Bippus, P. M., Krueger-Hadfield, S. A., & Sotka, E. E. (2018). Palatability of an introduced seaweed does not differ between native and non-native populations. Marine Biology, 165(2). doi:10.1007/s00227-018-3291-5

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Parameters

Parameter	Description	Units
Plant_ID	Plant identification	unitless
Control_Initial_Weight_mg	Initial weight of control	milligrams
Control_Final_Weight_mg	Final weight of control	milligrams
Control_Amphipod_Size_mm	Amphipod size of control	millimeters
No_Choice_Initial_Weight_mg	Initial weight of amphipod with no choice of food	milligrams
No_Choice_Final_Weight_mg	Final weight of amphipod with no choice in food	milligrams
No_Choice_Amphipod_Size_mm	Amphipod size of individual with no choice in food	millimeters
trt_ctrl_ratio	Ratio of treatment to autogenic control	unitless
mg_wm	Consumption wetmass	milligrams
mg_wm_corr	Wet mass corrected for amphipod length	milligrams
dm_wm_ratio	Amount of drymass to wetmass ratio	milligrams
afdm_wm_ratio	Amount of ash-free-dry-mass to wetmass ratio	miigrams

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Project Information

Detecting genetic adaptation during marine invasions (Genetic Adaptation Marine Inv)

Coverage: Estuaries of NW and NE Pacific; estuaries of NW and NE Atlantic

Description from NSF award abstract: Biological introductions, defined as the establishment of species in geographic regions outside the reach of their natural dispersal mechanisms, have dramatically increased in frequency during the 20th century and are now altering community structure and ecosystem function of virtually all marine habitats. To date, studies on marine invasions focus principally on demographic and ecological processes, and the importance of evolutionary processes has been rarely tested. This knowledge gap has implications for management policies, which attempt to prevent biological introductions and mitigate their impacts. The Asian seaweed Gracilaria vermiculophylla has been introduced to every continental margin in the Northern Hemisphere, and preliminary data indicate that non-native populations are both more resistant to heat stress and resistant to snail herbivory. The project will integrate population genetics, field survey and common-garden laboratory experiments to comprehensively address the role of rapid evolutionary adaptation in the invasion success of this seaweed. Specifically, the PIs will answer the following. What is the consequence of introductions on seaweed demography and mating systems? How many successful introductions have occurred in North America and Europe? Where did introduced propagules originate? Do native, native-source and non-native locations differ in environmental conditions? Do native, native-source and non-native populations differ in phenotype? The intellectual merit of this project is based on three gaps in the literature. First, while biological invasions are widely recognized as a major component of global change, there are surprisingly few studies that compare native and non-native populations in their biology or ecology. Native and non-native populations will be surveyed in a similar manner, allowing assessment of differences in population dynamics, mating system, epifaunal and epiphytic communities, and the surrounding abiotic and biotic environment. Second, G. vermiculophylla exhibits a life cycle typical of other invasive species (including some benthic invertebrates), yet we still lack data on the effects of decoupling the haploid and diploid stages on genetic structure, and in turn, on the evolvability of their populations. Finally, this project will provide unequivocal evidence of an adaptive shift in a marine invasive. To our knowledge, such evolutionary change has been described previously for only a complex of marine copepod species. G. vermiculophylla will serve as a model for understanding evolution in other nuisance invasions, and perhaps lead to novel methods to counter future invasions or their spread.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1357386

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