

Dolphin habitat conservation and sustainable use: a pilot experience in the Egyptian coastal Red Sea

Final Report to the Abu Salama Society

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1. Executive Summary

This is the final report to the Abu Salama Society describing the activities undertaken in fulfilment of an assignment conferred upon one of us (GNS) related to the conduction of a project in the Egyptian coastal Red Sea, designed to take advantage of a special situation – the presence of spinner dolphins in an offshore reef, Samadai – to promote marine biodiversity conservation and management, and local training.

International cooperation to support the establishment of a sound management and conservation regime in the Egyptian Red Sea, centred around an offshore reef called Samadai used by spinner dolphins as a resting place, was seen as a very promising effort for a number of reasons: (a) spinner dolphins in particular, and marine mammals in general, are a component of the Red Sea marine fauna which is still largely unstudied, and yet has become of significant importance in recent year because of its ecological and charismatic properties and potential for tourist attraction; (b) a provisional management regime had been implemented in the area based on precaution and on a cooperative effort involving one of the authors of this report (GNS), and the “Samadai case” had become as a consequence an ideal playground for the creation of local capacity in terms of both management, research and monitoring; finally (c) in a scenario of tourist development characterised by dizzying speed along the Red Sea coasts of Egypt, it seemed important to demonstrate with facts that maintaining ecological integrity in the area, and protecting marine fauna, makes economical in addition to environmental sense. Based on such premises, the Italian Cooperation in Cairo decided to support this effort and funded the project.

Activities to implement the project took place in Marsa Alam, Egypt from October 2005 to September 2006. An international team coordinated by us alternated on site and worked in tight cooperation with the Red Sea Protectorates and with the two Egyptian trainees. Activities were centred on research and training on research and management.

Research addressed all marine mammal species found in the area, including four cetaceans (spinner, pantropical spotted, common bottlenose and Indo-Pacific bottlenose dolphins), and the dugong. However, activities were mostly focused on spinner dolphins in Samadai. Details of the dolphins’ ecology and behaviour were investigated through direct observation, underwater photo-identification and collection of food remains, and provided knowledge significant to improve future management in the area. Elements of the dolphins’ ecology and behaviour revealed by the study included a description of the seasonal and daily variations in the dolphins’ presence in the reef, of the circadian variability in their activity

levels and use of the reef, and preliminary information about their feeding and reproductive habits. Cetacean investigations were integrated by a study of dugong suitable foraging habitat along the Egyptian coast between Port Ghalib and Marsa Nakari, and revealed which of the bays seemed to be more suitable for dugong survival within the study area. All the research activities described in this report generated scientific knowledge that should be the subject of at least four papers to be submitted to international, peer-reviewed journals.

Intense training was performed on two Egyptian professionals who were detached from their duties to the task for a large portion of their time. Training consisted in the involvement of the trainees in all the phases of the project's activities with a hands-on approach, including field work, data analysis, report writing, and integration of research-derived information into adaptive management.

The entire experience – which involved intense field research in Samadai and surrounding areas, close contacts with the Red Sea Protectorates, frequent interactions with the key stakeholders including the tourist operators and the tourists themselves, the trainees and the local population – was of crucial importance for allowing us, at the end of the project, to formulate meaningful recommendations to the governing authorities with the intent of improving management. We strongly urge the Abu Salama Society to bring our recommendations to the attention of the competent bodies.

The management recommendations – listed and discussed in Section 6 of this document – include: general considerations, Samadai visiting regulations, monitoring, control, zoning, incentives to rangers, communication about visits to Samadai, and dugong conservation and welfare.

2. Introduction

Marine mammals worldwide are under threat and fall within various threat categories of IUCN's Red List. Their large size, long life, low reproductive rate, ecological position at the top of the trophic webs in their ecosystem makes these mammals particularly vulnerable to impacts deriving from human activities. Marine mammals in the Red Sea are among the world's least studied. At least 17 species are found in the region, at different levels of abundance, including 16 cetaceans (Notarbartolo di Sciara et al. 2007), and the dugong, a sirenian. This makes the Red Sea a region of very high value as far as marine mammal biodiversity is concerned. In spite of this fact, to date efforts to conserve marine mammals in the Red Sea have been nearly absent.

A significant experience has recently taken place in Samadai, a crescent-shaped offshore reef located approximately 15 km southeast of Marsa Alam, on the southern Egyptian coast. The reef is oriented E-W forming a natural lagoon on the south, in the lee of the prevailing winds. The sheltered waters of the lagoon provide a favourable daytime resting habitat for spinner dolphins (*Stenella longirostris*) from that area. Because of the exposed character of the Egyptian Red Sea coast with few embayments, protective reefs such as Samadai are exceedingly valuable habitats.

Spinner dolphins are a species which is commonly seen in the Red Sea, as well as in the Gulfs of Aden and Oman (Baldwin 2003). The species can be easily identified by its relatively long, slender beak and colour pattern, consisting of a dark grey cape, light grey lateral field and white ventral field. Adults range from 129 - 235 cm and reach a body mass of 23 - 78 kg (Perrin 2002). Spinner dolphins have a pantropical distribution, occurring in all tropical and subtropical waters around the world between roughly 30-40°N and 20-30°S (Jefferson et al. 1993). The geographical variation in body configuration and colour pattern is more pronounced in spinner dolphins than in any other species of cetacean, resulting in the description of four *S. longirostris* subspecies (Perrin 1990, Perrin et al. 1999).

Although historical information is lacking, we can presume that spinner dolphins have been using Samadai as a resting site for time immemorial. In recent years, however, Samadai has become a popular diving and snorkelling site for a growing population of tourists. In the early '90s, only 2-3 diving operators frequented the area. By 2002, there were 15 operators running 60 boats per day serving 1000-1200 guests from all over the world. This growth imposed formidable pressure on the resident dolphins and surrounding reefs, particularly considering that the dolphins use the reef as a resting place. During Summer 2003 the

pressure from swimmers on Samadai reef and its dolphins was so intense that the Red Sea Protectorates of the Nature Conservation Sector (NCS) of the Egyptian Environmental Affairs Agency (EEAA) and the Red Sea Governorate decided, by decree of the Governor, to stop tourist use of the area and closed the reef to the public. Based on expert advice requested by NCS to one of us (Notarbartolo di Sciara 2003), and well before the Abu Salama Society was established, a micromanagement plan based on precaution was then initiated. The plan, introduced by Governor's decree and currently operational, envisaged the adoption of four management elements concerning (a) visitors (limiting daily access to the reef to 10 boats, 100 snorkelers and 100 divers), (b) zoning (c) public awareness and (d) a monitoring programme to support future management with sound scientific knowledge. The Samadai model of protecting endangered species and using resource on a sustainable way has proven to be effective, providing that resources are made available.

In January 2004 the monitoring programme was developed by one of us (GNS) by request of NCS, and an *ad hoc* course was held in Marsa Alam to train Red Sea Protectorates personnel in monitoring techniques. Data were subsequently collected on a daily basis on dolphins and humans presence in Samadai. The analysis and description of these data are currently under way in a cooperative effort between scientists of the Red Sea Protectorates and us. Being part of a separate effort, these data are not presented and discussed here.

With the management of the Samadai reef having become a significant success story in spite of its obvious geographical limitations, the situation did present an opportunity for creating locally the capacity to enhance the management and conservation of Samadai itself, as well as facing similar situations in the surrounding area, and transforming local crises into opportunities for (a) the preservation of the marine environment, (b) the generation of revenues, and (c) the creation of jobs. The matter was brought to the attention to the Office of the Italian Cooperation in Egypt, which decided to support such an initiative within the framework of the Debt for Development Swap Programme agreed upon by the Italian and Egyptian Governments. Support was provided to the Abu Salama Society for the implementation of a 12-months project named "Dolphin habitat conservation and sustainable use – a pilot experience in the Egyptian coastal Red Sea". The Abu Salama Society, in turn, contracted one of the authors of this report (GNS) as consultant for the implementation of the project. This is the final report of the project, describing the activities undertaken and the results obtained.

3. Goals and objectives

Marsa Alam as all coastal cities of the Red Sea has been developed mainly for tourist designation. Tourism is a productive activity of fundamental importance for Egypt, and has become one of the main sources of foreign currency. Tourism also generates thousands of job opportunities for the local population and could be the engine for the socio-economic development of the region and of the country. The Marsa Alam area is rapidly becoming an important tourist destination for a large European public of vacationers and divers.

Red Sea marine mammals deserve special attention. Dolphins, along with other elements of the Red Sea marine biodiversity, are at the same time a powerful attraction for tourists and potentially the victims of uncontrolled development in the marine and coastal area. In this context it is essential that more knowledge be acquired about marine mammals in general, and dolphins in particular, in order to design effective management regimes by keeping into account consideration about the populations' status, threats and ecological needs.

