

**ANNUAL REPORT FY13**  
**Habitat Assessment Funded Research**  
**30 September 2013**

**Project Title:**

**Locating essential spawning grounds for red king crab**

**Principal Investigator(s):**

**William Christopher Long**

**Goals:**

- To examine large-scale movement of female red king crab in Bristol Bay
- To identify where red king crab are spawning in Bristol Bay

**Approach:**

The females for this project will be captured during the eastern Bering Sea trawl survey scheduled for 2013. Only new shell ovigerous red king crab with newly extruded clutches of uneyed eggs will be used. Crabs will be carefully assessed for injuries and kept in an on-deck tank with flowing seawater for several hours to ensure that they are healthy, before being tagged and released. Each female will be tagged with a pop-up satellite tag affixed to the carapace with marine grade epoxy. These techniques have been successfully used with similar acoustic tags by AFSC staff studying red king crab (Dew, 1990). Crabs will be released throughout their range in Bristol Bay. We will correct for tag malfunction by transporting 10 crabs from the Bering Sea, tagging them with dummy tags, and keeping them in tanks with flowing seawater in the Kodiak lab until after their larvae have hatched and they have molted. The pop-up tags will have sensors that will record temperature and depth. The sensors will also record light levels and magnetic fields which can be used to estimate location (Seitz et al., 2011). While the individual point estimates of location are imprecise, red king crab do not move very quickly, which will allow the use of a running average over the course of several days to give a more precise estimate of crab location and movement. In addition, because the crabs remain on the bottom, the precise location may be further refined by the use of the depth data combined with bathymetric charts. Finally the tags also have accelerometers which will allow an analysis of patterns in movement and behavior. Depending on when the crabs are tagged and when larval hatching occurs, the tags should collect around 9-11 months of data.

The tags will be programmed to pop up after the crabs have molted. Because the exuvia, along with the tag, will remain at the site of larval release, we can be assured of determining the exact location even if the tags pop up weeks after larval release. We will also run preliminary tests using exuvia in the lab to ensure that the tags will not drift after the crab molts. They will then transmit their exact location and the data collected during the previous year to a satellite. An added benefit of this is that any crab that dies will be identifiable by the lack of movement. Thus, we will be able to estimate the mortality rate of female crabs during the inter-molt period.

The tags will be purchased in 2012 and preliminary tests and tagging trials will be performed to perfect and optimize the tagging protocol. The crabs will be tagged on the 2014 survey between June and August. Data from the tags will be obtained by August 2015, and the

initial report completed by the end of FY 2015. Publication in the peer-review literature will follow.

**Work Completed:**

We were unable to deploy the tags this year because the vendor failed to deliver the tags on schedule. We have received a little over half of the tags and the remainder are *en route*. We will perform field tests of the tags this winter and spring and deploy them during the 2014 Eastern Bering Sea trawl survey.

**Applications:**

No results are available yet.

**Publications/Presentations/Webpages:**

- N/A

**Literature Cited:**

Dew, C.B., 1990. Behavioral ecology of podding red king crab, *Paralithodes camtschatica*. Can. J. Fish. Aquat. Sci. 47, 1944-1958.

Seitz, A.C., Loher, T., Norcross, B.L., Nielsen, J.L., 2011. Dispersal and behavior of Pacific halibut *Hippoglossus stenolepis* in the Bering Sea and Aleutian Islands region.