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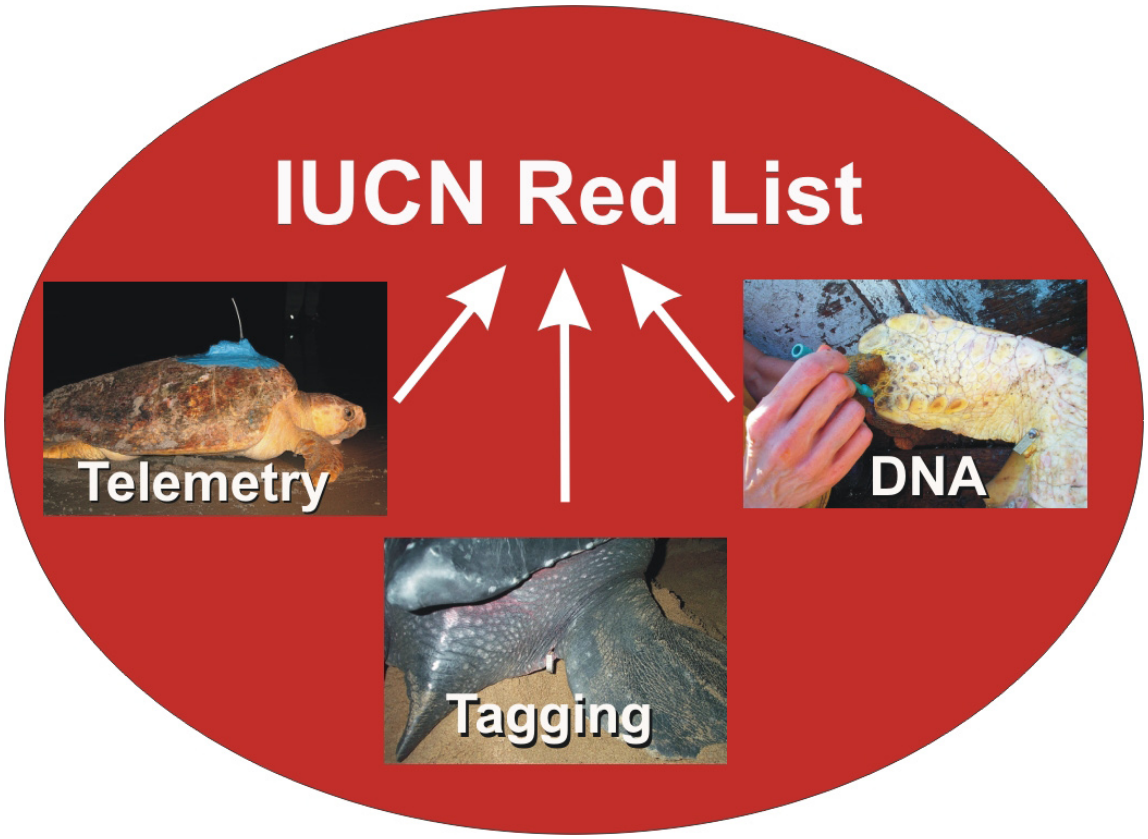

Naro-Maciel & Formia discuss the role genetic data can play in defining a sea turtle subpopulation (pp. 6-8).

IN THIS ISSUE:

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We are grateful to our major donors:

Editorial

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It is with great enthusiasm, and only slightly less trepidation, that we begin our stint as editors for the Marine Turtle Newsletter. The trepidation stems from the rather large footsteps we follow in; this history of editorship of the MTN is an impressive one, including Nicholas Mrosovsky, Nat Frazer, Karen Eckert & Scott Eckert, Annette Broderick & Brendan Godley. Our enthusiasm stems from the role the MTN plays in the world of marine turtle conservation and beyond, and our ideas about what we might do to enhance that role. We take this opportunity to share our vision of what we hope to achieve as the MTN's latest editors.

First, Nicholas Mrosovsky, the founding Editor, envisioned the MTN as providing both a forum for exchange of information and a mechanism for alerting people to threats in a timely manner. While advances in computer-based information exchange have undoubtedly reduced the importance of the MTN from the latter perspective, the newsletter continues to play an important role in communicating information about all aspects of marine turtle biology and conservation, and we would add 'communicating opinions' to this. We feel the MTN has a particular role to play in providing space for editorials, as illustrated in the last issue (MTN 113) by the exchange of letters on the shipment of green turtles from the Cayman Turtle Farm to the UK. There are points of considerable debate and contention in the marine turtle world, and the MTN can provide an important venue (and one of the few published ones) for considering the various sides of the issues at stake. We encourage authors to submit editorial style pieces to the MTN.

Second, a recent decision by the International Sea Turtle Society to no longer publish extended abstracts from the Annual Sea Turtle Symposium has left a gap in the communication of research results that the MTN can fill. The 4 page extended abstract format previously adopted in the symposium proceedings is just about the perfect length for an MTN research submission. Following the review policies implemented by Annette Broderick and Brendan Godley, all research submissions will continue to be subjected to peer review, and we believe this makes the MTN a better publication outlet than the former proceedings. We encourage authors to submit short research papers for consideration.

Third, one of our main goals as editors will be to produce regional special issues of the MTN. We intend to produce one such issue a year, and the first will be a special issue on sea turtle conservation and research in Africa, guest edited by Angela Formia, Jacques Fretey, Sue Ranger and Manjula Tiwari. The issue was inspired by the successful Africa meetings at the 2006 Symposium in Crete, and we plan to publish it in January 2007.

Finally, the MTN will continue with what must by now be considered its regular features: Recent Publications (compiled by Karen Bjorndal, Alan Bolten and Peter Eliazar of the Archie Carr Center for Sea Turtle Research), News and Legal Briefs (compiled by Kelly Samek), and ISTS and MTN information pages.

Of course, the production of the MTN is a shared responsibility with the Managing Editor Michael Coyne, the Editorial Board, and the numerous reviewers who donate countless hours to improving the articles that appear in the MTN. We thank them all and look forward to continuing the fine tradition that the MTN has become.

Guest Editorial: Revision of the Kemp's Ridley Recovery Plan

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The United States' Endangered Species Act (ESA) established policies and procedures for identifying, listing, and protecting species that are endangered or threatened with extinction. When in danger of extinction throughout all or a significant portion of its range, a species is listed as endangered. It is listed as threatened if likely to become endangered within the foreseeable future. Kemp's ridley sea turtle (*Lepidochelys kempii*) has been listed as endangered since 1970. Since the ESA-required recovery plan for Kemp's Ridley was published (USFWS and NMFS, 1992), much has been accomplished toward its recovery, and publications focusing on it have flourished (see Chelonian Conservation & Biology, v. 4, no. 4 and Plotkin in press). The recovery plan is now being revised by a Mexico-U.S. Kemp's Ridley Recovery Team (KRRT), to address current threats and needs, to highlight conservation accomplishments, and to meet ESA requirements (http://www.fws.gov/kempsridley). KRRT membership, background information, and minutes of its and its stakeholders meetings, are posted on the web site. A draft of the revised plan should be available for public review by early 2007.

I participated in two KRRT stakeholders meetings (April 2004 and February 2006) in Houston, Texas. At the first, input from stakeholders was solicited. At that meeting, and in an earlier Marine Turtle Newsletter guest editorial, I offered the following suggestions for consideration by the KRRT in revision of the recovery plan (Caillouet 2005):

1. Designate Texas beaches as known nesting habitats for Kemp's ridley, and provide these beaches, nesters, eggs and hatchlings additional protection,
2. Provide additional protection to Kemp's ridleys in Texas' nearshore waters, which are important migratory, breeding and foraging habitats, and
3. Reevaluate the Kemp's ridley head-start experiment's accomplishments to date (see Caillouet 2000a), and fulfill prior commitments to determine the fate of head-started turtles released into the Gulf of Mexico.

Adding support to these suggestions, documented Kemp's ridley nests on Texas beaches this year totaled 101, almost double the 2005 total (D. Shaver pers. comm.), and additional nestings probably were missed (see Pritchard 1990). Year 1985 marked the lowest reported annual nest count (740) at Rancho Nuevo, the primary nesting site in Tamaulipas, Mexico (see Table 1 in TEWG, 2000). It is remarkable that the Texas nest count has already reached 13.6 % of the lowest at Rancho Nuevo, and hatchling production from Texas nests could reach 7,000 this year (D. Shaver pers. comm.).

At the second stakeholders meeting, oral and visual presentations of draft portions of the revised plan were made by KRRT members. No copies of these materials were distributed to stakeholders before, during, or after the second meeting, nor had minutes of this meeting been posted on the recovery plan web site when this editorial was written. Stakeholders' were invited to submit written comments to the KRRT within 2 weeks of this meeting; mine were submitted March 2006, based on recall and notes. For purposes of discussion, below are my further suggestions and their rationale, based on those comments:

4. Update annual hatchling and nest count data and estimates of parameter values or levels through the 2006 nesting season, and rerun the age-based model.

Rationale - The KRRT is using age-based modeling (TEWG 1998, 2000; Heppell *et al.* 2005) to guide revision of the recovery plan. Model estimates of population status and trends, rates of population recovery, effects of recovery actions, and time required to fulfill downlisting and delisting criteria, could influence establishment and prioritization of recovery actions. Although age-based models are very helpful tools, flexibility and caution should be exercised in their use.

The input variable in such models is annual production of hatchlings in Tamaulipas, and the output variable is annual number of nests laid in Tamaulipas, with a time lag related to estimated age to maturity. Model-estimated rates of increase in annual number of nests are sensitive to choices of data time series and parameter values or levels (TEWG 1998, 2000; Heppell *et al.* 2005). The TEWG (1998, 2000) and Heppell *et al.* (2005) employed single point estimates for some model parameters; *e.g.*, a 1F:1M sex ratio was assumed, despite studies showing more female than male hatchlings are produced through beach corral hatchery operations in Tamaulipas, and sex ratios of older life stages are female-biased (Coyne in press; Landry *et al.* 2005; D. Shaver pers. comm.; reviewed by Wibbels in press). Note that the TEWG (1998, 2000) and Heppell *et al.* (2005) conducted model runs incorporating several different ages to maturity, but 10 years to maturity produced the best fit to the time series of data available to them.

The KRRT should rerun models using data time series updated through the 2006 nesting season, and incorporating ranges of parameter values, and include results in the revised plan, along with descriptions of the models, input time series of data, parameters, and outputs.

5. Estimate the relative contributions of annual hatchling production and post-1990 reductions in benthic stage mortality to the rate of increase in annual number of nests in Tamaulipas, and examine the cost-effectiveness of these two conservation approaches.

Rationale - One consequence of the observed exponential increase in annual number of Kemp's ridley nests in Tamaulipas is enhanced interest in determining which of several conservation approaches

produced this increase, as well as the relative cost-effectiveness of each. This was among topics explored by a project (http://www.nceas.ucsb.edu/fmt/doc?/frames.html) initiated in 2000 and aimed at developing new approaches to assess the Biggest Bang for the Buck in management alternatives for endangered species, including Kemp's ridley (Selina Heppell pers. comm). I have seen an early draft of the assessment for Kemp's ridley, which may eventually be published (Mark Plummer, pers. comm.). Its findings could be very useful to the KRRT.

Following the February 2006 stakeholders meeting, I developed a simple method to estimate relative contributions of (a) annual production of hatchlings in Tamaulipas, and (b) post-1990 reductions in benthic stage mortality, to the annual rate of increase in number of nests, using results from age-based modeling. Note that the TEWG (1998, 2000) and Heppell *et al.* (2005) incorporated a post-1990 multiplier, representing reduction in benthic stage mortality, to force model-estimated annual numbers of nests to track closely with actual annual numbers of nests in years following 1990. Note that reduction in post-1990 benthic stage mortality could encompass mortality reductions associated with all threats listed in Table 6-2 in CSTC (1990), and any additional ones that may be listed by the KRRT in the revised plan. Of primary interest among these is reduction in mortality due to turtle excluder devices (TEDs) in shrimp trawls. Contribution of the post-1990 mortality reduction to the estimated rate of increase in nests can be viewed as an upper limit or boundary for the influence of TEDs.

Two annual rates of increase (expressed in %) in nests can be estimated with an age-based model, one with and one without the post-1990 reduction in benthic stage mortality included. Heppell *et al.* (2005) estimated the mean annual rate of increase in nests during 1988-2003 at 14.9 % with the post-1990 multiplier included, but unfortunately, they did not report a rate estimated with the post-1990 multiplier excluded from the model. Earlier, Selina Heppell (pers. comm.) estimated the rate with the post-1990 multiplier included in the model to be 14 %, and the rate without the post-1990 multiplier included to be 5.7 %. Using these results, I calculated the relative contribution of hatchling production alone to be 5.7 %/14 % = 0.407, or 40.7 % (Table 1). The corresponding contribution of the post-1990 multiplier alone was 100 % - 40.7 %, or 59.3 %. The KRRT could use a similar approach on data updated through 2006. It should be especially interesting to see what effects female-biased sex ratios have on the magnitude of the estimated post-1990 multiplier.

I also decomposed the relative contribution of the post-1990 effect into its component parts, using as multipliers the geometric mid-points of mortality class intervals (Table 1), based on mortality categories listed in Table 6-2 in CSTC (1990). I simply multiplied the relative contribution of the post-1990 effect (59.3 %) by the geometric mid-point for each mortality class interval. The reduction in mortality associated with shrimping was the largest single contributor (51.6 %). The KRRT could use a similar approach with updated data and parameter ranges.

6. Caution should be exercised in imposing arbitrary limits on the number of nests protected annually in Tamaulipas.

Rationale - In 2005 and 2006, nests protected on Tamaulipas beaches exceeded 10,000. Annual reports to USFWS covering Tamaulipas operations for years 2000-2005 (provided by Jaime Peña, Gladys-Porter Zoo, Brownsville, Texas) stated: "Clearly we are going in the right direction but we cannot diminish our present effort if we are to succeed." That "present effort" has been increasing exponentially with the exponential increase in nests laid on Tamaulipas beaches (Heppell *et al.* 2005), but resources supporting that effort are not limitless.

The TEWG (1998, 2000) and Heppell *et al.* (2005) considered arbitrary limits on nests protected in beach corral hatcheries, by simulating effects of such limits on annual rate of increase in nests in Tamaulipas. Nests not protected in beach hatchery corrals were assumed to be left in situ. Before arbitrary limits are imposed on numbers of nests protected in Tamaulipas, further studies should be conducted on hatchling production of nests left in situ. Currently, only 3-4% of the total nests per season in Tamaulipas are left in situ, and hatchling production from these nests appears very low. Eggs left in situ are still stolen by human poachers or destroyed by predators, parasites, tides, etc., as was the case before Mexico's government began its beach protection operations in 1966. For four decades, standard practice has been to transfer eggs to beach corral hatcheries to protect them, and to protect hatchlings during their crawl to the surf. Leaving large numbers of nests in situ does not appear to be a good recovery option for Kemp's ridley, unless in situ nest receive greater protection than they do at present. Leaving all or a large portion of nests in situ, could substantially diminish hatchling production and rate of recovery, and other conservation measures alone might not be adequate to recover and maintain the species.

An exponential increase in annual number of nests is observed even when no post-1990 multiplier is included in the age-based model (Heppell *et al.* 2005). This suggests that restored and enhanced annual hatchling production alone (through beach protection and corral hatchery operations in Tamaulipas) more than compensated the detrimental impacts of all threats before TEDs were required. Later, TEDs and other factors reduced mortality in large juveniles, subadults, and adults, thus accelerating the rate of increase in nests after 1990 (Heppell *et al.* 2005).

It is puzzling why there is reluctance to give credit for the reversal of the decline in the Kemp's ridley population to beach protection and corral hatchery operations in Mexico (see Heppell *et al.* 2005). TED regulations were implemented in the late 1980s, yet signs that the downward trend in nests and nesters had slowed then reversed were evident earlier (seaturtle.org/mtn/special/MTN_Kemps.pdf). This is not to say that additional efforts, such as the requirement for TEDS, that mitigate detrimental impacts from other major threats should be diminished or discontinued. Although major anthropogenic threats to Kemp's ridleys have been assuaged, they have not been eliminated.

The growth curve for annual number of nests in Tamaulipas will eventually reach an inflection point, either before or after Kemp's ridley is downlisted to threatened from endangered status. Peter Pritchard (pers. comm.) suggested that the inflection point in this growth curve will be reached at a much higher population level than would have occurred naturally, because (a) beach corral hatchery operations result in much higher production of hatchlings than in situ, and (b) most density-dependent destruction of eggs by nesters during future arribadas is avoided in beach corral hatcheries. Eventually, natural limitations on population growth

will be imposed by environmental carrying capacity. To date, there is no evidence that density-dependent influences have slowed the rate of increase in nests. If limits are imposed on numbers of nests protected, whether arbitrary or driven by limitations of available resources, this could postpone recovery of the species, as compared to status quo conservation practices in Tamaulipas and elsewhere.

7. Proposed methods for ranking threats should be reconsidered and revised.

Rationale - There was an early focus by the KRRT on use of reproductive equivalents (REs) as multipliers in ranking threats. REs suggest that adults are relatively more important to recovery than eggs or hatchlings. Focus was shifted from REs to reproductive values (RVs) by the second stakeholders meeting in Houston. Although both REs and RVs provide indices of relative importance of various life stages, calculations of RVs and REs differ. The KRRT distinguished REs from RVs as follows: REs were scaled to adults, with 1 adult=400 hatchlings, and RVs were scaled to hatchlings, with 40-50 hatchlings=1 adult. The KRRT should reconsider use of RVs in ranking threats, because this risks giving a false impression that protecting eggs and hatchlings on nesting beaches is not as important as protecting larger life stages to recovery. Protecting all life stages is essential to recovery.

The threats ranking approach presented by the KRRT at the February 2006 meeting involved age-based model-generated RVs multiplied by logarithms of the arithmetic mid-points between lower and upper limits of annual mortality class intervals for each threat. Stakeholders at different meetings voiced reservations about this approach (see minutes posted at http://www.fws.gov/kempsridley). RVs are based on mortality rates, and the logarithmic multipliers are derived from mortality ranges for threat categories, so multiplication of RVs by the logarithm of such arithmetic mid-points seems redundant. Also, "extremely skewed" sex ratios affect age-based model estimates of REs [and, likely, RVs as well], but the threshold level of skewness that affects such estimates was not defined by the KRRT (see KRRT meeting minutes, 24-25 October 2002, posted on the web site).

In any case, use of logarithms of mortality levels to rank threats to each life stage could be problematical for other reasons. First, the original mortality scale, expressed in annual numbers of deaths (*e.g.*, Table 6-2 in CSTC 1990), better represents actual mortality than does a logarithmic transformation of deaths. Although logarithms provide a kind of "Richter scale" of threat severity, used as multipliers, they distort the actual numbers of deaths. Also, the arithmetic mid-point of annual mortality class intervals does not adequately represent the central tendency of mortalities in these intervals. Instead, the geometric mid-point is a statistically better estimator of the central tendency than an arithmetic mid-point. The antilog of the mid-point between logarithms of lower and upper limits of each mortality category is the geometric mid-point for the category (Table 1). If mortality-based multipliers are to be used in ranking threats, the geometric mid-points would be superior to logarithms as multipliers. If the mid-points between logarithms of mortality limits were used as multipliers, the threat due to shrimp trawling would not appear to be much greater than other threats (*i.e.*, logarithms convert exponential scale to linear scale). Finally, I recognize that annual mortality levels shown in Table 6-2 in CSTC (1990) are no longer applicable, especially with regard to mortality due to shrimp trawling, because TEDs allow escapement of sea turtles caught in trawls, and shrimping effort and shrimping fleet size in the Gulf of Mexico are declining due to rising fuels costs and competition from imported shrimp.

The pre-TED reversal of the downward trend in nests in Tamaulipas prior to implementation of TED regulations should be emphasized in the revised plan, in the context of evaluating and ranking threats. TEDs and all other measures that reduce mortality in benthic stages do not produce eggs or hatchlings, so they contribute to future generations of Kemp's ridleys only by saving some of the turtles produced from eggs. There are many threats to all Kemp's ridley life stages, but they all pale in comparison to the impacts of reducing or discontinuing protection of nesters, eggs and hatchlings in Tamaulipas before the species has recovered.

8. Use of Hildebrand's (1963) point estimate of the 1947 arribada as a benchmark for establishing recovery goals and criteria should be reconsidered.

Rationale - The recovery plan (USFWS and NMFS, 1992) established criteria for downlisting Kemp's ridley from endangered to threatened status. Included among these criteria is a threshold of "10,000 females nesting in a season" that must be reached before Kemp's ridley can be considered only threatened. According to Richard Byles (pers. comm., during TEWG deliberations in 1998, Miami, Florida), this threshold was calculated as 25% of an estimated 40,000-nester arribada (Hildebrand 1963), based on a movie made at Rancho Nuevo by Andres Herrera on one day in June 1947. This arribada size estimate has been used often as a benchmark from which to gauge population trends and status, without question as to its validity (Caillouet 2000b). Dickerson and Dickerson (2006) reexamined Herrera film images and concluded that the 1947 arribada "may have been overestimated due to the limited capabilities at the time for image analyses." Their "best" estimate appeared to be 5,746 nesters in the 4-hr period during which Herrera filmed the arribada (Dickerson and Dickerson, 2006)

Carr (1977) presented "nesting arrival" (=arribada) numbers for 1970 (2,500 nesters) and 1974 (1,200 nesters), as well as for 1947. Frazer (1986) estimated "around 3,000" (actually 2,940 by my recalculation) Kemp's ridley nesters in the 1947 season at Rancho Nuevo, using data from 1978-1985 (Woody 1985). Using the same data on nests, and 2.5 nests per nester per season, I recalculated nesters in 1947 to be 1,529. Given the extremely low nest numbers during 1978-1985, Frazer's (1986) back-calculation likely underestimated the number of nesters in 1947.

As an alternative, I back-calculated nesters in the 1947 season, using annual numbers of nests (TEWG 2000) at Rancho Nuevo during the 1966-1977 seasons. This period encompassed the earliest available data and the rapid decline in nests that preceded implementation of the joint Mexico-U.S. restoration and enhancement program (Woody 1989). Coding the years 1947=0, 1948=1, 1949=3...1977=30, I fitted the following linear regression (r^2=0.966) to ln(nests) versus coded year:

$$ln(nests) = 12.0866 - 0.1769(coded\ year)$$

From this, I estimated the number of nests (= $e^{12.0866}$) in 1947 at 177,478, which is equivalent to 70,911 nesters (*i.e.*, 177,478/2.5).

Source	Mortality class interval	Geometric midppoint of class interval	Proportion of mortality reduction	% contribution
Annual hatchling production				40.7
Post-1990 mortality reduction				59.3
Shrimp Trawling	500-5000	1581.14	0.8695	51.6
Other Fisheries	50-500	158.11	0.0870	5.2
Dredging	5-50	15.81	0.0087	0.5
Collision with boats	5-50	15.81	0.0087	0.5
Oil rig removal	5-50	15.81	0.0087	0.5
Power-plant entrainment	5-50	15.81	0.0087	0.5
Directed take	5-50	15.81	0.0087	0.5

Table 1. Estimated percentage (%) contributions of annual hatchling production and reductions in benthic stage mortality to the rate of increase in Kemp's ridley nests in Tamaulipas, Mexico

My back-calculated point estimate is of the same order of magnitude as Hildebrand's (1963), but larger (as would be expected) because it represents the entire nesting season rather than a single arribada. All these back-calculations assume static rates of decline, an assumption that cannot be tested. Interestingly, the absolute value of the estimated annual rate of decline (17.7 %) in nesters during 1966-1977 is less than 3% higher than the mean annual rate of increase (14.9%) in nests estimated by Heppell *et al.* (2005) for years 1988-2003.

The KRRT should reconsider the Hildebrand (1963) arribada estimate for 1947, in the context of more recent estimates (*e.g.*, Dickerson and Dickerson, 2006). Continued use of Hildebrand's (1963) estimate as a benchmark from which to gauge Kemp's ridley recovery, or for setting downlisting or delisting criteria is questionable.

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Guest Editorial: Sea Turtle Subpopulations and the IUCN Red List: A Complementary Role for Conservation Genetics

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A recent MTN editorial discussed categorization of marine chelonians on the IUCN Red List of Threatened Species (Mrosovsky 2006), commenting on genetic research in reference to the subpopulation status of Mediterranean green sea turtles (*Chelonia mydas*). Until recently, these turtles were considered a Critically Endangered subpopulation (IUCN 2004). However, due to a lack of supporting documentation (Mast *et al.* 2006), they are no longer listed separately from the species as a whole (IUCN 2006). Mrosovsky (2006) comments on conservation priorities and Red Listing of broadly distributed taxa, issues with potential ramifications for sea turtle conservation worldwide (Broderick *et al.* 2006a; Mrosovsky 2004; Seminoff 2004). The purpose of this article is to stimulate discussion of questions raised, rather than answered, by Mrosovsky (2006) about the role of conservation genetic research in subpopulation Red Listing. Addressing these is one way of enhancing transparency and objectivity in the listing process. These important and potentially controversial issues stem from the IUCN definition of a subpopulation, and its applicability to sea turtle rookeries:

> "*Subpopulations are defined as geographically or otherwise distinct groups in the population between which there is little demographic or genetic exchange (typically one successful migrant individual or gamete per year or less)*." (IUCN 2001)

Background

Female sea turtles tend to return to their natal regions to nest (reviewed in Miller 1996), while less is known about breeding males. Early demographic studies uncovered the striking nest site fidelity of many females (reviewed in Miller 1996). Subsequently, maternally inherited mitochondrial DNA (mtDNA) research demonstrated the isolation of many rookeries or rookery groups, supporting Carr's (1967) natal homing hypothesis (reviewed by Bowen & Karl 1996). Analysis of male and female mtDNA from Australian green turtle breeding areas reveal similar and significant levels of population structure, indicating philopatric behavior in both sexes (FitzSimmons *et al.* 1997a). Tagging and telemetry data also suggest fidelity of green sea turtle males to courtship sites, at least in some locations (Balazs 1980; Dizon & Balazs 1982; Limpus 1993). Biparentally inherited non-protein coding nuclear (nDNA) markers such as microsatellites, however, indicate there may be gene flow among breeding populations. In green sea turtles, gene flow is thought to occur during spatially overlapping reproductive migrations (FitzSimmons *et al.* 1997a; 1997b), and may be mediated by males (Karl *et al.* 1992; Roberts *et al.* 2004). Even so, most green sea turtle rookery pairs in Australia are significantly differentiated in microsatellite as well as in mtDNA analyses (FitzSimmons *et al.* 1997a; 1997b). Recent preliminary research examining microsatellite loci in various sea turtle species suggests there may be significant differentiation among several rookery pairs in these analyses as well (Formia & Bruford in press; Carreras *et al.* 2006; Dutton 2006; Naro-Maciel 2006; Carreras *et al.* in press). Whether the levels of genetic differentiation elucidated in ongoing studies will meet current IUCN subpopulation criteria in some cases, however, is presently an open question.

1. Which lines of evidence are to be considered in Red Listing sea turtle subpopulations?

Genetic, mark-recapture, and satellite telemetry data are important sources of information about linkages among sea turtle populations. Although previous studies have illuminated relationships among many groups, all of these methods are impacted to some extent by biological, logistical, or analytical constraints. Tagging studies do not indicate the route taken by the turtle, and may be affected by tag loss, monitoring intensity, sample size, and other factors. Tracking research is often limited by small sample sizes or data quality issues. Certain commonly employed genetic estimates of population subdivision and numbers of migrants may suffer from lack of resolution or rest on unmet assumptions (Bossart & Prowell 1998; Pearse & Crandall 2004). Although new approaches are being developed to address such issues (for example Beerli 1998; Pritchard *et al.* 2000), these often come with their own sets of assumptions and constraints. An integrated approach considering results of demographic and tracking research is therefore recommended when interpreting genetic data (Dutton *et al.*2002).

