Report to National Parks and Wildlife Service, Ireland on Turtle Protection and Related Activities in and around Mayumba National Park, Gabon, 2007 - 08 Nesting Season

Wildlife Conservation Society (WCS)
Aventures Sans Frontiers (ASF)
Mayumba National Park

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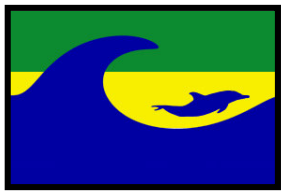
Report to The National Parks and Wildlife Service, Ireland on Turtle Protection and Related Activities in and around Mayumba National Park, Gabon, 2007 - 08 Nesting Season (Contract Ref D/C/265)

Comhshaol, Oidhreacht agus Rialtas Áitiúil
Environment, Heritage and Local Government



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EXECUTIVE SUMMARY

The sea turtle nesting beach at Mayumba is the most important leatherback rookery in Africa, and probably the world. However, turtles visiting Mayumba to nest are under threat from nest raiding and hunting. They also face threats from the sea. The most important is illegal or uncontrolled fishing. Turtles are swept up in trawl nets, drowned in static nets, or taken as by-catch in the deep water long-line fishery. In addition, oil pollution may leave a thick lethal barrier between the sea and the upper beach where hatchlings emerge from their nests. This project primarily concerns the direct protection of the nesting beach. However, this assistance in patrol effort has direct and indirect 'knock-on' effects in reducing other threats, which are an integral part of our whole turtle project. This report concentrates principally on patrol and monitoring efforts, however, we also include a report on related activities that were either directly or indirectly connected to beach patrols. The main results of the 2007/2008 season are highlighted below.

- Over 6000 kilometers of patrols were conducted between October 2007 and April 2008 by staff operating from 3 camps within Mayumba National Park.

- Support from the National Parks and Wildlife Service assured that an additional 30km of critical nesting beach was patrolled.

- As a result of these patrols, no incidents of nest raiding or hunting were reported from the research sections of the beach, and incidents on other sectors were greatly reduced.

- Patrol teams contributed to long-term data collection on turtle visitation rates. Data are being compared with rates since 2000 when the project began. It is clear that nesting was greatly reduced from the previous season, but additional data collection will be required to detect whether this phenomena was a cyclical dip, or represents a genuine drop in turtle numbers. Our data underline the importance of continued patrol presence on the nesting beaches.

- Patrol teams provided precise and swift reporting of illegal fishing activity opposite the nesting beach. This information permitted the project patrol vessel to be launched on 3 occasions, intercepting illegal vessels, and on 8 other occasions, information was used directly to establish a total of 11 illegal fishing reports. This effort has done a great deal

to enforce the no-fishing restriction within the national park, and reduce levels of by-catch related mortality in sea turtles.

- Patrols gave early warning of the arrival of two oil slicks that hit the nesting beaches at the start of the season. Fortunately, neither slick was large in size, and both dispersed before causing direct harm to nesting turtles.

- Patrol teams gave important assistance to the project's satellite tracking program. This vital program has allowed us to determine inter-nesting movements close to the coast, and large-scale migrations in the open ocean. This work is of paramount importance to designing effective conservation strategies for turtles as sea where they are at threat from coastal trawlers and deep water long-line fisheries.

- Also related to by-catch, the project has continued to promote and lobby for the upcoming first major sea trials of turtle excluder devices in Gabon. This work will save thousands of turtle from drowning in trawl nests, and we hope will pace the way to legal changes affecting the shrimp trawl industry in Gabon.

- The project grew its conservation education program, bringing a wide variety of stimulating and fun activities to children in remote village schools as well as those in Mayumba town. Outreach activities also helped the adult population to understand the value of turtle conservation to their communities. This long-term program of education is now beginning to bear fruit, with genuine signs that attitudes are changing towards nest raiding and hunting. This effort has been vital to ensuring that the nesting beach has a long-term future.

- Overall, the support from the National Parks and Wildlife Service has been of enormous benefit in extending the reach and scope of turtle protection and conservation in Mayumba, home of Africa's most important leatherback nesting rookery. However sustained support is required to ensure that we can reach our long-term goals of beach protection, fisheries control, pollution surveillance, and outreach. While leatherback turtles remain critically endangered, the nesting beach at Mayumba must remain a high priority for turtle conservation.

Introduction

Site description

The town of Mayumba is situated in the extreme south of Gabon, on the Atlantic coast of central Africa, approximately 84km from the international border with Congo. The coastline between the town and the border (see photo on front cover) is wild, exposed and in a relatively pristine state, due to a low human population, poor transport infrastructure, and the recent inclusion of the coastline within Mayumba National Park (created in 2002). The park protects 60km of coastline in Gabon, and is contiguous with the marine sector of the Conkouati-Douli National Park in Congo, creating a trans-frontier protected area covering approximately 120km of beach and 2000km^2 in total. The exposure of this coast, and the lack of human disturbance have contributed to it being among the 2 most important sites in the world for the nesting of Leatherback turtles (*Dermochelys coriacea*), and the most important site in Africa. The beach is also used as a nesting site for olive ridley turtles (*Lepidochelys olivacea)* and more rarely, green turtles (*Chelonia mydas*). In addition to being a turtle nesting beach of high global significance, the waters off Mayumba are used by up to 10% of the world's humpback whales each year during their breeding migration into the Gulf of Guinea from the Southern Ocean. Rays, sharks and dolphins are present within the park, including the rare and threatened humpback dolphin (*Sousa teuszii*). Finally, the waters off Mayumba have traditionally supported a rich coastal fishery. Due to uncontrolled industrial fishing, these resources are now greatly depleted, and the basic protein source for many coastal people is under threat.

Turtle presence in the Mayumba area

The IUCN lists leatherbacks (*Dermochelys coriacea*) as Critically Endangered due to fishery-induced mortality, combined with over-exploitation at the nesting beaches. Decades of monitoring have detected significant reductions in Pacific nesting populations, with an estimated decline of 95% in 20 years (Spotila et al. 2000). Comprehensive data are available only for few well-studied populations, and we do not have adequate long-term assessments of large leatherback rookeries in the Atlantic, such the Gabonese one. The scarcity of information on size, status and threats for this important population makes it very difficult to estimate overall survival probability for the leatherback in the Atlantic and worldwide.

However, recent research suggests that Gabon may host the largest leatherback nesting population in the world, and that the highest nesting density is found on a 130 km stretch of beach across the Gabon-Congo border, between Mayumba and Conkouati. A preliminary study based on three aerial surveys of the coastline carried out in 2003 by WCS estimated that approximately 1,000-1,500 nests are laid on an average night on Gabonese beaches during the peak month of the nesting season. A rough extrapolation suggests at least 30,000, and perhaps as much as 50,000 leatherback nests per season along Gabon's 850 km coast. PROTOMAC's research estimated that approximately 30,000 nests were laid just along Mayumba's 96.5 km beach during the 1999-2000 nesting season (Billes et al. 2000). For comparison, Hilterman and Goverse (2002) estimated 30,000 nests in Suriname in 2001, 15,000 in French Guyana, and a total of approximately 50,000 in Suriname, French Guyana and Guyana combined. The global leatherback population estimate of 34,500 nesting females (Spotila et al. 1996) significantly underestimated the size of the Gabonese population at 5,000 adult females (calculated from Fretey & Girardin 1988). Revising the global figures using a conservative Gabonese estimate of 30,000 nests per season, or approximately 15,000 adult females in the population (based on 5 nests per female and a renesting interval of 2.5 years), Gabon's leatherbacks could represent as much as 30% of the global population and are therefore critical for the survival of the species.

