


APPENDIX F - Memorandum from B. Morehead to W. Hogarth re: *Marine Turtle Mortality Rates from Interactions with Atlantic Pelagic Longline Fisheries*



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

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

FROM: F/SF - Bruce C. Morehead   
Acting Director, Office of Sustainable Fisheries

SUBJECT: Marine Turtle Mortality Resulting from Interactions with Atlantic  
Pelagic Longline Fisheries

The Office of Sustainable Fisheries (F/SF) has several comments on the recommendations stated in the January 4, 2001, memo addressing marine turtle mortality resulting from interactions with pelagic longline fisheries that occur in the Atlantic Ocean.

Summary

1. Available information on marine turtle mortality resulting from interactions with pelagic longline fisheries is sparse and incomplete. F/SF believes that observer reports, particularly handwritten notes on every interaction, constitute valuable information and often the best available information. Accordingly, we recommend that the observer reports be examined for detailed accounts of each pelagic longline interaction with sea turtles and coded by type of interaction (entangled, lightly hooked, and deeply hooked). These different interaction types should then be evaluated for serious injury and the differential mortality estimates by type of interaction should be incorporated in the next Biological Opinion.
2. F/SF believes that the 50% mortality level is a recommendation that does not take into account the current requirements for the Atlantic pelagic longline fishermen and does not reflect the best available science concerning post-release mortality. This concern was raised by industry representatives at the gear workshop (January 17 - 18).
3. F/SF would like to work with F/PR to develop and implement a protocol to characterize accurately and thoroughly the pelagic longline interactions with sea turtles, the response of the fishermen, and the observed injury. By ranking each factor, an overall expectation of survival could be assigned to each sea turtle interaction.



## 50% Mortality Recommendation

F/SF feels that there are some important issues that should be addressed concerning the 50% mortality recommendation. F/PR states that the 50% lethal classification considers the range of mortality suggested by tagging studies and assumes additional mortality under normal fishing conditions, where turtles are infrequently boarded, and gear can be assumed to be left on turtles at a greater rate. However, F/SF implemented regulations on November 24, 2000, requiring pelagic longline vessels to possess and use dipnets and line clippers to remove as much fishing gear as possible before releasing a captured sea turtle. These measures have changed normal fishing behavior and need to be taken into account in this mortality estimate. As the January 4 memo indicates (and several respondents concurred), gear left on turtles (especially trailing gear) is a significant risk to sea turtles and was a justification for the 50% post-release mortality recommendation. Accordingly, as the new handling and release requirements stipulate that turtles should be boarded and as much gear be removed as possible, the risk to turtles from remaining and trailing gear is significantly reduced. F/SF believes that these gear and handling requirements significantly improve sea turtle survival and should be incorporated into the recommendations on sea turtle post-release mortality estimation. Industry supported making these requirements permanent and NMFS has prepared a proposed rule to do so. Discounting the effects of these requirements would be inconsistent with the objective of the regulation.

In the serious injury assessment strawman, inputs were solicited regarding the various categorizations of pelagic longline related injuries. Several of the respondents suggested that the level of mortality depends on the severity of the interaction. Based on these inputs, F/PR revised the criteria for determining injury for sea turtle-pelagic longline fishery interactions. However, when determining post-release mortality, these criteria were ignored and a blanket 50% mortality level was recommended for all sea turtle interactions, regardless of interaction type noted by observers. The non-serious injuries and minor or moderate injury categories are not thought to have the same mortality levels as the serious injury criteria. The observer reports should be used to determine the severity and rate of interactions by type. These data represent the best available information for this fishery and should be used instead of the 50% mortality estimate that has been recommended for application to all sea turtle / longline gear interactions.

Finally, F/SF feels that more attention should be directed towards the tagging studies referenced in assessing the mortality level. F/SF staff have discussed with sea turtle scientists concerns that they have with how data from their studies have been used in this recommendation. Specifically, these scientists indicated that a uniform mortality level is not a realistic or an accurate reflection of the post-release survival of sea turtles. When the current data from the Azores and Hawaii tagging projects are combined according to hooking severity, there appears to be a discernable difference in post-release mortality (40% compared to 21.4% for deep versus light hooked loggerhead turtles). While there are concerns with these studies, (e.g. small sample size, lack of statistical significance in results) they may represent the best available science and should therefore be considered as part of these assessments.