The necessity and relative importance of insights from different fields in Red List categorization can vary. The subpopulation definition above refers to "geographically or otherwise distinct groups …between which there is little demographic or genetic exchange," allowing for distinctiveness that need not be genetic. In some cases, subpopulations have been listed despite the need for additional genetic studies (Bearzi 2003). There is also no consensus on the relative importance of nDNA or mtDNA research in Red List categorization of sea turtles. As mentioned above, differentiation among rookeries is less pronounced in nDNA than in mtDNA analyses, possibly due to the homogenizing influence of gene flow detectable at nuclear loci. Thus, estimates of rookery isolation using microsatellites are less likely to meet the IUCN definition. Even so, and while not specifically referring to the Red List, Bowen *et al.* (2005) consider that "Male-mediated gene flow does not detract from the classification of breeding areas as independent populations" (p. 2398). Mrosovsky (2006), on the other hand, finds the relatively low levels of differentiation suggested by non-protein coding nDNA to be more important in IUCN subpopulation listing than the isolation indicated by mtDNA. However, if results among markers do conflict an essential first step should be to determine whether additional work is needed specifically to address issues of

IUCN subpopulation Red Listing. With improving methods and technology, increased sample sizes, additional markers examined, and more sites included, apparent conflicts may be lessened or clarified in subsequent research.

2. To what extent do sea turtle breeding populations worldwide qualify as IUCN Red List subpopulations?

While philopatric behavior tends to isolate rookeries, does gene flow homogenize them enough that they fail to meet the currently accepted IUCN subpopulation definition? Does the only sea turtle subpopulation ever to appear on the IUCN Red List separately from the species in fact meet these criteria? To address these questions, a complete compilation of all pertinent information, including mark-recapture, satellite telemetry, and genetics, is an essential first step. Supplementary research specifically designed to address the question of IUCN subpopulation status may also be required. A regional assessment of green sea turtles in the Mediterranean is currently underway, and may provide the necessary justification for relisting (Mast *et al.* 2006). For now, consideration of readily accessible data about these turtles, which may not be comprehensive, indicates all females tracked after nesting in Cyprus have remained inside the Mediterranean (Broderick *et al.* 2006b; Godley *et al.* 2002). Differentiation of Cyprus from Atlantic rookeries is indicated by the unique nature of the mtDNA haplotypes, to date found only in the Mediterranean, and significant pairwise estimates of population subdivision in mtDNA analyses (Encalada *et al.* 1996; Kaska 2000). A comprehensive global study of four microsatellite loci, however, reports male-mediated gene flow among many rookeries (Roberts *et al.* 2004). This research also focuses on the molecular evolutionary history of these markers, detecting possible deviations from commonly assumed models of evolution (Roberts *et al.* 2004). These findings underscore the need for further attention to methodological and historical issues in ongoing microsatellite analyses.

3. Is the IUCN subpopulation definition inappropriate for sea turtles?

Lastly, the appropriateness of the IUCN subpopulation definition was questioned for sea turtles due to their life history characteristics by Mrosovsky (2006): "… it is assumed that in the definition of a subpopulation given above, for slowly maturing species with a long generation time, to base genetic isolation on one or fewer migrants or gamete exchanges per year is inappropriate… Most accounts of differentiation of populations use gamete/migrant exchange per generation" (p. 2). While these estimates, particularly in genetic analysis, do in fact tend to be given per generation, changing the definition without correspondingly increasing the numbers of migrants allowed would make subpopulation qualification more difficult. Despite possible shortcomings of the IUCN definitions for sea turtles (Mrosovsky 2004; Seminoff 2004; Mrosovsky 2006), Red List criteria are designed "to provide an explicit, objective framework for the classification of the broadest range of species according to their extinction risk" (Introduction, Section 1, IUCN 2001). The IUCN also states "[t]here is sufficient range among the different criteria to enable the appropriate listing of taxa from the complete taxonomic spectrum, with the exception of micro-organisms" (Preamble, Section 1, IUCN 2001). In light of the comprehensive nature of the IUCN Red List and its intended applicability across taxa, any proposed changes to the subpopulation definition for sea turtles should at the very least take into account similar decisions made by other specialist groups, and be considered within the larger context of the IUCN goals.

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Commentary: What is a Subpopulation?

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The editorial by Naro-Maciel & Formia (MTN 114: 6-8) is a welcome sign that red listing is currently receiving serious and informed airing in the sea turtle community. With respect to the status of green turtles in the Mediterranean, it is noticeable that the "preliminary research" suggesting that turtles in this region might qualify as an IUCN subpopulation and "may be" distinct, is supported with in press references and publications much more recent than the 1996 red listing as a subpopulation. That listing occurred without distribution of documentation to the membership of the MTSG, and without the opportunity for widespread discussion. In that context especially, but in general too, Naro-Maciel and Formia are surely right that a "complete compilation" of pertinent information is an essential first step for delineating what qualifies as a subpopulation. But what is meant by a subpopulation in IUCN's system? I have been trying for more than a year to obtain clarification from IUCN on the use of generations versus spans of a year for assessing genetic interchange. According to my latest information, some revision of their definition of subpopulation, or some additional guidelines for its use, may soon appear on the IUCN website. But do not count on it: IUCN have been known to take longer to do things than they first say.

Transatlantic Migration of Juvenile Loggerhead Turtles (*Caretta caretta* L.) from the Strait of Gibraltar

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One of the most important nesting population of the loggerhead turtle (*Caretta caretta* L.) in the Atlantic Ocean is situated in the southeastern coast of North America, with a main nucleus located in the Florida Peninsula (*e.g.* Dodd Jr 1988; Ehrhart *et al.* 2003). Hatchlings produced on these beaches migrate to the eastern Atlantic helped by the current systems (Carr 1986; Bolten *et al.* 1992b; Bolten 2003), while the oceanic small juvenile stage of these individuals occurs in the waters off Azores, Madeira and the Canary Islands (Bolten 2003). Larger juvenile loggerheads return to their natal areas in the western Atlantic with an average size of approximately 50 cm SCL (46-64 cm SCL, or 6.5-11.5 years, as reported by Bjorndal *et al.* 2000), where they enter a neritic juvenile stage before reaching maturity (Bolten 2003).

Another important nesting loggerhead population is found in the eastern Mediterranean Sea (Greece, Cyprus and Turkey) (Margaritoulis *et al.* 2003). Oceanic juveniles from this population are distributed all along the Mediterranean basin (Margaritoulis *et al.* 2003). The Strait of Gibraltar separates the Mediterranean Sea from the Atlantic Ocean. Migratory flux of loggerhead turtles near and through this strait has been reported in both directions (Camiñas 1997; López-Jurado & Andreu 1998; Margaritoulis *et al.* 2003). Thanks to this connection, the Atlantic and Mediterranean loggerhead populations share developmental habitats in the western Mediterranean (Margaritoulis *et al.* 2003) and in the northeastern Atlantic.

Oceanic juvenile turtles tagged in the eastern Atlantic have been reported off the North American coast (Bolten 2003), and likewise, individuals from the American coast have been recaptured in the eastern Atlantic and the Mediterranean Sea (Bolten *et al.* 1992a,b; Margaritoulis *et al.* 2003). Nonetheless, over the last years, satellite tracking has been the technique of choice for many researches to more accurately describe migration routes and the feeding grounds of sea turtles.

We used satellite telemetry to monitor the migration movements of juvenile loggerhead turtles in the Strait of Gibraltar, an area considered to be very important for the migration of this species (Camiñas 1997;). We fitted satellite-linked transmitters (PTTs) to two juvenile loggerhead turtles, named Centella and Malagueña, that were released in the Atlantic side of the Strait of Gibraltar, one in July 1999 and the other in July 2000. Both animals had suffered injuries related to incidental capture by fishing hooks and were successfully rehabilitated in the Threatened Marine Species Rehabilitation Centre of Fuengirola in Málaga, Spain (Table I). The transmitters used were Telonics ST-10 (Mesa - Arizona, U.S.A.). These transmitters were 100 x 48 x 20 mm in size and 190 g in weight. Neither PTT exceeded 5% of the turtle's body weight (Aldridge & Brigham 1988). The transmitters were deployed following the procedures proposed by Balazs *et al.* (1996) and by Dr. Alan Bolten (*pers. comm.*). These PTTs provided only location data; both PTTs were set with an 8 hours on/40 hour off transmission cycle.

Name	Malagueña	Centella
Argos ID	12953	12957
SCL (cm)	65.3	57.0
Mass (kg)	n/a	29.5
Capture date	07 Sept, 1998	09 Feb, 2000
Capture cause	Hook (flipper)	Hook (esophagus)
Release date	18 July, 1999	15 July, 2000
Days in captivity	314	157
Release location	Chiclana (Cádiz)	Tarifa (Cádiz)
	36.25°N, -6.09°W	36.01°N, -5.37°W
Last transmission	08 Jan, 2000	02 June, 2001
Duration of PTT (days)	174	322
No. Transmissions	65	194
Km from release site	4,405.6	4,795.5
Min. distance travelled (km)	4,652.7	7,111.6

Table I. Biometric data of the loggerhead turtles released and performance of their transmitters.

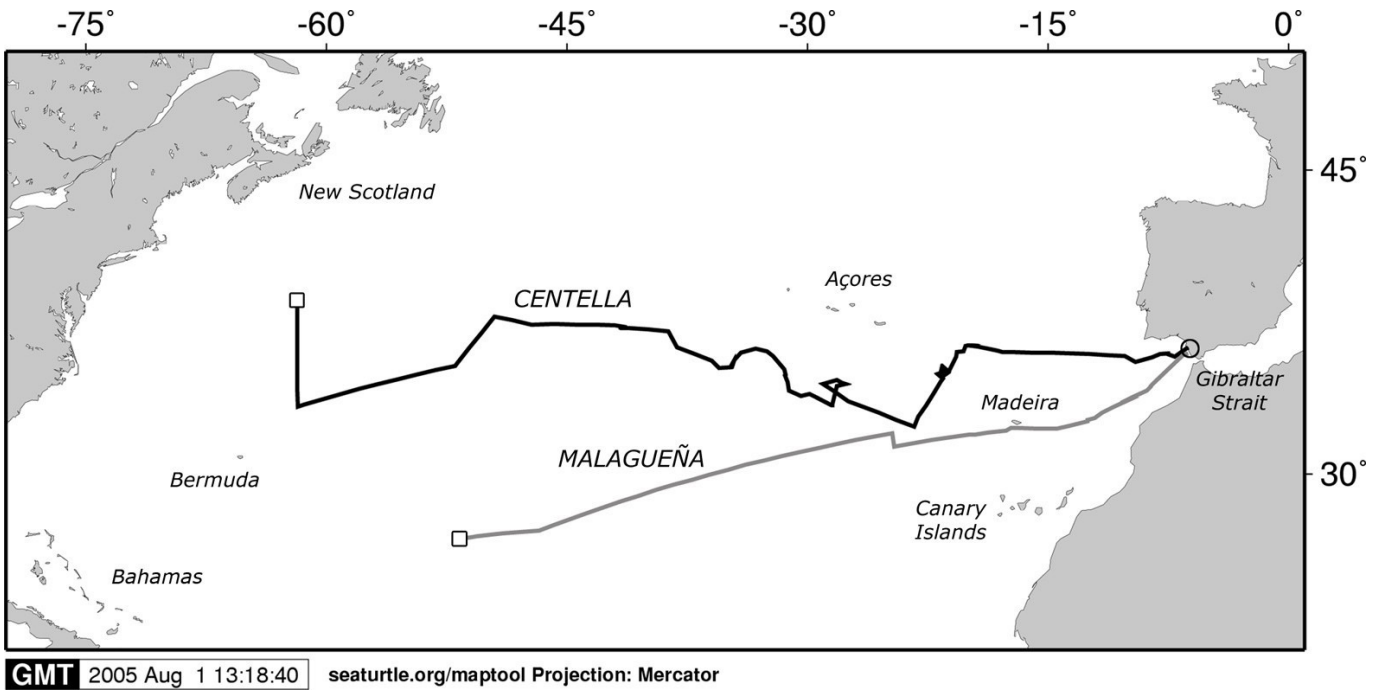

Figure 1. Migratory routes of two juvenile loggerhead turtles released with satellite tags (Centella, black line; Malagueña, gray line). Circle shows the release location, and squares show the last location for each transmitter.

The transmitters successfully sent location data for six to ten months (Table I). We filtered the data by discarding all positions with a location class B (ARGOS 1996) as well as those corresponding to transit speed of > 5 km/h (Godley *et al.* 2003). We did included positions with location class A, as suggested by Hays *et al.* (2001), since they were apparently quite accurate in our study turtles. Most location points included in the analysis were location classes 1, 0 and A.

Following release in the Strait of Gibraltar, both turtles headed westwards. Centella travelled 4795 km, going 344 km off northeast Bermuda and transmitted its last location at approximately 950 km off Nova Scotia, Canada. Mean latitude for this movement was 35.6º N (Fig. 1, black line). Malagueña moved in a similar fashion, but at a lower latitude and in a southwest direction (towards the Bahamas). It stopped transmitting 4405 km far from the release site, at latitude 32.6ºN (Fig. 1, gray line). Centella travelled at a mean maximum speed of 1.3 km/h (SD = 1.30, N = 67) and Malagueña at 1.4 km/h (SD = 1.21, N = 21). There were no significant differences between the mean maximum speed of both turtles ($X^2 = 0.92$, df = 1, p = 0.33).

There are several reports of transatlantic migrations of flipper-tagged loggerheads (*e.g.* Bolten et al. 1992a). Nonetheless, satellite tracking data of our study individuals provide more detailed information on the migration route followed, as well as the time and speed employed. Although the transmitters failed before the turtles likely reached a final destination, this is one of the few published records of east-west Atlantic migration of loggerheads using satellite telemetry (see Bolten *et al.* 1996). Centella's last location was along the 40º N parallel, in late spring. It is possible that this turtle was traveling to the foraging areas off the coast of northeastern North America (Ehrhart *et al.* 2003). In contrast, Malagueña was located at a lower latitude when its transmitter failed in December, suggesting it was moving to warmer zones. It should be noted that both turtles were held in captivity for several months, and thus their behavior after release might have been affected. Nonetheless, the injuries for which these turtles were admitted to the rehabilitation centre were judged slight.

The transatlantic movement of both turtles was carried out counter to the prevailing currents in the North Atlantic (Lópes-Ferreira 2005), though a more detailed analysis could reveal small scale currents that may have helped these turtles in their migration. It is likely that warm surface counter-currents occur during the summer time. Both sea turtles traveled at similar swimming speeds, suggesting that they could have been affected by the currents in the same way.

