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Green turtle hatchling from Turkey with extra carapacial scutes (see pp. 6-8). Photo by O. Türkozan

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Editorial: Conservation Conflicts, Conflicts of Interest, and Conflict Resolution: What Hopes for Marine Turtle Conservation?

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Debates about the role of science in policy–making, and that of scientists as policy advocates, are not new. These roles have been discussed among natural scientists (for example, see several articles in Conservation Biology 21:1) and examined by others (Jasanoff 1996; Kinchy & Kleinman 2003). While all sciences struggle with the tension between science and advocacy to a certain extent, this tension is inherent in the field of conservation biology given its normative goals; conservation is normative in that it promotes what 'ought' to be rather than simply describing what 'is.' For example, the mission of the Society for Conservation Biology is "to advance the science and practice of conserving the Earth's biological diversity" (http://www.conbio.org/AboutUs/). Among member organizations devoted to marine turtles, normative goals are also evident. For example, the International Sea Turtle Society's mission is bringing "people together to promote the exchange of information that advances the global knowledge of sea turtle biology and conservation" (http://www.seaturtle.org/ists/mission.php). While the ISTS mission statement can be read as advancing the 'knowledge of' conservation rather than conservation per se, the Marine Turtle Specialist Group of the World Conservation Union more directly advocates conservation. Its mission is: "To develop and support strategies, set priorities, and provide tools that promote and guide the conservation of marine turtles, and their ecological roles and habitats" (http://www.iucn-mtsg.org/about.shtml).

Scientists who are members of such organizations presumably identify with their mission statements. Does membership in such organizations undermine a scientist's claims to 'objectivity'? Can we interpret membership in conservation organizations as a potential source of bias when scientists are asked to provide data that will influence conservation policy? Beyond membership, are scientists open to accusations of conflicts of interest based on the funds and support they receive from specific organizations, be these government, private, or not-for-profit? At a more fundamental level, is anyone able to fully meet the ideals of objectivity, completely separating his/her values from science? In the world of marine turtle conservation and research, these questions are more than academic. Marine turtles and their conservation can be included in the category of what (Salwasser 2004) identifies as 'wicked' problems. These have several characteristics, including: clear winners and losers in policy outcomes; the use of science to mask personal policy preferences; divisiveness and confrontation, where individuals demonize supporters of competing policy preferences rather than present analytical arguments; high levels of uncertainty; national versus regional conflict; and semantic wrangling, where the meaning of words matters and arguments over meaning are often surrogates for debates over values (Lackey 2006; Lackey 2007). In such cases, Lackey (2007, 12) argues that scientists "must exercise great care to play an appropriate and clearly defined role" and suggests that scientists avoid advocacy altogether (this view is not shared by all conservation biologists, see (Brussard & Tull 2007) for an alternative view of advocacy). Lackey (2007, 13) argues that "Attempting to be both the provider of policy-neutral science and an advocate for one's personal policy preference is laden with conflicts of interest."

But what is conflict of interest? Generally, a conflict of interest arises when a person with obligations to a particular organization, or to maintaining a particular standard, is compromised by other commitments and interests. 'Other' interests are typically portrayed as financial, but can also include more intangible gains, e.g. ensuring one policy option is adopted over another, or realizing deeply held values. Conflicts of interest can be potential, real, or perceived, and there are several possibilities for dealing with them. Disclosure of conflicts of interest is probably the most common method (and the most feasible). Disclosure can contribute to transparency and assist people in assessing arguments for and against particular interpretations of data or of conservation policies. What is important to note is that disclosing a conflict of interest does not remove it, but rather alerts others to its presence.

Calls for disclosure of conflicts of interest surfaced recently in debates among members of the Marine Turtle Specialist Group (MTSG) about the utility of the IUCN's Red List criteria for assessing the status of marine turtles. These calls surface primarily when someone on one side of the debate is questioning the views of someone on the other, i.e. there has been a focus on the conflicts of interests, and to a certain extent Lackey's (2006)'demonization', of particular people. There have also been suggestions for widespread disclosure of conflicts of interest. Such disclosure in debates about marine turtle conservation would achieve three important things. First, it would increase transparency in the debate for all of those participating and watching from the sidelines. Second, it would increase self-awareness among participants. It is much easier to see conflicts of interest in other people, particularly those we don't agree with, than in ourselves (to this end, I advocate full disclosure, i.e. moving beyond a listing of funding agencies and policy preferences, to a more self-reflexive examination of personal bias). Third, it might decrease animosity, since self-disclosure would reduce the need for accusations of conflicts of interest between colleagues.

All of these things are worth pursuing. However, we need to recognize the limits to disclosure, i.e. what it won't achieve. First, given the normative nature of conservation itself, the mission statement of two of the largest organizations dedicated to marine turtles, and the way research on conservation and on endangered species is funded, there are likely to be few scientists actively engaged in debates about marine turtle biology and conservation that could convince all other scientists that they have no potential, perceived, or real conflict of interest. Perception is important in this case, since it will impact on how someone's position is assessed whether or not the conflict of interest is 'real.' If everyone can be

accused of having a conflict of interest, we are unlikely to achieve much in terms of resolving debates through their disclosure. Second, focusing on conflicts of interest can serve as a distraction, directing people to spend more time assessing each other's credibility than examining the data or policy at stake (Campbell 2002). Finally, the above referenced debate in the MTSG revealed that several researchers had received funding from what some people considered a 'problematic' source (problematic because it has a clear policy objective), and yet the views of those researchers on the Red List process varied. Thus, accepting funds from a particular source did not pre-determine individual assessments of the Red List. In general, assessments of funding sources and whether or not these are 'problematic' is likely to be subject to the same problems encountered when assessing conflict of interest; perceptions of problems will be as important as their actual existence.

In the end, we will see conflicts of interests where we want to. While their disclosure will achieve a number of things, disclosure in and of itself is unlikely to settle debates about marine turtle conservation.

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From Hendrickson (1958) to Monroe & Limpus (1979) and Beyond: An Evaluation of the Turtle Barnacle *Tubicinella cheloniae*

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The sessile barnacles included in the family Platylepadidae are obligatory symbionts of marine animals, with some species occurring solely on turtles, sea snakes, and fish (Ross & Newman 1967; Newman & Ross 1976; Monroe & Limpus 1979). All of them, as well as the related turtle and whale barnacles (Chelonibiidae and Coronulidae, respectively), have evolved various strategies for locating, settling and firmly attaching to their hosts. For the most part, coronulid whale barnacles, and some chelonibiid turtle barnacles entrain the dermis of the host in external elaborations of the wall. Alternatively, the platylepadid turtle barnacles are fully embedded in the host tissues, but commonly develop external wall elaborations that serve to anchor them in the host (Monroe & Limpus 1979).

Monroe and Limpus (1979) described a new species of turtle barnacle which they assigned to the genus *Tubicinella* Lamarck, a genus previously known to occur only on cetaceans. Our analysis of the situation confirms our suspicion that they misinterpreted certain characteristics and relationships concerning their new species, as detailed below. Monroe & Limpus (1979) expressed reservations about including their new species, *Tubicinella cheloniae*, within the whale barnacle clade (Coronulidae) because it would not " ... adequately reflect the relationship of this species to other members of the family." Nonetheless, Monroe (1981) elected to redefine the higher taxa and resurrect one other familial level taxon that in effect destroyed the unity of the whale barnacles on one hand and the turtle barnacles on the other, a unity which was so clearly expounded by Pilsbry (1916) and carried forward in later studies (Newman & Ross 1976). Below we re-establish this unity by incorporating *Tubicinella cheloniae* (here renamed *Chelolepas cheloniae*) into the Platylepadidae and we assign a new genus to this unique form of turtle barnacle. We also trace the history of this species through the literature from its original description as a life stage variation of another platylepadid, *Stephanolepas muricata*, to subsequent studies that, as a result of its original misidentification, have improperly catalogued this species as *S. muricata* when encountering it upon marine turtles (i.e. Hendrickson 1958).

The whale barnacle *Tubicinella* Lamarck, 1802 (Figures 1A, 2B)

Lamarck (1802) described two species of *Tubicinella* based on specimens taken from a whale in the south Atlantic Ocean. Among the species he described only one, *T. major*, is presently recognized and it occurs solely on the southern right whale, *Eubalaena australis* (DesMoulins). According to Pilsbry (1916), Olas Worm reported a tubicinellid on the head of a stranded whale from the coast of Syderoe, one of the Faroe Islands, and there is one unconfirmed

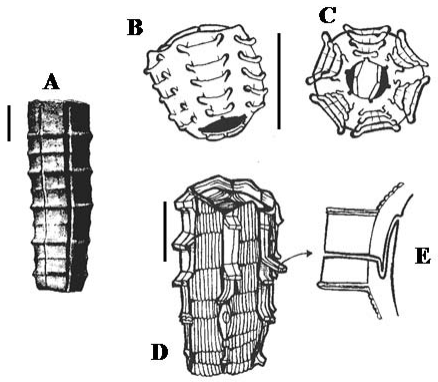

Figure 1. Technical representations of cirripeds: **A**. *Tubicinella major*, scale bar = 10 mm, **B**. *Stephanolepas muricata* (side view), **C**. *S. muricata* (ventral view), scale bar between **B** and **C** = 6 mm, **D**. *Chelolepas cheloniae* (formerly *Tubicinella cheloniae*) (side view), scale bar = 10 mm, **E**. dorsal schematic of external, upturned flange in *Chelolepas* consisting of two juxtaposed components, each contributed from opposite sides of the suture – representing the key diagnostic character of this new genus. Figure adapted from Pilsbry (1916), Fischer (1886) & Nilsson-Cantell (1932). **A**, **B** & **D** depict the barnacles in an upright position (aperture or opening face up). When embedded in turtles the entire barnacle is located subcutaneously and only the opening (aperture) and the top edge of the barnacle shell is exposed.

record on a stranded bottlenose whale (*Hyperoodon ampullatus*) in Nova Scotia (Mitchell & Kozicki 1975).

Tubicinella is a relatively large barnacle, often exceeding 50 mm in height. The wall is cylindrical, bilamellar, and ornamented externally by simple, relatively wide-spaced ridges, and it lives wholly embedded to its orifice in the tissues of its host. The external ridges comprise swellings in the parietes rather than discrete structures added to the wall.

Darwin (1854) devoted considerable space to his description of *Tubicinella*. Among other aspects of its morphology he analyzed the manner of growth and he interpreted the development of the parietal ridges as a means of forestalling the rejection of the barnacle from the tissues of the host.

The turtle barnacle *Stephanolepas* Fischer, 1886 (Figure 1B&C)

Fischer's (1886) description of *Stephanolepas muricata* from Pulo Condor, Condor Is., Cochin China (= Viet Nam) was based on specimens taken from the carapace and plastron of the hawksbill turtle *Eretmochelys imbricata* (Linnaeus). Nilsson-Cantell (1932) mistakenly described and illustrated specimens from Bentota, Ceylon, also from a hawksbill, that he attributed to *Stephanolepas*, believing his specimens were adult whereas those described by Fischer were juveniles. He also suggested that his specimens revealed that the species in question was closest in form to that of *Tubicinella*, but quite distinct from this genus. Hendrickson (1958) described and illustrated the same species taken from growths on the carapace of the green turtle *Chelonia mydas* (Linnaeus) taken at Talang Talang, Besar Island, Sarawak - presumably basing his identification on the work of Nilsson-Cantell and, as a result, called his specimens *S. muricata*. However, Monroe & Limpus (1979) clearly recognized that what Nilsson-Cantell and Hendrickson had described was not *S. muricata* but rather a wholly different species for which they proposed the epithet *Tubicinella cheloniae*.

The basally tapering, or deep bowl-shaped wall of *Stephanolepas* also has external ridges extending completely across the parietes. However, as we shall demonstrate these are special structures added to the wall and they develop in part from the suture where they form small knobs, the whole reminiscent of a dog bone or bow tie (Figure 1 B-C). These similarly serve to anchor the barnacle in the host.

The turtle barnacle *Tubicinella cheloniae* Monroe & Limpus, 1979

Monroe & Limpus (1979) included "... this species in *Tubicinella* because of the strong affinity shown by the general facies of the shell and the mode of invasion of the host". However, *Cylindrolepas,* a platylepadid turtle barnacle, also has a tall cylindrical wall and has never been considered a feature warranting its designation to the coronulid whale barnacles.

The wall in *T. cheloniae* is relatively small, attaining a height of about 20-25 mm and a diameter of 10 mm. The most outstanding feature is the development of horizontally flattened, upward curving flanges that project from the lateral edges of the parietes and extend well beyond the circumference of the wall (Figure 1D).

SYSTEMATICS

Superfamily Coronuloidea Leach, 1817

Family Platylepadidae Newman & Ross, 1976

DEFINITION. Wall with six plates, deciduous; parietes commonly with pronounced medial tooth or sulcus; wall elaborations, when present, emanating from both sides of suture concomitant with diametric growth; opercular plates wider than high; embedded in tissues of sea turtles and other marine animals.

