

ARCHELON, the Sea Turtle Protection Society of Greece



**Sea Turtle Conservation
in Laganas Bay, Zakynthos, Greece,
during 2011**

Short report submitted to
the European Commission, and the Standing Committee of the
Bern Convention (Council of Europe)

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Foreword

In this short report, covering the period 1 January – 15 October 2011, we present major facts concerning sea turtle conservation on Zakynthos, Greece. Specifically, the ARCHELON's field project and the work of the Management Agency of the National Marine Park of Zakynthos (NMPZ) are presented. Further, we update the status of the nesting beaches and the problems at the protected marine area, as these were witnessed through ARCHELON's field observers. Finally, we provide a set of recommendations for the improvement of the conservation perspective of this regionally very important sea turtle nesting habitat. Numerical data should be considered preliminary as detailed analyses are still in process. ARCHELON field leaders (Helen Cook, Danielle Gault, Robert Newman, Friederike Stramm, Paul Walton) contributed to the drafting of this report.

1. Background

Laganas Bay, at the southern part of the Island of Zakynthos, western Greece, hosts the largest nesting aggregation of the loggerhead sea turtle *Caretta caretta* in the Mediterranean. The average number of nests in Laganas Bay accounts for about 26% of the total documented nesting effort of the Loggerhead Turtle in the Mediterranean. The reproductive habitat of Laganas Bay consists of a terrestrial part comprised of six distinct nesting beaches (Marathonissi, East Laganas, Kalamaki, Sekania, Daphni, Gerakas), totalling 5.5 km in length, and a marine part comprising of the entire Bay.

ARCHELON, the Sea Turtle Protection Society of Greece, has been systematically monitoring the Bay's nesting beaches since 1984 and records annually nesting levels and associated data. ARCHELON's standardized monitoring project in Laganas Bay is the oldest in the Mediterranean and one of the oldest in the world. As a result, Laganas Bay is used by the Red List Task Force of IUCN's Marine Turtle Specialist Group (MTSG) as an "index" area for the assessment of long-term population trends for the endangered Loggerhead Turtle in the Mediterranean.

ARCHELON's long-term project, carried out yearly from mid-May through mid-October, involves mainly monitoring of the turtle nesting population, as well as protection of endangered nests and hatchlings. Further, it includes an extensive public awareness component aimed at residents and visitors. The project receives substantial labour assistance from a contingent of international volunteers who are organized, trained and supervised by ARCHELON.

Due to the significance of Laganas Bay as a nesting habitat, and the threats it faces from increasing tourism pressure and development, the Greek State has attempted, since 1984, its protection through various legislative acts. However, these measures were not endorsed by part of the local community and were generally poorly enforced. Following substantial pressure from domestic, foreign and international NGOs, the Council of Europe (through the Bern Convention) and the European Union, and after several years of deliberations, the NMPZ was eventually established in December 1999 and its Management Agency was set up in July 2000. The Presidential Decree includes a zonation scheme with varying regulations on land and at sea. It must be noted that ARCHELON, WWF-Greece and MOM (Society for the Study and Protection of Monk Seals) participate with one joint seat in the 11-member Board of the Management Agency.

The Management Agency discontinued its operations from April 2004 until August 2005 because of a lack of political will on the part of the Ministry of Environment followed by a cutting of funds. Inevitably, this disruption stopped progress and brought things back to the hard situation before the creation of the Park. During these two difficult seasons ARCHELON carried out its monitoring and public awareness work with increased presence on the beaches to offset, as much as possible, the absence of the Agency's personnel and seasonal wardens.

The reason that made the Ministry of Environment re-activate the Management Agency in August 2005 was a Ruling of the European Court of Justice, which threatened the Greek government with a severe penalty. In the following nesting seasons (2006-2009) the Agency, having a strong political and financial support (mainly through EU funds) from the Ministry of Environment, improved control at the nesting beaches and several other measures were noted for the protection of the nesting habitat. In particular the Agency worked towards establishing a conservation scheme mainly through adequate wardening on all beaches and a compromise with local owners in the problematic area of Daphni.

In November 2009, after the formation of a new government following national elections, the NMPZ President submitted her resignation and a new President was appointed after an open Call of Interest by the Ministry of the Environment (now named Ministry of Environment, Energy and Climate Change).

In 2011, in the frame of a reform of the Public Administration (Kallikratis Project), the six municipalities of Zakynthos Island were merged into a broader municipality covering the entire island, the Municipality of Zakynthos. Further, the structure of Prefectures changed as well. Thus, the existing Board of the NMPZ was disabled on 31 March 2011 in order to be modified according to the incurred administrative changes. The new Board appeared in 13 July 2011 and during this period (about 3.5 months) the Management Agency was not able to take any substantial decisions.

ARCHELON collaborates with the Management Agency since the Agency's formation. Collaboration, established through annual and tri-annual agreements, consists mainly of ARCHELON continuing its monitoring and public awareness work, following mutually agreed upon methodologies, and reporting to the Agency violations of regulations, on land and at sea. All data are given to the Agency for its management needs. From 2007 until 2009 the Agency expanded its activities by employing a number of field assistants who accompanied ARCHELON's monitoring teams and collected additional data on the nesting beaches.

In the last years ARCHELON has noted an increase in the number of dead and injured turtles stranded on Zakynthos. This upward trend, coupled with a multitude of violations recorded at sea, made ARCHELON to call the attention of the Agency. Although little improvement was seen in the enforcement of maritime regulations, the Management Agency showed a raised interest in understanding the cause of these strandings. Specifically, the NMPZ personnel was more involved in recording and evaluating strandings, particularly in the period when ARCHELON was not present on the island (November to April).

The financial crisis in Greece forced the government to reduce drastically the funding of the NMPZ in 2010 and 2011. This created a difficult situation for the operation of the Management Agency and its concomitant responsibilities.

2. ARCHELON's work in 2011

Introduction

During 2011, as in 2010, ARCHELON's project at Zakynthos was reduced as a result of financial constraints, caused by a decline in expected donations and other contributions due to the financial difficulties of the country. It should be noted that in 2010 and 2011 the Ministry of the Environment has cut drastically the funding of the NMPZ which inevitably imposed an increased workload on ARCHELON, who tried to cover priority actions on behalf of the Park.

ARCHELON, a self-funded NGO, finds it absolutely necessary to sustain its long-term project on Zakynthos, despite difficulties, as this is considered a safety provision against undesirable situations affecting the appropriate operation of the NMPZ, as this was experienced in 2010 and 2011.

In 2011, the main research field station was set up at Kalamaki on 15 May; fieldwork commenced on 21 May and terminated on 10 October. After this date, the permanent NMPZ wardens will continue monitoring the few incubating nests and two of the wardens that are fully trained will perform the needed post-hatch excavations, following ARCHELON specific instructions. Daily monitoring of the six nesting beaches started on 21 May at East Laganas, Kalamaki, Sekania, Daphni and Gerakas, and on 9 June on Marathonissi (interrupted next day because of lack of transportation and resumed on 19 June). As in previous seasons, nests deposited in vulnerable sites were protected either *in situ* by placing a wooden cage or by relocation to safer locations, and hatching nests affected by artificial lights were shaded to reduce hatchling disorientation.

