

Project Title: At-sea experiments to estimate footrope escapement for rock soles \$57K

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Proposal:

Use the new trawl under-bag, funded with 2015 NCRP money, in a 5 day field experiment to estimate footrope escapement of northern and southern rock sole from the Poly Nor' eastern trawl used in the biennial demersal trawl surveys of the Gulf of Alaska (GOA) and the Aleutian Islands (AI).

Abstract:

We propose to add 4 days on to the 2016 AI survey to conduct a 5 day escapement experiment (1 day has already been prepaid with 2015 funds) in an area with known high concentrations of rock sole. We expect to accomplish approximately 20 experimental tows during this period. Combined with the results from the herding experiment, conducted on the 2015 GOA survey, the proposed experiment should produce the data needed to estimate the sampling efficiency of the Poly Nor' eastern trawl for rock soles. This estimate, in turn, will be combined with the survey trawlability and flatfish habitat maps, under development by Groundfish Assessment Program staff, to develop preliminary estimates of the absolute abundance and survey catchability of northern and southern rock sole in the GOA. The survey catchability estimates for northern and southern rock sole are intended to be used to set Bayesian priors on the survey catchability parameters in the stock assessment models for these two species (A'mar, T., and W. Palsson. 2013).

Background

Recent CIE, MSA, and stock assessor reviews have identified the need for accurate estimates of survey catchability to improve estimates of abundance produced by stock assessment models. One of the main components of bottom-trawl survey catchability is the sampling efficiency, or the proportion of fish within the swept area that are caught. For flatfishes, trawl sampling efficiency depends upon the herding of fish by the trawl bridles and the escapement of fish under the footrope. Previous experiments conducted with the Poly Nor' eastern (PNE) bottom trawl on deep water flatfishes demonstrated that sampling efficiency could be estimated as a function of these two processes (Munro and Somerton 2001, Somerton and Munro 2001, Somerton 2003). However, similar studies have not been conducted for the two rock sole species.

A new effort has been developed to estimate the survey catchability of shallow water flatfishes, especially rock soles. To aid this effort, trawl efficiency studies began on the 2014 AI survey with both an old under-bag design, used to estimate footrope escapement, and the existing

experimental bridles, used to estimate herding. This field work indicated that the under-bag was damaged and, more importantly, affected the performance of the main survey trawl. The altered performance caused the trawl to operate beyond the established performance limits in the AFSC trawl survey protocols (Stauffer 2004). This finding led to the design of a new type of under-bag using funds from a 2015 NCRP proposal. We anticipate that the design and construction of a new trawl under-bag will be completed by March, 2016, and that the bag will be available for use in time for our August experiment.

We are asking for support to deploy this net during the 2016 AI bottom trawl survey to estimate escapement under the footrope as part of a larger study to estimate the survey catchability of rock soles.

Approach

We will deploy the newly designed under-bag, attached to the standard PNE bottom trawl, to estimate the footrope escapement of rock soles during the 2016 AI bottom trawl survey. The RACE Division has already allocated one day for the fine tuning of the new under-bag trawl, but we are asking for NCRP funds to purchase an additional four days to conduct at least 20 tows of the trawl. These additional days will be integrated or added to the standard 70 day bottom trawl survey of the Aleutian Islands, and the escapement studies will be conducted where there are known concentrations of rock soles. In the Aleutian Islands, we anticipate that northern rock sole (*Lepidopsetta polyxystra*) will be the primary rock sole species.

Footrope escapement, or actually its inverse, the retention proportion, will be estimated as the proportion of the combined catch (i.e. main net plus under-bag) that was captured in the main net as a function of fish length. We will then combine this estimate of escapement with the herding coefficient estimates from experiment conducted on the 2015 GOA survey into an analysis to estimate the trawl efficiency for rock soles (Somerton et al. 2007).

In future work, after the experiment and analyses are complete, these trawl efficiency estimates will be combined with survey availability to estimate the total survey catchability of rock soles. These estimates will, in turn, be used to set Bayesian priors on the survey catchability parameter in the rock sole stock assessment models (A'mar and Palsson 2013), thereby producing more reliable model predictions of absolute stock abundance.

Costs:

Vessel charter and fuel (4 days at \$13k/day)	\$52,000
Overtime (5 days at \$1000/day)	\$ 5,000
Total:	\$57,000

Products:

Escapement estimates for rock sole and other shallow fishes

Mileposts and Timeline:

December 2015: Amend vessel charter contract to include 5 additional days
May 2016: Ship under-bag trawl with other AI survey gear
July 2016: Conduct 5 day flatfish escapement experiment in the Aleutian Islands
May 2017: Final Report of study including escapement estimates.

Citations

- A'mar, T., and W. Palsson. 2013. 4.1 Assessment of the northern and southern rock sole (*Lepidopsetta polyxystra and bilineata*) stocks in the Gulf of Alaska for 2014. In: Stock Assessment and Evaluation Report for the Groundfish Resources of the Gulf of Alaska. North Pacific Fishery Management Council, Anchorage, AK.
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