REMARKS. Monroe (1981) was confronted with an ambiguous definition of the platylepadids largely stemming from the work of Pilsbry (1916). Newman & Ross (1976) in recognizing the familial level status of the platylepadids unfortunately did not provide a definition. For the most part Monroe (1981) was unable to adequately define the platylepadid clade which accounts for his unusual reassignment of genera to one or another family.

Chelolepas gen. nov.

TYPE SPECIES. *Tubicinella cheloniae* Monroe and Limpus, 1979; Recent, Mon Repos, southeast Queensland, Australia; on *Caretta caretta*.

ETYMOLOGY. Derived from Greek, Chelo-, turtle, and -lepas, barnacle; gender feminine.

DEFINITION. Wall tall, cylindrical, tubiferous; parietes with flat upturned, flanges arising from each side of suture, enlarging during diametric growth and extending well beyond circumference of wall; articulation of wall plates complex.

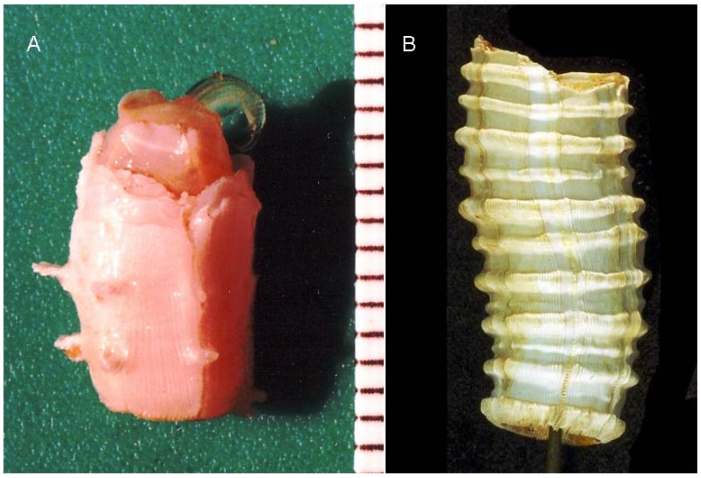

Figure 2. Photographs of cirripeds: **A**. *Chelolepas cheloniae* (formerly *Tubicinella cheloniae*) (side view) and **B**. *Tubicinella major* (side view). Units on the middle scale bar = 1 mm.

REMARKS. The two part nature of the flanges, with a portion contributed from each side of the suture, clearly separate *Chelolepas* from all other known platylepadids. These flanges obviously serve to anchor the barnacle in the tissues of the host, where they are commonly entwined with fibrous connective tissue (Monroe 1981).

Chelolepas cheloniae (Monroe & Limpus 1979) (Figures 1D&E, 2A)

Stephanolepas muricata: Nilsson-Cantell 1932: 258 (wall morphology, Ceylon); Hendrickson 1958: 524 (effect on host, Sarawak).
Tubicinella cheloniae Monroe & Limpus 1979: 199 (morphology, Queensland); Monroe 1981: 241 (growth and phylogeny, Queensland); Jones et al. 1990 (Australian distribution); Limpus et al. 1994: 147 (Queensland).

MATERIAL: Scripps Inst Oceanography, Benthic Invertebrates C- 5813; 4 spec. alcohol, Talang Talang, Besar Is., Sarawak; on *Chelonia mydas*; J. R. Hendrickson coll., Sept. 1952. California Acad Sci 153163, same as SIO C-5813. Queensland Museum W7473; Wynnum, Moreton Bay, SE Queensland; on *Chelonia mydas*; P. Davie coll., October 1, 1978.

REMARKS. This species is only known to occur on three species of turtle in Australasian waters (Dobbs & Landry 2004). Its presence has not been detected in the central or eastern Pacific regions based on material available to us. However, photographic evidence from Baja California, Mexico suggests that this species is present in the eastern Pacific (see Figure 3) but no specimens have been collected to verify this possibility. Thus, researchers in this area should conduct detailed analyses of the platylepadid, skin barnacles from dead or dying chelonians.

Hendrickson (1958) described the deleterious effects it has on the green turtle in Sarawak. However, we are not convinced it is the causative agent in the development of the tumors that Hendrickson described.

DISCUSSION

Tubicinella and *Chelolepas* live fully embedded in the tissues of their host, the former on whales the latter on sea turtles (see Figure 3 for an example of *C. cheloniae* colonization). Both have a relatively thin or flimsy cylindrical wall and both rely on a combination of factors, including modest diametric growth, to increase the size and volume of the body chamber as well as to maintain the apex of the wall at the surface of the host. For the most part *Tubicinella* relies on abrasion and breakage to maintain its position whereas *Chelolepas* depends upon corrosion and delamination, something that is abundantly evident when cleaning any platylepadids in household bleach, especially individuals of *Stomatolepas* Pilsbry. This pronounced difference clearly sets them apart.

The tissue surrounding the aperture or scuto-tergal flaps are a characteristic of all sessile barnacles. However, in the whale barnacles they reach their greatest development by forming a tall apertural shroud that likely functions to prevent over extension and expansion of the cirral net when deployed. Monroe & Limpus (1979) did not report its presence in *C. cheloniae*. Nonetheless, in this species it does not attain the prominence displayed in whale barnacles, and we have not detected its presence in other platylepadids.

The opercular plates in whale and turtle barnacles, unlike those found in balanids, are clearly a laminate of cuticular and calcareous material. It is likely that corrosion of the cuticular lamina at each major growth increment results in delamination, thus periodically exposing a fresh surface to the vagaries of an abrasive environment. In both families the opercular membrane, comprised of several layers (Darwin 1854), has one or two layers extending to the base of the wall. Noteworthy is that the opercular plates in *Tubicinella* are higher than wide, but wider than high in *Chelolepas* as in all platylepadids.

The large, conspicuous, longitudinal parietal tubes in *Tubicinella* are numerous and surprisingly uniform in size except for one or two larger ones adjoining the radius (Figures 1A & 2B). These develop externally by deepening and closing over external striae (Darwin

Figure 3. A subadult loggerhead turtle from Baja California, Mexico hosting numerous platylepadid barnacles embedded into the flippers and an eyelid. These insitu specimens appear to be *Chelolepas cheloniae* but collections from dead turtles would be necessary to confirm the species in question.

1854; Pilsbry 1916), as they do in certain species of *Platylepas*. In contrast, those in *Chelolepas* are cryptic, ovate to circular in outline, few in number and apparently secondarily filled, but develop in the same manner. The longitudinal tubes are directly involved in the formation of the transverse ridges of *Tubicinella*, but they are not involved in the construction of the flanges in *Chelolepas*.

The circumferential transverse ridges of *Tubicinella* reflect a swelling or slight bulge of the exterior lamina, and they are low, simple, evenly rounded and they are not involved in diametric growth. The flanges in *Chelolepas* consist of two juxtaposed components each contributed from opposite sides of the suture (Figure 1E & 2A). In addition, although initially hollow, the flanges become multiseptate and some appear to be secondarily filled. Their growth is concomitant with diametric growth. The delicate and intricate lace-like fimbriations in *Stomatolepas* are similar in that they arise from each side of the suture. In both of these genera the wall elaborations forestall their rejection by the host.

The tubiferous radii in *Tubicinella* which extend from the apex to the base consist of an inner and outer lamina connected by transverse septa. Near the outer lamina they bifurcate or trifurcate, thereby resulting in a square primary tube and irregular secondary or tertiary tubes all of which connect with the large proximal longitudinal tubes of the parietes (Darwin 1854). The radius in *Chelolepas* is an open channel bordered on one surface by strong denticles. The radius in *Platylepas* and *Stomatolepas* is also an open channel.

The paired branchiae or gills in *Tubicinella* are "enormously developed" - their combined size equaling about two-thirds of the area of the mantle cavity. Each consists of two folds, both deeply plicated (Darwin 1854). In *Chelolepas* they are relatively small and simple and they lack any plications. The difference between the two genera may reflect physiological or ecological differences relating to swimming speed, diving depth, or rate of descent of the host.

In comparing sperm ultrastructure Healy & Anderson (1990) discovered that the sperm of *Chelolepas* is most closely related to the platylepadid *Cylindrolepas*. In differing significantly from the whale barnacle *Coronula*, they summarily dismissed the notion of Monroe & Limpus (1979) and Monroe (1981) to include *C. cheloniae* within the whale barnacle lineage.

Monroe's (1981) reassessment of the whale and turtle barnacles resulted in an unnatural alliance of diverse taxa, and did not recognize the convergent evolution of wall structures that are an adaptation for living in the soft tissues of a mobile host. Based on the foregoing comparisons we view the resemblance of *Chelolepas* to the whale barnacle *Tubicinella* as an excellent example of convergent evolution; in all other regards it is a platylepadid turtle barnacle. Furthermore, we subscribe to the alignment of taxa so lucidly promulgated by Pilsbry (1916).

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Nest relocation as a conservation strategy: looking from a different perspective

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The relocation of nests either up the beach or into centralized hatcheries is a conservation technique used for reducing threats to eggs and hatchlings of marine turtles. Mortimer (1999) stated that hatcheries should be used as a last option. This is due to the potential negative effects of hatcheries such as sex ratio alteration (Godfrey & Mrosovsky, 1999) or reduction of hatching success relative to natural nests (Limpus et al. 1979; Mortimer 1999). More recently, Mrosovsky (2006) suggested that nest relocation over the long term may distort gene pools. He cautioned that more research should be conducted on the impacts of nest relocation, and also suggested that alternative strategies for doomed egg management be explored. Other publications have suggested that increasing hatchling output, either through nest protection and/ or nest relocation, can have positive impacts on population size (Dutton et al. 2005; Mazaris et al. 2005).

One aspect of nest relocation that has received relatively little attention is anatomical differences of the resultant hatchlings. For example, Mast & Carr (1989) observed that for Kemp's ridleys, "handling of the eggs after oviposition has a marked effect on carapacial scute variability." A similar effect was reported for hatchlings from relocated olive ridley eggs in Suriname (Hill 1971) and Sri Lanka (Hewavisenthi & Kotagama 1989), and also for green turtle hatchlings in Japan (Suganuma et al. 1994). Although supernumerary and subnumerary scute counts have been observed for nearly all species of turtles that possess scutes (Gadow 1899; Newman 1906), the causes are less clear. Some authors have suggested that abnormalities of scute patterns arise from accidents or disturbances during ontogenetic development (Parker, 1901; Hildebrand, 1930; Zangerl, 1969). Hildebrend (1938) suggested that scute anomalies in diamondback terrapins (*Malaclemys terrapin*) result from changes in available oxygen supply during incubation. Temperature variation during incubation may also account for scute abnormalities. Morphogenetic effects can occur in turtles as a result of incubation temperature (e.g. Yntema 1976; Yntema & Mrosovsky 1980).

The implications of scute variation for sea turtle biology are unclear. Interestingly, Gadow (1899) noted over a century ago that for loggerhead sea turtles, carapacial scute variation is greater in hatchlings than adults. We confirmed this in loggerheads in a rookery in Turkey (Türkozan et al. 2001). To explain this difference, Gadow (1899) proposed the idea of "orthogenetic variation," theorizing that young turtles with more than the normal complement of scutes undergo fusion of scutes during ontogeny such that the adults exhibit the normal scute pattern. Newman (1906) opposed this view and suggested that supernumerary scutes were an atavistic reappearance of scutes that had been lost during phylogeny. Another explanation could be that scute variation is linked to reduced fitness, thereby resulting in fewer adult turtles with observed scute variations.