The public awareness (PA) programme, through which residents and visitors are informed about the plight of the Loggerhead Turtle and how they can utilise the beaches without disturbing turtles and nests, started on 18 May. The PA programme is conducted through information stations and tables, pub quizzes, presentations in hotels and commercial tour boats, live information to beach users, and whilst present on Turtle Spotting Boats (see Appendix 2). An Information Station, in the form of a wooden kiosk, was opened at the central square of Zakynthos town on 7 June (in collaboration with the new Zakynthos Municipality).

The ongoing good cooperation between ARCHELON and the Management Agency is an essential component for the smooth operation of the NMPZ. Especially in 2010 and 2011, with the reduction of both the ARCHELON and the NMPZ personnel, on numerous occasions this cooperation prevented problems on the nesting beaches and if problems did arise, they were acted upon immediately or as soon as possible.

Prior to and during 2009, ARCHELON volunteers were conducting beach patrols at peak touristic hours to inform people and supervise enforcement of the NMPZ regulations. In 2010 and 2011, beach patrols were undertaken by the NMPZ personnel as this complies better with the legal responsibilities of the NMPZ.

Close cooperation continued between ARCHELON and the Coast Guard of Zakynthos for incidents of turtle strandings and the transportation of injured turtles to ARCHELON's Sea Turtle Rescue Centre located in Glyfada, a suburb of Athens. The NMPZ wardens, as well, undertook the responsibility to register turtle strandings within the boundaries of the Park when ARCHELON personnel were not present on the island (i.e. November to April).

To implement the field work at Zakynthos, ARCHELON used inflatable boats in previous years. However, the financial constraints of 2010 and 2011 prevented the use of boats, and all field work was arranged by land transportation. Marathonissi, only accessible by boat, was reached with the aid of NMPZ's own patrol boats.

Results

A. Nesting

During the 2011 nesting season on all six monitored nesting beaches of the Bay a total of 2,683 turtle emergences were recorded of which 786 were assessed as nests. This number of nests, although considered as provisional because data analysis is still in progress but not expected to change much, is well below the annual average of 1,216 nests as derives from the previous 27 years (1984-2010) of monitoring.

B. Dead and injured turtles

For the fourth consecutive year, there was an increased number of turtle strandings on Zakynthos. During 2011, as of 21 October, 45 turtles were found dead, which is the highest ever recorded in Zakynthos. Of these, 27 (60.0%) were found within the boundaries of the NMPZ and 18 (40.0%) at the eastern coast of Zakynthos (outside the NMPZ area).

For 19 of the 45 dead turtles, it was not possible to determine the cause of death, mainly due to advanced decomposition. Of the remaining 26 turtles, 7 bore injuries related clearly to fisheries interaction (1 inside the NMPZ area, in advanced decay), 2 had severe head injuries due to human direct action (1 found on the eastern coast, 1 inside the NMPZ in advanced decay assuming that it was floating for days before it got stranded in the Bay), 1 was hit by boat propeller (outside the NMPZ), and 16 adult female turtles were confirmed to have been predated by monk seals (*Monachus monachus*), all inside the boundaries of the NMPZ. From the 16 predated turtles, 3 have been observed nesting during 2011, one of them the night before her death. It should be noted that this number is considered rather conservative because other carcasses may have remained unobserved or may have been transported offshore by currents. Furthermore, a tagged hind left flipper of a turtle, that had been observed nesting earlier in the season, was found on a nesting beach.

In addition, one juvenile turtle was found alive within Laganas Bay, very weak and exhausted with a fishing line through its digestive tract that required transportation to ARCHELON's Rescue Centre in Glyfada, but died in the first days of treatment. Furthermore, a female turtle was observed bearing sections of fishing line and net. More information on fisheries interaction is presented in Section 4.2.

It has been known since 1994 that monk seals at Zakynthos predate loggerhead turtles, and this behaviour was correlated at the time with the declined fish stocks recorded locally that year. Although this kind of predation continued occasionally in subsequent years it was thought to be a minor threat. The confirmed 21 cases of predation in 2010 were very alarming and ARCHELON alerted the Ministry of Environment, the Management Agency, MOm and WWF Greece. The 16 recorded cases in 2011 indicate that the phenomenon is still ongoing and should be tackled as soon as possible. The loss of such a large number of adult turtles (18 females and 3 males in 2010, and 16 females in 2011), in their reproductive phase, **may impact unsustainably the breeding population.** In 2011, with

combined efforts from ARCHELON, MOm, WWF-Greece and the Management Agency a basic short-term project was initiated in order to understand the reasons behind this phenomenon and collect information for further investigation.

Concerning the high number of strandings, it should be reminded that in 2010 the NMPZ faced an international defame by an international TV Channel¹ on 11 August, which presented overestimated altered data on the issue. Due to the strong political component inherent in the conservation efforts of Zakynthos sea turtles and the many interested parts involved, certain facts, such as massive strandings, usually attract the attention of international media and may easily result to false information broadcasted worldwide. Unfortunately, the said TV channel had not consulted for precise data neither the Management Agency nor ARCHELON (which is nation-widely responsible for sea turtle stranding data).

C. Public awareness

From 18 May until 15 October 2011, ARCHELON carried out more than 330 Slide Show Presentations (concentrated in tourist facilities), informed two foreign adolescent groups and completed 31 Turtle Quizzes, while the Information Station in the main square of Zakynthos town, in collaboration with the new Municipality of Zakynthos, operated for 123 days.

Furthermore, ARCHELON project members carried out more than 110 Slide Show Presentations on all-day and half-day cruise trips, as well as participated on 88 trips onboard Turtle Spotting Boats (see Appendix 2). As in 2010, improvements were effected in the method ARCHELON volunteers inform tourists onboard and record violations observed within the Bay; more detailed paperwork has been formulated and the use of photography has been strongly encouraged to aid the identification of violations and the offending parties.

Additionally, ARCHELON project members were regularly informing beach visitors during the course of monitoring duties. As a result of these activities, from 18 May until 15 October, a total of **35,544** visitors were informed (Table 1).

TABLE 1. NUMBER OF PEOPLE INFORMED PER ACTIVITY DURING THE ARCHELON PUBLIC AWARENESS WORK ON ZAKYNTHOS

Activity	People informed
Boat Trips	8,425
Turtle Spotting Boats	1,252
Quizzes and adolescent groups	814
Information Station	9,067
Beach Field Work (until 10/9)	4,397
Slide Show Presentations	11,589
Total	35,544

¹ Internet link for the BBC video reportage: <http://www.bbc.co.uk/news/science-environment-10934974>

3. The Work of the Management Agency during 2011

As mentioned before, the decision of the Ministry of the Environment to reduce the funding of the NMPZ did not allow the Management Agency to fully deploy its planned activities. Below are presented some general points per activity, with more specific information given in Section 4.

In contrast to 2009, when the Agency's warden program was fully expanded and fulfilled the needs in most of the cases (see Appendix 1), wardening in 2010 and 2011 was much reduced due to financial inability to hire the necessary personnel. Specifically, in 2010, the Agency conducted the task of wardening with only the year-round personnel of 20 wardens (18 for the terrestrial part and 2 for the marine area including Marathonissi). In 2011, the year-round NMPZ wardens remained unpaid from November 2010 until June 2011 (8 months) when financial support came from the Ministry of the Environment, which also permitted the hiring of 15 seasonal wardens by the end of July 2011. Thus, although the funds came towards the end of the nesting season, the Management Agency could at least cover part of its wardening needs for August, the month with the highest number of tourists. More details in Appendix 1.