Achieving successful sustainable tourism in Samadai is important to conserve the local dolphin population, however it will have far reaching effects beyond the protection of marine biodiversity, because it will demonstrate that "nature can pay for itself". An exemplary case may thus stimulate policies grounded on economic considerations in favour of eco-tourism development as opposed to more traditional, massive tourism.

Monitoring and research must necessarily contribute to resolving this issue. Public awareness is also a management tool to be developed and enhanced to change the behaviour of divers, of dive boat crews who seek out dolphins, and of other marine resource users. Community and stakeholder participation in the management process can also solve problems related to bad practices through education and direct involvement.

The project described here was implemented in view to its strong potential not only for supporting with a sound technical and scientific background the Samadai Management Plan currently implemented by the Red Sea Protectorates. The project was seen also as a contribution to the success of an exemplary case which could demonstrate the long-term advantages of a careful management and stewardship of marine biodiversity, through the application of the principles of adaptive management and the building of local capacity.

Specifically targeting the group of spinner dolphins regularly found in Samadai and its interactions with the local tourism industry, the activities described here present an unique

opportunity for addressing and experimenting with the wider issue of marine mammal and, more in general, marine biodiversity conservation in the Red Sea in a rapidly changing world. Given the wide array of anthropogenic pressures which may or are likely to impact on Red Sea cetaceans (e.g., habitat degradation through pollution of various types, coast development, vessel traffic, disturbance, noise, dolphin watching activities, bycatch), the results of this project may provide insight into impact mitigation measures. Thus, the overarching goal of the project was to strive to conserve important elements of the Red Sea marine biodiversity while ensuring that sustainable development is achieved and promoted. Such goal was attained through the building of scientific, technical and managerial local capacity, concentrated at Samadai and surrounding reefs of Marsa Alam, ultimately to conserve and enhance the status of spinner dolphins, as well as other marine mammals.

In order to attain the stated goal, the project addressed the following objectives: (a) make progress in the acquisition of an in-depth understanding of the dolphins' presence and use of the reef to enable an effective management of tourist use of the area, (b) train local personnel in research techniques, (c) train local personnel in the management of a specially protected area for cetaceans, and (d) provide a practical contribution to a test case to verify and perfect the economic viability of eco-tourist activities based on the respectful use of marine biodiversity.

4. Methods

Activities were conducted by us along four main directions: research, training, monitoring, and support to management through recommendations and awareness building.

4.1. Research activities

A team was established consisting of a senior investigator and a number of junior researchers and volunteer field assistants (Table 1), which were later joined by the two trainees, Beshoy Morise and Ahmed Shawky. The field work started on 15 October 2005 and ended on 30 September 2006 (Table 2). At the beginning of the project the camp was set at a tourist facility in Tondoba, in the vicinity of the embarkation point to travel to Samadai. In a second stage the camp was moved to an apartment in Port Ghalib, courtesy of the Diving Ocean company, waiting for construction work at the housing and office (research

and training) facilities in Marsa Alam to be completed. The team was finally allowed to move in the permanent facilities in Marsa Alam at the end of calendar year 2005.

Name	Role	Profession	Activity of visitors	Nationality
Giuseppe Notarbartolo di Sciara	Principal Investigator	Marine Biologist		Italy
Marina Costa	Field coordinator	Biologist		Italy
Géraldine de Montpellier	Research assistant	Naturalist		Belgium
Amina Cesario	Research assistant	Biologist		Italy
Maddalena Fumagalli	Research assistant	Biologist		Italy
Jean de Cambry	Visitor	Engineer	Logistical assistance	Belgium
Ameer Abdulla	Visiting scientist	Biologist	IUCN - Protected areas science & management	Egypt
Giovanna Pesante	Visiting scientist	Biologist	Dolphin behaviour	Italy
Alessia Tilesi	Visiting scientist	Veterinary	Veterinary	Italy
Simona Bernasconi	Visiting scientist	Naturalist	Photo-identification	Italy

Table 1. International members of the team. Two trainees, Beshoy Morise and Ahmed Shawky, were the Egyptian members.

The team's work was supported through provision of land and sea transportation. Land transportation was with various vehicles made available by the Abu Salama Society or, when these were unavailable, by courtesy of the Red Sea Protectorates or taxi. Sea transportation to travel to and from Samadai and collect data was through the project's own vessel, a 7,2 m long, Egyptian made RIB (rigid-hull inflatable boat), powered by a single outboard Yamaha 140 hp engine, provided by the Abu Salama Society. Given that this vessel was only made available at a later stage of the project, during the initial phase the team was allowed to use a vessel kindly provided by the Red Sea Protectorates.

Year	Month	days	Field activities (days)		
			Samadai	dugong habitat	other locations
2005	Oct	17	9	0	1
	Nov	30	13	7	0
	Dec	18	6	5	0
2006	Jan	28	9	0	1
	Feb	28	12	3	0
	Mar	18	7	2	0
	Apr	14	5	4	0
	May	19	10	1	0
	Jun	21	8	1	0
	Jul	31	11	3	3
	Aug	23	7	0	7
	Sep	30	11	0	0
TOT	12	277	108	26	12

Table 2. Presence of the team in Egypt between 15 Oct. 2005 and 30 Sep. 2006.

Of the 277 days spent in total in Egypt by the team, 146 (53%) were spent in the field collecting data on Red Sea marine mammals and their habitats. The remainder 131 days were dedicated to office work, training, workshops, and other non-field work-related activities. Of all the time spent in the field, 108 days (74%) were spent in Samadai, 26 (18%) investigating dugong habitat, and 12 (8%) searching for dolphins in other locations (Table 2).

Observations in Samadai were performed mostly from the dedicated RIB. When the dedicated vessel was unavailable for repair or maintenance reasons, instead of cancelling the field activity the team (always including at least one of the trainees) travelled to Samadai as a guest aboard one of the tourist vessels travelling daily to the reef. These circumstances presented an opportunity for interacting with the tourists and supporting awareness actions.

Photo-id was taken both from the surface and underwater, although underwater pictures made the vast majority of the total taken. The camera was a digital Canon 350D with 16-35 mm f.2,8 zoom lens set at 20 mm (underwater), whereas from the surface a 70-200 mm f.2,8 lens was used. For underwater pictures the camera was contained in a Plastmeccanica waterproof housing. Every day two underwater photo-id sessions were performed, lasting between 1 and 2 hours each: the first early in the morning, and the second in the early afternoon. The presence of underwater researchers was used not only for photo-id, but also to count the animals and to assess group composition (adults, juveniles, calves, newborns). Criteria for assigning individuals to these age categories were adapted from Norris et al. 1994. Finally, the swimming researcher also collected dolphins' vomits with a 400 μ m mesh plankton net to investigate the dolphins' feeding habits. 82 samples of dolphin vomits were collected during the study, from 22 April to 27 Sept. 2006.

Behavioural observations were performed from the vessel anchored in a fixed mooring position in the centre of Zone A. During behavioural observation sessions, fixes of the dolphin school (taking the dolphins in the front of the school as the fix reference point) were taken every 2.5 min (timed with a digital clock) using a bearing compass and an eye estimate of the distance from the boat. Accuracy of eye estimates was judged satisfactory given that the maximum distance of the lagoon coral border from the boat never exceeded 200 m. Training sessions to improve eye estimates of distances within the reef were done routinely, and feedback on the quality of the estimates was provided through GPS readings of known reference points within the lagoon. During the behavioural observation sessions also the number and type of aerial behaviours was recorded within each 2.5 min period.

Dugong habitat. Activities related to dugong conservation were performed in the days the team could not travel to Samadai to allow for the boat crew and the trainees to rest. Most of the dugong-related activities centred on describing and mapping suitable habitat for the species along the southern Egyptian coast from Port Ghalib to Marsa Nakari (Table 7 and Fig. 9). The mapping task could not be completed because of land transportation limitations imposed on team members by the Abu Salama Society Project Manager during the last third of the project.

Literature search. Among the activities conducted at the beginning of the study, a bibliographical search was performed to collect all the pre-existing information about (a) cetaceans in the Red Sea and spinner dolphins in particular, and (b) the specific situation in Samadai. Copies of all the bibliographical material thus collected was left at the trainees' disposal, thus supporting the creation *in situ* of a specialised library on the subjects of interest to the project. Whereas collecting literature on the first topic did not present difficulties through conventional bibliographical means (as summarised in Notarbartolo di Sciara et al. 2007), collecting information on (b) proved to be more problematic, as we received limited assistance from our local contacts. In particular, we were unable to obtain the following:¹

- EEPP/USAID Deliverable No. 13 titled "Economics and sustainable use of Samadai reef 'Dolphin House', Marsa Alam - Red Sea - Egypt."
- "Sustainable use of Samadai Dolphins, South Marsa Alam, Red Sea, Egypt" by professor M. Fouda.