To further investigate this issue and to contribute to ongoing discussions concerning when to relocate sea turtle eggs, we examined differences in carapacial scute patterns, sizes and weights of hatchlings produced from loggerhead nests that were incubated *in situ* and from nests that were relocated to a hatchery on Dalyan beach, Turkey. From loggerhead clutches laid 2004 season (June to early August), we examined 734 hatchlings from 34 *in situ* nests and 1188 hatchlings from 49 hatchery-relocated nests. The nests in the hatchery were relocated for either of the following reasons:

	Distribution	Natural nests		Hatchery	
	Right-Left	n	%	n	%
Nuchal	1	699	95.2	1170	98.5
	2	35	4.8	18	1.5
Vertebral	5	675	92.0	1048	88.2
	6	51	7.0	112	9.4
	7	7	1.0	27	2.3
	8	1	0.1	1	0.1
Costal	4-4	4	0.5	3	0.3
	4-5	9	1.2	12	1.0
	4-6	2	0.3	-	-
	5-4	3	0.4	3	0.3
	5-5	676	92.1	1116	93.9
	5-6	16	2.2	18	1.5
	6-5	13	1.8	23	1.9
	6-6	7	1.0	8	0.7
	6-7	-	-	2	0.2
	6-8	-	-	1	0.1
	7-5	1	0.1	1	0.1
	7-6	2	0.3	-	-
	7-7	1	0.1	1	0.1
Marginal	10-12	1	0.1	-	-
	11-10	-	-	1	0.1
	11-11	131	17.9	235	19.8
	11-12	87	11.9	137	11.5
	11-13	1	0.1	2	0.2
	12-11	43	5.9	104	8.8
	12-12	459	62.5	678	57.1
	12-13	4	0.5	15	1.3
	13-11	1	0.1	2	0.2
	13-12	2	0.3	13	1.1
	13-13	4	0.5	1	0.1
	14-12	1	0.1	-	-
Supracaudal	2	734	100	1188	100

Table 1. Proportion of loggerhead turtle hachlings from Turkey with different distributions of carapace scutes

	Nuchal		Vertebral		Costal		Marginal	
	0	1	0	1	0	1	0	1
Natural	699	35	699	35	699	35	699	35
Hatchery	1171	17	1171	17	1171	17	1171	17
Total	1869	53	1869	53	1869	53	1869	53
	X^2=20.42, p<0.0001		X^2=29.18, p<0.005		X^2=1.89, p<0.05		X^2=7.30, p<0.005	

Table 2. Comparison of distribution of scute patterns observed in natural nests and hatcheries (0 = hatchlings with no deviations; 1 = hatchlings with scute deviations).

Figure 1. Occurrence of hatchlings with scute variations (filled bars) and without scute deviations (open bars) in natural nests and hatchery nests.

were not able to protect them with wire mesh cages against fox predation or the nests would have been flooded otherwise. The hatchery site was roughly 30 m away from the water line. The physical conditions of the hatchery site were nearly the same as the original nest site because Dalyan beach has a homogenous profile consisting largely of fine sand. We compared measures of straight carapace length (SCL), straight carapace width (SCW), mass, and scute patterns. Length was measured with a dial calliper with an accuracy of ±0.02 mm. Mass was measured with a digital scale (accuracy ±0.1 gr). Comparisons of the scute patterns were evaluated with a chi-square test while the length and mass data were compared with one way analysis of variance (ANOVA). All means are presented with ±SD.

The vertebral, costal and marginal series were the most variable and the supracaudal scutes were extremely stable (Table 1). The most common (normal) scute pattern that we found was 1 nuchal, 5 vertebrals, 5-5 costals, 12-12 marginals, and 2 supracaudals. This is concordant with Türkozan et al (2001) and Reichart (1993). There were variations from the normal pattern in hatchlings from both natural and relocated nests (Table 1), with significant differences between the two groups for all sets of nuchal, vertebral and marginal but not costal scutes (Table 2). When the data on deviations are pooled, there was a higher rate of scute deviation for hatchlings from the relocated nests (Figure 1). However, this difference was not significant (Chi-square test p>0.05).

For hatchlings from natural nests, the mean SCL was 40.48 ± 1.60 (range= 33.54-43.62) mm, the mean SCW and 31.73±1.38 (range 25.20-36.46) mm, and the mean weight was 14.81±1.76 (range=8.70-18.90) gr. For hatchlings produced by relocated nests, the mean SCL was 40.39±1.34 (range=35.60-44.48) mm, the mean SCW was 31.48±1.10 (27.50-34.60) mm, and the mean weight was 14.51±1.41 (range=9.60-18.40) gr. Although there was no significant difference in SCL of hatchlings from natural or relocated nests, hatchlings from relocated nests did have smaller SCW (ANOVA F= 19.65, p<0.001) and lower mass (ANOVA F= 16.77, p<0.001) than hatchlings from natural nests. In contrast, when we compared hatchings exhibiting scute deviations with normal hatchlings from in situ nests (Table 3), the turtles with variable scute patterns were longer (ANOVA F=4.56, p<0.05) and heavier (ANOVA F=13,49, p<0.001). For turtles produced from clutches relocated to hatcheries, hatchlings with deviant scute patterns were smaller (ANOVA F=6.09, p<0.05) than normal turtles, although there was no significant difference in weight (ANOVA F=0.008, P>0.05).

Scute variation in hatchlings is a natural occurrence, although the rate of expression is generally higher in hatchlings from relocated loggerhead nests in Turkey. Interestingly, hatchlings from natural nests were more likely to have variation in the nuchal scutes than hatchlings from relocated nests, although deviations in nuchal scutes were far less frequent than deviations in marginal, costal and vertebral scutes. Hatchlings from relocated nests were also significantly thinner and had less mass, although the absolute differences were small (<0.3mm for SCW, <0.4g for mass). The differences observed in hatchlings from natural and relocated nests were not likely to be due to differences in seasonal changes in weather, as hatchlings from both groups came from nests that were laid throughout the season. Micro-environmental differences in the zones where natural and relocated nests were incubated may be linked to the anatomical differences, particularly if the sand conditions varied in temperature and/or moisture between hatchery and natural nesting beach (cf. Foley et al. 2000; McGehee 1990).

The impact of these anatomical differences in hatchlings remains unclear. Adult turtles tend to have fewer scute deviations than hatchlings (Gadow 1899; Türkozan et al. 2001). Could this indicate that hatchlings with scute deviations are less fit and thus less likely to survive to adulthood, relative to hatchlings with normal scute patterns? It may be that the smaller size of hatchlings with scute variations is linked to reduced fitness. For example Janzen et al. (2000) found that larger hatchlings of Cheldra serpentina exhibited significantly greater survivorship than smaller individuals. Perhaps in loggerhead turtles, smaller hatchlings are more susceptible to predation. Therefore, it is possible that as relocated nests are more likely to produce smaller hatchlings (that also have scute variation), these hatchlings tend to be removed from the population before reaching adulthood, making observations of adults with scute

	Natural Nests		Relocated Nests	
	0 (n=408)	1 (n=326)	0 (n=642)	1 (n=546)
SCL (mm)	40.4±1.52	40.6±1.69	40.5±1.35	40.1±1.33
SCW (mm)	31.6±1.40	31.8±1.36	31.5±1.09	31.4±1.11
Weight (g)	14.6±1.59	15.1±1.92	14.5±1.42	14.5±1.41

Table 3. Mean size and weight (±SD) of hatchlings from natural and relocated nests (0 = hatchlings with no deviations; 1 = hatchlings with scute deviations).

variations relatively rare (Gadow 1899; Türkozan et al. 2001). However, it remains the case that not all hatchlings from relocated nests are small and/or exhibit scute anomalies. It is likely that there are trade-offs associated with nest relocation – for example, higher rates of deformities and possibly reduced fitness (current work) vs. population increases due to increased nest protection. More research is needed on the impacts of translocation and artificial incubation of sea turtle eggs.

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Linking Micronesia and Southeast Asia: Palau Sea Turtle Satellite Tracking and Flipper Tag Returns

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The richness of the ocean surrounding the nation of Palau has played an essential role in sustaining the Palauan people for millennia. Marine turtles, a highly valued part of this marine biodiversity, are a source of food and hawksbill shell is used to make *toluk*, traditional women's money that circulates at funerals and first birth ceremonies (Matthews 2005; Guilbeaux 2001). Palau's most frequently harvested turtle species are hawksbill turtles, *ngasech*, and green turtles, *melob*. These species are listed as critically endangered and vulnerable, respectively, according to the World Conservation Union (Meylan & Donnelly 1999).

An ongoing challenge for the Republic of Palau and the Pacific Region is to adequately monitor turtle populations to determine their relative abundance, distribution, and migration patterns. As a result, the Bureau of Marine Resources (BMR) within the Palau National Government initiated the Marine Turtle Conservation and Monitoring Project (MTCMP) in September 2004. The project, coordinated by BMR, is a collaborative effort involving the Koror State Rangers, Division of Fish & Wildlife Protection, Palau Conservation Society, Palau Automated Land and Resource Information Systems, Community Conservation Network, Helen Reef Project, Sonsorol State Turtle Project, and Kayangel State.

The Republic of Palau has one of Micronesia's largest nesting populations of hawksbill turtles (*Eretmochelys imbricata*) (NMFS & USFWS 1998). In Palau, hawksbill turtles nest primarily in the Rock Islands Southern Lagoon area of Koror State, an area particularly important for recreational and tourist activities (Matthews 2005). The majority of Palau's threatened green turtles (*Chelonia mydas*) nest on Helen Island and Merir Island in the remote Southwest Islands (NMFS & USFWS 1998).

To raise public awareness of sea turtles and shed light on their migration routes, the MTCMP began a satellite tracking and flipper tagging project. Four Telonics ST-20 Platform Terminal Transmitters (PTTs) were attached with marine resin and fiberglass cloth to the carapace of one hawksbill and three green turtles after nesting, following the methodology of Balazs et al. (2005). Their movements were tracked using ARGOS/CLS technology. Spatial information from the transmitters was sent via e-mail to the MTCMP office where the most accurate positions, with location classes (LC) of 0,1, 2, 3, or A at biologically realistic speeds (Blumenthal et al. 2006), were mapped to construct routes and estimate distance traveled (Figure 1). These coordinates were imported into ArcMap GIS 8.3© to create custom maps. The MTMCP also established an account on seaturtle.org using the Satellite Tracking and Analysis Tool (STAT, Coyne & Godley 2005).

Satellite Tracking. On July 27, 2006, a satellite transmitter was mounted on a hawksbill, Dilioulomekang, that nested in the Southern Lagoon in Koror state. A second transmitter was mounted on Helen, a green turtle nesting on Helen Island, on September 27, 2006. This turtle's transmitter sent four location class B messages, the last of which was received on October 9, 2006. Conservation officers reported that she returned to Helen Island to nest again on October 12, but her transmitter ceased to transmit. A third transmitter was

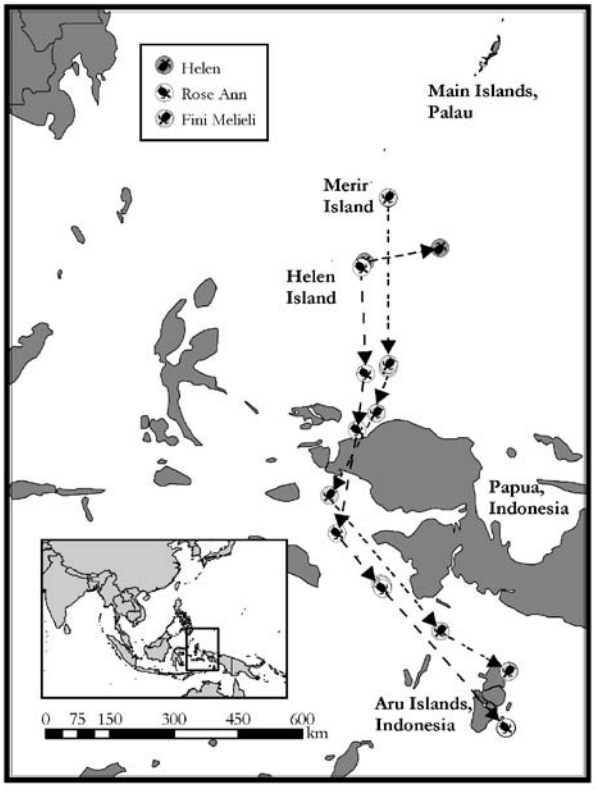

Figure 1. Migratory routes of three post-nesting green turtles, two of which were tracked from Palau's Southwest Islands to Indonesia's Aru Islands.