The lack of personnel during 2011 also affected the marine area which was largely unpatrolled from the side of the NMPZ, as the two year-round marine wardens undertook wardening shifts on beaches as well. Nevertheless, after the employment of seasonal wardens in August 2011, the Management Agency organised joint patrols in the marine area with the Coast Guard using the NMPZ boat. This coincided with the replacement of the local Coast Guard Chief Officer, as with the new Officer there was an increased effort to patrol better the maritime traffic in Laganas Bay. In conclusion, and despite combined efforts by the Management Agency, ARCHELON, and local authorities (see details in Section 4) to find alternative solutions, **the impact of reduced NMPZ personnel was noticeable throughout most of the season on both the protected terrestrial and marine areas.**

Since 2006 a restriction on vessels in the shallow, northern part of the Bay, with the highest concentration of turtles, has been imposed by the NMPZ (albeit without a relevant legislation) with the intention of only the endorsed Turtle Spotting Boats (TSBs) being allowed to operate in this area (see Section 4.2 and Appendix 2 for details). Nevertheless, the noted lack of enforcement by both the NMPZ and the Coast Guard rendered useless the purpose of this zone, as in 2011 (as in 2010) it was used indiscriminately by any boat, including large cruise boats and a multitude of hired boats.

In 2011, as in 2010, the inability of the NMPZ to operate effectively, due to the lack of funding, provided locals opposing to the NMPZ with the opportunity to reassert frustration and disapproval towards unresolved issues (e.g. Daphni). Generally, the situation concerning local attitudes and actions appeared as widely uncontrolled, especially at the beginning of the season, when the Board of the Management Agency was inactive. Illegal activities were blatant as a result of lack of control from the side of the NMPZ. The lack of 24-hour wardening on the beaches led to various illegal actions in Daphni (i.e. alteration of part of the nesting beach, further destruction of the sand dunes, creation of a large car-park behind the illegal tavernas by flattening the hill) and in Marathonissi (construction of an illegal underwater wave-breaker). These actions were definitely prompted by the

unstable political situation due to the lack of a Board for the Management Agency for almost 3.5 months (31 March – 13 July). More details on interventions on Daphni and Marathonissi can be found in Section 4.1.

Since 2006 control of beach furniture (umbrellas and sun beds) in Laganas Bay was implemented by the Management Agency by providing distinctive furniture carrying the NMPZ's logo. In 2011, as in previous seasons, beach furniture operators on all protected beaches were instructed to remove all sun beds at night allowing an increase in available nesting area. More importantly, the problem with the numerous pedalos remaining on Kalamaki and East Laganas during the night was reduced in 2011 by the obligation of businesses to have them removed at night as part of their business contract. In 2011, however, private umbrellas could be seen in most nesting beaches, as a result of the lack of continuous warden presence on the beaches.

In 2006, signposting was implemented at the major entrances of the nesting beaches as well as on roads crossing the boundaries of the Marine Park. Nevertheless, signposting in 2011 was largely inadequate, because several signs were either destroyed or in need of repair (e.g. Marathonissi, Sekania). Inadequate signposting results to numerous violations from unaware visitors.

After several years of delay, and recommendations on the part of ARCHELON (see previous reports), the NMPZ contracted in 2009 a consultancy to work on the elaboration of a Management Plan for the area. However, the lack of funds has caused the interruption of this venture in 2010. Therefore, eleven years after its establishment, the NMPZ is still operating under annual action plans without an integrated Management Plan that it is by law required.

4. Conservation Status of the Nesting Habitat during 2011

4.1. The terrestrial habitat (protected beaches)

Marathonissi (zone A2: Nature Protection Site, maritime zone B)

Marathonissi is a small island within the Bay and its nesting beach is characterized by low sand temperatures probably due to its northern orientation and whitish sand colour. Low temperatures in Marathonissi produce predominantly male hatchlings and this makes this short beach an extremely important one, bearing in mind that most other beaches in Laganas Bay produce mainly female hatchlings. The value of male-producing beaches is enhanced with the incoming global warming.

The beach is a popular destination for day-visitors who arrive by boat from several locations within the Bay. Prior to 2009, despite maritime regulations of zone B, boats would moor and drop anchor in the shallow waters just off shore or right on the beach. The anchoring problem was partly mitigated in 2009 by the placement of a floating pontoon for boats to moor to. In 2010 and 2011, however, the pontoon was not set due to the lack of a 24-hour wardening, which may have caused the liability of NMPZ in case of an accident. This led to regression to the previous years' uncontrolled anchoring. On a daily basis, more than 10 visiting vessels would be dragged onto the beach, anchored on the sand, with the tourist numbers and duration of stay far exceeding the accepted limit of up to 200 persons at one time for a maximum of 1 hour stay. Furthermore, an equivalent number of vessels would be anchored in the shallow waters of the western rocky shore of the Island,

which also lies within maritime zone B. Further, the marker buoys, used in previous years to indicate the non-boating and bathing area in front of the beach, were placed in 2011.

It must be noted that visitors to Marathonissi are largely unaware of the NMPZ's regulations and thus may trample on nests or remove nest markers. To compensate for the lack of wardening, ARCHELON with the approval of the Management Agency, placed protective cages on most of the nests laid on Marathonissi leaving only the ones that were deemed safe.

In 2011, before the onset of the nesting season, an underwater wave-breaker was constructed in proximity to the nesting beach. It was made of stones within a metal grid, 31.5m in length, 81cm in width and 75cm high with supporting metal poles in it, reaching about 50cm under sea surface. The construction was made without any official permission or oceanographic study. It was first spotted on 19 June 2011 by the ARCHELON monitoring team and the NMPZ warden. It is assumed that it has been constructed some time ago, probably in late spring, without being noticed. **It is worth noting that Marathonissi beach is a dynamic beach with fluctuations of sand deposition from year to year. Thus, there is great danger that the underwater construction may reduce the drifting of sediments and create considerable beach erosion - the first signs of which had been already observed.**

The Management Agency reacted immediately and reported the illegal action to the competent authorities. After persistent requests from the NMPZ's Board, ARCHELON, MOm, Medasset, WWF-Greece, local cultural associations, local community groups and the parishes in the area, as well as the support of the Zakynthos Coast Guard and the Public Land Department, a permit for the immediate demolition of the illegal structure was granted by the local Public Prosecutor. The demolition of the wave-breaker was implemented on 29 September and 7 October by the Public Land Department, the Zakynthos Coast Guard, the Management Agency of the NMPZ, the Director of Medasset, local residents, and 23 ARCHELON volunteers and personnel of Zakynthos field station.

East Laganas (zone Π3: Nature Protection Site, maritime zone B)

This beach, partially backed by an extensive sand dune field, stretches for about 2.7 km at the northernmost part of the Bay. The international airport behind the beach of East Laganas was generally closed at night and this prevents substantial light and noise pollution. However, some night flights were observed during 2011.