In addition, we were able to locate the following title on the Internet, however no information was provided on the web concerning year and site of publication, nor could we obtain such information from our Egyptian colleagues, so we must still consider this an incomplete citation:

- "Economics and sustainable use of Samadai reef 'Dolphin House', Marsa Alam - Red Sea - Egypt", by M. Sarhan, H. Hanafy and M. Fouda.

¹ Our attention was brought on these titles by an assessment on a previous version of this report, made by the Abu Salama Society.

4.2. Training

A total of two trainees, Beshoy Morise and Ahmed Shawky, both Red Sea Rangers, were assigned to the programme. The trainees were not allowed to begin participating to the programme before 14 Jan. 2006. Training, both theoretical and practical, covered a number of topics which are described under Section 5.2 of this report. To further consolidate training, both trainees were awarded a scholarship from the "*Istituto Italiano di Cultura*" in Cairo through the good offices of the Italian Cooperation Office in Cairo, to attend courses provided by the University of Milano – Bicocca (Academic Year 2007) for obtaining a master in scientific communication on the marine environment (Mediterranean and Tropics).

Although we were available to organise and perform the training of Field Guides (specifically to lead snorkelling tours in Samadai inside the B Zone), and although we solicited the need for such initiative, we were not offered the opportunity for such task. We were also available to participate to the final evaluation test of the trainees, however we were not requested to do so.

4.3. Monitoring

The presence of the project team in Egypt presented an opportunity for an assessment of the monitoring activities, which had been performed in large part by the trainees B. Morise and A. Shawky in their capacity of Red Sea Rangers, and provision on advice on how best to continue such activities in the future.

4.4. Support to management

During the project the team members participated in, and helped organise, a number of events where the different stakeholders of the "Samadai" case (i.e., government representatives, tourist operators, rangers, NGOs and the public at large) were brought together to learn about the project results, discuss implications for management participate in the planning of future activities.

At the end of the project the team was also in condition of reassessing the management criteria that had led to the formulation of the provisional management plan in late 2003, on the bases of the recently acquired knowledge on spinner dolphins' use of Samadai and the dynamics of the tourists' presence in the area (see Section 6 of this report).

5. Results

This section of the report briefly describes the results of the activities of the project, with respect to research, training, and support to management.

5.1. Research activities

The results of this study in part confirm what was known about spinner dolphins in other parts of the world, in part bring interesting new contributions to our knowledge of cetaceans in the Red Sea, and spinner dolphins in particular. No ecological information of this sort and detail had ever been provided before for any cetacean species from the Red Sea.

The immediate scientific goal of the project, which was to provide elements of knowledge essential for the formulation and implementation of meaningful conservation measures, was fully attained, and has generated recommendations for the improvement of the management regime in Samadai (see Section 6 of this report). A vast amount of data was collected, which needs to be carefully examined, prepared, analysed and summarised in the published international scientific literature, and cannot obviously be the subject of this report. We anticipate that the following papers may be generated by the research activities here described:

- Ecology of spinner dolphins, *Stenella longirostris*, off the southern coast of Egypt: site fidelity, habitat use, seasonality, feeding and breeding habits.
- Behavioural and social ecology of spinner dolphins, *Stenella longirostris*, frequenting Samadai Reef, southern Egypt: patterns of association, sex segregation, group fidelity, seasonal and daily behavioural patterns.
- Management of tourist use of a tropical reef frequented by spinner dolphins: the case of Samadai Reef, southern Egypt.
- Atlas of seagrass meadows important for dugong foraging along the coasts of southern Egypt.

As verbally agreed between one of us (GNS) and the President of the Abu Salama Society, Mr. Ayman Afifi, during an early phase of the project², we reaffirm our availability to assist

² This "gentleman agreement" was made during the occasion of a meeting of the Convention of Biological Diversity in Montecatini, Italy, in June 2005, in the presence of Dr. M. Fouda.

our Egyptian colleagues in the publication of a number of scientific papers (e.g., those listed above), describing in appropriate detail the project's scientific results.

During the project a total of 120 sightings of marine mammals were made (Table 3).

Cetaceans. Of all marine mammals sighted, 5 were dugongs and 115 cetaceans. The detail of cetacean sightings is given in Table 4.

Species observed		N. of sightings
<i>Stenella longirostris</i>	Spinner dolphin	94
<i>Stenella attenuata</i>	Pantropical spotted dolphin	3
<i>Tursiops truncatus</i>	Common bottlenose dolphin	4
<i>Tursiops aduncus</i>	Indo-Pacific bottlenose dolphin	8
<i>Tursiops</i> sp.	Unidentified bottlenose dolphin	6
<i>Dugong dugon</i>	Dugong	5
Total		120

Table 3. Marine mammal species sighted during the project.

Of all the cetaceans sighted, 83 were inside Samadai, 13 in other reefs (five of which in Satayah Reef, further south along the Egyptian coast) and 19 in the open sea. Spinner dolphins were sighted mainly in Samadai (81 sightings), six times in the open sea, two of which associated with other species (*T. truncatus* and *S. attenuata*), five times in Satayah, and twice in other reefs.

Year	Month	Field days	Days with dolphins	time spent with dolphins	Sightings					Photos
					SI	Sa	Ta	Tt	T sp.	
2005	Oct	9	6	20h 19min	6		1			1,001
	Nov	13	12	63h 22min	12					2,320
	Dec	6	6	33h 19min	5	1				532
2006	Jan	9	8	41h 26min	9			1	1	1,068
	Feb	12	8	25h 00min	7	1		3		858
	Mar	7	5	17h 49min	3	1		1	1	997
	Apr	5	4	43h 44min	4		2			1,268
	May	10	8	58h 25min	8					1,607
	Jun	8	7	49h 16min	7		1			1,782
	Jul	11	9	85h 47min	14			3		4,407
	Aug	7	6	35h 33min	11				3	668
Sep	11	9	61h 22min	8				1	2,166	
Tot		108	88	535h 22min	94	3	4	8	6	18,674

Table 4. Summary of cetacean sightings. SI, *Stenella longirostris*; Sa, *S. attenuata*; Ta, *Tursiops aduncus*; Tt, *T. truncatus*; T sp, unidentified *Tursiops*.

Presence of spinner dolphins in Samadai. The monthly means of the number of dolphins seen in the reef every day was plotted in Fig. 1. A marked seasonality of the presence of the dolphins in Samadai is evident, in general agreement with the results from the monitoring data collected by the Red Sea rangers in previous years, although some differences are evident (thus indicating the existence of marked departures from the general pattern). The minimum was observed in February, and two high peaks of presence occurred in the warmer season (April and June).

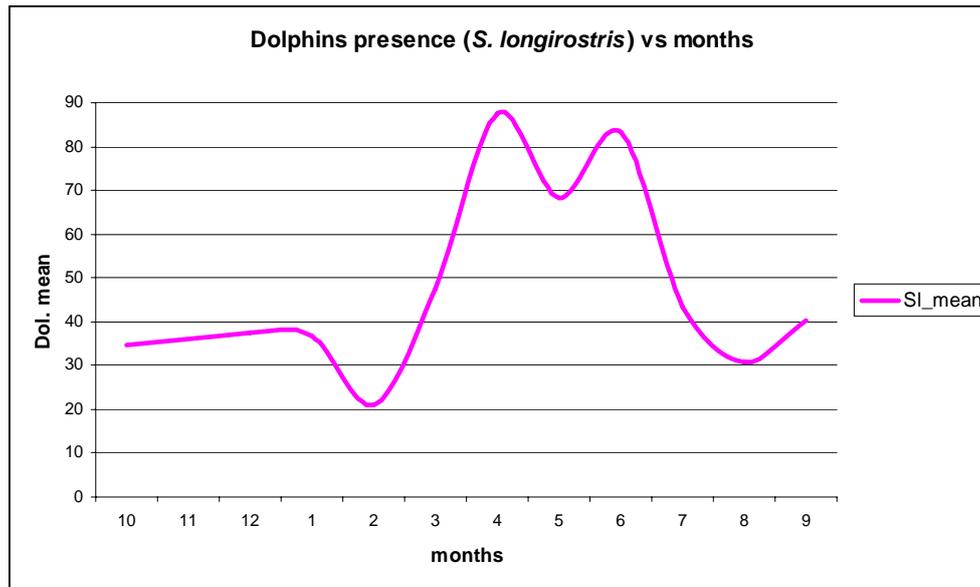


Fig. 1. Monthly means of the daily presence of spinner dolphins in Samadai, Oct. 2005 - Sep. 2006.