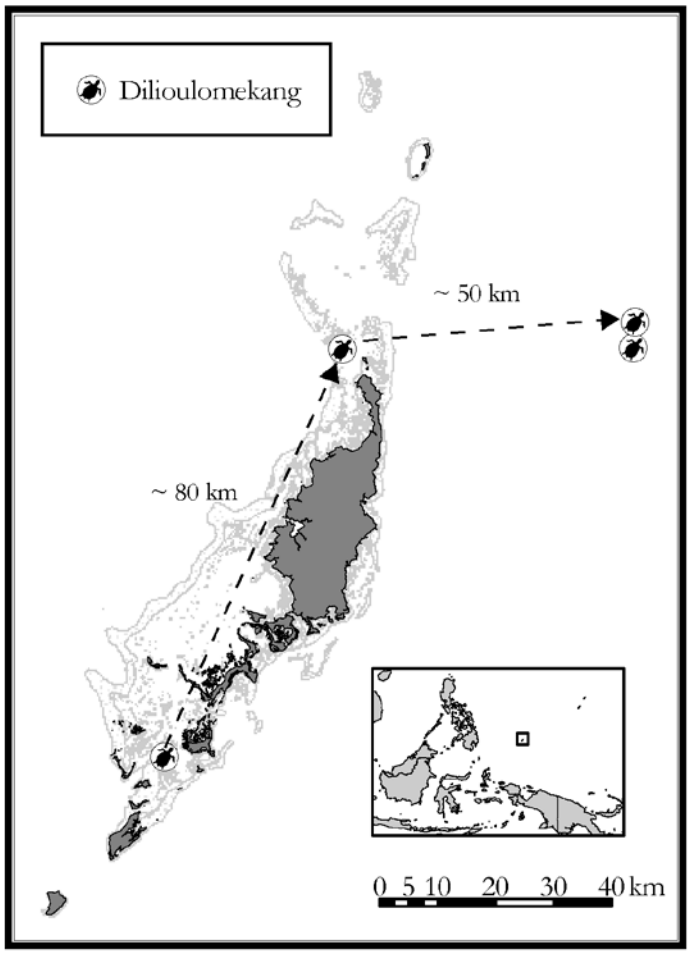

Figure 2. Tracking the hawksbill turtle Dilioulomekang near the Main Islands of Palau.

attached to a nesting green turtle, Fini Melieli, on Merir Island on November 1, 2006. An additional ST-20 was mounted on a post-nesting turtle, Rose Ann, on Helen Island on December 8, 2006

Results of the tracking (Figure 1) show that both Fini Melieli and Rose Ann migrated directly south to West Papua, Indonesia. Fini Melieli migrated approximately 1,500 km to the northeast of the Aru Islands in 37 days where she last transmitted on February 11th, 102 days after she began transmitting. Rose Ann migrated approximately 1,300 km to reach the southeastern shores of Aru Islands in 39 days. Rose Ann has remained in the same vicinity, sending numerous LC B messages, but only 3 LC A messages. The last LC A transmission was March 2, 84 days after she was fitted with a transmitter. Based on this tracking information, the foraging grounds of these two green turtles appears to be the Aru Islands.

The hawksbill's transmitter sent messages lacking latitude and longitude until June 6, 2007 (Figure 2). The MTCMP speculates that the numerous limestone Rock Islands of Koror State interfered with her earlier transmissions. Dilioulomekang was tracked approximately 135 km from the beach where she nested when her last transmission was received on June 24, 2007.

The MTCMP plans to mount another transmitter on a post-nesting hawksbill turtle in the Rock Islands of Palau to learn more about the animal's migration. The MTCMP hopes that this planned tracking project will spotlight a hawksbill as Palau's government is considering a five year moratorium on hawksbill harvest with the support of the Palauan women's group.

Satellite tracking reflects the movements of a small number of sea turtles, not populations as a whole. It is likely that there are several foraging sites for green and hawksbill turtles that nest in Palau and the satellite tracking work together with the flipper tagging recaptures in the region have identified a few of these areas. Similar to the tagging recapture results from neighboring Yap State of the Federated States of Micronesia (Kolinski 1995), the turtles that nest in Palau range widely in the Western Pacific and Southeast Asia.

Flipper Tagging. In addition to satellite tracking, flipper tagging is ongoing in Palau. Turtles are tagged on both front flippers with titanium flipper tags using Stockbrands, Inc applicators. The piercing site is proximal of and adjacent to the first large scale on the posterior edge of the flipper (Balazs 1999).

Since 2004, 187 nesting green turtles, 51 foraging green turtles, and 6 foraging hawksbills have been tagged on Helen Island. The foraging turtles were captured with a dip-net and by in-water rodeo methods developed by Ehrhart & Ogren (1999) which included sighting, pursuing, and capturing the turtles from a small boat. On Merir, 73 nesting green turtles have been tagged. On the main islands of Palau, three nesting greens, two captured and released olive ridleys (*Lepidochelys olivacea*), and 16 captured and released hawksbills have been tagged. The majority of the turtle tagging has been accomplished by state conservation officers who are working in partnership with the national turtle monitoring program.

The MTCMP office received recapture information on a hawksbill turtle tagged on February 24, 2005 in Malakal, Palau, then caught with a fisherman's net in Davao, Philippines on October 1, 2005 (Figure 2). This hawksbill was released after the tag was removed. This hawksbill tag recapture information was provided by the Secretariat of the Pacific Regional Environment Programme, the organization that provides flipper tags to member countries including the Republic of Palau and the Federated States of Micronesia.

On February 25, 2006, Helen Reef Conservation Officers tagged a post-nesting green turtle on Helen Island in Hatohobei State that was caught by a fisherman in Likopang, Northern Sulawesi, Indonesia on March 5, 2007 (Figure 3). After measuring the minimum curved carapace length (106 cm in 2007 compared to 105 cm measured in 2006), this turtle was released by WWF-Indonesia in Manado.

A turtle with a tag in each front flipper was caught near Aimeliik State off the southwestern shores of the main island of Palau on March 20, 2007 (Figure 3). This green turtle nested approximately 630 km away on Gielop Island in Ulithi Atoll, Yap State, Federated States of Micronesia, where the post-nesting turtle was tagged nearly two years ago on June 26, 2005. This tagging was done as part of the Yap State Marine Turtle Project.

On September 5, 2007, a fisherman caught a tagged green turtle in Ngardmau Channel near the main island of Palau. Sonsorol State Conservation Officers tagged this turtle that nested on Merir Island on April 3, 2007.

Similar to traditional Micronesians who were among the world's greatest seafarers, this tracking and tagging information demonstrates that Palau's marine turtles navigate vast stretches of open-ocean. Tracking turtle migrations with flipper tags and satellite transmitters has been a catalyst leading to increased exchanges of

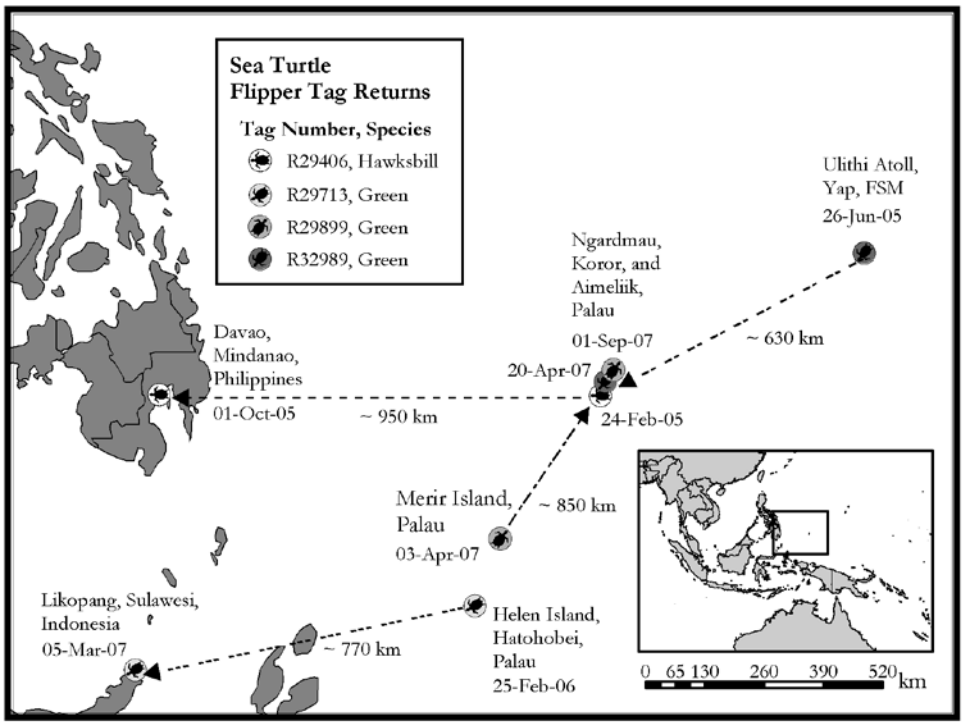

Figure 3. Tag recaptures linking Micronesia, Indonesia, and the Philippines.

information among Palau and neighboring countries. Since sea turtles are a shared resource in the Pacific, responsibility for their management must also be shared. International collaboration is necessary to ensure the future of these species threatened by over-harvesting, habitat destruction, nest poaching, pollution, and off-shore fisheries impacts.

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Morphometrics of the Green Turtle at the Atol das Rocas Marine Biological Reserve, Brazil

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In Brazil, knowledge concerning green turtles (*Chelonia mydas*) is centered on the study of reproductive populations at the oceanic islands of Fernando de Noronha (Bellini & Sanches 1996), Atol das Rocas (Grossman *et al*. 2002) and Trindade (Moreira *et al*. 1995). However, Marcovaldi & Marcovaldi (1999) classify the Atol das Rocas Marine Biological Reserve as a mixed area, considering that it hosts the second largest reproduction site for green turtles in the Southwestern Atlantic and is also an important feeding space for juvenile populations of both green and hawksbill turtles (*Eretmochelys imbricata*). Since 1991, with the establishment of TAMAR research methodology for feeding areas, information on juvenile turtles also came to be systematically acquired through diving (Bellini & Sanches 1993).

The present study reveals focuses on the biometry of green turtles at the Atol das Rocas Marine Biological Reserve (03°45' to 03°56'S and 33°37' to 33°56'W). Captures were associated mainly to the seasonality of reproductive periods, which initiates in December and ends in July (Grossman *et al.* 2002). Juvenile turtles were sampled outside this period. Females were sampled during night monitoring of the Farol Island, always after having laid eggs, being specifically weighed during March 2003. Meanwhile, male and juvenile animals were manually captured through free or SCUBA dives, at depths varying from 0.5 to 25m.

Measurements: included curved carapace length (CCL); straight carapace length (SCL); curved carapace width (CCW); straight carapace width (SCW). A manual Crown AR dynamometer with 50kg capacity and 200g precision was employed for weighing juvenile turtles. Adults were weighed with digital Crown IP65 dynamometer with 500kg capacity and 200g precision, configured to *Live Cargo*, which automatically determines values for cargo that oscillate or move – taking 5 simultaneous measures in 6 second intervals and presenting a mean value for the stabilized cargo.

During the survey period, 368 immature individuals of undetermined sex, 113 males and 331 females were captured (n=812). Of this total, 193 turtles were weighed: 80 juvenile, 62 males and 51 females. We employ the terminology suggested by Musick & Limpus (1997), in which the term "juvenile" describes turtles that have commenced feeding but have not yet attained sexual maturity.

Size frequency distribution (CCL - cm) demonstrated separation between size classes, with a group of smaller individuals of undetermined sex presenting mode at 40cm, and another group formed by adults with accentuated increment at 115 and 100cm (Figure 1). Juvenile turtles, class with smallest medium values for all measured parameters, presented the highest variation coefficients among individuals. Meanwhile adult turtles presented low variation coefficients, demonstrating a more homogeneous population structure regarding the same morphometric characteristics (Table 1). However, the males were on average smaller than females (maleCCL= 0.0651 femaleCCL + 101.52, $R^2 = 0.8739$, $t_{2.58}$=174.67, p<0.001) confirming observations of Sanches & Bellini (2002) and in accordance with Godley et al. (2002), who described a consistent pattern of sexual dimorphism in adult green turtles.

Weight-curved length and curved width-curved length relationships of juvenile turtles (size classes: 29.5 - 86cm) were described by the equations: $y = 5E\text{-}05\ x^{3.2026}$ ($R^2 = 0.9508$, $t_{2.62}$=1.24, p<0.001, n=80); and $y = 0.8986x - 0.3588$ ($R^2 = 0.9616$, $t_{2.58}$=9.90, p<0.001, n=368), respectively. Models describing the same relationships of larger individuals (males and females grouped for posterior analysis; size classes: 94-130cm) were expressed by: $y = 0.2888x^{1.3171}$ (R^2 = 0.4004, $t_{2.62}$=4.29, p<0.001, n=113); and $y = 0.8133x + 12.833$ (R^2 = 0.6252, $t_{2.58}$=6.41, p<0.001, n=444), respectively. The null hypothesis for *isometry* was tested using Student´s *t*-test and values were compared with critical *t* values for *n*-2 degrees of freedom (Davenport & Scott, 1993; Bjorndal & Bolten, 1988). In a general manner, the observed tendencies were *allometric*, with adults demonstrating an accentuated disproportionality for weight increment, when associated to curved length – *positive allometry*. The only exception was the regression coefficient of the weight-curved length relationship

	Undetermined sex	Male	Female
CCL	48 ±11cm (29.5-86cm; 368)	106 ±4cm (94-118cm; 113)	113 ±5cm (96-130cm; 331)
CCW	43 ±10cm (25-76.5cm; 368)	97 ±5cm (76.5-109.5cm; 113)	105.5 ±5cm (92-117.5cm; 331)
SCL	31 ±22cm (30-65.5cm; 58)	99 ±6cm (71-107cm; 45)	105.5 ±5cm (92-115 cm; 38)
SCW	25 ±18cm (23.5-53cm; 58)	79 ±6cm (69-96cm; 45)	83.5 ±4.5cm (73-92.5 cm; 38)
Wt	14 ±10kg (2-41kg; 80)	134 ±14kg (95-176kg; 62)	147 ±18kg (121-191 kg; 51)

Table 1. Morphometric parameters for *Chelonia mydas* in the Atol das Rocas-RN, Southwestern Equatorial Atlantic Ocean, between 2002 and 2006. Values are given as mean ±SD (range; *n*) Wt = weight (kg); CCL = curved carapace length; CCW = curved carapace width; SCL = straight carapace length; SCW = straight carapace width.