TURTLE TEAM OBJECTIVES IN MAYUMBA

The following list briefly summarizes the principal objectives for the marine turtle work in Mayumba during 2007/08.

1) Ensure sufficient basic infrastructure (especially transport) to support turtle conservation and related activities in the Mayumba coastal sector.
2) Continue, and develop turtle monitoring activities.
3) Protect turtle nesting beaches from egg collectors and/or turtle hunters.
4) Reduce and eventually eliminate illegal industrial fishing from the sector, thus greatly reducing turtle mortality as 'by-catch'. Also, to lobby for the implementation of turtle excluder devices (TEDS) on trawl nets.
5) Over-flights undertaken for nest counts and assessment of threats etc.

6) Begin regular surveillance of beaches for oil pollution, and work with government and industry to limit the risks of hydrocarbon pollution and other oil industry impacts on marine and coastal species and ecosystems.
7) Undertake a conservation education campaign in local schools to promote turtle awareness.

Patrol and Monitoring Methods

Teams were drawn from experienced turtle patrol members from ASF during past years, and members of the WCS/Mayumba National Park 'ecoguard' team. During early September 2007, WCS held a three-day training event in the town. Trainers from Italy, Gabon, and the United Kingdom taught classes on patrol methodology, the use of new standardized data collection sheets, measuring turtles, correct tagging methods, the collection of genetic material, and the reporting of dead or injured turtles. Following the training, teams entered the field at the allotted time for the start of the season at each site.

Patrols were generally divided into two distinct categories:

1) Nocturnal patrols – usually began between 22:00 and 02:00; these were designed for the tagging of females during nesting (using monel metal tags), the measuring of turtles and collection of any genetic material desired, and of course deterring any presence on the beach by nest raiders or turtle hunters.

2) Daytime patrols – these were conducted during daylight hours, mostly either on the return patrol back down the beach following the upward nighttime patrol, or heading out onto the beach between 06:00 and 09:00. Team members counted fresh turtle tracks of all species, and noted any other signs of interest or concern (turtle or nest predation, human disturbance, presence of oil pollution or illegal fishing vessels etc.).

Each afternoon, following the patrols, the rough checksheets of data were copied neatly onto fresh sheets and stored securely. These were removed each month by WCS staff and immediately entered into the digital database of the project.

Any sign of human presence on the beaches was investigated immediately and tracks followed to determine which path had been used to gain access to a beach. In this way the village from which a person had come could be ascertained, and questions asked. Persons found on the nesting beaches were generally questioned on the spot, their names and addresses recorded and their photograph taken. Due to the permanent presence of teams on the research beaches, no nest raiding or hunting was observed in these sectors during the season.

Activity Report

Patrol Effort

The two camps of 'Bame' and 'Nyafessa' were staffed throughout the 2007/2008 nesting season. Patrol activities began on the 24th October 2007, and the season was formally ended on the 10th April 2008. Thus a total of 209 days presence on the nesting beaches was assured. Presence in the field is shown in Table 1 below.

Table 1. Duration and Length of Patrol Period

	Turtle Tagging			Turtle Nest Counting			Combined
Periods:	**Bame**	**Nyafessa**	**Total (days)**	**Bame**	**Nyafessa**	**Total (days)**	**Total (days)**
Start Date	22 Nov 07	28 Oct 07		22 Nov 08	24 Oct 07		
End Date	25 Mar 08	5 Apr 08		10 Apr 08	5 Apr08		
Total Days At Camp	124	200	**324**	141	204	**345**	**669**
Total Patrolled Days	44	134	**178**	128	160	**288**	**466**
Person Patrolled Days	110	335	**445**	320	400	**720**	**1165**

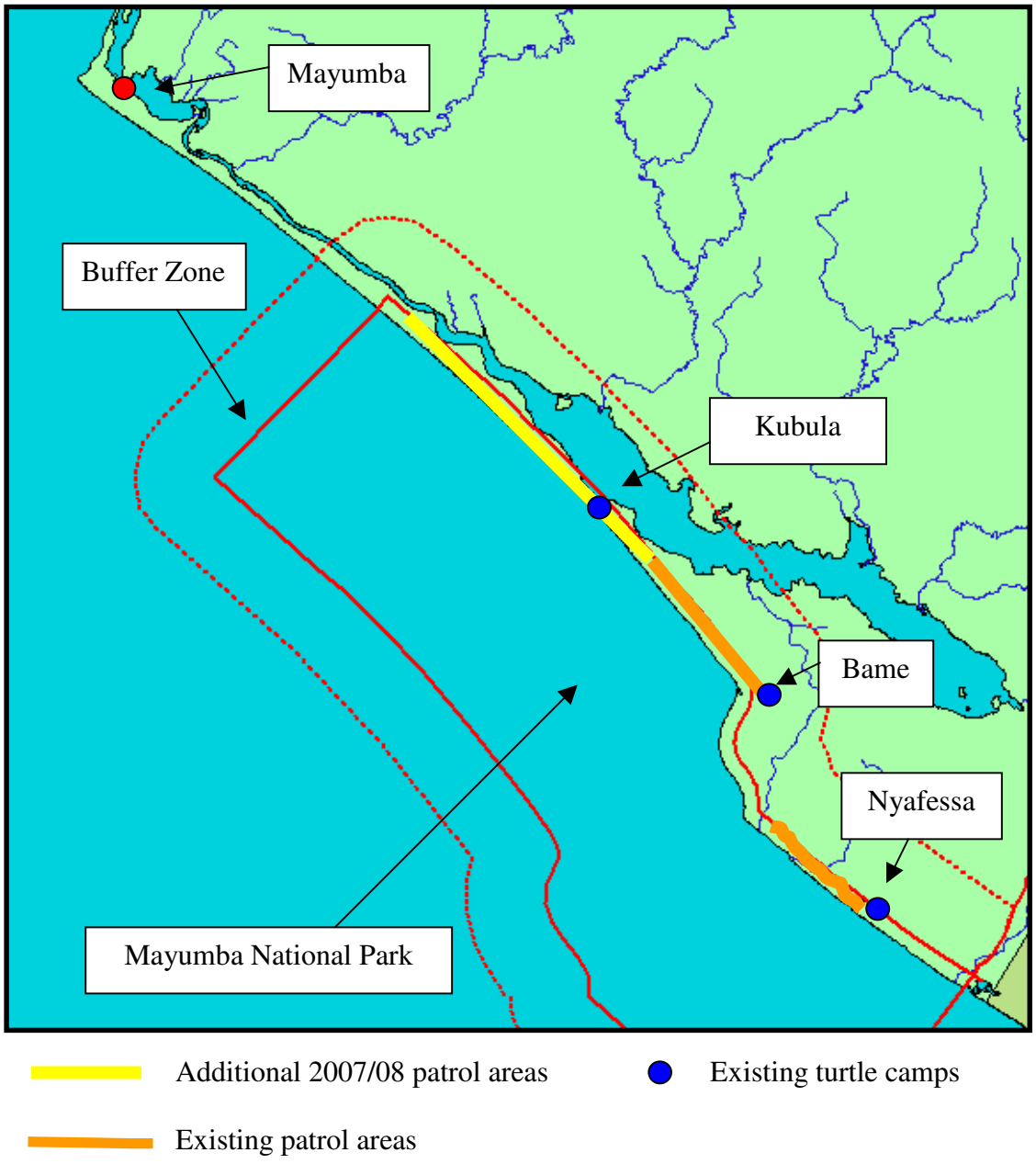
All patrols were executed in the context of either nighttime live turtle censuses, or daytime nest counts. In total, 1529 kilometers of nighttime patrol were executed, while daytime patrols accounted for 4754 kilometers, giving a total patrol distance of 6283 kilometers. A breakdown of patrol effort is given in Table 2. The average number of persons at each camp was 2.5, thus the total number of 'man-kilometers' patrolled was 15,707 km.