Photo-identification of spinner dolphins in Samadai. Results of the photo-identification effort are summarised in Table 5, and graphically shown in Fig. 2 (rate of discovery). During this initial phase of the analysis only the clearly marked individuals (labelled as D1) were included in the analysis, although we don't expect major differences from these results to occur once the less marked individual categories (D2 and D3) will be included. A small number of dolphins appeared to be frequenting Samadai throughout our study period (Table 5). Others were seen in the area for much shorter durations, perhaps indicating the existence of a much larger population in the region that makes use of Samadai only on an occasional basis. This hypothesis is corroborated by the shape of the discovery curve (Fig. 2), which indicates the continued inflow of new animals from March through June (which are also the months of peak presence), and only levels off from July to the end of the study, with only the "resident" animals present. It is worth noting that there were no photo-id

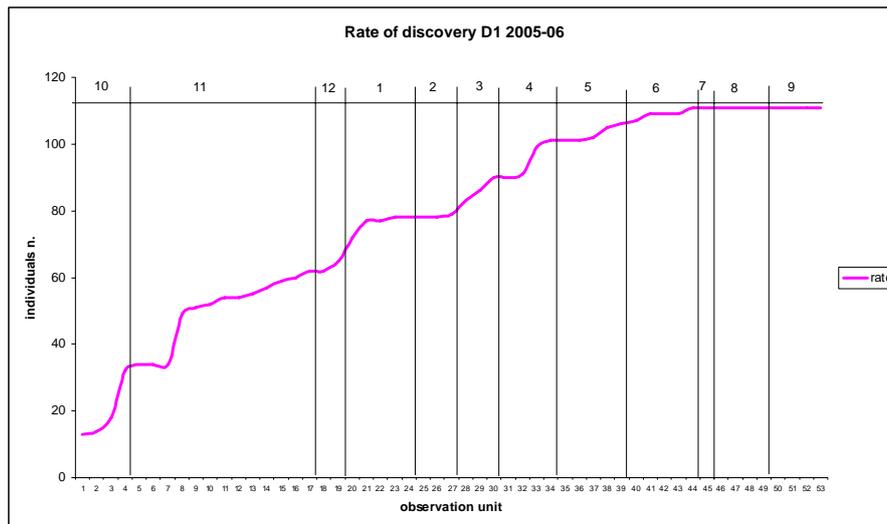


Fig. 2. Rate of discovery of newly identified spinner dolphins in Samadai.

matches between the Samadai and the Satayah catalogues. If confirmed by further data (unfortunately the Satayah catalogue size is very small due to the short time we were allowed to spend in that location), this would indicate limited flow of dolphins along the coast, and from one reef to the other, possibly with most of the exchanges between the reefs and the wider population occurring along the inshore – offshore directrix. As is well-known, photo-identification research programmes are used to their full potential only in longitudinal studies, typically lasting five years or more (Hammond 1986, Würsig and Jefferson 1990), because it is only on that time scale that repeated sightings of recognisable individuals can be used to generate population estimates through mark-recapture techniques, long-lasting association among individuals in the group, reproductive rates, other life history parameters, and site fidelity traits. In our case we were hugely advantaged as compared to more “traditional” field conditions because: (a) we had extraordinary opportunity of repeated encounters with the dolphins due to the peculiarity of the study conditions (i.e., the same group of dolphins being stationary in a very limited space for hours), and (b) we were able to photograph the animals at very close quarters and from underwater, allowing the “capture” of many parts of their bodies in addition to the dorsal fin, and ultimately greatly increasing the effectiveness of the photographic capture effort. All these advantages notwithstanding, simply the short duration of the time available (11 months in the field) is preventing us from comparing photo-id data across years to derive the desired information. However, these data now exist and are available for comparisons with new photo-id data that might be collected in the future. This eventuality is highly recommended, because it will be only at that point that the benefits of the current work will be reaped to their full potential.

Behaviour of spinner dolphins in Samadai. As revealed by the Red Sea rangers' monitoring data collected in Samadai during the previous years, dolphins enter the reef early in the morning (often around daybreak) and exit to go foraging during the afternoon, before sunset. We presume that the dolphins spend the whole of the night in open waters, although of course there is no observation data to corroborate this speculation. While in the reef during daylight, both the use of space by the dolphins and their levels of activity changed with time of day. Differences in the use of the reef with time of day and with season by the dolphins is shown in Fig. 3 and 4. During the morning hours dolphins are tightly clustered in the inner portion of the reef (3A), whereas in the afternoon there are more inclined to venture outside (3B). There is a marked difference in the dolphins' tendency to cluster inside the reef in the morning, between summer (4A) and winter (4B), with a much tighter swimming behaviour in the colder season.

Differences during time of day in the use of the reef coincide with dramatic differences in the dolphins' behaviour (Fig. 5). During the early hours the dolphins exhibited a resting behaviour, swimming back and forth within the innermost part of the reef at a slow speed, with regular surfacings, and with very limited aerial behaviours. As day time went by the dolphins progressively increased their activity levels up to 7 – 8 times, as they transitioned from a resting behaviour to one which was increasingly devoted to social interactions, play, aggressive and courtship behaviours. This trend is evident year-round, although in Autumn and Winter it is more evident than in Spring and Summer.

A first glance on spinner dolphins' feeding habits. This is the first time that any information on Red Sea cetacean feeding ecology is being investigated. The collection and analysis of cephalopod and fish remains in the dolphins' vomits (currently in progress) sheds light on the dolphins' feeding ecology; only preliminary information is available at this stage (Table 6).

The most frequent food item (96% of the samples) included squid beaks, all of them of a very small size (Fig. 6). The beaks have been tentatively identified as belonging to small mesopelagic enoploteuthid squid, possibly *Abralia* sp. (pending submission to word specialists of good quality microphotographs of the beaks).

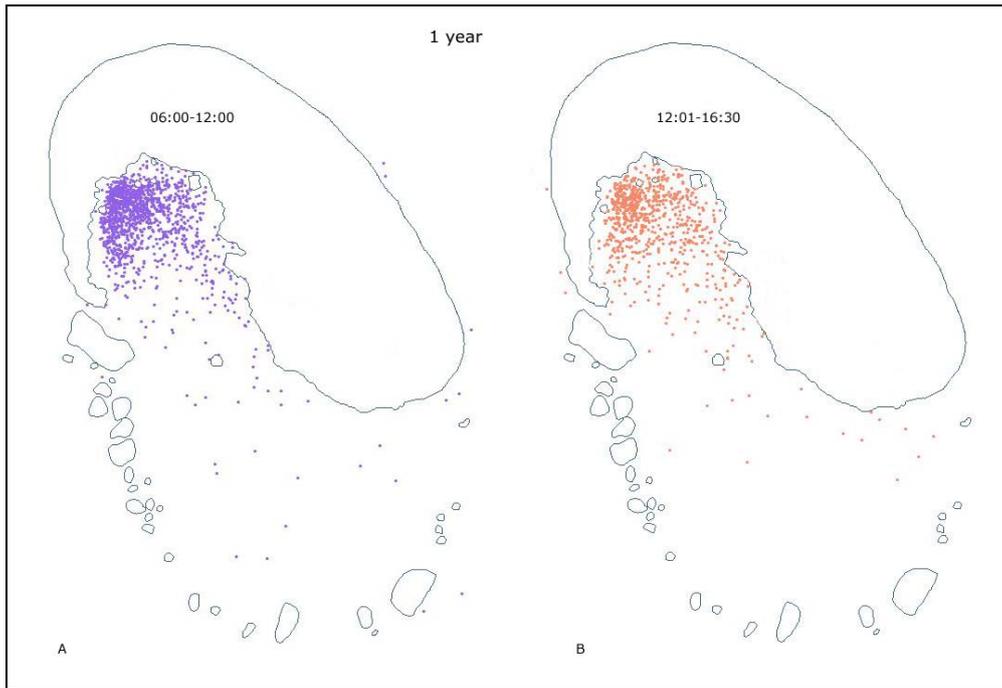


Fig. 3. Spinner dolphin positions recorded in Samadai (all year):
A: morning hours; B: afternoon hours.

