1. PROJECT INFORMATION

GOA IERP Project Number:	4181-00
Title:	UTL – Surviving the Gauntlet
Overall project duration	1 October 2010 – 30 Sept 2014
Overall project funding	$3,765,811
Report period	1 October 2010 to 1 May 2011
Report submission date	29 April 2011
Lead Author of Report*	Jamal Moss

**Although there may be only one lead author of the report, all PIs and co-PIs of the project, as identified in the approved statement of work and listed below, are responsible for the content of the Semiannual Progress report in terms of completeness and accuracy.*

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2. PROJECT OVERVIEW

The overall goal of our proposed research focuses on identifying and quantifying the major ecosystem processes that regulate recruitment strength of key groundfish species in the Gulf of Alaska (GOA). We concentrate on a functional group of five predatory fish species that are commercially important and account for most of the predatory fish biomass in the GOA. We focus on recruitment success because large swings in the abundance of these species have occurred despite precautionary fishing levels. Their early life begins with an offshore pelagic phase followed by a nearshore settlement phase. Spatial distribution, food preference, and habitat suitability of these two life history phases are poorly known. Fieldwork will define a critical environmental window for these five focal species by examining the gauntlet they endure while crossing from offshore spawning to nearshore settlement areas. We will contrast two regions: the central GOA with a broad shelf dominated by high oceanographic variability and large demersal fish biomass and the eastern GOA with a narrower shelf, lower demersal biomass, and higher species diversity. Retrospective analysis of biological and environmental variability combined with multispecies stock assessment models will determine the relative influence of environmental parameters and identify processes influencing recruitment. Regional differences will be linked to dietary preference

of top level predators to infer causal mechanisms for population trends and influence of climate change on ecosystem structure and diversity.

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

The Gauntlet: 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.

GOAIERP hypotheses are posted in SharePoint at: https://agora.afsc.noaa.gov/sites/gisr

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

1.) Quantify, by region, the temporal variability in potential climatic, oceanographic, or biological drivers influencing the early life survival of key groundfish species. Differences between the eastern and central GOA will be examined through retrospective analyses of available spatial datasets. Please refer to the retrospective component progress report for more details.
2.) Determine by region the abundance, distribution, and condition of key groundfish species during their offshore to nearshore pelagic phase through at-sea sampling with concurrent observations of the biophysical environment (i.e. oceanography, prey, competitor, and predator fields). Please refer to the lower trophic level (LTL) and the middle trophic level (MTL) component progress reports for more details on nearshore sampling and the offshore concurrent observations of oceanography, prey, competitor, and diet fields.
    a. Conduct 2010 pilot survey in eastern GOA region to trial oceanography and fish sampling during spring and summer seasons.
    b. Specify Process and analyze samples from pilot survey to inform subsequent surveys in 2011.
    c. Conduct fish sampling during summer and fall 2011 surveys in central and eastern GOA regions and assist other components where needed.
    d. Develop a base habitat suitability model for each species and region by applying information gathered during literature synthesis.
    e. Genetically identify larval and juvenile rockfish samples from 2011 and 2013 surveys.

    Stack spatial layers of predictor variables (e.g. depth, slope, grain-size) and calculate quantitative measure (ordinal or continuous scale depending on data).
3.) Create benthic habitat suitability maps by region through analysis of available bathymetry and substrate data (e.g. slope, grain-size) to characterize the nearshore demersal habitat.
    a. Conduct literature synthesis and evaluate relevant information on habitat preferences and associations for each of the five focal species.
    b. Specify these relationships by eastern and central GOA sampling regions where possible (e.g. depth and habitat of capture in surveys).
    c. Collect, georegister, and digitize soundings and habitat from available historic datasets (e.g. smooth sheets) for eastern and central GOA.
    d. Develop a base habitat suitability model for each species and region by applying information gathered during literature synthesis.
    e. Stack spatial layers of predictor variables (e.g. depth, slope, grain-size) and calculate quantitative measure (ordinal or continuous scale depending on data availability) of suitability for each species utilizing base habitat suitability model.

   f. Develop species specific habitat suitability (SSHS) maps for each of the five focal species and provide data to modeling component for integration.
4.) Develop growth curves and consumption rates through laboratory work, which will parameterize simple bioenergetics models that will estimate potential fish growth for rockfish.
5.) Analyze dietary preference and foraging behavior of seabirds and relate diet to prey availability. Please refer to the MTL component progress report for more details on the estimation of total biomass removals by seabirds.