In 2009 all four warden posts along the beach were staffed 24 hours a day. This succeeded in leaving the beach largely undisturbed from human presence. This changed in 2010 and 2011 with only two warden posts staffed by wardens.

In previous seasons wooden posts were placed every 1 m along the back of the beach to discourage access to the beach by vehicles and riding horses from the sand dune area. Nevertheless, numerous incidents (such as horse-riding, all-terrain bikes, and people on the beach outside the permitted hours) were common occurrences throughout the 2011 season.

Beach furniture at the beginning of the season was not removed at all during the night in specific posts, but after recommendation from ARCHELON, NMPZ immediately responded with on-site visits and in-writing to the beach furniture

businesses. In general, the numbers of beach furniture were within the set quota.

The westernmost part of the beach, bordering Laganas village, suffers from light pollution associated with local hotels and street lights. In 2010, hatchling disorientation due to the bright lights of the Louis Zante Beach Hotel was intense and, following ARCHELON recommendation, the NMPZ officially asked the hotel to mitigate the disturbing light sources, something that was poorly improved and remained a problem for 2011 season. In 2011 season, after further pressure from ARCHELON, the NMPZ decided to officially inform Louis Head Office for the situation and thus improvement of light and sound pollution was drastically applied, and further turtle-friendly changes have been promised from the part of the company for the future. Hatchling disorientation was also consistently noted by ARCHELON personnel around the middle of this beach, mainly attributed to the airport glow and to a house located there. Regrettably the NMPZ effort to conduct a study towards improving the light pollution problem, initiated in 2009, was not continued, and this remains an important issue to be dealt with in future.

In 2010 and 2011, an intense beam of a green laser spotlight, transmitting from a nightclub in Laganas village, seemed to cause stress to emerged female turtles on the beaches of Marathonissi, East Laganas and Sekania.

In 2011 increased incidents of nest predation by stray dogs were also noted. This should be reduced as it affected a large number of nests on this beach.

Kalamaki (zone Π3: Nature Protection Site, maritime zone B)

Although this 600m beach stretches within maritime zone B (no anchoring, speed limit of 6 knots), boats can still be seen intermittently anchoring close to the beach or speeding past. Access to Kalamaki is gained through a single main beach entrance featuring a barrier preventing vehicle access.

In 2011, wardens were placed in Kalamaki for the peak tourist hours, but human activity on the beach at night remained an issue for the whole season. In some cases tourists were encouraged by the personnel of the nearby hotel to visit the beach at night. Again, after recommendations from ARCHELON, the Management Agency requested from Crystal Beach Hotel to reduce the lights and the human activities that interfere with nesting and hatching procedures.

In 2011, as in 2010, although beach furniture at Kalamaki remained within allocated numbers, the rental businesses decided not to stack the sun beds at the back of the beach during the night as they should, but to fold them sideways on the umbrella, and this caused some turtles to abandon nesting attempts. This practice, even if it seems better than leaving the sunbeds on the beach overnight, is unacceptable since Kalamaki is within the responsibility of the NMPZ.

In 2009, a large number of pedalos left on the beach at night created a notable problem for emerging turtles as well as for hatchlings on their way to the sea. In 2010 and 2011, however, the Management Agency included the removal of pedalos from the beach at night as a contractual obligation for the pedalo business, and this worked well in most cases, although further enforcement of the regulation should be applied.

Sekania (zone A1: Absolute Protection Site, maritime zone A)

Sekania beach hosts one of the highest nesting densities for *Caretta caretta* in the world. It is reminded that WWF-Greece acquired the land behind the beach

preventing development and vehicular access. In 2006 the NMPZ erected a sign on the land behind Sekania, advising that there is strictly no access to the beach. More recently a large gate was constructed restricting access from the road onto the trail leading to the beach.

Although in previous years a warden was present either on the beach or on the road leading to the beach, in 2010 and 2011 Sekania was left unguarded. As a result some people managed to get on this strictly protected site.

The beach is located at the centre of no-boating maritime zone A. However, during monitoring work at Sekania many vessels in zone A were observed, some of them attempting landing even on the beach. ARCHELON and the NMPZ were informing the Coast Guard of these incidents but to no or little avail.

Due to its remote location and the high level of hatchling production Sekania beach is particularly susceptible to hatchling predation by sea gulls. In 2010 and 2011, a noticeable reduction in seagulls was observed.

Daphni (zone Π1: Nature Protection Site, maritime zone A)

Background

Daphni beach hosted the second largest number of nests on Zakynthos until 2000. The beach has been subject to many illegal activities such as building and road constructions, flattening of dunes, sand removal, planting of non-native vegetation. It should be noted that Daphni is an unstable beach as sometimes strong southerly winds during winter and spring change its profile revealing a large amount of stones. This probably is aggravated by the human-induced interventions and especially the flattening of the low-lying dunes which replenished the beach with sand in cases of adverse conditions. Further, the repair of rough roads and bush fires (both occurring almost every year) accelerate erosion on the clay hills behind the beach, with the eroded clay being deposited on the beach.

Following recommendations by the Council of Europe, the removal of illegal buildings at Daphni has been an obligation of the Greek government since 1987, when only two buildings existed (Recommendation No. 9, Bern Convention). However, still no action for their removal has been taken even though demolition protocols have been issued by courts.

It is reminded that land owners in Daphni, supported by the local community, never accepted NMPZ wardens and regulations before 2006. In 2006 the Management Agency came to a compromise with the landowners, which led to several changes on the beach and the area behind. Daphni was closed to visitors in the evenings and vehicle access was restricted by a road barrier and the presence of wardens. During daytime, tourists wishing to visit the beach were transported by NMPZ vans, with restrictions to visitor numbers and staying time. An Education Centre was created in a house on the hills and guided tours were organized on the beach during daytime. Umbrellas and sun beds were placed behind the beach on a levelled area, not affecting the nesting zone. In 2007 the NMPZ constructed two car-parks, on top of the hill nearest to the beach, and no longer provided free transport to the beach, as was the case in 2006.

In 2009, the relationship between the NMPZ and the residents of Daphni and Vassilikos reached a boiling point. The owners of Daphni, under legislative

procedures relevant to the NMPZ, are obliged to pay large fines for their illegal constructions, as well as the expenses for the reconstructions that the NMPZ forced them to do as per a Memorandum of Collaboration, signed in 2006. As a result, the local community representatives on the Board of the Management Agency resigned and accused the President of the NMPZ of being “un-cooperative, arrogant and indifferent to the needs of the local people”. Furthermore, the President of Vassilikos Community Council was arrested for removing one of the NMPZ’s barriers at Gerakas beach.

In comparison to previous seasons, the incurred changes in the period 2006-2009 generally provided better conditions for turtles on the beach by putting some control over the number of visitors and reducing other disturbances (lights, noise, etc.). Nevertheless, the above actions of the Management Agency did not stem from an integrated management plan which would have taken into consideration all possible factors towards the long-term conservation of the area.

In 2010 Daphni had only one wardening shift on the beach (10:00-18:00) and that was only applied after 10 June when the relations with locals were improved. The car-parks, constructed in 2007, were not operative as they were eroded by rainfalls in winter. Development behind the beach was increased with more huts and sun bed businesses being present. In front of some tavernas locals had transferred pebbles to secure their fences in order to avoid winter erosion from the sea. In many occasions, water from shower facilities and machines watering daily the planted grass, was ending at the nesting zone. Furthermore, human presence on the beach during the night, causing disturbance to emergent females, was increased.

