Mark recapture data for introduced crab in Seadrift Lagoon 2011-2018

Website: https://www.bco-dmo.org/dataset/701840
Data Type: Other Field Results
Version: 2
Version Date: 2021-03-16

Project
» RAPID: A rare opportunity to examine overcompensation resulting from intensive harvest of an introduced predator (Invasive_predator_harvest)

Contributors	Affiliation	Role
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Abstract
Mark recapture data for introduced crab in Seadrift Lagoon (Central California coast, shallow subtidal (<3 m depth)) from 2011 to 2018.

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Coverage

Spatial Extent: **Lat**:37.90744 **Lon**:-122.666169
Temporal Extent: 2011-07-19 - 2018-08-17

Dataset Description

Mark recapture data for introduced crab in Seadrift Lagoon (Central California coast, shallow subtidal (<3 m depth)) from 2011 to 2018.

Methods & Sampling

We conducted monthly trapping of invasive European green crabs to gather demographic data in Seadrift Lagoon, Stinson Beach, CA (lat 37.907440, long -122.6661694). All sites were accessed by either kayak or by foot via shore entry. At each of the six sites used for monthly trapping plus three additional sites, we placed 15 baited traps (folding Fukui fish traps) in shallow (<2 m) subtidal areas. Traps were retrieved 24 hours later and were rebaited and collected again the following day. Trapping was continued for four consecutive days with traps removed on the final day. Crabs were marked by clipping two adjacent anterio-lateral spines. Each day,

data for crab species, size, sex, reproductive condition, injuries, and presence of marks were collected for all crabs in the field. Following data collection, all marked crabs were returned to the lagoon at the same site that the crabs were collected.

See Turner et al. (2016) for additional methodological details.

Data Processing Description

Data were entered and checked in MS Excel spreadsheets. Statistical analyses were run with either (R Development Core Team) or SAS (Statistical Analysis Systems).

BCO-DMO Processing:
v1 (2017-06-02):
- converted date to YYYY-MM-DD format;
- modified parameter names to conform with BCO-DMO naming conventions (changed to lowercase from mixed case, replaced spaces with underscores);
- created column for full species names and added names corresponding to each code from metadata page; changed 'species' column provided to 'species_code';
- replaced commas with semi-colons;
- replaced blanks (missing data) with 'nd';
- replaced spaces with underscores;
- sorted by date, site, then size.

v2 (2021-03-16):
- replaced version 1 of dataset with version 2, which includes a longer time series of data;
- replaced commas with semi-colons in the injury and recap_mark columns;
- converted date to YYYY-MM-DD format;
- replaced invalid values in sex and size columns with 'nd'.

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Data Files

File	
mark_recapture.csv	(Comma Separated Values (.csv), 5.62 MB) MD5:d6602378e47cc56a72328e32df574148
Primary data file for dataset ID 701840	

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Related Publications

Turner, B. C., de Rivera, C. E., Grosholz, E. D., & Ruiz, G. M. (2015). Assessing population increase as a possible outcome to management of invasive species. Biological Invasions, 18(2), 533–548. doi:10.1007/s10530-015-1026-9
Methods

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Parameters

Parameter	Description	Units
lagoon	Name of the site	unitless
lat	Latitude of Seadrift Lagoon	decimal degrees
lon	Longitude of Seadrift Lagoon	decimal degrees
date	Date (yyyy-mm-dd)	unitless
site	Name/identifier of site	unitless
size	Carapace width in millimeters	millimeters (mm)
sex	Sex: M = male, F = female = F, P = feminized male due to parasite infection	unitless
gravid	G = indicates an egg mass was present	unitless
injury	Injuries noted on the individual. Abbreviations: ML=missing leg, MC=missing claw, 2ML= two missing legs, DA=damaged abdomen, DL=damaged leg, etc.	unitless
recap_mark	Refers to mark-recapture markings. Pairs of antereo-lateral spines (indexed 1-10) that had been removed by clipping a pair of spines as a 'mark' either spines 1,2 or 9,10.	unitless
species_code	Species identifier/code	unitless
species	Species or taxon	unitless

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Instruments

Dataset-specific Instrument Name	Fukui fish traps
Generic Instrument Name	Fukui fish trap
Dataset-specific Description	At each of the six sites used for monthly trapping plus three additional sites, we placed 15 baited traps (folding Fukui fish traps) in shallow (
Generic Instrument Description	Fukui produces multi-species, multi-purpose collapsible or stackable fish traps, available in different sizes.

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Deployments

Grosholz

Website	https://www.bco-dmo.org/deployment/704849
Platform	Central_CA_Coast
Start Date	2009-07-07
End Date	2019-08-08
Description	Central California lagoon and bay sampling for the project, "RAPID: A rare opportunity to examine overcompensation resulting from intensive harvest of an introduced predator".

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Project Information

RAPID: A rare opportunity to examine overcompensation resulting from intensive harvest of an introduced predator (Invasive_predator_harvest)

Coverage: Europe

The usual expectation is that when populations of plants and animals experience repeated losses to predators or human harvest, they would decline over time. If instead these populations rebound to numbers exceeding their initial levels, this would seem counter-intuitive or even paradoxical. However, for several decades mathematical models of population processes have shown that this unexpected response, formally known as overcompensation, is not only possible, but even expected under some circumstances. In what may be the first example of overcompensation in a marine system, a dramatic increase in a population of the non-native European green crab was recently observed following an intensive removal program. This RAPID project will use field surveys and laboratory experiments to verify that this population explosion results from overcompensation. Data will be fed into population models to understand to what degree populations processes such as cannibalism by adult crabs on juvenile crabs and changes in maturity rate of reproductive females are contributing to or modifying overcompensation. The work will provide important insights into the fundamental population dynamics that can produce overcompensation in both natural and managed populations. Broader Impacts include mentoring graduate trainees and undergraduate interns in the design and execution of field experiments as well as in laboratory culture and feeding experiments. The project will also involve a network of citizen scientists who are involved with restoration activities in this region and results will be posted on the European Green Crab Project website.

This project aims to establish the first example of overcompensation in marine systems. Overcompensation refers to the paradoxical process where reduction of a population due to natural or human causes results in a greater equilibrium population than before the reduction. A population explosion of green crabs has been recently documented in a coastal lagoon and there are strong indications that this may be the result of overcompensation. Accelerated maturation of females, which can accompany and modify the expression of overcompensation has been observed. This RAPID project will collect field data from this unusual recruitment class and conduct targeted mesocosm experiments. These will include population surveys and mark-recapture studies to measure demographic rates across study sites. Laboratory mesocosm studies using this recruitment class will determine size specific mortality. Outcomes will be used in population dynamics models to determine to what degree overcompensation has created this dramatic population increase. The project will seek answers to the following questions: 1) what are the rates of cannibalism by adult green crabs and large juveniles on different sizes of juvenile green crabs, 2) what are the consequences of smaller size at first reproduction for population dynamics and for overcompensation and 3) how quickly will the green crab population return to the levels observed prior to the eradication program five years earlier?

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1514893

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