ADDENDUM

A Feasibility Study that Investigates Options for Monitoring Bycatch of the Short-tailed Albatross in the Pacific Halibut Fishery off Alaska

Prepared for the National Marine Fisheries Service
by the staff of the International Pacific Halibut Commission

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(revised)

Author's Note

Two major additions have been made to the December, 2000 version of "***A Feasibility Study that Investigates Options for Monitoring Bycatch of the Short-tailed Albatross in the Pacific Halibut Fishery off Alaska***". The first is the addition of an Executive Summary. The second is an expanded discussion of an Evaluation of Video Monitoring. Although the latter topic was addressed in the December, 2000 version, we believed that the inclusion of additional information would make the report more informative for decision-makers. Both sections are included in this Addendum. A revised final report containing these additions has been released with a February, 2001 date and the word Revised on the cover.

In lieu of obtaining a February, 2001 report, this Addendum may be added to the December, 2000 report for a report equivalent to the February, 2001 report. Note that the section on Evaluation of Video Monitoring in this Addendum should <u>replace</u> the section contained in the December, 2000 report.

EXECUTIVE SUMMARY

The listing of the short-tailed albatross (*Phoebastria albatrus*) as endangered by the U.S. Fish and Wildlife Service (FWS) prompted regulatory action by the National Marine Fisheries Service (NMFS) to monitor takes and develop a plan to minimize bycatch in the hook-&-line fisheries off Alaska, including the commercial fishery for Pacific halibut. NMFS contracted with the International Pacific Halibut Commission (IPHC) to study the monitoring options for the Alaskan halibut fishery. The study includes background information on the halibut fishery, information known about the distribution of short-tailed albatross as observed by the halibut fleet, bycatch of seabirds by the halibut fleet, and an evaluation of potential monitoring options.

The monitoring programs examined were: (1) self-monitoring by the fleet; (2) monitoring by IPHC port samplers; (3) on-board monitoring, either by existing groundfish observers or separate and stand-alone observers for the halibut fishery; and (4) technological monitoring, possibly with video systems.

None of the systems evaluated completely fits the diverse, wide-ranging halibut fleet fishing off Alaska. A combination of monitoring systems may prove more efficient and cost effective than a single system. A requirement for self-monitoring, the least expensive and least complicated system, would require statutory obligations for reporting bycatch of short-tailed albatross. At present, there is no requirement to report encounters and regulations are recommended to require self-monitoring for this feature alone. However, self-monitoring alone will not adequately summarize all short-tailed albatross bycatch because of the incentive for fishers to misreport any bycatch. A requirement for monitoring short-tailed albatross with IPHC port samplers offers no advantage over self-monitoring, because the same incentive exists to misreport. In addition, the IPHC port sampling program interviews only a subsample of the fishery, although the program could be expanded if it was determined to be the best monitoring method.

An observer program represents the traditional method for obtaining bycatch information for fishing vessels in Alaska. Complete coverage of the fleet is impractical due to the high number of vessels in the fishery. Critical issues for this option include observer cost, coverage levels, and cost recovery. If an observer program is determined as the best option, it is recommended that program developers look at a minimum vessel size between 40-60 feet, and evaluate times and areas for elimination or reduction of coverage. Observer programs involving partial coverage have often been promoted under the rationale that observations expanded from the observed to the unobserved fleet will be "statistically sound", insofar as fleet differences and potential bias is recognized and addressed in the sampling design. The validity of such extrapolations rests on the assumption that the fishing processes on observed and unobserved vessels will be identical. This assumption may be questionable in situations where the sampled fleet represents a small component of the total and the impacts of observed encounters (violations) are large. Therefore, reliance on estimates derived using low levels of coverage should be done with caution.

A video and GPS-based system has high potential for nearly complete monitoring of the short-tailed albatross mortality in the Pacific halibut fishery. Such systems are being used successfully in other fisheries for monitoring. A video system has clear advantages in cost and ease of logistics over other methods, if developers can assure adequate accuracy and preclude fishers from affecting the image captured by the camera. Developers may improve video monitoring to a satisfactory level with advance notice and support from NMFS or FWS, over the time necessary for the NMFS and FWS to evaluate and recommend a monitoring system for short-tailed albatross. We strongly recommend the development of the video monitoring option.

Finally, whatever final design is adopted to monitor short-tailed albatross, that design should also incorporate data gathering on other Alaskan seabirds.

Evaluation of video monitoring.

Pro. Technology exists for a deck system. A 10-sec frame rate (6 frames per minute) has high chance of detection if all birds are held up towards camera for identification, but a faster frame rate would likely be necessary to identify birds without crew cooperation; potentially a lower cost than an observer program; could be set up to monitor all seabird bycatch.

Con. Development needed to enable specific species identification; 10-sec frame rate allows risk of seabird discard although fishers will not know whether frame being taken; a fisher could possibly cut gangion out of camera view; need reliable staff to download data; image recognition software not proven for this type of application.

Cost. The cost of a video monitoring system is dependent upon the configuration of the system. The Canadian examples presented in this report illustrate two very different types of systems, and a discussion of each will serve to identify the wide range of costs associated with this type of technology. For either of these systems, a vessel could purchase a system, pool with others to purchase several systems to share, or associations (or towns or processors) could purchase systems and rent them to members (or residents or customers). In the following discussion, we estimate startup and annual costs for each system to provide a measure of the costs associated with these types of systems. This example is intended to illustrate the general nature of the costs associated with these systems, and not a precise accounting of VMS systems.

The sablefish seamount VMS is a video (VHS) analog-based system. The objectives identified by the Blackcod Fishermen's Association were to monitor the activity of the vessel and its compliance with regulations. With those objectives, a slow frame rate was determined to be sufficient to monitor the vessel and the crew's activities, with a strong degree of certainty regarding compliance. The slow frame rate also permits a larger amount of data to be stored on a single 6-hr videocassette. Each deck unit cost the B.C. fishermen about $6,500 (US) in initial costs. Using this figure, 500 units for the U.S. halibut fleet fishing off Alaska would be $3.25 million. Some savings may be achieved with such a large acquisition through economies of scale.

Annual costs primarily consist of expenses associated with (1) personnel to monitor and review the tapes, (2) maintenance and repair of equipment, and (3) program administration. We estimated the monitoring costs (per trip and annual) using the 10-sec frame rate (6 frames per minute) configuration of the B.C. sablefish seamount fishery as follows. We assumed an average of 4 days per halibut trip (Table 15), a total of 6,700 trips being monitored (an extrapolation from the number of landings per vessel shown in Table 1), and personnel costs of $15 per hour for examining the video for birds and/or violations. Additionally, we believe it would probably take 6 hours to review 5 hours of video, due to the expected starting and stopping to examine the picture. The calculations resulted in a total of $90 per average 4-day trip and $0.6 million per year in monitoring costs associated with this configuration for coverage of all halibut trips. Even at double or triple these estimated costs, a video system using this frame rate would cost of fraction of complete, or of even restricted, observer coverage.

Summary of Analog VMS System

Estimated Initial Acquisition Costs –

- $6,500 per unit based on Cdn system
- $3.25 million for 500 units

Estimated Annual Monitoring Costs –

- $0.6 million, calculated as follows:
  1) 6 frames/min x 1,440 min/day x 4 days/trip = 34,600 frames/trip
  2) @ 0.5 sec/frame = 17,300 sec/trip = 5 hr/trip
  3) 6 hr/trip x $15/hr = $90 trip
  4) 6,700 trips x $90/trip = $603,000