The two turtles tracked in this study fall within the stage that Bolten (2003) defined as the oceanic-neritic transition. The mean size of loggerheads found in the Strait of Gibraltar is similar to that reported from the Canary Islands (50 cm SCL, A. Liria, *in prep*.) and the coast of Morocco (Benhardouze 2004). Because of their size, there is a possibility that these two tracked turtles belonged to the group of loggerhead turtles that spend part of their oceanic stage in the western Mediterranean Sea. Note that there appears to be an influx of loggerhead juveniles from the Mediterranean to the Atlantic in warm summer months, starting in July (Camiñas 1997), when these two turtles were released.

The different latitudes of the two migration routes may reflect that the turtles belong to different sub-populations. It may also be the case that there is no tightly defined migration corridor from the eastern to western Atlantic; rather, the trajectories undertaken reflect not only the prevailing marine currents but also other factors such as time of year, local currents, and the final destination (neritic habitat). Regardless of the reasons, the variation in migration routes highlights a conservation concern related to incidental capture by

fisheries. Both study turtles traversed an area near the fishing grounds off Madeira and Azores, where the impact of fishing activities on sea turtles is considered to be serious (López-Ferreira 2005).

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On the Occurrence of Columbus Crabs (*Planes minutus*) from Loggerhead Turtles in Florida, USA

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Columbus crabs (Genus *Planes*) are well-documented epibionts of loggerhead turtles (*Caretta caretta*), particularly the species *P. minutus* from juvenile or oceanic-stage loggerheads (Dellinger *et al.* 1997; Frick *et al.* 2004). A recent study by Carranza *et al.* (2003) reports data concerning *P. minutus*' congener *P. cyaneus* from oceanic-stage loggerheads from Uruguay. The remaining recognized species of Columbus crab, *P. marinus*, has never been observed as an epibiont of any sea turtle species.

To date, there is a paucity of data concerning the association between *P. minutus* and neritic-stage (subadult and adult) sea turtles. That is, such observations simply report the occurrence of *P. minutus* as an epibiont with no supporting biological or ecological information regarding the observed relationship. Here, we report the occurrence of *P. minutus* as an epibiont of large, immature and adult loggerhead turtles from St. Lucie County, Florida, USA. We also report behavioral, ecological and physical data from *P. minutus* and we discuss how the occurrence of *P. minutus* from this population of turtles can be used to elucidate some aspects of the behavior of loggerheads from Florida during the winter and early spring.

Collections for this study began in March of 2002 and ended in April 2003. Loggerheads that hosted *P. minutus* were encountered from March - April 2002, and from December 2002 – April 2003, after turtles were incidentally entrained into intake canals at the St. Lucie Nuclear Power Plant (SLNPP). The SLNPP is located on Hutchinson Island in St. Lucie County, Florida and draws cooling water from the Atlantic Ocean through three large diameter pipes (3.9 - 4.9 m). Cooling water then flows into a 1500 m long intake canal. The structures housing the intake pipes are 365 m offshore in approximately 7 m of water. The pipe openings are vertically oriented and are situated 3 m above the ocean floor. A large velocity cap sits approximately 2 m above each pipe opening and extends more than 3 m beyond the pipe diameter. Turtles encountering these structures are often transported into the intake canal where they are captured with tangle nets, dipnets and by SCUBA divers. Morphometric data are collected from each turtle, tags are applied to both front flippers and turtles are returned to the ocean approximately 750 m north of the canal.

From March 2002 through April 2003 594 loggerheads were captured at the SLNPP. Of these turtles, 22 individual loggerheads (mean straight carapace length (SCL) = 74.6 ± 3.4SD cm, range = 65 – 105.6 cm) hosted 28 crabs (3.7 % occurrence of *P. minutus*). It should be noted, however, that because collected turtles had been entrained and pulled through a network of pipes before entering holding lagoons, and turtles were subsequently captured using nets, the frequency of occurrence reported for *P. minutus* is likely much higher; as crabs can be dislodged or flee host turtles during entrainment and hand-capture.

Of the crabs collected, all were adults (15 males, 13 females). Six turtles hosted heterosexual crab pairs (27.3 %) and 16 turtles hosted crabs as singletons (72.7 %). Only one female crab was not ovigerous. Ovigerous crabs carried eggs pertaining to stages 1 (50 %), 2 (16.7 %) and 3 (33.3 %) as defined by Hartnoll (1963) where stage 1 eggs are eggs of uniform color and even yolk distribution, stage 2 eggs are eggs containing a clear area devoid of yolk and stage 3 eggs are eggs containing pigmented eyespots. Stage 4 eggs (hatching) and stage 5 eggs (hatched or empty eggs) were not observed from this group of crabs.

Male crabs and female crabs were similar in size. The average straight carapace widths (SCW) of males and females, including range, were 11.9 mm (9.1 – 16.5 mm) and 12.9 mm (9.8 – 18.9 mm), respectively. A single non-ovigerous crab, included within the above average for females, was 18.9 mm SCW.

Previous agonistic interactions were apparent in 7 specimens (3 males, 4 females; 25 % of the crabs encountered). Injuries resulting from these interactions included missing chelipeds and walking legs; however, none of these injuries were severe as all crabs had developed leg buds and no crab was missing more than a single appendage. Four injured crabs occurred as singletons upon their respective host turtle and three injured crabs were from heterosexual pairings. No heterosexual pair contained more than one injured crab.

A few points concerning aspects of the natural history of both host loggerheads and Columbus crabs can be gleaned from our data. The morphometric data we present for ovigerous *P. minutus* contain some of the smallest specimens reported for females with eggs. Data from other studies presenting similar information suggest that crabs approximately 11 mm SCW and smaller are juveniles and most often found as *Sargassum* associates (see Chace 1951). These crabs then emigrate to flotsam and turtles at the onset of sexual maturity. Although sexually immature *P. minutus* (9 – 13 mm SCW) can also be found as epibionts of turtles, albeit rarely (Dellinger *et al.* 1997; Frick *et al.* 2004), our data do confirm that some *P. minutus* are capable of attaining sexual maturity as small as 9.1 mm SCW. Moreover, it is possible that juvenile crabs collected from flotsam and turtles in other studies represent sub-adult specimens undergoing the initial stages of sexual maturity.

The relatively low percentage of *P. minutus* from this study bearing injuries from agonistic interactions (25 %) is similar to data presented by Dellinger *et al.* (1997) and Frick *et al.* (2004) for crabs from loggerhead turtles. The same studies also found that *P. minutus* from turtles suffered markedly fewer instances of missing appendages when compared to collections obtained from inanimate flotsam and jetsam. Additionally, the large proportion of ovigerous crabs from our collection coincides with data from Dellinger *et al.* (1997) and Frick *et al.* (2004). Two large collections of *P. minutus* made by Dellinger *et al.* (1997), one from turtles and the other from

inanimate flotsam, demonstrate that female crabs from turtles were brooding eggs more often (71 %) than female crabs from inanimate flotsam (21 %). Dellinger *et al.* (1997) suggest that, given their reported data, turtles appear to offer a substantially better platform for egg brooding and, likely, production than inanimate flotsam. These authors speculate that the higher instances of egg-brooding observed in *P. minutus* from turtles could be attributed to the fact that turtle crabs are likely exposed to better food or a larger variety of food items than those clinging to inanimate flotsam.

A study by Frick *et al.* (2004) determined that turtle crabs do feed upon a larger variety of food items than crabs inhabiting inanimate flotsam. However, the same study found that crabs inhabiting inanimate flotsam contained similar amounts of food, albeit a lower diversity of prey types, as crabs from loggerhead turtles. Moreover, crabs from inanimate flotsam produced similar sizes and numbers of eggs as those from turtles. Yet, Frick *et al.* (2004) did not examine a collection of crabs from inanimate flotsam as large as that examined by Dellinger *et al.* (1997). Therefore, the former study could not offer any supporting evidence that a higher proportion of turtle crabs were brooding eggs when compared to crabs inhabiting inanimate flotsam. Instead, a higher proportion of ovigerous crabs and, consequently, an increased chance of encountering ovigerous crabs from turtles than from inanimate flotsam suggest that multiple annual broods produced by crabs from turtles might be occurring with greater frequency than from crabs inhabiting inanimate flotsam. Because agonistic interactions between crabs on turtles are proportionately lower than agonistic interactions between crabs inhabiting inanimate flotsam (Dellinger *et al.* 1997, Frick *et al.* 2004), crabs from inanimate flotsam would likely experience decreased survival probabilities and reproductive output as energy is diverted from reproduction to repair injuries.

With regard to the life history of host turtles, the occurrence of *P. minutus* from neritic-stage loggerhead turtles suggests that these turtles were exhibiting a great deal of surface-oriented or pelagic behavior prior to their entrainment at the SLNPP; particularly during the winter and early spring. Loggerhead turtles are captured at the SLNPP year-round and turtles that hosted *P. minutus* were encountered in December, January February, March and April 2002 and 2003. As previously mentioned, Columbus crabs cling to most anything that floats. Physically and physiologically, *Planes* are surface-water specialists and these aspects are likely attributable to the colonization of other grapsid species into supra-littoral habitats and maritime forests (Williams 1984).

Although loggerhead turtles inhabiting the western North Atlantic, particularly the southeastern US, are most often referred to as largely benthic-associated animals, dietary studies reveal that some prey items consumed by neritic-stage loggerheads are actually largely pelagic species (*i.e. Aurelia aurita* and *Physalia physalis*; Bjorndal 1997; Frick *et al.* 2001). Moreover, a study by Frick *et al.* (1999) reports several accounts of pelagic foraging by loggerhead turtles during the winter and early spring in Florida, often alongside leatherback turtles (*Dermochelys coriacea*) – a turtle species that is well-documented to spend a great deal of time in the pelagic environment (Bolten 2003). Such observations might indicate why the turtles encountered during the present study hosted a pelagic species such as *P. minutus*. Additionally, surface-active behavior such as courtship and mating that occurs in Florida during the early spring (Frick *et al.* 2000) might explain why large adult-sized turtles (> 80 cm SCL for Atlantic U.S. *C. caretta*; Dodd 1988) sampled during this study (n = 5; 22.7 %) hosted *P. minutus*.

During their first decade of life loggerheads are highly pelagic, particularly within oceanic habitats (water masses away from the continental shelf ≥ 200 m deep; Hedgpeth 1957; Bolten 2003). Such behavior decreases in frequency as turtles migrate from their nursery habitats to the neritic habitats that will support them for the remainder of their life (Musick & Limpus 1997). However, it appears from data collected during epibiont and dietary studies that, while benthic habitats are heavily utilized by neritic stage loggerheads, the pelagic environment still represents an important habitat for loggerheads as they mature, even into adulthood (Frick *et al.* 2001; present study).

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Hawksbill Turtle Tracking as Part of Initial Sea Turtle Research and Conservation at Groote Eylandt, Northern Australia

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Limited sea turtle research has been conducted in the Gulf of Carpentaria in northern Australia because of its remoteness and inaccessibility. Groote Eylandt lies in the north east of the Gulf of Carpentaria and is a large continental island (area of over 2260 km^2) with many smaller associated islands, all of which are Aboriginal owned. The population of 2500 resides in two main Aboriginal communities and in one urban centre associated with mining operations. Green, hawksbill, flatback and olive ridley turtles nest on the main and associated islands (Chatto 1998) and green and hawksbill turtles are resident in the local waters. In 2001 the Anindilyakwa Land Council established an Aboriginal Sea Ranger Unit to manage marine species and their habitats. Sea turtle management was a priority and as part of initial sea turtle research, satellite transmitters were attached to two post-nesting hawksbill turtles. The objectives of the tracking study were to; 1) identify migration paths of two turtles; 2) increase awareness of sea turtle biology and conservation among all residents on Groote Eylandt and 3) increase enthusiasm for management.

Satellite transmitters (PTTs) (KiwiSat 101 – Sirtrack Pty Ltd) were attached using epoxy (Mitchell 1998) to the carapace of two hawksbill turtles immediately after oviposition on North East Island, 12 km NE of Groote Eylandt on 2 August 2005. The turtles were named Numarngainyamba (meaning Cheeky) and Numinuwurrariyaamakilya (meaning Bad Skin) in the local Anindilyakwa language by the Traditional Owners and Sea Rangers. The Argos data were analysed using STAT (Coyne & Godley 2005).

Numinuwurrariyaamakilya remained in the vicinity of the nesting beach for 43 weeks. Her transmitter produced poor results; transmitting for 5 weeks, remaining dormant for 26 weeks and transmitting intermittently for a further 12 weeks. However, the results were sufficient to indicate no long distance migration.

Numarngainyamba made a straight-line post-nesting migration of 600 km (Fig. 1). She remained in the vicinity of the nesting beach for 89 days and laid a further five clutches of eggs (based on renesting intervals of 14.2 days, Dobbs *et al.* 1999). Numarngainyamba then moved directly to the mainland of Australia and followed the coastline northward until she reached a rocky reef area near Maningrida 21 days later. She remained at this location for seven weeks before transmissions ceased. Although this transmitter produced only a small percentage (8%) of good quality (Class 3, 2, 1 – Argos 1996) results, her migration path was easily identified.

This study was the first to track post-nesting hawksbill turtles in Australia and identified the first migration route for an Australian nesting hawksbill outside the rookeries on the east coast of Queensland. This tracking project proved very successful in raising awareness of sea turtle biology and management in the Aboriginal communities on Groote Eylandt through the public interface of STAT (Coyne & Godley 2005). By mapping movements which intersected the hunting grounds of many Traditional Owners, Numarngainyamba's migration clearly demonstrated in a non-technical fashion why sea turtle conservation needs the cooperation of many communities and stakeholders. The rangers have included this message in numerous community talks, presentations to government and local schools, and informally throughout their own communities.

Further, the degree of interest in this project has provided the impetus for the establishment of track, nest and harvest surveys at key rookeries within the Groote archipelago. If maintained, the value of this long-term data, in one of Australia remotest areas, will be a significant, desirable and an unexpected outcome of this tracking study.

