R computer code and associated data files for predator-prey simulation model (NW_AtlEcosysConnect project)

Website: https://www.bco-dmo.org/dataset/557351
Data Type: model results
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Project
» CAMEO: Patterns of Connectivity in Northwest Atlantic Fishery Ecosystems (NW_AtlEcosysConnect)

Program
» Comparative Analysis of Marine Ecosystem Organization (CAMEO)

Contributors	Affiliation	Role
Latour, Robert J.	Virginia Institute of Marine Science (VIMS)	Principal Investigator
Buchheister, Andre	University of Maryland Center for Environmental Science (UMCES/CBL)	Contact
Rauch, Shannon	Woods Hole Oceanographic Institution (WHOI BCO-DMO)	BCO-DMO Data Manager

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Dataset Description

This dataset includes the source computer code and supporting data files for the predator-prey simulation model (parameterized for summer flounder, *Paralichthys dentatus*) developed to investigate bottom-up effects defined to be temporal pulses in prey abundance on predator growth, production, and fisheries management. The model is age-structured and spatially explicit to accommodate ontogenetic dietary changes and seasonal migrations, respectively. Three general prey groups were modeled and assumed to be small crustaceans, forage fish, and larger fish prey. The code was written in R by Andre Buchheister.

The dataset includes:
Source computer code (core simulation): PredPreySim.r
Source computer code (graphing results): PredPreySim_Graphing.r
Data file (stock recruitment): Stock_Recruitment.csv
Metadata file (simulation model parameter descriptions): Parameter_Categories.csv
Data file (summer flounder growth): LW_Age.csv

See http://www.vims.edu/research/departments/fisheries/programs/multispecies_fisheries_research/index.php for more information about growth data.

Related Publications:

Buchheister, A., M.J. Wilberg, T.J. Miller, and R.J. Latour. In press. Simulating bottom-up effects on predator productivity and consequences for the rebuilding timeline of a depleted population. Ecological Modelling.

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Data Files

File
pred-prey_simulation_model.csv (Comma Separated Values (.csv), 707 bytes) MD5:b2c2429e35861f7e11e8080e27e9b108 Primary data file for dataset ID 557351

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Parameters

Parameter	Description	Units
description	Description of the file.	text
file	Link to file.	text

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Project Information

CAMEO: Patterns of Connectivity in Northwest Atlantic Fishery Ecosystems (NW_AtlEcosysConnect)

Website: http://hjort.cbl.umces.edu/NWACS/NWACS.html

Coverage: U.S. waters in the Northwest Atlantic coastal shelf, north of Cape Hatteras, NC, out to approximately -64W

Description from NSF award abstract:
The importance of fluxes across ecosystem boundaries is a characteristic of marine ecosystems that differentiates them from their terrestrial counterparts. From this viewpoint, any comparative analysis of marine ecosystems should address the patterns and degree of connectivity among ecosystems to be of highest utility. Here the investigators will conduct a suite of analyses that seek to quantify the sources, patterns and consequences of connectivity among 10 marine fishery ecosystems that together from the northwest Atlantic coastal shelf ecosystem. By conducting analyses in a hierarchical fashion with smaller ecosystems nested spatially within larger ecosystems they hope to identify scaling relationships in the ecological processes that characterize the dynamics of key species within these ecosystems. This work seeks to quantify the patterns and degree of connectivity among ecosystems in the Northwest Atlantic. Specifically, the investigators will conduct statistical analyses of empirical data from each ecosystem to quantify patterns in univariate, distribution and multivariate descriptors of their structure. They will also undertake time series analyses to describe relationships in the responses of different taxa and groups within each ecosystem. They will use the results of analyses conducted on the highly studied nearshore ecosystems as hypotheses to be tested on the somewhat sparser data of the offshore ecosystems. These analyses will delineate patterns of functional connectivity among ecosystems. They will also construct dynamic models of differing complexity to understand the principal consequences of the connectivity demonstrated in the first two objectives on ecosystem function. Models will include biomass dynamic and coupled predator-prey simulations that will consider the impacts of removals from the overall region globally and more specific patterns of localized spatial depletion.

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Program Information

Comparative Analysis of Marine Ecosystem Organization (CAMEO)

Website: http://www.nsf.gov/geo/oce/programs/CAMEO_Webpage.jsp

CAMEO Science Plan (2012).

The Comparative Analysis of Marine Ecosystem Organization (CAMEO) program was implemented as a partnership between the NOAA National Marine Fisheries Service and National Science Foundation Division of Ocean Sciences. The purpose of CAMEO was to strengthen the scientific basis for an ecosystem approach to the stewardship of our ocean and coastal living marine resources. The program supported fundamental research to understand complex dynamics controlling ecosystem structure, productivity, behavior, resilience, and population connectivity, as well as effects of climate variability and anthropogenic pressures on living marine resources and critical habitats. CAMEO encouraged the development of multiple approaches, such as ecosystem models and comparative analyses of managed and unmanaged areas (e.g., marine protected areas) that can ultimately form a basis for forecasting and decision support. Central to the program was the emphasis on collaborations between academic and private researchers and federal agency scientists with mission responsibilities to inform ecosystem management activities. (adapted from CAMEO website)

This funding opportunity implemented CAMEO research by supporting the development of research tools and strategic approaches through the following types of proposals:

1. Development of strategies and methodologies for comparative analyses that can be applied consistently across spatial and temporal scales and ecosystems, and that facilitate the design of decision support tools for marine populations, ecosystems and habitats.

2. Development of models that address key scientific questions by comparing ecosystems and ecosystem processes. Models that are geographically and temporally portable, and that incorporate assessment of modeling skill, are particularly encouraged.

3. Retrospective studies that analyze, re-analyze or synthesize existing information (historic, time-series, ongoing program, etc.) using a comparative approach.

4. Studies that integrate the human dimension within ecosystem dynamics. The CAMEO program seeks to promote interdisciplinary research using comparative approaches to link marine ecosystem research with the social and behavioral sciences in new and vital ways.

To guide program priorities, a Science Steering Committee was formed through Dr. Linda Deegan and the initial Scientific Planning Office at the Marine Biological Laboratory in Woods Hole, MA. This Committee was designed to provide scientific advice and broad direction to NOAA and NSF regarding the CAMEO program.

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Funding

Funding Source	Award
NSF Division of Ocean Sciences (NSF OCE)	OCE-1041713

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