A higher standard was demanded in the B.C. Dungeness crab fishery. Although regulatory compliance is one objective, catch monitoring was an important need identified by the fishermen. Consequently, a higher frame rate (1 per second, or 60/minute) is used in the crab fishery VMS and the entire fishing trip is recorded. The system is digital, so data are written to a computer disk drive rather than a video tape. The extremely large drives (e.g., 40GB) available today provide for ample storage of such data. Additional sensors monitoring other deck equipment, such as hydraulics and gurdy rotation, can enable tracking of vessel activity and events. By examining the computer-generated logs of such activity, shoreside video review can skip to the points when gear is being retrieved, greatly reducing the amount of time required to look for seabird bycatch. Also, camera positioning and lens specifications can enhance the ability to provide species identification. Several cameras can be placed on one system, providing several different views of the deck and gear retrieval area. AMR's experience shows that such a system can be installed on a vessel in about a 4-5 hours. The inevitable attempts at tampering by vessel crew would require sufficient deterrents or penalties, e.g., fines, loss of catch, etc.

Initial acquisition costs of this system ranged from $8,500 (US) to $13,000 (US) per vessel for the 48 vessels in the crab fishery. This figure included the first year program operating costs, shoreside monitoring equipment, and RFID tags. The actual per-vessel cost varied according to the number of RFID tags needed for the trap floats in use on each vessel. A system used for monitoring seabird bycatch in the halibut fishery would not need the RFID component, so costs for a similar system for the halibut fishery would be lower than the crab fishery. We assumed at the RFID component added approximately $2,000 to the unit cost on average and thus arrived an average per-unit cost of $8,000. Using this average, 500 units could be purchased, operated for the first year, maintained, and provide for the data review for $4.0 million. Costs in the second and third years of the Canadian system and totaled approximately $120,000 (US) annually, or $2,500 (US) per vessel. Revenues generated through license fees were used primarily for data review and maintenance of the 48 systems, included replacement computer components as well as RFID tags.

Summary of Digital VMS System

Estimated Initial Acquisition Costs –

- $8,000 per unit based on Cdn system
- $4.0 million for 500 units

Estimated Annual Monitoring Costs –

- $0.7 million, calculated as follows:
  1) 1.5 hrs setting + 10 hrs haulback = 11.5 hrs of video
  2) Review at 2x speed plus extra stop/start time = 7 hrs
  3) 7 hrs/trip x $15/hr = $105 per trip
  4) 6,700 trips x $105/trip = $703,500

We estimated the annual monitoring costs for the halibut fishery off Alaska in the same manner as with the analog system. Although the digital system is on continuously, only the setting and hauling need to be reviewed. Sensors employed in the system can pinpoint when a vessel's hydraulics are on, enabling a reviewer to quickly move to that point in the video. We didn't have any information on setting or hauling durations, so we assumed a daily average of 1.5 hrs for setting and 10 hrs for hauling on a 4-day halibut trip as an example. From this starting point of 11.5 hrs of digital video, a reviewer would be able to go through the video at twice the normal playback speed while looking for seabird occurrences. We added some additional time for the usual setup and start/stop time that would be expected during such a review, bringing the total review time to 7 hours. We also used the same $15 per hour personnel costs. The total estimated cost for monitoring came to roughly $0.7 million, just slightly more than the analog video model.

System costs would increase if more cameras are employed or better camera lenses are used. Cost reductions are also possible. One technique suggested for the B.C. crab fishery VMS was to distribute dummy systems in place of fully operational systems without the vessel's knowledge. Virtually indistinguishable from a regular system, the dummy systems would lack many of the expensive internal components. The presence of a system would be enough of a factor to reduce the occurrence of trap piracy. Other decisions about areas covered and/or vessel size categories monitored would also affect costs.

The latter system probably more closely resembles the type of system needed for the halibut fishery. The catch of seabirds is not necessarily predictable nor common, but is more likely a random event. As such, a continuous monitoring of gear setting and retrieval would be necessary, which is what the digital VMS system is capable of doing. Camera set-up would be unique to each vessel in order to satisfactorily monitor the gear. Also, other monitoring sensors would need to be employed to facilitate the video review. A more critical factor in determining costs, however, is the area and fleet coverage.