Sex ratio averages by location in M. beryllina collected in Suisun Bay, California from 2012 to 2013.

Website: https://www.bco-dmo.org/dataset/713188

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
White, J Wilson	University of North Carolina - Wilmington (UNC-Wilmington)	Principal Investigator, Contact
Brander, Susanne	University of North Carolina - Wilmington (UNC-Wilmington)	Co-Principal Investigator
Ake, Hannah	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

Abstract

Sex ratio averages by location in M. beryllina collected in Suisun Bay, California from 2012 to 2013.

Table of Contents

Coverage

Spatial Extent: **Lat**:38.078633 **Lon**:-122.06896

Dataset Description

This dataset contains averages from population surveys of inland silversides (Menidia beryllina) collected by beach seine at sites in Suisun Bay, CA

Acquisition Description

Fish survey data were collected by beach seine in the Suisun Bay region of the San Francisco Bay-Delta by Susanne Brander and Bryan Cole. Sampling methodology is fully described in Brander et al. (2013).

Processing Description

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

BCO-DMO Data Processing Notes:

-combined the peak GSI summary tables from Bryan Cole and Susanne Brander.
-two columns were added to distinguish between the data in the combined tables: investigator, and paper.
-reformatted column names to comply with BCO-DMO standards

[table of contents | back to top]

Related Publications

Brander, S. M., Connon, R. E., He, G., Hobbs, J. A., Smalling, K. L., Teh, S. J., … Cherr, G. N. (2013). From 'Omics to Otoliths: Responses of an Estuarine Fish to Endocrine Disrupting Compounds across Biological Scales. PLoS ONE, 8(9), e74251. doi:10.1371/journal.pone.0074251

Parameters

Parameter	Description	Units
Site	Collection site	unitless
Total_adults	Total number of adult M. beryllina collected	count
Sex_ratio	Proportion of males in sample	unitless
variance_factor	Variance factor for regression analysis	unitless
Z	Z factor	unitless
lower	Lower statistical limit	unitless
upper	Upper statistical limit	unitless

Instruments

Dataset-specific Instrument Name	Beach seine
Generic Instrument Name	Purse-seine Fishing Gear
Dataset-specific Description	Used to collect samples
Generic Instrument Description	A purse seine is a large wall of netting deployed in a circle around an entire school of fish. The seine has floats along the top line with a lead line of chain along the bottom. Once a school of fish is located, a skiff pulls the seine into the water as the vessel encircles the school with the net. A cable running along the bottom is then pulled in, "pursing" the net closed on the bottom, preventing fish from escaping by swimming downward. The catch is harvested by bringing the net alongside the vessel and brailing the fish aboard.

Deployments

White_2012

Website	https://www.bco-dmo.org/deployment/713241
Platform	shoreside Calif_shore
Start Date	2009-03-20
End Date	2013-10-09
Description	Menidia beryllina individuals were collected from Suisan Bay, California for spawning experiments.

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.

Funding