## Recommendations

F/SF recommends that the handwritten observer reports be reviewed and interactions coded by type as soon as possible according to the injury criteria presented in the January 4, 2001 memo. F/SF1 staff can be made available to help review the observer reports from the Atlantic if necessary. The recent regulations requiring pelagic longline vessels to carry and use dipnets and line clippers will reduce the level of post-release mortality and this needs to be incorporated into the mortality estimates. Finally, the tagging studies need to be utilized to provide a scientific basis for mortality determinations based on the severity of injury. By assigning mortality estimates based on the types and severities of the gear interactions, a more accurate determination of overall impact can be generated. The table below gives an indication of how the various interactions could be assessed. Based on the tagging studies (a summary sheet is attached with this memo), no injury would involve no mortality, minor and moderate injury would involve 0 or 27 % (Azores or Hawaii Study respectively), and serious injury would involve 33, 35, or 42 % (Azores, Aguilar, or Hawaii study respectively) mortality. F/SF recommends using mortality estimates of 27 % for minor and moderate injuries and 42 % for serious injuries as appropriate and reasonable risk averse assumptions, given the current scientific information.

Interaction	Response	Injury	Mortality Rate
Entangled / no hook	Disentangled	No injury	0%
Entangled / external hook	Disentangled, no gear	Minor	27%
	Disentangled, trailing gear	Moderate	27%
	Dehooked, no gear	Minor	27%
Hooked in beak or mouth	Hook left, no gear	Moderate	27%
	Hook left, trailing gear	Serious	42%
	Dehooked, no gear	Moderate	27%
Hook swallowed	Hook left, no gear	Serious	42%
	Hook left, trailing gear	Serious	42%
Turtle Retrieved Dead	---	Lethal	100%

## Future Considerations

F/SF feels that the best manner to determine the post-release mortality of sea turtles following an interaction with pelagic longline gear involves characterizing the encounter, the response by the fishermen, and the observed injury. By establishing a ranking system for each of the factors associated with these categories, every turtle take could be evaluated for severity and mortality.

risk. When more data are available on the estimate of post-release mortality, the mortality of sea turtles as a result of pelagic longline fisheries can better be approximated. The serious injury workshop proposed by F/PR should address this ranking system. Once the characterization criteria are determined, observer data recording forms and training materials should be amended accordingly. Finally, guidance should be issued to all potential users regarding a protocol for applying the criteria for the purpose of generating annual mortality estimates.

#### Attachment

cc: F/NEC - Michael Sissenwine  
F/NER - Patricia Kurkul  
F/PR - Donald Knowles  
F/SEC - Nancy Thompson  
F/SER - Joseph Powers  
F/ST - William Fox  
F/SWC - Michael Tillman  
F/SWR - Rebecca Lent

Summary of Aguilar 1995 (loggerhead)

Hooked?	# Turtles	Deaths	Mortality
Deep	32	11	34.4%

(excludes 6 turtles under observation)

Bjorndal, Bolten, and Riewald 1999 Azores Study (loggerhead)

Hooked?	# Turtles	Stop Trans	Released	Mortality
Control	5	0	9/15/98-10/12/98	0%
Light	3	0	10/28/98-12/5/98	0%

Dipnetted  
Mouth hooked

All still functioning Feb. 28. 1999

Riewald, Bolten, and Bjorndal 2000 Azores Study (loggerhead)

Hooked?	# Turtles	Stop Trans	Released	Mortality
Control	4	2	07/15/2000	50%
Deep	6	2	8/3/00-9/8/00	33%

Dipnetted  
Throat hooked

Still transmitting Dec. 2000

Mortality estimate includes one turtle that is sending signals suggestive of mortality

NMFS 2000 Hawaii Study (green, loggerhead, olive ridley)

Hooked?	# Turtles	Stop Trans	Mortality
Light	19	4	21%
Deep	30	11	37%

Beak or flipper hooked  
Swallowed hook

Successful track = at large for > one month

Hawaii - Green

Hooked?	# Turtles	Stop Trans	Mortality
Light	2	0	0%
Deep	1	0	0%

Beak or flipper hooked  
Swallowed hook

Hawaii - Loggerhead

Hooked?	# Turtles	Stop Trans	Mortality
Light	11	3	27%
Deep	24	10	42%

Beak or flipper hooked  
Swallowed hook

Hawaii - Olive Ridley

Hooked?	# Turtles	Stop Trans	Mortality
Light	6	1	17%
Deep	5	1	20%

Beak or flipper hooked  
Swallowed hook

Totals from Azores and Hawaii Tagging Studies (all species)

Hooked?	# Turtles	Stop Trans	Mortality (%)
Control	9	2	22.2%
Light	22	4	18.2%
Deep	36	13	36.1%

Dipnetted  
Beak, flipper, or mouth hooked  
Swallowed or throat hooked

n=67 (Includes likely Azores mortality)

Totals from Azores and Hawaii Tagging Studies (loggerhead only)

Hooked?	# Turtles	Stop Trans	Mortality (%)
Control	9	2	22.2%
Light	14	3	21.4%
Deep	30	12	40.0%

Dipnetted  
Beak, flipper, or mouth hooked  
Swallowed or throat hooked

n=53 (Includes likely Azores mortality)

Notes from conversation between Laurie Allen and John Hoey 8/17/2000.

