Mortality Rate of Brown Crab (Cancer pagurus) Discarded from the Pot Fishery on the West Coast of Scotland.

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The Fishery

Fleets of ~300 small crab pots are set on sandy substrates at depths between 60 and 120m. Pots soak for three days before being checked, re-baited and set again. The fishery targets Brown crab (Cancer pagurus) and bycatch levels of other species are minimal.

In 2008 the Scottish fleet landed 9504 tonnes of Brown crab. In 2007 Brown crab was the second largest Scottish shellfish fishery by weight, with a value of £38 million (DEFRA 2007).

The Concern

Although bycatch levels of non-target species are low, 10-50% of the target species catch is incommensurate and discarded. Discarding can be rough and crabs can incur considerable damage during the process of catch and discard. The concern is that the fishing mortality (F) taken from landings records is considerably lower than the true impact of the fishery.

The Aim

The aim of this study is to experimentally obtain a figure for the proportion of discards which die as a result of the catch and discard process in the Scottish West coast Brown crab fishery. With this figure and the previously calculated discard rate (Tully et al., 2006) it will be possible to identify the licensing of crabs killed by making calculations from landing records. Due to the scale of this project, the aim is to prove the worth and practicality of such a study but not provide the statistically robust numbers needed for management applications.

Experimental Design

- Samples of 30 crabs were taken.
- Nicked and placed in keep pots.
- Pots were kept in the vivier tank.
- Samples were kept for 7 days and removed daily to check for mortality.

Split Samples

Discards were separated into three groups determined by the reason for rejection. These groups were “Undamaged “(U) and “Soft shelled”. Catch composition varies by season, area and no doubt other unidentified factors. Because the discard groups have different mortality rates, the overall mortality must be adjusted accordingly to the catch composition. Knowing individual group mortality rates makes this possible. Adjustment is only necessary if the discard mortality is being calculated from landings, or catch composition sampling, rather than full mortality rate experimentation.

Combined Samples

Combined samples were not split by group. Because only one random sample needed to be taken from each fleet sampled, more fleets could be sampled in this way than using split samples.

Control Samples

Samples of healthy marketable crab were taken and treated with the same experimental procedure. If returned to the sea these crabs would all be expected to survive, therefore any mortality is attributed to experimental handling. This gives an approximation for experimentally induced handling mortality. To obtain a realistic figure for mortality when returned to the sea, the experimentally induced mortality rate can be subtracted from the rate for experimental samples.

Results

Graph 1. Bar graph showing percentage mortality by discard group for three repeated samples, and the mean for each group. Mean mortality was 25% for the small group (n=56), 44% for the soft group (n=96), and 57% for the soft shelled group (n=92). The dashed control mean shows the level of experimentally induced mortality (5%).

Graph 2. Bar graph showing mortality rate per sample after 7 days for 3 combined and 5 control samples. Mean experimental mortality was 27% (n=187), mean control mortality was 14% (n=143).

Graph 3. Bar graph showing percentage mortality by group for three repeated samples, and the mean for each group. Mean mortality was 25% for the small group (n=56), 44% for the soft group (n=96), and 57% for the soft shelled group (n=92). The dashed control mean shows the level of experimentally induced mortality (5%).

Graph 4. Bar graph showing the weight of crabs landed for each fleet alongside the weight of crabs discarded for the same fleet.

Conclusions

Experimental mortality rate = 27%
Control mortality = 14%
Annual discard rate = 28% (Tully et al. 2006)
Scottish vessels landed 9504 tonnes in 2008

27% - 14% = 13% Discard mortality rate
28% X 9504 = 2661 tonnes discarded
24% X 2661 tonnes = 639 tonnes
Total fishery induced mortality = 639 + 9504 = 10,143 tonnes

References:


ICES CM 2010/C:24

References: