

## **Environmental Data from Fishing Fleets; the Potential of Vessel Monitoring Systems**

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The widespread distribution of fishing fleets in the world ocean make them excellent candidates for transmission of real-time sea surface environmental information. Many large, open ocean fishing vessels routinely provide surface ship reports and these represent an important source of data in certain regions. Elsewhere, however, many fishing fleets have been hesitant to provide such data either because of the difficulty of data transmission or because of issues related to the confidentiality of fishing locations. While the latter issue remains a difficult and often contentious one, new technology in fisheries management and regulation called the "Vessel Monitoring System" (VMS) holds the potential to provide an uplink with a great deal of real-time surface data at modest cost.

The VMS was pioneered in a pilot project on the Hawaiian longline fleet in a cooperative venture between the Western Pacific Fisheries Management Council (Council), the Coast Guard, and the National Marine Fisheries Service. The longline fleet is regulated by the Council under the Pelagics Fishery Management Plan. It has some 166 permits outstanding under a management scheme that limits the number of vessels allowed to fish; presently 110 vessels are actively fishing, and 130 VMS units are in place. The fleet ranges from relatively small vessels fishing primarily for tuna and billfish in waters surrounding the Hawaiian Islands to larger vessels fishing more distant waters, often for swordfish. In 1991, the Council designated a no-fishing zone in the area around the Northwestern Hawaiian Islands (NWHI) to prevent interactions between the fishing fleet and the endangered Hawaiian monk seal. Because of the great geographic extent of the NWHI, enforcement was deemed a problem and a

cost-effective system to monitor vessel locations was explored. Alternative system designs were investigated and the decision was made to procure a commercially available system (Trimble Galaxy tranceiver), which sends information on vessel position (GPS), speed, and course through Inmarsat-C. These confidential data are recorded on a secure computer system at the Coast Guard facility in Honolulu. Cost for each position record is approximately \$0.06. Many vessel owners also use the system for text messaging and fax services.

The system has been operating since December, 1994. Position locations are sent every hour for vessels at sea. Examination of the data for April and May 1996 showed 79,185 observations ranging from 38° S to 64° N latitude and 144° E to 118° W longitude. Plots of daily mean position by month demonstrate the concentration of the vessel locations in an area approximately 20° latitude by 25° longitude. These bounds are subject to shift seasonally, however, as the fish move with environmental conditions.

The VMS system may provide an excellent mechanism to piggyback environmental data sensors for surface ship reports and deserves further evaluation. Fisheries frequently operate in ocean regions with very few surface ship reports and in fact pelagic fisheries for tuna or billfish frequently congregate (as do the fish) near frontal regions where ocean conditions are dynamic. Regulatory requirements for VMS systems will also expand in the future as scrutiny of fisheries in international waters increases. The next candidate fishery may be the Western Pacific tuna fleet, which operates in the tropical and South Pacific.



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# **CHANGING OCEANS AND CHANGING FISHERIES: ENVIRONMENTAL DATA FOR FISHERIES RESEARCH AND MANAGEMENT A WORKSHOP**

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