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SEA TURTLES AS FLAGSHIPS FOR PROTECTION OF THE WIDER CARIBBEAN REGION

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ABSTRACT Sea turtles are emerging as one of the most popular icons of the marine environment. Capitalising on their charismatic image, a remarkable variety of stakeholders, including scientists, conservationists, community-based organisations, corporations, and governments, have sought to utilise sea turtles as flagships. This paper focuses on the Wider Caribbean Region, emphasising small island developing states, and explores the ways, and appropriateness, of using sea turtles as flagships to motivate people to consider complex contemporary management and policy issues, including those associated with protected areas, fisheries, multilateral conservation of shared species and seascapes, and tourism.

Introduction

The Wider Caribbean Region (Figure 1) consists of twenty-eight sovereign nations and their dependent territories, of which twenty-three (including Belize, Guyana, and Suriname) are classified as Small Island Developing States (SIDS).¹ The range states of the region vary in size from very small island territories, such as Montserrat (population: 8,000) and Anguilla (population: 12,000), to some of the largest nations in the world, including Mexico (population: 103 million) and the United States of America (US)² (population: 288 million) (USCB 2002). The Wider Caribbean Region (WCR) is an area of significant geological, biological, and political complexity, largely comprised of two semi-enclosed basins -- the Caribbean Sea and the Gulf of Mexico. The region is known for its tropical shallow marine ecosystems (coral reefs, sea grasses, mangroves), species diversity, and patterns of endemism (summarised by Spalding and Kramer 2004). The region is also characterised by broad social and political diversity, including the world's greatest concentration of small countries, representing 'the full range of the world's major political systems' (Carpenter 2002:3). These SIDS are recognised as having particularly vulnerable economies, while bearing responsibility for a 'significant portion of the world's oceans and seas and their resources' (UNGA 1994).

Within any particular territory there is considerable human diversity, including rural communities dependent upon a range of resources from agriculture to fisheries, urban and suburban residents, mobile immigrant labourers, and significant numbers of foreign tourists and investors. While the views of individuals

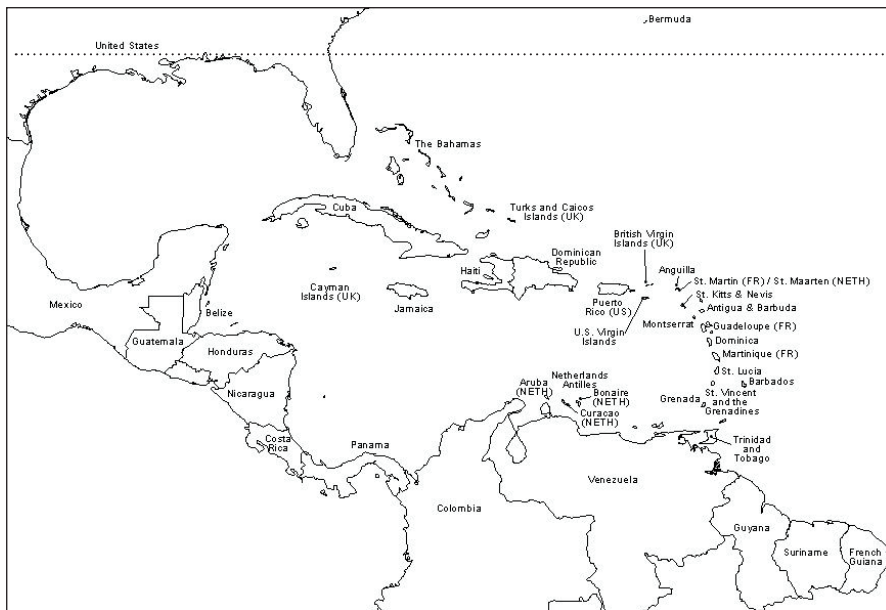


Figure 1. *The Wider Caribbean Region (WCR), one of 19 geographic components of the global Regional Seas Programme of the United Nations Environment Programme (UNEP), is defined as the marine environment of the Gulf of Mexico, the Caribbean Sea and the areas of the Atlantic Ocean adjacent thereto, south of 30°N latitude and within 200 nautical miles of the Atlantic coasts of the States referred to in article 25 of the 1983 Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (the full text is available at <<http://www.cep.unep.org/pubs/legislation/cartxt.html>>.*

concerning sea turtles might be expected to differ, both within and among these various sectors, this large, culturally and economically diverse region is particularly suited for the use of sea turtle flagships, because for historic and cultural reasons the region's governments and peoples have already strongly identified with this symbol. Although endemic birds (generally parrots), charismatic rainforest mammals, and luxurious tropical flora have traditionally carried the conservation message to the general public, recent decades have witnessed the appearance of urgent marine and coastal issues (UNEP 1989a; Norse 1993; Sullivan Sealey and Bustamante 1999; Glover and Earle 2004). Sea turtles are known to depend for their survival on both marine and terrestrial habitats of the coastal zone, and have emerged as commonly used emblems of a relatively new portfolio of public concerns regarding the continued viability of coastal landscapes and resources. Sea turtle populations, whether currently increasing or decreasing in numbers, are widely viewed as severely depleted from historical levels of abundance throughout the region (see for example, Carr 1955; Parsons 1962; Rebel 1974; King 1982; Groombridge and Luxmoore 1989; Ross *et al.* 1989; Reichart 1993; Jackson 1997; Meylan 1999; Bjorndal and Bolten 2003; Seminoff 2004). While they continue to be exploited species in many parts of the WCR, we believe that there can be compelling cultural considerations that, coupled with widespread fascination for these creatures and genuine concern over their depleted status, make a good case for selection of the sea turtle as a flagship for Caribbean biodiversity in general.

We use the term ‘flagship’ to imply an ambassadorial role, whereby sea turtles are employed as messengers or representatives to motivate people to consider complex contemporary issues surrounding marine ecosystem health, the sustainability of fisheries, the potential benefits of protected areas, the value of indigenous biodiversity (often implicating nationalism and cultural pride), and the desirability of collaborative, multilateral management of shared species and seascapes. We also acknowledge that a conservation icon, such as this one may be used to ‘flagship’ a cause or an industry that is not conducive to biodiversity conservation, and issue caution in this regard. Moreover, substantial costs must be considered when using sea turtles as flagships for the conservation of habitats they utilise, a problem that is not unique to sea turtles. Dobson *et al.* (1997) suggested that a large proportion of endangered species in the US could be protected within a small fraction of the nation’s land area. However, the area needed to do this represented some of the most valuable real estate in the country. This enigma certainly holds true for sea turtles, which require some of the best of beachfront property and, when at sea, are drawn to the same biologically rich areas, including estuaries, coral reefs, and zones of upwelling and convergence, that support many of the world’s fishers (Bjorndal 1997; Musick and Limpus 1997; Epperly 2003; Lewison, Freeman, and Crowder 2004).

Although the lack of prior studies on flagships species in the Caribbean makes it impossible to produce a quantitative analysis, we provide a description of examples where sea turtles have served as symbols to motivate the public for achieving conservation goals. These fall into four categories: general use of the attractive features of sea turtles, protected areas, national and intergovernmental policy, and tourism. In addition, we offer recommendations on approaches for using sea turtle flagships for promoting other, larger objectives in relation to conservation.

Considerations on the Use of Sea Turtles as Flagships in the Wider Caribbean Region

In general, flagships are species that attract the attention of the public and have features that make them suitable for communicating conservation concerns (Western 1987; Froese and Pauly 2003). Flagship species have been widely used at national and international levels to leverage the conservation or protection of biologically diverse ecosystems. Most of the major international conservation organisations have used this approach, featuring popular megafauna (including tigers, rhinos, pandas), with varying degrees of success (Jackson 2001; RSCF 2004; WWF 2004a, 2004b). Flagships are often addressed in the conservation literature in terms of raising funds and establishing protected areas (Zacharias and Roff 2001; Walpole and Leader-Williams 2002), but such an end constitutes only one of several strategies that may employ wildlife as flagships. In addition to the creation and management of protected areas, sea turtles have the potential to serve as symbols for a variety of activities that include policy, economics, and public outreach. Embraced by conservationists and industry alike, their charismatic image is being used to attract consumers to an endless array of products and services, ranging from tourism to jewelry to vitamins and beer (Hemphill *et al.* 2004). The popularity of sea turtles, whose use as a marketing tool can range even into industries that directly threaten their survival (Schofield, Kat-

selidais, and Hoff 2001), has resulted in these reptiles becoming a logical choice for harnessing public support for initiatives that seek to address complex contemporary issues surrounding management of marine ecosystems and development agendas.

It might seem unlikely that a group of ancient reptiles could capture the imagination of millions, yet these charismatic denizens of the sea may yet emerge as a universal symbol for ocean health in the new millennium. The key to choosing a successful flagship is rooted in the willingness of the public to embrace the chosen symbol, and then act appropriately for achieving conservation goals. Such public acceptance is based largely on the charisma of the given animal, which in the case of sea turtles may be propelled by their relatively large size, associated mythology (related to creation, fertility, and longevity; see for example, McNamee and Urrea 1996), unthreatening nature, and seemingly expressive 'facial features' (for example 'crying' during egg-laying). Their mysterious habits, particularly trans-oceanic migrations, add to their appeal. Whether or not flagships fulfill additional ecological roles as indicators, umbrellas, or keystone species, these are not dependent on their ambassadorial role as flagships.³ Their success is defined more through public awareness and societal behavior changes than any direct ecological outcome (Leader-Williams and Dublin 2000; Walpole and Leader-Williams 2002). In short, whether through fund-raising, changes in purchasing or fishing practices, or stimulating public support for a new park or managed reserve, flagships are meant to serve as a catalyst for change in the human dimension.

