Coastal habitat restoration survey

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Project
» CAREER: Linking genetic diversity, population density, and disease prevalence in seagrass and oyster ecosystems (Seagrass and Oyster Ecosystems)

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Abstract
Online expert elicitation survey of the membership of CERF and ICRS. This dataset includes responses to a series of questions exploring scientist and practitioner experience restoring particular coastal habitats (coral reefs, oyster reefs, mangroves, salt marsh, and seagrasses), as well as perceptions of the purpose of restoration, site selection practices, the types of metrics used to evaluate restoration success, and the potential challenges to successful restoration.

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Coverage

Temporal Extent: 2017 - 2017

Dataset Description

The data accompanying these metadata reside at the Dryad repository. Dryad has provided the dataset DOI and is linked on this dataset metadata landing page.

These data were used in the analyses presented in Hughes, *et al.,* 2020.

Methods & Sampling

We conducted an online expert elicitation survey of the membership of CERF and ICRS, two organizations focused on coastal habitat restoration with members representing academia, government, and non-governmental organizations within the U.S and internationally.

The standardized online survey was developed and pretested by the authors and hosted and administered through Qualtrics Research Suite. The survey was distributed by email to membership lists of both organizations by the organization leadership. The email invitation was sent to CERF members in January 2017 and to ICRS members in April 2017.

We received 67 responses from CERF members and 41 responses from ICRS members. Five additional respondents who belonged to both organizations were excluded from our analyses. Because we did not have access to the membership lists for either organization, we were unable to calculate a response rate. Of those who were qualified to take the survey by virtue of having some restoration experience, the completion rate was 63%.

Parameter descriptions of this dataset:

Name	Description	Units	Missing data identifier
Oysters restored	Yes/no whether respondent has restored oysters	Not applicable	NA
Marshes restored	Yes/no whether respondent has restored salt marshes	Not applicable	NA
Seagrasses restored	Yes/no whether respondent has restored seagrasses	Not applicable	NA
Mangroves restored	Yes/no whether respondent has restored mangroves	Not applicable	NA
Corals restored	Yes/no whether respondent has restored corals	Not applicable	NA
Number of habitats restored	Sum of number of coastal habitats (oysters, marsh, seagrasses, mangroves, corals) restored	Integer from 0-5	NA
Research purpose	Yes/no whether research has been the purpose of restoration	Not applicable	NA
Remediation purpose	Yes/no whether remediation has been the purpose of restoration	Not applicable	NA
Habitat purpose	Yes/no whether habitat enhancement has been the purpose of restoration	Not applicable	NA
Fisheries purpose	Yes/no whether fisheries enhancement has been the purpose of restoration	Not applicable	NA
Water quality purpose	Yes/no whether improving water quality has been the purpose of restoration	Not applicable	NA
Biodiversity purpose	Yes/no whether enhancing biodiversity as been the purpose of restoration	Not applicable	NA
Protection purpose	Yes/no whether protection of people or property has been the purpose of restoration	Not applicable	NA
Erosion purpose	Yes/no whether erosion control has been the purpose of restoration	Not applicable	NA
Carbon purpose	Yes/no whether carbon sequestration has been the purpose of restoration	Not applicable	NA
Community purpose	Yes/no whether community engagement has been the purpose of restoration	Not applicable	NA
Economic metrics	Yes/no whether economic metrics have been used to monitor restoration success	Not applicable	NA
Social metrics	Yes/no whether social metrics have been used to monitor restoration success	Not applicable	NA
Community metrics	Yes/no whether community outreach metrics have been used to monitor restoration success	Not applicable	NA