Table 2: Patrol data for both camps for the entire 2007-2008 nesting season.

Distance Covered During Patrols

	Turtle Tagging			Turtle Nest Counting			Combined
Patrol Distance:	**Bame**	**Nyafessa**	**Total (km)**	**Bame**	**Nyafessa**	**Total (km)**	**Total (km)**
Per Person	326.48	1202.7	**1529.18**	1899.52	2854	**4753.52**	**6282.7**
Average (2.5 persons)	816.2	3006.75	**3822.95**	4748.8	7135	**11883.8**	**15706.75**

Figure 1: Map of existing and additional turtle patrol zones in Mayumba National Park



In addition to regular nighttime and morning patrols over the most heavily nested and thus most threatened areas of the beach, Nyafessa staff undertook additional patrols south of the camp to the Congo border (adding 10km to the normally patrolled distance). Also, additional patrol personnel were stationed at the Kubula Camp in the middle of the park to ensure a patrol presence in the northern sector of the park (adding 20km to the patrolled distance). This area was added after another turtle NGO was unable to assure their normal annual presence in the sector, and the beach was to be left un-patrolled). Both of these areas were more frequently visited by local people, and thus, although having fewer nests, were a source of concern for protection teams. Patrols operated in this area were restricted to nest protection missions and no additional turtle data were collected. The addition of these areas to the zones traditionally patrolled by our teams added a further 30km to the overall area that would have received protection during the 2007-200 season in Mayumba (see Figure 1).

Nest counts

The total of 1824 turtle nesting attempts were counted in the Bame and Nyafessa sectors during the 2007/08 season. This included nests from Leatherbacks, Olive Ridley's, and Green turtles. Of these 1824, 97 (5.3%) were 'false crawls' – turtle tracks that led up the beach but did not show evidence of a nest having been made. Thus the number of actual nests counted was 1727. Due to the team's patrol efforts, none of these nests were subsequently raided by human egg gatherers. As is usual in this area, animal egg and hatchling predators were common, and included, ghost crabs, mongoose, monitor lizard, civet, and a range of birds. No attempts were made to protect nests from natural predators.

For each patrol site (Bame and Nyfessa) data were collected on each species of turtle noted as present. In order to examine nesting rates and trends, we look first at Leatherback nesting at Bame.

Leatherback turtles

Number of nests - Bame

The total number of nesting attempts of Leatherback turtles in the Bame sector (7.42km) was 1026. Of these nests 34 (3.31%) were false crawls, thus giving a total of 992 true nests. False crawls are not included in any subsequent analysis of nest data.

Number of nests – Nyafessa

The total number of nesting attempts of Leatherbacks at Nyafessa (8.7km) was 566. Of these, 34 (6%) were false crawls, giving a total number of genuine nests of 532.

Nest-site position

The position of each genuine nest was noted as being either on the beach itself (On sand) or in the vegetation at the top of the beach (In vegetation). In addition, all nests on the beach were noted as being either above the high tide line or below it. Although we lack corroborative data, it is assumed that all nests made below the high tide line will be lost due to subsequent flooding by a subsequent high tide.

In the Bame sector, 115 of the 992 leatherback turtle nests (11.6%) were situated below the high water mark, and were therefore doomed to flooding. This is an important statistic to bear in mind when considering the survivorship of eggs and hatchlings, and making demographic extrapolations from the number of nests made per season. This is especially so bearing in mind that the 877 nests that were not immediately subject to flooding, were subsequently at risk from natural predators and subsequent beach erosion, further reducing the proportion of nests surviving to full-term.

A total of 732 nests (73.8%) were made between the high water mark and the pioneer vegetation at the top of the beach. 142 nests (14.3%) were made in and amongst the vegetation. These nests are considered to be the safest from flooding or beach erosion, and generally have the greatest chance of producing living hatchlings. The hazardous journey taken by those hatchlings through the vegetation in search of the sea is likely, however, to put them at increased risk of predation or disorientation leading to overheating, dehydration and death.

The data from the Nyafessa sector were slightly different in character. Of 532 leatherback nests, 28 (5.3%) were situated below the high water mark, leaving a total of 504 initially un-flooded nests. 490 nests (92.1%) were made on the sand above the high water mark and 12 nests (2.26%) were situated within the vegetation above the beach. The position of a further final 2 nests was not recorded. These data are shown in Figures 2 and 3.

Figure 2

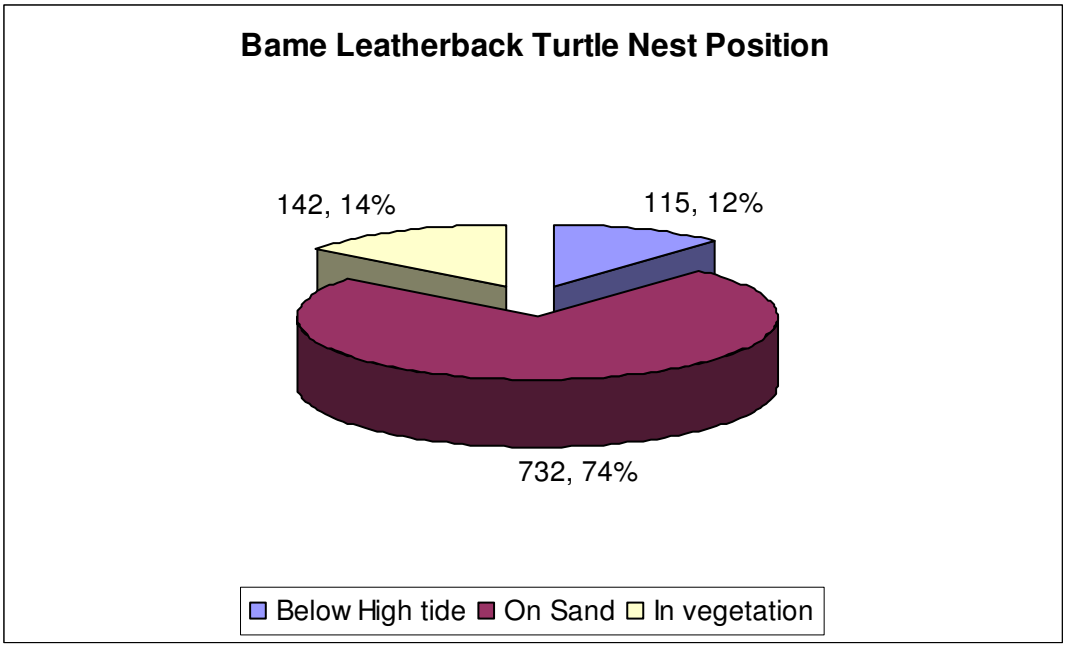
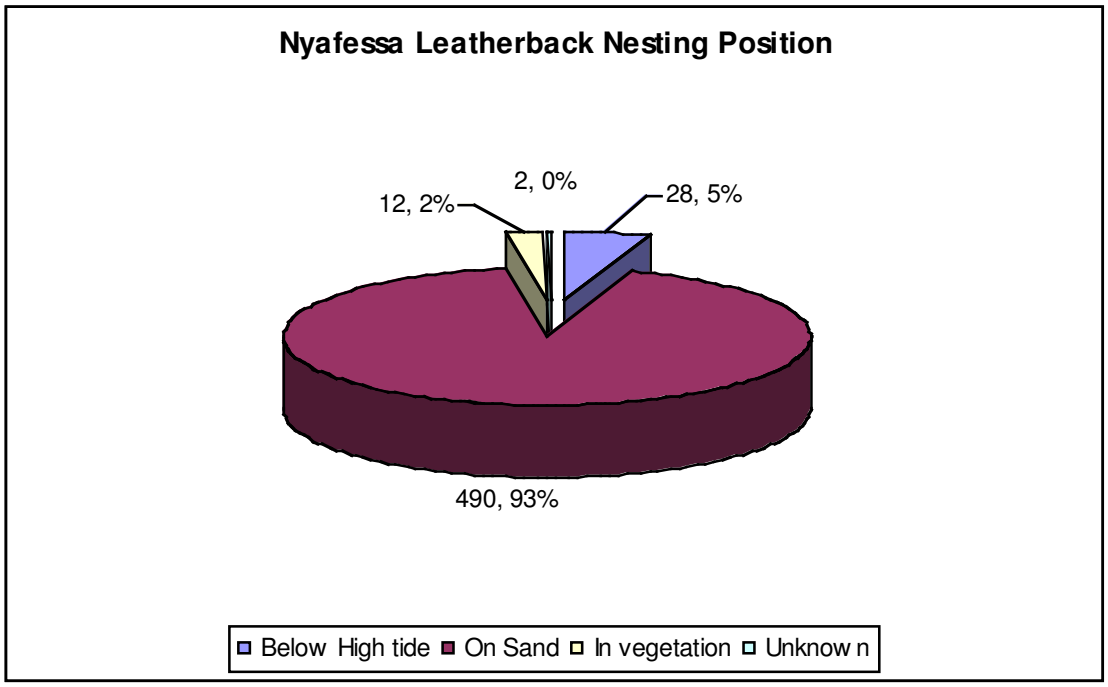


