

APPENDIX U

M. Chaloupka Memorandum to S. Martin (HLA) Re: *HLA Proposal for Management Regime Change for the Hawaii Pelagic Longline Fishery - Revised WPRFMC Take.*

MEMORANDUM

TO: Sean Martin
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RE: HLA proposal for Management Regime Change for the Hawaii Pelagic Longline Fishery — revised WPRFMC take

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Background

The Incidental Take Statements in the HLA proposal for Management Regime Change for the Hawaii Pelagic Longline Fishery outline the expected incidental take and expected mortality of 4 species of sea turtle in the Hawaii-based tuna-style and swordfish-type fisheries (Table 1). The possible impacts of the proposed take and mortality schedules on sea turtle population viability were evaluated in a previous memo.

The status of these 4 sea turtles stocks in the Pacific are shown in Fig. 1.

The WPRFMC recently revised the incidental take and mortality schedule in an Emergency Interim Rule for Management of the Hawaii-based pelagic longline fishery — these revised estimates for the proposed swordfish fishery are also summarised in Table 1. A qualitative evaluation of this revised schedule is given below for greens, loggerheads and ridleys. A quantitative stochastic simulation based evaluation is given below for leatherbacks.

Table 1 HLA incidental take statement with WPRFMC proposed management alternative takes and mortalities shown in brackets

fishery	species	expected		ageclass
		take	mortality	
swordfish-type	green	8 (8)	3 (7)	adults
	leatherback	25 (41)	7 (12)	adults
	loggerhead	120 (29)	42 (9)	immatures
	olive ridley	16 (54)	5 (45)	adults/immatures

