



KIRIBATI MARINE TURTLES PROFILE

Prepared by

Lui A.J. Bell¹ Turang T. Favae² Nenenteiti Teariki-Ruatu³ Ratita Bebe⁴ Paul Anderson⁵ Catherine Siota⁶

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¹ Marine Species Officer, Secretariat of the Pacific Regional Environment Programme (SPREP)

² Environment Officer, Environment and Conservation Division, MELAD, Kiribati

³ Deputy Director, Environment and Conservation Division, MELAD, Kiribati

⁴ Environment Officer, Environment and Conservation Division, MELAD, Kiribati

⁵ Marine Conservation Analyst, SPREP.

⁶ Associate Turtle Database Officer, SPREP.

PREFACE

Kiribati consists of 33 coral islands divided among three island groups as follows:

- *The Gilbert Islands*: these islands are on the west side and include Makin, Abaiang, Butaritari, Marakei, Tarawa, Maiana, Abemama, Kuria, Aranuka, Nonouti, Tabiteuea, Beru, Onotoa, Tamana and Arorae.
- *The Phoenix Islands*: these islands are in the centre and include Kanton, Edenbury, Birnie, Rawaki (Phoenix), McKean, Manra (Sydney), Orona (Hull) and Nikumaroro (Gardner).
- *The Line Islands*: these are on the east end and include Teraina, Tabuaeran, Kiritimati (Christmas), Malden, Starbuck, Caroline, Vostok and Flint.

Kiribati's exclusive economic zone (EEZ) covers more than 3 million sq km (more than 1 million sq miles).



Figure 1: Map of Kiribati showing the location of its 32 of the 33 islands. (Source: <u>http://www.kiribatitourism.gov.ki/index.php/aboutkiribati/aboutkiribatioverview</u>)

The marine turtle profile is an attempt to document all known information on marine turtles in Kiribati including their management and protection to:

- Provide an over-view of the status of marine turtles and their conservation in Kiribati;
- Identify priority areas to assist in the formulation of priority research areas for improved information on marine turtles;
- Identify areas for priority consideration in the formulation of legislation and policies to improve management and protection of marine turtles in Kiribati.

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1. MARINE TURTLE SPECIES

Seven species of marine turtles are recognized globally. Six of these species occur in the Pacific.

Two species of marine turtles have been positively identified to occur in Kiribati waters:

- Green turtle (*Chelonia mydas*, locally called *Te On*), and
- Hawksbill turtle (Eretmochelys imbricata, locally called Te tabakea or Te borauea).

The following marine turtle species have also been reported to occur in Kiribati only through descriptions:

- Loggerhead (*Caretta caretta*, *Te on n ae*),
- Olive ridley (*Lepidochelys olivacea*, *Te on mron*)
- Leatherback (Dermochelys coriacea, Te kabi n waa).

Onorio (1979) reported the following concerning the loggerhead, Olive Ridley and Leatherback turtles in Kiribati:

- Loggerhead turtles were obtained while nesting and also in gillnet catches, with a size range of about 60 cm to over 1 m in length and that they were seen at Butaritari, Kuria, Aranuka and Tarawa.
- Olive ridley turtles were normally caught by divers and in gillnet catches, not so much during egg laying period. Reported to be seen at Butaritari and Kuria and that size range was 40-60 cm.
- Leatherback: One was hooked up by fishermen who were fishing using hook and line off the reef edge at the ocean side of Tanimainku village. It was reported that it took six canoes tied together to tire the turtle which the fishermen took for a feast.

With the exception of the leatherback turtle, there is a possibility of mis-identification of species concerning loggerhead and olive ridley turtles.

The green turtle is the most common species and the only turtle species known to nest in Kiribati, even though hawksbill may also nest.

2. BIOLOGY AND ECOLOGY

The hawksbill turtle feeds on a diet of invertebrates, sponges and soft corals. The green turtle, by contrast, is mainly herbivorous, feeding mainly on sea-grasses and algae but also feeds on a variety of other items including mangrove, fish egg-cases, jellyfish and sponges. Green turtles may have to migrate from a resident habitat to breeding beaches and back at intervals. Loggerheads and olive ridleys are also carnivorous. Movements of the olive ridleys are particularly poorly known. The loggerhead nests mainly outside the tropics, on subtropical and warm temperate coasts.

