

## **Project Title: Fishing Technology and Conservation Engineering to Reduce Bycatch**

**Contact:** Dr. Craig S. Rose

**Overview:** The Conservation Engineering (CE) project of the AFSC conducts an ongoing program of cooperative research with Alaska fishing groups to improve fishing gear and methods to achieve bycatch reduction, measure mortalities from all kinds of bycatch and address the effects of fishing gear on seafloor habitats. The program combines its scientific techniques and direct observation tools with the gear and fishing expertise of industry partners to design and test solutions to these issues. Funding is needed for fishing vessel costs, freight, travel, field personnel costs and supplies necessary to pursue these opportunities. Partner organizations include the North Pacific Fisheries Research Foundation, The Groundfish Forum, Alaska Pacific University, Alaska Seafood Cooperative, Dantrawl, NET Systems, and United Catcher Boats. Other projects may be pursued with individual fishermen or gear designers. This project contributes to NOAA Fishery Research Goal 2, Objective 2.1, 2.4, and 2.6 and Goal 5, Objectives 5.1 and 5.2.

**Research Description:** Conservation Engineering scientists of the AFSC perform research in cooperation with industry partners to improve fishing gear and methods for bycatch reduction. These studies follow a cycle of: a) meetings and informal discussions with industry experts on how to use fish behavior and gear performance information to reduce bycatch, b) observations of relevant fish behavior in the field, c) design and physical testing of net modifications, d) field tests of prototypes, addressing bycatch performance and relevant fish behavior, and e) analysis and presentation of results and their application back to the next cycle.

Each of these activities addresses issues that put substantial limitations on subject fisheries and have been identified by fishermen as areas where the proposed technologies could make significant improvements. Government participation requires funding for fishing vessel costs, travel, shipping, supplies and salaries. Limited AFSC funds will require Conservation Engineering scientists to exploit a mix of funding sources, including national programs for Cooperative Research, Bycatch Reduction Engineering and Reducing Effects of Fishing. Each year's projects are scalable and pursued to the extent that funding is provided by those programs. Because availability of BREP funding to federal researchers has been shifted to a grant program for non-federal researchers, CE will have to rely more heavily on Cooperative Research funding.

### **2013 Research**

Cooperative research for conservation engineering in 2013 included a combination of projects continued from 2012 and projects initiated with this year's funding. Ongoing projects include: Devices to reduce salmon bycatch in pollock fisheries, alternative footropes for pollock trawls to reduce seafloor contact, alternative footropes for bottom trawl to reduce crab mortality and provision of underwater video systems to fishermen and other researchers to facilitate bycatch reduction developments. New projects include: developing devices to reduce salmon bycatch in Gulf of Alaska bottom trawl fisheries and developing devices to reduce halibut bycatch in pollock fisheries.

Development of salmon excluders for pollock fisheries has continued, primarily through testing of new devices under exempted fishing permits, managed by our industry collaborators, under the North Pacific Fisheries Research Foundation. AFSC participation in tests has primarily been through developing and providing and supporting new camera systems for monitoring escape rates of pollock and salmon and aiding in analysis and presentation of results.

The development of alternative groundgear for pollock trawls started in 2012 with an experiment that demonstrated that a footrope raised 3 – 4 inches off the seafloor, with widely-spaced point of contact still captured almost all of the pollock that encountered it. The 2013 experiment focused on whether single sweep cables, similarly raised, were effective in herding pollock over the seafloor. If effective, this would allow simple sweeps to replace much of the swept-width of full trawls in capturing pollock on the seafloor. These tests were carried out during a June cruise aboard the F/V Great Pacific. Other work during that cruise prepared for 2014 tests of whether such alternative pollock groundgears actually reduce seafloor contact and damage to structure-forming organisms. That work included successful deployment and testing of the cameras and sonar to assess the condition of seafloor and benthos and their use to identify areas appropriate for next year's testing. We identified an area with little previous trawling effort and consistent abundance of structure-forming sea whips. Partners for this research are United Catcher Boats and the At-Sea Processors Association.

Our primary efforts on alternative bottom trawl footropes to reduce crab mortality were expected to be completed in 2012. However, analysis of our 2012 tests and discussions with cooperating fishermen last fall indicated that further testing was warranted. Initial modifications were not effective and bottom trawlers were routinely using gear configurations with higher and wider seafloor clearances. We therefore decided to use some of our 2013 vessel time to test both this new industry configuration and a novel configuration that minimized seafloor contact. While the minimal-contact gear performed slightly better, both designs were shown to result in very low crab mortality. We collaborate with the Bering Sea bottom trawl fleet in this project, organized under The Groundfish Forum and the Alaska Seafood Cooperative.

Because of increased management scrutiny and regulation of salmon bycatch by Gulf of Alaska bottom trawlers, we have initiated an effort with that group to begin development and testing of salmon excluders for those fisheries. While no field work could be achieved during FY 2013, resources were obligated to support initial field observations, planned for fall 2013. Our principal collaborator on this project is the Alaska Groundfish DataBank, an organization representing the Kodiak trawl fleet.

Finally, part of better managing the capture of near-seafloor pollock is reducing halibut bycatch. While a vessel offered no-cost testing of such a device in winter of 2013, cooperative research funding was not yet available. We have since procured most of the components to build such a halibut excluder. However, if that opportunity is again

available, 2014 funding will still need to identified to support travel and field salary for scientist participation.