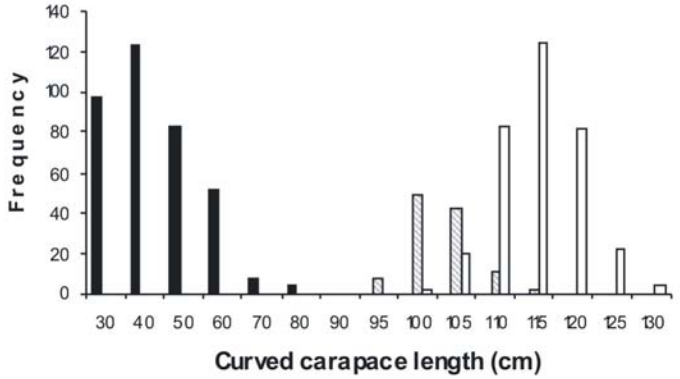

Figure 1. Frequency distribution by size of all *Chelonia mydas* captured during four breeding seasons 2002-2006 in the Atol das Rocas-RN, Southwestern Equatorial Atlantic Ocean (*n*=812). *Black bars* = undetermined sex (*n*=368); *Shaded bars* = male (*n*=113); *White bars* = female (*n*=331)**.**

in juveniles, which presented no significant differences in relative growth, accepting the null hypothesis for *isometry*.

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Epibionts of Olive Ridley Turtles Nesting at Playa Ceuta, Sinaloa, México

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Epibiosis in sea turtles is well documented (Schärer 2003); however, compared to other species of marine chelonians, little has been reported on the epibionts associated with olive ridley sea turtles (*Lepidochelys olivacea*). Here we provide data on the epibionts associated with olive ridleys nesting at Playa Ceuta, Elota, Sinaloa, Mexico - an important rookery area for olive ridleys (Sosa *et al.* 1996). We compare our results to those reported from olive ridleys elsewhere and we demonstrate how epibiont data indicate that there are differences in the internesting behavior of olive ridleys from the eastern Pacific and the Indian Ocean.

Twelve olive ridleys were sampled for epibionts while nesting at Playa Ceuta, Elota, Sinaloa, Mexico from July-December 2006. The mean curved carapace length for the turtles sampled was 65.3 cm (±1.8 SD range: 60-69 cm). Conspicuous epibiota were removed and fixed in 10% formalin. For storage, epibionts were removed from formalin, rinsed and placed in 70% isopropyl alcohol. Samples were sorted and identified to the lowest taxon possible. Because the focus of this study was to document the diversity of epibionts present on olive ridleys in Sinaloa, epibiont species that had already been collected were not sampled in subsequent observations. Thus, we do not provide data on the frequency of occurrence of the epibionts described herein. Additionally, due to the possibility of infection, burrowing barnacles from the skin of olive ridleys were not removed. However, we are currently undertaking studies that examine these species from dead olive ridleys that strand at Playa Ceuta and these results will be presented in a later report.

We identified 5 epibiotic species from olive ridleys nesting at Playa Ceuta (Figure 1). Coronuloid turtle barnacles, *Chelonibia testudinaria* (Figure 1A), were largely confined to the anterior portion of the carapace, particularly along the anterior margin and

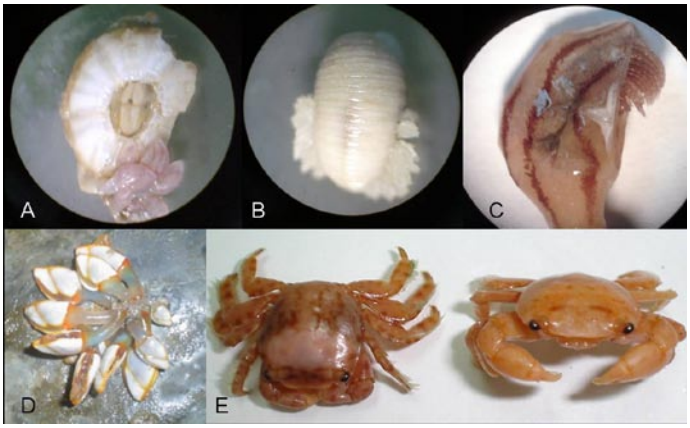

Figure 1. Epibionts collected from *Lepidochelys olivacea* nesting in Sinaloa: A. *Chelonibia testudinaria* with specimens of *Conchoderma virgatum* attached, B. *Ozobranchus branchiatus*, C. *Conchoderma virgatum*, D. *Lepas anserifera*, E. *Planes cyaneus* heterosexual pair, female (left) and male (right).

occasionally on the underside of the posterior margin of the carapace near the tail. Leeches, *Ozobranchus branchiatus* (Figure 1B), were commonly attached to the soft skin of the shoulder region, adjacent to the flippers and the soft skin areas on the underside of host turtles. Lepadomorph barnacles, *Conchoderma virgatum* (Figure 1C) and *Lepas anserifera* (Figure 1D), were commonly found attached to the neck and shoulder regions of host turtles, often in high densities and appearing from afar as leeches. *Conchoderma virgatum* was also common on the flippers and plastron and was occasionally found attached to specimens of *C. testudinaria* (Figure 1A). *Lepas anserifera* was also found attached to the posterior third of the carapace (Figure 1D) and ours is the first report of this species from olive ridleys. Grapsid crabs, *Planes cyaneus* (Figure 1E), were collected from the underside of turtles in the tail region, always appearing as heterosexual pairs.

Our results coincide with other epibiont studies conducted on olive ridley nesting beaches along the Pacific coast of Mexico: La Gloria in Jalisco (Hernández-Vázquez & Valadez-González 1998); Playa Calabazas in Michoacán, and Playas Escobilla and Morro Ayuta in Oaxaca (Gámez Vivaldo *et al.* 2006). That is, ridleys nesting in this area host relatively few epibiont species, and the non-obligate species present are largely pelagic/oceanic in nature (i.e. *C. virgatum*, *Lepas* sp. and *P. cyaneus*). Conversely, studies conducted on the epibionts of nesting olive ridleys in Orissa, India report largely benthic/neritic non-obligate species from ridleys in this area (Frazier *et al*. 1985; Mohanty-Hejmadi *et al*. 1989). Apparently there are internesting behavior differences between these two widely separated olive ridley populations despite the fact that both populations are conspecific. Thus, it appears that olive ridleys nesting along the west coast of Mexico spend a great deal of time at or near the water surface during the internesting period (possibly in oceanic habitats), whereas ridleys nesting in India spend a substantial amount of time in coastal habitats during internesting periods (possibly in benthic or estuarine habitats). Telemetry studies on Mexican and Indian olive ridleys would help to reinforce these differences in internesting behavior.

While examining the literature on the epibionts of olive ridleys we encountered several incorrectly identified epibiont species illustrated by Gámez Vivaldo *et al*. (2006). The aforementioned study provides four photographic figures, three of which are incorrectly described (therein Figures 1, 3 & 4). Figure 1 is labeled as 'Crustacea: Cirripedia: *Conchoderma virgatum*', but is actually a photograph of several *Lepas* sp. barnacles. Figure 3 is labeled 'Crustacea: Cirripedia: *Chelonibia testudinaria*', but actually depicts three different obligate commensal barnacle species: *C. testudinaria* (top left), *Stomatolepas* sp. (top right) and *Platylepas hexastylos* (bottom: dorsal view/left, ventral view/right). Figure 4 is labeled 'Crustacea: Amfipoda [sic]: *Caprella* sp.', but actually depicts Gammaroid amphipods, likely the obligate commensal of marine turtles: *Podocerus chelonophilus*. Another study from Mexico, Hernández-Vázquez & Valadez-González (1998), reports Gammaroid amphipods from nesting olive ridleys but does not identify the species in question. Future studies on the Gammaroid amphipods of olive ridleys should seek to identify the species in question as a record of *P. chelonophilus* would be the first for any marine chelonian other than loggerheads (*Caretta caretta*).

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Self-Grooming by Loggerhead Turtles in Georgia, USA

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Numerous studies have documented the plants and animals, collectively referred to as 'epibionts', that grow upon loggerhead sea turtles (*Caretta caretta*) (Dodd 1988). The first comprehensive study of the epibionts of loggerhead turtles was that of Caine (1986). Caine notes that some of the nesting turtles that he observed from South Carolina and Florida, USA hosted few or no carapace epibionts but bore lengthwise scratch marks instead (Figure 1). He attributed these scratches to turtles wedging themselves into coral crevices during periods of rest, or to the active removal of epibiota by host turtles scraping against hard substrates. The latter possibility seemed most plausible to Caine because Limpus (1980) had noted that turtles in aquaria are observed to scratch themselves against submerged objects, a behavior also noted by Parrish (1958). A recent study of loggerheads in Greece found that turtles will utilize submerged objects, in this case a derelict ship's anchor, to rub barnacles and other epibionts from their carapace (Schofield *et al.* 2006). We have observed similar behavior from loggerhead turtles at NOAA's Gray's Reef National Marine Sanctuary, Georgia. The present observations involve loggerheads removing epibionts by rubbing against limestone ledges rather than anthropogenic debris.

On May 24, 2005 at 1505h EDT National Oceanic and Atmospheric Administration divers conducting fish counts at Gray's Reef photographed a juvenile-sized loggerhead turtle actively grooming itself beneath a limestone ledge located in 19 m of water (http://www.seaturtle.org/cgi-bin/imagelib/index.pl?photo=3478). Water temperature at this site was 24°C at depth. The turtle was seen using its flippers to elevate its carapace into contact with the undersurface of the ledge. The turtle then began moving forwards and backwards and side to side to remove barnacles that were situated on the left side of the carapace. This episode lasted approximately ten minutes. Another observation in July 2007 indicates that adult-sized turtles also utilize these ledges for the purposes of grooming (/www.seaturtle.org/cgi-bin/imagelib/index.pl?photo=3479).

The vigorous activity of grooming both stirred up the sediments beneath the turtle and contributed to the particulate matter suspended in the water column in the form of barnacle fragments, displaced epifauna from the ledge, and limestone fragments chipped-away from the ledge by the turtle's behavior. Marine geologists consulted by the authors indicate that the arched ledges associated with turtle grooming are not likely the result of erosion by currents and are not naturally-shaped formations (Clarke Alexander, Georgia Southern University, pers. comm.). Instead, geologists concurred that these ledge types are actually scours created as a result of the abrasion generated by the frequent grooming behavior of local turtles. Moreover, arched ledges on the reef where turtles have not been observed grooming can also be classified as turtle grooming sites. Fragments of the obligate commensal turtle barnacles (*Chelonibia testudinaria*) often litter the floor of these sites (www.seaturtle.org/cgi-bin/imagelib/index.pl?photo=3480) – indicating the prior grooming activities of sea turtles and further linking these unique, arched structures to sea turtles.

Such observations are critical in ascertaining the importance of certain marine habitats in the life history of sea turtles and, therefore, are important in drafting and implementing sound management strategies regarding the recovery of foraging turtle populations. Moreover, our observations may indicate methods by which satellite tagged turtles might remove telemetry devices from their carapace.

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Figure 1. Scratch marks on the carapace of a nesting loggerhead turtle at Wassaw Island, Georgia, USA.

IUCN-SSC Marine Turtle Specialist Group Quarterly Update

Nicolas J. Pilcher[1], Roderic B. Mast[2] & Brian J. Hutchinson[2]

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Progress on Global Redlisting. Conducting global assessments is one of the principle mandates of the MTSG, and one which we have pledged to achieve. Countless non-profits and governments use the IUCN Red List to set priorities for conservation and policy actions around the world, and it is our job to assure that these are up-to-date and defensible for all the sea turtles. The ASC has an ambitious plan for completing assessments and re-assessments of all sea turtle species as part of an ambitious work plan undertaken by the Assessment Steering Committee (ASC), under the Chairmanship of Milani Chaloupka.

The IUCN Red List Standards and Petitions Working Group (SPWG) has approved a status of Vulnerable (A2bd) for the olive Ridley, as recommended by the ASC. This comes at the end of a long process that included a 2006 petition of the former EN listing, and the submission of a new draft assessment prepared by Alberto Abreu and Pamela Plotkin. The details of the process are summarized in a memo from the SPWG that can be seen at the MTSG website. We encourage all the members to read this enlightening memo, as it demonstrates the processes and complexities of the work of species Red Listing. Congratulations and deep thanks to the reviewers, Alberto Abreu and Pam Plotkin.