Figure 3



Combining Bame and Nyafessa data gives 1542 leatherback nests, 1222 (80.2%) of which were made in the sand above the high water mark, while 153 (10.1%) were dug in the

vegetation. 143 (9.4%) were doomed to immediate flooding, leaving 1399 nests to face the further threat of predation or later flooding/exposure through erosion.

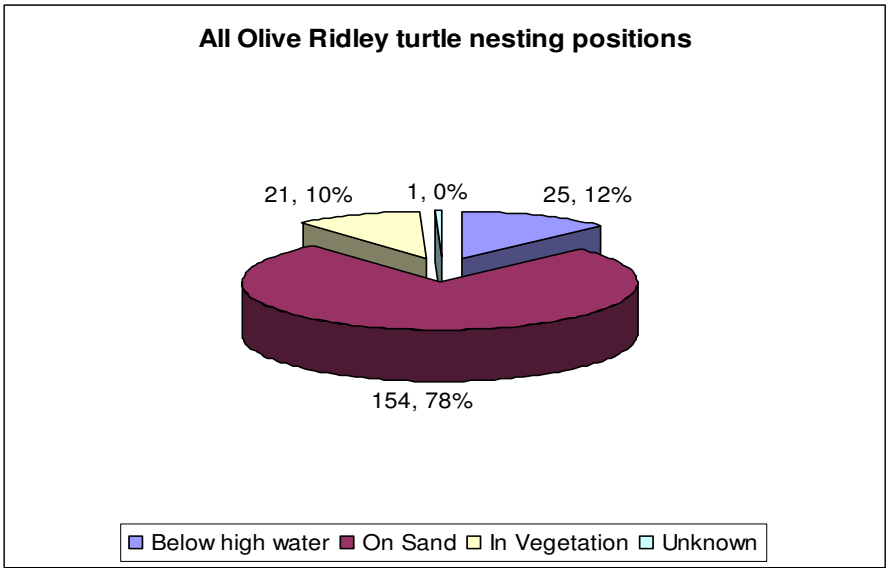
Olive Ridley turtles

Olive ridley's generally nested much earlier than leatherbacks, and many nesting attempts were probably missed through a lack of patrol presence in the early stages of the nesting period. As was noted in all previous years, there were many more olive ridley nesting attempts in the Nyafessa sector than the Bame sector. Only 39 olive ridley nests were counted in Bame, although the slightly late start of detailed data collection at this site meant that some nests from this species would have been missed. Of these 39 nests, 3 (7.7%) were false crawls. Of the remaining 36 genuine nests, a massive 19% of nests were immediately doomed, having been made below the tide line.

In Nyafessa, 191 tracks were counted of which 165 (86.4%) were genuine nests. A total of 18 nests (10.1%) were made below the high tide line and would have been immediately flooded.

Figure 4 below shows the proportions of olive ridley nests in different beach positions from Bame and Nyafessa combined.

Figure 4



Only 4 green turtle nests were noted during the season, both at Nyafessa.

Turtle biometrics

During night patrols, all turtles encountered were tagged and measured. 143 leatherbacks were measured. The longest carapace was 172cm, and the shortest 117cm. The mean length was 149.5cm ±8.0SD. The widest carapace measurement was 121cm and the shortest width 94cm. The mean leatherback turtle carapace width was 108.2 ±5.0SD.

Only 26 olive ridley turtles were measured during the study. The longest carapace measured 76cm and the shortest 68cm. The mean length was 71.2cm ±2.2. The widest carapace was 79cm and the shortest 67cm. The mean width was 71.3 ±2.5cm.

INTER-ANNUAL COMPARISON OF TURTLE NEST NUMBERS

Of course, after protecting the nesting beaches from egg raiding and hunters, the primary goal of beach monitoring is to follow long-term trends in turtle numbers. These data give us a window into turtle migration patterns, and may also reveal any increase or decrease in the Atlantic population. Typically data of this type on such a long-lived species must be gathered over many years before trends can become apparent. It is not uncommon for turtle researchers to record years of extremely high nesting numbers followed by very poor years. The reasons for these anomalies are still unknown, but it is clear that much data will be required before overall pronouncements can be made regarding the health of the population. In this report, we compare the 2007/08 season with the 2006/07 season. Data from previous years is currently being prepared in order to make comparisons over a longer time-span.

In order for comparisons to be justified, the data must first be reduced to comparable units. In this study, we have chosen to express number of nests by firstly reducing the daily nest count to the number of nests per kilometer (i.e., dividing the total day's nest count by the distance patrolled (which was constant). We then established 14 day measuring periods, counted from the 1st January. Thus the first 14 days of the calendar year are given as 'Period 1, and the final 14 days, as Period 26, and so on. We chose 14 day periods instead of 7 days periods as in some cases too much data would be lost due to too small a sample size for averages to be calculated. Thus the 14 day period trades in the extra precision of a 7 day period for the capacity to keep more data in the calculation overall.

The final step was to calculate the mean number of nests per kilometer for each 14 day period. These means could then be expressed solely for the year in question in order to examine the timing of nesting across the season, or used to compare between years.

The data presented below attest to a dramatic reduction in nesting leatherback turtles during the 2007/08 season compared to the 2006/07 season. This effect was notable across the two study beaches.

