

Theme Session K

Small-scale and recreational fisheries surveys, assessment, and management

Conveners: Jon Helge Vølstad (Institute of Marine Research, Norway), Dave Van Voorhees (NOAA-NMFS Fishery Statistic Division, USA), and Patrick Berthou (IFREMER, France)

ICES theme session K for the first time brought together scientists working on alternate survey sampling methods, assessment methods, and management approaches for recreational and small-scale (including artisanal) fisheries. This session called for papers within three topics of research:

I) Field Data Collection Systems

- Applications of angler diary and self reporting programs to survey small-scale and recreational fisheries at large spatial scales
- Access point and other forms of direct catch and effort surveys in small-scale fisheries monitoring
- Complemented methods, with separate effort and catch-per unit effort surveys to estimate total catch of recreational fishers
- Off-site survey methods (telephone, mail, etc.) for estimating fishing effort and participation.

II) Assessment and estimation methods

- Methods for estimating effort, catch-per-unit-effort, and total catch (e.g., use of auxiliary and census data to improve the precision in total catch estimates)
- Adjusting for effects of non-response bias in self reporting and interview programs
- Combining multiple sampling frames for estimating catch and effort (e.g., use of aerial frames, license registries, lists of access points etc. for covering diverse sectors of recreational and small-scale fisheries).

III) Indicators for use as a fishery assessment and management tool

- What types of biological indicators are appropriate to judge the health of fish stocks that supports small-scale and recreational fisheries and how do the indicators link to the management
- Indicators of over-capacity in the small-scale fishing fleet or tourist industry, and overfishing.

A total of 22 papers were accepted for the session, covering all topic categories with examples from a wide range of recreational and small-scale fisheries from local to national scales. A brief overview of the contributed papers grouped by topic follows.

Topic category I. Field sampling, survey design and analysis.

This topic covered wide aspects of statistical sampling survey methods and field sampling methods to estimate key statistics for the monitoring and assessment of recreational and small-scale fisheries. Papers presented methodological developments on complemented surveys, self-sampling surveys, and off-site direct surveys (e.g. diaries and telephone interviews).

Complemented methods typically involve dual independent surveys, combining an on-site survey to provide estimates on mean catch per unit effort with an independent off-site survey that provides estimates of total effort. A series of papers (K:03, K:20, K:21, K:22) covered methods for the combination of on-site sampling to estimate catch per unit effort with the use of telephone surveys to estimate effort in widely dispersed recreational fisheries on large

spatial scales in the U.S. and France. The marine recreational fisheries survey (MRFS) in the U.S. has recently been reviewed by the Academy of sciences, resulting in many new methodological developments presented at this conference. A novel paper (K:04) on complemented methods described a method where an aerial survey was employed to estimate one component of the fishing effort (number of active fishing parties), and a concurrent creel survey was used to estimate mean number of people in the fishing parties, in addition to catch and catch per unit effort by species. Another paper (K:07) demonstrated the use of complemented (off-site) telephone and diary surveys to estimate catch and effort in recreational fisheries in Australia. Direct methods where on-site surveys provide estimates of effort, catch per unit effort, and total catch included a large-scale survey of Mozambique small-scale (artisanal) fisheries (K:05). These papers demonstrated that probability-based survey designs and analytical methods can be practical and cost-effective for the monitoring of recreational and small-scale fisheries, and discussions during the session also focused on how methods widely used in recreational fisheries could be applied in monitoring and assessment of small-scale commercial fisheries. During discussions in this session the importance of well defined sampling units (e.g., trips, or ports/days) and sampling frames was stressed.

Survey sampling programs to monitor small-scale and recreational fisheries frequently suffer from incomplete coverage due to lack of a single complete survey frame that can be used to cover all angler (or vessel) trips. One important field of research involves the use of multiple survey frames (for example a combination of area- and list frames) to increase the coverage. Paper K:06 presented two dual-frame approaches to address shortcomings of the sampling frame in marine recreational surveys.

Self-sampling programs combined with quality-control routines provide an alternative cost-effective method to monitor small-scale fisheries as demonstrated in papers K:02 and K:18. Discussion on this topic stressed the importance of trust between scientists and fishers. Anonymity is one important aspect of self-reporting, particularly to reduce bias in reported catches (including catches that are not landed.)

Topic category II. Assessment and Estimation Methods

Several papers in this session focused on estimation procedures to derive catch and effort estimates with applications to specific fisheries. Paper K:08 provided estimates for Asian moon scallops in Indonesia. Papers on model-based estimation of catch and effort used auxiliary information to improve precision. In paper K:09 information on fuel consumption where used as a proxy for fishing effort in the estimation of fleet landings per species. Paper K:16 used generalized linear models to analyze log-book data on catch and effort to support assessment of Mediterranean swordfish. Comprehensive multi-disciplinary fisheries information systems for the assessment of small-scale fisheries on large spatial scales were presented in papers K:11, K:12, and K:14. Paper K:13 demonstrated how partnerships between scientists and fishers could provide information on discards from near-shore fisheries that improved monitoring and assessment of skates in the western North Sea. Paper K:15 evaluated species designations in trawler and small scale (artisanal) fleets and concluded that species classifications in gurnard landings data in north Portugal were insufficient for use in stock assessment by species. Paper K:19 showed how advanced statistical analysis of data from the small-scale fisheries for meagre in Portugal could provide information on fish movements that could not otherwise be inferred from analyses of fisheries-independent data.

Topic category III. Indicators for use as a fishery assessment and management tool

Paper K:01 discusses the problems of managing coastal zone fisheries that are exploited by small-scale commercial and recreational fishing, using Mallorca Island as a case study. The paper discusses options for the management of shared resources. Paper K:10 presents methods to characterise the status of small-scale fisheries based on economic indicators. Paper K:17 presents a stake-holder driven decision analysis approach for developing performance measures, evaluating the status, and developing management options for king mackerel in the U.S.

Conclusions

Marine recreational and small-scale fisheries typically have in common that the fishing effort is wide-spread and scattered geographically, and are often characterized by a large number of small boats, and multiple gears. An added complexity is that these fisheries often operate from numerous launching and landing sites that may not be well known in advance. These factors make it difficult to define complete sampling frames for use in the selecting of representative trips for estimating catch and effort statistics. Survey sampling, assessment and management approaches presented during this session can be adapted to small-scale and recreational fisheries in other regions, and should provide a useful background for the planned ICES theme session in recreational fisheries to be held in April, 2008.