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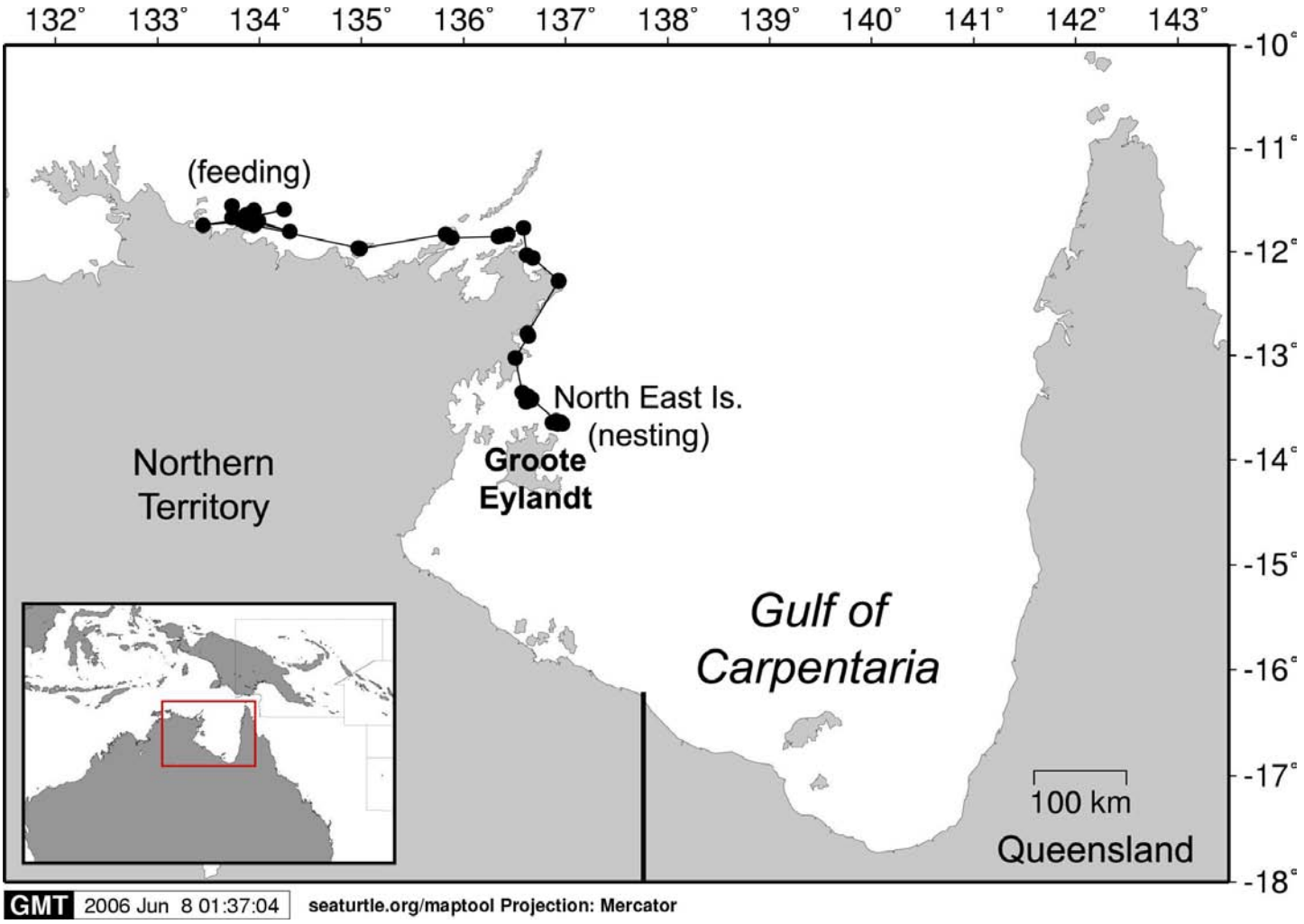

Figure 1. Post-nesting migration route of Numarngainyamba from North East Island, northern Australia in 2005. Map created using Maptool (SEATURTLE.ORG Maptool 2002).

Lower nesting success of flatback turtles caused by disorientation

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Nesting behaviour of sea turtles is stereotyped and typified by turtles making their way directly up the beach, making a body pit, digging an egg chamber, laying their eggs, covering the eggs, scattering sand over them, and returning to the sea (detailed process in another species described by Hendrickson 1958). The physical environment causes deviations to this process when debris and man-made barriers cause nesting attempts to be aborted.

Several hundred flatback sea turtles (*Natator depressus*) nest on Bare Sand Island each year. This rookery is about 50 km west of Darwin in the Northern Territory, Australia, and is typical of the low-energy beaches in the area. The main nesting beach faces west, is composed of fine sand, and rises gently from the low water region to a small primary dune. Wave action is slight but tidal variation reaches 8 metres during spring tides. Winds are a significant influence on beach formation with the southeast monsoon establishing during the dry-season months from May to October, the peak sea turtle nesting period, and the northwest monsoon dominating during the wet season months of November to February.

In 2004 and 2005, the normal nesting behaviour of flatback sea turtles at Bare Sand Island was disrupted by the presence of an intertidal ridge and runnel in the middle of the beach that was exposed at neap tides and low and mid spring tides. The ridge was formed parallel to the strand by natural wind and wave action during the preceding wet seasons. The crest of this ridge varied from 0.3 to 1.5 metres in height above the runnel that filled with water during spring high tides. This ridge and runnel behind it confused and disorientated nesting flatback sea turtles and their hatchlings leading to lower nesting success and higher hatchling mortality.

Nesting sea turtles were monitored nightly for five weeks in each of 2004 and 2005 and their behaviour was opportunistically observed from the edge of the dune vegetation when sufficient moonlight or daylight allowed. On other occasions, the tracks were followed and paths were measured in daylight to minimise potential observer effects on the nesting turtles.

Nesting sea turtles crossed the beach exhibiting typical behaviour similar to green turtles as described by Hendrickson (1958) until they reached the crest of an intertidal ridge. Few turtles would proceed downwards into the runnel before ascending the vegetated dune of the beach (< 5 % during neap and low and mid spring tides), with most turtles zigzagged their way along the crest until ultimately returning to the water without nesting (54.8 % during neap and low and mid spring tides in 2004, n= 31; and 12.2 % in 2005, n= 49). Tidal height and the height of the ridge affected this behaviour. During the neap tides turtles approaching the crest would generally slow their speed noticeably and zigzag along the ridge for as much as 150 m before heading back to the water for a few meters and then turning around to continue their ascent further along the beach. When the spring tide height was greater than 6.6 m water became trapped in the runnel forming a channel along the nesting beach where water remained throughout the day. While there was water in the channel, turtles were not disturbed by the ridge with all turtles having a successful ascent up the beach – exhibiting similar nesting behaviour to that previously observed by flatback turtles at Bare Sand Island during 1996-2003 by nesting on or directly in front of the primary dune. The channelling of water along the beach caused greater erosion that increased the depth of the runnel throughout the season.

All successful nests hatching emerged on the landward side of the ridge causing much disorientation of hatchlings on their path to the water. As hatchlings entered the runnel, their view of the low light horizon was disrupted. Many walked parallel to the shore towards the lower light horizon (using sea finding mechanisms described by Limpus 1971) orientating towards the water at the far end of the beach some 500 m away. Many of the hatchling tracks in the trough terminated at either crab or bird tracks with only a few making their way over the ridge to the waters edge. The persistence of water in the channel throughout the day during spring high tides trapped hatchlings in the channel well into the daylight hours, further increasing their chances of predation and reducing their survivorship (Pilcher & Enderby 2001).

This is the first observation of the formation of an intertidal ridge at Bare Sand Island that is persistent in the dry-season months. The intertidal ridge was more pronounced in 2004 than in 2005, resulting in greater disturbance to sea turtle nesting activity during the 2004 nesting season. After failed nesting attempts, turtles generally came back on subsequent nights and continued attempting to ascend the beach until a successful ascent past the intertidal ridge was made which would generally result in successful nesting. This process often continued until the following spring high tides, when most sea turtles nested successfully. The impact on individual's reproductive output for the season due to this additional energy expenditure is unknown. This intertidal ridge has been present for two subsequent nesting seasons. Long-term effects on the nesting population may occur if the intertidal ridge remains in subsequent years, potentially causing turtles to choose other nesting beaches. This paper shows that beach structure or form has major implications to nesting behaviour and should be considered during any development or beach modification including sand mining and artificial beach nourishment.

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IUCN-MTSG Quarterly Report

Marine Turtle Specialist Group Hosts Third Burning Issues Workshop, August 2006

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Introduction

The MTSG Burning Issues 3 (BI-3) Workshop was convened to revisit, revise, and expand the MTSG's "Burning Issues" priority-setting process, which began at the MTSG Vision and Mission Retreat in December 2003, and continued with the Burning Issues 2 (BI-2) Workshop in August 2005. A group of some 21 MTSG members, hailing from several countries, and including both MTSG Co-Chairs and five Regional Vice Chairs, gathered at the Headquarters of Conservation International in Washington, DC for a period of three days. Through plenary discussions at the meeting and in preparatory discussions by the BI-3 Co-Chairs (A. Bolten, M. Chaloupka, and R. Mast), five main objectives were identified for the BI-3 meeting:

1. Review and validate the BI Mission and progress to date, address concerns voiced by MTSG members, and sketch-out a tentative multi-year work plan;
2. Review progress and procedure for *Red List* assessments and other types of risk assessments and priority-setting techniques;
3. Develop an internet survey tool (and a strategy, timeline and work plan for its use) that will allow the MTSG to regularly access the collective wisdom, knowledge and expert opinion of our far-flung membership;
4. Discuss ways to communicate BI Results broadly;
5. Create a list of "Top Un-Answered Questions/Mysteries" about sea turtle natural history, the understanding of which will better guide conservation and management efforts;

Red Listing and other Assessments

One of our most important mandates from the IUCN is the timely and accurate assessment of all sea turtle species, which is a time consuming, complex and difficult task. For the past 18 months, the MTSG's Red Listing efforts have been spear-headed by Dr. Jeffrey Seminoff, who prior to accepting the post also authored the 2004 Red List Assessment for *Chelonia mydas*. Jeff made a very compelling presentation at BI-3, including a preliminary review of the results of the survey sent to MTSG members several weeks ago. His talk set the stage for a lengthy discussion, from which several important decisions derived concerning the future directions of Red List and other types of priority assessments within the MTSG.

The group concluded, as have other Specialist Groups before us, that managing Red Listing is a greater burden than a single volunteer can handle. As such, the group unanimously agreed upon the need to create an Assessments Steering Committee (ASC). Under the direction of the Co-Chairs, the ASC will assume responsibility for the timely completion of Red List Assessments, and will assure that these documents reflect the highest possible degree of accuracy and scientific rigor, as well as maximum involvement from the MTSG membership. Criteria for participation and composition of the ASC were discussed, and the Co-Chairs have begun the process of establishing this committee. We envision this body being staffed and fully functional prior to the end of 2006.

The ASC will steward a process that begins with the selection of qualified Assessors. These Assessors will prepare preliminary species Assessments based on the IUCN criteria, which the ASC will distribute for peer review by other leading experts. Necessary changes will then be made by the Assessors under the direction of the ASC before each assessment is posted on the MTSG website. Membership will be notified and provided a suitable comment period during which to offer public and/or private opinions, question the Assessors, and hopefully shed light on new data that may be pertinent. Red List species assessments are perhaps the most publicly valuable contribution that the MTSG can make to the conservation of sea turtles, and they must serve as examples of our group's professionalism and commitment.

The ASC will also look into other aspects of priority setting for sea turtle research and conservation, beyond global-scale Red Listing. As such, it was agreed that the MTSG, with guidance from the new ASC, would commit in earnest to undertaking ***regional sea turtle status assessments*** in each of the world's four major ocean basins for sea turtles (Atlantic, Pacific, Indian, and Mediterranean). These exercises will be scheduled with the assistance of the Regional Vice-Chairs, and will also serve as fora for team-building and technical training among our members.

Moreover, it was agreed that the ASC would draft an overview of what some of the most critical assessment and priority setting issues are for sea turtles, including a critical look at why the IUCN Red List Criteria are not perfectly suited to globally ranging, long-lived, slow reproducing creatures, and how complementary assessment methodologies, such as regional assessments, can help to round-out our understanding of sea turtle status. Drs. Kartik Shanker and Jeff Seminoff volunteered to take a lead in producing this overview.

MTSG Member Surveys

The group also discussed the importance of better understanding the nature of our membership and enhancing networking and communications among our some 300 far-flung members worldwide. Discussions centered on the development of an internet survey tool to engage the membership, harness the collective knowledge of the group to identify priorities, and make the BI meetings and outputs more transparent. The group decided that surveys should be performed a few times a year and take no longer than 10-15 minutes

to complete. Surveys should be conducted in English, French, and Spanish. The network of Regional Vice-Chairs will be asked to help ensure participation from members in their region. Each survey will be focused around a general theme, and results will be reported to the respondents and to the entire MTSG as soon as possible after completion. The results of each survey will be used by the MTSG to set priorities, act as an early warning mechanism for crises, and improve the MTSG's ability to achieve its mission. Marketing survey expert, Peter Schireson (of Schireson Associates, www.schireson.com), has agreed to work with the group to implement the survey. During a group teleconference with Mr. Schireson, the group asked a number of questions including, principally: will an internet survey be an effective tool for engaging members?; how can we encourage participation in the survey?; what is the process for constructing the survey?; and, what does Mr. Schireson need from the group in order to construct the surveys?

Following the discussion with Peter Schireson, the group began to develop questions for each survey based on Mr. Schireson's guidance. Throughout the afternoon of Day 2 and morning of Day 3, the group drafted the first two surveys to be reviewed by Mr. Schireson, adjusted, tested, translated, and ultimately sent to the MTSG membership. The BI Working Group set a goal to complete both surveys and have results tabulated and analyzed by the MTSG Annual General Meeting at the 27th Annual Sea Turtle Symposium in Myrtle Beach, SC, USA in February of 2007.

