APPENDIX L

Memorandum from W. Hogarth to William Fox, Donald Knowles, and Bruce Morehead:
Mortality of Sea Turtles in Pelagic Longline Fisheries - Decision Memorandum

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Silver Spring, Maryland 20910

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MEMORANDUM FOR: William T. Hogarth, Ph.D.
Acting Assistant Administrator for Fisheries

FROM: William W. Fox, Jr., Ph.D.
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Donald R. Knowles
Director, Office of Protected Resources

Bruce C. Morehead
Acting Director, Office of Sustainable Fisheries

SUBJECT: Mortality of Sea Turtles in Pelagic Longline Fisheries-DECISION MEMORANDUM

Per your request, on February 9 and 10, 2001, we met to discuss the status of available information to assess mortality of sea turtles hooked or entangled in longline gear set for swordfish, tuna, and sharks, and to provide you with a recommendation for a mortality rate for application in Endangered Species Act (ESA) biological opinions until additional scientific information is available. John Oliver, Acting Deputy Assistant Administrator for Fisheries and Laurie Allen, Policy Analyst, from your office, participated as facilitators during the meeting. The goal was to come to a consensus decision, and if consensus was not possible, to provide you with discussion. We did reach a consensus on an approach, which will be described below. We also called George Balazs and Jeffrey Polovina of the Honolulu Laboratory to confirm some technical details of the Honolulu data, including an understanding of the reliability of the satellite tagging equipment.

After reviewing Don Knowles' January 4, 2001, memo on the subject, meeting notes from a nationwide internal conference call with NMFS Center and Regional Office personnel on February 7, 2001, and responses to Knowles' memo from Bruce Morehead dated January 31, 2001, supplying an alternate recommendation, it was obvious that scientific data to answer this question are inconclusive and that disparate opinions still exist among scientists and managers. We also knew that we needed to develop a precautionary process, consistent with the ESA, for development of these values. While in concept, the Knowles recommendation provided a precautionary approach, we wanted to evaluate the

method to either support that conclusion, or provide a different recommendation for a value(s) that was clearly supported by best available information. We summarized scientific information for comparison to Knowles' and Morehead's recommendations in a table:

Interaction	Protected Resources	Sustainable Fisheries	Aguilar et al. Study (n=38)	Honolulu Lab Study* (n=49)	Azores Study
External (i.e. entangled or hooked externally)	50	0-27	----	----	-----
Mouth	50	27-42	----	17-27	0
Ingested	50	42	29	20-42	33
Dead	50	100	----	100	----

* Low number in each cell is olive ridley sea turtles, the other is loggerhead sea turtles.

The Honolulu Laboratory study with satellite transmitters is the largest data set that approximates real conditions, although as Knowles' memo pointed out, the turtles were treated before being released and so may have been less susceptible to later physiological or infection problems than in the real world. However, the conditions in this study were still closer to actual conditions than the conditions in Aguilar et al., where turtles were held in tanks. Consequently, we focused on that data set as the best available scientific data.

In discussing this data set to look for a precautionary process for the development of appropriate values, Knowles pointed out two factors: (1) we needed to consider error due to real world conditions and reduced compliance rates with mitigation measures for such problems as rough weather or safety or when observers were not present, and adjust upward accordingly, and (2) it was unlikely that all post-incident mortality occurred within 30 days. On the other side of error, Balazs also noted that there were legitimate reasons why some compensation for transmitter failure should be figured into development of precautionary numbers so that they are not adjusted too high. Possible transmitter complications with the models used in the study include failure due to battery life, transmitter attachment, transmitter electronic failure (the Azores study showed a 20% failure rate in a bench test), and oceanographic conditions during application. Balazs chose one month as the point to calculate the potential rate because if lack of transmission were due to electronic failure alone, it would be expected within a

short period of time. Balazs expected mortality to be negligible for turtles just hooked in the mouth based on his long experience in working with sea turtles. However, the loss rate was 27% in the first month and climbed to 90% in 6 months, converging with the loss rate for deeply hooked turtles. These two facts indicated a high failure rate of the transmitters is likely in light of Balazs' expectation.

Choosing the appropriate estimate of mortality was the subject of much debate within the group. One could review the data and recommend adjustments based on professional judgement, or one could accept the data set at face value. We decided to develop a logical process, as described below, with built in precaution, go through the data and see where it led. This involved looking at the categories for which ranges of estimates were given in the studies.

Everyone was in agreement that a turtle that is not hooked (entangled), is released with no line, and was visibly uninjured, has an expected zero mortality rate from the interaction. Therefore, we recommend creating a new category for "no hooking, entangled no line" and that it be assigned zero.

The next category would then be a turtle that was externally hooked. The high value in the range of rates given in the Honolulu study for turtles that were considered lightly hooked (i.e., did not swallow hook, includes hooking in other body parts, considered lightly hooked) was 27%. Since as the Knowles memo points out, some animals that are hooked could still develop secondary infections, depending on the location of the hook, the conservative decision would be to assign the 27% to turtles hooked externally, rather than zero, including mouth hooks that do not penetrate the inside tissues of the mouth.

The loss rate in the Honolulu Lab study for turtles that were hooked in the mouth or had ingested the hook ranged from 27-42%. Therefore, we also decided that the precautionary approach for ingested hooks or hooks that penetrate the internal structures of the mouth would be to assign 42%, the high number, to those turtles. This is conservative because it combines a category that likely has a lower mortality rate (hooked in mouth-not ingested) at the higher rate. For turtles that are retrieved already dead, everyone agreed 100% would be assigned as the number. The following table summarizes the recommendation:

No hooking, no injury, disentangled completely	0%
Hooked externally or entangled, line left on animal (hook does not penetrate internal mouth structure e.g., lip hook)	27%
Mouth hooked (penetrates) or ingested hook	42%
Dead	100%

Summary: This scenario reflects our collective opinion, based on our respective expertise, of the best scientific information available, and resulted from a precautionary process to develop these numbers. We believe this apportions mortality in a manner consistent with best scientific information in lieu of applying one standard across the board. We also believe that by making a series of clearly precautionary decisions, the net effect is sufficiently conservative to include other smaller and non-quantifiable sources of mortality. The net effect is conservative and therefore meets the ESA criteria of finding on the precautionary side for the animal when there is uncertainty. As better data become available, these estimates can be refined. Morehead pointed out that the impact of new regulations in the Atlantic that require the use of dipnets and linecutters on pelagic longline vessels to reduce the impact on turtles would be expected to reduce injury and mortality. Since these measures were used in the Hawaii study it supports relying on this study in developing these numbers.

Concur KDA Do Not Concur _____ Date 2/15/01