

North Pacific Groundfish Diet Data: An Overview of the Resource Ecology and Ecosystems Management's Diet Information System (DIS) and Diet Analysis Tool (DAT).

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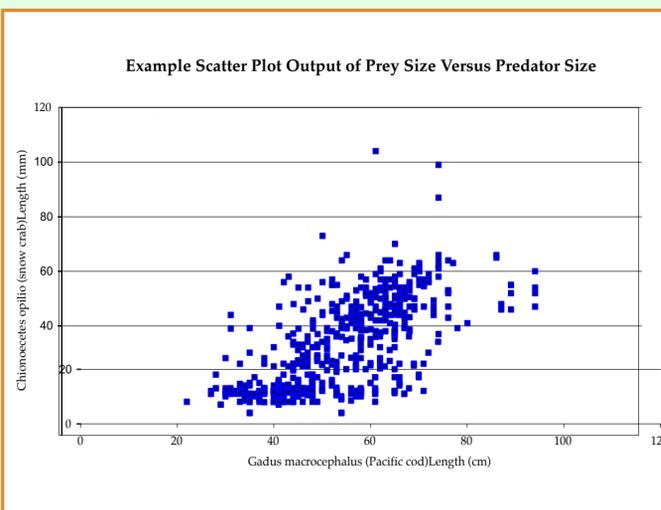
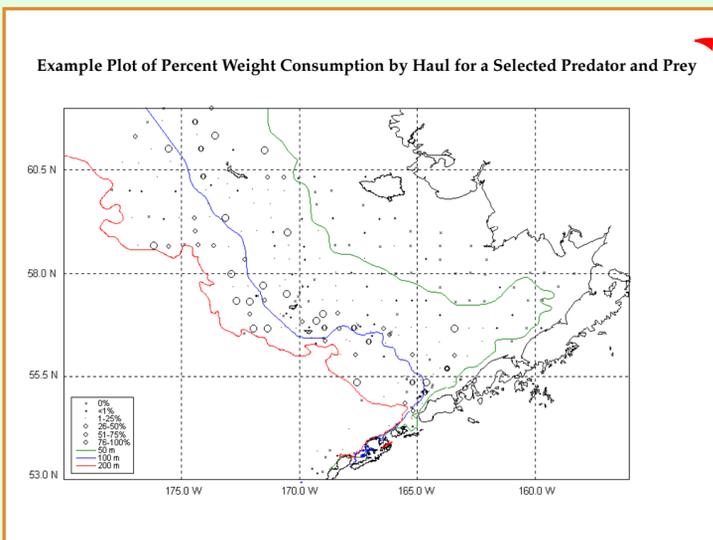
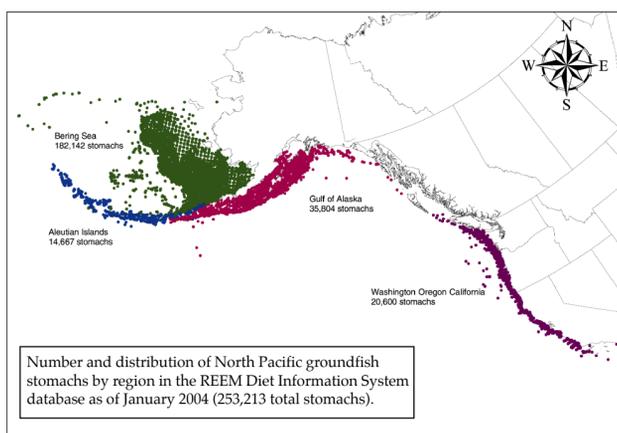
Overview

The Resource Ecology and Ecosystem Modeling Task (REEM) at the Alaska Fisheries Science Center focuses on the collection and analysis of data relating to trophic interactions in the North Pacific and incorporation of these data into environmental assessments and single-species and multispecies models. Data on size-at-age are integrated with bioenergetic information to estimate food consumption rates by fish populations. Information on marine mammal and bird diet is obtained from other Center programs or outside researchers. Quantifying food web linkages is essential to increase our understanding of how external forces such as fishing may cause unanticipated shifts in ecosystem composition. The importance of this research is also elevated given the increasing emphasis on fishery-mammal interactions: groundfish predation interactions are an important part of knowing the true nature of resource availability to mammals and birds. The REEM food habits database consists of two parts. Diet data are maintained in an Oracle 9i database known as the Diet Information System (DIS). Data exploration takes place using an MSAccess application known as the Diet Analysis Tool (DAT). An overview of each is presented here.

DIS

Diet Information System (DIS) contains diet data collected from groundfish throughout the northeast Pacific. Our samples are primarily collected from trawl-caught groundfish by NOAA scientists aboard research surveys. However, we also utilize Fishery Observers to collect samples from regions and seasons outside our standard survey areas. Fish stomach samples preserved in the field are returned to the lab for analysis and account for the majority of our database. Lab analysis results are entered in an interactive on-screen data from which does the initial error checking and screening. Further data quality procedures are performed before data are entered into the database. A small number of samples have been analyzed at sea in a qualitative manner and account for the remainder of our data.

Our data come from four regions (eastern Bering Sea, Aleutians, Gulf of Alaska, Washington-Oregon-California) and are split into four regional data sets with identical table structure. We currently have data from approximately 250,000 stomach samples representing 130 predator species in our database. These samples comprise a time series from 1984 through 2000, with recent collections being added constantly. Additionally, meristic (length or width) data for approximately 94,000 prey items (primarily fish and crab) from stomach contents exist in our database. Data are presently available to outside users via request. Future plans include making these data available in some form via the web. A detailed description of our research program and database can be found at <http://www.afsc.noaa.gov/refm/reem/Default.htm>.