The Major Unanswered Questions of Sea Turtle Natural History

Expanding on the priority-setting efforts of the first two Burning Issues efforts, one of the objectives of BI-3 was to develop a list of "the major unanswered questions about sea turtle natural history, the knowledge of which will help us to better conserve these animals and their habitats." The purpose of this list is to highlight these important questions, and to guide the MTSG membership, students, researchers, conservationists, and donors towards a focus on the highest priority issues in sea turtle conservation. While not exhaustive, the list can be used for many purposes, including public outreach and awareness, and will aid the MTSG in fulfilling our mission.

Prior to the meeting, a survey was sent via email to the entire MTSG membership in English, Spanish and French in order to elicit feedback on what are the most important unanswered questions relating to sea turtle natural history. At the BI-3 meeting, the MTSG member survey responses were (anonymously) compiled and grouped into thematic categories, reviewed for redundancy, and reexamined to create a consolidated list of "Key Unsolved Mysteries." These seven Key Unsolved Mysteries are, in no particular order, as follows:

Where do sea turtles spend their first years of life?
What are the ecological roles of sea turtles, and how many do we need to fulfill those roles?
What proportion of male sea turtles is necessary to maintain a healthy population?
How do sea turtles sense their environment?
How do sea turtles navigate?
How will global warming affect sea turtles?
What causes fibropapillomas?

Meeting Report

The Fifth Reunion of Mediterranean Sea Turtle Specialists at the 26th Annual International Sea Turtle Symposium in Crete, Greece, 3-4 April 2006

Paolo Casale[1], Dimitrios Dimopoulos[2], Mohamed Nada[3], Aliki Panagopoulou[2] & Dimitris Margaritoulis[4]

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[4]IUCN/MTSG, Regional Vice-Chair for Mediterranean, P.O.Box 51154, GR-14510 KIFISSIA, Greece (E-mail: margaritoulis@archelon.gr)

For the first time, an Annual Sea Turtle Symposium was held in the Mediterranean, and this made the Reunion of Mediterranean Specialist an event extremely rich in participation and discussion. About 80 people attended, from 14 Mediterranean countries and from other five countries in Europe, America and Australia. The reunion was held on the 3rd and 4th of April 2006 in the Capsis Beach Hotel, Aghia Pelaghia, Crete, Greece, the same venue of the 26th Sea Turtle Symposium (3-8 Apr 2006; MTN 113:11-13), it was chaired by P. Casale and was structured in the following sessions.

Meeting of LIFE-Nature projects on marine turtles (Day 1) (Chair: A. Panagopoulou; Facilitator: P. Casale).

The meeting was focused on the contribution of LIFE-Nature Projects (co-funded by the European Commission) in sea turtle conservation in the Mediterranean, in particular projects on fisheries interaction with sea turtles. Representatives from different projects were R. Sagarminaga (Spanish Cetacean Society), C. Carreras (Dopana Biological Station –Valencia), C. Giacoma (University of Torino), S. Nannarelli (CTS) and A. Koutsodendris (ARCHELON),

who presented methods to mitigate the consequences of sea turtle's accidental capture in fisheries (*e.g.* use of circle hooks), as well as its strengths and weaknesses. The main conclusions of the meeting were: the project results should be made available to DG Fisheries as well as DG Environment for the implementation of relevant policies; fishermen and their needs should be taken into account while designing policies and mitigation measures.

Panel discussion "*The involvement of local communities in the management of nesting beaches in the Mediterranean*" (Day 1) (Chair: M. Nada).
The discussion aimed at exploring what are the enabling and disabling factors affecting the active involvement of local communities in conservation initiatives. During the meeting, three case studies were presented from Crete, Greece (by A. Petrandonaki), Cephalonia, Greece (by K. Xenopoulou) and Cirali, Turkey (by B. Kutle). The main lesson learned were: community involvement at the different stages of conservation initiatives, along with key government and informal leaders, is a key element in achieving sustainable outcomes; understanding the needs and priorities of each target group is essential for tailoring conservation approaches and entry points; and promoting rights of local communities and other stakeholder should be accompanied with identification of their responsibilities and roles in conservation. The participants concluded that while conservation initiatives are currently acknowledging the importance of community role in conservation, this issue is not thoroughly studied and more emphasis should focus on exploring best practices and documenting lesson learned.

The Mediterranean Rescue Centre Network (Day 1) (Chair: A. Panagopoulou)
As a follow-up of an important conclusion of the Workshop on the Rehabilitation of Injured Sea Turtles in the Mediterranean (Glyfada, Athens 20-22/11/2004 – MTN 108:26), this meeting had as its main objective to move forward with the idea of creating a Network of Rescue Centres in the Mediterranean. During the meeting, everyone agreed that it is important to have communication flow and exchange of experiences and know-how among sea turtle rehabilitation facilities across the region. It was also agreed that although there are tools available such as MedTurtle and the existing communication amongst Rescue Centres it would be useful to create a special webpage hosted by an independent site such as seaturtle.org. A co-ordinating team for its realization was established, comprising of D. Freggi (WWF Italy's Lampedusa Rescue Centre), Y. Levi (Israeli Rescue Centre) and A. P Panagopoulou (ARCHELON).

The current status of sea turtle conservation in the Mediterranean: a country-by-country overview (Day 2) (Chair: P. Casale).
As proposed at the Fourth reunion (MTN 108:22), a special session was dedicated this year to present to the audience an updated situation about turtle conservation and related initiatives in the most important countries for sea turtle conservation. The following persons (mostly MTSG members) gave thoughtful presentations on 16 countries/areas: I. Haxhiu (Albania), B. Lazar (Croatia and Slovenia), W. Fuller (Cyprus, north coast), A. Demetropoulos (Cyprus, south coast), M. Nada (Egypt), A. Panagopoulou (Greece), Y. Levi (Israel), P. Casale & F. Bentivegna (Italy), M. Aureggi (Lebanon), A. Hamza (Libya), M. Aksissou (Morocco), J. Tomas & C. Carreras (Spain), A. Rees (Syria), M. Bradai (Tunisia), F. Demirayak & O. Turkozan (Turkey).

Panel discussion "*The National Marine Park of Zakynthos, Greece*" (Day 2) (Chair: D. Dimopoulos)
The panel comprised T. Arapis (ARCHELON), C. Chryssomalis (Ministry of Environment), D. Karavellas (WWF Greece), K. Katselidis (National Marine Park of Zakynthos) and L. Venizelos (Medasset). Their presentations drew a stark picture of the current status of the NMPZ and the nesting beaches. The lack of political will and the non existence of a national strategy for protected areas in Greece led the Management Agency of the NMPZ to stop its work three years after its establishment. For the next two years it did not operate and only recently has it resumed operation, however with an ambiguous future. The status of the nesting beaches is deteriorating especially that of Daphni which has experienced some severe alterations and the 13 illegal buildings remain in operation flouting existing legislation and all court decisions for their demolition. In the end the body unanimously endorsed a resolution to minimize disturbances of nesting loggerhead turtles by tourist activities on Zakynthos, prepared by ARCHELON and WWF Greece and then submitted to and accepted by the plenary of the ISTS (MTN 113:11-13).

In addition to the above sessions, three presentations (P) were given and two videos (V) projected during the two days:

(P) "*Regional Red Listing of Sea Turtles: A Mediterranean perspective*" (by J. Seminoff).
(P) "*The WWF's Marine Turtle Action Plan for the Mediterranean*" (by P. Casale)
(P) "*The nature of Crete*" (by P. Lymberakis, Natural History Museum of Crete)
(V) Conservation project at Çirali, Turkey
(V) Surgery techniques at the University of Bari, Italy

Letter to the Editors

Dear Editors,

I have enjoyed the "Marine Turtle Newsletter" for as long as it has been published; it has been a stimulating experience for me to see so many familiar names over so many years. I have often been tempted to write "To the Editor," as I was the president, a founder, and a major capitalizer of Mariculture, Ltd., a predecessor to Cayman Turtle Farm. I organized Mariculture with Dr. Robert Schroeder in 1968 and the rest, as they say, is history. I have never before responded to anything which I read in the MTN, but the letter "Cayman Island Turtle Farm: Under Fire by Conservationists" (MTN 113, page 9) was a bit more than I could stomach in silence. The inaccuracies are as spurious today as they were almost 40 years ago and most were addressed by the letter "Cayman Turtle Farm – a Response to NGO Comments" (MTN 113, page 10). However, I do think my unique experience with the (original) turtle farm requires me to add a few thoughts:

1. I have never seen the "evidence submitted by the government of Costa Rica" which "showed that at least some of the founding stock was taken illegally from that country" – but Dr. Schroeder and I were given oral permission and a handshake by Mr. Roberto Morales to take "whatever stock we though necessary." Mr. Morales was an official with the government whose portfolio included both "natural resources" and air transportation that was Lasca Airlines, then owned/operated by the Costa Rican government. Indeed, all of the "founding stock" was removed from Tortuguero by small private plane to the airport at San Juan and then flown as commercial freight in the hold of Lasca Airlines on their regularly scheduled routes between San Juan, Costa Rica and George Town, Grand Cayman, BWI. It is illogical to aver that the national airline would be party to contraband trafficking!
2. The most important way in which the farm showed "its activity benefited wild populations" is the fact that the original franchise granted by the Island government to Mariculture, Ltd. And included with the license for the Cayman Turtle Farm is the fact that the taking of wild green turtles in Cayman waters was prohibited, except for a few indigenous, licensed persons.
3. And speaking of proof – it has never been proved that "releasing a portion of (the farm's) overflow of juvenile turtles into surrounding waters could pose serious threats to wild turtle populations." How any reasonable person could come to such an assumption has, to the best of my knowledge, never made even the theoretical scan, let alone had any scientific merit.
4. To the best of my memory, there has never been a serious allegation made that "diseases occurring in Cayman Farm-raised turtles can be spread to wild populations." To make such an assertion without peer-reviewed proof is poor science.

On a totally personal basis, it never ceases to amaze me that the few antagonists to Mariculture, Ltd./Cayman Turtle Farm express their "concerns" but never seem to have a better idea than commerce to guarantee the perpetuation of *Chelonia mydas*. Mariculture Ltd./ Cayman Turtle Farm has produced thousands of released turtles. When I first went to Cayman in 1968, it was highly unusual to see a green sea turtle of any size whilst scuba diving; today, it is all but impossible to dive anywhere around the Cayman Islands and not see more than one turtle per dive. This simple barometer of success is probably meaningless to the scientific world – but it's might practical to those genuinely interested in the perpetuation of the green sea turtle, which could be absolutely guaranteed through its commercial success – a viable theory in 1968 and 2006.

Irvin S. Naylor, 100 Boxwood Lane, York, PA 17403 (*E-mail: inaylor@snowtimeinc.com*)

Book Reviews

Title: Voyage of the Turtle: In Pursuit of the Earth's Last Dinosaur
Year: 2006
Author: Carl Safina
Publisher: Henry Holt Company, New York, USA
ISBN: 08-0507-891-6
Pages: 400
Price: US $27.50

What better prognosis for a good read than a great protagonist, the leatherback turtle, and an author who has – so the dust jacket tells us – won awards for literature. But writing about seeing a leatherback emerge from the surf, he comes up with the following: "The sight of her is sufficiently astonishing to strike a deep gasp into my ribs". This encapsulates the problems with this book: too often the writing is excruciating, too often the reactions of the author distract from the animal itself. Strunk & White (1999) admonish writers to place themselves in the background. But this is not so much an account of the voyage of the turtle as of the author's travels to places where leatherbacks can be seen and studied, and the conversations he has with those engaged in that work.

In another passage, the author relates being shown the tracks of satellite monitored turtles on a computer screen. To heighten the mood he has to tell us when he draws his chair closer to the computer. A simple map showing migratory paths would make a more vivid and direct impression. Talking of figures, line drawings of O and J hooks, and of turtle excluder devices would also have been helpful.

It may be suspected that the best books about animals and their life histories are by those who have studied their subjects first hand, over a number of years, and become absorbed in the animals rather than themselves. Tinbergen's (1953) Herring Gull World , and the books by Heinrich and those by Schaller come to mind.

Safina's book does, however, provide a reasonably satisfactory introduction to some of the main questions about the conservation of sea turtles. The chapter set in Florida, albeit more about loggerhead and green turtles than leatherbacks, discusses whether turtles and people can coexist on the same beaches. The conclusion is a cautious yes.

Another vital topic is that of regional differences in survival prospects. The author recognizes that leatherbacks are doing much better in the Atlantic than in the Pacific. To his credit he does not over exploit brink-of-extinction hype, but neither does he delve deeply enough into the interesting question of why differences between ocean basins exist. Are other medusivores doing poorly in the Pacific? Are patterns of incidental catch responsible? If the causes of regional differences were understood, perhaps preventative measures could be instituted in the Atlantic. The danger of excessive egg harvest is highlighted but this is hardly a new idea.

Voyage of the Turtle is prone to errors and too ready acceptance of mere ideas as established fact. There is no solid evidence that the wrong incubation temperatures produce sterile intersex individuals. The leatherback is not the only reptile capable of maintaining its body temperature above ambient level: the brooding Indian python also does well in this respect. In the leatherback, thermogenic fat has not been demonstrated: this is only inference based on structure. That is why the original paper put a question mark after the part in its title about a "thermogenic organ". And then there is that pink spot. Why is it that turtle enthusiasts are so fascinated by occurrences such as albino hatchlings and the pink spot on the top of the leatherback's head? Safina relays the idea – twice, in disconnected places - that less pigmented skin lying over a thinner area of the skull allows light to reach the pineal and so govern responses to daylength. I am unaware of studies of light penetration, if that takes place at all, through different parts of sea turtle skulls. But Peter Pritchard does have a magnificent collection of leatherback skulls, crying out for this kind of investigation! Other errors include failing to get the quotation from Ogden Nash (about the turtle living " 'twixt plated decks") exactly right.

Nevertheless, those who know little about sea turtles may learn something from this book, and about the allure of turtle work, on beaches, at sea and in the air. Whether this is the best place to learn such things is another matter. Structuring the narrative as a travelogue interspersed with mini expositions on biology makes for a disjointed presentation.

