Amino acid compound specific nitrogen isotopic analysis (AA-CSIA) data from reef fish samples collected over a 4 year period from 2008 to 2012 from the Hawaiian Islands

Website: https://www.bco-dmo.org/dataset/564570
Version: 14 Aug 2015
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Project
» CAMEO 2009 - A novel tool for validating trophic position estimates in ecosystem-based fisheries models (CAMEO_Trophic_Position)

Program
» Comparative Analysis of Marine Ecosystem Organization (CAMEO)

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Methods & Sampling

The reef fish samples were collected over a 4 year period from 2008 to 2012 from the main Hawaiian Islands. Species of lanternfish and dragonfish were grouped as mesopelagics, as they were collected using midwater trawling equipment (see Choy et al. 2012 PLoS ONE 7(11): e50133. doi:10.1371/journal.pone.0050133 for detailed collection methods), or dipnets in the open ocean. Finally, large, open-ocean predator species were collected at sea by trained longline fishery observers of the National Oceanic and Atmospheric Administration's (NOAA) Pacific Islands Regional Observer Program during the years 2009-2011 in the central North Pacific Subtropical Gyre.

Methods described in:
Bradley C. J., Wallsgrove N. J., Choy C. A., Drazen J. C., Hoen D. K., Hetherington E. D., and Popp B. N. (2015) Trophic position estimates of teleosts using amino acid compound specific isotopic analysis. *Limnology and Oceanography - Methods* doi: 10.1002/lom3.10041. (PDF)

Data Processing Description

BCO-DMO Processing:
- Modified parameter names to conform with BCO-DMO naming conventions.
- Replaced blanks (missing data) with 'nd' to indicate 'no data'.

- Transposed columns to rows for amino acid and standard deviation columns.

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Data Files

File
bradley_AA_transp.csv (Comma Separated Values (.csv), 167.92 KB) MD5:9f01b9c2277a29240a16005e1ea01cad Primary data file for dataset ID 564570

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Parameters

Parameter	Description	Units
sample	Sample identification number.	alphanumeric
species	Name of the species.	text
length	Length in centimeters.	centimeters (cm)
amino_acid	Name of the amino acid.	text
d15N_AA	d15N value of individual the amino acid.	parts per thousand (per mil, ‰)
stdev	Standard deviation of the d15N value.	parts per thousand (per mil, ‰)

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Instruments

Dataset-specific Instrument Name	gas chromatograph
Generic Instrument Name	Gas Chromatograph
Dataset-specific Description	The d15N values of derivatized samples were determined using a Delta V Plus mass spectrometer interfaced to a Trace GC gas chromatograph through a GC-C III combustion furnace.
Generic Instrument Description	Instrument separating gases, volatile substances, or substances dissolved in a volatile solvent by transporting an inert gas through a column packed with a sorbent to a detector for assay. (from SeaDataNet, BODC)

Dataset-specific Instrument Name	Longline Fishing Gear
Generic Instrument Name	Longline Fishing Gear
Dataset-specific Description	Large pelagic fish tissue samples were collected at sea by trained longline fishery observers of the National Oceanic and Atmospheric Administration's (NOAA) Pacific Islands Regional Observer Program during the years 2009-2011.
Generic Instrument Description	Longlining employs a central fishing line that can range from one to 50 miles long; this line is strung with smaller lines of baited hooks, dangling at evenly spaced intervals. Longlines can be set near the surface to catch pelagic fish like tuna and swordfish, or laid on the sea floor to catch deepdwelling fish like cod and halibut. (www.montereybayaquarium.org/cr/cr_seafoodwatch/sfw_gear.aspx)

Dataset-specific Instrument Name	mass spectrometer
Generic Instrument Name	Mass Spectrometer
Dataset-specific Description	The d15N values of derivatized samples were determined using a Delta V Plus mass spectrometer interfaced to a Trace GC gas chromatograph through a GC-C III combustion furnace.
Generic Instrument Description	General term for instruments used to measure the mass-to-charge ratio of ions; generally used to find the composition of a sample by generating a mass spectrum representing the masses of sample components.

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Project Information

CAMEO 2009 - A novel tool for validating trophic position estimates in ecosystem-based fisheries models (CAMEO_Trophic_Position)

Website: http://cameo.noaa.gov/pres_bpopp.html

Coverage: Subtropical North Pacific Ocean

(*From NSF Award Abstract*)

Evidence increasingly demonstrates that selective removal of marine life can induce restructuring of marine food webs. Trophic structure is the central component of mass balance models, widely used tools to evaluate fisheries in an ecosystem context. Food web structure is commonly determined by stomach contents or by bulk tissue stable isotope analyses, both of which are limited in terms of resolution and versatility. The investigators will refine a tool, Amino Acid Compound-Specific Isotopic Analyses (AA-CSIA), which can be broadly applicable for quantifying the time-integrated trophic position (TP) of consumers. Differences in source and trophic nitrogen isotopic composition for specific amino acids will provide an unambiguous and integrated measure of fractional trophic TP across multiple phyla, regardless of an animal's physiological condition or of the biogeochemical cycling at the base of the food web. AA-CSIA will allow testing of the efficacy of trophic position estimates derived from ecosystem-based models and promote the evolution of these models into decision-support tools.

This project has three goals: 1. To validate the application of AA-CSIA across multiple marine phyla under

differing physiological conditions. 2. To compare the application of AA-CSIA across systems with contrasting biogeochemical cycling regimes. 3. To develop the use of AA-CSIA TP estimates for validating trophic models of exploited ecosystems. The investigators will test and refine the approach using a combination of laboratory feeding experiments and field studies across regions with differing biogeochemical cycling regimes. They will determine the applicability of the AA-CSIA approach in a variety of marine organisms assessed in controlled studies. Subsequently, ecosystem components will be sampled from the eastern tropical Pacific, coastal California and the subtropical Pacific gyre. They will also test the effects of sample preservation on the isotopic composition of individual AA to determine whether the approach can be used on archived samples. This tool will allow testing of the efficacy of ecosystem-based models currently used to gain insight into the ecological effects of fisheries removals and improve the reliability of future models required to manage marine resources. In addition to the goal of developing AA-CSIA for use as a TP indicator, the information obtained through this project will provide important species-specific biological data on the feeding behavior of marine organisms that could have implications for their resilience to anthropogenic pressures and climate change.

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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-1041329
National Oceanic and Atmospheric Administration (NOAA)	NA07NOS4780190
Hawaii Undersea Research Laboratory (HURL)	NA09OAR4300219

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