North Pacific Research Board
Gulf Project Semiannual Progress Report: Middle Trophic Level (MTL) Component

1. PROJECT INFORMATION

GOA IERP Project Number:	G82
Title:	Middle Trophic Level: Temporal and spatial axes of variability in the structure of Gulf of Alaska forage fish communities
Overall project duration	October 1, 2010 to January 31, 2015
Overall project funding	$1,858,400
Report period	October 1, 2010 to April 30, 2011
Report submission date	May 2, 2011
Lead Author of Report*	Olav A. Ormseth

Principal Investigator(s), Co-Principal Investigators and Recipient Organization(s):

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2. PROJECT OVERVIEW

a. Briefly (4-5 sentences) describe the core purpose of your project, and the underlying need for this research.

Forage fish link primary and secondary producers to upper trophic level (UTL) predators. The forage fish community includes small, fast-growing species such as capelin and sand lance, as well as juvenile stages of groundfishes (e.g. walleye pollock and Pacific cod). The MTL seeks to understand the ecosystem role of forage fishes as well as their predators, prey, and competitors by studying how forage fish communities and the GOA ecosystem varies over time (seasonally and annually) and through space (variation within regions and between regions). Sampling is being conducted in spring, summer, and fall of two years (2011 and 2013). The study area includes two main regions (eastern, comprising the outer coast of southeast Alaska, and western, comprising the east side of Kodiak Island and the southern coast of the Kenai Peninsula). Nearshore surveys are focusing on 5-6 sampling sites within each main region; offshore acoustic surveys throughout each region are being conducted aboard the UTL vessel; and diet and energetics studies are addressing relationships among species and the flow of energy among trophic levels. Oceanographic studies are being conducted aboard the nearshore surveys in collaboration with the LTL component. The MTL project is also contributing to the all-component retrospective analysis effort.

b. State the specific GOAIERP hypothesis or hypotheses that your project is addressing.

The MTL component is addressing all three of the overarching GOA IERP hypotheses:

1) The primary determinant of year-class strength for marine groundfishes in the GOA is early life survival. This is regulated in space and time by climate-driven variability in a biophysical gauntlet comprising offshore and nearshore habitat quality, larval and juvenile transport, and settlement into suitable demersal habitat.

2) The physical and biological mechanisms that determine annual survival of juvenile groundfishes and forage fishes differ in the eastern and western GOA regions.

3) Interactions among species (including predation and competition) are influenced by the abundance and distribution of individual species and by their habitat requirements, which vary with life stage and season.

c. List the specific objective(s) of your research project.

1) Provide a synoptic view of nearshore/offshore distribution and abundance (past and present) to gain a comprehensive understanding of how GOA forage communities are structured, how this structure changes in response to the environment, and the effects of this variability on prey availability for upper trophic level species.

2) Analyze habitat associations to determine how habitat needs influence the spatial overlap among species and resulting predation and competition.

3) Use analysis of stomach contents, stable isotopes, and fatty acids to infer diets and elucidate relationships among forage community members, lower trophic level prey, and upper trophic level predators.

4) Use proximate analysis to assess nutritional condition of community members and relate condition to spatial and diet overlaps among species.

3. PROGRESS SUMMARY

a. Provide a table showing the timeline and milestones for the current reporting period only.

Activity	*Q1 – FY2011*	*Q2 – FY2011*
Planning	X	X
Gathering of data for retrospective analysis	X	X
Nearshore survey and sample collection		X

b. Describe report period progress.

Objectives 1 & 2

Research activities: nearshore surveys, offshore acoustics surveys, retrospective analysis

Progress:

- Planning for nearshore surveys is largely complete. Cruise dates are set and, although vessel and staffing decisions for the summer and fall cruises are not finalized, they are well under way.
- The first leg (SE Alaska) of the spring nearshore surveys has been completed. Five of the six sampling sites were visited; weather prevented us from sampling in Shelikof Bay.
- For the offshore acoustics portion, staffing has been finalized to meet requirements of the four legs in the 2011 UTL/MTL summer and fall surveys. A graduate student, Dave McGowan, has been accepted at the University of Washington and will join the project mid-June to participate in the summer and fall surveys. Cold water survival training has been completed by John Horne and Dave McGowan.
- Along with investigators from other components, we have initiated a system for collecting and organizing data for the retrospective analysis.

Objective 3

Research activities: analysis of stomach contents and tissues

Progress:

- Preliminary work has begun on determining the tissues and techniques that will be used for the fatty acid analysis. Further analyses are not scheduled to begin until the 2011 field collections are complete.

Objective 4

Research activities: proximate analysis of fish tissues

Progress:

- We have coordinated our efforts with the UTL component. Analyses are not scheduled to begin until the 2011 field collections are complete.

c. Describe preliminary results.

Nearshore survey, spring 2011, eastern region (SE Alaska): A 16-day survey was conducted from April 15-April 30. Analysis of the data has not been completed, but it appears that herring were abundant in Whale Bay, Salisbury Sound, and Torch Bay. Herring spawn was observed in Salisbury Sound and Torch Bay. Very few seabirds were sighted in the vicinity of St. Lazaria. Little acoustic sign was observed around St. Lazaria, in Islas Bay, or in Graves Harbor. In the shallow nearshore, fish catches were light and dominated by pink and chum salmon fry. Several species of adult rockfishes were observed in most of the sites visited.

d. Describe integration activity.

