

In this review:

- A. Recent articles – no abstract available
- B. Recent articles with abstracts

O/A denotes an open access article or journal

A. Recent articles – no abstract available

Godfrey, M.H., Webb, G.J.W., Manolis, S.C., and Mrosovsky, N. **Hawksbill sea turtles: Can phylogenetics inform harvesting?** [comment] *Molecular Ecology* 16(17): 3511-3513, 2007. O/A

Bowen, B.W., Grant, S., Hillis-Starr, Z., Shaver, D.J., Bjorndal, K.A., and Bolten, A.B. **The advocate and the scientist: debating the commercial exploitation of endangered hawksbill turtles.** [reply] *Molecular Ecology* 16(17): 3514-3515, 2007. O/A

Mortimer, J. A., Donnelly, M., Meylan, A. B., and Meylan, P. A. **Critically endangered hawksbill turtles: molecular genetics and the broad view of recovery.** [reply] *Molecular Ecology* 16(17): 3516-3517, 2007. O/A

B. Recent articles with abstracts

Hawkes, L.A., Broderick, A.C., Godfrey, M.H., and Godley, B.J. **Investigating the potential impacts of climate change on a marine turtle population.** *Global Change Biology* 13(5): 923-932, 2007.

Notes: Recent increases in global temperatures have affected the phenology and survival of many species of plants and animals. We investigated a case study of the effects of potential climate change on a thermally sensitive species, the loggerhead sea turtle, at a breeding location at the northerly extent of the range of regular nesting in the United States. In addition to the physical limits imposed by temperature on this ectothermic species, sea turtle primary sex ratio is determined by the temperature experienced by eggs during the middle third of incubation. We recorded sand temperatures and used historical air temperatures (ATs) at Bald Head Island, NC, to examine past and predict future sex ratios under scenarios of warming. There were no significant temporal trends in primary sex ratio evident in recent years and estimated mean annual sex ratio was 58% female. Similarly, there were no temporal trends in phenology but earlier nesting and longer nesting seasons were correlated with warmer sea surface temperature. We modelled the effects of incremental increases in mean AT of up to 7.5°C, the maximum predicted increase under modelled scenarios, which would lead to 100% female hatchling production and lethally high incubation temperatures, causing reduction in hatchling production. Populations of turtles in more southern parts of the United States are currently highly female biased and are likely to become ultra-biased with as little as 1°C of warming and experience extreme levels of mortality if warming exceeds 3°C. The lack of a demonstrable increase in AT in North Carolina in recent decades coupled with primary sex ratios that are not highly biased means that the male offspring from North Carolina could play an increasingly important role in the future viability of the loggerhead turtle in the Western Atlantic.

Troeng, S. and Chaloupka, M. **Variation in adult annual survival probability and remigration intervals of sea turtles.** *Marine Biology* 151(5): 1721-1730, 2007.

Notes: We analyzed a large dataset to quantify adult annual survival probability and remigration intervals for the Tortuguero, Costa Rica green turtle population. Annual survival probability was estimated at 0.85 (95% CI 0.75-0.92) using a recovery model and at 0.85 (95% CI 0.83-0.87) using an open robust design model. The two most common modes of remigration are 2 and 3 years. Annual survival probability is lower and remigration intervals are shorter than for other green turtle populations. Explanations for short remigration intervals include reproductive compensation due to historic population declines, availability of better quality food items, favorable environmental conditions, and short distance to the main foraging grounds. Variation in survival and remigration intervals have profound consequences for management and life history evolution. The short remigration intervals of Tortuguero green turtles partly offset mortality caused by turtle fishing in Nicaragua and mean that low juvenile survival represents a more urgent threat to the population than low adult survival. Low adult survival probability could result in selective pressure for earlier age at maturity.

Broderick, A.C., Coyne, M.S., Fuller, W.J., Glen, F., and Godley, B.J. **Fidelity and over-wintering of sea turtles.** *Proceedings of the Royal Society of London [B]* 274(1617): 1533-1538, 2007.