The hawksbill draft assessment will also be submitted soon to the IUCN. A 2-month member review generated numerous comments; a number of respondents came out in favor of the final hawksbill assessment, and support was echoed for the robustness of the data analysis and level of effort expended on the assessment. Congratulations to Jeanne Mortimer and Marydele Donnelly for a job exceptionally well done. Soon to come are the Red List Assessments for the loggerhead and flatback as well, if all goes according to the ASC's plan.

Thanks also to all who contributed to the lively on-line dialogue related to the IUCN Red List criteria as they apply to marine turtles. In brief, several members have argued that the IUCN Red List criteria are not well suited for widely distributed and long-lived species such as marine turtles, and have urged the MTSG to liaise with IUCN to consider the development of criteria, either global or regional-scale , that would result in better reflecting the status of marine turtles. This important issue was addressed at the MTSG Burning Issues Workshop in August, 2006, at which time a study was commissioned. That study has resulted in a recently drafted "White Paper" on the topic of sea turtles and the IUCN Red List criteria, in which Jeff Seminoff and Kartik Shanker outline several options and opportunities for moving forward in ways that enhance our abilities to properly assess extinction risk in sea turtles. This document will soon be made available for broader member review, and it will be the topic of discussion at the 2d of two MTSG gatherings to be held at the XXVIII Sea Turtle Symposium in Loreto, Mexico on Saturday January 26 from 09:00-12:00.

The MTSG has also committed to pursuing regional assessments to define priority populations for conservation attention, and we are currently planning a regional workshop (S. Atlantic) to take place in Uruguay in October. The regional assessment for Mediterranean sea turtles will soon be completed also.

MTSG Representation at Meetings. The MTSG leadership has spent the last few months representing the MTSG at various fora, and summaries of those meetings are presented below.

The IUCN/SSC Sustainable Use Specialist Group (SUSG) convened a Strategic Planning Meeting during 10-13 July 2007 at White Oak Plantation, Florida, to which Co-Chair Nicolas Pilcher was invited as representative of the MTSG. The meeting was hosted by the Chair of the SUSG Jon Hutton and the Chair of the SSC, Holly Dublin. The meeting was convened to review the mandate and *raison d'être* of the SUSG, particularly as it relates to the Precautionary Principle guidelines adopted by IUCN at its 67th meeting of the IUCN Council on 14-16 May 2007. The meeting was attended by a number of SUSG Steering Council members, TRAFFIC, the IUCN Species Programme, and a number of Specialist Group Chairs. The meeting was preceded by the distribution of an interesting review of the sustainable use (SU) and how it relates to the precautionary principle (PP) by Rosie Cooney, who originally drafted the guidelines for IUCN. Many interesting questions were considered -- What is meant by sustainable use? Does it mean consumptive use? Does it include non-consumptive use? Does consumptive use include extraction of plants, or parts of plants? The IUCN definition of sustainable may be completely different in other sectors of society. For instance, some groups refer to the sustainable use of refrigerators – so if you thought the MTSG grapples with these concepts, as was raised during the last AGM, be aware that the world at large grapples with an even wider issue: what do people mean? What is sustainable and what is not?

The meeting addressed a number of points related to the use of flora and flora (including various uses of marine turtles, both consumptive and non consumptive and examples of sustainable and unsustainable use), and examined how to move forward with regard to the concept of use. A final report by the SUSG is pending, and will be made available to the MTSG membership at our website once released.

Shortly after the SUSG meeting in Florida, a second meeting of the Marine Conservation Subcommittee of the SSC was convened in Gland, Switzerland (IUCN headquarters), and this meeting was also attended by Co-Chair Nicolas Pilcher.

Chaired by Claudio Campagna and Yvonne Sodovy, the MCSC is responsible for advising and assisting the Chair of the SSC on all marine matters. The Gland meeting was convened to move forward with priorities identified in the strategic planning and preparatory meetings (August 2006 and December 2005; a copy of the reports from these meetings is available upon request). The core aim was to decide on focal actions for the next few years, and determine where the MCSC should invest efforts and resources. The first segment

of the meeting was taken up with short updates by members related to their relevant interests and focal areas (Global Marine Species Assessment, bycatch, invasive species, etc) following which the group prioritized activities developed and augmented since the previous meeting. A significant portion of the meeting was also related to the activities of the MCSC at the upcoming IUCN world congress in Barcelona in 2008. While the MCSC and related meetings are not aimed specifically at marine turtles, it does allow us to keep marine turtle conservation issues towards the top of the priority list for IUCN. A final report of this meeting is pending.

Finally, we report on the progress of the dialogue between the Tata group of companies and IUCN regarding the proposed development of a port on the coast of Orissa, some 15 km from Gahirmatha, one of the key mass nesting beaches in India – and the world for that matter. In an earlier update we noted that IUCN had been requested to look into the case and determine options for the path forward. A report of the original scoping mission conducted in December 2006 can be found at www.dhamraport.com/download/dhamraport_iucnreport.pdf. This is an interesting and widely disputed case as previous arguments have rarely addressed the biology of the turtles themselves, and have more often than not been generalized and ineffective. At present the construction of the port is being contested in the high court in India, and no resolve is expected any time soon. However, in the meantime development of the port continues. It is IUCN's viewpoint that no port would be a great option, but *if* the port is to be developed, IUCN would much rather it be developed while taking on board the very best mitigation measures (for example during the dredging work period, and for lighting) then with none at all. These mitigation measures would rely in great part on the MTSG and its colleagues, given the longstanding history of dealing with these exact issues, and for that reason N. Pilcher has been involved in the discussions related to the port development and IUCN at the request of the SSC Chair. Recently Nick presented the options and alternatives and potential scenarios to all IUCN member organizations at a meeting in Delhi, which drew both favorable and unfavorable responses. Some NGOs argue that the port would be a complete catastrophe for turtles in the region, while others contend that development will inevitably take place, and that they would much prefer it to be guided by sound science and mitigation efforts.

IUCN's position has been criticized by some agencies, who claim it capitulated to industry and gave the green light to continue to build, but this could not be further from the truth: The port has all clearances required by the Indian and Orissa State governments and is proceeding with construction. IUCN, being neither an advocacy body not able to interfere with the laws of any sovereign nation, can not force the port to stop construction – the port made it very clear that this was not one of their potential solutions. Only the High Court in India may do this, and they have not done so to date. Given this situation, and the fact that construction is ongoing, IUCN sees a role in mitigating to the fullest extent any potential impacts the port may have. IUCN does not 'greenstamp' commercial interests, and neither will it support efforts which are clearly going to mean the complete loss of major turtle populations. In the interests of turtles, we feel the MTSG should continue to be involved in this process, and we will keep you updated as developments occur.

The MTSG AGM will take place on Tuesday, January 22d from 08:00-09:00 in Loreto, Mexico at the XXVIII Sea Turtle Symposium. Please come one and all.

ANNOUNCEMENTS

Raine Island, World's Largest Green Turtle Nesting Population, Given Highest Protection Status

Colin J. Limpus

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22 August 2007, Brisbane: The Premier of Queensland, Peter Beattie, and the Queensland Environment Minister, Lindy Nelson-Carr, announced today that the world's largest known green turtle population, at Raine Island (Figure 1) off Cape York Peninsula in the northern Great Barrier Reef, will be safeguarded following an historic National Park (Scientific) agreement between the Queensland Government and traditional owners.

Raine Island becomes just the eighth area in Queensland to be granted National Park (Scientific) status and the first for six years. This status is only granted to areas to protect species or habitats of exceptional scientific value. In practical terms, that means only those people with permission to monitor or study this vital turtle rookery will now have access to the fragile island.

Not only does Raine Island have the largest known green turtle nesting population in the world with tens of thousands of turtles coming to lay their eggs each year, it is home to the endangered herald petrel and the vulnerable red-tailed tropic bird and is arguably the most significant seabird rookery on the Great Barrier Reef.

The Queensland Government has signed an historic new Indigenous Land Use Agreement (ILUA) with Aboriginal and

Figure 1. Green turtles coming ashore at dusk for nesting at Raine Island, December 2006. Photograph by Duncan Limpus.

Torres Strait Islander traditional owners - the Wuthathi people from Shelbourne Bay who identify as native title holders and the traditional owners of the area, and the Erubam Le of Darnley Island, the Ugarem Le of Stephen Island and Meriam Le of Murray Island, who identify as the Torres Strait native title holders of the area.

Environment Minister Lindy Nelson-Carr said the Environmental Protection Agency negotiated the ILUA with the stakeholders in a process convened through the National Native Title Tribunal. The agreement recognises the Traditional Owners' connection to the place and respects the need to jointly manage and conserve Raine Island and its surrounds. The Traditional Owners will work with the Queensland Government to manage and conserve the island's values and they have agreed not to take any flora or fauna from the national park, while allowing for a limited take of fish and invertebrates from the surrounding three nautical mile zone. The EPA will be able to continue its successful monitoring and conservation of the tens of thousands of green turtles that come ashore on the island each year to nest.

Green turtles migrate to breed at Raine Island from coral reef and seagrass pastures within a 2,500 km radius of the island (Figure 2). This dispersed foraging population is the focus of probably the largest take of green turtles from the wild by coastal communities throughout eastern Indonesia, southern Papua New Guinea, northern Australia, including Torres Strait, and to a lesser extent in Vanuatu and New Caledonia. In addition to being hunted for food, the green turtle is significant because it is iconic, including totemic significance, within the traditional custom of many of the coastal peoples of this region. The biology of this nesting population has been summarised by Limpus *et al*. (2003).

LIMPUS, C.J., MILLER, J.D., PARMENTER, C.J., AND LIMPUS, D.J. 2003. The green turtle, *Chelonia mydas* , population of Raine Island and the northern Great Barrier Reef: 1843-2001. Memoirs Queensland Museum 49, 349-440 (Available upon request from author).

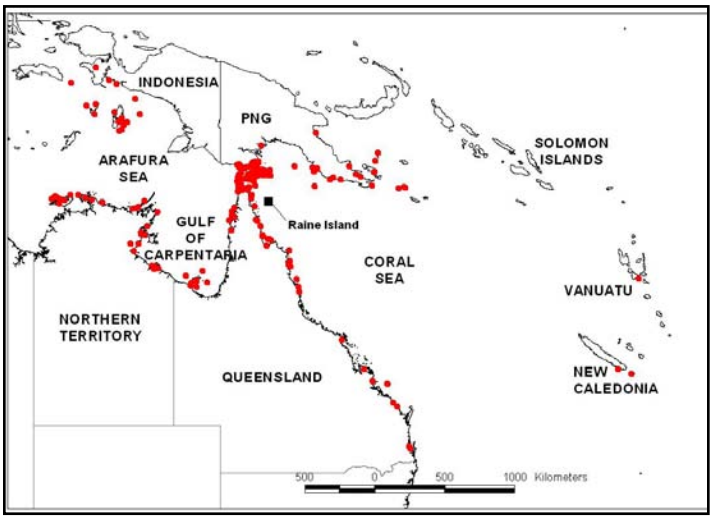

Figure 2. Foraging area distribution of green turtles that breed at Raine Island and adjacent islands, based on tag recoveries (dots).

Update: 28th Annual Symposium on Sea Turtle Biology and Conservation Loreto, Baja California Sur, Mexico January 19-26, 2008

Wallace J. Nichols
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Hopefully everyone that intended to submit an abstract for the 2008 International Sea Turtle Symposium already did, as the deadline has now passed on September 15th and we are on track for a nice, big meeting. However, it is not too late to register for the symposium, and we encourage you to do so as soon as possible in addition to booking your travel plans through Journey Mexico. Airline tickets and hotels are beginning to fill up, so don't miss your chance. Don't hesitate to contact us for travel advice. Travel arrangements can be made at: http://www.journeymexico.com/register.php.

Please note that if you would like to edit your registration information (ie sign up for the Opening Social or Banquet, add a vendor table, or sponsor a room or coffee-break) you can still do so until further notice.

We also would like to remind everyone of this year's "green initiative", called the LIVE BLUE Challenge. It seemed long overdue that annual sea turtle conferences work hard to minimize their ecological imprints, so this year we chose to take on this challenge and would like to ask all attendees for their help. What does this entail? Well, don't forget to pack your handy camping utensils such as cups/mugs, sporks, etc. and don't be afraid to sleep under the vast Baja night sky. We are working hard to provide sustainable, local and organic products and experiences in Loreto, including, symposium paraphernalia, seafood, tequila, and fieldtrips. Since all events will be held in beautiful, historic downtown Loreto, everyone is encouraged to walk, ride bikes, use public transportation, share rides and enjoy the fresh air.

Please consider bringing some interesting and fabulous items for the ISTS auction. Keeping our "LIVE BLUE" theme in mind.

If you would like to register for a vendor table please contact Celene Nahill (luna_bedoya@hotmail.com). Vendors will set up beginning after the January 22nd opening social and first thing in the morning on 23rd January, with exhibit times from 9am-6pm on 23-25 January. Vendor table takedown is 25-26 January.

