Data describing Long-term PaV1 lobster surveys in the south-central Florida Bay from 1999-2014 (Lobster disease connectivity project)

Website: https://www.bco-dmo.org/dataset/556162
Version: 2015-04-13

Project
» Connectivity of disease in marine Ecosystems: multi-scale dynamics of a viral disease infecting caribbean spiny lobster (Lobster disease connectivity)

Contributors	Affiliation	Role
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Dataset Description

From 1999-2014, lobsters were briefly captured in Florida Bay. Measurements taken included sex, length, molt condition, evidence of injury and disease. PaV1 virus PCR results were logged.

Related References:

Portions of these data have been reported in the following publication:

Behringer, D.C., M.J. Butler, J. Shields, and J. Moss. 2011. A review of Panulirus argus Virus 1 – a Decade after its Discovery. Diseases of Aquatic Organisms 94: 153–160.

Methods & Sampling

At each permanent 25m x 25m sample location (hard-bottom habitat 1.5 – 3.0 m depth), delineated by rope border affixed to seafloor, two divers search the entire site for spiny lobsters (Panulirus argus). All lobsters sighted are collected in hand nets by divers and brought aboard the topside vessel where the data are collected & recorded. Lobsters are then returned live to the original site. Hemolymph samples are stored in labeled vials with 90% ETOH and kept in dark and on ice until return to shore where they are then stored in a -

40C freezer until processed.

Data Processing Description

BCO-DMO Processing:

- added conventional header with dataset name, PI name, version date, reference information
- renamed parameters to BCO-DMO standard
- added lat/lon
- changed NA and ? to nd
- replace blanks with 0 for injuries, disease, blood sample, PCR Results; replaced other blanks with nd

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Data Files

File
longterm_survey.csv (Comma Separated Values (.csv), 208.96 KB) MD5:92925e6448415b693c569141ff2844d6 Primary data file for dataset ID 556162

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Parameters

Parameter	Description	Units
year	year of survey	yyyy
date	date of survey	yyyy-mm-dd
site	survey site	unitless
lat	latitude; north is positive	decimal degrees
lon	longitude; east is positive	decimal degrees
sex	sex of lobster	unitless
length_carap	carapace length of tethered lobster	millimeters
molt_cond	visual assessment of molt condition: I = intermolt; PR = premolt; PO = postmolt	unitless
leg_old_new	old and new injuries number of old/new leg injuries if any	unitless
ant_old_new	number of old/new antennae injuries if any	unitless
other_old_new	number of old/new other injuries if any	unitless
visible_disease_flag	signs of PaV1 infection in lobster obvious to naked eye; 0 = no; 1 = yes	unitless
blood_sample	hemolymph sample vial label if any	unitless
PCR_result	positive or negative PCR test for presence of PaV1 virus DNAa	unitless
comments	comments	unitless

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Instruments

Dataset-specific Instrument Name	pCR
Generic Instrument Name	Thermal Cycler
Generic Instrument Description	A thermal cycler or "thermocycler" is a general term for a type of laboratory apparatus, commonly used for performing polymerase chain reaction (PCR), that is capable of repeatedly altering and maintaining specific temperatures for defined periods of time. The device has a thermal block with holes where tubes with the PCR reaction mixtures can be inserted. The cycler then raises and lowers the temperature of the block in discrete, pre-programmed steps. They can also be used to facilitate other temperature-sensitive reactions, including restriction enzyme digestion or rapid diagnostics. (adapted from http://serc.carleton.edu/microbelife/research_methods/genomics/pcr.html)

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Deployments

Butler_FloridaBay

Website	https://www.bco-dmo.org/deployment/556102
Platform	Lobster habitat
Start Date	2004-07-15
End Date	2004-08-11
Description	Field expts with diseased lobsters

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Project Information

Connectivity of disease in marine Ecosystems: multi-scale dynamics of a viral disease infecting caribbean spiny lobster (Lobster disease connectivity)

Coverage: Florida Keys, USA and Carrbbean

Scientists are struck by how different terrestrial epidemiology is from that in marine ecosystems, a crucial difference being the more rapid spread of diseases in the ocean due to the presumed absence of barriers to waterborne dispersal. Yet, the movement of pathogens in the sea and its importance to disease dynamics in marine metapopulations is virtually unstudied. Marine pathogens do spread among distant host populations, as demonstrated by dramatic epizootics, but is this common or demographically relevant? Nearly all studies of marine diseases treat such events as transitory, focusing instead on local disease dynamics. This approach suggests either that small-scale phenomena normally trump the influence of large-scale pathogen connectivity or, alternatively, that the dispersal of marine pathogens by highly motile adults or free-living waterborne pathogens is simply too intractable for empirical investigation. Yet, there is another perhaps unappreciated mechanism – dispersal by infected larvae. Most marine animals have life histories that include planktonic larvae, many of which are highly dispersive. If infected by pathogens, these “larval vectors” would provide an efficient mechanism for distributing pathogens at high concentrations directly into habitats where hosts dwell. More so than passive, waterborne pathogens that are subject to rapid dilution and have no means of targeting distant hosts.

We have evidence that long-distance pathogen dispersal in the sea via infected meroplanktonic larvae may be possible. The pathogen in question is an often lethal, pathogenic virus (PaV1; Panulirus argus virus 1) that infects the Caribbean spiny lobster, Panulirus argus – a species broadly distributed throughout the Caribbean where it supports the most valuable fishery in the region. We described the PaV1 virus in 1999 and since then have studied its pathology, epidemiology, transmission, and effects on juvenile lobster populations in the Florida Keys. Like others, our focus has been on local pathogen-host dynamics, but PaV1 infections in lobsters are now confirmed in distant areas of the Caribbean (Belize, Mexico, St. Croix) in regions that are demographically linked only by dispersing larvae that spend >6 mos. in the open ocean. We recently discovered that many lobster postlarvae recruiting to coastal nurseries in Florida are infected with PaV1, providing novel evidence for pathogen connectivity among distant host populations.

Focusing on the spiny lobster-PaV1 virus association as a case study, we propose an ambitious program of laboratory, field, and modeling research whose broader implications will better our understanding of the importance of dispersal by infectious agents on the spread and maintenance of disease in marine populations. The project builds upon data and techniques developed with prior NSF sponsorship, and brings together partners in developing Caribbean nations with a multidisciplinary group of scientists with long-standing research programs in larval biology, biophysical and ecological modeling, crustacean biology, molecular biology, and the study of marine diseases.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-0928930
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