Sea turtles strongly reflect the characteristics for flagship species as defined by Caro and O'Doherty (1999) and by Andelman and Fagan (2000), including large body size and a long generation time, while providing an ideal alternative to the mammal-centric approach criticised by Entwistle (2000). However, ecologists and resource managers are pressed to look beyond charisma into a host of ecological characteristics that oftentimes have little to do with whether the public will accept the flagship, but instead whether the actions adopted in the name of the flagship will support management needs. For instance, consider the biological characteristics of having a wide geographic range and making vast migrations -- qualities for which sea turtles are well known (Plotkin 2003). Were these animals confined all their lives to a restricted area, their charisma might still appeal to the public, but their use as a tool for raising awareness of and protecting numerous ecosystems across the WCR would be diminished. In this paper we will consider the ways in which sea turtles match up to proposed criteria for successful flagships, both in terms of attractive characteristics and ecologically beneficial ones.

Although the criteria for selecting a flagship do not depend on ecological and biological characteristics, a flagship is often chosen on the basis of dwindling population size or endangered status (Dietz, Dietz, and Nagagata 1994; Caro and O'Doherty 1999). Sea turtles fit these criteria, with all six Caribbean-occurring species classified by the World Conservation Union as either endangered or critically endangered (IUCN 2003). In addition, accessibility, especially during nesting, has been instrumental in many areas of the WCR for raising awareness and increasing the popularity of sea turtles. Furthermore, the proliferation of underwater tourism and advancements in SCUBA technology and accessibility have increased humankind's contact with these animals, greatly expanded the diversity of habitats, in which they can be observed for science and other activities, and, arguably, deepened awareness

among the general public regarding the interdependence of sea turtles and the habitats upon which they depend.

Kellert (1986) concluded that knowledge of local or national attitudes was essential for choosing successful flagship candidates. In this light, it is worth noting that it may be inappropriate, or even counterproductive, to use sea turtles as flagships for conservation if they are generally viewed as an exploitable species. Rare, a leading conservation organisation in the use of flagship species (see www.rarecenter.org), typically selects a campaign mascot based on three primary criteria: endemic to a restricted country or area (thereby symbolising the uniqueness of the host country or target area), resides in a critical habitat (providing an environmental focus for the project), and marketable (simply put, the campaign is less likely to be successful if the mascot is perceived as ugly, fearsome, pestilent, or is a widely exploited species).

‘Using an existing national symbol is especially effective, as it provides a strong linkage to nationalism and pride - pride for oneself, one’s country, and one’s environment. Other considerations are species that tie positively into a local legend or a species that is believed to carry good omens, be wise or be a “special friend” of the primary target group, such as a bird that fishermen may use to find fish. Sea turtles have been avoided in the past because they are harvested species, although recently they were used to good effect outside the Wider Caribbean Region, in Palau, based on strong cultural connections.’ (P. Butler, Rare, personal communication).

Dozens of WCR outreach campaigns focusing on biodiversity issues have emphasised the popularity of sea turtles in communicating campaign messages, suggesting, although not yet in any quantitative way, that these species, whether exploited or not, are effective flagships in the region. Perhaps the most recent example is that of the Dutch Caribbean Nature Alliance (DCNA), which is sponsoring a three-year outreach and publicity campaign to be run simultaneously on the five islands of the Netherlands Antilles. The campaign will focus on sea turtles and aims to ‘improve the understanding and awareness of sea turtles, build the case for sea turtle conservation and provide practical solutions, and emphasize the need for improved environmental protection and in particular the need for actively managed Marine Protected Areas as turtle refugia’ (DCNA 2004:3). Among the results expected from this campaign, which is based on Rare’s successful ‘Promoting Protection through Pride’ model, are increased appreciation of the critical role of marine protected areas throughout the Netherlands Antilles, increased respect for, and compliance with, conservation laws and regulations (such as those that govern beachfront lighting, sand extraction and beach modification at known sea turtle nesting beaches), increased conservation funding, hands-on training in conservation education programme design and implementation, and the development of essential community contacts to support future conservation partnerships (DCNA 2004).

Sea Turtle Flagships in the Wider Caribbean Region

Examples of Sea Turtles as Popular Images

Sea turtles appear on national and regional currencies (Aruba, Cayman Islands, Eastern Caribbean; Lopez 1996, 2004), postage stamps (Antigua and Barbuda, Aruba, Bermuda, British Virgin Islands [BVI], Cayman Islands, Costa Rica, Dominican Republic, Grenada, St. Kitts and Nevis, St. Vincent and the Grenadines, and Trinidad and Tobago, to name a few; Linsley and Balazs 2004), phone cards (Linsley 2004), and even national flags (Cayman Islands). They grace the logos of intergovernmental entities (Caribbean Environment Programme of the United Nations Environment Programme [CEP/UNEP]), cities (Juno Beach, Florida, US; Rémire-Montjoly, French Guiana), and government agencies (Conservation and Fisheries Department, BVI; National Parks Trust, BVI; Fisheries Department, Belize; Department of Tourism, Cayman Islands). They are featured in the logos of protected areas (Bacalar Chico Marine Reserve, Belize; Area de Conservación la Amistad Caribe, Costa Rica) and the agencies that manage them (Foundation for the Preservation of Klein Bonaire, and Carmabi Foundation, Curaçao, Netherlands Antilles), and innumerable community-based and non-governmental organisations (see www.widecast.org). In Guyana, the Ministry of Trade and Tourism recently featured sea turtles in the welcoming signage for GUYEXPO 2004, the nation's largest commercial trade exhibition.

Perhaps the most successful mass marketing of the sea turtle icon to the benefit of a national economy and identity is found in the Cayman Islands, an overseas territory of the United Kingdom in the northern Caribbean Sea. Turtle fishing once formed the basis of the economy and culture of these islands, providing a food source and means of livelihood, for several centuries (Parsons 1962; King 1982; Aiken *et al.* 2001). Their historical role is reflected in the prominent position of sea turtle images in the Cayman Islands' Coat of Arms, national flag, coins, and currency notes.

In the Cayman Islands and elsewhere, many popular depictions of sea turtles, such as logos, are indistinguishable as to species, yet even caricatures can be effective. In Bonaire, Netherlands Antilles, a sea turtle character modeled after the popular Teenage Mutant Ninja Turtles® has served as mascot for the Tortuganan di Boneiru Children's Snorkel Club since 1993. The children appreciate the 'can do' attitude exemplified by the mascot, and openly identify with the idea that learning the skills necessary to enter the sea turtle's world are an essential first step in becoming environmental stewards (K. De Meyer, Dutch Caribbean Nature Alliance, personal communication).

On the other hand, individual sea turtle species may also be singled out as flagships. In the BVI, an archipelagic territory in the northeastern Caribbean Sea, the fishery for trunk turtles, also known as leatherback (*Dermochelys coriacea*) turtles, was never as profitable as the fisheries for hawksbill (*Eretmochelys imbricata*) or green (*Chelonia mydas*) turtles, but 'trunking' is deeply rooted in tradition and mysticism, featuring apparitions, signs in the sky, and otherwise unexplained voices and noises that occur during the nesting season of these ancient reptiles (Eckert, Overing, and Lettsome 1992; Hastings 2003). Concerns that over-exploitation and careless coastal development will eliminate critically depleted leatherback populations draw the public into an open debate over the regulatory framework, coastal zone management issues, and related policy issues. Recent public opposition over

proposed coastal development on prime nesting habitat along the northern coasts of Tortola and Beef Island has resulted in delays and setbacks for developers. In areas where commercial development has been permitted, the need for leatherback conservation precipitated the drafting of unique guidelines and mitigation measures aimed at safeguarding nesting colonies (B. Lettsome, BVI Conservation and Fisheries Department, personal communication).

It is the experience of the authors that throughout the WCR, leatherbacks are particularly useful as flagships, as in the example just cited. Their legendary size, with adults attaining weights of more than 900 kilograms (Morgan 1989), and matchless appearance may combine to make them uniquely influential. But whether, in fact, larger versus smaller sea turtles, or more abundant (more familiar?) versus depleted and rare (more sympathetic?) turtles are more effectively utilised as flagships are intriguing, and unanswered, questions.

Sea Turtles and Protected Areas

Although we could not confirm any instance among SIDS members where sea turtles had been used *uniquely* as flagships for the designation of a protected area, a number of sites were created with specific reference to their importance to sea turtles as nesting or foraging grounds. These include, among others: Sandy Point National Wildlife Refuge on St. Croix, US Virgin Islands, the first federal refuge established specifically to protect sea turtles in the US (USFWS 2005a), Zeelandia Beach on St. Eustatius, Netherlands Antilles (R. Le Scao, St. Eustatius National and Marine Parks, personal communication), Grande Anse Beach and Fond d'Or Beach on St. Lucia (d'Auvergne and Eckert 1993), Levera National Park on Grenada (R. King, Ocean Spirits, personal communication), Klein Bonaire on Bonaire, Netherlands Antilles (I. Esser, Sea Turtle Conservation Bonaire, personal communication) and, in Belize, the Bacalar Chico Marine Reserve, Sapodilla Cayes Marine Reserve, and Gales Point Wildlife Sanctuary (J. Gibson, Wildlife Conservation Society, personal communication).