June 30, 2000 Biological Opinion. Statements Justifying Re-initiation of Consultation.

- 1) Proposed time-area closure had potential to increase interactions with turtles.
  - @ 6-8% increase in turtle interactions w/ proportional effort redistribution for alternative w/ large time and area closures.
  - No increase with effort removal scenario.
  - likely that 6% increase was an over-estimate because small boat effort was re-apportioned to northern and distant water areas (NED & Offshore south) beyond range of these vessels. With revised smaller time-area closures in final rule and re-apportionment to open southern areas, estimate will probably not be significantly different from status quo.
  
- 2) Concern that a new estimation procedure, using pooling, indicated that previous estimates of total takes were significantly lower. P6 B.O. "Additional information received on May 18, 2000, during the conduct of this consultation indicates that past estimates of incidental take evaluated in the April 23, 1999 Opinion have been underestimated by as much as 50%." P55 B.O. "as the revised estimates are substantially higher than those previously reported, thus significantly elevating the degree of concern ..."
  - June 7, 2000 (Yeung, Epperly, Brown) SEFSC document says revised estimates with pooling are similar to past estimates – "Page 1 Intro – "the summed total of the bycatch estimates across strata are generally not greatly different." Annual confidence intervals indicate differences are probably not significant. @ 25% increase for loggerheads and 9% increase for leatherbacks are cumulative over 8 years. Greatest annual differences driven by environmental events.
  - Higher estimates result from pooling approach using QYN strategy which expands rare events associated with environmental anomalies (decaying eddys) to fishing effort under conditions not associated with those environmental conditions. The alternative YQN strategy, which would reduce this influence, produces lower estimates.
  - Recommendations have been made to attempt to address concern with eddy trips by pooling Grand Bank observations by temperature (less than 68 vs  $\geq$  68), two month periods, and year clusters (91-93, 94-96, 97-99) to reduce affect of temporal trends.
  
- 3) Established Incidental take levels and 1999 Observations (some preliminary concerns on a few problems).
  - If new estimation method with pooling is better, should revise take levels using the same calculations used for past take statements since pooling provides more complete coverage..

- Previous incidental take statements were for total interactions and for the numbers of takes that observers coded as dead. The estimation procedures predicted total catch and the total number that were estimated as dead. Serious injury criteria were first applied to 1998 data in an SEFSC Technical memo published in 1999. Since ingestion has not been coded, how could it be included in a serious injury threshold now referred to as hooked by ingestion or moribund? If serious injury threshold is now needed, we need to code observer records appropriately and re-run estimations. It would also be reasonable to address questionable identifications so that incidental take statement doesn't disregard published papers indicating that the Kemps, green, and hawksbill turtles were probably loggerheads.
- Evaluation of 1999 Observations. A review of 1999 observer notes on the incidental take logs (copy provided to Laurie Allen) does not indicate that any of the leatherbacks were dead, or had ingested (swallowed) the hook. For loggerheads, observer notes indicated that 10 had ingested the hooks and ~~two~~ <sup>3</sup> mouth hooked turtles were associated with notes indicating concern about the status of the turtles. None were noted as dead. The statement on page 57 of the B.O. indicating that the "location of the hook was not always recorded (n=60)" is difficult to reconcile with the observer notes. Observer program documentation and training has referred to terms like "hooked in jaw" or "hooked in mouth" as applying to conditions when the hook is visible, similar to protocols in the Pacific where these are referred to as lightly hooked. The Aguilar (1992) study of loggerheads captured in the Spanish Mediterranean fishery is the source for the 29% mortality estimate and it appears to reflect deep hooked turtles where the hooks could not be removed and these were moved to a rehabilitation aquarium. If hooked in "mouth/beak/jaw" is an inadequately detailed notation, it should be clarified on the recently revised sea turtle life history forms, which were recently developed by SEFSC turtle scientists and are now being used by observers. Criteria for counting turtles should not change without revising thresholds.
- Adjusting counts for differences in coverage rates requires review. The B.O. argues that the 1999 observations reflect only 3% annual coverage, whereas the threshold supposedly reflects a 5% target. While 5% coverage was the target, the realized coverage rate differed by year and the threshold values are only appropriate for the coverage rate reflected in the series of years used in the calculation. This analytical approach is not very reliable, since we know that area-qr coverage rates have varied dramatically and since the absolute number of turtle interactions are influenced by coverage in specific area-quarter strata. 5% or 6% annual coverage with no randomly selected trips for the grand banks can produce a very low number of interactions, whereas 3% coverage with one disaster trip can account for a very large number of turtles.