3. PROGRESS SUMMARY

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

Timeline	Milestone	Completion Date
Planning	Prepare for 2011 field season	In progress
Habitat Suitability	Central GOA region georegistering and digitizing of smooth sheets has begun. Collection of southeast Alaska smooth sheets has begun. Georegistering of available sediment data has begun.	In progress
Seabirds	Prepared for at sea observing of marine mammals and seabirds	April 2011
Seabirds	Prepare for seabird diet work on Lazaria Island	In progress
Seabirds	Hire observers and field technicians	In progress

b. Describe report period progress.

Retrospective Analysis (1):
Please refer to retrospective component progress report.

2010 Pilot Survey (2):
Chlorophyll and CTD cast data from the spring and summer 2010 pilot survey have been processed and entered in PMEL's database. Ichthyoplankton samples from the spring pilot survey have been processed and species distribution maps were posted to SharePoint. Summer ichthyoplankton samples are currently being processed. Zooplankton samples from the 2010 pilot survey are in storage at UAF waiting to be processed. Pelagic trawl catch data for age-0 groundfish species from the 2010 spring, summer, and fall pilot surveys were plotted and presented at the annual GOA Project PI meeting.

Habitat Suitability (3):
Georegistering and digitizing of available historical smooth sheet maps and sediment data sources have begun. Priorities for assembly of available bathymetry and sediment data are established for the two sampling regions, with central GOA being first followed by southeast Alaska. Region boundaries for mapping alongshore and nearshore areas were established at the February PI meeting.

Bioenergetics (4):
No actions scheduled for this reporting period.

Seabirds (5):
A technician (graduate student, UAF) was hired to collect data on foraging distributions of piscivorous seabird species (rhinoceros auklet; i.e., focused study within seabird component), and telemetry equipment was obtained for our use until custom made units are acquired from the manufacturer. A training session focused on at-sea observation protocols was attended, and equipment needed for at-sea

observations acquired. At-sea observers were assigned to the R.V. Thompson and R.V. Tiglax cruises (April-May 2011). A list of potential observers for future at-sea cruises was developed. Data collection needs for seabird diet work (tufted puffins, storm-petrels) were coordinated with the project leader for East Amatuli Island. The processing of approvals for humane handling of birds and attaching telemetry gear was completed.

c. Describe preliminary results.

2010 Pilot Survey (2):
Chlorophyll blooms detected north of Cross Sound during the 2010 pilot survey verified a mechanistic explanation put forth by P. Stabeno regarding high nutrient surface water exiting Cross Sound. Moorings deployed in 2010 measured nutrient rich water entering the Cross Sound at depth, mixing in the Sound between tidal cycles, and providing a constant and stable supply of nutrients at the surface which are transported out of Cross Sound on the changing tide. Age-0 arrowtooth flounder (ATF), rockfish, and pollock were spatially segregated in the southeastern GOA during summer months of 2010. ATF were primarily located on and off the shelf within the vicinity of Chichagof Island. Rockfish were primarily located on and off the shelf within the vicinity of Baranof Island. Pollock were distributed within the nearshore regions of both islands.

Habitat Suitability (3):
Many smooth sheets in central GOA region have been georegistered and some are complete with habitat features digitized.

d. Describe integration activity.

2010 and 2011 Surveys (2):
Over the past six months we have been routinely communicating with LTL and MTL lead PIs and field component leads to coordinate field design and standardize sampling methodologies for the program. We have also jointly developed 2011 field sampling plans for fisheries oceanographic surveys. We have disseminated catch information and distributed samples from the 2010 pilot survey to the LTL and MTL groups in order to provide preliminary information and guide discussions on timing and coordination of 2011 field sampling, refine hypotheses for individual species, and develop a 2011 sample processing plan. We organized a meeting at AFSC to bring PIs from each of the trophic levels together to design a field sampling plan in December 2010.

Habitat Suitability (3):
We have been in communication with the MTL to provide sample maps of specific areas for guiding 2011 nearshore surveys. Additionally, we discussed the outline of our project timeline and product delivery schedule with the modeling component.

Bioenergetics (4):
We have met with the modeling component to identify data products that will be of value to them.

