

Bering Sea Integrated Ecosystem Research Project: Semiannual Progress Report

Project #: B.61

Title: Functional Foraging Response

Principal Investigator(s) and Recipient Organization(s):

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Contract Period and Amount of Funding:

Contract Period: April 1, 2007 – September 30, 2010

Amount of Funding: \$258,260

Report Period: April 1, 2007 – September 30, 2008

Report Date: September 25, 2008

Lead Author of Report: Kerim Aydin, Ed Farley, Troy W. Buckley

Proposed timeline and milestones within report period: No milestones occurred within this report period, but participation in various scientific cruises and surveys to collect stomach samples was accomplished. Stomach content analyses aboard the BASIS survey were completed.

Project Summary: This project is aimed at distinguishing between temperature related and prey density related responses of juvenile and adult pollock, a nodal species in the eastern Bering Sea food web. Understanding these biological responses will help predict ecosystem responses to projected reduced production, increased overlap between piscivores and forage fishes, and increased abundance of piscivores due to predicted warming of the climate. The specific functional forms and relationships measured between predator and prey will become a critical component of the FEAST model (Project B.70).

Progress Summary: This was a successful and productive period for this project in terms of conducting and participating in scientific surveys and collecting stomach samples. Stomach samples were collected from arrowtooth and Kamchatka flounders (1,238), walleye pollock (1,867), and Pacific cod (1,358) during the bottom trawl surveys of the eastern Bering Sea continental shelf and slope. Bongo tows were used to sample zooplankton at some stations where stomachs were sampled. Stomach samples from age 0 walleye pollock ($n = 468$), sand lance ($n = 67$), Pacific herring ($n = 176$), age 0 Pacific cod ($n = 169$), sandfish ($n = 69$), capelin ($n = 41$) and Pacific salmon ($n = 225$) were analyzed at sea during the BASIS survey. These data were provided to the Functional Foraging Response project upon completion of the BASIS research cruise (Oct 2, 2008). Additionally, we have examined records of retrospective data from previous cruises conducted by the Alaska Fisheries Science Center for which both pollock and plankton collections exist and identified several sources for which both types of data are available; these data will be part of the analysis to be performed over the next year.

Lessons learned and project adjustments: The extension of our work back into retrospective studies was an addition for the purposes of modeling as identified by the Ecosystem Modeling Committee; those costs were submitted separately as part of the modeling package but the data analysis shall be included here (with no adjustments to this project).

Integration activity: All PI meetings were well attended. The Functional Foraging Response project component has the same lead PI (Kerim Aydin) as in the Modeling project and in the Science Advisory Board, thus facilitating communication with both groups. Previously established collaborative

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communication between Resource Ecology and Ecosystem Modeling (REEM) and Fisheries Oceanography Coordinated Investigations (bongo tows for zooplankton prey), REEM and Midwater Assessment and Conservation Engineering (euphausiid prey abundance), REEM and Groundfish Assessment (pollock distribution), and REEM and Pacific Marine Environmental Laboratory (water temperature profiles and fronts) has continued to develop. New collaborative communication has developed between REEM and Auke Bay Laboratory (seasonal gadoid liver energy), and we are attempting to coordinate this work with the Ichthyoplankton Seasonal Bioenergetics project component (Project B.54, PI Ron Heintz).

Education and Outreach: None to date.

Next year's Work plan (not part of the 5 page target length):

BSIERP Project B.61, Functional Foraging Response

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2009-2012 Tasks, Assignments, Timeline:

<i>Milestone</i>	<i>Who</i>	<i>Due</i>	<i>Status</i>
Food habits data from field work through September 2008 made available (submitted to data manager). Identify additional stomach sampling platforms that potentially can provide physical (e.g. temperature), prey-field (e.g. zooplankton) and predator-field (e.g. arrowtooth flounder, pollock, P. cod) information.	Buckley, Aydin, Farley	March 31, 2009	Currently on schedule to meet this milestone.
Food habits data from field work through March 2009 made available (submitted to data manager)	Buckley, Aydin, Farley	September 30, 2009	
Food habits data from field work through September 2009 made available (submitted to data manager)	Buckley, Aydin, Farley	March 31, 2010	
Analyzed maps of food habits and functional responses for field work to date prepared for input into FEAST model	Aydin, Buckley, Farley	April 30, 2010	
Food habits data from field work through March 2010 made available (submitted to data manager)	Buckley, Aydin, Farley	September 30, 2010	
Manuscript submitted: Functional response between pollock and prey (specifically	Buckley, Aydin, Farley, other fish group	September 30, 2010	

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zooplankton), local environmental factors affecting functional response, and global extrapolation of geographic conditions (e.g. cold pool) in relation to functional response.	members		
Food habits data from field work through September 2010 made available (submitted to data manager)	Buckley, Aydin, Farley	March 30, 2011	
Manuscript: Functional responses and foraging from the BASIS survey.	Farley, other Fish group members	March 30, 2011	
Manuscript: Statistics of diet and functional response analysis: implications for multispecies models.	Aydin, Buckley, other Fish group members	March 30, 2011	
Manuscript: Bioenergetic growth potential (dynamic habitat) of pollock given prey and oceanographic conditions.	Aydin, Buckley, Hollowed, Heinz, other Fish group members	Sept 30, 2011	

Additional publications leveraging BSIERP PIs and other NPRB work:

1. Buckley, Hurst, Aydin: Cod and prey, specifically focusing on Benthic/pelagic split: ~September 2010.
2. Aydin, Buckley, Zador, Cianelli: the relationship between ATF density and pollock consumption: extend focus on local factors (water column, etc.): ~December 2009.