Leatherbacks

Figure 5

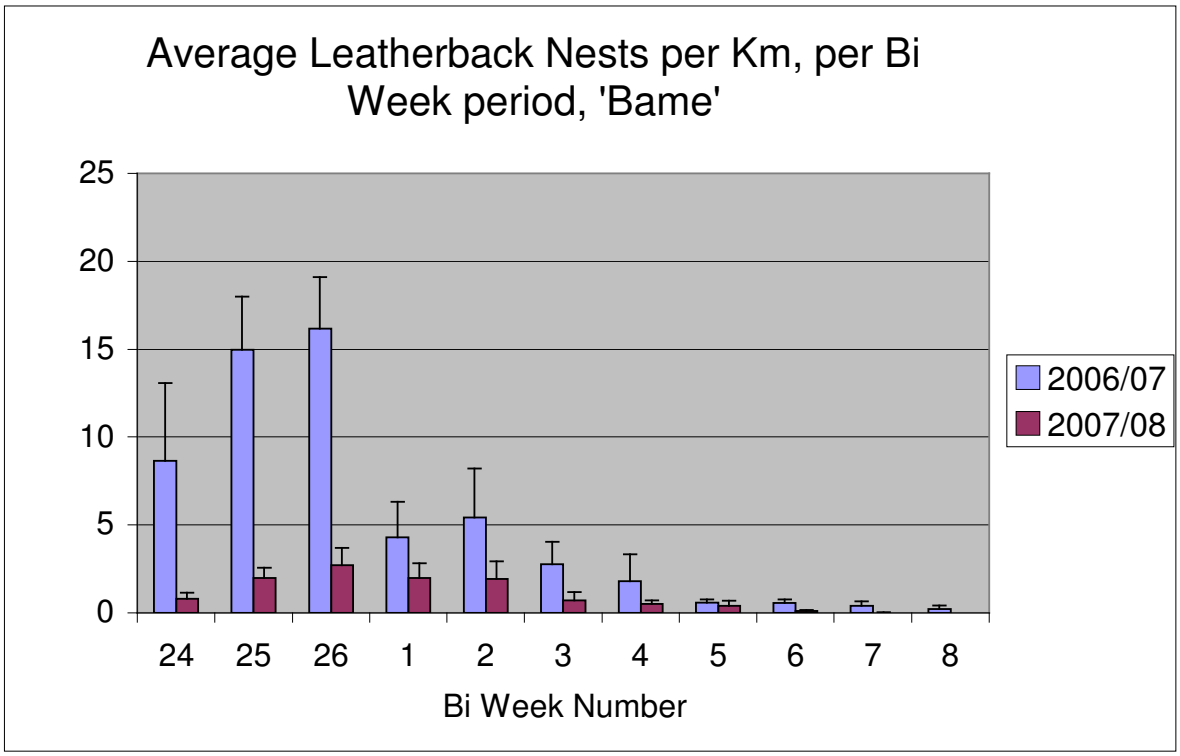


Figure 5 shows that although leatherback nesting at Bame this season followed the usual pattern, with peak nesting occurring around Christmas and gradually tailing off to zero nests by April. The previous season shows an unusual cut of taking place from January onwards. We currently have no explanation for this uncharacteristic reduction in the peak of the nesting season. It is clear though that nest numbers this season were in most cases less than half those of last season, and in the peak period, very much less.

Figure 6

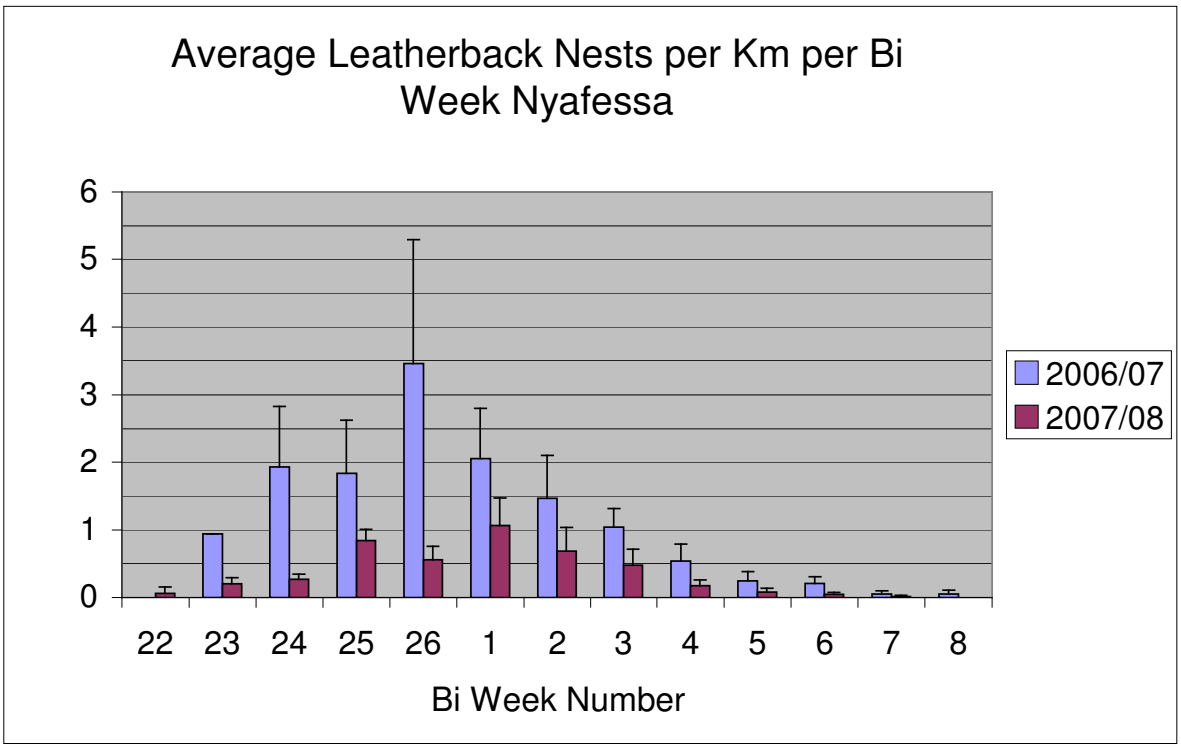


Figure 6 shows the same major reduction in nest numbers from the previous season, but also that there were very many fewer leatherback nests on the Nyafessa beach than at Bame. This is generally the case, and not a cause for alarm.

Olive Ridleys

The situation for olive ridley turtles during the 2007/08 nesting season was more similar to that in the previous season. Although some patrol effort was assured in early October, detailed nest counts did not begin until the 24th October. As such, important numbers of nesting turtles may have been missed by the survey teams at the start of the season.

The chart from Bame (Figure 7) shows a very similar pattern of nesting to that in the 2006/07 nesting season. However the data reflect an extremely low nesting density that represents only 36 individual turtles.

In Nyafessa, as Figure 8 shows, the overall number of turtle nests observed, and their distribution across the season were very similar to the previous year.