Notes: While fidelity to breeding sites is well demonstrated in marine turtles, emerging knowledge of migratory routes and key foraging sites is of limited conservation value unless levels of fidelity can be established. We tracked green (*Chelonia mydas*, $n = 10$) and loggerhead (*Caretta caretta*, $n = 10$) turtles during their post-nesting migration from the island of Cyprus to their foraging grounds. After intervals of 2-5 years, five of these females were recaptured at the nesting beach and tracked for a second migration. All five used highly similar migratory routes to return to the same foraging and over-wintering areas. None of the females visited other foraging habitats over the study period (units lasted on average 305 days; maximum, 1356 days), moving only to deeper waters during the winter months where they demonstrated extremely long resting dives of up to 10.2h (the longest breath-holding dive recorded for a marine vertebrate). High levels of fidelity and the relatively discrete nature of the home ranges demonstrate that protection of key migratory pathways, foraging and over-wintering sites can serve as an important tool for the future conservation of marine turtles.

Casale, P., Mazaris, A.D., Freggi, D., Basso, R., and Argano, R. **Survival probabilities of loggerhead sea turtles (*Caretta caretta*) estimated from capture-mark-recapture data in the Mediterranean Sea.** *Scientia Marina* 71(2): 365-372, 2007.

O/A

Notes: Survival probabilities of loggerhead sea turtles (*Caretta caretta*) are estimated for the first time in the Mediterranean by analysing 3254 tagging and 134 re-encounter data from this region. Most of these turtles were juveniles found at sea. Re-encounters were live resightings and dead recoveries and data were analysed with Barker's model, a modified version of the Cormack-Jolly-Seber model which can combine recapture, live resighting and dead recovery data. An annual survival probability of 0.73 (CI 95% = 0.67-0.78; $n = 3254$) was obtained, and should be considered as a conservative estimate due to an unknown, though not negligible, tag loss rate. This study makes a preliminary estimate of the survival probabilities of in-water developmental stages for the Mediterranean population of endangered loggerhead sea turtles and provides the first insights into the magnitude of the suspected human-induced mortality in the region. The model used here for the first time on sea turtles could be used to obtain survival estimates from other data sets with few or no true recaptures but with other types of re-encounter data, which are a common output of tagging programmes involving these wide-ranging animals.

Hawkes, L.A., Broderick, A.C., Coyne, M.S., Godfrey, M.H., and Godley, B.J. **Only some like it hot - quantifying the environmental niche of the loggerhead sea turtle.** *Diversity and Distributions* 13(4): 447-457, 2007.

Notes: Although the Atlantic waters of North America support hundreds of thousands of loggerhead sea turtles (*Caretta caretta*), remarkably little is known regarding their migratory ecology and habitat use. We integrate satellite tracking with remotely sensed oceanographic data to uncover two different migratory strategies used by loggerhead turtles at the northern part of their range. Most turtles travelled from the nesting beach to forage at higher latitudes in summer, before migrating south to wintering grounds in the autumn. Others moved south after nesting to forage for up to 514 days and did not make an

autumn migration. Both groups utilized warm waters at the very edge of the Gulf Stream during winter: for southerly turtles obviating seasonal migration, and for northerly turtles minimizing the distance, time and energy required to reach northern areas for subsequent foraging seasons, avoiding lethally cold winter temperatures in inshore waters at the same latitude, and reducing energy costs that would be incurred within the fast-flowing Gulf Stream. Females made long resting dives of up to 7 h 24 min, effectively hibernating during the colder months. Offshore federal waters of the USA constitute a more important habitat for both foraging and wintering turtles than previously appreciated. These areas are potential hotspots for interaction with fisheries and proposed US military training activities and should receive special monitoring efforts to fully assess the extent of overlap.

Carreras, C., Pascual, M., Cardona, L., Aguilar, A., Margaritoulis, D., Rees, A., Turkozan, O., Levy, Y., Gasith, A., Aureggi, M., and Khalil, M. **The genetic structure of the loggerhead sea turtle (*Caretta caretta*) in the Mediterranean as revealed by nuclear and mitochondrial DNA and its conservation implications.** *Conservation Genetics* 8(4): 761-775, 2007.