Moreover, coastal habitats in several WCR countries are secured under protected area status as a result of their hosting some of the largest sea turtle nesting colonies in the world, with such designation serving, in turn, to protect other unique biological assets as well. These sites include: Archie Carr National Wildlife Refuge in the US (USFWS 2005b), Tortuguero National Park in Costa Rica (legislative history summarised by Troëng and Rankin 2005), Amana Nature Reserve in French Guiana (Fretey and Lescure 1979, 1998), Aves Island Wildlife Refuge in Venezuela (Gov 1972) and, in the Republic of Trinidad and Tobago, the Prohibited Areas of Fishing Pond, Matura and Grande Riviere, declared under the Forests Act (Fournillier and Eckert 1998).

In a rare example of using the sea turtle flagship to safeguard marine habitat, an Environmental Zone was designated in the Cayman Islands in 1986 to protect important mangrove wetlands and sea grass beds. All taking of marine life and all in-water activities were prohibited in this zone; in addition, a speed limit of five miles per hour was instituted to protect sea turtles from boat-strikes in the area. Sea turtles were intentionally used as flagships in this context, with the idea that regulations instituted to protect them would have collateral value in reducing erosion due to propeller wash, preventing propeller strikes and turbidity, and avoiding disturbance

to birds and other wildlife (G. Ebanks-Petrie, Department of the Environment, personal communication).

Nonetheless, protected areas designed with sea turtles in mind are normally biased toward terrestrial habitat and ignore or underrate the need for protecting marine areas. The usual case is for the terrestrial component of the reserve to reflect the biological requirements of nesting, whilst the marine extension, if it exists, bears no resemblance to spatial habitat requirements of reproductively active turtles during the seasonal nesting phase. For example, Critical Habitat designated off Sandy Point National Wildlife Refuge includes the waters from the hundred fathom isobath shoreward (NOAA 1979), despite the fact that gravid leatherbacks spend virtually no time in this zone, save to access the nesting beach, but rather range widely offshore during their inter-nesting intervals (Eckert 2002). Similarly, in the case of the Amana Nature Reserve, the offshore component extends only fifty to 500 metres seaward of the nesting beach (Jorf 1998).

Only recently has any attempt been made to design management corridors based on the migratory routes of sea turtles. In October 1995, federal regulations in the US established all inshore and offshore waters from Cape Canaveral, Florida (28° 24.6' N) to the North Carolina/ Virginia border (36° 30.5' N) as the Leatherback Conservation Zone, providing for short-term fishing closures of areas in that zone when high abundance levels of leatherback turtles were documented (NOAA 1995). The ruling was instigated because of seasonal pulses of leatherback strandings associated with their winter and spring migrations; during this time the turtles, too large to be accommodated by the escape openings of most federally-approved turtle excluder devices (TEDs), were more likely to wash ashore dead.⁴

New research, based on satellite-tracking of post-nesting females from Atlantic Florida breeding grounds, confirms that this population is generally coastal in its migrations, partially explaining the seasonal cycle of fisheries interactions (Eckert *et al.* in press), and lending impetus to the idea that protected areas and other management regimes can be constructed that embrace migratory corridors and effectively mitigate principal threats. At present there are no protected seascapes in the WCR designed specifically to safeguard the migration routes of sea turtles, which are well known to cross ocean basins (see Eckert and Martins 1989; Eckert 1998; Bolten 2003a; Hays, Houghton, and Myers 2004). This highlights an important gap in the international management framework, and the need for international cooperation (see below). Hence, it seems that the flagship appeal of sea turtles has not been either adequate, or adequately exploited, to design protected areas for these animals, much less for other marine life.

Intergovernmental Policy

Fisheries and Bycatch. Sea turtles have been used as leverage to enact policy change, and can serve as both indicators and flagship species on the issue of destructive fishing practices. Assessments of the ecological and economic implications of the mass mortality of non-target species in a variety of commercial fisheries (Alverson *et al.* 1994; Arnason 1994; Pascoe 1997; Warren, Ess, and Swenson 1997; Alverson 1998; NOAA 1998) underscore the gravity of the global bycatch issue. Pascoe (1997) estimated that twenty per cent of marine landings by the world's fisheries is discarded. Shrimp trawlers, particularly those in the tropics, can catch over 400 marine species

in their nets, and non-target species are often discarded -- either they are inedible or are simply not worth retaining when shrimp is worth up to thirty times more per kilogram. It has been estimated that tens of millions of tons of bycatch are taken by shrimp trawl fisheries worldwide each year and that shrimp fisheries are responsible for one-third of the world's discarded catch, despite producing less than two per cent of global seafood (EJF 2003). The Caribbean is not immune to this global dilemma; in Trinidad, for example, located in the southern Caribbean Sea, FAO reported the 'discard ratio' (kilograms of catch discarded for each kilogram of catch retained) in shrimp/prawn trawls as 14.71 (Alverson *et al.* 1994).

Amid the larger carnage reflected in global bycatch statistics, it was concern over the sea turtle death toll that brought the issue forward more than three decades ago when, as early as 1973, shrimp trawling in the WCR (specifically the Gulf of Mexico) was implicated in the collapse of the last breeding assemblage of Kemp's ridley (*Lepidochelys kempii*) turtles (Ross *et al.* 1989; Weber *et al.* 1995). Today the repeated patterns of over-fishing, bycatch mortality, and habitat damage are so well established that additional scientific study often adds only incrementally to further document immediate effects (Dayton, Thrush, and Coleman 2002). Sea turtles continue to command attention in this arena, focusing science, technology, policy, and media attention on the highly complex issues of bycatch as they relate both to marine ecosystem management and the economics of fishing, because of their flagship appeal. This can be used to the benefit of organisms that do not, and could not, wield the same influence, demonstrating the sea turtle's ability to simultaneously function as an indicator of the bycatch problem and a flagship for motivating society to resolve this dilemma.

In the WCR, the efforts of one range state (the US) to deal effectively with the sea turtle bycatch crisis hinged on the finding that, in US waters, 'the most important human-associated source of mortality is incidental capture in shrimp trawls, which accounts for more deaths than all other human activities combined' (NRC 1990:5). What began as a US mandate for reducing sea turtle bycatch in shrimp trawls, ultimately became a global issue, with the US imposing unilateral bans on the import of certain shrimp and shrimp products from countries failing to comply with turtle excluder device (TED) related mandates. Although this ban, through the implementation of Section 609 of US Public Law 101-162, was disputed for half a decade within the World Trade Organisation (WTO), a dispute settlement panel released a report on 15 June 2001, finding that the US had made adjustments in the implementation of its sea turtle protection law, which were considered to be fully consistent with WTO rules and to comply with the recommendations of the WTO Appellate Body (USDOs 2001)⁵.

Multilateral Environmental Instruments.

As a result of the WTO decision and ongoing implementation of Section 609, nations around the world seeking to export shrimp to the US must authenticate that their shrimping vessels do not harm sea turtles, or that they are equipped with TED technologies. Bringing the discussion full circle, back to the WCR, the Inter-American Convention for the Protection and Conservation of Sea Turtles (or IAC; in force since May 2001 and with eight of the eleven contracting parties located in the WCR)⁶ has been called the 'consummation of Section 609 of US Public Law 101-162, which

invokes the conservation of sea turtles as a relatively small, yet significant, part of the gargantuan problem of bycatch destruction during commercial shrimp (prawn) trawling' (Frazier 1997:7). Article IV of the Inter-American Convention obliges contracting parties to reduce, to the greatest extent practicable, 'the incidental capture, retention, harm or mortality of sea turtles in the course of fishing activities, through the appropriate regulation of such activities, as well as the development, improvement and use of appropriate gear, devices or techniques, including the use of turtle excluder devices (TEDS) ... in keeping with the principle of the sustainable use of fisheries resources', but the treaty also emphasises scientific research, public outreach and involvement, and habitat protection and restoration throughout the hemisphere. Hence, focusing on a single flagship group, sea turtles, has resulted in a greater degree of protection for a variety of non-target species, as well as facilitated greater environmental protection, research, and restoration of marine resources and environments. Moreover, on the regulatory and technological heels of TEDS have come a variety of administrative, economic, and gear-based measures designed to address these issues.

The use of flagship species to promote intergovernmental policy, and specifically to promote collaborative, multilateral management of shared species and seascapes, is embraced in the WCR by the Caribbean Environment Programme (CEP). The UNEP Regional Seas Programme is implemented in the Caribbean Sea by the Action Plan for the Caribbean Environment Programme (APCEP), initiated in 1974 at the request of Caribbean governments, by Decision 8/11 of the Second Session of the Governing Council of UNEP (UNEP 1983). The Action Plan outlines programmes of assistance, institutional strengthening, and technical cooperation, and in 1983 led to the adoption of a legal framework -- the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (Cartagena Convention) -- which entered into force in 1986. The Convention is supplemented by three protocols on: oil spills, specially protected areas and wildlife, and pollution from land-based sources and activities. The Protocol Concerning Specially Protected Areas and Wildlife (SPAW), which came into force in 2000, 'is arguably the most comprehensive regional wildlife protection treaty in the world'; with provisions on environmental impact assessment, planning and management regimes, and buffer zones, as well as a range of protection measures (including species recovery plans), it reflects much of the 'best in modern thinking on wildlife protection and management' (Freestone 1990:368). Six species of Caribbean-occurring species of sea turtle are listed in Annex II, affording them the full weight of protection under the Cartagena Convention, and strategically positioning these species in a role with strong implications for regional policy.

