

Poster

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Integration of discards in the Roundnose
Grenadier stock assessment
in ICES division Vb, subarea VI, VII

Integration of discards in the Roundnose Grenadier stock assessment in ICES division Vb, subarea VI, VII.

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Abstract

We present a series of exploratory stock assessments for roundnose grenadier (*Coryphaenoides rupestris*) from estimates of catch data based on information and assumption of discards and landing statistics. It is a common practice to consider landings data as a substitute of catch data to perform stock assessments. When a significant portion of the catch is discarded, this assumption is likely to be misleading as assessment methods will provide underestimated stock size.

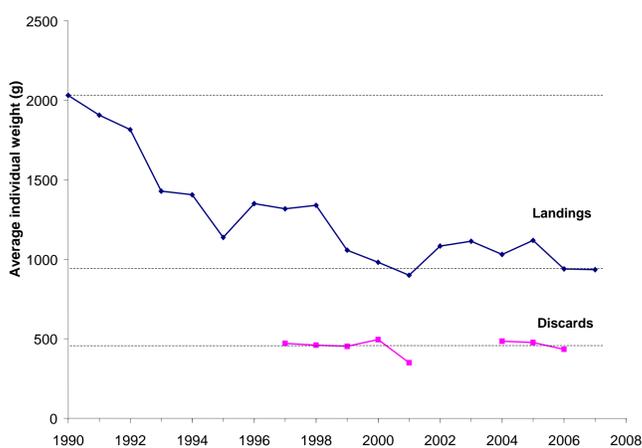
Observations have shown roundnose grenadier discards account for about 30% of the catch in weight. Discards data for this species have been available scarcely through observer programs since 1997 to 2005 and exhibit relatively stable length distributions and ratios between discards and catch. Although landings data have been available since 1990, no information on discards was available before 1997. Length distributions from landings show the average pre-anal length has decreased from 20.7 cm in 1990 to 15.7 cm in 2007 resulting in a reduction of 50% of the mean individual weight (980g in 2007) and an increasing occurrence of overlapping class sizes between landings and discards in recent years.

In order to rebuild the catch time series, it was necessary to make some assumptions regarding the missing information. In a first attempt, we assumed length distributions for discards had not changed over the 1990-2007 period. We applied the same length distributions for discards and extrapolated the proportions of weights between discards and catch to all the missing years. The exploratory assessments were performed through a series of separable virtual population analysis. Results show the hypothesis of stable length distributions is acceptable in recent years. However, for the early 1990s, catch length distributions were bimodal which is not realistic considering the slow growth and longevity of roundnose grenadier. These results imply the length distribution of discards has changed from the beginning of the fishery in 1990 to 1997 with probably bigger individuals discarded in the past.

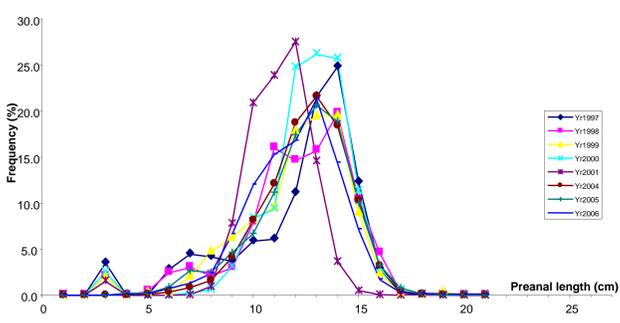
These changes in distribution could reflect a pickier behaviour of the fishermen when bigger fishes were more abundant. With a decreasing individual size in the catches, some size classes that used to be discarded would now be kept for landings. Those changes could also be the consequence of the evolution of fishing depths over the years. Both hypotheses are explored through exploratory assessments based on informations from the observer programs, fishing efforts and vertical distributions of roundnose grenadier.

Landings and discards datasets

Landings data are available each year since 1990. Discards data are scarce and only available since 1997 from observer programs.



→ Mean individual pre-anal length has lost 5 cm since 1990, leading to a 50% decrease of the average individual weight.

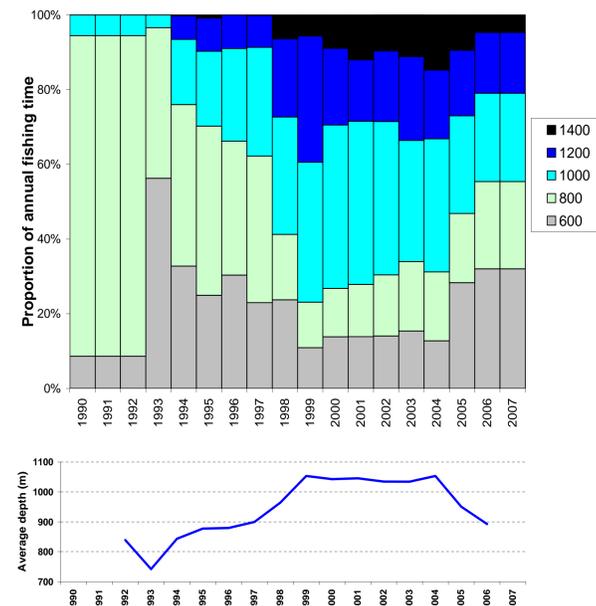


Year	Scottish observers aboard french vessels					French vessels (Observer database)		
	1997	1998	1999	2000	2001	2004	2005	2006
Landings	24227	37786	31425	38933	28232	209772.1	102936.4	22978.5
Discards	7441	12636	14477	18493	10863	65069.3	41505.1	16623.0
%	23.5	25.1	31.5	32.2	27.8	23.7	28.7	42.0

→ Length distributions and proportion of weight of discards in catches have remained constant for the 1997-2006 period

Fishing time and depth

Fishing depths and time for some vessels of the French fleet targeting grenadier have been provided by the fishing industry.