Notes: The population genetic structure of the loggerhead sea turtle (*Caretta caretta*) nesting in the eastern Mediterranean was assessed by sequencing a fragment of the control region of the mitochondrial DNA ($n = 190$) and seven microsatellites ($n = 112$). The two types of markers revealed genetic structuring (mtDNA: $\gamma_{st} = 0.212$, $P < 0.001$; nDNA $F_{st} = 0.006$, $P < 0.001$), thus indicating that both females and males are philopatric and that gene flow between populations is restricted. Mitochondrial DNA data indicate that the female populations nesting on the islands of Crete and Cyprus have suffered a recent bottleneck or colonization event. However, no bottleneck or founder effect was revealed by nuclear markers, thus indicating male-mediated gene flow from other populations that would increase nuclear genetic variability. Crete, and to a lower extent Cyprus, are thought to play a central role in such male-mediated gene flow that may reduce the negative effect of genetic drift or inbreeding on the small populations of Lebanon and Israel. This population structure indicates that assessing population relevance only on the basis of genetic variability and size would be misleading, as some populations not fulfilling those requirements may play a relevant role in genetic exchange and hence contribute to the overall genetic variability.

Chaloupka, M. and Balazs, G. **Using Bayesian state-space modelling to assess the recovery and harvest potential of the Hawaiian green sea turtle stock.** *Ecological Modelling* 205(1-2): 93-109, 2007.

Notes: The Hawaiian green sea turtle genetic stock is endemic to the Hawaiian Archipelago. This stock was depleted over the past century mainly due to over-exploitation that ceased during the 1970s following protection under the US Endangered Species Act. Nesting trends suggest the stock has been recovering but no formal stock assessment has been undertaken. So, we used a Bayesian state-space surplus-production model to describe Hawaiian green turtle population dynamics given limited data and uncertainty about sea turtle demography. Data series comprised commercial landings of green turtles reported from the Archipelago (1944-1973) and nester abundance recorded at the primary rookery on East Island, French Frigate Shoals (1973-2004). The model incorporated process and observation error and was fitted using Markov chain Monte Carlo simulation with a mix of informative and non-informative priors. We estimated that the Hawaiian green turtle stock was ca. 20% of pre-exploitation biomass when monitoring and protection began in the 1970s. The stock is estimated to be now ca. 83% of pre-exploitation biomass with an intrinsic growth rate ca. 5.4% pa (95% Bayesian credible interval: 3.1-8.9%). Rebound or recovery potential (also exploitation rate at MSP) of this stock was estimated to be 3.4% (1.6- 6.2%), which is consistent with estimates for other long-lived late-maturing marine species. So, this once-seriously-depleted green turtle stock is well on the way to recovery and a limited harvest might now be demographically feasible. These findings are relevant for supporting informed public policy debate on the restoration of indigenous hunting rights in the Archipelago. Parameter estimates and model structure from the Bayesian surplus-production model were incorporated in an interactive easy-to-use stochastic simulation model to help support policy analysts in stock recovery planning and to explore sustainable harvest potential.

Benson, S.R., Forney, K.A., Harvey, J.T., Carretta, J.V., and Dutton, P.H. **Abundance, distribution, and habitat of leatherback turtles (*Dermochelys coriacea*) off California, 1990-2003.** *Fishery Bulletin* 105(3): 337-347, 2007. **O/A**

Notes: Leatherback turtles (*Dermochelys coriacea*) are regularly seen off the U.S. West Coast, where they forage on jellyfish (Scyphomedusae) during summer and fall. Aerial line-transect surveys were conducted in neritic waters (< 92 m depth) off

central and northern California during 1990-2003, providing the first foraging population estimates for Pacific leatherback turtles. Males and females of about 1.1 to 2.1 m length were observed. Estimated abundance was linked to the Northern Oscillation Index and ranged from 12 (coefficient of variation [CV]=0.75) in 1995 to 379 (CV=0.23) in 1990, averaging 178 (CV=0.15). Greatest densities were found off central California, where oceanographic retention areas or upwelling shadows created favorable habitat for leatherback turtle prey. Results from independent telemetry studies have linked leatherback turtles off the U.S. West Coast to one of the two largest remaining Pacific breeding populations, at Jamursba Medi, Indonesia. Nearshore waters off California thus represent an important foraging region for the critically endangered Pacific leatherback turtle.

Pike, D.A. and Stiner, J.C. **Sea turtle species vary in their susceptibility to tropical cyclones.** *Oecologia* 153(2): 471-478, 2007.