The impetus for development of the APCEP was, of course, broader than sea turtles, and explicitly focused on goals related to strengthening the capacity of constituent states and territories 'for implementing sound environmental management practices [to] achieve the development of the region on a sustainable basis' (Preamble: UNEP 1983). Once these goals were articulated, however, sea turtles played a uniquely catalysing role in implementing the intergovernmental agenda. Based on recommendations from the First Meeting of Government-Nominated Experts to Review the Draft Action Plan (UNEP 1980), concern over the status of shared sea turtle stocks and their habitats, including coral reefs and 'turtle grass beds', was the

basis for APCEP project 6/1⁷, which was ranked among the first cohort of ‘projects of common interest’ to be implemented as a matter of priority (UNEP 1983). The sea turtle section of APCEP 6/1, implemented in partnership with the Wider Caribbean Sea Turtle Recovery Team (now known as the Wider Caribbean Sea Turtle Conservation Network, WIDECAST), was among the first funded initiatives of the new Caribbean Environment Programme (UNEP 1985, 1989b).

From the earliest days of negotiation surrounding the priorities of the CEP, the region’s sea turtles have served as a flagship for the development of models to ensure international cooperation in preventing the further decline of depleted living resources, in restoring them to former levels of abundance, and in maintaining them for sustainable use (Frazer 1985). Frazer observed that the methodology necessary to achieve these goals may also have ‘more immediate benefits, even beyond the protection of six endangered or threatened species’; specifically, use of the sea turtle flagship for protection of critical coastal habitat like mangrove forests, sea grass beds, coral reefs, and pristine beaches could play an important role in safeguarding the region’s economic foundations in fisheries and tourism and ‘should be seen as part of an over-all plan to enable other species to flourish as well.’

National Sea Turtle Recovery Action Plans (STRAPS) were among the first contributions to the Caribbean Environment Programme Technical Report Series (Sybesma 1992)⁸. Each STRAP is tailored specifically to local circumstances and discusses the following issues: the national status and distribution of sea turtles; major causes of mortality; the effectiveness of existing legislation; the present and historical role of sea turtles in local culture and economy; and recommendations for research, management, public awareness, and conservation initiatives. In the past decade, implementation of STRAP recommendations has resulted in changes in fisheries regulations; designation of protected areas; realisation of long-term sea turtle population monitoring programmes; adoption of standardised record-keeping and database management protocols; training of enforcement and natural resource officers; development of public awareness materials; creation of grassroots organisations; promotion of sustainable livelihoods in marginalised communities; a commitment to new partnerships (such as co-management); and a broadly enhanced capacity for sea turtle management within the nations participating in the CEP.

The experience of developing Sea Turtle Recovery Action Plans has set an example for other taxa-specific initiatives under the aegis of the CEP. Among these examples are the consultative processes that led to the Regional Management Plan for the West Indian Manatee (UNEP 1995). In 1994, a UNEP meeting of experts concluded that ‘in light of the successful sea turtle recovery effort of WIDECAST ... a similar structure would be desirable for the implementation of manatee activities in the region [including] the need to establish in each country, in consultation with the relevant governments, national recovery teams and country co-ordinators that will assist with the preparation of the country’s recovery plan and implementation of relevant conservation activities at the national level’ (UNEP 1994:10). Most recently, again building on the WIDECAST experience, the UNEP Caribbean Environment Programme will convene a ‘Regional Workshop of Experts on the Development of the Marine Mammal Action Plan for the Wider Caribbean Region’ in Barbados, 18-21 July 2005 (A. Vanzella-Khoury, UNEP, personal communication).

In 2002, UNEP adopted the sea turtle as the logo of the Caribbean Envi-

ronment Programme and cited the region's efforts to 'promote best management practices for turtle survival, such as community-based eco-tourism, alternatives to beachfront lighting, protecting coral reefs and other feeding habitats, and improving law enforcement and the regulatory framework' as evidence that, 'through the Caribbean Environment Programme, governments are co-operating to create a more sustainable future for marine and coastal resources in the Wider Caribbean Region' (UNEP 2001).

Turtles and Tourism – the Case of the Cayman Islands

Of primary importance as an economic driver in the WCR is the tourism industry, with more than twenty-six million annual visitors to the region. As one of the largest and fastest growing industries, tourism (in 1996) accounted for 2.4 million jobs and approximately twenty-five per cent of the Gross Domestic Product (GDP) in the insular Caribbean alone (Spalding and Kramer 2004). Two sectors of the Caribbean tourism industry in particular, SCUBA diving and the cruise-ship business, are predicted to generate a combined total of 4.2 billion US dollars by 2005, accounting for fifty-seven per cent (SCUBA) and fifty per cent (cruise-ships) of global profits in these industries (UNEP 1999).

Like many insular Caribbean territories, tourism is a mainstay of the Cayman Islands' economy, with SCUBA diving and other water sports providing primary attractions. Within the tourism industry, images of turtles are common in advertisements promoting diving and snorkelling, submersible and semi-submersible tours, cruises, and other activities. Cayman sea turtles are often featured in travel, tourism, and dive magazines, and are a primary example of 'charismatic megafauna' used as a symbol for a greater set of attractions that encourage visits from tourists (including divers, snorkelers, and boaters) who, in this case, contribute some seventy per cent of the territory's GDP. Far more than simply a publicity stunt, however, sea turtle images are woven into the fabric of society, their prominence clearly illustrating the continuing importance of these endangered species to the culture, economy, and sense of identity of the Cayman Islands.

The economic importance of sea turtles for the Cayman Islands also lives on, though in a very different form than when they were the mainstays of the Islands' fishery and economy in the late seventeenth and early eighteenth centuries (Jackson 1997). Today a remnant wild fishery (estimated twenty adults per annum, half of which are likely to be taken illegally; Aiken *et al.* 2001) is regulated by means of a short open season and size limits (Fleming 2001). The real value of the sea turtle today would appear to be as a marketing tool and attraction throughout the territory. This use includes the logos of the National Airline ('Sir Turtle'), the national power company ('Sparky the Turtle'), and the Cayman Islands Tourism Association, as well as names or logos for dozens of hotels, inns, condominiums, water sports operations, and other businesses ranging from building supply to travel agencies. The Cayman Islands is a thought-provoking example of the potential for the principal economic contribution of a flagship species to transform over time. Consumptive use of turtles for their meat and other products, once a major economic contributor to the islands' economy, has now been largely eclipsed by the economic contributions associated with non-consumptive use. In the absence of significant commercial exports of products derived from captive-bred green sea turtles by the

Cayman Turtle Farm (CTF), management has, since 1983, been directed primarily to tourism and the production of meat for local consumption (CTF 2002). According to Allan (1998), the abattoir at the CTF processed more than 2,100 turtles for food during 1997, resulting in nearly 51,000 kilograms of meat and edible products (steak to tourist restaurants and a stew mixture for local consumption). In 2000, production was scaled down to 1,800 green turtles (Parsons *in* Fleming 2001). At retail prices that range from four to nine CI dollars per pound (approximately eleven to twenty-four US dollars per kilogram), abattoir revenues pale in comparison to gate receipts (six US dollars for adults, three US dollars for children) and other on-site expenditures derived from the more than 340,000 visitors in 2001, and numbers increasing annually (CTF 2002).

The CTF is arguably the single most visited tourist attraction in this British territory, a significant economic engine driven by the public's desire to see these creatures, once nearly extirpated in the wild, and now a living tribute to the cultural history of the Cayman Islands. Catering to this reality, the farm is investing in a new on-site attraction known as 'Boatswains Beach', which will include 'an interactive turtle area, a snorkel lagoon, a predator tank which snorkelers will also be able to view, an aviary, a Caymanian heritage street with craft vendors, restaurants and a nature trail. An educational pavilion and a one-of-a-kind world-class research centre will make the park a rounded, full day experience for visitors and locals' (CTF 2004).

Discussion

In comparison to many marine species, sea turtles have the potential to be highly successful flagships under diverse circumstances. Additionally, sea turtles embody a unique set of characteristics that enables them to serve successfully not only as flagships, but as indicators of specific marine conservation issues; essential species, or keystones, for critical ecological processes; and umbrellas, promoting the protection of large and/or critically important areas. It is often thought that if numerous conservation goals are involved, a single species is unlikely to satisfy them all (Lambeck 1997). However, there are exceptions to this rule. Caro and O'Doherty (1999) discuss the spotted owl, well known in North America as a flagship for attracting public attention to logging practices in the Pacific Northwest. This particular bird has also demonstrated utility as an umbrella for the protection of old-growth forest communities and as an indicator for population trends in other species (Murphy and Noon 1992; Franklin 1993; Chase 1995). Likewise, sea turtles demonstrate similar potential for simultaneously serving different conservation objectives and strategies.