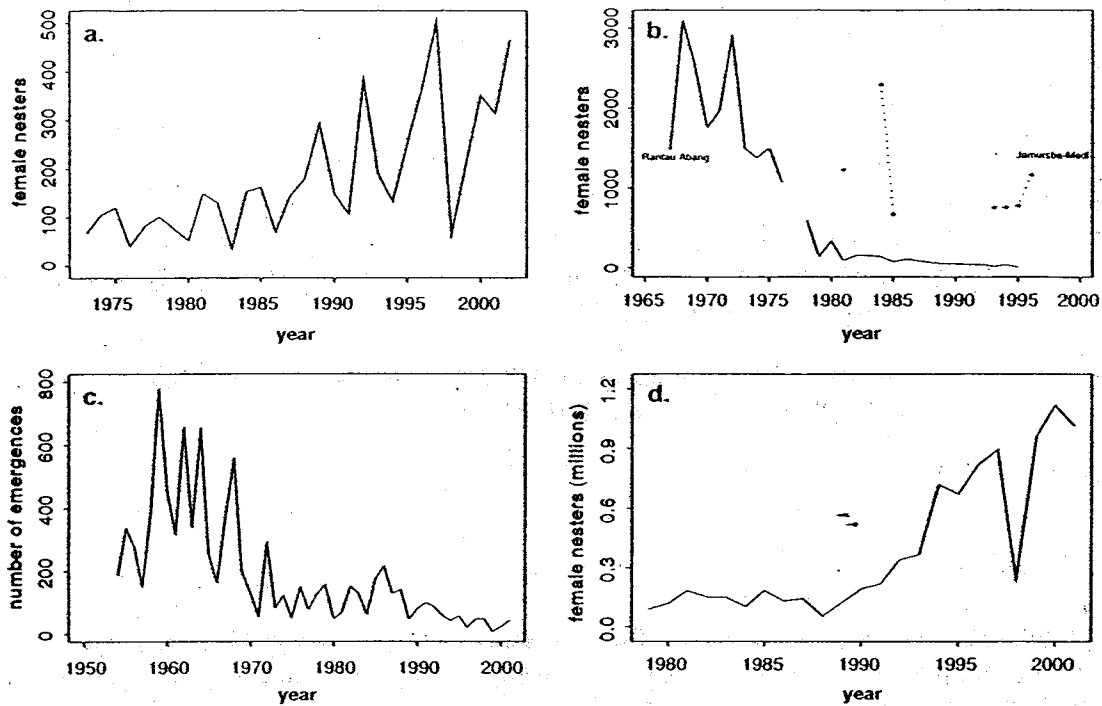


Figure 1 Trends in nester abundance of the 4 sea turtle stocks exposed to the Hawaii-based pelagic longline fisheries. Panel (a) shows female green turtle nesting abundance at the East Island rookery for the Hawaiian green turtle stock (Balazs and Chaloupka 2003). Panel (b) shows female leatherback nesting abundance at the Rantau Abang and Jamursba-Medi rookeries for the western Pacific stock (Chua 1988, Chan and Liew 1996, Suarez et al. 2000). Panel (c) shows female loggerhead nesting abundance at the Kamouda, Tokushima Prefecture for the Japanese loggerhead stock (Kamezaki et al 2003). Panel (d) shows female olive ridley nesting abundance at the La Escobilla rookery, Mexico for the east Pacific stock (Penaflares et al. 2000; Dr F Alberto Abreu 2002, pers comm).

Impact evaluation

The historical impacts of various fisheries and other anthropogenic hazards on the 4 sea turtles stocks are unknown — what is known is that these stocks have been and continue to be exposed to many of these hazards. Despite this exposure, 2 of the stocks are clearly increasing in abundance as evidenced by increasing trends in female nester abundance while 2 stocks are clearly decreasing (Fig. 1).

The revised take and mortality of Hawaiian green turtles (Table 1) would have no detectable marginal impact on stock abundance. This conclusion is based on the following points. The annual loss of Hawaiian green turtles to the tumour-forming diseases, fibropapillomatosis, is substantial greater than the proposed loss to the Hawaii-based swordfish fishery (see Chaloupka & Balazs 2003). Despite ongoing exposure to disease and various fisheries, the Hawaiian green turtle stock continues to increase in

abundance (Balazs & Chaloupka 2003). There are no proposed conservation measures to offset any pelagic longline loss, however, the Hawaiian stock is clearly increasing.

The revised take and mortality of eastern Pacific olive ridley turtles (Table 1) would have no detectable marginal impact on stock abundance. This conclusion is based on the following points. The annual loss of eastern Pacific olive ridleys turtles to incidental take in various fisheries along the Mexican Pacific coast is substantially greater than the proposed loss to the Hawaii-based swordfish fishery (see Chaloupka & Balazs 2003). Despite exposure to all fisheries, the eastern Pacific olive ridley turtle stock(s) continues to increase in abundance (Fig. 1d, see also Penaflores et al 2002). There are no proposed conservation measures to offset any pelagic longline loss, however, the eastern Pacific stock(s) are clearly increasing.

The revised take and mortality of Japanese loggerhead turtles (Table 1) would have no detectable impact on stock abundance. The revised loss is substantially less than the scenario modelled previously that involved an annual loss of 42 immatures — the revised annual loss is 9 not 42 (Table 1). An annual loss of 42 immatures would have no detectable marginal impact on stock viability so clearly an annual loss of 9 would also have no detectable marginal effect. Hence no additional simulation modelling is required here. The proposed conservation measures that could result in an additional 295 immatures pa to offset the proposed annual loss of 9 immatures attributable to the Hawaii-based longline fishery seems worthwhile. No modelling is required to draw this conclusion. The recovery of the stock will, however, depend on a much broader range of conservation measures.

The marginal effect of the revised take for the western Pacific leatherback stock(s) was evaluated against the expected steady-state stock abundance assuming no exposure to any other anthropogenic hazards. This was modelled here using a 2-substock western Pacific leatherback simulation model developed for the US NMFS and provided to the HLA. The previous modelled scenario used an annual loss of 25 adult leatherbacks (tuna- and swordfish-type fisheries combined). No marginal effect was detectable for that loss of 25 adults pa. The revised loss is an additional 5 adults pa over the previous scenario so the modelled scenario here was 30 adults pa for a 25 year period starting in the year 2000. The runs are for a simulation period from 1900 to 2100, which is 75 yr beyond the cessation of the incidental loss to review possible recovery of the stocks. The 25 yr intervention period is arbitrary but sufficient to determine any marginal effect of the proposed losses. The model results are shown in Fig 2 as the expected stock abundance (± 1 standard deviation) derived from 1000 Monte Carlo trials.