Notes: Severe climatic events affect all species, but there is little quantitative knowledge of how sympatric species react to such situations. We compared the reproductive seasonality of sea turtles that nest sympatrically with their vulnerability to tropical cyclones (in this study, "tropical cyclone" refers to tropical storms and hurricanes), which are increasing in severity due to changes in global climate. Storm surges significantly decreased reproductive output by lowering the number of nests that hatched and the number of hatchlings that emerged from nests, but the severity of this effect varied by species. Leatherback turtles (*Dermochelys coriacea*) began nesting earliest and most offspring hatched before the tropical cyclone season arrived, resulting in little negative effect. Loggerhead turtles (*Caretta caretta*) nested intermediately, and only nests laid late in the season were inundated with seawater during storm surges. Green turtles (*Chelonia mydas*) nested last, and their entire nesting season occurred during the tropical cyclone season; this resulted in a majority (79%) of green turtle nests incubating in September, when tropical cyclones are most likely to occur. Since this timing overlaps considerably with the tropical cyclone season, the developing eggs and nests are extremely vulnerable to storm surges. Increases in the severity of tropical cyclones may cause green turtle nesting success to worsen in the future. However, published literature suggests that loggerhead turtles are nesting earlier in the season and shortening their nesting seasons in response to increasing sea surface temperatures caused by global climate change. This may cause loggerhead reproductive success to improve in the future because more nests will hatch before the onset of tropical cyclones. Our data clearly indicate that sympatric species using the same resources are affected differently by tropical cyclones due to slight variations in the seasonal timing of nesting, a key life history process.

Bowen, B.W., Grant, W.S., Hillis-Starr, Z., Shaver, D.J., Bjorndal, K.A., Bolten, A.B., and Bass, A.L. **Mixed-stock analysis reveals the migrations of juvenile hawksbill turtles (*Eretmochelys imbricata*) in the Caribbean Sea.** *Molecular Ecology* 16(1): 49-60, 2007.

Notes: Hawksbill turtles (*Eretmochelys imbricata*) migrate between nesting beaches and feeding habitats that are often associated with tropical reefs, but it is uncertain which nesting colonies supply which feeding habitats. To address this gap in hawksbill biology, we compile previously published and new mitochondrial DNA (mtDNA) haplotype data for 10 nesting colonies ($N=347$) in the western Atlantic and compare these profiles to four feeding populations and four previously published feeding samples ($N=626$). Nesting colonies differ significantly in mtDNA haplotype frequencies ($\Phi_{ST}=0.588$, $P<0.001$), corroborating earlier conclusions of nesting site fidelity and setting the stage for mixed-stock analysis. Feeding aggregations show lower but significant structure ($\Phi_{ST}=0.089$, $P<0.001$), indicating that foraging populations are not homogenous across the Caribbean Sea. Bayesian mixed-stock estimates of the origins of juveniles in foraging areas show a highly significant, but shallow, correlation with nesting population size ($r=0.378$, $P=0.004$), supporting the premise that larger rookeries contribute more juveniles to feeding areas. A significant correlation between the estimated contribution and geographical distance from nesting areas ($r=-0.394$, $P=0.003$) demonstrates the influence of proximity on recruitment to feeding areas. The influence of oceanic currents is illustrated by pelagic stage juveniles stranded in Texas, which are assigned primarily (93%) to the upstream rookery in Yucatan. One juvenile had a haplotype previously identified only in the eastern Atlantic, invoking rare *trans*-oceanic migrations. The mixed-stock analysis demonstrates that harvests in feeding habitats will impact nesting colonies throughout the region, with the greatest detriment to nearby nesting populations.

Van Houtan, K.S. and Bass, O.L. **Stormy oceans are associated with declines in sea turtle hatching.** *Current Biology* 17(15): R590-R591, 2007.

Notes: Many sea turtle populations are below 10% of their pre-Columbian numbers. Though historic and systematic over-exploitation is the principal cause of these declines, sea turtles face similar threats today. Adults and juveniles are actively hunted and commercial fisheries catch them incidentally. Nesting suffers from beach development, egg poaching and the poaching of nesting females. Accompanying these familiar hazards is the largely unknown consequences of recent climate change. Here we report monitoring surveys from the Dry Tortugas National Park (DTNP, 24.64N 82.86W), Florida, and show that hurricanes and other storm events are an additional and increasing threat to loggerhead turtle (*Caretta caretta*) and green sea turtle (*Chelonia mydas*) nesting. Both species are listed by the US Endangered Species Act and the IUCN considers them 'endangered'.

