Theme Session N

Technologies for monitoring fishing activities and observing catch

ICES CM 2006/N:01

OLFISH: Commercial electronic fishery management system : A demonstration of a unique, electronic solution for the collection, management, presentation and utilization of commercial fishing data

Amos Barkai and Mike Bergh

Fisheries management is continually frustrated by the lack, or poor quality, of critical data on fish catches, sizes, fishing locations, and relevant environmental conditions. While quantitative methods for managing fisheries have developed considerable complexity, the quality of the available data remains an obstacle to meaningful advances in fisheries management. There are a number of aspects to the problem. The first is the absence of a flexible and comprehensive system for capturing essential data during fishing operations. A large amount of environmental data is lost simply because of the difficulty of recording this information easily in real time. This is despite the advent of a complex array of sensory equipment available in the bridge of modern fishing vessels. As a result, environmental patterns become part of skippers' experience, and seldom if ever become formally available to scientists or managers of fishing operations.

The authors have also found in their scientific work that much energy is wasted and important opportunities lost because of the uncertainty surrounding crucial historic data. For example, there are typically many factors related to catch-per-unit-effort data, a key index of trends in resource abundance, which are not recorded, and hence cannot be incorporated in statistical analyses. Frequently, these missing data are crucial to management decisions.

For scientists unreliable data leads to a poor basis for stock assessment models and management programmes. For industry the lack of sound data significantly reduces its fishing efficiency, since past performance cannot be studied properly. As a result poor management decisions based on unreliable analyses are made, often with substantial cost and risk to fish resources and the fishing industry.

Although there is presently greater awareness amongst scientists and fisheries managers about the importance of collecting fishing data there is still confusion about exactly which data are needed, and how to collect and store them. It is common for skippers to record scientific data in one form, for shore managers to use another for commercial purposes, and for skippers to keep separate fishing logbooks. These data are then transferred to different computer systems, often complex spreadsheets, or sometimes are left in paper format in large inaccessible books and files. There is a degradation in the quality of data because of the multi-stage process of transcription from handwritten logbook sheets to paper forms and then to computer databases. The most logical first point of data entry, the fishing vessel skipper, should occur in digital format directly into a computer. One of the difficulties with fisheries data is the complexity of the logical linkages between the different types of data. Any reasonable approach to the problem requires the use of modern relational databases which are able to address the multidimensional complexity of the problem.

The authors developed an electronic, fishery data management system, named **Olfish (**or **Olfish-2005** for the latest version).

Olfish is a software program for capturing, storing, summarising,and reporting of fishing data. It can be used by skippers, managers, and scientists during fishing operations and for scientific surveys. It provides a comprehensive, user-friendly means of compiling data reports. One of the most important features of OLFISH is that it virtually eliminates the need for paper logbooks. **Olfish** can, virtually, transfer each vessel in the fishing fleet into a research station able to collect vast amounts of valuable data with great accuracy and minimal effort. **Olfish** is a generic, infinitely customisable, solution which can be used for any type of commercial fishery in the world.

Keywords: electronic commercial fishing logbook, fishery data management, GIS, real-time reporting, tracing.

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ICES CM 2006/N:02

Evaluation of vessel detection system use for monitoring of fisheries activities

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We present results from the use of a vessel detection system (VDS) which locates vessel positions in orbiting SAR satellite sensors. The system, which is developed and maintained in house, has been tested in several vessel traffic situations in European waters and some international waters during the last 3 years.

Our analysis focuses on metrics that quantify the performance of the VDS. In particular we look at detection

rates, false alarms, and correlation to known vessel VMS and AIS positions for various classes of vessels, in function of the SAR image options used.

Based on the outcome of this analysis, we project how VDS can potentially contribute to localising and quantifying fishing vessel activity.

Keywords: vessel detection system, VMS, AIS.