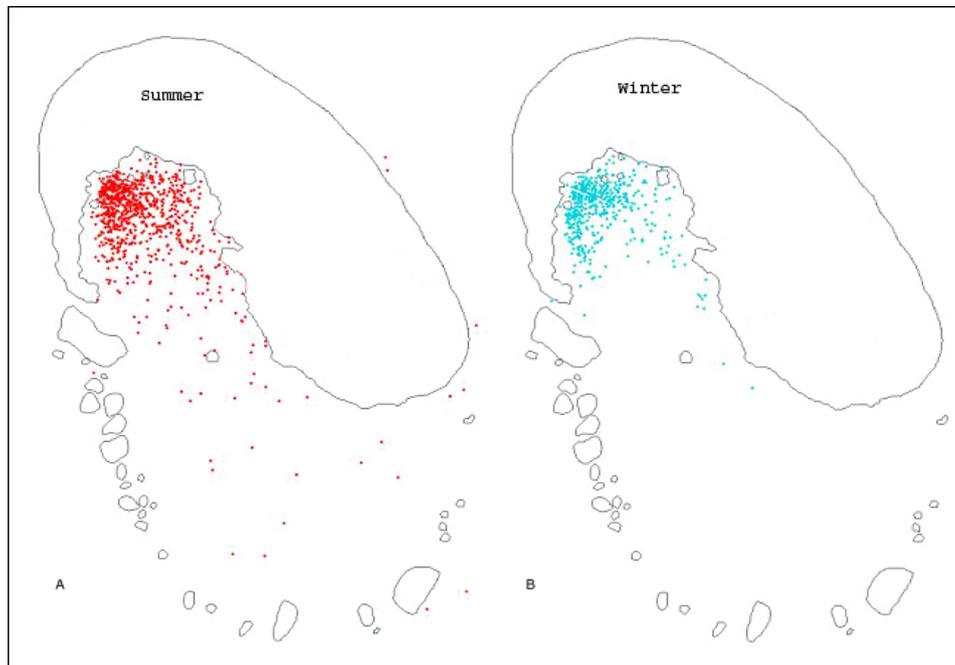


Fig. 4. Dolphin positions recorded in Samadai (mornings):
A: summer months; B: winter months.

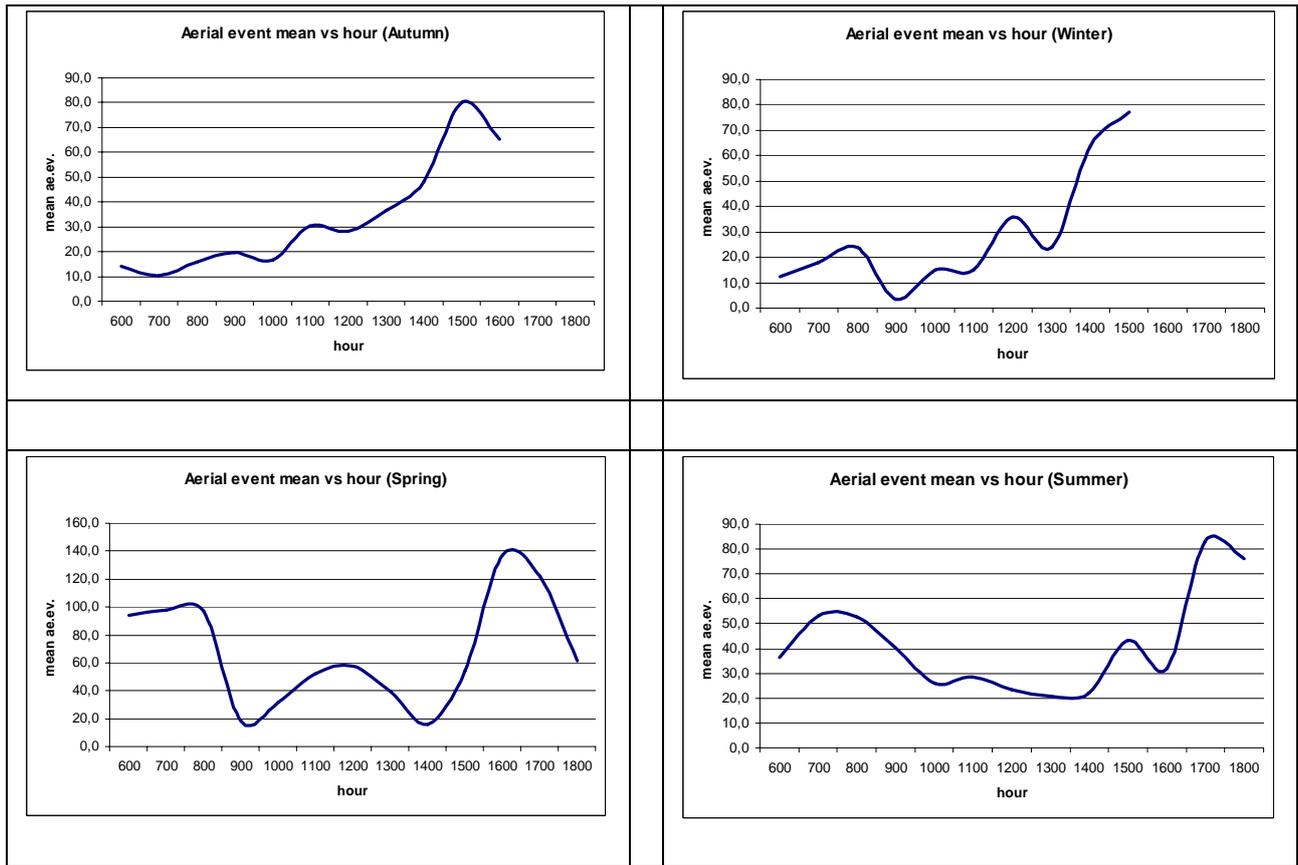


Fig. 5. Mean hourly number of aerial events recorded in Samadai in different times of year.

In addition to squid remains, there was also a small number of fish bones in the samples (18%). Unfortunately, very little information exists on the mesopelagic cephalopod fauna in the Red Sea.



Fig. 6. Beak of a small mesopelagic squid, possibly enoploteuthid, found in the vomit of a spinner dolphin in Samadai.

Month	Days	Samples
April	2	6
May	5	11
June	4	12
July	9	27
August	3	8
September	5	18
Total	27	82

Table 6. Stomach remains collected in Samadai from April to September 2006.

Breeding of spinner dolphins in Samadai. The observations revealed a very marked calving season in Samadai (Fig. 7). Newborn animals, very distinctive because of their tiny size and evident foetal folds (Fig. 8), started to appear in July and persisted through early September. A few days after being born, animals started to be classified as calves until approximately Nov. – Dec., thereby progressively decreasing as a greater number of calves started to qualify as juveniles. We conclude that in Samadai there is a very narrow and well-defined dolphin birth season, from July to September.

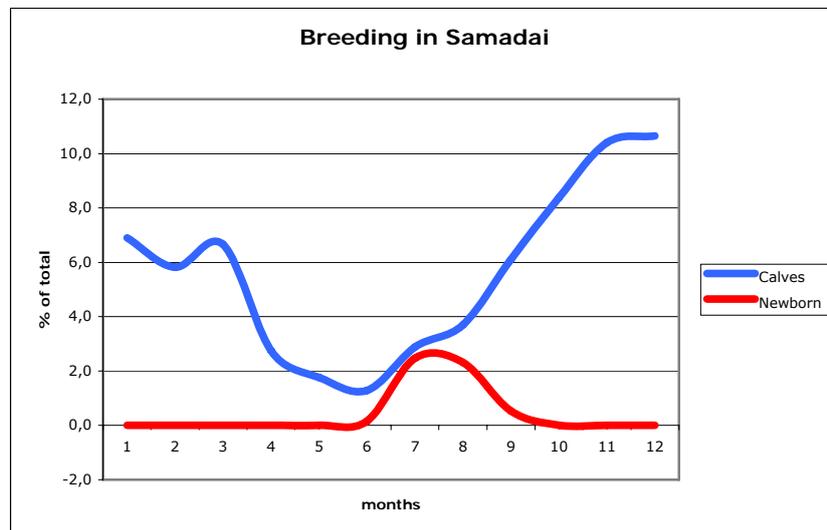


Fig. 7. Monthly variation (in % of total dolphins seen) of the presence of calves (blue) and newborns (red) in Samadai. Study period is Oct. 2005 to Sept. 2006 (Jan. shown as n. 1 in the abscissa to better represent seasonality).



Fig. 8. Newborn spinner dolphin photographed in July 2006 in Samadai.

Dugong. The work consisted in the description and mapping of suitable habitat for the species along the southern Egyptian coast from Port Ghalib to Marsa Nakari (Table 7 and Fig. 9).

Date	Location	Mapping		
		<i>coast</i>	<i>reef</i>	<i>seagrass</i>
13/11/2005	Marsa Abu Dabab	complete	no	no
17/11/2005	Marsa Mubarak	complete	no	no
23/11/2005	Marsa Shouna	complete	no	no
25/11/2005	Zar Om Selmen	no	no	no
26/11/2005	Marsa El Gabel El Rosas	complete	no	no
27/11/2005	Marsa Eglā	complete	no	no
30/11/2005	Marsa Assalaia	complete	complete	complete
02/12/2005	Marsa Samadai	complete	complete	complete
03/12/2005	Marsa Nakari	complete	complete	complete
04/12/2005	Marsa Shagara	complete	complete	no
06/12/2005	Marsa Murain	complete	no	no
08/12/2005	Marsa Sheikh Malek	no	no	no
22/02/2006	Marsa Abu Dabab	-	-	incomplete
23/02/2006	Marsa Abu Dabab	-	-	incomplete
24/02/2006	Marsa Shouna	-	no	no
10/03/2006	Marsa Abu Dabab	no	no	no
16/03/2006	Marsa Abu Dabab	no	no	no

Table 7. Dugong habitat mapping effort.