As a lament for the devastating effects of expanding humanity, in the oceans and on turtle beaches, the book is tolerably successful. It may please readers who can overlook or even enjoy the purple prose, the heapings of adjectives and similes, and the straining for cosmic overtones. For me the most effective passage was the account of the destructiveness of trawling for shrimp. The fancy writing gives way to an enumeration of the piles of gasping ocean life, several times greater than the amount of target species obtained; the non-shrimp portion, mostly edible, is swept overboard, dying and wasted. An account of a remotely controlled video dive to 200-1000 m or so is also well done, vivid, and a reminder that leatherbacks spend much time in an environment of whose physical characteristics and inhabitants we have no more than a rudimentary appreciation.

STRUNK W. & E.B. WHITE 1999. The Elements of Style, 4th Edition. Longman, New York. 105pp.
TINBERGEN, N. 1953. Herring Gull World: A Study of the Social Behavior of Birds. Collins, New York. 255pp.

Reviewed by N. Mrosovsky, Department of Zoology, University of Toronto, Toronto, Ontario, Canada M5S 3G5 E-mail: mro@zoo.utoronto.ca

Title: Turtle Story
Year: 2006
Author: by Kartik Shanker with art by Maya Ramaswamy
Publisher: Pratham Books
ISBN: 81-8263-285-4
Pages: 24
Price: Rs 120 or US $12 (http://www.atree.org/order_ts.html)

In this picture book, *Turtle Story*, Kartik Shanker introduces us to a young olive ridley turtle floating in the sunlit Indian Ocean with a full belly and time to contemplate life. The tranquil mood is cut short by the arrival of a "really big fish" craving baby turtle soup. And so the little ridley's odyssey begins as we follow her on her travels through the blue-green water, onto the seaweed rafts, to the coral reefs and eventually to nest herself.

Turtle Story introduces children to basic facts about sea turtles through conversations between the ridley and the other species she encounters. Most noteworthy is her chat with the kind leatherback, whom she deferentially calls "Sir," as she marvels at his size and soft shell, and the competitive loggerhead, with a head both figuratively and literally big, as he sniffs at the distance of the ridley's comparatively short migration. Although Shanker draws attention to the danger of natural predators, fishing gear, and human impacts on the nesting habitat, the story's narrative force is drawn resolutely from the turtle completing her life cycle.

Narrative non-fiction, like *Turtle Story*, is a tricky genre. Shankir's tale has difficulties that result from attempting to present a vast array of natural history fact through the eyes of an anthropomorphized animal. The narrative is not rich enough to free the reader from the sense that the book is primarily a recounting of turtle facts, as opposed to a story as its picture book format would suggest. The attempt to engage the audience through the character of the ridley presents problems from the purely scientific perspective that non-fiction requires: for example, the book's ridley swims "carefully" so as to "avoid" fishing gear, and after she lays her eggs she is "happy" when she thinks about her own hatchlings' lives. Elements of non-fiction writing, such as maps highlighting the many geographic locations described and a glossary, would also have enriched the book and made it a more useful teaching tool.

In general, *Turtle Story* is a pleasant read with an ultimately charming olive ridley at its core. What makes it a must-buy, however, are the truly beautiful illustrations by Maya Ramaswamy. Her work effortlessly balances the scientific with the imaginative, bringing the world of the olive ridley, both in and out of the ocean, into sharp focus.

Reviewed by Kathleen Martin, Canadian Sea Turtle Network, 2070 Oxford Street, Suite 110, Halifax, Nova Scotia B3L 2T2 Canada, E-mail: kmartin@seaturtle.ca

Announcements

British Chelonia Group Makes 2007 The Year of the Sea Turtle

The British Chelonia Group (BCG) is a registered charity dedicated to the care and conservation of chelonia worldwide (www.britishcheloniagroup.org.uk). Each year the BCG launches an appeal designed to raise funds to help finance projects aimed at the conservation of endangered species. The year 2007 has been nominated as the Year of the Sea Turtle when the BCG will be concentrating on assisting organisations or individuals who are actively engaged on worthwhile schemes to safeguard sea turtles or are planning to do so in 2007.

The intention is to allocate monies to projects that fall under the headings of Research, Protection or Education or a combination of these. Grants will be small and will not exceed £1000 sterling. It is therefore expected that any BCG grant will probably supplement funds already raised or promised.
Proposals for consideration are invited and must contain the following:

a. Full details of the project which show clearly its contribution to Marine Turtle conservation;

b. A detailed budget which covers the costs and shows where applicable other contributions either current or expected;

c. The applicant where applicable must provide a CV which shows any previous experience with Marine Turtle research etc. together with the names of two suitable referees.

The BCG will expect acknowledgement of any contribution in any written reports published and may itself require an original report on the results of the project for publication in its annual journal TESTUDO.

Two copies of the application should reach the undersigned by 1st March 2007 at the latest:

Bob Langton
BCG Conservation Officer
13 Springfield Road
Exmouth
Devon EX8 3JY
ENGLAND
Email: bcgmailboxthree@gofornet.co.uk

27th Annual Sea Turtlers' Migration

Michael S. Coyne
President, International Sea Turtle Society (E-mail: mcoyne@seaturtle.org)

Marine turtles ply the world's seas and oceans, migrating from here to there in search of food, mates and a place to deposit their eggs. Every year (since 1981) a multitude of sea turtlers from around the world have migrated to a predetermined location, gathering to discuss their favorite topic. What drives these mass migrations? Answering this question with regard to turtles is one of the many reasons the turtlers gather. Even after decades of studying sea turtles, their habits and habitats remain, in large part, a wondrous mystery. It is this very mystery that makes them such a compelling subject of study and affection.

This year the meeting of turtlers returns to the state of South Carolina, USA, in what promises to be the largest gathering yet. The meeting will conclude with a focus on sea turtle movement which will take a critical look at the methods we have used and what we have learned about the how, what and why of where sea turtles go. This will be a special mini-symposium on Tracking for the Conservation of Migratory Vertebrates sponsored by Inter-Research (http://www.int-res.com/). A number of experts in the tracking of a variety of migratory marine vertebrates will provide relevant background and insights from their own taxa.

The logo for the 27th Annual Symposium will also be very special, incorporating the tracks of more than 700 individual turtles and the combined work of hundreds of people and more than 40 organizations. This incredible effort highlights some amazing work, identifies remaining gaps in knowledge and provides a glimpse at the possibilities that arise when we all work together.

While the meeting ends with the tracking mini-symposium, it begins with a plenary session on sea turtles in the Carolinas. These two special sessions bracket nearly 400 outstanding oral and poster presentations on a wide variety of topics related to marine turtles. Join us for these and many other outstanding (and fun!) events. Please plan to come early or stay late as we will have a full slate of field trips and activities for you to enjoy. I look forward to seeing you all in Myrtle Beach. Safe migrations!

http://iconferences.seaturtle.org/

NEWS AND LEGAL BRIEFS

This section is compiled by Kelly Samek. You can submit news items at any time online at <http://www.seaturtle.org/news/>, via e-mail to news@seaturtle.org, or by regular mail to Kelly Samek, 127 E 7th Avenue, Havana, Florida 32333, USA. Many of these news items and more can be found at http://www.seaturtle.org/news/, where you can also sign up for news updates by E-mail. Note that News Items are taken directly from various media sources and do not necessarily reflect the views or opinions of the editorial members of the MTN.

AFRICA

Kenya: Row Threatens Move to Settle Trawlers Issue

Controversy has hit preparations for a meeting called by the Fisheries ministry to discuss the fate of trawlers after the Government's temporary ban last month. Key players in the fishing industry in Malindi have criticised the selection of participants for the talks scheduled for Malindi next week, saying that it was not done properly. Some told the Nation that most invited people were women "who have nothing to do with fishing." Some have accused the local fisheries officials, who selected the participants, of picking people likely to support the Government's plan to re-allow trawling. But officials at the fisheries department in Nairobi said all the key players had been invited, adding that where the chairpersons of beach units were not present, their assistants and secretaries had been selected. Some officials said that among the key players set to attend the meeting were representatives from the Kenya Marine and Fisheries Research Institute, the fisheries department, the Kenya Wildlife Service, the Association of Trawler Operators, the Coast Development Authority and the Watamu Turtle Watch as well as some fishermen. A spokesman for the local fishermen, Mr Ali Shaibu Shekue, said the issue of representation was critical to ensure that the meeting did not look like one meant to approve any government decision. Source: *The Nation*, 15 September 2006

Namibia: Preserve Fish Resources, Sea Life, Urges Prime Minister

Opening the third annual general meeting of the South-East Atlantic Fisheries Organisation (Seafo) in Windhoek, Prime Minister Angula said the World Summit on Sustainable Development in Johannesburg four years ago resolved that effective monitoring systems of illegal fishing should be in place by 2004 worldwide and that fishing capacities had to be in place by 2005. "Some implementation deadlines have passed. If you are behind schedule, my advice is to urgently devise a fast-tracking strategy to move upfront," Prime Minister Angula said. The Seafo convention was signed in 2001 and came into force on April 13 2003. Other signatories to the convention are Iceland, South Korea, South Africa and the US. The convention has been ratified by the European Community, Namibia and Norway.The convention ensures the long-term conservation and sustainable use of fish resources on the high seas of the South East Atlantic Ocean. Seafo is to adopt measures to ensure the conservation and sustainable use of fish resources, take account of the impact on ecologically related species like seabirds, whales, dolphins, seals and marine turtles and minimise harmful impacts on living marine resources and protect its biodiversity. Source: *The Namibian*, 4 October 2006.

THE AMERICAS

Turtle Nest Totals Make History

Nesting season for the Kemp's ridley sea turtles isn't over yet, but early reports show there have been a record number of nests found at the Padre Island National Seashore already this year. The most recent sighting of an endangered sea turtle nest at the National Seashore marked the 51st at the National Seashore this year. A record 76 Kemp's ridley sea turtle nests have been reported on the Texas Gulf Coast this year. That's up from 51 last year and the most since efforts to restore the endangered turtle began three decades ago. Source: *Corpus Christi Caller-Times*, 3 June 2006.

Sea Turtles Come Out Ahead

Sea turtles and the volunteers who look for their nests on Flagler County beaches every morning won a victory Monday when a judge ruled that a beach-driving ban enacted to protect the turtles shouldn't prohibit volunteers with the same goal from using ATVs. Flagler County Judge Sharon B. Atack acquitted a Turtle Patrol volunteer of violating the county's beach-driving ban, ruling that other state and federal laws aimed at protecting the reptiles have given their blessing to the use of all-terrain vehicles by specially trained turtle volunteers. Her ruling clears 53-year-old volunteer Denis Cody of a traffic ticket, but members of the turtle group are waiting for a written copy of the judge's ruling before they'll drive on the disputed 11 miles of beach. Source: *South Florida Sun-Sentinel*, 6 June 2006.

Aquarium and DNR Working To Save Endangered Sea Turtle

The National Aquarium in Baltimore and the Maryland Department of Natural Resources (DNR) are hopeful that a Kemp's ridley sea turtle, the most endangered sea turtle in the world, will recover successfully from emergency surgery to remove a hook embedded in the animal's throat. The turtle was reported to DNR on June 7 by a local citizen as part of a mark and recapture study that the agency is conducting on sea turtles in the Chesapeake Bay. Upon examination, DNR 's veterinarian Dr. Cindy Driscoll and biologist Tricia Kimmel discovered that the turtle had a prior injury – a recreational fishing hook was caught in its throat – and transported the animal to the Aquarium's Marine Animal Rescue Program (MARP) hospital facilities for treatment and rehabilitation. Source: *Maryland DNR press release*, 12 June 2006.

Dominica Moves to Protect Endangered Sea Turtles

The Ministry of Tourism and the Ministry of Agriculture are collaborating to protect sea turtles in Dominica, which are now on the verge of extinction. At a recently held news conference, the Tourism and Agriculture Ministers both explained the significance

of conserving leatherback turtles, which nest in Dominica, and also as a tourism product for turtle watching. Agriculture Minister John McIntyre believes that locals need to stop hunting sea turtles. Source: *Caribbean net News*, 12 June 2006.

Live Leatherback May Be Island's First in 20 Years

Amelia Island residents near American Beach were treated to a rare sight - a live leatherback sea turtle. It's possibly the first live leatherback spotted on Amelia Island's beaches in two decades, said Mary Duffy of Amelia Island Turtle Watch. Nicknamed Ethel because she "seemed to be running out of steam," the 375-pound female leatherback was first spotted in the surf near Summer Beach about 6 a.m. June 9 before making her way south near Burney Park at American Beach. Obviously disoriented and struggling in the surf, the young female was loaded onto a truck about noon by local volunteers and Florida Fish and Wildlife officials. She was then transported, carefully wrapped in a special tarp, to SeaWorld in Orlando for examination. Source: *Fernandina Beach News-Leader*, 14 June 2006.

Guyana Sets up Fishing Restrictions to Help Endangered Sea Turtles

Guyana has banned fishermen from spreading large nets off its northeastern coastline after more than two dozen dead sea turtles washed up on beaches, officials said Tuesday. Guyana's fisheries ministry established the restrictions, designed to protect the endangered sea turtles, after environmental wardens reported finding the carcasses of the large turtle species on northeastern beaches. The fishing ban covers a 15-mile (24-kilometer) stretch of turtle-rich waters. Several species of endangered turtles, including the giant leatherback nest on Guyanese beaches each year. Source: *Associated Press*, 28 June 2006.

U.S.-Mexico Effort Saves Rare Turtles from Extinction

On the remote beaches of northern Mexico, the most endangered of all sea turtles, the Kemp's ridley, is marching back from the brink of extinction. Based in simple camps and basic corrals, teams of Mexican and American biologists and volunteers patrol miles of remote beaches for nests and then dig up the eggs to protect them from predators and poachers. Last week marked the peak of hatching season as more than 200,000 hatchlings made their slow crawl to the sea. The releases set a new benchmark for the joint conservation effort between Mexico and the United States that began 26 years ago to save the smallest sea turtle species. In 1985, when only 702 nests were found on Mexican beaches, many scientists predicted that the Kemp's ridley wouldn't be around for long. Then, the numbers slowly started to climb. This year, 11,600 nests already have been counted, exceeding last year's total of 10,099. And the season isn't over yet. It has even led to talk that the Kemp's ridley could be downlisted from an endangered species to threatened status by 2012. Source: *McClatchy Newspapers*, 7 July 2006.