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ICES CM 2006/N:03

Automatic species recognition, length measurement and weight determination, using the CatchMeter computer vision system

Cato Svellingen, Bjørn Totland, Darren White, and Jan Tore Øvredal

The collection of biological data on species composition and individual length and weight of specimen has always been an important part of fisheries research. Traditionally, the collected information has been recorded on paper prior to being entered into a computer for analysis. Electronic measuring boards that record length measurements, such as the FishMeter (Øvredal and Totland, 2000), have made the data collection process more efficient and reliable. In this contribution we describe a vision-based catch registration system called the CatchMeter that makes it possible to automatically recognize fish species and measure the length and weight of fish. A camera and light unit is located above a conveyer belt moving at a maximum speed of 1.5 m s^{-1}. One ore more images of the fish are taken as it passes the camera and are then analyzed by the computer. Both roundfish and flatfish from 5 cm to over 1 m can be recognized and the system can easily be trained to recognize new species of fish. So far the prototype system has been trained to identify 7 different species with a recognition rate of 98.6%. In a test where the length of the same fish was measured repeatedly, the standard deviation of the length measurement was 3 mm on a 265-mm long haddock.

Weight measurement has not yet been implemented, but we plan to do this by using electronic grader, laser triangulation and/or using length-weight relationships. Provisions for connecting an automatic sorting unit to the CatchMeter will be included to enable sorting of selected individual fish for recording of extended biological parameters.

A computer controls all the processes and sorting criteria may be selected from the user interface. With the CatchMeter the sampling process is automated and the capacity for biological sampling will be increased with a reduced need for manpower for measurements and sorting. The new system is primarily intended for use on research vessels, but it will also be of interest to commercial fishing vessels and at landing sites of fish processing plants. The prototype has been successfully tested on the Norwegian research vessel "G.O. Sars".

Keywords: CatchMeter, length, weight, species, machine vision, biological sampling.

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ICES CM 2006/N:04

Technologies for monitoring fishing activities and observing catch in Canada

Denis Tremblay and Gerry Sullivan

Fisheries and Oceans Canada (DFO) is implementing and/or assessing multi-channel technology innovations under an overall strategy for one-time electronic fishing activity data capture at source (e-collection).

Data collected are used to support science, fisheries management, and compliance monitoring and observation objectives. Innovative tools already in place or in the pilot stage include a GIS-based National Vessel Monitoring System (VMS), electronic fishing logbooks (E-Logs) including web-based catch reporting, an automated Observer Trip Information System (OTIS), and telephone-based voice recognition systems for hailing out and licence renewal. DFO is piloting a Mobile Office and integrated reporting application supporting data capture and remote access by field officers, resource managers, and scientists.

Data captured at source are stored in legacy systems in each DFO region and/or a newly constructed and growing common repository or Operational Data Store (ODS) based on national data standards, common language tools, and integrated access and reporting interfaces. Specialized modular web-services tools, sharable from one data access application to another, have been developed to access the ODS and, where necessary, regional back-end legacy systems.

Multi-channel electronic data capture at source has led to improvements in the quality and timeliness of monitoring and compliance data. Multiple data tools and integrated databases have increased DFO's capacity to develop exception-reporting applications designed to contrast and compare fishing activity data from multiple sources in order to identify potential occurrences or violations.

This paper will present the state of development of these integrated solutions and outline how they serve both government and industry in better managing the fisheries.

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ICES CM 2006/N:05

The Norwegian Reference fleet : co-operation between fishermen and scientists for multiple objectives

K. H. Nedreaas, A. Borge, and H. Godøy

In Norway, port sampling of landings, sea sampling by the coastguard and by inspectors from the Directorate of Fisheries are used for collecting biological samples from commercial catches for research and assessment purpose.

In order to obtain better and continuous samples from the fishing fleet, knowledge about fleet behaviour and technical developments influencing efficiency and effort, 14 open-sea and 18 coastal fishing vessels (the Reference fleet) are contracted, some of them since 2001. The vessels may be equipped with an electronic length measuring board, electronic scales, and PC with necessary software including satellite communication. Crew members are trained to conduct self-sampling. Biological samples (length, otoliths, genetic samples, stomachs, etc.) and logbook data are delivered according to contract, which secures a proper statistical coverage for a defined number of species in time and area. The programme is mainly financed by a minor extra catch quota.