While green turtles often nest together in large numbers at sites called 'rookeries', the nesting of the hawksbill at some places is diffused, with no great concentrations believed to have resulted from population decimation through activities such as the tortoise shell trade. However, there are still a lot of locations with aggregated hawksbill nesting. The single largest known green turtle rookery is Raine Island, on the northern Great Barrier Reef in Queensland, with 80,000 nesting females per year in a large nesting season (Pickering, 1989) but as low as a few thousands in a poor season (Limpus, *et al* 2003). Other major rookeries occur around Australia, on the Caribbean coast of Costa Rica (Tortuguero), the Pacific coast of Mexico, Ascension Island, the coasts of Oman and Pakistan and islands in the Mozambique Channel (Pickering,

1989). Hawksbill nesting density is low throughout its range, with moderate concentrations in a few localities such as the Torres Straits islands of Queensland, the southern Red Sea and the Gulf of Aden and the Arnavon Islands near Santa Ysabel in Solomon Islands.

Green and hawksbill turtles spend their first five to ten years drifting on ocean currents. Once they reach 30 to 40 cm curved carapace length, they settle and forage in tropical tidal and sub-tidal coral and rocky reef habitat. The shallow foraging habitat of adults contains seagrass beds or algae mats on which green turtles mainly feed (Musick & Limpus 1997; Poiner & Harris 1996; Robins *et al.* 2002; Whiting 2000). Hawksbill primarily feed on sponges and algae (Whiting 2000).

Age at first breeding has been estimated for Australia to be about 35-40 years for green turtles. For the Hawaii marine turtles, recovery of tagged turtles confirmed that some green turtles can first breed at 20-25 years. For Hawaiian hawksbill turtles, age at first breeding is about 18-25 years. Overall though, estimates of age at first breeding of turtles in the Pacific are 35-45 years for greens and 35-40 years for hawksbill. Marquez (1990) reported that in captivity (Cayman Turtle Farm), green turtles reach 35 kg in about three years and start to reproduce in less than 10 years.

3. DISTRIBUTION

3.1 GLOBALLY

Sea turtles are marine reptiles which have inhabited the earth for over 100 million years. Seven species of turtles exist worldwide with all but one occurring in the Pacific region. The most frequently seen species in the Central Pacific are the hawksbill and green turtles, although the leatherback (*D. coriacea*), loggerhead (*C. caretta*) and olive or Pacific Ridley (*L. olivaccea*) turtles also occur.

Marquez (1990) reported that green turtles occur in tropical and subtropical waters throughout the world but normally remain within the northern and southern limits of the 20°C isotherms. However, Limpus reported green turtles actively feeding at 15°C in south Queensland and they live year round in New South Wales and Victoria, as well as in New Zealand, beyond the 20°C isotherm. Green Turtles make long reproductive migrations between foraging grounds and nesting beaches (Limpus *et al.* 1992).

The hawksbill turtle has a circumglobal distribution throughout tropical and, to a lesser extent, subtropical waters of the Atlantic Ocean, Indian Ocean, and Pacific Ocean. They are found in the waters of 108 countries, with nesting occurring in 70 countries. Hawksbills are migratory and individuals undertake complex movements through geographically disparate habitats during their lifetimes (Mortimer and Donnelly, 2007).

3.2 IN KIRIBATI

Within Kiribati, very little information is known about turtle populations including nesting populations. However, green turtles have been reported as the most common turtle species occurring in all island groups of Kiribati. During Captain Cook's stay in Christmas Island in 1777, green turtles were reported as a stable food. Hawksbill turtle is also reportedly common in Kiribati. While loggerhead turtles were reportedly obtained while nesting, caught in gillnet and that they were seen at Butaritari, Kuria, Aranuka and Tarawa, it is very likely that these were mis-identification. Similarly with Olive ridley turtles which were also supposedly caught by divers and with in gillnets, and reportedly seen

at Butaritari and Kuria. A leatherback turtle was reportedly caught by fishermen who were fishing using hook and line off the reef edge at the ocean side of Tanimainku village (year not known).

(i) Marine Turtle Nesting

Similar to most Pacific Island countries, there has not been a study to properly document the extent of turtle nesting sites through-out the country. The following information summarizes reported turtle nesting sites in Kiribati:

- *Gilbert Islands Group:* Onorio (1979) reported that turtle nesting occurs on most of the islands in the Gilberts except Banaba, with the most important two areas being,
 - o Katangatemau, a sandbank about 300 km N.E. of Makin Island, and
 - o A sandbank by Nonouti Island.