It is apparent given model assumptions (see previous memo) and the reference used that there is no detectable marginal effect of the loss of either 25 or 30 adult leatherbacks pa on the western Pacific leatherback stock. The stock is declining due to a range of effects other than any possible marginal effect due to the Hawaii-based longline fishery. The proposed conservation measures that could result in an additional 258 adults pa to offset the proposed annual loss of 30 adults attributable to the Hawaii-based longline fishery seems worthwhile, although this will only be useful for the melanesian substock not the

near-extinct malaysian substock. No modelling is required to draw this conclusion. The recovery of the Malaysian substock will, however, depend on a much broader range of conservation measures.

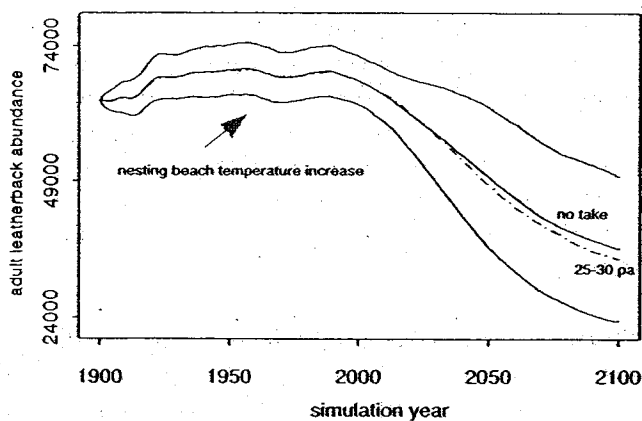


Figure 2 Expected stock abundance (± 1 sd) from 1000 Monte Carlo trials given annual loss of 25 or 30 adults from the western Pacific leatherback stock. The loss of 30 adults is based on the additional loss of 5 adults listed in Table 1 compared to previous modelled scenarios that used a loss of 25 pa. The difference between a loss of 25 or 30 adults pa is indistinguishable.

References

- Balazs GH, Chaloupka M (2003). Thirty-year recovery trend in the once depleted Hawaiian green sea turtle stock. *Biological Conservation*.
- Chaloupka M, Balazs GH (2003) Modelling the effect of fibropapilloma disease on the somatic growth dynamics of Hawaiian green sea turtles (manuscript in review).
- Chan EH, Liew HC (1996) Decline of the leatherback population in Terengganu, Malaysia, 1956-1995. *Chelonian Conserv Biol* 2: 196-203
- Chua TH (1988) Nesting population and frequency of visits in *Dermochelys coriacea* in Malaysia. *J Herpetol* 22: 192-207
- Kamazaki N, Matsuzawa Y, Omuta K, Abe O and 23 others (2003) Population change of Japanese loggerhead turtles, *Caretta caretta*, estimated by nesting number. In: Bolten AB, Witherington BE (eds) *The Biology and Conservation of Loggerhead Sea Turtles*. Smithsonian Institution Press, Washington, DC, USA
- Penaflores C, Vasconcelos J, Albavera E, Marquez R (2000) Twenty-five years nesting of olive ridley sea turtle *Lepidochelys olivacea* in Escobilla Beach Oaxaca, Mexico. In: Abreu-Grobois FA, Briseno R, Marquez R, Sarti L (eds) *Proceedings of the 18th International Sea Turtle Symposium*. NOAA Technical Memorandum NMFS-SEFSC-436: 27-29
- Suarez A, Dutton PH, Bakarbessy J (2000) Leatherback (*Dermochelys coriacea*) nesting on the north Vogelkop coast of Irian Jaya, Indonesia. In: Kalb H, Wibbels T (compilers) *Proceedings of the 19th Annual Symposium on Sea Turtle Biology and Conservation*. NOAA Technical Memorandum NMFS-SEFSC-443: 260