Nearshore surveys: The nearshore work is heavily integrated with the UTL and especially LTL components. On board the surveys, we are focusing on UTL focal species and conducting a full suite of oceanographic studies.

Offshore acoustic surveys: Discussions have been held with project PIs on a variety of topics. Contributions were made to the UTL survey design at all PI meetings and follow up emails. Coordination between nearshore and offshore MTL sampling was discussed with Olav Ormseth. Finalizing staffing and in-port dates for the survey vessel was coordinated with Jamal Moss.

Retrospective analysis: We are an integral part of the retrospective team that has formed to coordinate the analyses.

Modeling: We have worked with the modelers to develop sampling plans for gathering data (particularly food habits data) for use in the models.

General: We have been actively involved in developing overall GOA IERP hypotheses and objectives, sampling plans, and other activities. This includes participation in all PI meetings and phone calls as well as GABI meetings.

e. Describe any concerns you may have about your project's progress.

Nearshore surveys: Due to the federal budget situation, we were hindered in our ability to prepare all of the required gear and supplies in time for the start of the survey (including having to deal with the preparing for a government shutdown several days before the survey was set to begin). This resulted in two main impacts. We had to borrow a tow fin (along with other items) for the acoustics work rather that buying our own as planned. This limited us to two transducer frequencies (38 and 120) instead of the planned three. In addition, we had to spend more time than planned aboard the vessel (i.e. use cruise time) to finalize many of the gears such as the underwater camera and some of the nets. This reduced the amount of time available for sampling. These are not major impacts; the main effect is that our ability to perform seasonal comparisons using the spring eastern GOA data will be hindered somewhat. The budget situation appears to be resolved and we hope to purchase the necessary gear for the summer surveys.

We also encountered several technical problems during the spring EGOA survey. We were unable to fully utilize the net sounder (another borrowed item). Because we had only depth information, we could not deploy the net in some areas where safety concerns required us to have a picture of the net relative to the bottom. In addition, our skiff acoustics setup was inoperable and we were unable to conduct acoustic surveys in shallow water. The underwater camera failed as well. The impacts from these developments are similar to those described above: they all reduced the amount and type of data we were able to gather, but should not have major impacts on the overall study. We have solved these problems in preparation for the spring survey in the western region. None of the technical problems will affect the project timeline.

Offshore acoustic surveys: An attempt to have a 120 kHz transducer installed on the F/V Northwest Explorer was thwarted due to the inability to route the transducer cable through a fuel tank (no room in a conduit). The lack of the 120 kHz channel will restrict data collection during

the 2011 field season to 38 kHz. Discussions were held with the chartering company to install a 120 kHz transducer during the next dry dock but I do not know if a plan has been finalized. An alternate pole mount, welded to the side of the vessel, was also discussed with the company. The lack of a second frequency constrains the ability to acoustically discriminate among groups of backscattering organisms (e.g. krill and fish).

f. Poster and oral presentations at scientific conferences or seminars

Ormseth presented a talk in the FOCI seminar series at the Alaska Fisheries Science Center entitled "NPRB GOA IERP: A multidisciplinary study of the Gulf of Alaska ecosystem" on March 2, 2011. Ormseth was also scheduled to deliver a talk on the MTL project at the Kodiak Marine Science Symposium, but was unable to attend due to budget and time constraints.

g. Education and outreach

Part of the development of overarching hypotheses and objectives was to have a concise, unified presentation to the public concerning our research. Beyond that, we have not conducted any education or outreach activities yet except for providing photos and bios to NPRB.

4. PROGRESS STATUS

Overall we feel our progress has been good. Despite the federal budget situation we were able to get our nearshore survey operation up and running (basically "by hook or by crook"). The problems described above are minor relative to the overall goals of the project. The offshore acoustics project is also well underway, and the sampling grid we developed in common with the other components should provide good opportunities for acoustic transects on the UTL surveys. We have been particularly satisfied with the collaboration between the LTL component and our nearshore surveys: we have a solid oceanography component as an integral part of those surveys.

5. FUTURE WORKPLAN and DATA DELIVERY

Workplan

What	*Who*	*Start and end dates*	*Other key dates*
Summer nearshore surveys	Ormseth/DeRobertis	7/7-8/15	
Fall nearshore surveys	Ormseth/DeRobertis	9/15-10/15	
Gather data for retrospective analyses	Ormseth	6/1-12/1	
Preliminary fatty acid analysis	Budge/Wang	6/1-12/1	
Acoustic and net sampling during UTL summer/fall survey	Horne/ McGowan	6/30-10/13	
Archive acoustic survey data	McGowan	9/30-12/31	

Data delivery.

GOAIERP Data Delivery Table		
Data type for delivery	Delivery Month & Year	Person sending data, with email address
No data are expected to be available by the end of the next reporting period (December 1, 2011).		