Anyone who is interested in volunteering at the symposium please contact Elena Finkbeiner (elena@seaturtle.org). Bilingual volunteers and people with technical expertise are needed. Please note that the International Sea Turtle Society is unable to pay registration or travel accommodations for volunteers. However, anyone who already applied for a travel grant (deadline for grant applications was on 15 September) qualifies for consideration of travel aid. We are also looking for people who have extra space in their hotel rooms and vehicles to share, as we'll have a full house in Loreto.

Safe travels to all and we hope to see you in January!

Democracy in International Sea Turtle Society

Board of Directors, International Sea Turtle Society
www.seaturtle.org/ists

The International Sea Turtle Society brings people together to promote the exchange of information that advances the global knowledge of sea turtle biology and conservation (ISTS Constitution http://www.seaturtle.org/ists/). The ISTS is a member organization, and membership is open to anyone who supports this mission and who pays their annual dues (currently US $25).

An elected Board of Directors (BOD) oversees the activities of the ISTS. Currently, BOD activities are focused primarily on the general function of the society and on organizing the Annual Symposium, but as the society grows, its activities are also likely to expand. We encourage all members to think carefully about who should represent them on the BOD and Nominating Committee, to make nominations, and to vote in annual elections. The current Board has been working to make the process of nominating and electing Board and Nominating Committee members more transparent and accessible. For example, nominations for Board and Nominating Committee members now come primarily from the membership-at-large (nomination criteria and procedures are described at: http://www.seaturtle.org/ists/nominations.php), with the process overseen by the elected Nominating Committee.

We are taking further steps to improve this process. To date, voting has taken place at the ISTS Plenary meeting, held at the Annual Symposium. In order to increase member participation in ISTS elections, we are now moving to an on-line voting system, which the membership recently approved in on on-line ballot (296 in favor, 2 opposed, 8 abstentions). Beginning with ISTS 2008, on-line voting will be open one month prior to the Symposium. In this way, members will be able to vote, regardless of whether they attend the Symposium. Computer terminals will also be available on site at the Symposium, and voting will close at midnight the day before the Plenary. Election results will be announced at the Plenary.

In order to vote, you must be a member in good standing. Members can continue to pay their dues when they register for the symposium (http://iconferences.seaturtle.org/); alternatively, those who will not be attending the Symposium can pay their dues separately (http://www.seaturtle.org/ists/membership.php). Membership in any year will now begin at the start of the on-line voting period and expire before the beginning of the next on-line voting period, regardless of when dues are paid. For example, if you have already registered for ISTS 2008, membership fees paid with registration will apply when on-line voting opens in December 2007.

In 2008, the following positions will be filled: BOD (2 positions open) and Nominating Committee member (2 positions open). Notice will be sent to ISTS members when on-line voting opens. We encourage all members to review the terms of reference for positions and information on the nominated candidates, and to vote. This is your Society and every member should play a role in determining its leadership.

Organizational Profile: Peyu Project – Sea Turtles of Argentina

José Luis Di Paola, Marcela Iglesias, Cintia Echenique, Luis Maina, Daniela Campanella, Susana Lapergola, Natalia Gonzalez, Natalia Irurita, Mercedes Barbara, Tania Giuliani, Lucas Dalessandro & Laura Prosdocimi
Proyecto Peyu - Tortugas Marinas de Argentina - PRICTMA Facultad de Ciencias Naturales y Museo - Universidad Nacional de La Plata, Calle 122 y 60 - La Plata - CP 1900 Buenos Aires – Argentina
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Peyu Project was founded in 2001 by a group of young graduate students from La Plata, Buenos Aires and El Salvador Universities. Peyu Project is the first group dedicated entirely to the conservation and research of sea turtles that inhabit the Argentinean waters, namely: green turtle (*Chelonia mydas*), loggerhead sea turtle (*Caretta caretta*) and leatherback turtle (*Dermochelys coriacea*).

In the past six years, our efforts have focused on the study of sea turtles and their status in Argentina. Much of our work has been motivated and informed by our experience working with sea turtles that we acquired in other countries. Also, the lack of information available about sea turtles in Argentina prompted us to organize this group in collaboration with other national and international organizations.

Peyu Project works on conservation, research and education as related to sea turtles in Argentina and the wider Atlantic. Some examples of our work include the following:

1. Collection and identification of gastrointestinal parasites;
2. Collection of sea turtle tissues for genetic studies;
3. Investigation of diet composition of sea turtles, including identification of vascular plants, algae and invertebrate taxa;
4. Behavioral studies of green and loggerhead turtles in captivity
5. Collaboration with fishermen to identify spatio-temporal distribution of sea turtles in coastal waters. Initial data indicate that Bahia San Borombóm and Bahia Blanca are two locations with high density of sea turtles (Figure 1).

On a national level, Peyù Project is member of PRICTMA, the Regional Program for Research and Conservation of Sea Turtles in Argentina, which is a collaboration among the Buenos Aires Aquarium, Aqcuamarina Foundation, Mundo Marino Foundation and Bahia Blanca Reserve. On the international level, our project participates in the meetings for the Conservation of Sea Turtles in the Southwestern Atlantic Ocean (ASO), which includes other groups from Uruguay and Brazil.

In the future, we plan on continuing with all our current programs, including education, conservation and research, particularly in the south of Buenos Aires Province, where to date there are little information available on sea turtle occurrence. More information can be obtained at our website: www.proyecto-peyu.com.ar

Aknowledgements: Universidad Nacional de La Plata, Facultad de Ciencias Naturales y Museo, Embajada de Inglaterra en Buenos Aires, Proyecto Karumbe – Tortugas Marinas de Uruguay, Jardín Zoológico de La Plata, Gabriela Gorritti, Jack Frazier, Luis Maina, Jorge Williams, Alejandro Falabrino, Hedelvy Guada, ASO members, International Sea Turtle Society.

Figure 1. Map of Argentina, highlighting the coastal zone of the province of Buenos Aires and two areas of observed high density of sea turtles.

The Sixth Reunion of Mediterranean Sea Turtle Specialists at the 27th Annual Symposium on Sea Turtle Conservation and Biology (Myrtle Beach, SC, USA, 24 February 2007)

Dimitris Margaritoulis & Paolo Casale

MTSG Regional Co-Chairs for the Mediterranean (E-mail: margaritoulis@archelon.gr; paolo.casale@tiscali.it)

The Reunion of Mediterranean Sea Turtle Specialists within the context of the Annual Sea Turtle Symposia brings together scientists, conservationists and students working with sea turtles in the Mediterranean. These gatherings promote regional cooperation, disseminate recent information on events concerning conservation and research, and create a basis for planning and organizing regional projects. This year's meeting was held in Myrtle Beach, South Carolina (USA) at the venue of the 27th Sea Turtle Symposium (Embassy Suites Hotel), on 24 February 2007. Twenty four people from eight countries participated.

The meeting began with a short introduction by DM who emphasized the importance of these annual meetings and introduced PC as his co-chair for Mediterranean of the IUCN's Marine Turtle Specialist Group. DM invited PC to chair the present meeting and to take over the task of organizing these meetings in the future, which responsibilities PC readily accepted. Then all participants introduced themselves and a draft agenda, previously posted at the regional listserv MedTurtle, was finalized. The main items discussed at the meeting were the following:

Country-by-country update

Recent events, related to sea turtle conservation and research, were presented by participants for the following countries:

Spain: Turtle work is expanding in terms of numbers of researchers and groups and new work with genetics and telemetry has been initiated.

Italy: Several large, unspecified, projects are underway or planned. There remains a problem with competition among various groups but is not too severe.

Croatia: Satellite telemetry has started in cooperation with Slovenia and Italy. Ten year studies on sea turtle over-wintering, genetics and foraging have been completed and a new exhibition on sea turtles is planned for April 2007.

Greece: A video was shown on the controversial issue at Daphne beach within the boundaries of the National Marine Park of Zakynthos. Illegal buildings started to be erected behind this protected beach in 1984 and now there are about 14 of them. The issue is highly political and the authorities seem unwilling to demolish them. The two options, i.e. demolition of the illegal buildings or incorporation of them in the facilities of the Park, as was done under a pilot scheme in 2006, were presented. Compromise with local owners eventually saw the condition of the nesting beach improve and beach use regulated. Further, summaries of the monitoring and public awareness projects in Greece together with news of expansion of the Rescue Centre at Glyfada and results from the National Stranding Network were presented. The alarming news came from Crete where long-term monitoring data sets show signs of population declines. Taking this example, the value of long-term standardized monitoring projects was highlighted. Lastly it was noted that a draft National Action Plan for the conservation of sea turtles has been submitted to the government.

Turkey: Because of a change in the way that the authorities auction beach monitoring, now new researchers are involved every year who cannot see the year-by-year beach changes. Further, new

nesting beaches have been surveyed and national genetic studies for loggerheads and greens have been started. Additionally a National Action Plan has been drafted.

Libya: A video presentation has shown the expanding beach monitoring work. During the video there was a general discussion on the direct take of turtles in Libya and the impact of fisheries on turtles which nest at the northern coasts of the Mediterranean.

Syria: Information was presented that conservation work continues and efforts are underway to create a protected area for the recently discovered green turtle nesting beach near Latakia, but there is opposition from the Ministry of Tourism.

Cooperative projects

The following regional projects were discussed:

Regional genetics: Spanish colleagues are conducting a regional genetics study for the green turtle, into which several Mediterranean countries participate. However, Turkey will be doing a similar national study, undertaken as PhD researches. Then the green turtle findings will be fed into the regional study.

FP7 project: The option for collaboration on an FP7 project was raised. 'Brain storming' by email was suggested before more concrete actions be decided at another meeting.

Stable isotopes for green turtles: A suggestion to study food selection of greens from around the Mediterranean requested assistance in obtaining carapace scale samples from stranded green turtles together with *Cymodosea nodosa* and *Posidonia oceanica* sea grasses.

Project GloBAL: An international proposal was brought forward to collect bycatch data from across taxa (birds, turtles, mammals) which should result in identification of suitable mitigating measures. This stimulated brief discussion on regional bycatch projects, networking issues and the number of telemetered turtles proven to be caught in fisheries.

Regional Red List Assessments

DM briefly described the situation of the regional red list assessments, which are the first regional ones to be undertaken by the IUCN's MTSG. The draft for *Dermochelys coriacea* (assessor: Paolo Casale) has been completed and is currently available on the MTSG website. Andreas Demetropoulos (assessor for *Chelonia mydas*), not present at the meeting, will provide in the next few months a draft for the green turtle. Bojan Lazar (assessor for *Caretta caretta*) gave an in-depth presentation of the process for the loggerhead turtle. Discussion followed that included suggestions of comments on non-nesting beach issues, separating the populations in analysis as indicated through genetic analysis and the validity of modelling methods used.

MTSG Med website

Urgent update of the Mediterranean web site (hosted by the MTSG web site) was agreed. Alan Rees was proposed and accepted to undertake this task as the new web-master for the Med MTSG web site, in collaboration with the MTSG Regional Co-Chairs.

Other matters

Brief mention were given to the 3rd Mediterranean Sea Turtle Conference to be hosted in Tunisia, the revision of the UNEP's RAC/SPA Mediterranean Action Plan for the Conservation of Marine Turtles, and the 14th European Congress of Herpetology held in Portugal in September which will have a special session on sea turtles.

Acknowledgements: We thank (1) all participants for their active involvement, (2) Alan Rees for drafting the minutes, and (3) the Symposium organizers for securing the meeting room and projector.

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.

GLOBAL

Scientists Deliver Sobering News in 'The 11th Hour'

In a world full of exhaust fumes, marine biologist Wallace J. Nichols is like a breath of fresh air. But some of his words might make you choke. "This is it," Nichols speaks candidly of global warming. "No kidding — this is our 11th hour. We have to rise to the occasion." The local research associate for San Francisco's California Academy of Sciences is turning heads with a slew of other like-minded scientists in "The 11th Hour," which opened Friday. More than 50 scientists and dignitaries — from Stephen Hawking to Mikhail Gorbachev — are spotlighted in a project that DiCaprio produced and narrates, and sisters/filmmakers Nadia Conners and Leila Conners Petersen directed. Collectively these eco patriots issue a warning: The planet can't be healed with a verbal bandage. But Nichols, who lives in Davenport and has been with CAS for more than seven years, says that when it comes to global warming, "we are essentially talking about an ocean issue. "Oceans make up 75 percent of the planet," he adds. "If the planet is warming, the ocean is warming. If the ocean warms, even a little bit, we are in trouble. As go the oceans, so goes life on planet Earth." Another dilemma the film addresses is over-consumption, something that ignites co-director Leila Conners Petersen. "People are more consumers than citizens these days," she says. "We all need to rediscover what it means to participate in life with other people. It's not just about what we do to ourselves and with our families, we all live in community. That's what this film, this whole movement is about." In the meantime, between all the acid rain, drought, famine, flooding, hurricanes, record rainfall

and having the highest average global temperatures in recorded history, Nichols and others find hope. "I'm not fond of saying, 'change your light bulbs, carpool and ride your bike,' as if that's the answer," he says. "That's part of it. I'm much more interested in helping people express themselves and take it to another level. It's speaking out, especially young people — young activists who are pretty fearless and can shake things up." Source: *The Examiner*, 25 August 2007.

