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Subject: For FWS Personnel: Palmyra training of AMNH turtle team August 5-14, 2008

Don and FWS Team, Thank you again for FWS sponsorship of my travel to Palmyra for the AMNH turtle training mission. I'm very appreciative and deem the trip as having been fully successful. It was a pleasure to work closely with Chris Depkin on a daily basis; I have admiration for his management and communication skills.

As I conveyed to Chris during discussions prior to departure on the 14th, the three AMNH researchers were good learners and fully obtained the basics in using their tangle nets to catch turtles in Palmyra habitats.

A brief historical recap of events leading up to the trip may be useful. As you will recall, four AMNH personnel (Eleanor Sterling, Kevin Frey, Eugenia Naro-Maciel, Katherine McFadden) came to Hawaii in early January 2008 for a week of training under my program. This session was a pre-requirement for the NMFS Permit Office issuing authorization to capture and sample sea turtles at Palmyra. That training went very well and was reported as 'successfully accomplished' to the Permit Office. However, the use of tangle nets to catch turtles in Hawaiian habitats was recognized as very different from what could be expected in the atoll environment of Palmyra. Hence, the Permit Office made it a condition of permit issuance that training (oversight, if you will) be continued by my program on-site during the first AMNH field trip to

Palmyra. Following the January training, I had two very helpful meetings with Bill Smith (that included Thierry Work) to discuss conditions and multiple other
aspects relating to issuing an FWS Refuge Permit to AMNH. I am indebted to Bill for his advise, professionalism, insights, and friendship.

After ironing out several modest issues with AMNH, I traveled to Palmyra and worked with their team August 5-14, 2008. Marc Rice, a 20-year veteran research collaborator in Hawaii, accompanied me as a seasoned field worker. Thierry Work had made other commitments for this time-window, so couldn't participate as originally planned. The AMNH team consisted of Sterling, Frey, and Katherine Holmes (note McFadden arrived on 8/14/08, Naro-Maciel was unable to participate).

Nine of the 10 days at Palmyra involved ocean activities, eight of which included the use of tangle nets. Nets were deployed adjacent to the Turtle Hole, at Shark Nursery patch reef, on the ocean reef of Paradise Island, and adjacent to Bird Island. Turtles, totaling 14, were captured at three of these sites (none caught by Bird Island). Two other turtles (making 16 total) were captured by hand, one of which was in poor body condition, on the ocean reef of Paradise Island.
Bycatch amounted to eight eagle rays, and all were released unharmed (with demonstrations given to maximize human safety during their release). Several small sharks were seen passing through the net sets, but none became entangled. Limestone rocks and rubble commonly became entangled on the bottom of the net on the Paradise Island reef flat. However, only rarely was living coral involved. Care was taken to not lay the nets in areas of obviously living coral. The smallest turtle captured (~38 cm) became heavily entangled in the bottom of the net during one of the sets near Turtle Hole. This incident served as an excellent example of the need for vigilance to prevent mortality and injury, when netting for turtles. The turtle was held long enough to ensure good health before release.

The following recommendations and observations were emphasized to the AMNH Team on several occasions, especially to and through Eleanor Sterling, the leader of the team:

- Maintain high vigilance of nets and conduct all activities with great care, keeping human safety and the safety of turtles, as the highest of priorities (in that order).

- One person in the immediately area of a deployed net must have a razor-sharp folding knife and pliers on their person. These tools are absolutely essential for responding to capture urgencies (cutting out bycatch or a turtle heavily entangled, and (using pliers) extracting the dangerous deadly barbs of a ray).

- Two or more people must be involved in the removal of a ray or other bycatch. It is unsafe for one person to do so.

- Great care must be taken so that a sufficient number of personnel, with adequate safety and skill training, are present if a net is deployed that can catch more than one turtle at a

time. Surround netting of a group of foraging turtle could end up entangling multiple animals and create an overwhelming situation dangerous to the turtles and the personnel. In one of our sets on the Paradise Island reef, five of us were were only marginally adequate to handle the capture situation that unfolded.

