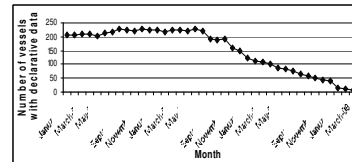
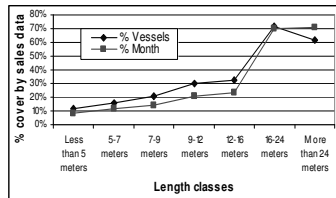


Context of the different small scale fisheries studied

Lack of catches and fishing effort's data is a special feature of small scale fleets in Europe

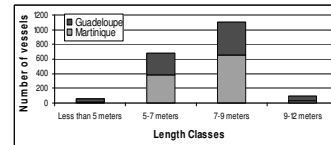
(Guyader et al. 2007. *Small-Scale Coastal Fisheries in Europe*.
http://ec.europa.eu/fisheries/publications/studies_report_en.htm)



In the Mediterranean fleet, sales data available almost complete for large-scale fleets but very partial for coastal fleets

In the Reunion Island fleet, monthly declarative fishing forms present decreasing return rate over time and a suspicion of bias – not usable

In the French West Indies fleet, 2000 coastal vessels (less than 12 meters vessels) have no production data or very partial



Sampling fishing trips on-site: a way to respond to the lack of information

Reliable statistical estimation implies the set up of a sampling scheme i.e. some form of framework for data collection that responds to the statistics criteria of sampling theory (Caddy J.F. and G.P. Bazigos. 1985. *Practical guidelines for statistical monitoring of fisheries in manpower limited situation*, FAO Fish. Tech. Pap)

Objective

Estimate, at best and in function of the available money, catches and effort data of the fleets considered

- By optimizing the allocation of the limited sampling effort available between sampling strata
- By covering, at best, the variability of catches between métiers, fishing zones or seasonality

Data

- The Community Fishing Fleet register
- The FIS collection of annual fishing activity calendars

Sampling protocol

Population: Total number of harbours*day of activity

- List the harbours where fishing activity may occurs
- List the days professional fishing activity is allowed
- Define a time strata (year, quarter, month)

Spatial stratification: Aggregation of homogeneous harbours in term of métiers and fleets. Define the sub-populations to be surveyed

The methodology is applied independently for each sub-population

Observation unit:

set of harbours an observer may sample during one day

The “observation unit*activity day” define the primary sampling unit (PSU)

Sampling protocol

Random selection of observation units: observation units randomly drawn for each sub-population and time stratum

The spatial stratification into homogeneous sub-population in term of fishing activity lead up to favour an unequal probability allocation for OUs.

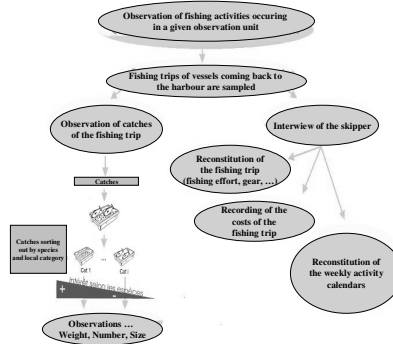
$$h_h$$

In the end, applied methodology comes down to a set of observers that survey fishing trips following a sampling scheme.

Following the methodology, each observer survey every sampling day the statistical harbour unit specified in the sampling scheme.

This one aggregates restricted or diffused sites in which varied data about fishing trips has to be surveyed.

Scheme about general processus of fishing trips on-site:



Estimation strategy

Following such a rigorous sampling scheme allow making statistics inferences. Inferences have to take into account the intrinsic factor of the sampling protocol applied with a raising procedure ad hoc.

1/ The raising issue:

Knowledge of the number of fishing trips at the population level is required to make assumptions. Not known, this information has to be estimated => various strategies of estimation are actually tested => constitute the key for a quality assumption => for the moment first non optimal estimation based on annual fishing calendars is used.

2/ Post stratification:

Catches and fishing effort are more depending on the fishing activity practised by a vessel than on her location => sample has to be post-stratified => poststratification proposed depends on fleets, métiers, fishing zones, seasonality, ... => the more the sampling rate is important, the more detailed post stratification can be and the more reliable are the estimators

3/ The raising method:

Theoretically, the formulation of estimates and their precision associated have to take into account all the aspects of the sampling scheme adopted, even the very first => BUT complicated sampling scheme implies complicated estimates => so non-parametric bootstrapping methods have been preferred => it allows being free from the strict rules of the sample theory

Conclusion

-First interesting results obtained, especially for common métiers or fleets

-Increasing sampling rate is preliminary to improve the quality of the estimates obtained BUT the implication in terms of cost is important (expensive method).

-If budget is limited:

- Such methodology has to concentrate on common métiers or fleets
- Alternative methodologies have to be developed to survey the others

-Telephone surveys can be an inexpensive way to hugely increase the sampling rate BUT quality of such surveys is to prove

-Combined the two surveys can be a solution

THANK YOU FOR YOUR ATTENTION