In Tarawa, two nesting turtles were reportedly caught in 1978 in Buariki, northern Tarawa (Onorio, 1979). In addition, in 2007, according to a local turtle fisherman who lived in Nooto village, nesting turtles have been observed and even caught and eggs collected for consumption on the beaches along the ocean side of Taratai to Nooto. Turtle nests were located on the beach in the village of Noto and a green turtle nester caught on the beach in the village of Marenamuka in North Tarawa in October, 2007 (Bell, 2007 and ECD data 2008). Nests were again recorded on the beach at Nooto village in November and December 2007 as well as February and May in 2008. All nests recorded for Nooto village were reported to be dug up and eggs presumed consumed.

- *Phoenix Group*: Onorio (1979) suggested that good numbers of nesting may occur in view of infrequent disturbances. However, nesting is thought to be sparse. In the Phoenix Islands, mating green turtles were seen at Gardner Island and Enderbury in June while nesting is known on all 8 islands in the Group. Surveys in 1973, 1986, 2000 and 2002 confirmed nesting on the following islands in the group:
 - o Kanton
 - o Nikumaroro(Gardner)
 - o McKean
 - o Rawaki (Phoenix)
 - o Ederbury
 - o Manra (Sydney)
 - o Orona (Hull)
 - o Birnie
- Line Group: sparse nesting had been cited on Tabuaeran (Fanning) and Kiritimati (Christmas) Islands. Turtle nests were located on the northeast beach of Banana village and along the Bay of Wrecks on Kiritimati Island. Green turtle nesters were sighted occasionally on these two nesting beach sites in November 2008 to May 2009 with a number of nests observed at the Bay of Wrecks (WCU-ECD data 2009). Nests and nester were again sighted and recorded on the beach at the Bay of Wrecks and northeast of Banana village in October 2009 to May 2010 (WCU-ECD data 2010). The Bay of Wrecks seems to be the more common nesting site on the Island compared to other nesting sites. Turtles are often sighted swimming and feeding on green algae at the Southeast Peninsula of Island during the breeding season of October to May.

In March-April 2010, turtle monitoring was carried out in the south Line islands of Malden, Flint, and Starbuck as part of the survey activities and tour to Flint in September in 2009 (WCU-ECD staff trip report, 2009 & 2010). Old nests were found on Malden and new nests with new tracks on Flint. Green turtles were also

observed swimming close to Starbuck (WCU-ECD staff trip report 2010). The reports confirm that Malden, Flint and Starbuck are among the islands in the Southern Line Islands where turtle nesting occurs. Due to limited time, the monitoring did not cover Millennium Island (Caroline) to confirm whether turtle nesting occurs there. However, given that Millennium Island is one of the sandy beach islands with near pristine condition, there is likelihood that turtle nesting also occurs there.

Specific sites where turtles nest on these islands within Kiribati as well as the number of nests recorded are reported in the chapter on turtle nesting populations.

(ii) Turtle migration

Information in the Regional Turtle Database at SPREP of records of turtle tag recoveries from flipper tagging involving Kiribati is recorded below:

Tag no.	Species	Sex	Date tagged	Location tagged	Turtle Activity	Date recaptured	Location recaptured
R5651/R5652/ R5653/R5654	Green	F	7-Aug-92	Bikar Atoll, Marshal Islands	Nesting	23-Apr-93	Aranuka Lagoon, Kiribati
R42015/R42075	Green	F	12-May- 07	Betio, Tarawa	Foraging	31 Mar 09	Tarawa Lagoon
R16661/R16662	Green	М	21-June- 04	Malua Theological College, Upolu, Samoa	Captive	21 Sep 09	Tabiteuea north, Utiroa village, Kiribati

So far, there are only three records. One involves a green female turtle that was tagged in Marshall Islands in 1992 and recaptured in Aranuka Lagoon, Kiribati in 1993 (fate of turtle not reported). The second one involves a green turtle tagged on 21 June 2004 on Upolu Island, Samoa and recaptured at Tabiteuea north, Utiroa village, Kiribati on 21 September 2009. The third one is a sub-adult green turtle tagged in Betio in May 2007 and recaptured in the Tarawa Lagoon in 2009. Figure 2 depicts the movements for the two turtles that were flipper-tagged outside of Kiribati and recaptured in Kiribati. So far, there are no records in the regional turtle database of any marine turtle flipper-tagged in Kiribati.



Figure 2: Turtle movement from flipper-tagging involving Kiribati.

A hawksbill nester (named Lady Vini) mounted with a satellite tag in Samoa in March 2006, migrated through Kiribati waters (south of Phoenix Islands) and was there for about two months (June/July 2006) before moving on to Tuvalu and eventually Fiji where the last signal was received (Figure 3). At least two green turtle nesters mounted with a satellite tag each in Marshall Islands in 2007 migrated through Kiribati waters (Figures 4 and 5).