→ Fishing depths have substantially changed since 1990. Catches are likely to have been impacted by these changes.

Two methods to estimate catches

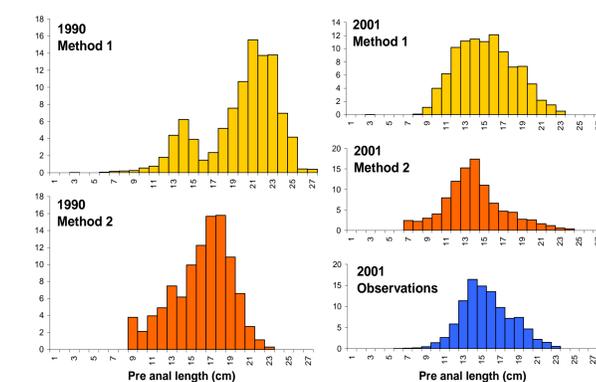
• Method 1 : Using landings and discards data

- Weighted sum of length distributions for both landings and discards.
- Missing data are inter/extrapolated with neighboring years.
- Relies on landings and discards records.

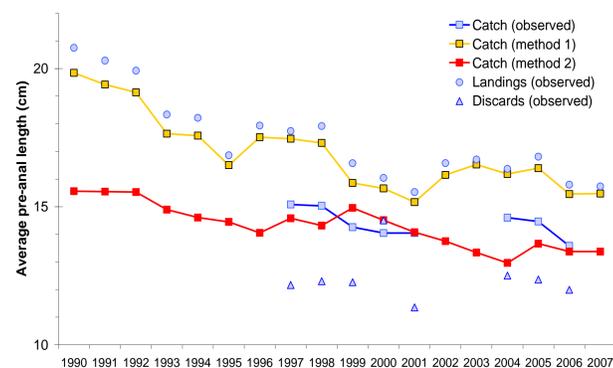
• Method 2 : Using fishing effort and vertical distribution of the stock

- The proportion of fishing time in 5 vertical layers is combined with depth-dependent length distributions of the stock.
- Relies on length distributions available from records, literature and data on fishing effort available from the industry.

Validation of length distributions

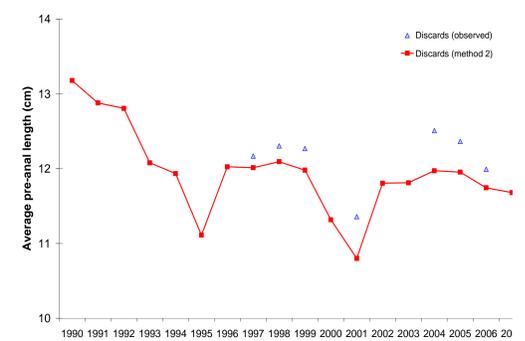


→ A bimodal length distribution of catches in 1990 is inconsistent with the slow growth of Roundnose grenadier. Bigger individuals were probably discarded in the early days of the fishery



→ Length distributions from method 2 fit better catches estimates derived from observations (in blue).

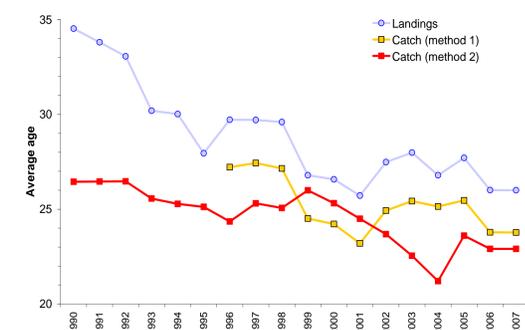
Changes in discarded sizes



→ Estimates of discards from Method 2 confirm the assumption (from Method 1) that discarded fishes were bigger in the early days of the fishery.

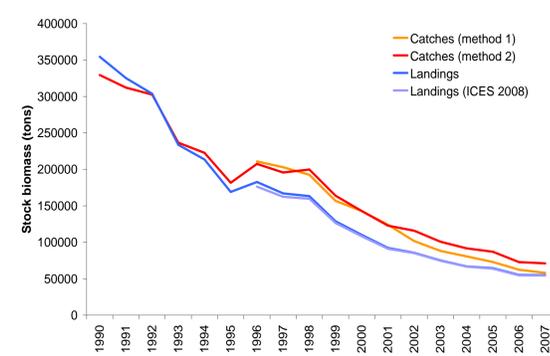
Separable Virtual Population Analysis

Rebuilt datasets are combined with an age-length key to define catch-at-age matrices.



→ The average age in catches has strongly decreased for both catches and landings suggesting some deep changes in the demographic structures.

SVPAs are applied to the datasets using VPA95 (CEFAS, Lowestoft, UK) and the same parameters: age groups 16-40+, age reference: 25, terminal F:0.1, Selectivity factor S:0.8



→ Stock biomass has decreased from 330-355 000 tons in 1990 to 54-70 000t in 2007.

→ Biomass from catch-derived SVPAs is between 5 and 36% higher than its equivalent based only on landings.

Concluding remarks

- Integrating discards into the assessment leads to higher estimates of biomass.
- Bigger individuals were discarded in the early days of the fishery.
- Both methods lead independently to the same above conclusions.
- Method 1 can not be used to extrapolate data to more than 2-3 years in the past or future.
- Method 2 invites to stronger partnerships between science and the fisheries to gather more information about fleets and fishing efforts and may require more survey cruises.

Acknowledgement: This work relies on a partnership between Ifremer and the fishing industries (Proma, Euronor). We also thank Valérie Allain for providing additional fishing datasets.