Fish observations corresponding to one fish or a group of conspecific fish taken in Point Lobos, California between 1997 and 2007.

Website: https://www.bco-dmo.org/dataset/712771
Data Type: Other Field Results
Version: 1
Version Date: 2017-08-04

Project
» Impacts of size-selective mortality on sex-changing fishes (Goby size-selection)

Contributors	Affiliation	Role
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Abstract
Fish observations corresponding to one fish or a group of conspecific fish taken in Point Lobos, California between 1997 and 2007.

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Coverage

Spatial Extent: **N**:36.525859 **E**:-121.93559 **S**:36.451476 **W**:-122.010601
Temporal Extent: 1999-09-20 - 2014-11-04

Dataset Description

This dataset contains a subset of data collected by the Partnership for Interdisciplinary Study of Coastal Oceans (PISCO) that was used to demonstrate the model code for publication. Each row corresponds to one observation of a fish or group of conspecific fish.

Methods & Sampling

Fish survey data were collected by underwater visual survey on transects in kelp forests surrounding Pt. Lobos California from 1999-2007. Full description of details is provided in Appendix S1 of White et al. (2016).

Data Processing Description

Scripts that were used to process these data can be found here: github.com/jwilsonwhite/IPM_statespace.

BCO-DMO Data Processing Notes:

-Data file was initially missing header row. The appropriate column names were included in the final data display.
-Reformatted column names to comply with BCO-DMO standards
-Replaced blank cells with nd

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Data Files

File
fish_observations.csv (Comma Separated Values (.csv), 999.58 KB) MD5:e4e6cce6a560a0805b0e1af37d1ca91e Primary data file for dataset ID 712771

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Related Publications

White, J. W., Nickols, K. J., Malone, D., Carr, M. H., Starr, R. M., Cordoleani, F., … Botsford, L. W. (2016). Fitting state-space integral projection models to size-structured time series data to estimate unknown parameters. Ecological Applications, 26(8), 2677–2694. doi:10.1002/eap.1398
Methods

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Parameters

Parameter	Description	Units
campus	Group collecting the data; UCSC or UCSB	unitless
method	Survey method; SBTL_fish = subtidal visual surveys	unitless
year	Year of collection	unitless
month	Month of collection	unitless
day	Day of collection	unitless
site	Site name	unitless
side	Side of site; East or West	unitless
zone	Zone within side; inner outer etc.	unitless
level	Depth of survey; CAN = canopy; BOT = bottom; MID = midwater	unitless
transect	Transect number	unitless
classcode	4-letter species code; NO_ORG = no organisms observed	unitless
count	Number of fish observed	count
fish_tl	Total length of fish observed	millimeters
min_tl	Minimum total length (if in a group)	millimeters
max_tl	Maximum total length (if in a group)	millimeters
observer	Name of observer	unitless
depth	Depth of transect	meters
vis	Visability on transect	meters
temp	Temperature at transect	degrees Celsius
surge	Qualitative description of surge	unitless
windwave	Qualitative description of wind and wave conditions	unitless
ptccnpy	Relative kelp canopy cover; 0-3	percent

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Deployments

PISCO_1997

Website	https://www.bco-dmo.org/deployment/712780
Platform	shoreside Calif_shore
Start Date	1997-01-01
End Date	2007-12-31

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Project Information

Impacts of size-selective mortality on sex-changing fishes (Goby size-selection)

Coverage: Southern California, Santa Catalina Island

Description from NSF award abstract:

Many marine fish species change sex during their lifetimes, and many of them are targets of commercial and recreational fishing. The timing of sex change in these animals is often related to body size, so populations typically consist of many small fish of the initial sex (usually female) and few large fish of the other sex (usually male). In nature, smaller fish are at a greater risk of mortality due to predation, but fishermen tend to seek larger fish. Thus fishing that targets larger individuals may skew sex ratios, removing enough of the larger sex to hinder reproduction. However, the extent to which size-selective mortality affects sex-changing fishes is poorly understood. This research will explore the effects of size-selective mortality on the population dynamics of sex-changing species using an integrated set of field experiments and mathematical models. It will provide the first experimental exploration of the sensitivity of different sex-change patterns and reproductive strategies to selective mortality. The results will advance our knowledge of the susceptibility and resilience of sex-changing organisms to different types of size-selective mortality and will reveal how sex-changing species can recover after size-selection ceases, as in populations within marine reserves where fishing is suddenly prohibited. The findings will inform fisheries management policies, which do not currently consider the ability of a species to change sex in setting fisheries regulations.

This project will consist of a three-year study of the effects of size-specific mortality on sex-changing fishes. Field experiments will use three closely related rocky-reef fishes that differ in sex-change pattern and are amenable to field manipulation and direct measurement of reproductive output. The species include a protogynous hermaphrodite (a female-to-male sex-change pattern common among harvested species) and two simultaneous hermaphrodites that differ in their ability to switch between male and female. Two types of experiments will be conducted on populations established on replicate patch reefs at Santa Catalina Island, California: (1) sex ratios will be manipulated to determine when the scarcity of males limits population-level reproductive output; and (2) experiments cross-factoring the intensity of mortality with the form of size-selection (i.e., higher mortality of large or small individuals) will test the demographic consequences of size-selective mortality. In concert with the field experiments, size- and sex-structured population models (integral projection models) will be developed for use in three ways: (1) to evaluate how different types of selective mortality should affect population dynamics; (2) to predict outcomes of the field experiments, testing/validating the model and allowing direct prediction of the ecological significance of short-term selection; and (3) to fit to existing survey data for a fourth species, a widely fished, sex-changing fish, inside and outside of marine reserves. Part (3) will evaluate whether and how quickly the mating system and reproductive output of that species (not directly measurable in the field) is recovering inside reserves. This integrated set of field experiments and models will yield novel insight into the effects of size-selective mortality on the population dynamics of sex-changing marine species.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1435473

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