In addition to improved biological sampling, the Reference fleet provides better insight for optimised sampling, it updates the scientists on technological developments, it is a useful platform for testing official catch statistics and data collecting systems and procedures (e.g. electronic logbooks), provides the scientist with continuous information about species that are hardly accessible by research vessels (e.g. deepwater species, near-coast fish populations), and also provides observations of sea mammals, sea birds, crabs etc. Furthermore, such a trust-based co-operation between fishermen and scientists seems to reduce controversies and rather build a common understanding and ownership of improved stock assessments and fisheries management.

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ICES CM 2006/N:06

Can trawling effort be identified from satellite-based VMS data?

Are Salthaug

Data from satellite-based vessel monitoring systems (VMS) can, in principle, be used to measure fishing effort with a high spatiotemporal resolution. However, it can be difficult to separate between fishing activity and other activities (like steaming). The vessels' speed (at a given time) may give an indication of whether fishing activity occurs or not. In this work VMS data from two factory trawlers in the Norwegian Reference fleet are merged with detailed logbook information. The average speed between consecutive VMS observation was estimated (using time difference and distance) and grouped according to type of activity (from the logbook records). About 70–80% of the VMS observations below 5 knots represented trawling, but speed alone could not be used to determine with high degree of accuracy whether the vessels were trawling or not.

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ICES CM 2006/N:07

The Norwegian in-year monitoring fishery for sandeel in the North Sea using satellite-based VMS data and landings information

Are Salthaug and Tore Johannessen

Due to the critically poor status of the sandeel stock in the North Sea, the Norwegian Ministry of Fisheries and Coastal Affairs decided to conduct a monitoring fishery in April/May 2006 with a limited number of Norwegian commercial vessels. An eventual re-opening of the sandeel fishery (in the Norwegian Economic Zone) was to be based on the results from the monitoring fishery. It was later decided that the monitoring fishery should take place in weeks 16–18. One of the main goals of the monitoring fishery is to obtain an estimate of the strength of the 2005 year class (since age 1 is the most important age group in the fishery). This requires estimation of a relationship between Catch Per Unit Effort (CPUE) and abundance. Logbooks from the Norwegian sandeel fleet are not recorded electronically and it is therefore difficult to perform traditional CPUE calculations. However, data from the Norwegian satellite-based vessel monitoring system (VMS) can be used to measure effort, and CPUE can then be estimated by combining VMS and landings data (which exist electronically on trip level). In this work, some of the preliminary analyses conducted in advance of the monitoring fishery are presented. The correlation between estimated CPUE at age 1 (based on VMS data) and estimated abundance at age 1 (from the latest ICES assessment) was positive and significant ($p < 0.05$) for the years 2001–2005.

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ICES CM 2006/N:09

An innovative approach to sampling catch in the North Pacific groundfish fisheries

William A. Karp, T. Loomis, J. Gauvin, C. Colway, J. Watson, T. Meintz, and G. Williams

Observer sample selection and collection is subject to human and mechanical biases. Electronic monitoring (video) and automated catch sampling systems have been proposed as potential approaches for reducing these sources of bias. The National Marine Fisheries Service(NOAA Fisheries) partnered with the International Pacific Halibut Commission, the Marine Conservation Alliance Foundation, and the fishing industry to conduct a two-week cooperative research cruise to test technologies that may mitigate sample bias and automate sample collection. The research was conducted aboard the 70-m trawl catcher/processor, "Seafisher" during the 2005 fishery for yellowfin sole (*Limanda aspera*) in the eastern Bering Sea. We evaluated the functionality of a prototype automatic catch sampling system based on hardware and software modifications of the vessel's motion-compensated electronic flowscale. The system was operated by entering estimated catch weight, number of desired subsamples, and desired individual subsample weights into the scale's control pad and the system's computer determined when random subsamples would be diverted from the catch and delivered by conveyor to the sample processing location. Six 100-kg subsamples were collected from each of thirty hauls and video equipment was used in a pilot study to explore the utility of using video technology to monitor for potential pre-sorting. The system functioned as intended and automated the sample selection and collection processes to a substantial degree. Data collected during this study will also be useful for determining accuracy and precision of estimates of target and non-target species catch.