Daphni during 2011

The 2011 nesting season started with Daphni beach being out of control. The daily presence of a warden between 10:00-18:00 made any illegal activities possible during the non-wardening hours and even during the night. In general most of the illegal buildings and businesses were transformed with further external additions, the sand dunes and the surrounding areas of the buildings were planted with grass that was watered daily, showers were added in all touristic facilities with their water ending on the beach and even inundating a nest. Nesting turtles had been disturbed by tourists in several occasions. The two illegal roads that lead to the beach were cleaned and flattened for the tourists to have easy access to the illegal facilities. The eroded clay, transported by rainfalls and deposited on the beach, hardens the sand surface and turtles cannot excavate an egg-chamber or hatchlings cannot emerge from their nest. **In conclusion, the general situation at Daphni was out of control and opposing to the legislation valid for the area.**

Two main illegal facts should be highlighted, for their severe impact on the area:

Transfer of pebbles from the western part to the sand dunes of the eastern part

The transfer of pebbles was made to secure a field in order to avoid erosion by the sea and also by rainwater that is lead there on its way to the sea due to the construction of an illegal road that ends behind that field. This action destroyed substantially a part of the beach that was suitable for nesting. Furthermore, the transferred pebbles were protecting the western part from erosion against the winter southern winds which erosion now will certainly affect this part of the beach.

Creation of an illegal car-park

In the evening of 18 May 2011, after the warden shift, the hill behind the tavernas was cut and flattened to create a wide car-park. All the soil from the hill was left aside or flattened. The next days gravel was placed and plants were planted on the perimeter of the new car-park, and a sign was erected to indicate “*free parking only for customers*”. During the nesting season, customers of the specific tavernas would pay a deposit for parking that they would take back after their lunch.

In both cases, the Management Agency, informed by wardens and ARCHELON, acted with officially reporting the issue to the competent public authorities (police, public land department, planning department). ARCHELON reported the case in-writing to the Ministry of Environment and the European Commission in collaboration with other NGOs (Medasset, MOM, WWF-Greece). Currently, there hasn't been any change in the above illegal acts. The lack of 24-hour wardening and the unstable political situation, due to the inactive Board of the Management Agency, let the creation of these facts to happen and any official action afterwards can only be considered as late.

On 1 October a devastating bush fire, intentionally set, burnt the vegetation on the hills between Daphni and Gerakas.

Gerakas (zone Π2: Nature Protection Site, maritime zone A)

Gerakas beach is free from development and light pollution, and accessed via a single entrance, featuring a barrier restricting vehicular access.

In 2008, the Management Agency installed a wooden boardwalk from the main entrance to the beach. By using this boardwalk visitors could reach either the waters edge, through a roped path, or the western end of the beach behind the sun beds. In addition to the boardwalk the Management Agency also created a viewing platform behind the beach from which visitors were permitted to view the sunset before being asked to leave by the wardens. The wooden boardwalk and the viewing platform were still intact in 2011.

A ticketing scheme, in operation since 2007, imposed a time-limit to visitors in such a way that their maximum number would not exceed 350 people at any time. In 2010 and 2011, however, this measure was not applied. As a result the number of visitors was regularly in great excess of the limit dictated by the Presidential Decree, at times reaching more than 1,000 people. Such numbers are clearly unaffordable for the capacity of the beach and may even endanger incubating nests. Especially when the sea is reaching higher the beach, there is danger of trampling the nests when the number of visitors is increased and the limited number of wardens cannot control the situation.

Throughout the 2010 and 2011 season, the night-warden would use the hut at the top of the beach while the day-wardens were situated on the beach at the end of the wooden boardwalk. In this way visitors entering the beach were obliged to walk past the wardens, which ensured that all visitors were informed on the code of conduct. During the peak season, NMPZ head office personnel was undertaking supplementary wardening shifts in Gerakas to aid management of the high number of visitors.

The Presidential Decree states that a maximum of 60 umbrellas and 120 sun beds are permitted on this beach. During 2010 and 2011 sun beds were stored overnight above ground-level on top of the table that accompanies the umbrellas.

Although this seems successful as it permits turtles to reach the nesting zone crawling below the elevated sun beds, it cannot be considered as an appropriate management practice.

In 2010 private umbrellas were allowed at the western part of the beach, mostly unsuitable for nesting. In 2011 the amount of private umbrellas was very high, covering the whole western section and they were allowed as well in the wet sand zone of the eastern section.

In 2011, as in 2010, the insufficient patrolling of the Bay led to frequent incidents of sailing boats and other vessels being observed in zone A, and often anchoring overnight. In these instances, the Coast Guard was contacted but, in most cases, no action was taken.

Furthermore, in August, a car-park was created about 500m from the entrance of the beach by the Management Agency. The car-park has been a constant request by the local community and businesses. The car-park improved the management of the cars in the area and definitely assured that in case of emergency a fire engine or ambulance could reach the beach. However, the new car-park facilities attract more visitors and this augments the problem of exceeding the carrying capacity of the beach. Worth noting though that other car-parks were created from local businesses in 2010 and also in previous years, so the new car-park is not the main reason of the high attendance of visitors.

4.2. The protected marine area (Zone Ia: Nature Protection Site)

General

The marine area of Laganas Bay (from about Cape Keri to Porto Roma) is a Nature Protection Site (Zone Ia). According to the Presidential Decree, its management target is the conservation of the area as a habitat for the endangered sea turtle and monk seal species, the conservation of the coastal and marine ecosystems, and the protection and rational management of the piscatorial resources. Inside Zone Ia passage of tanker ships and any kind of mariculture is prohibited. Professional fishing is allowed the whole year, except underwater fishing and fishing with the use of trawling and seining gear (e.g. beach seines, trawlers, purse nets). Furthermore, “soft” recreational activities are allowed during the day (e.g. swimming, underwater photography, wind surfing, diving).



The protected marine area of Laganas Bay (Zone 1a) includes three zones regulating maritime traffic and fishing annually from 1 May to 31 October (Zone A: no boating activity, no fishing; Zone B: speed limit of 6 knots, no anchoring; Zone C: speed limit of 6 knots). Maritime regulations are supposed to be enforced by the combined efforts of the NMPZ and the local Coast Guard. However, in 2010, due to lack of funds, the Coast Guard would patrol the Bay using the NMPZ boat from 11:00 to 16:00 every day, which was deemed insufficient. It must be stated that several maritime regulations, and especially the 6-knot speed limit, were frequently observed to be broken. The situation at the beginning of 2011 season was similar. Since August though there was increased interest from the part of the Coast Guard to contribute to joint patrolling with the marine area NMPZ wardens, resulting to some control of the violations seen in the Bay and to issue fines (e.g., for exceeding speed limit, for illegal underwater fishing). Although this initiative was very positive, it needs to be realized for the whole season to render an enduring result.