Seabirds (5):
We have attended (remotely) all GOA Project PI meetings and shared progress of seabird component with team members. We coordinated graduate student's orientation to the project with the student's advisor. Training for at-sea observers was provided by USFWS Regional Office staff (Migratory Bird Management office). We arranged and attended this training to ensure consistency in following protocols across cruises throughout the Gulf of Alaska.

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

In late April there was a problem with the laptop/software interface of the equipment sent on the April-May 2011 UTL cruise (aboard the M/V Tiĝlax̂). As this is on-going at the time this report is due, it is premature to say if the solution worked.

f. Poster and oral presentations at scientific conferences or seminars

1. UTL presentations (Moss, Heintz, and Shotwell) on habitat project objectives, goals, methods, and scope, bioenergetics of age-0 groundfish, and preliminary results from the 2010 pilot survey were given at the annual GOA Project PI meeting (February 2011).

2. The Gulf of Alaska Project: An Inter-Regional Research Project Through Which Salmon Ocean Ecology Studies Should Be Integrated. Oral presentation delivered to Salmon Ocean Ecology Meeting (March 2011) by Jamal Moss.

g. Education and outreach

None

4. PROGRESS STATUS

Overall, the UTL component of the GOA Project is progressing as anticipated. The primary challenge over the past 6 months has been access to FY 2011 funds. Due to the federal government's fiscal challenges this year and the avenue through which the AFSC receives reimbursable funding from NPRB, purchasing equipment for oceanographic surveys has been challenging. Considerable effort was put toward finalizing the sampling grid for this program; with many compromises made by all investigators, which has resulted in a survey design that has advantages and disadvantages for addressing our hypotheses. We recommend that a small group of PIs meet this winter to discuss and/or design a process-oriented field study in 2012 after field data from 2011 has been reviewed. The 2012 process study would focus on addressing unknowns in biological rates, iron as a limiting nutrient, and physical processes associated with bathymetric features of interest.

5. FUTURE WORKPLAN and DATA DELIVERY

Workplan

What	*Who*	*Start and end dates*	*Other key dates*
UTL field surveys	**Moss**	June 30 – Oct 14	
Hire UTL technician	**Moss**	June 1	
Complete georegistering and digitizing of central GOA bathymetry and sediment data and begin process for southeast Alaska region	**Zimmermann, Shotwell**	Begin fall 2010, continue until completion of product	

Create SOW for habitat post doc position	**Zimmermann, Shotwell**	Begin summer 2011, end fall 2011	
Contract post-doc	**Heintz**	May 2011	
Design preliminary studies to determine ingestion rate in POP	**Heintz**	May – June 2011	
Acquire POP for lab studies	**Heintz/Post-doc**	August 2011	October 2011
Acquire field samples	**Heintz**	August – Oct 2011	
Begin lab studies on POP	**Post-doc**	September – December 2011	
Identify & hire at-sea observers for remaining UTL cruises	**L. Slater**	Present – November	At least 3 weeks prior to each cruise to solidify plans
Oversee initiation & help with rhinoceros auklet study at St. Lazaria	**L. Slater**	Late June	
Direct rhinoceros auklet study at St. Lazaria	**A. Will**	Present – November	
Supervise seabird monitoring work at St. Lazaria Island	**L. Slater**	May – September	

Data delivery.

GOAIERP Data Delivery Table		
Data type for delivery	Delivery Month & Year	Person sending data, with email address
2011 Field Survey Data	November 2011	Jamal Moss Jamal.moss@noaa.gov
Species Specific Habitat Suitability (SSHA) maps	None	

1) Haul data (surface and subsurface hauls) and marine mammal and seabird observation data will be delivered. UTL surveys serve as a platform for collecting data for the MTL (bioacoustics) and LTL (physical and biological oceanography, zooplankton, icthyoplankton) components, and data delivery schedules for these modules can be found in the MTL and LTL bi-annual report. Specific data that will be delivered are:

    - Haul location, timing, weather, and net mensuration
    - Fish species abundance by haul (counts and total weight)
    - Individual lengths and weights for all fish sampled
    - Event log with time and location (GPS) of all sample activities
    - Transect line counts (with locations) of seabirds and marine mammals

2) 2011 field survey data will be delivered to the Data Management System by December 31st 2011.
3) Jamal Moss will send the fish data and Leslie Slater will send the seabird and marine mammal observational data.