Keywords: observer, bias, automated catch sampling, electronic monitoring, cooperative research, yellowfin sole.

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ICES CM 2006/N:10

Video monitoring of a trawl catcher processor in the North Pacific: A pilot study to identify requirements for catch monitoring

G. Williams, T. Loomis, J. Watson, H. McElderry, J. Gauvin, and T. Meintz

The ability of a video monitoring system to monitor fish handling and discard operations on a chartered 70-m trawl catcher processor operating in the North Pacific was evaluated. Cameras were placed on deck and in the processing factory to monitor catch during all phases of handling and sorting prior to discard. Pacific halibut (*Hippoglossus stenolepis*), a regulatory discard, were visually marked to track their movement through the processing system when the vessel was targeting yellowfin sole (*Limanda aspera*) and arrowtooth flounder (*Atheresthes stomias*). Although 12 cameras were expected to be needed, only nine cameras proved necessary once the vessel was on the grounds. In addition, a large monitor was mounted on a factory bulkhead within view of the processing crew and fishery observers. Contrary to expectation, the vessel crew found video monitoring beneficial by providing visual information on several operational aspects, including timing of gear retrieval, size of the catch being brought on board, and fish flow through the processing system. The fishery observers also benefited from the video display by gaining knowledge of the flow of fish through the factory, improving efficiency in sampling. The video system was successful in enabling individually marked Pacific halibut (40–85 cm TL) to be tracked through the processing system to discard.

Keywords: electronic monitoring, Pacific halibut, observer, pre-sorting, yellowfin sole.

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ICES CM 2006/N:11

The innovative application of vessel monitoring systems for the effective fisheries monitoring control and surveillance

Brendan O'Shea and Sylvia Thompson

The purpose of this paper is to demonstrate through case studies the innovative application of the vessel monitoring system (VMS) in fisheries management, with a view to maximising the benefits of such systems in the framework of fisheries monitoring control and surveillance.

The paper examines concrete methodologies that would allow these benefits to be realised by expanding the role of satellite surveillance systems so that the data gathered would provide real-time benefits to fisheries enforcement. In this context, the case studies presented in this paper demonstrate the innovative application of integrated technologies making use of relational databases (catch registration, effort, and licensing systems) together with real-time VMS data to provide real-time fisheries monitoring and control systems. In this context the case studies presented in this paper will demonstrate the potential of fisheries monitoring centres (FMC) to monitor on a daily basis vessel permit schemes, effort management schemes, time and geographical restrictions on the management of resources, and monitoring and validation of fishing activity.

Ever since VMS was formally introduced to the European Commission (EC) in 2001, experience demon-

strated that in the scope of the legal framework developed (describing technologies and operational criteria) both within the EC and international organisations, that national FMCs and the fishing industry are confident with the confidentiality structures in place in order to guarantee cooperation for the exchange of data between FMCs and various recognised bodies.

If the measures and methodologies demonstrated are adopted real financial benefits through more effective deployment of existing resources will lead to consequent improvements in the enforcement of conservation measures, thereby creating a sustainable model for the management of the fish stock resource.

Keywords: Vessel Monitoring System (VMS), fisheries management, fisheries monitoring, fisheries control, fisheries surveillance.

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ICES CM 2006/N:12

Integrated electronic onboard observer data collection and reporting system for Australia's Antarctic fisheries

Bob Stanley and Tim Lamb

In Australia's Antarctic Fisheries observers use an integrated electronic data collection system comprising an electronic fish measuring board, motion-compensated scale, and access data base. The system allows the collection of biological and effort data for all of the fishing effort of the observed vessel. The system is capable of being used across three CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources) approved fishing methods trawl, longline, and trapping. There is also the capacity for the direct entry of observer data related to environmental or wildlife observations. On the completion of fishing operations the database can generate all the necessary observer reports for the CCAMLR secretariat and other reporting needs.

Keywords: observer measuring database, Fishlog, CCAMLR.