Name	Description	Units	Missing data identifier
Ecological metrics	Yes/no whether ecological metrics have been used to monitor restoration success	Not applicable	NA
Geophysical metrics	Yes/no whether geophysical metrics have been used to monitor restoration success	Not applicable	NA
Poor water ordinal	Degree to which poor water quality is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Disease ordinal	Degree to which disease is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Coastal development ordinal	Degree to which coastal development is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Permitting ordinal	Degree to which permitting and regulations are a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Public awareness ordinal	Degree to which public awareness or support is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Site availability ordinal	Degree to which site availability is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Storms ordinal	Degree to which storms are a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Herbivory or predation ordinal	Degree to which herbivory or predation is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Competition ordinal	Degree to which competition is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Invasive species ordinal	Degree to which invasive species are a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Climate change ordinal	Degree to which climate change is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Boating ordinal	Degree to which boating is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Dredge ordinal	Degree to which dredge and fill is a challenge to successful restorationon on a scale from 1 (not a challenge) to 4 (major challenge)	Likert scale	NA
Genetic diversity is important restoration strategy ordinal	Degree to which respondent agrees that genetic diversity is an important restoration strategy on a scale from 1 (do not agree at all) to 5 (agree a great deal)	Likert scale	NA
Importance of oyster genetic diversity ordinal	Degree to which respondent agrees that genetic diversity is important for oyster restoration on a scale from 1 (not at all important) to 5 (extremely important). No answer or don't know coded as NA.	Likert scale	NA
Importance of marsh genetic diversity ordinal	Degree to which respondent agrees that genetic diversity is important for marsh restoration on a scale from 1 (not at all important) to 5 (extremely important). No answer or don't know coded as NA.	Likert scale	NA
Importance of seagrass genetic diversity ordinal	Degree to which respondent agrees that genetic diversity is important for seagrass restoration on a scale from 1 (not at all important) to 5 (extremely important). No answer or don't know coded as NA.	Likert scale	NA

Name	Description	Units	Missing data identifier
Importance of coral genetic diversity ordinal	Degree to which respondent agrees that genetic diversity is important for coral restoration on a scale from 1 (not at all important) to 5 (extremely important). No answer or don't know coded as NA.	Likert scale	NA
Societies	Society that respondent belongs to: Coastal and Estuarine Research Federation (CERF) or International Coral Reef Society (ICRS)	Not applicable	NA
Gender	Gender that respondent identifies with: male, female, prefer not to answer	Not applicable	NA
Percentage of restoration projects published	Self-reported percentage of restoration projects that have been published	0-100	NA
Site selection - need vs. success	Categorical response regarding what determines where you conduct restoration: where restoration is most likely to be ecologically successful; where restoration is most needed ecologically; where restoration is most needed to benefit society; where restoration is most likely to be permitted or funded; other	Not applicable	NA
Site selection - picking site vs. habitat	Categorical response to which is more challenging: picking an appropriate site to restore a given habitat; picking an appropriate habitat to restore a given site	Not applicable	NA
Most important for selecting restoration site	Categorical response for what factor is most important for selecting restoration sites: access and logistical feasibility; permitting or regulations; appropriate environmental conditions; available funding; geographic proximity	Not applicable	NA
Country	Categorical response to in which country do you reside	Not applicable	NA
Birth year	Free numerical response to what is your birth year	Numerical	NA
Highest degree	Categorical response to what is your highest degree: High school diploma or GED; Bachelors; Masters; PhD	Not applicable	NA
Employer	Categorical response to which of the following best describes your employer: national government; state or provincial government; academic institution; non-governmental organization; private for-profit organization; local municipality; other	Not applicable	NA

Data Processing Description

This dataset includes responses to a series of questions exploring scientist and practitioner experience restoring particular coastal habitats (coral reefs, oyster reefs, mangroves, salt marsh, and seagrasses), as well as perceptions of the purpose of restoration, site selection practices, the types of metrics used to evaluate restoration success, and the potential challenges to successful restoration (see Appendix A for a list of survey questions).

We included responses to a question regarding the perceived importance of genetic diversity for restoration success as an indicator of innovative restoration practices. For experience with individual coastal habitats, the purpose of restoration, and metrics used to evaluate restoration success, we calculated the percentage of respondents responding affirmatively to a given habitat/purpose/metric. We measured each respondent’s perceptions of the challenges to successful restoration on an ordinal Likert-type scale from 1 to 4: not a challenge (1); minor challenge (2); moderate challenge (3); major challenge (4). The importance of genetic diversity was also measured on an ordinal Likert-type scale from 1 to 5: do not know (0); not at all important (1); slightly important (2); moderately important (3); very important (4); extremely important (5). The survey also included sociodemographic questions to document gender, age, education, U.S./international, type of employer (academia, state government, federal government, non-governmental organization, other), years in restoration, and the percentage of restoration efforts that they have been involved in which have been published in the scientific literature.