The decision to use any flagship must take into consideration local cultural values, politics, and socio-economics, as well as the conservation outcome sought and the potential impacts of management actions on the flagship organism itself. In spite of the difficulty often encountered in selecting an appropriate flagship, sea turtles have shown promise in obtaining a broad cross-section of coastal and marine conservation goals for the WCR. The broad appeal of this flagship, as evidenced by its iconographic use by governments and institutions throughout the region, is rather remarkable considering the sheer cultural and geopolitical diversity of the region. Communities in small island developing states are often able to relate to

the sea turtle as an element of everyday life -- and one worth conserving, whether through outright protection or through sustainable exploitation regimes -- and yet this same symbol appeals readily to the citizens of first world cities, inspiring visits to exotic locales and harnessing foreign support for both local and global conservation efforts.

The use of a sea turtle flagship in the designation and management of coastal and marine protected areas is one aspect that warrants further study in the Caribbean context. Sea turtles move freely amongst multiple political jurisdictions, and some species are dependent on high seas environments, outside the jurisdiction of any nation. It is inconceivable from a practical standpoint to suggest absolute protection for all sea turtles throughout all their ranges, nor is this necessarily a prerequisite to achieving conservation goals. But a representative network of protected areas, embracing critical habitat during all life stages, would appear a logical prerequisite to achieving population recovery and maintenance in the WCR and beyond. In consideration of the importance of sandy beaches, as well as nearshore and offshore marine zones, to sea turtle survival (Ackerman 1997; Bjorndal 1997; Bolten 2003b; Musick and Limpus 1997; Plotkin 2003), these ancient creatures may yet prove uniquely useful in focusing public support for marine protected areas.

The creation of new protected areas, and even the existence of sites already so designated, is often resented by fisher communities, the tourist industry, and certain other resource users and stakeholders who view protected area restrictions as incompatible with their livelihood interests, which may include the direct exploitation of sea turtles, or other activities that are subject to regulation. Most conflicts over protected areas arise from a general lack of success in identifying and understanding the goals and interests of the major stakeholders in and around the area in question, and a failure to exploit opportunities for negotiation and consensus building to defuse conflict and seek common ground in competing agendas. Hence, what may appear as a simple conflict over resource use options can sometimes be a far more complex tension over unmet aspirations among the diverse elements of the community (Wells and McShane 2004). The transfer from exploited species to protected conservation icon is unlikely to take place until tangible social and economic benefits of the protected area are clarified and accessible. We believe that the use of the sea turtle flagship in motivating stakeholder dialogue and promoting consensus, based on the intersection of shared interests, has significant untapped potential in the region.

Green and hawksbill sea turtles are thought to have been integral keystone species in pre-Columbian coral reefs and seagrass beds of the Caribbean, having performed critical ecological roles that were once essential for the structure and function of these ecosystems. Jackson (1997) and Bjorndal and Jackson (2003) suggest that the dramatic decline of these turtles has radically reduced, and qualitatively changed, grazing and excavation of seagrasses, as well as depredation on marine sponges; and that this has in turn resulted in loss of production to adjacent ecosystems and disrupted entire food chains. In short, these ecosystems have been fundamentally altered and currently exist in a less than optimal state because of the decimation of keystone species, such as the herbivorous green turtle and the sponge-eating hawksbill. Managing marine ecosystems of the Caribbean, with an emphasis on sea turtles as both flagships and keystones, may provide renewed clarity to current ecosystem management regimes, the definition of which has received no

consensus among modern day ecologists and protected area managers (Simberloff 1998). Simberloff contends that using keystones to unite the best features of single species and ecosystem management regimes will have wide ranging impacts and, at the very least, will allow researchers to derive information on ecosystem function. An additional opportunity, worthy of thoughtful inquiry, could employ the sea turtle flagship to inspire citizens and governments of the Caribbean, as well as visitors to the region, to take action in thwarting the dire environmental and economic consequences that will follow the ecological extinction of the region's coral reefs and seagrass pastures. Coral reefs in the western Atlantic region, of which the wider Caribbean is the most important component, are the most degraded in the world (Gardner *et al.* 2003; Pandolfi *et al.* 2003). Based on historical analyses of the status and trends of seven major guilds of carnivores, herbivores, and 'architectural builders' from fourteen coral reef regions around the world, Pandolfi *et al.* (2003:956) concluded that, 'in general, large animals declined faster than small animals and free-living animals declined more rapidly than architectural builders such as seagrasses and corals'. They urged that 'there must be a common goal of reversing common trajectories of degradation [because] coral reef ecosystems will not survive for more than a few decades unless they are promptly and massively protected from human exploitation.'

Sea turtles are increasingly characterised as keystone species in maintaining and structuring seagrass and coral reef communities (León and Bjørndal 2002; Bjørndal and Bolten 2003; Bjørndal and Jackson 2003). In rallying broad public support to reverse 'common trajectories of degradation' in nearshore tropical marine ecosystems, sea turtles could act as ambassadors for integrated coastal zone management policies engendering broad ecological benefits. The ambassador role is a natural one for the comparatively well-known and charismatic sea turtle, and investigations into the use of the sea turtle flagship in coastal zone themes are likely to demonstrate its effective utility in forums ranging from management and policy, to tourism awareness, to school-based marine studies. Extending the use of the sea turtle flagship to less charismatic but equally imperilled, and ecologically and economically vital, coastal ecosystems may hold even greater promise, since benthic algae and shellfish do not share the charisma of sea turtles and therefore would not be expected to have the same capacity to catalyse changes in human behaviour, especially among people without direct economic ties to the resource in question.

We also see significant unrealised potential for use of the sea turtle flagship in providing incentives to promote sustainable practices and direct tourists towards protected areas, 'turtle friendly' hotels, such as those endorsing best practices concerning beachfront lighting and nesting beach management (see, for example, Choi and Eckert 2005), and community-based conservation and/or ecotourism initiatives in which sea turtles are highlighted. Sea turtles may increase demand on tourist facilities and thus offer direct benefits to local economies, further encouraging local support for protected areas (Goodwin 1996) and other conservation actions. This stimulation of the local economy may have the side benefit of engendering support for conservation where it had previously been lacking and in turn change local perceptions of the flagship in question. This could offer the possibility, for example, that a live turtle is worth more, and perhaps a good deal more, than a dead turtle. In a recent review of the economic aspects of sea turtle use and conservation, Troëng and

Drews (2004) concluded that the greatest potential for realising economic gain from thriving sea turtle populations was in countries with developing economies, and that non-consumptive use of marine turtles, such as tourism, can be a major revenue generator. Although the use of sea turtles in marketing mass tourism has been discouraged, particularly in the Mediterranean (Cosijn 1995; Godley and Broderick 1996; Schofield, Kateselidais, and Hoff 2001), the potential exists for raising funds and awareness for Caribbean conservation through focused ecotourism derived from developed nations (Walpole and Leader-Williams 2002). However, great care must be taken to avoid the negative impacts of tourism. Pirating of the sea turtle icon, by destructive industry, is also a potential danger.

Conclusion

This is the first focused treatment of sea turtles as flagship species on a Caribbean regional scale, and we hope the examples we have selected will stimulate a more thorough compilation of case studies, as well as further discussion and rigorous testing of the flagship species concept, not to mention a deeper commitment to the conservation of marine ecosystems and resources requisite to support the needs -- ecological, economic, and aesthetic -- of future generations. It is evident that no flagship species will be useful in every situation; even with one conservation agenda, a specific flagship species may have varying degrees of success as a catalyst among different public sectors. In the case of sea turtles, for example, their use on a particular issue may be quite successful with funding agencies, governments, and stakeholders dependent upon the tourism sector, yet might be less effective with other sectors of society.

Is use of the iconographic sea turtle an effective strategy for conveying the essence of complex ecological, geographical, and socio-cultural issues in the WCR? The inherent risks we have discussed, namely the public highlighting of exploited species as well as the potential that an attractive species will divert attention and resources away from work on other, equally important species, environments, and processes (see Simberloff 1998), appear to pale in comparison to the progress being made and the future potential for marine conservation and integrated coastal/ocean management in the WCR through the use of sea turtle flagships.

From sandy shorelines to deep offshore benthos, no other animal is so wholly representative of divergent marine habitats and their interdependent biodiversity. Likewise, from the gillnets of traditional fishers and the trawl nets of commercial shrimp boats, to the high stakes race to develop pristine shorelines and capture international tourism markets, no other animal is so wholly representative of the diverse portfolio of contemporary threats to marine and coastal ecosystems in the WCR. Now, with the growing availability and affordability of remote sensing technologies for the tracking and monitoring of turtles and the concepts of transboundary and high seas marine protected areas emerging as management possibilities (Gjerde and Breide 2003), there is a great opportunity to thoroughly test the utility of these animals as flagship species.

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Notes

¹ Currently, fifty-one small island developing states and territories are included in the global list used by the United Nations Department of Economic and Social Affairs for monitoring progress in the implementation of the Barbados Programme of Action; twenty-three of these are located in the Wider Caribbean Region (WCR), including: Anguilla (UK), Antigua and Barbuda, Aruba (NL), Bahamas, Barbados, Belize, British Virgin Islands (UK), Cuba, Dominica, Dominican Republic, Grenada, Guyana, Haiti, Jamaica, Montserrat (UK), Netherlands Antilles [Bonaire, Curaçao, Saba, Sint Eustatius, Sint Maarten] (NL), Puerto Rico (US), Saint Kitts and Nevis, Saint Lucia, Saint Vincent and the Grenadines, Suriname, Trinidad and Tobago, and the U.S. Virgin Islands (US) (www.un.org/esa/sustdev/sids/sidslist.htm).