In 2011, as in previous seasons, the Management Agency used buoys to mark out the maritime no-boating zone A which encircles the nesting beaches of Sekania, Daphni and Gerakas. These buoys have a twofold role: they inform boaters on the exact boundaries of the protected zone, and assist Coast Guard and NMPZ wardens to identify violations.

As in previous years, ARCHELON personnel onboard Turtle Spotting Boats and cruise boats would take note of regulation violations and report to the NMPZ major incidents and problems frequently observed. However, the majority of violations were not responded to by either the Coast Guard or the NMPZ's marine area wardens on time, although the attention was raised in the problematic areas and the Management Agency was collaborating with the Coast Guard to mitigate the problems. Despite the general interest and effort, the overall situation of the marine area remains highly challenging. This was particularly true for violations at the NMPZ's endorsed turtle-spotting zone and for guidelines for turtle-spotting behaviour (see Appendix 2 and "The NMPZ-endorsed turtle-spotting zone" in this Section below).

Maritime zone A

By law all boating activity and fishing is prohibited within Zone A from 1 May to 31 October. However, in 2011 ARCHELON volunteers have recorded, during occasional observations, at least 18 incidents of boats in Zone A, some of which were fishing vessels. In most of the occasions, ARCHELON and NMPZ wardens would contact the Coast Guard who usually were not able to react.

Maritime zone B

In this zone, from 1 May to 31 October, there is a speed limit of 6 knots, but anchoring and mooring are not permitted. However, anchoring and mooring on Marathonissi beach, within maritime zone B, was daily observed, as this beach is visited by many people during the day arriving there by private or hired boats. During 2011, **163 cases of boats anchored in zone B** were recorded by ARCHELON volunteers. Further, **686 incidents of boats breaching the speed limit of 6 knots** were recorded by ARCHELON personnel on duty onboard TSBs. Of these boats about 80% were privately hired boats. Also water sports (e.g. jet

skis) were frequently observed in this zone.

Maritime zone C

In this zone, from 1 May to 31 October, there is a speed limit of 6 knots. Despite the regulations, there are numerous occasions of boats speeding in the zone.

“Peripheral” Maritime Zone Ia (the area remaining when A,B,C zones are excluded)

The increased number of turtle strandings due to monk seal (*Monachus monachus*) interactions the last two years placed the issue of the degradation of their habitat, the lack of adequate food sources, the high human frequency in their habitat and their surprisingly human-tolerant behaviour under attention of the Management Agency. Observations in Zone Ia verified problematic activities in this zone, such as daily visits from cruise boats with loud music (party cruises) in remote small bays usually frequented by monk seals, high number of hired boats or private boats constantly throughout the day, or extended spear gun fishing during the touristic season. A purse seine fishing incident had been observed within the boundaries of the zone, but still inside the protected area.

The Management Agency and the Coast Guard enforced their patrolling in this area and informed the captains about the existing legislation or issued fines for illegal spear gun fishing. It is an issue, however, that needs to be addressed well in advance before the touristic season, as the tourist agents should be aware of the permitted activities before drafting their annual schedules.

The NMPZ-endorsed turtle-spotting zone

In 2006 a new maritime zone was introduced, albeit without legislation, only for NMPZ-endorsed turtle spotting trips. This zone runs parallel to the East Laganas beach, from about Aghios Sostis to Kalamaki, at a distance of 1.4 km from the shore. Although it was assumed that only the NMPZ-endorsed boats would use it, in the course of subsequent years it has been overwhelmed with many non-endorsed boats. These non-endorsed boats seem to have little regard for the NMPZ's turtle spotting guidelines (see Appendix 2). The lack of enforcement in this zone was not helped by the lack of buoys in place to mark this zone. Many of the endorsed boat drivers feel disappointed at the NMPZ's poor enforcement as while they follow the set guidelines, these are not followed by the other boats with no further consequences to them.

ARCHELON volunteers go onboard the NMPZ-endorsed boats to inform visitors and to supervise compliance with guidelines and regulations. A preliminary analysis of recorded data in the period between 27 May and 15 October 2011 showed that ARCHELON personnel confirmed 1,918 violations during 88 boat trips on Turtle Spotting Boats and 76 cruise operating near the turtle spotting zone. Violations were done by the endorsed TSBs themselves as well as by other vessels and humans nearby, such as large cruise boats, various hired vessels (small boats, pedalos, and canoes) and snorkelers/swimmers. An analysis of violations appears in Appendix 2.

In 2011 the disappointment of the endorsed boat-drivers grew higher for the future of the turtle-spotting zone. The turtle-spotting activity was totally uncontrolled with large cruise boats entering daily the shallow waters of the zone and thus threatening both turtles and swimmers. Furthermore, new modern technology

vessels were added to the already competitive business, letting the NMPZ-endorsed boats remain inferior in the competition. Especially after the enforcement of the patrolling from the Management Agency and the Coast Guard the disappointment reached the point that most of the collaborating NMPZ-endorsed boat owners denied to take onboard ARCHELON volunteers. The reason appeared to be the application of fines to these boats for entering the swimmers' area (200m from the coast), while they were forced to go there to avoid the large boats that were already in proximity. **It is apparent that all these problems occur because the turtle spotting zone is not demarcated by law, thus the Coast Guard does not have the authority to regulate the turtle spotting activity and any attempt might prove negative in the long term. It is urgent to issue a law for this extremely important inter-nesting area for the sea turtle population in Laganas Bay. Otherwise, the initial idea for the turtle-spotting zone will soon face a total failure.**

A major problem for the protected marine area is the noted increase of hired boats; for instance in 2009, 24 new boats were added to the existing ones **making a total of 100 boats available for hire within the Bay!** Licences for these boats were provided by the Coast Guard, who did not consult nor even informed the Management Agency before issuing them. Of course, the Management Agency should have made the necessary interventions at the competent authorities to mitigate this unforeseen situation. It should be noted that the tourists that are hiring these boats are not required to have a driving licence if the boat engine is less than 25 HP, which is usually the case, and are largely unaware of maritime regulations as well as of the zone boundaries. To address this issue, specific informational sheets or stickers with all maritime regulations and the turtle-spotting guidelines should be obligatory in each one of these hired boats.

It is therefore urgent that the Management Agency, in close collaboration with the Coast Guard, sets a maximum boat capacity in the Bay and strictly regulates the turtle-spotting activity, which first should be clearly defined through a legislative act.

Fisheries interaction

In the last four years (2007-2010), there has been a notable increase in the number of dead and injured turtles found within the boundaries of the Park and in the wider area of Zakynthos. Many of them have signs of interaction with fishing gear. It has been occasionally observed, in 2011 as well, that fishing vessels drop gill-nets close to Marathonissi and in other areas within the Bay, an activity allowed by the Presidential Decree. These nets present a grave danger to sea turtles during the nesting season. Moreover, long-lines are permitted in the Bay even though there is adequate evidence that it leads to fatal incidents with turtles (see "Dead and injured turtles" in Section 2). It should also be noted that fishing activities outside but in proximity to the NMPZ's boundaries, definitely impact the turtle population that seems to be foraging or resting as well outside the Bay, e.g. male adult turtles (long-line fishing in the eastern coast of the island appears a frequently recorded cause of death). Further, these turtle strandings are only those recorded by or reported to ARCHELON, with unknown numbers of other incidents going unobserved or unreported – in 2011 divers informed ARCHELON for turtle carcasses on the sea-floor that never got stranded on a beach.