Loggerheads Lagging

The number of loggerhead turtle nests on Treasure Coast beaches has dropped from the number reported this time last year, prompting some scientists to predict that 2006 will follow a statewide trend of decline that started about seven years ago. "We believe it's a real decline that is statistically significant, not just a blip on the radar screen," said Blair Witherington, a research scientist with the Florida Fish and Wildlife Conservation Commission in Melbourne Beach. In Palm Beach County, there has been a continued decline in loggerhead nests in Boca Raton, said the Gumbo Limbo Nature Center's marine conservationist, Kirt Rusenko. He also said he believes it's part of a larger trend. Source: *Palm Beach Post*, 29 July 2006.

Historic Caribbean Sea Turtle Population Falls 99%

Current conservation assessments of endangered Caribbean sea turtles are too optimistic due declines of populations on historically important nesting beaches, according to new research from the Scripps Institution of Oceanography published in the August issue of *Frontiers in Ecology and the Environment*. The researchers estimate that turtle populations have declined significantly since the 17th century, with the number of green turtles living throughout the Caribbean falling from 91 million to 300,000 today and the population of Hawksbill turtles plunging from 11 million to less than 30,000 during this same time period. The change represents a 99.7 percent drop in historic Caribbean sea turtle populations for the two species. Source: *Mongabay.com*, 1 August 2006.

Medical Examiner's Report Says Sea Turtle Researcher Probably Drowned

A sea turtle researcher who died last week near Sebastian Inlet probably drowned, according to a medical examiner's preliminary report done Tuesday, said county Sheriff's agent Gary Harrell. Boyd Lyon, a 37-year-old University of Central Florida graduate student who was living in Melbourne Beach, disappeared last Thursday while diving after a sea turtle for research. Sheriff's deputies found his body about 11:35 a.m. Monday about 3 miles north of the Sebastian Inlet — roughly 300 yards west of where he dove after a 300-pound sea turtle Thursday and never resurfaced. Lyon had on a wetsuit, face mask and weight belt, officials said. Lyon on Thursday had jumped into 36-foot-deep water and was using the "rodeo-style" method of capture, which involves a diver jumping on a turtle, grabbing its shell, positioning it toward the surface and onto a research boat. Harrell said officials expect a final medical examiner's report, including a toxicology report, to be finished in about six to eight weeks. Source: *TCPalm*, 16 August 2006.

New Wildlife Refuge for Leatherback Sea Turtles in Costa Rica

On August 11, 2006 the Costa Rican government announced the creation of a new national wildlife refuge and marine protected area on the Pacific coast to protect critically endangered leatherback sea turtles as well as other endangered flora and fauna. The refuge, known as “Caletas-Ario,” will cover 313 hectares on the coast of the Nicoya Peninsula stretching from Coyote Point along the Caletas beach and continuing south past the Bongo River. The refuge includes a 19,846 hectare Marine Protected Area extending 12 miles off shore, where destructive fisheries such as shrimp trawling and compressor diving will now be outlawed. Source: *Sea Turtle Restoration Project press release*, 16 August 2006.

Methods Enable Longline Swordfish Fishery to Minimize Turtle Interactions

A study announced by the Western Pacific Regional Fishery

Management Council indicates that measures have been extremely effective at reducing interactions with endangered sea turtles in the Hawaii-based longline swordfish fishery. Regulations designed to reduce turtle interactions came into effect for the Hawaii-based longline swordfish fishery in May 2004. The regulations changed the type and size of fishing hook and bait used by the Hawaii-based longline swordfish fleet from using a J-shaped hook with squid bait to a wider circle-shaped hook with fish bait. There were significant reductions in sea turtle and shark capture rates and reduced proportion of turtles that ingest hooks, which may increase post release survival prospects, without comprising target species catches. Capture rates of leatherback and loggerhead turtles declined significantly by 82.8 percent and 90.0 percent, respectively, after the turtle regulations came into effect. The swordfish catch rate, the target species of this fishery, was significantly higher by 16.0 percent. Source: *Western Pacific Regional Fishery Management Council press release*, 29 August 2006.

Turtles Show Signs of Red Tide

A sluggish, underweight loggerhead turtle rescued from the Anclote Harbor on September 5 was the third turtle to be pulled from waters off Pinellas County this week with signs of "Red Tide intoxication," a state wildlife official said. Rhonda A. Bailey, the Fish and Wildlife Conservation Commission official who responded to the report about a sickly turtle in Tarpon Springs, said the testing on the turtle will likely take a week, but it exhibited several telltale symptoms of the potentially lethal condition: lethargy, malnourishment and patches of barnacles on its face, flippers and other fleshy body parts. Source: *St. Petersburg Times*, 6 September 2006.

ASIA

Viet Nam Strengthens Sea Turtle Conservation

Viet Nam celebrated World Environment Day (June 5) in the Nha Trang city of the central coastal province of Khanh Hoa on June 4, with focus being placed on the 2006 International Year of Marine Turtles. During the ceremony, held by the Ministry of Fisheries, the provincial People's Committee, the World Conservation Union (IUCN), the Nha Trang Bay Reserve Management Board and the Nha Trang Institute of Oceanography, participants stated their committment to reducing threats to sea turtles, conserving their habitats and strengthening international cooperation in their conservation in Viet Nam. Source: *VNA*, 4 June 2006.

Leatherback Turtles 'Not Coming Back'

It is time to say goodbye to the leatherback turtle. It is on the point of extinction and is not going to make a comeback. The head of the Marine Turtle Project at Kolej University Sains dan Teknologi Malaysia, Professor Chan Eng Heng, said: "It is sad but we have to face reality. We should not be in denial." Chan said the leatherbacks are not returning in the numbers expected and experts cannot really say why. The population drop is compounded by the fact that most of the hatchlings released between the 1960s and the 1980s were female, a result of the "open air" hatchery practice at that time. Experts are also aware that since 2000, none of the eggs laid on Terengganu's beaches were fertilised because there were so few males. Source: *New Straits Times*, 8 June 2006.

Project to Monitor Turtles Using Satellite Launched

The Ministry of Regional Municipalities, Environment and Water Resources launched a vital project on Masirah Island to monitor the turtles using satellite. Being the first of its kind in the Sultanate, the project aims to study and maintain four species of turtles nesting on the Masirah Island shores throughout the year. The project aims to set sustainable development-based general administrative plan, to maintain the original marine and coastal systems on Masirah Island. Source: *Times of Oman*, 11 June 2006.

8 Chinese Poachers Nabbed in Palawan

Philippine Coast Guard (PCG) personnel in Palawan have apprehended eight Chinese fishermen aboard an unregistered Chinese vessel that was found poaching protected species of marine life off the island's southernmost tip. The PCG arrived at the Puerto Princesa port at 8 a.m. yesterday with the Chinese fishing boat's catch of three six-foot whales and 26 preserved green turtles. Philippine authorities said the 300-ton, 30-meter Chinese vessel was spotted 33 nautical miles southeast of Balabac town's Mangsee island on June l7. After a brief chase, the Chinese fishing boat was apprehended by the law enforcers as it attempted to escape toward Malaysian waters. Provincial Fisheries Officer Paciano Gianan said the suspected poachers will be charged with violating provisions of the Philippine Wildlife Act, or Republic Act 9147, and RA 8550, also known as the Philippine Fisheries Code of l998. Source: *Philippine Headline News Online*, 20 June 2006.

Strategy Sought for Protecting Endangered Sea Turtles

More than 50 environmental experts from the GCC, Iran and Yemen are expected to attend the Marine Conservation Forum, where a strategy on regional cooperation to preserve endangered marine turtles and coral reefs will be developed. The Marine Conservation Forum, which will take place on 11 - 14 September 2006, is organized by Emirates Wildlife Society - World Wildlife Fund for Nature under the patronage of the UAE Ministry of Environment & Water. The first two days of the Marine Conservation Forum will be dedicated to coral reef conservation followed by two days of presentations focused on turtle protection. Areas of discussion over the four days will include habitats, legal aspects, management, protected areas, population assessment, threat assessments and mitigation strategies. Local conservation efforts in each participating country will be reviewed and best practices assimilated into a Regional Conservation Action Plan. Source: *AME Info*, 30 July 2006.

Malaysian Official Rejects
UN Report that Leatherback Turtles Gone

A Malaysian official rejected a UN report saying highly endangered leatherback turtles were virtually extinct in the country, and said it was taking steps to save the creatures that scientists believe once swam with dinosaurs. "It is correct to say the population of the leatherback has declined drastically, but the turtle has not become extinct," the chief of Malaysia's Turtle and Marine Ecosystem Center, Kamaruddin Ibrahim, was quoted as saying by the official Bernama news agency. Turtle eggs are still being sold openly on the east coast, local media have reported. The UN said earlier this week that leatherbacks have become virtually extinct in Malaysia. But Kamaruddin said they found five nesting sites with more than 360 eggs this year alone. Source: *Associated Press*, 9 August 2006.

Heat Takes its Toll on Marine Life

Large quantities of dead fish and sea turtles have been found on the Qatari shores over the past three days due to record high sea temperatures, marine experts warned here on September 5. The Supreme Council for Environment and Natural Reserves, the country's main environmental authority, convened an urgent meeting and is conducting surveys to assess the proportion of the calamity, but experts said little can be done if the sea temperatures remain high. A record 37 degrees Celsius was recorded over the past few days in Qatar's coastal waters, the highest since 1998. Source: *Gulf News*, 6 September 2006.

EUROPE

Expert: Lebanon Oil Slick Kills Turtles, Ruins Tourism Business

The oil spill caused by an Israeli airstrike on a Lebanese power station last month is killing the young of a rare turtle and has ruined the future of the Lebanese beach holiday business, a German environmental campaigner warned. Joerg Feddern, a biologist at Greenpeace, said satellite pictures showed the slick was now 130 kilometres long and up to 30 kilometres wide. Speaking on Hessischer Rundfunk radio in Frankfurt, he said the green sea turtle laid eggs at some sites on the Lebanese coast. "When the young turtles hatch in the next few weeks, they have to crawl into the sea," he said. "But as they can't get over oily sand, they'll die." A Lebanese environmentalist, Wael Hmaidan, confirmed that oil- smeared, dead turtle young had already been seen on the beaches. The oil spread after coastal tanks were hit in a mid-July bombardment, releasing 15,000 tons of heavy heating oil. Clean-up efforts cannot begin as long as the fighting continues. Hmaidan said Monday in Beirut that the oil was breaking up into poisonous components including sulphates and heavy metals. Thousands of dead fish, prawns and turtles had been washed up on the shore. Source: *Deutsche Presse-Agentur*, 7 August 2006.

Appeal for Missing Turtles

The team in charge of the turtle information centre in Akamas' Lara beach were in for a shock on the August 15 holidays, when they arrived at the station only to find seven baby turtles missing. Strangers, who had obviously visited the station the previous afternoon, stole four green turtles and three carettas. The turtles, 12 in total, were being kept in a large tank for examination in the framework of the rescue programme for endangered species. They were also shown to visitors. The turtles are kept alive with careful scientific care, as they are outside their natural habitat. This is why the station's operators have sent out a plea to the turtle thieves to put the turtles in the sea as soon as possible, otherwise they will definitely die. Source: *Cyprus Mail*, 19 August 2006.

It's a Record Summer for Some Turtles

Italian scientists say an endangered species of marine turtle -- loggerhead turtles -- are appearing along Italy's southern shores in increasing numbers. Researchers say record numbers of loggerheads have been spotted in waters off Sicily, Calabria, Puglia and even Sardinia, the Italian news agency ANSA reported. Source: *United Press International*, 21 August 2006.

Turtles Released to Combat Jellyfish Plague

Regional Territory minister, Esteban Gonzalez Pons, was present as several small sea turtles were released into the Mediterranean August 18. The species is in danger of extinction, and the Valencian government has put measures in place to ensure the protection of the breed. However, the main food of this particular sea turtle is jellyfish and it is hoped that nature will combat nature in an effort to diminish the current plague around the beaches of the region. More than 200 of this species of sea turtle have been recovered and are recuperating at various installations in Valencia. Source: *Valencia Life*, 21 August 2006.

Rare Turtles Sighted on Cornish Coast

Young leatherback turtles have been spotted along the north Cornwall coast at two locations, according to reports received by the Marine Conservation Society. Adult leatherbacks are a common sight on the Cornish coast, but juveniles measuring less than 1m in length are rarely seen. The first sighting was reported by a wind-surfer at Constantine Bay and the second by a surfer in Fistral Beach, Newquay. The public has been asked to report any further turtle sightings to Turtle, the national database of turtle sightings. Source: *ThePasty.com*, 7 September 2006.

OCEANIA

Chevron's Australian Gas Project Stalled

An environmental regulator recommended Tuesday that Chevron Corp.'s $8.2 billion liquefied natural gas project be blocked to protect a species of marine turtle. Chevron Corp. is operator of the Gorgon project in partnership with Royal Dutch Shell PLC and Exxon Mobil Corp. The project involves a two-train, 10 million metric ton per-year LNG plant and a domestic gas facility on Barrow Island, located off Australia's remote northwest coast. However, the EPA's chairman Wally Cox said the project did not meet his agency's environmental objectives and was "environmentally unacceptable." Cox said little was known about the life cycle, behavior and feeding habits of Flatback turtles. The EPA recommendation will be used by Western Australia's Environment Minister, Mark McGowan, to make a final determination on Gorgon later this year. Source: *Associated Press,* 6 June 2006.

Tri-national Commitment to Leatherback Turtle Conservation in the Pacific

Indonesia, Papua New Guinea and the Solomon Islands have agreed to protect the endangered leatherback turtle in the Pacific through joint conservation activities. The tri-national partnership, supported by WWF, will allow the three countries to enhance conservation of leatherback turtles through information sharing, data exchange and cooperative research. It also plans to establish a network of marine protected areas covering critical leatherback habitats throughout parts of the western Pacific Ocean. Source: *WWF press release*, 29 August 2006.

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It is requested that a copy of all publications (including technical reports and non-refereed journal articles) be sent to both:

1) The ACCSTR for inclusion in both the on-line bibliography and the MTN. Address: Archie Carr Center for Sea Turtle Research, University of Florida, PO Box 118525, Gainesville, FL 32611, USA.

2) The editors of the Marine Turtle Newsletter to facilitate the transmission of information to colleagues submitting articles who may not have access to on-line literature reviewing services.

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