- Be alert to the possibility of both a turtle and a ray being entangled close to one another and only the turtle being observed before rushing in to untangle it. During the early 1980's just such a situation occurred to me, resulting in a ray barb stabbing my assistant's arm requiring major emergency surgery to remove it. Victims can and do go into serious shock from ray-barb injuries.

- There is the distinct potential for bycatch of a large shark in a tangle net at Palmyra. Tiger sharks occur there, probably in greater numbers than commonly realized because of the scarcity of sightings. Turtles are a common prey of tiger sharks. Several of the turtles we captured had injuries suggestive of tiger shark attack. If a large shark tangles in the net the situation will immediately become critical, especially in terms of human safety, attempting to release it. Extreme common sense and calm will be required. The approach taken to respond will depend upon the circumstance. It may be entirely necessary to do nothing and stay away, because doing something may subject personnel to considerable danger.

The following information will be useful for internal FWS records:

- The used tangle net loaned to AMNH by a researcher in Florida for use at Palmyra should be removed from the island without being placed into Pacific waters. This is a repeat of an earlier recommendation I made, and indeed may already have been accomplished.

- The turtle nets that AMNH had fabricated for the project, patterned after the nets used in my program here in Hawaii, were not made the same. The "float" line of AMNH nets consists solely of polypropylene line. This line should have been "foam-core float line" a special line designed to be very buoyant and light weight. Attaching separate floats to the polypropylene line (standard practice) can't really compensate for the lack of foam-core line. The AMNH nets constructed in this fashion present no particular negative factor to the habitat at Palmyra. But they are more difficult to use, especially to retrieve, under the conditions we experienced.

- In addition to the above, the AMNH nets were constructed from 14 inch knot-to-knot webbing. This apparently was all the company had to offer. The tangle nets used in my program over the years have 16 or 18-inch webbing. Smaller webbing means that relatively smaller non-target species can potentially become entangled. It also means that larger turtles (large subadults and adults) can and will bounce off the net, swim along it, find the end and swim off free. Or, swim over the net in areas where external floats aren't attached (see above). The fact is that Marc Rice and I witnessed these avoidance strategies by the turtles at Palmyra, made possible by the smaller webbing. Is this a problem to the habitat of Palmyra? No, not based on our experience while there. However, it could possibly affect other things relevant to the AMNH study design and statistical analysis. AMNH has been made aware of these views.

- Any and all turtles found dead at Palmyra should be submitted to Thierry Work for necropsy health evaluation. This would also include carcasses in less-than-fresh condition. Large animals will present a serious problem of storage and shipment, but small to medium turtles should be triple bagged sealed and frozen for shipment to Dr. Work's lab here in Honolulu. Samples desired (and authorized by FWS) for AMNH research can be collected and forwarded by Thierry. Certain samples from such turtles are also appropriate to submit to my program (such as humeri for skeletochronology where we have full capacity for analysis).

- Because the AMNH turtle project is significantly funded by a contract from NOAA/NMFS Pacific Islands Regional Office, from the early planning stages the stock assessment quantitative skills of Dr. Melissa Snover (PIFSC) were encouraged for collaboration with AMNH. I spoke about this with Eleanor and she agreed that reconnecting with such an endeavor was something she wished to pursue.

- An ST-24 Telonics satellite tag from my program was donated to Eleanor for use at Palmyra with the resulting data being included as an integral part of the AMNH research. That tag was deployed at Paradise Island on a ~82 cm male turtle on 8/13/08.

Thank you again. If you have any questions or need clarification of any aspect, I'm of course always pleased to be at your service.

Aloha, George Balazs

Note: I've included Thierry Work as a recipient of this message. While not FWS, he is indeed an integral part of federal turtle studies in Hawaii and elsewhere throughout the Pacific, and is referred to at several places in my above report.