There is an urgent need for the Management Agency to look into this serious matter and invest in mitigating the effects of fisheries interaction impacting the population of sea turtles at Zakynthos.

Diving tourism

Diving tourism exists in Zakynthos for many years, although it is not very widespread. A further expansion of this activity has to be well and carefully planned under a legislative frame that would prevent disturbance to turtles. The current Decree does not include any provision concerning such an activity. If not adequately regulated, diving tourism will be added as one more disturbing component to those already there. Turtle-spotting boats, hired boats, wind-surfers, free-ranging swimmers, pedalos, and canoes create already a considerable disturbance to turtles which need to rest between successive nestings. Additional in-water disturbances might be the *coup de grâce* for the sensitive ecosystem of Laganas Bay and the largest sea turtle population in the Mediterranean.

Water pollution

Poor water quality is observed in Laganas Bay associated with the rivulet of Bouka at East Laganas, tourist boats and the landfill site behind Vrodonero. Several incidents of oil or polluted water discharged from boats inside the Bay were reported or observed by ARCHELON volunteers, especially in the Peripheral Ia Zone. Further, liquid pollutants (including heavy metals and toxic material) from the saturated landfill site (see Section 4.3) are reaching the sea.

Conclusion for the protected marine area

Indisputably, there is a great need for updating the legislation concerning the marine area of the NMPZ. The existing maritime zonation in Laganas Bay, dictated by the Presidential Decree of 1999, more than a decade ago, urgently needs amending as to (1) a new maritime zonation system since recent scientific data have shown major flaws with the current zones, (2) determining the carrying capacity of the Bay in terms of numbers of vessels, (3) specifying better the permitted human activities per maritime zone, and (4) ensure that any visitor of the marine area receives adequate information for the legislation and turtle-spotting guidelines, especially those hiring private boats. Furthermore, since 1999, existing markets such as the Turtle Spotting Boats have grown while new activities such as the promotion of Diving Tourism have arisen, all relying on the sea turtle as a touristic product, and none of which are addressed or regulated by the existing Presidential Decree.

4.3. The landfill site

An active landfill site is located within the boundaries of the NMPZ, behind Vrodonero beach, between Kalamaki and Sekania. The landfill site attracts sea gulls which in turn predate on hatchlings, particularly at Sekania where hatchlings are numerous. In 2010 the report of an official investigation, ordered by the Ministry of the Environment, concluded that the landfill site is totally over its capacity, rubbish is over floating, plastic bags and light items are flown away, liquids from the landfill site reach the sea with eutrophication noted at Vrodonero beach, and heavy metal and toxic pollution threatening the marine area of the NMPZ. Further, the investigation report stated that the landfill site is a serious threat for public health and that the supporting wall is not stable

anymore. In spring 2011, an incident of marine pollution in Vrodonero was a result of liquid leakage from the landfill site. Actions have already been made from the Ministry of the Environment to set a new location outside the NMPZ, but it is expected that many years will pass until such a change will be realized.

5. Recommendations

5.1 General Recommendations

1. Alternative measures and compensation schemes for confirmed affected landowners should be sought.
2. Acquisition of a strip of land (approx. 4ha) at Sekania where an illegal road was built in 1995.
3. The problematic sanitary landfill will have to be removed from the NMPZ area.
4. The elaboration of the Management Plan for the NMPZ should be resumed.
5. Emphasize on the environmental awareness of visitors and locals in the NMPZ area for the impact of various activities on the sea turtle population, such as disturbing basking and nesting turtles, nests or hatchlings and increase general environmental awareness for why the area is unique and the whole habitat needs protection (see specific examples in 5.4 below).

5.2 Recommendations for the Nesting Beaches

The Management Agency should continue improving the conditions on the nesting beaches and should become hard on tackling illegal activities. In particular:

6. At Daphni, the illegal buildings should be removed and the beach profile restored; also any construction works that transport clay to the beach should be forbidden.
7. Signs at the entrance points informing that you are now entering a National Park with certain regulation would increase the awareness of beach users.
8. No single stretch of beach currently being used by turtles for nesting should be compromised, in fact stretches of the developed beach in West Laganas, not used currently by turtles, should be in the long term reclaimed.
9. A better management of the access to East Laganas beach would reduce sand compaction and disturbances of incubating nests by people walking through the crucial nesting area at the back of the beach.
10. An environmental impact study should be carried out to minimise light and noise pollution.

5.3 Recommendations for the Protected Marine Area

In the last five years (2007-2011) a great increase on turtle deaths, within the boundaries of NMPZ, has shown that protection measures at sea are inadequate or poorly enforced. Therefore:

11. The NMPZ should focus on the strict enforcement of existing regulations in the marine area. In addition, the existing legislation should be amended towards the designation of more appropriate zoning and measures, following new scientific

data, as well as determining the capacity of the Bay in the number of vessels.

12. Commercial activities, such as turtle-spotting and diving tourism, should be regulated by appropriate legislation. Specifically, the NMPZ-endorsed turtle-spotting zone should be legislatively delimited and marked, and the glass-bottom boats should be banned. The NMPZ-endorsed turtle-spotting activity should be revised as many boats in this category are regular violators. Only drivers who follow the guidelines should be endorsed by the NMPZ. Specific characteristics for the turtle-spotting boats should be set including protective rings around their propellers preventing damage to turtles.

13. The hiring of private boats should be strictly regulated (as these boats account for about 80% of speed violations). Information should be given to customers about the marine regulations as well as a signed agreement.

14. The specific cause of turtle deaths, particularly by fishing practices, should be investigated. Also appropriate means to reduce monk seal predation should be examined and implemented, the soonest possible.

5.4. Recommendations for Public Awareness and Education

The most efficient way of reducing threats to endangered species and their habitats is to establish a strong public awareness and education programme within the area affected. We provide below some examples to enhance public awareness:

15. Construction of an information centre in Laganas/Kalamaki in addition to the centre in Daphni. This is crucial due to the sheer contrast in numbers of tourists visiting Laganas/Kalamaki compared to Daphni.

16. Leaflets in additional languages, ARCHELON's Public Awareness Programme recorded the top five spoken languages around the NMPZ: German/Dutch (32%), English (31%), French (10.8%), Greek (9.1%) and the remaining 17.1% comprises of other European languages. At present, NMPZ leaflets are offered in Greek and English leaving almost 60% of tourists uninformed about the NMPZ.

17. A permanent information table (or exhibition) in Zakynthos Airport/Zakynthos Port offering information to tourists at both major entry points to the Island. Also the reintroduction of an informative TV spot during the incoming flights would have a very positive impact.

18. Media coverage such as daily radio advertisements in various languages explaining the importance of the NMPZ and the regulations.

19. Information at hotels directly on the nesting beaches, posters should be displayed in all hotels on or near to the nesting beaches explaining regulations and the importance of the NMPZ.

20. Training for the NMPZ wardens (especially the seasonal ones) should be thorough at the beginning of both nesting and hatchling season so they are equipped with knowledge to deal with situations that may arise during the season, as well as general environmental education for natural processes on marine and coastal environments relevant to the NMPZ's major features (e.g. sand dune system, erosion).