Figure 7

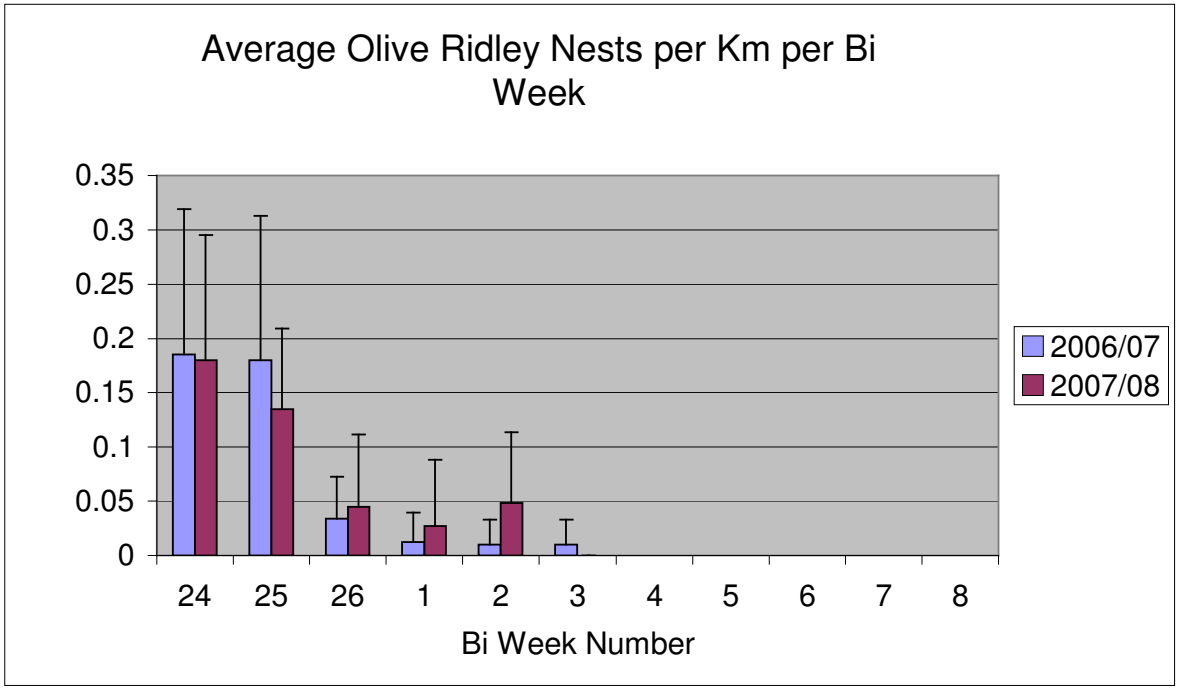
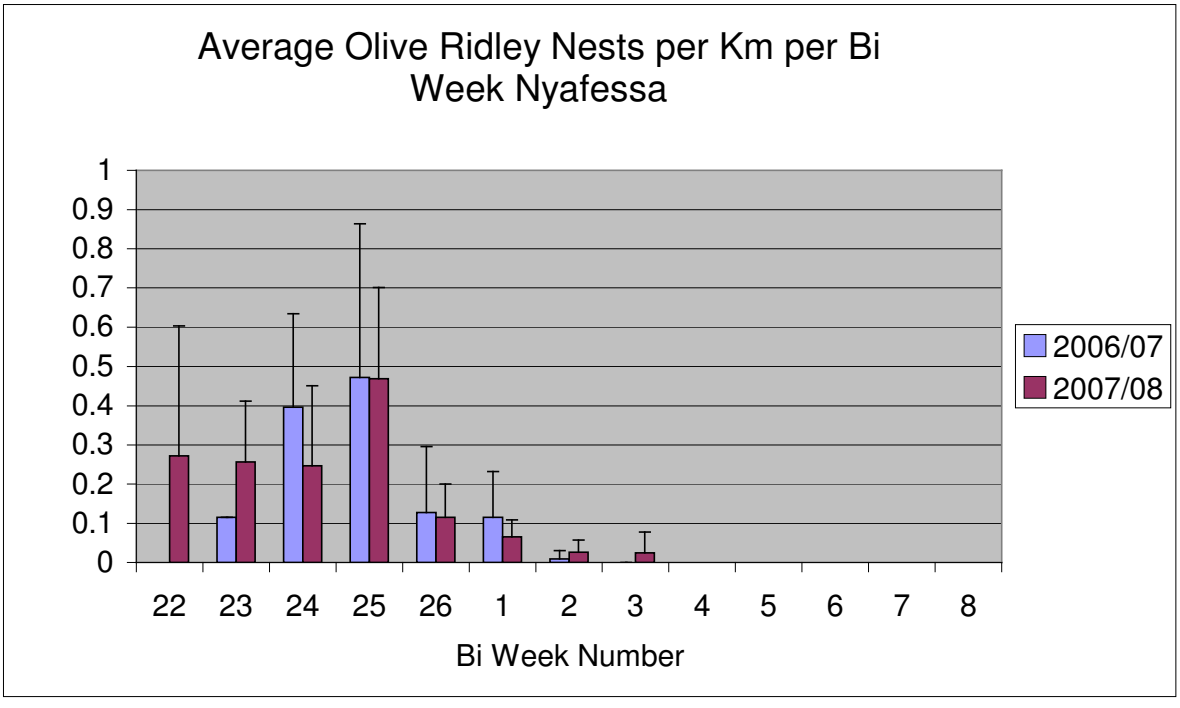


Figure 8



The project is currently analyzing nest data from years 2000 to 2006, in order to produce a longer time-series for comparison. Each successive year of such data collection adds value

to this long term monitoring effort, and our ability to make informed commentary regarding the health of the population.

ADDITIONAL ACIVITIES

In addition to assuring adequate protection of the nesting beaches, and collecting long term monitoring data on size of the nesting population, the project was involved in other conservation and applied research activities, working with partners and matching funds. Wherever possible, patrol personnel funded under the current agreement assisted with these efforts. The most important of these was coastal surveillance for illegal fishing.

Fisheries surveillance

Without any additional need for equipment or logistical support, beach patrol teams were able to greatly assist the efforts of Mayumba National Park and WCS in combating illegal fishing within the boundaries of the park. Just as the park protects the most valuable segments of the turtle nesting beach, its marine borders protect the approaches to these beaches. Turtles arriving at, or departing from the nesting beach are at great risk from fish nets, either static nets left overnight by small-scale fishermen, or industrial-scale trawl fishing. In coastal waters, trawlers pose the greatest threat to sea turtles, and their exclusion from within the national park borders and other restricted areas is a priority for the park and WCS.

Turtle patrol teams located at Bame, Nyafessa and Kubula were equipped with telescopes by WCS, and checked for illegal activity as a routine element of their day or night missions. Satellite phones and HF radio were used to convey information on vessels to the park headquarters, and digital cameras used to record vessels whenever possible.

Information from turtle teams contributed to the generation of 11 illegal fishing reports during the nesting season. Six of these were commercial trawlers, 4 were small open vessels from Congo or Mayumba that fished with static nets opposite the most densely nested area of beach, until controlled, and the last, a Korean ‘mother-ship’ from which were discharged 40 wooden canoes, each with 5 hand-line fishermen. The potential impact of these vessels on sea turtles in the Mayumba area was massive, and was only limited by the presence and swift reporting of turtle patrol teams. Three reports led to intervention by the WCS/National Park patrol vessel, and the remaining 8 were reported using photos and maps produced by

the beach teams. These were all transmitted to the national parks or fisheries authorities. All vessels controlled by boat missions left the area immediately, as did most of those denounced through written reports only. One small vessel experienced engine trouble and was grounded on the beach in front of Nyafessa turtle camp, where its engine and other materials were confiscated and its crew sent to Mayumba.

Fisheries control is as, if not more, important than nesting beach protection. The beach teams are a vital element in facilitating at-sea, and legal efforts to eradicate this menace from the protected area. A sample of photos from the nesting period is shown in the following figures.

Figure 9: The trawler 'VALERIE', fishing illegally in Mayumba National Park on the 29 January 2008 (photographed from the beach by a turtle patrol team).

Figure 10: Trawlers 'Amerger 9' and 'Amerger 7' intercepted by the WCS patrol vessel on the 17 November 2007 following information supplied by the patrol teams in the park (note the proximity of the coast).

Figure 11: The small Congolese vessel 'Ya Salamou', intercepted opposite the peak nesting beach on the 13 December 2007

Figure 12: A Senegalese canoe dispatched by Korean mother-ship '**SEOHYUN 101**' fishing illegally in the park on the 27 mars 2008

Oil pollution surveillance

Another major threat to nesting turtles at Mayumba comes from oil in the environment, either as slicks at sea, or a barrier washed up on the nesting beach. Oil enters the environment either naturally (through seeps in the ocean floor), deliberately (through the rinsing of ballast or holding tanks, or accidentally (through burst pipes, trans-shipping incidents, or transport vessel accidents.

Crude oil or fuel oils can be dangerous to turtles either through the toxic effects of contact, inhalation or ingestion, or through mechanical inhibition. Hatchlings in particular are susceptible to any oil washing up on the high tide line. The physical barrier the oil creates prevents them from reaching the sea, exposing them to greater risk from predators. Alternatively, hatchlings may become trapped in the oil and die from asphyxiation or exposure.