We used Chi-square tests to analyze whether the proportion of each habitat restored, the purpose of restoration efforts, the metrics measured, and site selection methods differed between organizations. To analyze the data regarding challenges to successful restoration and the importance of genetic diversity overall and by habitat, we used non-parametric Kruskal-Wallis tests to determine whether the ordinal responses for each threat differed between the two organizations. We used linear models with a fixed factor of organization to test whether age, years in restoration, or the percentage of restoration efforts published differed between organizations. Finally, we tested differences in gender identity, type of employer, domestic/international, or highest degree by organization using Chi-square tests. All analyses were run in R Studio v.1.1.442 using the base packages.

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Supplemental Files

File		
Coastal Habitat Survey filename: CoastalHabitatSurvey_OnlineSurveyQuestions.pdf	(Portable Document Format (.pdf), 284.84 KB) MD5:9d4bd0316293592a55965dee30a6da33	
The survey questionnaire that has been distributed to obtain dataset 806786. The survey questions are in pdf format.		

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Related Publications

Hughes, A. R., Edwards, P., Grabowski, J. H., Scyphers, S., & Williams, S. L. (2020). Differential incorporation of scientific advances affects coastal habitat restoration practice. Conservation Science and Practice. doi:10.1111/csp2.305
Results

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Parameters

Parameters for this dataset have not yet been identified

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Project Information

CAREER: Linking genetic diversity, population density, and disease prevalence in seagrass and oyster ecosystems (Seagrass and Oyster Ecosystems)

Coverage: Coastal New England

NSF Award Abstract:
Disease outbreaks in the ocean are increasing, causing losses of ecologically important marine species, but the factors contributing to these outbreaks are not well understood. This 5-year CAREER project will study disease prevalence and intensity in two marine foundation species - the seagrass Zostera marina and the Eastern oyster Crassostrea virginica. More specifically, host-disease relationships will be explored to understand how genetic diversity and population density of the host species impacts disease transmission and risk. This work will pair large-scale experimental restorations and smaller-scale field experiments to examine disease-host relationships across multiple spatial scales. Comparisons of patterns and mechanisms across the two coastal systems will provide an important first step towards identifying generalities in the diversity-density-disease relationship. To enhance the broader impacts and utility of this work, the experiments will be conducted in collaboration with restoration practitioners and guided by knowledge ascertained from key stakeholder groups.

The project will support the development of an early career female researcher and multiple graduate and undergraduate students. Students will be trained in state-of-the-art molecular techniques to quantify oyster and seagrass parasites. Key findings from the surveys and experimental work will be incorporated into undergraduate courses focused on Conservation Biology, Marine Biology, and Disease Ecology. Finally, students in these courses will help develop social-ecological surveys and mutual learning games to stimulate knowledge transfer with stakeholders through a series of workshops.

The relationship between host genetic diversity and disease dynamics is complex. In some cases, known as a dilution effect, diversity reduces disease transmission and risk. However, the opposite relationship, known as the amplification effect, can also occur when diversity increases the risk of infection. Even if diversity directly reduces disease risk, simultaneous positive effects of diversity on host density could lead to amplification by increasing disease transmission between infected and uninfected individuals. Large-scale field restorations of seagrasses (Zostera marina) and oysters (Crassostrea virginica) will be utilized to test the effects of host genetic diversity on host population density and disease prevalence/intensity. Additional field experiments independently manipulating host genetic diversity and density will examine the mechanisms leading to dilution or amplification. Conducting similar manipulations in two marine foundation species - one a clonal plant and the other a non-clonal animal - will help identify commonalities in the diversity-density-disease relationship. Further, collaborations among project scientists, students, and stakeholders will enhance interdisciplinary training and help facilitate the exchange of information to improve management and restoration efforts. As part of these efforts, targeted surveys will be used to document the perceptions and attitudes of managers and restoration practitioners regarding genetic diversity and its role in ecological resilience and restoration.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1652320

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