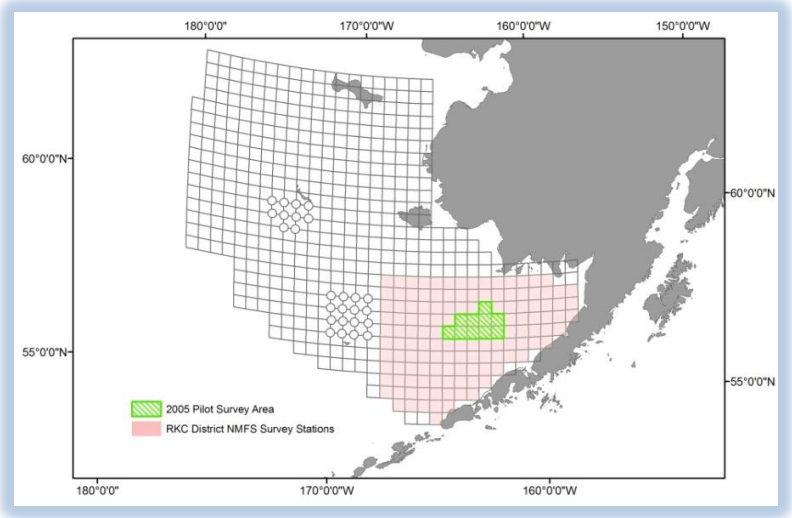
2005 Bristol Bay Red King Crab Cooperative Survey

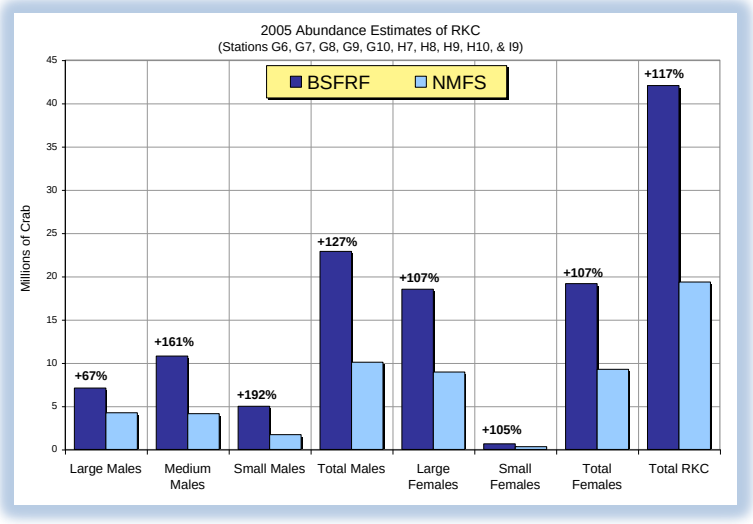
This pilot study focused on the testing of specialized trawl gear (*Nephrops* survey trawl) and crab survey methods in the Bering Sea that have been utilized for several years to assess snow crab in the Gulf of St. Laurence, Canada. This research focused on Bristol Bay red king crab as it was believed to be a more tractable survey target to test new methods on due to shallower waters and harder substrate in the area of interest. There were four main objectives for this cooperative research:

1) Determine the feasibility of conducting a survey using a gear/equipment package presently designed and used in Eastern Canada, to survey Bristol Bay red king crab.
2) Estimate mean and variance of the abundances of juvenile and mature male and female Bristol Bay red king crab.
3) Compare estimates of crab density by species/size/sex categories from the pilot survey with estimates from NMFS standard survey in the same areas of high density.
4) Evaluate the scientific utility, feasibility and cost of the alternative survey design for long term application.



The BSFRF signed a Memorandum of Agreement with NMFS to complete this research. The BSFRF chartered the 120' Bering Sea catcher vessel stern ramp trawler F/V *American Eagle* for 20 days. The survey gear package consisted of otter trawls and trawl doors specially designed and rigged for "heavy on bottom tending characteristics," net sensors for trawl spread and associated instrumentation and software for other trawl performance monitoring and data recording. The research trawls measured 20 meters on the headrope by 27 meters on the footrope. The trawls were equipped with a "tickler chain array" designed to "dig out" crab in the substrate for subsequent capture.

Operations were conducted during a 20-day period in June of 2005 and timed to match the standard NMFS survey of Bristol Bay red king crab in the southeastern Bering Sea. The cooperative pilot survey for red king crab was conducted in 10 NMFS standard survey blocks (map above) that in the two prior years had represented a core area of higher density legal sized male red king crab. Within this 4,000 square mile area, 129 tow sites were randomly chosen from a predetermined sampling grid. Tow durations were set at 5-7 minutes and the target tow speed during towing with trawl winches off was 2.0 knots. Analysis of BSFRF survey data from the 10 blocks surveyed in the Bristol Bay red king crab district was completed using the standard NMFS area swept methodology of generating crab densities in numbers of animals per square nautical mile and expanding these numbers to crab abundance estimates for the area in the 10 blocks (about 4,000 square nautical miles). Analysis of red king crab abundance was summarized by the NMFS five standard size/sex categories; large males (≥135 mm), medium males (110-134 mm), small males (<110 mm), small females (<90 mm) and large females (≥90 mm).



The experimental trawl gear package performed well in the Bristol Bay red king crab survey area and proved the feasibility of this new crab trawl survey gear package for use in the Bering Sea. The results (chart at left) showed that the *Nephrops* trawl consistently caught more red king crab. Although the statistical comparisons of this data were not published, the results were reviewed closely by all research partners and were further used to build a semivariogram for use in future planning. Research partners agreed to the general utility of the results and the plans to use them to inform future cooperative work.