² The United Nations Environment Programme's definition of the Wider Caribbean Region (WCR) includes those coastal marine areas of the western Atlantic basin as far north as thirty degrees N, Figure 1; hence, the WCR includes the US as a member nation, as the region embraces the coastlines of the Gulf of Mexico and nearly the entirety of the state of Florida.

³ For a more detailed explanation of keystone, indicator, umbrella, and flagship species, see Frazier (2005).

⁴ A decade after the ruling was passed, it is now moot because a new rule, calling for the mandatory use of TEDs with openings sufficiently large to release the half-ton turtles, became law in 2003. This applies to US Atlantic waters south of the North Carolina/Virginia border and also in the Gulf of Mexico west of 81° W (NOAA 2003).

⁵ For case documents, Panel Reports, and Appellate Body Reports, see the World Trade Organisation archives at www.wto.org/english/tratop_e/envir_e/edis08_e.htm. For a more detailed examination of the case, see Bache (2005).

⁶ Parties to the IAC, with jurisdiction in the WCR include: Belize, Costa Rica, Guatemala, Honduras, Mexico, Netherlands Antilles, US, and Venezuela (www.iacturtle.org).

⁷ The title of APCEP project 6/1 was 'Surveys to determine status of endangered, threatened and vulnerable species in the Caribbean Region and development and implementation of measures for their conservation'.

⁸ For a complete list of CEP Technical Reports, www.cep.unep.org/pubs/Techreports/techreports.php#tabular.

References

- Ackerman, R.A.
1997 The Nest Environment and the Embryonic Development of Sea Turtles. In: P. Lutz and J. Musick (Eds.), *The Biology of Sea Turtles*. Boca Raton, Florida: CRC Press. Pp. 83-106.
- Aiken, J.J., B.J. Godley, A.C. Broderick *et al.*
2001 Two Hundred Years after a Commercial Marine Turtle Fishery: The Current Status of Marine Turtles Nesting in the Cayman Islands. *Oryx* 35:145-152.

- Allan, C.
1998. *Conched Out: A Review of the Trade in CITES-listed species in the United Kingdom Overseas Territories in the Caribbean*. Godalming, UK: World Wildlife Fund (WWF) UK, 87 pp.
- Alverson, D.L.
1998 *Discarding Practices and Unobserved Fishing Mortality in Marine Fisheries: An Update*. Seattle, Washington: Washington Sea Grant Program. 76 pp.
- Alverson, D.L., M.H. Freeberg, S.A. Murawski, and J.G. Pope
1994 *A Global Assessment of Fisheries Bycatch and Discards*. FAO Fisheries Technical Paper 339. Rome: Food and Agricultural Organisation of the United Nations (FAO), 233 pp.
- Andelman, S.J. and W.F. Fagan
2000 Umbrellas and Flagships: Efficient Conservation Surrogates or Expensive Mistakes? *Proceedings of the National Academy of Sciences US* 97(11):5954-5959.
- Arnason, R.
1994 On Catch Discarding in Fisheries. *Marine Resource Economics* 9(3): 189-207.
- Bache, S.J.
2005 Marine Policy Development: The Impact of a Flagship Species. In: J. Frazier (Ed.), *MAST* 3(2): PAGES
- Bjørndal, K.A.
1997 Foraging Ecology and Nutrition of Sea Turtles. In: P. Lutz and J. Musick (Eds.), *The Biology of Sea Turtles*. Boca Raton, Florida: CRC Press. Pp. 199-232.
- Bjørndal, K.A. and A.B. Bolten
2003 From Ghosts to Key Species: Restoring Sea Turtle Populations to Fulfill Their Ecological Roles. *Marine Turtle Newsletter* 100: 16-21.
- Bjørndal, K.A. and J.B.C. Jackson
2003 Roles of Sea Turtles in Marine Ecosystems: Reconstructing the Past. In: P.L. Lutz, J.A. Musick and J. Wyneken (Eds.), *The Biology of Sea Turtles Volume II*. Boca Raton, Florida: CRC Press. Pp. 259-273.
- Bolten, A.B.
2003a Active Swimmers – Passive Drifters: The Oceanic Juvenile Stage of Loggerheads in the Atlantic System. In: A.B. Bolten. and B.E. Witherington (Eds.), *Loggerhead Sea Turtles*. Washington, DC: Smithsonian Books. Pp. 63-78.
2003b Variation in Sea Turtle Life History Patterns: Neritic vs. Oceanic Developmental Stages. In: P.L. Lutz, J.A. Musick and J. Wyneken (Eds.), *The Biology of Sea Turtles Volume II*. Boca Raton, Florida: CRC Press. Pp. 243-258.
- Caro, T.M. and G. O'Doherty
1999 On the Use of Surrogate Species in Conservation Biology. *Conservation Biology* 13(4):805-814.
- Carpenter, K.E. (Ed.)
2002 *The Living Marine Resources of the Western Central Atlantic. Volume 1: Introduction, Molluscs, Crustaceans, Hagfishes, Sharks, Batoid Fishes, and Chimaeras*. Rome: FAO Species Identification Guide for Fishery Purposes, and American Society of Ichthyologists and Herpetologists Special Publication No. 5. 600 pp.
- Carr, A.
1955 *The Windward Road*. New York, New York: Alfred A. Knopf, Inc., 258 pp.
- Chase, A.
1995 *In a Dark Wood: The Fight over Forests and the Rising Tyranny of Ecology*. New York, New York: Houghton Mifflin.

- Choi, G.-Y. and K.L. Eckert
 2005 *Sea Turtles and the Hotel Industry: Best Practices Manual for Beachfront Properties in the Wider Caribbean Region*. Beaufort, North Carolina: Wider Caribbean Sea Turtle Conservation Network (WIDECAST) Technical Report No. 4. 78 pp.
- Cosijn, R.
 1995 Using Sea Turtles for Tourism Marketing. *Marine Turtle Newsletter* 71: 12-14.
- CTF (Cayman Turtle Farm)
 2002 *Application to Register a Captive Breeding Operation Involving Chelonia mydas on Grand Cayman, Cayman Islands*. Submitted to the 12th Conference of Parties to the Convention on International Trade in Endangered Species of Wild Fauna and Flora, Santiago, Chile. Available at: www.ukcites.gov.uk/news/ctf.pdf
 2004 Cayman Turtle Farm reports no losses from the hurricane. *Cayman NetNews*: Available at: <http://caymannetnews.com/2004/10/741/turtles.shtml>
- d'Auvergne, C. and K.L. Eckert
 1993 WIDECAST Sea Turtle Recovery Action Plan for St. Lucia. CEP Technical Report No. 26. Kingston, Jamaica: UNEP Caribbean Environment Programme, xiv + 66 pp.
- Dayton, P.K., S. Thrush and E.C. Coleman
 2002 *Ecological Effects of Fishing in Marine Ecosystems of the United States*. Arlington, Virginia: Pew Oceans Commission. 45 pp.
- DCNA (Dutch Caribbean Nature Alliance)
 2004 *Project Document: Sea turtle education, publicity and outreach campaign for the Netherlands Antilles built around Bonaire's sea turtle tracking programme*. Bonaire, Netherlands Antilles: Dutch Caribbean Nature Alliance. 8 pp. (unpublished)
- Dietz, J.M., A.L. Dietz and E.Y. Nagagata
 1994 The Effective Use of Flagship Species for Conservation of Biodiversity: the Example of Lion Tamarins in Brazil. In: P.J.S. Olney, G.M. Mace and A.T.C. Feister (Eds.), *Creative Conservation: Interactive Management of Wild and Captive Animals*. London, UK: Chapman and Hall. Pp. 32-49.
- Dobson, A.P., J.P. Rodriguez, W.M. Roberts, and D.S. Wilcove
 1997 Geographic Distribution of Endangered Species in the United States. *Science* 275: 550-553.
- Eckert, K.L., J.A. Overing and B.B. Lettsome
 1992 WIDECAST *Sea Turtle Recovery Action Plan for the British Virgin Islands*. CEP Technical Report No. 15. Kingston, Jamaica: UNEP Caribbean Environment Programme, xv + 116 pp.
- Eckert, S. A.
 1998 Perspectives on the Use of Satellite Telemetry and Electronic Technologies for the Study of Marine Turtles, with Reference to the First Year Long Tracking of Leatherback Sea Turtles. In: S.P. Epperly and J. Braun (Compilers), *Proceedings of the seventeenth Annual Symposium on Sea Turtle Biology and Conservation*. Miami, Florida: NOAA Tech. Memo. NMFS-SEFSC-415:44-46.
- Eckert, S.A.
 2002 Swim Speed and Movement Patterns of Gravid Leatherback Sea Turtles (*Dermochelys coriacea*) at St. Croix, US Virgin Islands. *Journal of Experimental Biology* 205:3689-3697.
- Eckert, S.A. and H.R. Martins
 1989 Transatlantic Travel by a Juvenile Loggerhead Turtle. *Marine Turtle Newsletter* 45:15
- Eckert, S.A., D. Bagley, S. Kubis, L. Ehrhart, C. Johnson, K. Stewart, and D. DeFreese
 in press Interesting, Post-nesting Movements and Foraging Habitats of Leatherback Sea Turtles (*Dermochelys coriacea*) Nesting in Florida. *Chelonian Conservation and Biology*