6. Appendices

Appendix 1: The warden programme of the Park

Wardening is crucial for the protection of the nesting beaches as well as of the protected marine area. Wardens should be trained and be totally aware of the impacts to turtles' nesting caused by human activities and actions. In 2009, three drivers and 74 local wardens were employed by the NMPZ to establish a 24-hour guarding of the nesting beaches and the marine area. Thirteen of them were employed all year round while the rest were under a 6-month contract to cover needs during the tourist season. Additionally, a car to prevent or extinguish fires was present and was staffed with NMPZ personnel. All this led to an effective 24-hour wardening of the nesting beaches, besides Sekania which continued to have a part-time day-warden. ARCHELON multi-lingual volunteers assisted wardens in informing visitors, especially in Kalamaki and East Laganas. As a result of such adequate wardening, adherence to beach regulations was improved in 2009.

In 2009, all the warden huts and NMPZ boats were equipped with mobile phones, made available to ARCHELON staff as well. This assisted significantly communications between ARCHELON and the NMPZ during incidents. In 2010 and 2011, this continued to be an effective way of communication, although the number of wardens was limited or non-existent in specific beaches or during specific hours.

The lack of any substantial funding in 2010 has led to a wardening staff of only 20 wardens covering 24-hour rotating shifts only at the most populated areas (2 posts on the East Laganas) and intermittent shifts in other areas, mainly at the peak touristic hours or the most important hours for turtle nesting and hatching (10:00-18:00 and 22:00-6:00 in Gerakas and 8:00-16:00 and 22:00-6:00 in Marathonissi). Daphni had only one wardening shift on the beach (10:00-18:00) and that was only applied after 10 June when the situation was better with the locals. Kalamaki and Sekania had no warden presence for the entire nesting season. Strofades Islands were sporadically patrolled to reduce illegal hunting and fishing (i.e. three visits were made by the Coast Guard in the period 16/3-18/5, and one visit by the NMPZ warden in the following periods: 23-27 July, 3-5 August, 17-20 September, and continuous wardening from 5 October onwards).

In 2011, the situation was similar to 2010 until the hiring of 15 new seasonal wardens at the end of July. Unfortunately 2 of them quit in the meanwhile, leaving only 13 seasonal wardens. Wardening was realized under the following working schedule:

Gerakas: 24hours.

Daphni: 10.00-18.00 and some hours during the night.

Kalamaki: 6.00-22.00 and some hours during the night.

In Laganas there were two warden-huts active: Zante Beach 24-hours, Kalamaki Beach Taverna 24-hours.

Marathonissi: 8.00-16.00 and 22.00-6.00.

Sekania: no wardening.

Marine area: Some days 6.00-22.00 and some days 10.00-18.00.

It should be noted that the nesting results of 2011 show clearly an increase of nesting at the fully (24-hour) warded beaches, like Gerakas and East Laganas.

Appendix 2: Turtle-spotting boats (TSBs)

In 2001 a Memorandum of Cooperation between the majority of turtle-spotting entrepreneurs and the NMPZ was signed. In 2003, two turtle-spotting stations in Laganas Bay were endorsed by the NMPZ via an agreement which specified a mutually accepted set of “guidelines” to be followed on turtle-spotting trips. After an agreement with the Management Agency, ARCHELON provides multilingual volunteers onboard the NMPZ-endorsed TSBs with the task of informing tourists on sea turtles and conservation measures. In addition, ARCHELON personnel onboard TSBs register any violations of the set guidelines, which are then passed onto the Management Agency.

In 2006 a new zone was introduced by the NMPZ to be used only by the NMPZ-endorsed TSBs. A major concern associated with turtle spotting in this zone is the overwhelming presence of many hired boats as well as of commercial glass-bottomed boats (some of them endorsed!) which do not comply to the set guidelines. Glass-bottom boats are worse since by design they have to stay on top of turtles in order for them to be viewed interfering with the turtle’s need to breathe. Since 2009 a new type of submerged boat has been introduced for turtle spotting (not endorsed by the NMPZ for that purpose) that is stressing the turtles when in the shallow waters, as its deep keel is disturbing the sediment and confuses the turtles. In 2011, another modern technology boat was added, whose shape is not considered as safe for the basking turtles as it has a large prolapsed metal frame in the front side to be able to reach the speed of 40 knots.

Hired boats are not regulated in any way and constantly follow endorsed boats in high numbers in order to view turtles. Visitors using hired boats and glass-bottom boats are poorly informed and frequently cause stress to resting turtles. Violations associated with turtle spotting tend to worsen towards the end of the nesting season when there are fewer turtles in the Bay and spotting a turtle becomes more difficult.

In 2010, as in 2009, the situation within the Turtle Spotting Zone was totally unacceptable. According to the guidelines, the number of boats around one turtle should be at any time maximum two. **In high season, though, more than 10 vessels were observed over a single turtle almost daily with a maximum of 14 boats gathered on a single turtle!** Further, the number of boats exercising turtle spotting increased as well leading to intense competition among boat operators. The competition of boat operators, in 2009, was so great that, in view of the inadequacy of the NMPZ to control this situation, **boat operators discussed the possibility of running night trips!**

It should be reminded that in 2009 a half-underwater boat with passenger seats below sea level operated in the Bay for turtle-watching during the day. Later on the boat owner insisted **on conducting night trips as well with the use of strong lights.** The boat managed to make one night trip in the middle of the nesting season before such trips be banned by the NMPZ. It must be noted, however, that the existing legislation does not explicitly state such a prohibition specifically for turtle spotting activities – the Presidential Decree does not mention that activity at all as it was not present at that time - thus an appropriate amendment is necessary. On the other hand, the Presidential Decree explicitly allows for minor marine recreational activities in the Marine Area of Laganas Bay (Zone Ia) but only during daytime.

During 2011, as in 2010, many violations and incompatible behaviours were noted on the part of the TSB operators as well as of other boats involved in turtle-spotting activities. **Indeed, ARCHELON observers onboard 88 boat trips on Turtle Spotting Boats and 76 trips on cruise boats operating near the turtle spotting zone from 27 May until 15 October registered the following incidents: 139 cases of large cruise boats operating in Turtle Spotting Zone, 253 cases of more than 2 boats around one single turtle, 80 cases of boats driving on top of turtles, 42 cases of boats chasing turtles, 23 cases of revving the engine to trigger turtles to move so the tourists would view them, 44 cases of reversing boat over/around turtle, 26 cases of boats blocking turtles, and 2 cases of boats colliding with turtle! Worth noting that in majority the turtles observed were adult females. ARCHELON was informed from tourists, as well, for incidences that people were catching turtles and dragging them to the shallow waters to show them to other people!**

Appendix 3: Beach cleaning activities

During May 2011 ARCHELON, together with NMPZ wardens and WWF Greece volunteers, conducted beach cleans on the beaches of Sekania, East Laganas, Kalamaki, Daphni, Gerakas and Marathonissi. This was then continued during the season by NMPZ wardens and ARCHELON volunteers as part of ARCHELON's public awareness program. ARCHELON conducted as well underwater cleans in the shallow waters of Laganas Bay at the start of hatching season and participated at the clean of the coastal forest of East Laganas beach initiated by the Zakynthos Municipality.