Example Diet Table Report

Prey Name	Percent Frequency	Percent Count	Percent Weight
Polychaeta (worm)	64.71	36.32	11.38
Nephtyidae (polychaete)	2.94	0.47	0.09
Goniadidae (polychaete)	2.94	0.47	0.02
Orbiniidae (polychaete)	2.94	0.24	0.02
Ophiuridae (polychaete)	23.53	6.13	2.85
Maldanidae (polychaete)	5.88	5.42	0.67
Gastropoda (snail)	5.88	0.47	0.09
Bivalvia (clam)	17.65	1.42	1.11
Yoldia sp. (clam)	2.94	0.47	3.66
Mysidacea Mysida (mysid)	2.94	0.24	0.07
Cumacea (cumacean)	2.94	0.94	0.01
Gammaridea (amphipod)	32.35	5.66	0.48
Euphausiacea (euphausiid)	2.94	0.24	0.02
Crangonidae (shrimp)	2.94	0.24	0.21
Sipuncula (marine worm)	2.94	0.24	10.24
Echiura (marine worm)	5.88	0.71	47.82
Asteroidea (starfish)	2.94	0.24	0.07
Ophiuridae (brittle star)	2.94	0.24	0.15
Echinoidea Clypeasteroidea (sand dollar)	11.76	3.54	4.23
Clypeasteridae (sand dollar)	20.59	7.55	2.73
Urochordata (tunicate)	23.53	27.36	7.79
Osteichthyes Teleostei (fish)	2.94	0.24	4.56
Non-gadoid fish remains	2.94	0.24	0.42
Unidentified organic material	8.82	0.71	0.96
Fishery offal	2.94	0.24	0.35

Full stomach summary statistics	
Total non-empty stomachs =	34
Total prey number =	424
Total prey weight =	45.61g
Total empty stomachs =	5
Number of hauls =	5

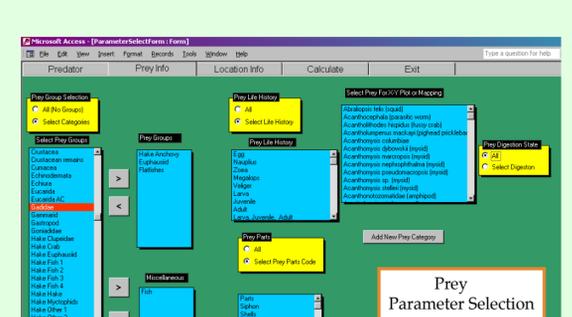
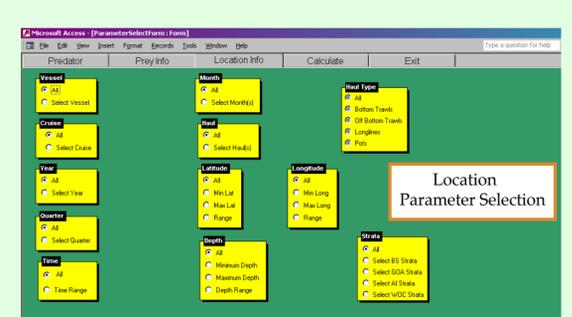
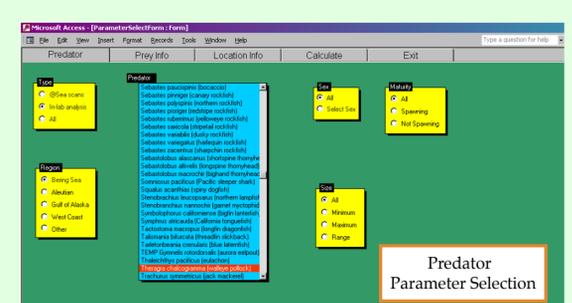
Full stomach summary statistics	
Average fork length =	28.029
Standard deviation of fork length =	5.94
Minimum fork length =	12
Maximum fork length =	36
Average fullness =	3.4117
Standard deviation of fullness =	1.07
Minimum fullness =	2
Maximum fullness =	6

Empty stomach summary statistics	
Average fork length =	28.6
Standard deviation of fork length =	5.683
Minimum fork length =	19
Maximum fork length =	34

DAT

The Diet Analysis Tool (DAT) interactive screen application allows users to summarize and view data currently in the REEM food habits database. It allows users to import other diet data sets that have similar table structure as well. The DAT currently provides many of the diet analysis techniques used for data exploration by REEM scientists in a user friendly, point and click environment with results that formerly required utilization of software packages such as SPSS and S-plus as well as a knowledge of basic SQL. With the DAT, users primarily set their input parameters from drop down lists. Current output from the DAT includes a mapping function that allows users to map consumption of a selected prey by a selected predator along with spatial and temporal parameters of choice. The same criteria can be used to plot predator size against prey size as well. The main output from the DAT are diet tables that show the percentages each prey consumed by weight, frequency of occurrence, and count as well as descriptive information about the predator data selected (mean length, fullness, etc). Future development of the DAT will include a direct export to ArcMap as well as possible web based access.

Examples of Interactive Parameter Selection Screens



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Poster design by Elisha M. Johnson