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ICES CM 2006/N:14

At-sea observing using video-based electronic monitoring

H. I. McElderry

With lower cost data storage media video-based electronic monitoring (EM) has become practical for fisheries applications. EM systems consist of a tamper-resistant control box with on-board data storage, one or more CCTV cameras, a GPS receiver, hydraulic and winch sensors. EM systems automously operate while the vessel is at sea, and provide independent information for activities such as fishing time and location, gear deployment and retrieval methods, catch estimation, and bycatch mitigation practices. The use of this technology is described for two British Columbia, Canada fisheries.

In 2000, the 50-vessel Area A crab fishery, with a fleet effort of over 30,000 traps, was facing management reforms to limit effort and rising industry concerns of gear theft and vandalism. Primarily led by industry, the fleet implemented 100% monitoring for all vessels in the fishery using EM at a cost of about 20% of an at-sea observer program. After six years of operation, support for the programme is very high. The programme is entirely funded by industry and there is widespread feeling that the EM system provides a significant deterrent, creating an unprecedented degree of order and co-operation in the fishery.

The 350-vessel groundfish longline fleet recently adopted an industry-funded monitoring programme to provide very accurate catch accounting by each vessel. An audit-based analysis approach validates vessel logbook records of fishing locations and catch, using independent data from EM systems and offload monitoring as a source of comparison. The audit results provide feedback on logbook data quality and directly influence future fishing opportunity for the vessel. Logbook data quality determines monitoring cost and, with fishery participants actively involved in data collection, the industry becomes more actively engaged in their fishery.

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ICES CM 2006/N:15

Data validation of gross data quantities: a practical approach

Leon Smith and Petur Steingrund

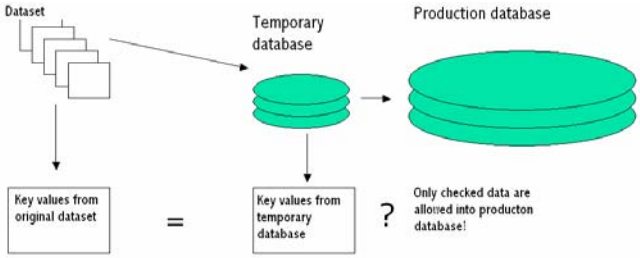
Using electronic devices to acquire data has increased the amount of data collected in orders of magnitude. The need for scrutinization of the data and to document the quality of the data has obviously been growing in the same magnitude. This increased volume of data has

made it difficult to meet the demand for well documented data. Nevertheless, producing data with a *documented* quality is of the utmost importance, keeping in mind that the obtained data is the sole foundation for sound scientific inference.

Implementing electronic catch registration systems onboard the Faroese R/V "Magnus Heinason", harvesting huge biological datasets especially on trawl surveys, initiated the work to develop a simple routine to trap the errors that inevitably occur in datasets, produced via human/machine interaction. The challenge was to trap all errors in a dataset without scrutinizing it row by row. The solution was to produce, on two independent systems, two sets of comparable key values, ordered by trawl station and species.

On foundation of the whole dataset obtained on the cruise, the scientist in charge delivers a table of values representing the fingerprint of the dataset along with the dataset itself. For every trawl station and species, 14 key values are obtained, e.g. condition factors, number of length measurements, mean weights, total catch, number of females, mean maturation, etc. The dataset is then loaded into a temporary database, where the same fingerprint is calculated by views on the original data.

By comparing the view of the fingerprint and the actual fingerprint calculated by the responsible scientist, it is possible to trap even the smallest errors in the dataset. Trapable errors are corrected, and the data will be allowed to enter the production database.



Having a well documented database does have a tremendous influence on the effectivity of the work of science staff. A positive side effect is the confidence the scientist can express in their scientific work and public statements as a whole.