- EJF (Environmental Justice Foundation)
- 2003 *Squandering the Seas: How Shrimp Trawling Is Threatening Ecological Integrity and Food Security around the World*. London, UK: Environmental Justice Foundation.
- Entwistle, A.
- 2000 Flagships for the Future? *Oryx* 34: 239.
- Epperly, S.P.
- 2003 Fisheries-Related Morality and Turtle Excluder Devices (TEDs). In: P.L. Lutz, J.A. Musick and J. Wyneken (Eds.), *The Biology of Sea Turtles Volume II*. Boca Raton, Florida: CRC Press. Pp.339-353.
- Fleming, E.H.
- 2001 *Swimming Against the Tide: Recent Surveys of Exploitation, Trade, and Management of Marine Turtles In the Northern Caribbean*. Washington DC: TRAFFIC North America 183 pp.
- Fournillier, K. and K.L. Eckert
- 1998 *Draft WIDECAST Sea Turtle Recovery Action Plan for Trinidad and Tobago*. Prepared under the auspices of the Wider Caribbean Sea Turtle Conservation Network (WIDECAST) and the United Nations Environment Programme. In review.
- Franklin, J.F.
- 1993 Preserving Biodiversity; Species, Ecosystems, or Landscapes. *Ecological Applications* 3:202-205.
- Frazer, N.B.
- 1985 WIDECAST: Help for Caribbean Sea Turtles. *Oceanus* 28(1):100-102.
- Frazier, J.
- 1997 Guest Editorial: Inter-American Convention for the Protection and Conservation of Sea Turtles. *Marine Turtle Newsletter* 78: 7-13.
- 2005 Marine Turtles as Flagship Species: The Role of Flagship Species in Interactions between People and the Sea. *MAST* 3(2) and 4(1):5-38.
- Freestone, D.
- 1990 Specially Protected Areas and Wildlife in the Caribbean: The 1990 Kingston Protocol to the Cartagena Convention. *International Journal of Estuarine and Coastal Law* 5(4):362-382.
- Fretey, J. and J. Lescure
- 1979 Rapport sur l'étude de la protection des tortues marines en Guyane française. Notes sur le projet de réserve naturelle de Basse-Mana. Ministère de l'Environnement, Paris. Mimeogr., 59 pp.
- 1998 Les tortues marines en Guyane française : bilan de 20 ans de recherche et de conservation. *Journal d'Agriculture Tropicale et de Botanique Appliquée, revue d'ethnobiologie* 40(1-2):219-238.
- Froese, R., and D. Pauly (Eds.)
- 2003 *FishBase*. World Wide Web Electronic Publication. <<http://www.fishbase.org>>, version 22 March 2004.
- Gardner, T.A., I. M. Côté, J.A. Gill, A. Grant, and A.R. Watkinson
- 2003 Long-term Region-wide Declines in Caribbean Corals. *Science* 301: 958.
- Gjerde, K.M. and C. Breide (Eds.)
- 2003 Towards a Strategy for High Seas Marine Protected Areas: Proceedings of the IUCN, WCPA and WWF Experts Workshop on High Seas Marine Protected Areas, 15-17 January 2003, Malaga, Spain. Gland, Switzerland: World Conservation Union (IUCN). 181 pp.
- Glover, L.K. and S.A. Earle (Eds.)
- 2004 *Defying Ocean's End: An Agenda for Action*. Washington DC: Island Press, 283 pp.

- Godley, B. and A. Broderick
 1996 Turtles and Tourist Marketing: A British Perspective. *Marine Turtle Newsletter* 74:12-14.
- Goodwin, H.
 1996 In Pursuit of Ecotourism. *Biodiversity and Conservation* 5:277-292.
- gov (Government of Venezuela)
 1972 Gaceta Oficial de Venezuela, No. 1029. August 23, 1972. Creación del Refugio de Fauna Silvestre Isla de Aves. [in Spanish]
- Groombridge, B. and R. Luxmoore
 1989 *The Green Turtle and Hawksbill (Reptilia: Cheloniidae): World Status, Exploitation and Trade*. Lausanne, Switzerland: Secretariat of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), 601 pp.
- Hastings, M.
 2003 A Conservation Success: Leatherback Turtles in the British Virgin Islands. *Marine Turtle Newsletter* 99:5-7.
- Hays G.C., J.D.R. Houghton, A.E. Myers
 2004 Pan-Atlantic Leatherback Turtle Movements. *Nature* 429:522.
- Hemphill, A.H., L.K. Glover, S.A. Earle, and R.M. McManus
 2004 *From flagships to beneficiaries: The Defying Ocean's End global agenda for action and its implications for sea turtles*. Oral Presentation to the twentyfourth Annual Symposium on Sea Turtle Biology and Conservation, San José, Costa Rica. 22-28 February 2004.
- IUCN (World Conservation Union)
 2003 *2003 IUCN Red List of Threatened Species*. Gland, Switzerland: World Conservation Union (IUCN). Available at: www.redlist.org
- Jackson, J.B.C.
 1997 Reefs since Columbus. *Coral Reefs* 16, Suppl.: S23-S32.
- Jackson, P.
 2001 Flagship Species: 1. Tigers. *Peopleandplanet.net: People and Biodiversity*. Available at: <http://www.peopleandplanet.net/doc.php?id=822>
- JORF (Journal Officiel de la République française)
 1998 *Décret n°98-165 portant création de la RN de l'Amama (Guyane), 14 mars 1998*, Pp. 3835-3837.
- Kellert, S.R.
 1986 Social and Perceptual Factors in the Preservation of Animal Species. In: B.G. Norton (Ed.), *The Preservation of Species: The Value of Biological Diversity*. Princeton, New Jersey: Princeton University Press. Pp. 50-73.
- King, F.W.
 1982 Historical Review of the Decline of the Green Turtle and Hawksbill. In: K.A. Bjorndal (Ed.), *The Biology and Conservation of Sea Turtles*. Washington, DC: Smithsonian Institution Press. Pp. 183-188.
- Lambeck, R.J.
 1997 Focal Species: A Multi-species Umbrella for Nature Conservation. *Conservation Biology* 11:849-857.
- Leader-Williams, N. and H. Dublin
 2000 Charismatic Megafauna as 'Flagship Species'. In: A. Entwistle and N. Dunstone (Eds.), *Priorities for the Conservation of Mammalian Diversity: Has the Panda Had Its Day?* Cambridge, UK: Cambridge University Press. Pp. 53-81.

- León, Y.M. and K.A. Bjørndal
 2002 Selective Feeding in the Hawksbill Turtle, an Important Predator In Coral Reef Ecosystems. *Marine Ecology Progress Series* 245:249-258.
- Lewis, R.L., S.A. Freeman and L.B. Crowder
 2004 Quantifying the effects of fisheries on threatened species: the impact of pelagic longlines on loggerhead and leatherback sea turtles. *Ecology Letters* 7:221–231.
- Linsley, N.B.
 2004 *Sea Turtle Phonocards*. Available at: www.2xtreme.net/~nlinsley/phonocard/
- Linsley, N.B. and G.H. Balazs
 2004 *Sea Turtle Postage Stamps of the World*. Available at: www.2xtreme.net/~nlinsley/info.htm
- Lopez, F.
 1996 Marine Turtles on Coins and Paper Money: A Checklist. *Marine Turtle Newsletter* 74:17-19.
 2004 *Turtles and Tortoises on Coins and Paper Money*. Available at: www.angelfire.com/ca/turtle-manfrank/coins.html
- McNamee, G. and L.A. Urrea (Eds.)
 1996 *A World of Turtles: A Literary Celebration*. Boulder, Colorado: Johnson Books. 149 pp.
- Meylan, A.B.
 1999 Status of the Hawksbill Turtle (*Eretmochelys imbricata*) in the Caribbean Region. *Chelonian Conservation and Biology* 3(2):177–184.
- Morgan, P. J.
 1989 Occurrence of leatherback Turtles (*Dermochelys coriacea*) in the British Islands in 1988 with Reference to a Record Specimen. In: S.A. Eckert, K.L. Eckert, and T.H. Richardson (Compilers), *Proceedings of the ninth Annual Workshop on Sea Turtle Conservation and Biology*. Miami, Florida: NOAA Tech. Memo. NMFS-SEFC-232:119-120.
- Murphy, D.D. and B.R. Noon
 1992 Integrating Scientific Methods and Habitat Conservation Planning: Reserve Design for Northern Spotted Owls. *Ecological Applications* 2:3-17.
- Musick, J.A. and C.J. Limpus
 1997 Habitat Utilisation and Migration in Juvenile Sea Turtles. In: P. Lutz and J. Musick (Eds.), *The Biology of Sea Turtles*. Boca Raton, Florida: CRC Press. Pp. 137-164.
- NOAA (National Oceanic and Atmospheric Administration)
 1979 Critical Habitat for Leatherback Turtle. *Federal Register* 44:17711, March 23, 1979. Redesignated and amended at *Federal Register* 64: 14067, March 23, 1999.
 1995 Final Rule: Leatherback Conservation Zone. *Federal Register* 60(178):47713-47715, September 14, 1995.
 1998 *Managing the Nation's Bycatch: Programs, Activities, and Recommendations for the National Marine Fisheries Service*. Washington, DC: NOAA 174 pp.
 2003 Final Rule: Endangered and Threatened Wildlife; Sea Turtle Conservation Requirements. *Federal Register* 68(35):8456-8471, 21 February 2003..
- Norse, E.A. (Ed.)
 1993 *Global Marine Biological Diversity: A Strategy for Building Conservation into Decision Making*. Washington, DC: Island Press.
- NRC (National Research Council)
 1990 *Decline of the Sea Turtles: Causes and Prevention*. Washington, DC: National Research Council. National Academy Press, 259 pp.
- Pandolfi, J.M., R.H. Bradbury, E. Sala *et al.*
 2003 Global Trajectories of the Long-Term Decline of Coral Reef Ecosystems. *Science* 301:955-958.