Weir, C.R., Ron, T., Morais, M., and Duarte, A.D.C. **Nesting and at-sea distribution of marine turtles in Angola, West Africa, 2000-2006: occurrence, threats and conservation implications.** *Oryx* 41(2): 224-231, 2007.

Notes: The status of marine turtles in Angola, West Africa, is poorly known, and therefore during 2000-2006 a combination of both dedicated and opportunistic beach and at-sea turtle surveys were carried out, and interviews conducted with fishing communities and at markets. Green *Chelonia mydas*, olive ridley *Lepidochelys olivacea*, leatherback *Dermochelys coriacea* and loggerhead turtles *Caretta caretta* were recorded, and nesting of the first three species confirmed during September-March (peaking November-December). Green turtles nested mainly in the south, leatherback turtles in north and central Angola, and olive ridley turtle nesting was widespread. Olive ridley turtle nest density at Palmeirinhas averaged 32 nests km⁻¹. At-sea surveys produced 298 turtle records, with peak occurrence during August. Significant anthropogenic-related mortality (including exploitation of meat and eggs and fishing bycatch) was recorded, in addition to natural predation and other threats. Maintenance of the long-term sustainability of these turtle populations should focus on the involvement of fishing communities and increasing awareness throughout Angola.

Metcalf, J., Hampson, K., Andriamizava, A., Andrianirina, R., Cairnes, T., Gray, A., Ramiarisoa, C., and Sondotra, H. **The importance of north-west Madagascar for marine turtle conservation.** *Oryx* 41(2): 232-238, 2007.

Notes: The coast of north-west Madagascar is an important nesting and feeding ground for marine turtles, but little is known about populations in this area. From July to December 2000 we documented nesting activity of, and investigated threats to, green *Chelonia mydas* and hawksbill *Eretmochelys imbricata* turtles at three sites along this coast: Nosy Iranja, the Radama Islands, and the Nosy Hara archipelago. Levels of nesting activity varied between sites, with green and hawksbill turtle nesting concentrated in different areas. The principal threats identified were opportunistic exploitation of nesting females and incidental capture in fishing nets. Commercial importance of marine turtles was negligible, suggesting conservation measures such as targeted environmental education could have beneficial impacts on these populations. Evidence for high levels of nesting activity reported here indicate that education efforts in these areas should be a conservation priority.

Georges, J.Y., Fossette, S., Billes, A., Ferraroli, S., Fretey, J., Gremillet, D., LeMaho, Y., Myers, A.E., Tanaka, H., and Hays, G.C. **Meta-analysis of movements in Atlantic leatherback turtles during the nesting season: conservation implications.** *Marine Ecology Progress Series* 338: 225-232, 2007.

Notes: Despite decades of conservation efforts on the nesting beaches, the critical status of leatherback turtles shows that their survival predominantly depends on our ability to reduce at-sea mortality. Although areas where leatherbacks meet fisheries have been identified during the long distance movements between 2 consecutive nesting seasons, hot-spots of lethal interactions are still poorly defined within the nesting season, when individuals concentrate close to land. Here we report movements of satellite-tracked gravid leatherback turtles during the nesting season in Western Central Africa, South America and the Caribbean Sea, which account for about 70% of the world population. We show that during and at the end of the nesting season, leatherback turtles have the propensity to remain over the continental shelf, yet sometimes perform extended movements and may even nest in neighbouring countries. Leatherbacks exploit coastal commercial fishing grounds and face substantial accidental capture by regional coastal fisheries (e.g. at least 10% in French Guiana). This emphasises the need for

regional conservation strategies to be developed at the ocean scale - both at sea and on land - to ensure the survival of the last leatherback turtles.

Baez, J.C., Real, R., Garcia-Soto, C., de la Serna, J.M., Macias, D., and Caminas, J.A. **Loggerhead turtle by-catch depends on distance to the coast, independent of fishing effort: implications for conservation and fisheries management.** *Marine Ecology Progress Series* 338: 249-256, 2007.