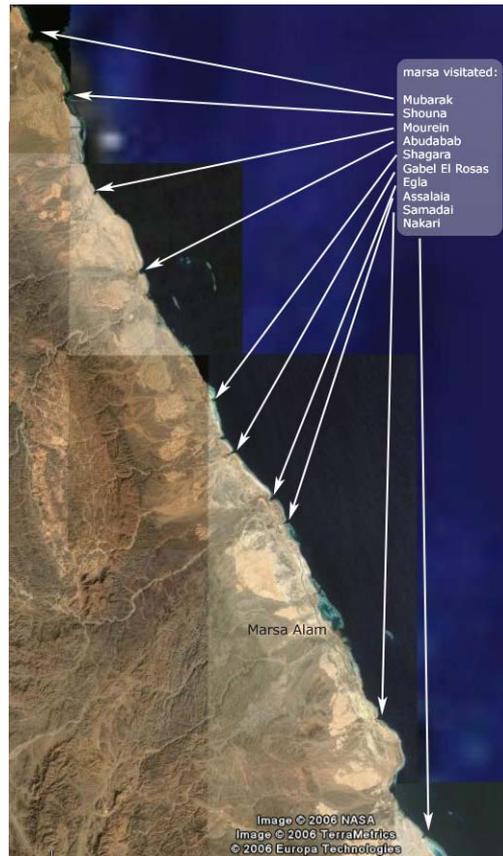


Fig. 9. Locations of inspected bays along the coast in the study area.

Mapping of seagrass meadows of potential interest for dugong feeding was performed by means of towing a GPS by swimmers following the contour of the meadows and identifying seagrass by species. A example of mapping is depicted on Fig. 10. During the mapping effort, dugong individuals were occasionally encountered. A summary of dugong encounters is given in Table 8. The adult individual repeatedly sighted in Marsa Abu Dabab is a well known male which spends most of his time in that bay. Two sightings of younger animals (sex unknown) were also made, one in Marsa Shouna and the other in Marsa Abu Dabab. It was unclear whether the juvenile sightings pertained to one or two individuals.

Date	Location	sex	age
23/11/2005	Marsa Shouna	?	juvenile
22/02/2006	Marsa Abu Dabab	male	adult
10/03/2006	Marsa Abu Dabab	?	juvenile
2/05/2006	Marsa Abu Dabab	male	adult
17/07/2006	Marsa Abu Dabab	male	adult

Table 8. Summary of dugong sightings.



Fig. 10. Example of seagrass mapping, Marsa Assalaia.

The data thus collected (integrated by information provided by local diving centres such as Diving Ocean and Orca) on exposure and size of the marsas and the presence, even at shallow depths (8-12 m), of marine sea grass suitable for the species' feeding ecology allowed a preliminary assessment of the suitability of the visited marsas as dugong foraging sites. Thus we suggest that marsas Assalaia, Abu Dabab, Mubarak, Sheikh Malek and Shouna all display the characteristics most favourable to host this marine mammal, whereas other marsas such as El Gabel El Rosas, Eglá, Samadai, Nakari, Shagara and Murain may not be so suitable. Our effort, which was concentrated in days when we could not go to Samadai mostly due to logistical reasons, indicates that rapid and low-cost assessments of this type can provide in a timely fashion results that are very relevant to the conservation of local marine biodiversity and endangered species, through the orientation of management measures towards sites having a particular biodiversity and faunal value.

5.2. Training

Training occurred in two separate moments: in the field and in the laboratory. Field training included both research and management aspects. Trainees have participated in all field activities, without exception. A typical day in the field involved leaving the shore in Tondoba early in the morning with a crew of four (boat captain excluded), and travelling to Samadai. Once inside the reef the boat was moored in the fixed observation point within the A Zone. In the absence of the dolphins, trainees and researchers took turns on the lookout, in groups of two, for 15 minutes, searching for the appearance of animals with binoculars and naked eye outside and inside the reef. With dolphins present, behavioural and swimming data were collected, by trainees and researchers alike, every 2.5 min in shifts of 1 hour. With dolphins present in the reef, twice a day researchers and trainees entered the water to collect photographs for photo-id purposes and vomited stomach contents for dolphin feeding habits analyses. Two persons entered the water every time, for approximately 1.5 hours on average. On the next shift, the other two persons entered the water, thus allowing training of both trainees. While on site, there were continuous occasions for watching and monitoring human (tourist) behaviour and presence as well, and this presented very good opportunities for discussing management aspects and quiz the trainees on how would they solve the management problems that presented themselves from time to time. Observation time was programmed ideally to last from dawn to dusk, although in many instances observations had to be interrupted earlier than sunset for various reasons. Mean daily observation time lasted slightly less than seven hours.

Laboratory time was used to debrief on field activities to make progress in research activities and at the same time to continue with the training process. Training time went from 9.30-10.00 (depending on the trainees' other commitments) to 18.30, with a lunch break from 13.30 to 15.00, and a daily average of about six hours per day. During laboratory time all the aspects listed under "Evaluation criteria" in the Training Handbook were dealt with. In addition, the trainees were requested to participate in the preparation, cleaning and maintenance of the research equipment (GPS, camera, underwater camera housing, etc.).

During the laboratory work the trainees were also given regular assignments, as described in a number of different protocols (prepared by the trainees themselves under the researchers' guidance), which were attached to the "Training handbook", provided by us to the Abu Salama Society under separate cover.

A further assignment involved the creation by the trainees of two databases, one on the photo-id catalogues and the other containing the activity sheets. Furthermore, exercises were assigned using photo ID-specific pattern-recognition matching software (developed by the EU-funded Europhlukes project), and the "Statistica" software package to perform simple statistical analyses on selected data sets. Finally, reading material on MPA theory and practice was provided, to provide stimulus for further discussion, debate, development and personal improvement.

The trainees were be expected to demonstrate proficiency in the following tasks:

- prepare, clean, and maintain the research equipment (GPS, camera, underwater camera housing);
- download from camera to computer, choose, rename, and clean photoID photographs;
- download tracking-data;
- collect points and/or tracks with the GPS;
- download points and/or tracks using OZI-explorer;
- plot points and/or tracks on GIS-Arcview;
- organise behavioural data:
- insert data from field forms into the computer (in database or excel sheets);
- fill in the daily form database;
- perform preliminary analyses on photo data;
- pre-matching;
- matching;
- perform matching using software (from Europhlukes);
- create a catalogue of pictures;
- export photo-data from ACDSee;
- insert the photo-data in a database (Excel);
- research and extract relevant information from the available literature.

5.3. Support to management

Results from research and monitoring activities have confirmed that the current management plan is adequate. A series of management recommendations, which were in part presented at the November 2006 final workshop, are included in this document in Section 6.

Our team has actively participated in the following events: a first workshop held in Tondoba on 25 October 2005, a second, mid-term workshop which was organised in the Brayka Hotel on 15 March 2006, and a third, final workshop held in Hurghada on 23 November 2006. The mid-term workshop was preceded by a preparatory work culminating in a document, "Samadai Implementation Strategy", presented for discussion at a working meeting held in Hurghada in Jan. 2006. Preparation also included the design of a questionnaire, "Pre-workshop questionnaire", which was handed to the Abu Salama Society and used to collect information from stakeholders. Both documents are attached as appendices to this document.

6. Management Recommendations to the Red Sea Protectorates

6.1. General considerations

At the end of almost one year (Oct. 2005 to Sept. 2006) of intensive research conducted in Samadai by a dedicated group of cetacean ecologists, the information thus collected combined with observations performed by Red Sea Rangers from Jan. 2004 to Jan. 2006, allows the formulation of management recommendations which hopefully will improve the conservation status of spinner dolphins in Samadai while, at the same time, allowing regulated but valuable fruition of the site by the tourists visiting the area.

We therefore urge the Abu Salama Society to bring our conclusions relevant to management to the attention of the relevant authorities at its earliest convenience.

Since the beginning of our involvement in the issues related to the management of Samadai and its dolphins, we have always based our recommendations on a **sound precautionary approach**. Now, while we insist that precaution must always be at the base of any management consideration, we are happy to advise that some of the measures that were envisaged by us in 2003 (Notarbartolo di Sciara 2003) may be relaxed to a very limited extent, in our opinion without prejudice to the dolphins' welfare, but with significant improvement for the tourist users of Samadai.