Mayumba has suffered a series of pollution incidents of varying degrees of seriousness. Although the origin of these slicks has never been pinpointed precisely, it is thought that oil producing operations in Congo or Cabinda may be implicated. Turtle patrol teams were on high alert for oil pollution throughout the nesting period, with instructions for accurately and

swiftly reporting any incidents. Neither the Park, WCS, nor ASF have the capacity to react to a serious spill event. However, our staff can neutralize small quantities, and the project maintains a stock of several thousand large plastic sacks, plus shovels and spades. A more important action is the swift reporting of any incidents to the authorities, such that a larger response can be organized and efforts made to identify the origin of a spill.

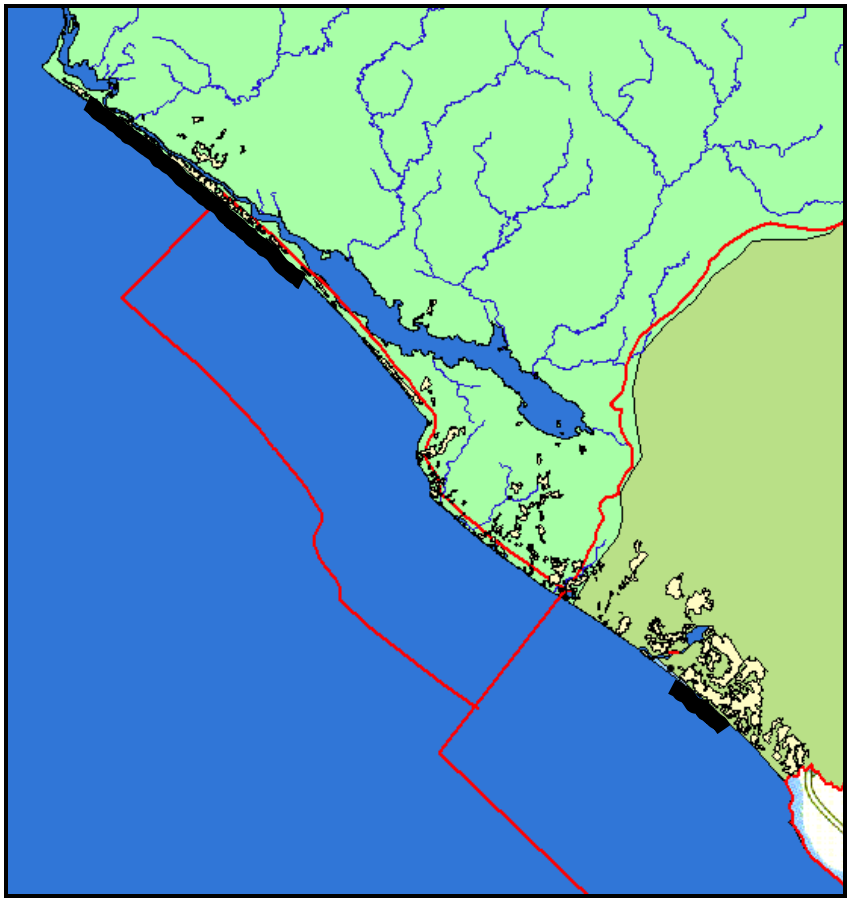
Fortunately during the 2007/08 nesting season, only two minor incidents of oil washing ashore were noted. In the first, a patrol on the 24 September 2007, noted the presence of oil washing ashore over a distance of 42km, from 13km south of Mayumba town to Bame turtle camp. This incident, affecting much of the best nesting beach, threatened to have a major impact. Fortunately, however, the quantity of oil washing ashore was not as great as first feared, and an extremely high tide on the night of the 24th, dispersed most of the oil. It is not thought that any turtles were affected by the incident on land, partly as it occurred very early in the season, when only a few olive ridley's had begun to nest to the south of the park, and because of the swift break-up of the slick by tide and wave action. The photos below show the evolution of the slick. Taken from the same vantage point, 24 hours apart, they indicate the rapidity with which the slick dissipated.

In the second incident, a small quantity of crude oil washed up over 26km of beach on the 22 October. The map below shows the noted position of the oil. The photo shows the oil along the high tide line near the park entrance. The dead turtle is an olive ridley, probably killed through illegal fishing in Congo and washed northwards by the tide.

Figure 13: Images of the oil pollution in Mayumba National Park taken from the same position on the 24th and 25th October 2007.

In the second incident, a small quantity of crude oil washed up over 26km of beach on the 22 October. The map below shows the noted position of the oil. The photo shows the oil along the high tide line near the park entrance. The dead turtle is an olive ridley, probably killed through illegal fishing in Congo and washed northwards by the tide.

Figure 14: The distribution of beached crude oil in Mayumba and Conkouati on the 22 October 2007



*The black lines indicate the position of the beached oil.

Figure 15: Oil pollution visible on the high tide line near Mayumba, 22 October 2007

Contact has been maintained with the hydrocarbons ministry, and the project as been collecting data for inclusion in the National Coastal Vulnerability Atlas. This work was begun by the Environment Ministry four years ago, but soon put on hold. Recently a French company has been contracted to prepare the Atlas, which will be used to inform not only decision making when responding to spill events, but also as a reference source for the preparation of environmental impact reports for new oil infrastructure. The Mayumba project has prepared materials for inclusion in this atlas, covering the main nesting beaches in southern and central Gabon. Data layers obtained have included both natural features, human activities, and response capacity, including: coastal vegetation, roads and other access, human settlements, fishing grounds, lagoons and rivers, mangroves, turtle nesting beaches, high- and low-energy beaches, communications capacity, known habitat for manatees, crocodile and hippo etc. In addition to working with the environment and hydrocarbons ministries on this issue, we have continued to lobby for a more dynamic response to oil spills, and particularly the investigation of spill incidents.

Over-flights

Due to financial and logistical difficulties, the project was only able to conduct one over-flight of the coast during the 2007/08 season. Most notably, the paucity of single engine light aircraft in Gabon has been a major hindrance to organizing these flights this year.

A flight was undertaken on the 29th February and the 1st March 2008. A single engine Cessna 206 was used to fly first from Libreville to Iguela (in the Loango National Park), and then, on the second day, from Iguela to the Congo border south of Mayumba. The aircraft maintained a height of 80m from the ground and flew slightly out to sea from the beach such that video footage could be taken of the entire beach. This was synchronized with a GPS such that each frame of the film could be geo-referenced. Unfortunately, we were only able to acquire the aircraft rather late in the season, so very few turtle tracks were still present (except in the Mayumba area, where many were still present). Data from the overflight is currently being analysed and will be available in the Gabon Turtle Partnership Report later this year.