Notes: Drifting longline is considered one of the most dangerous fishing gears for marine turtles and is their principal threat in the western Mediterranean Sea. During the summers of 2000 to 2003, 179 fishing operations were observed onboard a traditional Spanish drifting longline boat in the Balearic Sea (western Mediterranean) to analyse the effects of fishing effort and ecogeographical factors on the by-catch of loggerhead turtles *Caretta caretta*. We observed 4074 swordfish captured and 675 loggerhead turtles by-caught. The probability of catching at least 1 loggerhead was related to the distance of the fishing-ground to the coast and, to a lesser extent, depth, both independent of fishing effort. The average number of loggerheads captured was spatially structured only according to mean distance to the coast. However, the number of swordfish captured was correlated with fishing effort but was not correlated with distance to the coast or depth. Distance to the coast was correlated with gear retrieval time, sea surface temperature and velocity, and phytoplankton concentration. As the number of loggerheads captured was independent of the number of hooks, the number of fishing operations was a better unit than the number of hooks to assess loggerhead by-catch. Limiting drifting longline fishing activity to within 35 international nautical miles from the coast could reduce loggerhead by-catch substantially without affecting swordfish captures and with little resistance from fishermen.

Lorne, J.K. and Salmon, M. **Effects of exposure to artificial lighting on orientation of hatchling sea turtles on the beach and in the ocean.** *Endangered Species Research* 3(1): 23-30, 2007. O/A

Notes: Artificial lighting disrupts sea turtle hatchling orientation from the nest to the sea. We studied how a light-induced landward crawl affects the later ability of hatchlings to crawl to the sea, and to swim away from the shore from a dark beach. A brief (2 min) landward crawl had no effect on swimming orientation as long as surface waves were present. In a calm sea, landward-crawling hatchlings failed to swim offshore, while those crawling seaward were well oriented. A long (2 h) crawl toward a landward light source, however, impaired the ability of hatchlings to crawl seaward. These results demonstrate that orientation toward artificial light sources compromises the ability of hatchlings to respond to natural orientation cues, both on land and in the sea. Based on these results, we suggest several changes to current management practices used when releasing misoriented turtles in the wild.

Hazel, J., Lawler, I.R., Marsh, H., and Robson, S. **Vessel speed increases collision risk for the green turtle *Chelonia mydas*.** *Endangered Species Research* 3(2): 105-113, 2007. O/A

Notes: Vessel collisions contribute to the anthropogenic mortality of several threatened marine species including turtles, manatees, dugongs and whales, but scant data exist to inform the design of optimal mitigation measures. We conducted a field experiment to evaluate behavioural responses of green turtles *Chelonia mydas* to a research vessel approaching at slow, moderate or fast speed (4, 11 and 19 km h⁻¹, respectively). Data were recorded for 1890 encounters with turtles sighted within 10 m of the research vessel's track. The proportion of turtles that fled to avoid the vessel decreased significantly as vessel speed increased, and turtles that fled from moderate and fast approaches did so at significantly shorter distances from the vessel than turtles that fled from slow approaches. Our results imply that vessel operators cannot rely on turtles to actively avoid being struck by the vessel if it exceeds 4 km h⁻¹. As most vessels travel much faster than 4 km h⁻¹ in open waters, we infer that mandatory speed restrictions will be necessary to reduce the cumulative risk of vessel strike to green turtles in key habitats subject to frequent vessel traffic.

Marcovaldi, M.A. and Chaloupka, M. **Conservation status of the loggerhead sea turtle in Brazil: an encouraging outlook.** *Endangered Species Research* 3(2): 133-143, 2007. O/A

Notes: The loggerhead turtle *Caretta caretta* is one of the large and long-lived species that comprise the charismatic marine megafauna. The loggerhead is considered endangered, especially in the Pacific Ocean, where there have been substantial declines in all the major nesting populations. On the other hand, some loggerhead nesting populations in the northwest Atlantic are apparently increasing, but the conservation status of loggerheads in the Atlantic-Mediterranean is not well known. Here we report on a long-term and geographically extensive study of the nesting abundance of the Brazilian loggerhead genetic stock resident in south Atlantic waters. We show that there has been a substantial long-term increase in nesting abundance of this once depleted Atlantic stock following the cessation of egg and turtle harvesting in the 1980s. We estimated that the 2003/2004 austral summer nesting season in Brazil encompassed more than 4800 loggerhead nests or >1200 nesters or >0.57 million eggs. National conservation efforts have contributed significantly to the improving status of the Brazilian loggerhead stock since the mid-1980s, but there are emerging threats such as incidental capture in coastal and pelagic fisheries that might limit any further recovery. Moreover, we found that the Brazilian nesting population is probably one of the largest remaining loggerhead nesting populations in the world. Hence, continued protection of the Brazilian loggerhead stock is of paramount importance for the global conservation of this species.