Furthermore, as a general remark we would also like to recommend that a **participatory approach** in the managing of the Samadai issues be continued by the governing authorities. Stakeholder involvement is of paramount importance, and in spite of all the meritorious efforts made with the best of intentions by the authorities, of which we are witnesses, results are not satisfactory as yet. Many of the tourist operators frequenting Samadai still appear to be unconvinced of the need for management, of the goodness of the management results achieved so far, and on their own advantage and potential for tourist activities represented by the continuation of the presence in Samadai of a healthy dolphin population. We therefore strongly recommend that communication and awareness support to governmental action be sought by the authorities from professionals having a sound experience in the field and an established track of past achievements.

6.2. Samadai visiting regulations

- (a) The general policy should be to encourage visits in Zone B as late as possible during the day. To this end, we suggest extending allowed visiting time in Samadai for everybody (divers and snorkelers alike), from the current restricted schedule, to be extended to 16.00, because the current prohibition of visiting time as of the early afternoon makes no ecological sense. In fact during the afternoon dolphins are more active, move freely among zones and in and out of the reef itself, become more available to interact with visitors, and ultimately less prone to being disturbed. Visitors should be informed that the likelihood of swimming with dolphins in Zones B and C increases with time of day.
- (b) The current ceiling to the maximum number of daily swimmers should be maintained not to exceed 200 (with the divers allowed to swim in Zone B between dives). An effort should be made to distribute visits as much as possible during the day, so that the simultaneous presence of swimmers in Zone B is minimised.
- (c) The current obligation for the tourists to wear a life jacket may be very harsh on them, depending on the type of life jacket used. Inflatable life jackets can be worn deflated, and thus do not cause discomfort during swimming. By contrast, other types (those normally used for safety on boats), containing pieces of rigid floating material, cannot be deflated and are very cumbersome and uncomfortable, and may transform what is intended as a pleasant experience into a nightmarish adventure. We recommend that (a) the use of inflatable life jackets be encouraged, and (b) swimmers wearing a wetsuit (but with no weight belt) be allowed to visit Zone B without a life jacket, given that wetsuits have a strong natural buoyancy.
- (d) Behaviour and activities of the boats need stricter control. In our experience too often the large boats are a potential source of disturbance for the dolphins (unnecessary and prolonged use of engines at high revs, blowing the horn, high-volume music), whereas small boats with outboard engines zoom at full speed without a clear necessity even in close proximity to the dolphins when these are not in Zone A. A code of conduct for the boat captains and crew should be prepared, distributed and enforced.

6.3. Monitoring

Monitoring of Samadai should continue in the future on an indefinite basis, performed by the rangers in charge of control of the visits. If the management plan is modified (based on our

recommendations or any other consideration), only monitoring conducted in a manner which is consistent with the past will allow evaluation and detection of eventual effects of management on both dolphins and visitors.

On the other hand, monitoring can now be significantly simplified in terms of the quantity of the data collected, with respect to the routine adopted between 2004 and 2006, given that the baseline information has been collected, and could be limited to the daily collection of the following elements:

- Time of entrance in and departure from the reef by the dolphins, making sure to note, at the end of the daily observation, if the dolphins are still in the reef or not;
- Dolphin group size (at least three times per day: beginning, mid-day, and end);
- Presence/absence of calves and number thereof;
- Time of entrance in and departure from the reef by visitors;
- Number of boats and visitors (total);
- Time of entrance in and departure from Zone B by swimmers;
- Wind speed, three times per day (e.g., when noting the number of dolphins present);
- Unusual events.

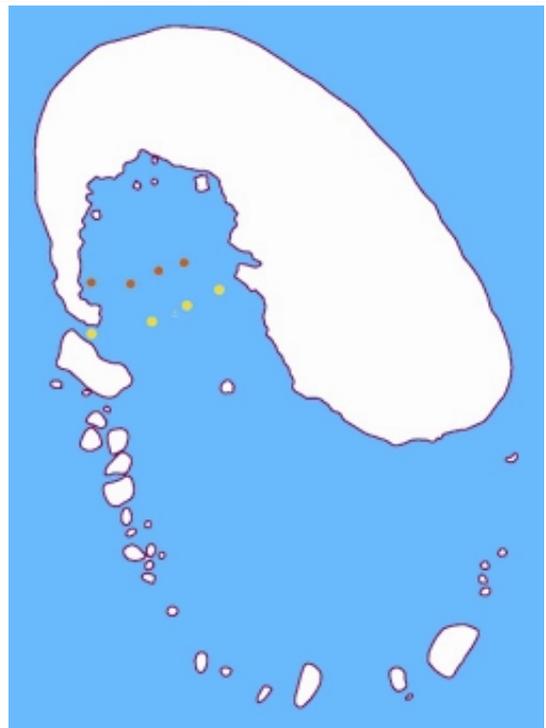
6.4. Control

We have learned that control by the Rangers in Samadai is essential at all times. During the days in which a Ranger is absent from the reef, the presence of swimmers in Zone A becomes a certainty. Given the vulnerability of the dolphins to disturbance, this is a serious problem. We note that several boat and dive operators have not absorbed the conviction that protection is needed (see "communication" below), and that they will try to seize the opportunity of getting close to the dolphins at all costs whenever given a chance. In particular, we recommend that control be kept with a special attention during the period between June and September, when calving occurs inside the lagoon of Samadai.

6.5. Zoning

We believe that the zoning can be improved to the benefit of swimmers, and at no detriment to the dolphins (Fig. 11). We have observed that when dolphins rest within Zone A, they

The current zoning of Samadai. The yellow dots represent the locations of the buoys marking the limit between Zone C (south portion of the reef) and Zone B. The red dots represent the locations of the buoys separating Zone B from Zone A (northern part of the reef). Zone A is the part of the reef used by the dolphins to rest, and is to be considered "critical habitat" of the dolphins in Samadai. This zoning configuration is very good for the dolphins, however it prevents swimmers from frequenting a portion of the reef (along the eastern portion of the inner lagoon). This would be important for them for safety and comfort considerations, because it is shallow and more protected when a combination of strong northerly winds and high tide causes waves to penetrate the lagoon.



Zoning modification proposal. We believe that Zone B could be enlarged in its eastern end without detriment to the dolphins, because, based on our observations, the area of Zone A as it is currently laid out (map 1 above) is more than adequate for their needs. The A-B line could be moved from its current location to connect the tip of the western "hook" of the reef to a location along the eastern shore of the inner lagoon which is further north than its current position. The proposed modification would not significantly decrease the total surface of Zone A, would still ensure that the dolphins' critical habitat is protected, and would allow access by swimmers to a large portion of the eastern shore of the inner lagoon, where they can more safely wait for the dolphins to appear, and swim more comfortably when the surface of the lagoon is rough due to strong winds and high tide.

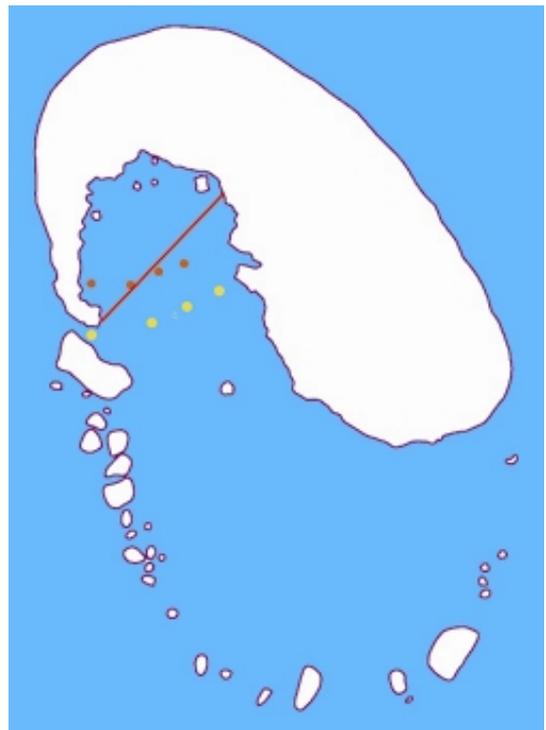


Fig. 11. Recommendations concerning zoning of Samadai.

always hold a position in the northern side of the lagoon, but rarely venture in the SE corner of Zone A. Thus the SE corner could be merged into Zone B (see Fig. 11) by shifting the A-B

line, with a negligible modification of the geometry of the Zone itself. A suggested counter clockwise rotation of the A-B line would also cause the SW corner of the Zone A to become enlarged southwards, which will compensate the area reduction to the East. The small SW corner thus lost to Zone B will not make any difference to the swimmers, given that that area is of little use to them, and when sea state becomes rough inside the lagoon it is not sheltered.