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ICES CM 2006/N:16 – Poster

An attempt to integrate logbook and VMS information: Spatial distribution of the German pelagic freezer trawler fleet's activity in two years

Christopher Zimmermann and Jens Ulleweit

ICES is increasingly moving from single-stock fishery advice towards multi-species fleet-based advice. The formulation of such advice requires an understanding of the behaviour of the specific fleets and their driving forces. The fishing activity of the fleets depends on a variety of factors, like the accessibility of the different target species, quota regulation, and market price. This paper intends to give an example on how to integrate spatial and temporal data (as obtained by the obligatory satellite-based vessel monitoring system, VMS) and catch data (catch mass and species distribution, obtained from logbooks). For this example, the German pelagic freezer trawler fleet operating in the Northeast Atlantic was chosen: The structure of pelagic fisheries appears to be less complex than that of most demersal fleets, and the German pelagic fleet only consists of a limited number of vessels. However, the fleet is regularly targeting different species at different times of the year in different areas. To highlight variances between years, its activity was analysed for the whole of 2003 and 2004. A combined analysis like this for the total international fleet operating in the area will provide the insight to a fleet's behaviour, which is necessary for the precise formulation of fleet-based advice.

Keywords: data integration, VMS, catch data, fleet-based advice, pelagic fishery, logbook information.

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ICES CM 2006/N:17 – Poster

Tracking changes in the ling and tusk populations using CPUE estimates from logbook data

Kristin Helle

Norwegian longliners conduct a large fishery in the Northeast Atlantic for two deep-water species tusk (*Brosme brosme*) and ling (*Molva molva*). Scientific surveys do not cover the spatial distribution of these species, and until recently the principal source of information on these stocks was from sale receipts from the commercial fleet. The Institute of Marine Research (IMR) began in 2003, in cooperation with the Norwegian Directorate of Fisheries (NDF), collecting logbooks of longliners larger than 21 meters that had a total catch of ling, tusk, and blue ling exceeding 8 tonnes. The logbooks give the daily catch, date, position, and number of hooks used per day. In 2000 the IMR began a programme to collect data and biological samples directly from some chosen commercial longliners, the so-called **"**reference fleet" Presently four longliners are in the reference fleet. Based on the number of vessels, the number of hooks per day, and the number of days each vessel participated in the fishery, the total number of hooks used per year has been estimated. Although the number of vessels has decreased considerably since 2000, the total number of hooks has remained remarkably stable. Even though catch-per-vessel was rather constant, these stocks may be declining. When the CPUE is split by spe-

cies the estimates for tusk appear to confirm that this stock has declined from 2000 to 2004. In 2005, the CPUE increased considerably. For ling the decline is not as apparent, and from 2003 to 2005 the CPUE has increased. The results from the reference fleet seem to confirm the estimated trends based on the logbook data.

Keywords: ling, tusk, logbooks, CPUE.

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ICES CM 2006/N:19 – Poster

GeoCrust 2.0 – a computer application for monitoring the Portuguese Crustacean Trawl fishery using VMS, landings and logbooks data

Manuel Afonso-Dias, C. Pinto, and J. M. Simões

GeoCrust 2.0 is a dedicated geographical information system (GIS) that uses satellite GPS data provided by MONICAP, the Portuguese vessel monitoring system (VMS). It was originally developed to map fishing effort for the South-Southwest Portuguese crustacean trawl fishing fleet, targeting *Nephrops norvegicus*, *Parapenaeus longirostris*, and *Aristeus antennatus*. The system also linked data on landings or logbook catches in weight, provided by the national fisheries database, with fishing effort, to estimate and map catch rates for each target species or group of species, by fishing ground. This GIS application was developed in Visual Basic 6.0, using MapObjects 2.1 (ESRI) for the GIS facilities. GeoCrust is a modular system. Current modules include Preliminary analysis, Speed analysis, identification of Fishing trips, identification of Trawl hauls, Cartography, Statistics, and Visualization of fleet activity. Version 2.0, now available, added some new features. It is now possible to analyse also data from the finfish trawl fishery that operates along the entire Portuguese continental coast. GeoCrust 2.0 stores its data in a MySql database (with about 10 million records of VMS data). Artificial intelligence algorithms were incorporated in the Trawl Hauls Identification module, allowing the automatic identification of trawl hauls within pre-defined fishing trips. An exploratory tool to quickly obtain maps of fishing effort using VMS data is also included in this version.

Keywords: crustaceans, trawl fisheries, fishing effort, catch rates, Geographical Information Systems (GIS), Global Positioning System (GPS), Vessel Monitoring System (VMS), Artificial intelligence.