- Parsons, J.J.
1962 *The Green Turtle and Man*. Gainesville, Florida: University of Florida Press.
- Pascoe, S.
1997 *Bycatch Management and the Economics of Discarding*. FAO Fisheries Technical Paper 370. Rome: Food and Agricultural Organisation of the United Nations (FAO). 137 pp.
- Plotkin, P.
2003 Adult Migrations and Habitat Use. In: P.L. Lutz, J.A. Musick and J. Wyneken (Eds.), *The Biology of Sea Turtles Volume II*. Boca Raton, Florida: CRC Press. Pp. 225-241.
- Rebel, T.P.
1974 *Sea Turtles and the Turtle Industry of the West Indies, Florida, and the Gulf of Mexico. Revised Edition*. Coral Gables, Florida: University of Miami Press. 250 pp.
- Reichart, H.A.
1993 *Synopsis of Biological Data on the Olive Ridley Sea Turtle, Lepidochelys olivacea (Eschscholtz, 1829), in the Western Atlantic*. Miami, Florida: NOAA Tech. Memo. NMFS-SEFSC-336. 78 pp.
- Ross, J.P., S. Beavers, D. Mundell, and M. Airth-Kindree
1989 *The Status of Kemp's Ridley*. Washington, DC: Center for Marine Conservation [now The Ocean Conservancy]. 51 pp.
- RSCF (Rare Species Conservatory Foundation)
2004 Powerful Conservation Tools – Flagship Species. *Rare Species Conservatory Foundation* website. www.rarespecies.org/flagship.htm
- Schofield, G., K. Katselidais and S. Hoff
2001 Eastern Mediterranean ‘Holiday Hotspots’ versus Sea Turtle ‘Nesting Hotspots’. *Marine Turtle Newsletter* 92:12-13.
- Seminoff, J.A.
2004 *Red List Assessment of the Green Sea Turtle (Chelonia mydas) using the 2001 Red List Criteria*. IUCN-SSC Marine Turtle Specialist Group. Available at: www.iucn-mtsg.org/red_list/cm/MTSG_Chelonia_mydas_Assessment_April-2004.pdf. 34 pp.
- Simberloff, D.
1998 Flagships, Umbrellas, and Keystones: Is Single-species Management Passé in the Landscape Era? *Biological Conservation* 83(3):247-257.
- Spalding, M. and P. Kramer
2004 The Caribbean. In: L.K. Glover and S.A. Earle (Eds.), *Defying Ocean's End: An Agenda for Action*. Washington, DC: Island Press. Pp. 7-41.
- Sullivan Sealey, K. and G. Bustamante
1999 *Setting Geographic Priorities for Marine Conservation in Latin America and the Caribbean*. Arlington, Virginia: The Nature Conservancy. 125 pp.
- Sybesma, J.
1992 *WIDECASST Sea Turtle Recovery Action Plan for the Netherlands Antilles* (K.L. Eckert, Ed.), CEP Technical Report No. 11. Kingston, Jamaica: UNEP Caribbean Environment Programme. xvii + 63 pp.
- Troëng, S. and C. Drews
2004 *Money Talks: Economic Aspects of Marine Turtle Use and Conservation*. Gland, Switzerland: WWF-International. 62 pp.
- Troëng, S. and E. Rankin
2005. Long-term Conservation Efforts Contribute to Positive Green Turtle *Chelonia mydas* Nesting Trend at Tortuguero, Costa Rica. *Biological Conservation* 121:111–116.

- UNEP (United Nations Environment Programme)
- 1980 *Report of the First Meeting of Government-Nominated Experts to Review the Draft Action Plan for the Wider Caribbean Region*, Caracas, 28 January-1 February 1980. UNEP E/CEPAL/PROY.3/L.6.
- 1983 *Action Plan for the Caribbean Environment Programme*. UNEP Regional Seas Reports and Studies No. 26. Geneva: UNEP, Regional Seas Programme Activity Centre. 19 pp.
- 1985 *Report of the Fourth Meeting of the Monitoring Committee on the Action Plan for the Caribbean Environment Programme*. UNEP/IG.54/7 10 June 1985. Kingston, Jamaica: UNEP Caribbean Environment Programme, 37 pp.
- 1989a *Regional Overview of Environmental Problems and Priorities Affecting the Coastal and Marine Resources of the Wider Caribbean*. CEP Technical Report No.2. Kingston, Jamaica: UNEP Caribbean Environment Programme. 39 pp.
- 1989b *The Action Plan for the Caribbean Environment Programme: Evaluation of its Development and Achievements*. UNEP Regional Seas Reports and Studies No.109. Nairobi: United Nations Environment Programme, Oceans and Coastal Areas Programme Activity Centre. 70 pp.
- 1994 *Report of the Regional Workshop on the Conservation of the West Indian Manatee*. Kingston, Jamaica, 1-4 March 1994. Submitted to the Eleventh Meeting of the Monitoring Committee on the Action Plan for the Caribbean Environment Programme and Special Meeting of the Bureau of Contracting Parties to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region, Kingston, Jamaica, 7-9 December 1994. UNEP (OCA)/CAR IG.11/INF4.
- 1995 *Regional Management Plan for the West Indian Manatee, Trichechus manatus*. CEP Technical Report No. 35. Kingston, Jamaica: UNEP Caribbean Environment Programme. 104 pp.
- 1999 *Regional Seas Reports and Studies, 172: Assessment of Land-Based Sources and Activities Affecting the Marine, Coastal and Associated Freshwater Environment in the Wider Caribbean Region*. The Hague: UNEP/GPA Coordination Office and Caribbean Environment Programme.
- 2001 *The Caribbean Environment Programme: Promoting Regional Co-operation to Protect the Marine Environment*. Kingston, Jamaica: UNEP Caribbean Environment Programme. 20 pp.
- UNGA (United Nations General Assembly)
- 1994 Barbados Programme of Action. Report of the Global Conference on the Sustainable Development of Small Island Developing States, 25 April-6 May 1994. Bridgetown, Barbados. Available at: www.un.org/esa/sustdev/sids/sids.htm
- USCB (United States Census Bureau)
- 2002 U.S. Census Bureau Global Population Profile: 2002. Table A-4: Population by Region and Country: 1950-2050. Available at: www.census.gov/ipc/prod/wp02/tabA-04.pdf
- USDOS (United States Department of State)
- 2001 "U.S. Wins WTO Case on Sea Turtle Conservation". Press Release distributed by the Office of International Information Programmes, US Department of State. 15 June 2001. Washington, DC
- USFWS (United States Fish and Wildlife Service)
- 2005a Sandy Point National Wildlife Refuge. Available: www.fws.gov/southeast/sandypoint
- 2005b Archie Carr National Wildlife Refuge. Available at: www.fws.gov/archiecarr/ArchieCarr.pdf
- Walpole, M.J. and N. Leader-Williams
- 2002 Tourism and Flagship Species in Conservation. *Biodiversity Conservation* 11(3):543-547.
- Warren, B., C. Ess and E. Swenson
- 1997 Managing Bycatch and Discards: A Review of Progress and Challenges in the United States. In: I. Clucas and D. James (Eds.), *Papers Presented at the Technical Consultation on Reduction of Wastage in Fisheries*. FAO Fisheries Report 547, Suppl. Rome: FAO. Pp. 69-88.

- Weber, M., D. Crouse, R. Irvin and S. Iudicello
1995 *Delay and Denial: A Political History of Sea Turtles and Shrimp Fishing*. Washington, DC: Center for Marine Conservation [now The Ocean Conservancy]. 46 pp.
- Wells, M.P. and T.O. McShane
2004 Integrating Protected Area Management with Local Needs and Aspirations. *Ambio* 33(8): 513-519.
- Western, D.
1987 Africa's Elephants and Rhinos: Flagships in Crisis. *Trends in Ecology & Evolution* 2: 343-346.
wwf (World Wide Fund for Nature)
- 2004a wwf's Flagship Species: the World's Most Famous Species under the Greatest Threats. *World Wide Fund for Nature*. Available at: www.panda.org/about_wwf/what_we_do/species/what_we_do/flagship_species/index.cfm
- 2004b Flagship Species: Marine Turtles. *World Wide Fund for Nature*. Available at: www.panda.org/about_wwf/what_we_do/species/what_we_do/flagship_species/marine_turtles/
- Zacharias, M.A. and J.C. Roff
2001 Use of Focal Species in Marine Conservation and Management: A Review and Critique. *Aquatic Conservation: Marine and Freshwater Ecosystems* 11(1):59-76.