6.6. Incentives to Rangers

Enforcing the law in Samadai is, for the Rangers, a rather hard and thankless task. The days are long, to be spent in a small boat under harsh environmental conditions. In addition to offering the Rangers an adequate platform for such task (which the small speedboats that they currently use are not), we recommend that the possibility of providing the Rangers with a bonus incentive for this task be carefully considered. As noted above (under "Control"), the enforcing role of the Rangers is essential for Samadai to continue offering adequate shelter to the dolphins, and the careful, passionate fulfilment of their duties *in situ* needs to be protected at all costs.

6.7. Communication about visits to Samadai

This is indeed still a sore spot of the entire Samadai management, because so much in terms of effectiveness of the MPA depends from a correct communication of its value, peculiarities, and need for protection. We note that many operators (as explained above) have not sufficiently grasped neither the need for protection, neither the advantages that can derive to them from an effectively managed MPA. Furthermore, in our experience the visitors travel to Samadai completely unprepared; they are not properly informed (when not deliberately misinformed) of what they are going to see.

We note that in some cases the visitors' perception and expectations are rather ruthlessly manipulated by operators, and believe that the whole aspect of communication, awareness and provision of information should be under the full control of the Red Sea Protectorates, who should maintain a direct link with the tourist community. The task of designing and implementing the communication & awareness strategy could, of course, be mandated by the Red Sea Protectorates to a trusted specialised organisation or agency, however in our

opinion the governing authorities must remain in control of this aspect of the conservation process.

In conclusion, we see the lack of proper communication about Samadai as a weak link of the chain that risks making the whole effort useless. In our view, the preparation of a communication and awareness strategy, that will provide sufficient information on the dolphins, on the ecological richness of Samadai and on the experience as a whole, should be currently seen as one of the highest management priorities.

6.8. Dugong conservation and welfare

We recommend that the work to determine the location, extent and quality of dugong critical habitat, initiated during this project, be completed along the Egyptian coastline at least from Suez to Hamata (for the time being), and that selected sites be identified within such habitat to be granted adequate protection. In particular, we believe that the adult male dugong which is regularly found in the Marsa Abu Dabab urgently needs protection from the constant harassment which he is subjected to by the uncontrolled swimmers in the bay, by boat traffic and by the current activities involving intensive coastal construction and development. We are aware that a new diving centre was recently opened on the beach, and that this has increased vessel traffic in the bay, thus increasing occasions for disturbance and collision hazard. Careful planning and control may encourage dugongs to remain in the area while allowing for the tourist activities to continue.

7. Acknowledgments

Our work could never have happened without the support of many persons and organisations. We wish to thank Dr. Moustafa Fouda, Director of the Nature Conservation Sector of the Egyptian Environmental Affairs Agency, Dr. Mahmoud Hanafy, General Supervisor of the Red Sea Protectorates, Mr. Ayman Afifi, Mr. Mohamed Gad and their staff, Mohamed Eid, Mohamed Negm, and General Mostafa Basuny, Head of the Marsa Alam City Council.

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Annex I

Timetable prepared by us in preparation for the mid-term workshop, and provided to the Abu Salama Society as a contribution to the implementation of management activities in Samadai.

Samadai Management Implementation Scheme (January 2006)

	Action	Deadline	Actors	Notes
1	Background information			
	Draw list of (a) players and interest groups (tour operators, dive centres, skippers, and guides), and (b) hotels	20 January	GNS, AAb, HT, MC, DO	We have received from RSP MA list of diving centres. From here it is possible to construct lists of guides, tour operators and hotels
	Survey of infringements occurred in Samadai (2004-2005)	31 January	HT	
2	Information collection from stakeholders (listed in 1.a)			
	Design questionnaire that is customized to stakeholders	20 January	GNS, AAb, HT	
	Disseminate questionnaire to all interested parties	15 February	HT, MC	
	Interview key individuals	15 February	HT, MC	
	Draw themes and issues from interviews (as a preparation of workshop, see 3 below)	20 February	HT, GNS, AAb, DO	
3	Workshop (Mid-March)			
	Prepare list of invitees	20 January	GNS, HT, MC	Spada, Marchetti, Fouda, Hanafy
	Prepare presentation of research data	28 February	GNS, MC	
	Prepare presentation of interview results	28 February	HT, GNS	GNS to present and discuss list of misleading information presented by Tour Operators on Samadai
	Presentation of current management guidelines		AAf	
	Discussion of management guidelines	During workshop	Fouda, Hanafy, AAf	
4	Recommendations for conservation and management to Red Sea Protectorates and EEAA			
	Management measures: recommendations for time and area closure based on data and observed needs of tourists / operators	30 June	GNS, DO	Need for enforcement and for RSP to have a direct contact with the visitors to elude cheating by TOs and guides
	New management plan: Rules, enforcement, mechanisms and penalties	?	Red Sea Protectorates	
5	Information dissemination and recommendations to stakeholders. Describe information material (including website) to be given to the different stakeholder categories			

	Zone B guides <ul style="list-style-type: none"> • Training module • Description of a typical visit to Samadai, recommended guidelines • Handbook • Code of conduct 	30 June	GNS, MC, AAb, DO	Training schedule and modalities to be defined by competent authority
	Diving centres, aquacentres, tour operators <ul style="list-style-type: none"> • Guidelines and recommendations 	30 June	GNS, MC, HT, AAb	Information material both on paper hand-outs and on website
	Captains and crews (daily trips and safaris) <ul style="list-style-type: none"> • Guidelines and recommendations 	30 June	GNS, MC, HT, AAb, DO	For example: never use the horn
	Hotel managers <ul style="list-style-type: none"> • Guidelines and recommendations 	30 June	GNS, MC, HT, AAb, DO	Information material both on paper hand-outs and on website
	Visitors <ul style="list-style-type: none"> • Code of conduct • Fact sheet about Samadai and dolphins • Information about the involved mechanisms (e.g., who does their money go to) • Visitor evaluation sheet 	30 June	GNS, MC, HT, AAb, DO	Information material both on paper hand-outs and on website and posters at the airport
6	Drafting proposals for further funding			
	Acoustic remote monitoring: preparation of proposal	20 January	GNS, HT	Requested from University of Pavia
	Further research proposals	30 June	AAb, GNS, HT	
7	Samadai as a case study for sustainable ecotourism development and marine wildlife conservation in the Red Sea			
	Cairo International Conference	Sometime after 2006 Ramadan	GNS, AAb, Fouda, Hanafy, HT, RS Governorate	

Key: AAb = Ameer Abdulla; AAF = Ayman Afifi; DO = Diving Ocean; HT = Hesham Tomoum; GNS = Giuseppe Notarbartolo di Sciarra; MC = Marina Costa

Annex II

Questionnaire provided by us to the Abu Salama Society in preparation for the mid-term workshop.

This questionnaire is designed to gage your opinion regarding Samadai Reef and its associated dolphins. The information you provide, in combination with the scientific data collected since January 2004, will serve to develop recommendations for management and potential modifications to regulations currently in place. The more details you will provide, the more informed the process will be, and it will be more likely that the final results will satisfy everyone. Your cooperation is vital to the success of this process.

Questionnaire

Basic information:

Name _____

Country of origin: _____

Organisation: _____

e-mail address: _____

Professional background: _____

Years of experience on the issue: _____

	Tour operator	Dive centre	Aqua centre	Cruise boat	Hotel
1 What type of operation do you work with?	<input type="radio"/>				

2
How many people work in your organisation?
How many large boats does your organisation
owns/employs?

How many tourists your organisation served in 2005?

3	strongly agree	agree	no opinion	disagree	strongly disagree
Relevance of Samadai to your business					
a) most of my business in Samadai is diving	<input type="radio"/>				
b) most of my business in Samadai is snorkelling	<input type="radio"/>				
c) swimming with dolphins in Samadai is important for my business	<input type="radio"/>				

4	strongly agree	agree	no opinion	disagree	strongly disagree
Management regulations currently in place are appropriate					
a) zoning of reef area	<input type="radio"/>				
b) time of closure	<input type="radio"/>				
c) number of snorkellers per day	<input type="radio"/>				
d) number of divers per day	<input type="radio"/>				
e) number of boats per day	<input type="radio"/>				
f) other measures (please list below)					
	<input type="radio"/>				
	<input type="radio"/>				

5

If you disagree with management regulations, what modifications would you suggest? (you can use additional sheets if you want)

a) zoning of reef area

b) time of closure

c) number of snorkellers per day

d) number of divers per day

e) number of boats per day

6	strongly agree	agree	no opinion	disagree	strongly disagree
Do you have access to sufficient information on					
a) management regulations	<input type="radio"/>				
b) dolphin ecology and behaviour	<input type="radio"/>				

7	Paper	Email	Website	Direct comm..
What form of information material is most accessible to you (scale on one to four)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

8
Do you have any additional comments that you would like to make regarding Samadai?