EUROPE

Almería nature park, possible new nesting site for Loggerhead Sea Turtle

Eighty Loggerhead Sea Turtle eggs from Cabo Verde are being buried this week on the beaches of the Cabo de Gata natural park, in Almería, in a programme which Ideal Almería reports aims to determine if Spanish beaches are suitable as nesting sites for the reptile. They will be collected after a week, just as they are about to hatch, and the baby turtles taken to the Biological Station in Doñana, to be reared in captivity until they are one year old before being released. Ten turtles which have already reached that stage are being released in Cabo de Gata this week, with hopes that they will return to the beach to lay their eggs. A similar programme takes place in the Canary Islands this week, where 800 *Carretta carretta* eggs, known as the Tortuga Boba in Spain, are to be buried on beaches in the islands. Source: *TypicallySpanish.com*, 01 October 2007.

Hezbollah on hand to help baby sea turtles

Being a sea turtle is difficult; sharks, fishermen and a dwindling habitat have all taken their toll. Using the beaches of war-ravaged Lebanon as a nesting site has not made life any easier. So it must have felt like the final straw when the foxes turned up. Driven from the coastal hills by the 34-day bombardment last summer, the red foxes took refuge on the last wild beach in the country. There they discovered the eggs of the rare green and loggerhead turtles, midway through their five-month nesting season. This year, the turtles have returned, but so too have the foxes. Lebanon's woes had already led to many ups and downs for the turtles. The Israeli gun boats that patrolled offshore during the 25-year occupation of southern Lebanon kept locals off the beach at night when the turtles come ashore to nest each summer between May and October. But while Israeli warships were inadvertently protecting the sea turtles, United Nations peacekeepers were creating havoc. Soldiers from the Fijian contingent were paying fisherman $10 a piece for the turtles, a delicacy in their native archipelago, until local conservationists convinced a sympathetic UN general to put a stop to the practice. The mile-long strip of beach on which they nest is split between two municipalities, one is controlled by Hezbollah, the other dominated by the rival Amal party. Hezbollah has proven itself a friend of the sea turtle, declaring its half of the beach a protected area. Amal has steadfastly refused. Now, with 20,000 Lebanese army troops stationed in south Lebanon, the turtles face a new set of challenges. The soldiers have set up camps along the beach and ripped up foliage to make a football pitch. Source: *Sunday Telegraph*, 20 August 2007.

Marine Visitor is a 'First' for Gairloch

A leatherback turtle, a species more normally associated with the balmy, turquoise waters of the Caribbean, has been recorded for the first time in the seas off Gairloch in Wester Ross. The two-metre reptile was spotted by passenger Mike Cleavin when he took a two hour survey cruise with Gairloch Marine Life Centre and Cruises on Tuesday. At first he thought the creature was a seal but as the animal swam closer to the boat the eleven passengers and guide Ian French, a marine biologist, were able to clearly identify it as a leatherback turtle. "We've been running survey cruises in the area since 1989 and this is the first time a leatherback turtle has been recorded in this area." The leatherback is the largest of the marine turtles and gets its name from the black, leathery skin that covers its shell. Leatherbacks are unique amongst reptiles in that they have some internal control of their own body temperature, so can forage in temperatures lower than 5 °C and can dive to depths of over one kilometre. They are usually about two metres long and weigh around 600 kgs. Five species of marine turtle have been recorded in UK and Irish waters. Leatherbacks are the most commonly sighted marine turtle species in UK seas, usually seen during the summer, and are believed to migrate thousands of kilometres across the Atlantic Ocean to feed on our abundant jellyfish. This is the fifth sighting of a leatherback this year in UK waters — records have been unusually scarce this year with only two live sightings in English waters, one live turtle spotted in Scottish waters and one found dead after being stranded on Scottish shores. Source: *Ross-shire Journal*, 17 August 2007.

AFRICA

Naomi Campbell May Put Rare Turtles in the Soup

The supermodel Naomi Campbell has shocked conservationists over plans for a hotel and casino complex on a coastal sanctuary for turtles in Kenya. Protesters say that the scheme in the Indian Ocean resort town of Malindi, put forward by the supermodel and Flavio Briatore, will wreck years of work to save endangered marine life. Three species, the green turtle, the hawksbill and the olive ridley, come ashore in Malindi and nearby Watamu Bay to nest and lay their eggs. Two other species, the leatherback and loggerhead turtles, migrate through Kenyan waters en route from South Africa to the Maldives and Seychelles. After the baby turtles hatch in the middle of the night, they follow the brightest natural light, which is normally a moonlit horizon between the ocean and night sky. However, they can be easily disorientated by artificial lights and can walk away from the sea and perish. Plans to build the six-star 40-apartment casino, called the Billionaires Resort, within the marine park would be in breach of local planning regulations. Mr Briatore, who heads Renault's Formula One team, already runs a hotel in the resort, the White Elephant. Residents describe it as a "ghastly construction" and say that it has encouraged the type of tourism the area has been at pains to avoid. Malindi, previously a retirement home for former white farmers from the Kenyan highlands, has boomed in recent years. Local officials in Malindi declined to discuss the issue, saying that all planning applications had to go through formal channels and that local residents would be consulted. Source: *Times (London)*, 13 September 2007.

OCEANIA

Groups Launch 'Turtle Friendly' Campaign

In an effort to discourage the purchase of turtle shell products, Palau's Marine Conservation and Monitoring Program at the Bureau of Marine Resources, the Belau Art Gallery and Sam's Tours (Palau

Sea Ventures) are distributing "Turtle Friendly" window stickers across the island nation. The campaign is aimed at drawing attention to the risk of sea turtle extinction and the dangers to turtles caused by over harvesting, habitat destruction, coastal development, nest poaching, disease, pollution and off shore fisheries. The hawksbill and green turtles are Palau's most frequently harvested turtle species yet are listed as critically endangered and vulnerable respectively. Earrings, pendants, bracelets, rings and other handicraft including complete shells are available in nearly every tourist shop and department store in Palau. Sam Scott, president of Palau Sea Ventures and Sam's Tours, says turtle watching and interaction is one of the most popular attractions for tourists. But turtles have always been a part of local Palauan marine food and the handicraft market, which has grown with tourism. Turtle products are banned from entry into the United States, Philippines, Taiwan and Japan, which supply most of Palau's tourists. Source: *Pacific Magazine*, 21 September 2007.

ASIA

Turtles Unlimited

Kolkata-based Turtle Ltd, the menswear garments company, has taken up the task of saving turtles, particularly in Orissa and Gujarat. It has joined hands with WWF India and the Wildlife Society of Orissa (WSO) to fund turtle conservation. According to the WSO, Turtle Ltd's support has helped in gathering valuable data regarding species distribution and threats due to poaching. Enforcement activities have also been undertaken with the help of forest officials and some poachers have been arrested with live turtles. The poaching network in the area has also been unearthed. During the last year, two turtle shells and a fishing boat were seized, and two poachers were arrested by the forest department, after a tip off by the WSO. Another 145 turtles were rescued from the poachers and later rehabilitated and released. In the next phase, WWF India would patrol the beaches in Gujarat during October-January, the nesting period of turtles. This endangered species nests at three major areas in Orissa, out of which Garihmata is its largest habitat in the world with over 1,000,000 nesting turtles. However, the nesting population of turtles at this place declined from 230,000 in 2006 to just 140,000 this year. According to WWF, the decline can be attributed to illegal trawl fishing operations, particularly shrimp trawling, in the shore waters of Garihmata and other coastal areas of Orissa. Source: *Business Standard*, 02 October 2007.

Experts: Setu Project Will Affect Olive Ridleys

Turtle lovers and marine scientists have raised strong objections to the Sethusamundram project of demolishing and dredging Rama Setu or Adam's Bridge. Their claim is it would change the migratory ways of olive ridley sea turtles towards Orissa coast and endanger marine lives. ''The proposed Sethusamundram Shipping Canal Project (SSCP) would hamper the annual migration of olive ridley sea turtles towards the Gahiramatha and other beaches of Orissa as their movement would be affected due to passing of ships and big vessels,'' said Arati Sridhar, a noted environmentalist and a researcher of Ashoka Trust for Research in Ecology and the Environment. Sridhar along with four scientists and environmentalists recently compiled a comprehensive report. They opined that since time immemorial turtles have been using the Palk strait route to reach Orissa coast. It was proved through satellite transmitters fitted on the back of the turtles in Orissa that the olive ridley has been using Palk Strait, Gulf of Mannar and the sea near Sri Lanka to reach Orissa, said an environmentalist. Source: *Newindpress.com*, 20 September 2007.

THE AMERICAS

Lost: 4 Turtles in Sea Race

Missing: Four leatherback turtles. Last known location: Pacific Ocean. Turtle researchers outfitted 11 leatherback turtles with satellite tracking equipment, gave them fanciful names and held a mock race as the creatures swam from their nesting grounds in Costa Rica to feeding grounds near the Galapagos Islands. Now they're reporting that four of the turtles have disappeared. Stephanie Colburtle (named in honor of comedian Stephen Colbert) and Drexelina (sponsored by Drexel University) have been missing for more than 100 days. About 90 days ago, Windy's transmitter went silent. Another turtle, Champiro, hasn't been heard from for two months. Best case scenario: The transmitters just stopped working, as sometimes happens. But considering that humans have caused the population of leatherbacks in the eastern tropical Pacific to plummet 95 percent in the last 10 years,some worry that these four could have been drowned after becoming ensnared in fishing longlines. Or maybe they consumed plastic bags, mistaking them for the jellyfish they normally eat, and died. Fortunately, the race itself raised awareness and funds for turtle conservation. Much of $250,000 raised is going toward conservation of the turtles' nesting area. Source: *Philadelphia Inquirer*, 19 Sept. 2007.

Dr. Caroline Rogers Wins Grand Prize in Photo Contest

Dr. Caroline Rogers' efforts to highlight the beauty of the underwater world which surrounds the Virgin Islands recently received additional publicity when Rogers, who works with the U.S. Geological Survey and enjoys photography in her spare time, was selected as the grand prize winner in the Ocean Conservancy's 2006 Marine Wildlife Contest. Rogers' picture of a hawksbill turtle, which she photographed near Waterlemon Cay, will be featured in the fall issue of the quarterly publication Ocean Conservancy Magazine, which will be on newsstands in September. Rogers said she was surprised to learn she had won the grand prize in the Ocean Conservancy contest. The local scientist was happy that her efforts to highlight the beauty of what's left in the underwater world following a devastating 2005 coral bleaching event have been recognized. Rogers said she hopes to motivate people to help preserve marine life through her photographs. "I want to spread the word that any time we can avoid standing on a reef, or throwing an anchor on coral, it can only be for the better," said Rogers. "There's still a lot of beauty out there." Source: *St. John Tradewinds*, 20 August 2007.

Eco-Wrestler, 'El Hijo del Santo' Receives Award

Superstar Mexican lucha libre star and WiLDCOAST ocean defender, El Hijo del Santo, received the 'Environmental Hero' award from the Monterey Bay Aquarium on September 9th for his work fighting the "enemies of the sea." Throughout 2007, El Santo traveled throughout Mexico with WiLDCOAST to fight for clean ocean water quality, to stop the slaughter of sea turtles and to protect marine mammals. At the Aquarium ceremony with over 1,000 fans in attendance, Santo committed to working to protect the ocean and the illegal slaughter of marine animals. "We couldn¹t have

asked for a better spokesperson than Santo," said Serge Dedina, the WiLDCOAST Executive Director. In March Santo traveled to the Colonia Los Laureles to ask the Mexican government to halt the illegal discharge of toxic waste into the Tijuana River watershed that flows into the beaches of Imperial Beach and Coronado. More recently Santo traveled to Rancho Nuevo in Tamaulipas to work with the Mexican National Park agency to protect nesting sea turtles from the depredation of poachers who sell their eggs on the black market. WiLDCOAST produced three-different Spanish language comic books that will be distributed widely in Mexico and California featuring Santo battling his enemies of the sea including "The Pirate", "Sewage Man" and the "Turtle Eater." Santo will travel to Cabo San Lucas next to help advocate for the protection of endangered sea turtles threatened by the black market trade in sea turtle meat and eggs. With a huge following in Japan, El Santo is planning a trip there in 2008 to ask the Japanese to stop the tradition of whale meat consumption. Source: *Global Surf News*, 12 September 2007

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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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