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ICES CM 2006/N:20 – Poster

GeoPesca – a website for the dissemination of geo-referenced information from the Portuguese crustacean trawl fishery

Carlos Pinto, J. M. Simões, and M. Afonso-Dias

GeoPescas is a website for the dissemination of geo-referenced data on fishing effort and catch rates, by species, from the Portuguese crustacean fishery. The geo-referenced data is obtained through GeoCrust 2.0, a dedicated geographical information system (GIS). This system uses satellite GPS data provided by the Portuguese vessel monitoring system (MONICAP), combined with data on landings or logbook catches provided by the national fisheries database. The main purpose of this website is to disseminate geo-referenced information on fishing effort, landings, catches, and catch rates. The target audience includes fisheries researchers, the fishery administration, and also the fishing industry. The website was entirely developed using free software, such as PHP (server side applications) and JAVA (applets for client applications), Geotools and XML, in connection with a MySQL database. The website provides maps of fishing effort and catch rates, as images prepared by the GeoCrust 2.0 software or generated by an on-line GIS application (JAVA applets). All the information presented, in tables, graphics, and maps, can be extracted as XML files, for further use.

Keywords: crustaceans, trawl fisheries, fishing effort, Geographical Information Systems (GIS), Vessel Monitoring System (VMS), fisheries website, free software.

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ICES CM 2006/N:21 – Poster

A new, intuitive, reliable and low cost electronic fish measuring board

Ivor Humphreys, Conor P. Nolan, Dermot Geraghty, and Alan Reid

The assessment of fish stocks and the application of fisheries management strategies is dependent on the collection, analysis, and interpretation of reliable morphometric and meristic data. Such data are collected at sea by fisheries observers in difficult conditions, with the process generally considered to be laborious, time-consuming, and error prone.

Currently, the vast majority of morphometric measurements are made using the simplest of equipment and recorded using paper and pencil techniques. The basic procedure is the same worldwide and is both low cost and reliable. While a number of ‘intelligent’ fish measuring

boards are available commercially, they are cumbersome and expensive and as a result have not been widely adopted. This paper presents a new design of fish measuring board, which is reliable, robust, lightweight, of relatively low cost and easy to use, either at sea or in the laboratory. The design incorporates detailed input from experienced observers, which is reflected in the ergonomics and functionality of the unit. The board improves the reliability of end user data and reduces operator fatigue and points of error entry through the use of electronic data capture, storage, and relay mechanisms. The operation of the system is intuitive and retains all the features of the conventional methods used by observers.

Keywords: electronic fish measuring board, intuitive, low cost.

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Portable scientific catch registration system on a PC-platform

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The increasing demand of scientific catch data from surveys in conjunction with a chronic lack of manpower has pushed the staff of the Faroese Fisheries Laboratory to develop a fish-measurement system fulfilling the demand of quality data in gross quantities with a minimum of manpower involved.

The first electronic measurement system saw daylight on board the Faroese R/V “Magnus Heinason” (MH) in the early 80s. The system has been steadily improved to date, where two permanent installations on board MH are producing high quality data. The last version of the measurement system has been onboard MH since January 2004, without any malfunction at all.

Fish measurement is handled by one person per installation, and will provide the laboratory with approx. 40,000 individual fish records pr. trawl survey, averaging 11 days at sea.

The system consists of 4 main components:

1) PC
2) User interface
3) Marine scale(s)
4) Length measurement device.

The emphasis of the development has been put in the length measurement device, which gives electronic length measurements on objects in the range of 0 to 1300 mm with a resolution of 1 mm. The user interface is a 4-button touch-pad interacting with the menu-driven “Imponator II” software also developed by Faroese Fisheries Laboratory. The measurement devices are connected to the PC by RS232 serial interfaces.

The demand for a solid and simple portable solution has driven the development a bit further. By installing the software on a Tablet PC and enabling Bluetooth communication between the main components, the result is a handy, portable, and user-friendly system.

The data obtained by the system are stored in ASCII files for backup of original data, and in a Microsoft Access database, facilitating extraction of the results.

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