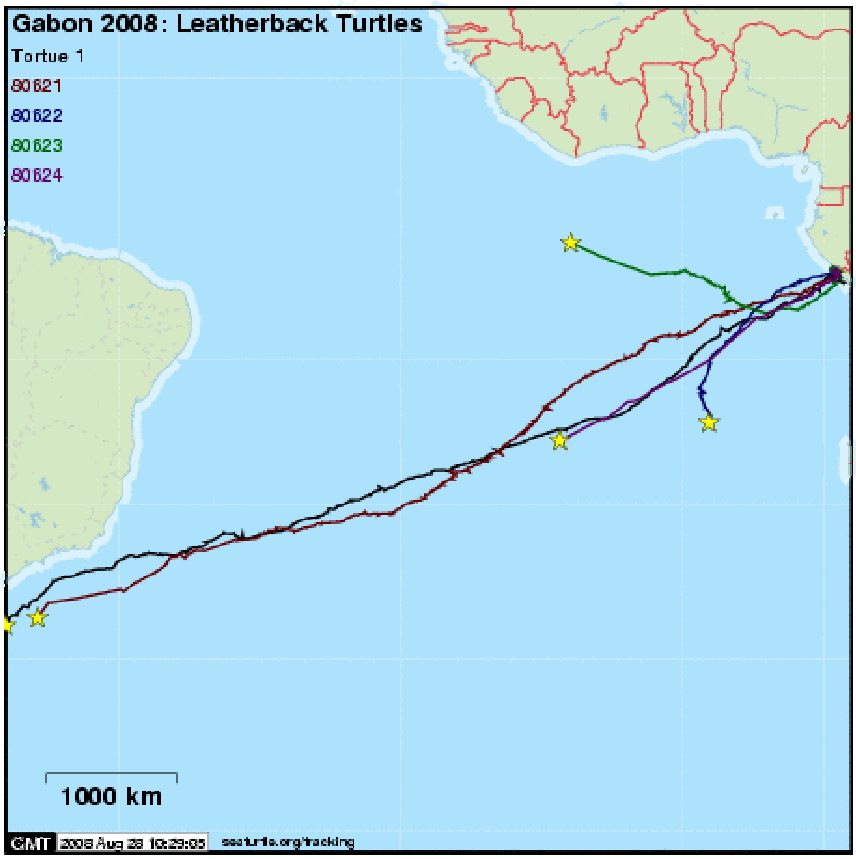
Turtle excluder devices (TEDS)

In 2007, the project helped to facilitate and promote a NOAA sponsored workshop on the use of TEDs, and their potential contribution to the industrial fishery. Since then, we have worked hard with NOAA to set up the first major sea-trials in Gabon, which are due to begin in early September. In the trials, a turtle excluder device will be fitted to the net on one side of a twin-beam shrimp trawler commercially operating in Gabonese waters. An experienced fisheries observer will monitor the level of by-catch and target species caught in the TED net and the normal net. After ten successful trawls, the TED will be moved to the other side of the vessel to remove any potential bias from the data. A further ten tows will be conducted. The trial is anticipated to last up to 3 weeks.

It is hoped that a successful trial will lead to discussions with the government on making the use of TEDS mandatory in the shrimp trawl fleet. This will have a major impact in reducing turtle mortality in Gabon's coastal waters.

Satellite telemetry

During the 2007/08 nesting season, patrol staff assisted a team of visiting scientists from the University of Exeter's Turtle Research and Conservation program. This partnership with the ASF/WCS program is now 3 years old, and has already led to one important publication on inter-nesting movements of leatherback turtles in the Mayumba area. This year 5 leatherback females were successfully fitted with satellite transmitters while they nested in Mayumba. Their migration tracks are visible via this link:



http://www.seaturtle.org/tracking/?project_id=270&dyn=1218617802

Two of the turtles fitted with transmitters in Mayumba have swum over 8500km since nesting and are now close to the South American coast. Three others are still in the mid-Atlantic. This study has enormous potential to guide conservation planning for leatherback sea turtles, and is vital if we are to address the huge threat of deep-sea long-line fishing.

Conservation Education

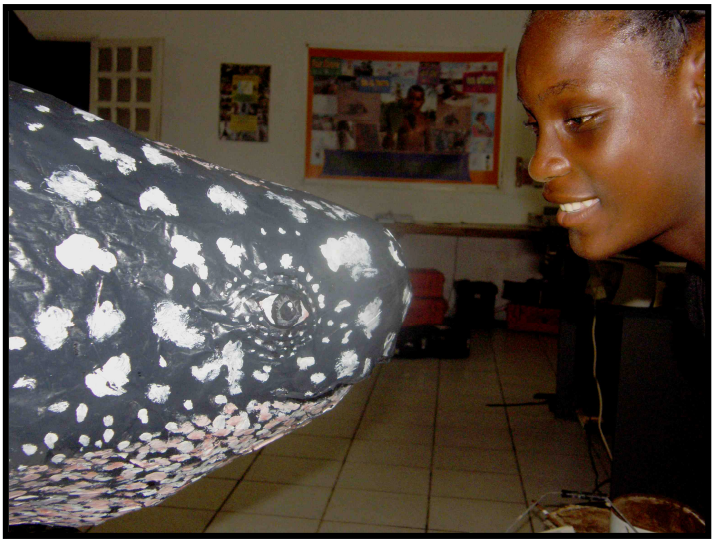
During the turtle nesting period and throughout the year, the project has remained dedicated to providing quality conservation education to the community. We believe that this is a key activity in reducing human threats to turtles in the years to come, and see our work in the villages, schools and colleges of the area as essential in the fight to see the nesting beaches respected in the long-term.

To this end, our outreach team made monthly visits to the principal villages of the Banio Lagoon (the area adjacent to the nesting beaches), using slide shows, puppet theatre, films and art activities to awaken in children a curiosity, affinity and respect for the wildlife of the area, and sea turtles in particular. In between village visits, the team visited each Mayumba school with the same program of activities.

Figure 16: Mayumba schoolchildren get acquainted with turtles during an educational visit

In March 2008, the project opened a seasonal turtle exhibit in Mayumba. This exhibition featured a homemade life-size leatherback turtle on a beach backdrop, model hatchlings, and displays of threats to turtles from long-line hooks to trawler nets. Fifteen professionally produced information panels (*see Appendix*) showed the different species of sea turtles found in Gabon, their life cycles, and other information. Simultaneously, in an adjacent room, a turtle film was screened, and in a third room, a specially produced activity book with quizzes, puzzles and colouring was available. After an official opening by the town authorities, every school class in Mayumba (around 1000 students) visited the exhibition. Unfortunately the exhibit had to close after one month due to space restrictions at the college. However the project is currently planning a purpose-built education center for Mayumba, where such displays can be put on every

year, or kept as permanent exhibits. Initial funding has been obtained and we are in discussion with the authorities regarding sites for the center.



Another successful activity was the celebrating in Mayumba of 'Turtle Day'. This event was first launched by the Mayumba program in 2007, when we held a major beach clean-up followed by, sports competitions, a talent contest and a party for Mayumba's children. The success of the event inspired us to export the idea to our partners in the Gabon Turtle Partnership, and in 2008, Gamba and Libreville joined Mayumba and held their own Turtle Day celebrations. Several hundred children attended the party in Mayumba, which was a great success.

A further celebration of the environment held by the project was a World Environment Day talent contest. With free admission to all-comers, the event featured music and dance by local adults and children, and a King and Queen of the Environment competition for local

teenagers. Once again, the turnout was enormous, and further helped to spread environmental awareness in the community.

Environmental education is a cornerstone of our efforts to protect sea turtles in the Mayumba area. Our efforts are aimed at arriving at a stage where anti-poaching patrols are no longer necessary. Culturally, it may be too late to fully persuade the older generations that turtles should be protected. However, we are confident that this program will have a profound affect on the attitudes and future behaviour of the next generation of householders in Mayumba.

ACKNOWLEDGMENTS

This work was made possible through the generous support of the Irish Government's National Parks and Wildlife Service. We are deeply indebted to them for supporting turtle protection activities at Mayumba. In particular we would like to thank Ferdia Marnell for his unfailing support in creating this partnership.

WCS, ASF, and Mayumba National Park would also like to acknowledge the support of our other partners, namely USAID (CARPE, CBFP), US Fish and Wildlife Service (MTCA), CAWHFI, Sea World Busch Gardens, and IdeaWild.

Finally we would like to thank the individual field staff who undertook most of the patrol and data collection work during the 2007/2008 season:

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APPENDIX 1

Samples of the panels printed for the Mayumba National Park turtle exhibit (designed in 2005 with funding from ASF and WCS).