Beggs, J.A., Horrocks, J.A., and Krueger, B.H. **Increase in hawksbill sea turtle *Eretmochelys imbricata* nesting in Barbados, West Indies.** *Endangered Species Research* 3(2): 159-168, 2007. O/A

Notes: Nesting by hawksbill sea turtles *Eretmochelys imbricata* in Barbados, West Indies, has been monitored since 1992. Data from the index beach indicate that the number of nests may have increased as much as 8-fold over this period. The estimated abundance of nesting females on Barbados is 1250, suggesting that this eastern Caribbean island now hosts one of the largest rookeries in the wider Caribbean, with over 230 females nesting on the index beach alone. Given its extreme easterly position and the prevailing north-westerly current flow into the Caribbean Sea, Barbados is likely to be a significant contributor to foraging grounds throughout the region. Primary females, which are untagged and without tag scars, made up the majority of females encountered on nesting beaches in most years, suggesting that reductions in juvenile and sub-adult mortality, both nationally and regionally, are significant to the increase in number of nesting females. Females nest every 2.47 yr on average, although remigration intervals of individual females vary (range: 1 to 6 yr), suggesting environmental influences on nesting periodicity. The average clutch frequency estimated from the index beach was 4.1 nests per female, but that calculated from less intensively surveyed beaches was lower. Primary and Remigrant females differed in length, mass and clutch frequency; the results must be viewed with caution, however, as preliminary laparoscopic examinations revealed that some Primary females were not in fact nesting for their first season, and because differences in nest site fidelity between the 2 groups of females could potentially cause the differences in clutch frequencies estimated.

Eguchi, T., Gerrodette, T., Pitman, R.L., Seminoff, J.A., and Dutton, P.H. **At-sea density and abundance estimates of the olive ridley turtle *Lepidochelys olivacea* in the eastern tropical Pacific.** *Endangered Species Research* 3(2): 191-203, 2007.

O/A

Notes: The first at-sea estimates of density and abundance of the olive ridley turtle *Lepidochelys olivacea* in the eastern tropical Pacific (ETP) were produced from shipboard line-transect data. Multi-ship surveys were conducted in 1992, 1998, 1999, 2000, 2003, and 2006 in the area defined by 5° N, 120°W, and 25°N and the coastline of Mexico and Central America. Sighting data of olive ridleys were stratified by survey effort and sighting conditions, thereby reducing potential biases from heterogeneous observation conditions. Dive data from satellite telemetry studies were used to correct for the proportion of turtles that were submerged and unavailable for detection during the surveys. A weighted average of the 5 by-year estimates (1998 to 2006) was 1.39 million (coefficient of variation, CV = 19.7%; approximate 95% CI: 1.15 to 1.62 million). Our findings are consistent with the dramatic increases of olive ridley nesting populations that have been reported over the past decade for beaches in the ETP.

Epperly, S.P., Braun-McNeill, J., and Richards, P.M. **Trends in catch rates of sea turtles in North Carolina, USA.** *Endangered Species Research* 3(3): 283-293, 2007. **O/A**

Notes: Sea turtles captured in pound nets during the autumn and early winter in the Pamlico-Albermarle Estuarine Complex, North Carolina, USA, were sampled 1995-1997 and 2001-2003 to monitor trends in catch rates during their autumn emigration from the temperate sounds. Juvenile loggerhead turtles *Caretta caretta* were the most frequent species encountered, followed by green turtles *Chelonia mydas* and Kemp's ridley turtles *Lepidochelys kempii*. Several different subpopulations with origins throughout the western North Atlantic were represented on these foraging grounds. The catch rates of loggerhead turtles increased significantly at a rate of 13% yr⁻¹. Despite annual increases in the major contributing nesting beach populations in excess of 10% yr⁻¹, we did not detect a trend in catch rates for either green or Kemp's ridley turtles, perhaps due to low statistical power. There was a significant increase in size of loggerhead turtles over time. We also detected a significant difference in annual size distributions of green and Kemp's ridley sea turtles, but there was no discernable pattern. We conclude that long-term studies on the sea turtles' foraging grounds, at multiple sites, are needed to monitor the status of sea turtle populations.