Figure 3: Post-nesting migration map of a hawksbill turtle nester that was mounted with a satellite tag at Aleipata, Upolu, Samoa in 2006.



Figures 4 and 5: Post-nesting migration maps of two green turtle nesters that were mounted with a satellite tag each on Loj Island, Marshall Islands in 2007.

4. THREATS TO MARINE TURTLES

4.1 GLOBALLY

The IUCN Marine Turtle Specialist Group (http://www.iucn-mtsg.org/hazards) identified the five most significant threats to marine turtles globally as:

- fisheries impacts (incidental by-catch);
- direct take (of both animals and eggs for consumption, sale, jewelry);
- coastal development;
- pollution and pathogens, and
- global warming.

These threats, if not mitigated against, will prevent the recovery of marine turtles and result in the decline and local extinction of populations.

4.2 IN KIRIBATI

Within the Pacific region the main threats to marine turtles as listed in the SPREP regional marine turtle action plan 2008-2012, include:

- unsustainable harvesting (direct take for meat and handicraft and egg harvesting);
- feral animal predation on turtle nests (eggs);
- incidental capture in commercial fishing;
- degradation of habitat (e.g. through coastal development and natural disaster);
- pollution, marine debris (e.g. plastic bags and fishing gear) and pathogens;
- boat strikes; and
- climate change.

The single major threat to marine turtles in Kiribati is the unsustainable harvesting of turtles and turtle eggs for consumption. Incidences of harvesting of nesters on land have also been reported. In South Tarawa, the sale of turtle meat as an alternative source of income is increasing. This seems to parallel with the dramatic increase of human population in South Tarawa in the last two decades. The absence of adequate legislation and policies to sufficiently protect marine turtles in Kiribati adds to the threats. The negative impacts of climate change on turtle nesting beaches have become apparent. Coastal erosion is becoming a major issue in the capital island of South Tarawa. In North Tarawa, impacts are apparent on turtle nesting beaches in Taratai, Nooto and Marenanuka villages.

5. UTILIZATION

Turtles are considered as totems and several traditional beliefs involving turtles in Kiribati exist, e.g. hawksbill turtle is sacred in some areas. Turtle meat is an important traditional food item and anecdotal information indicates declines mainly from over-harvesting (including the harvesting of eggs and nesters). Turtle fishing involves traditional specilaised knowledge that is known and kept as family secrets and is passed on from generation to generation. Only a small number of people fish turtle traditionally without the use of gillnets (Outer Island Biodiversity PLA workshops 2003-2005). Even in Captain Cook's time, it is reported that turtle meat became a stable food during their stay in Christmas Island in 1777 and journey to Hawaii (Bailey 1977, quoted in Onorio, 1979). It was reported that they once caught 42 green turtles in half an hour. Another report (Beaglehole, 1967 quoted in Balazs, 1979) estimated a catch of 200-300 green turtles

during 8 days. It was said that these successful turtle hunting may have attracted many other ships to stop at Christmas for provisions.

It is believed that both turtle eggs and meat constitute important items of the traditional diet in Kiribati and very little turtle meat is sold. Turtles are usually kept alive until required by the family. In 1979, turtle meat was sold for \$0.50 per pound in the Local Produce Division. Onorio (1979) provided the annual subsistence harvest of turtles in Tarawa in 1978, estimated to be 666 turtles, which were caught as follows:

- 576 turtles taken from the Tarawa lagoons using gillnets and involving 12 fishermen;
- 48 turtles taken at the Betio side by spearing and harnessing involving 6 fishermen;
- 40 turtles taken by 6 skin divers/tying/hooking;
- 2 reported turtles taken when nesting.

Turtle shell was also used for decorations and ornaments and a 40-50 cm shell would be sold for \$8.00 in 1979.

No information is available on estimates of turtle harvesting in other parts of Kiribati nor is there an updated estimate of turtle harvesting at any level in any area.

The turtle nesting monitoring programme initiated in the villages of Noto and Marenamuka in North Tarawa in the 2007/2008 nesting season recorded turtle nests in Noto that were all dug up and eggs presumed consumed.

Turtle poisoning

Poisoning after consumption of turtle meat is common in Kiribati. Limpus (1987) reported 5 deaths from Gilbert Islands from 1949. This is believed to be associated with the hawksbill turtle. In the early 1990s, a major food poisoning incidence was reported to have resulted in the deaths of about ten people on the island of Abemama, in the central parts of Kiribati, from eating turtle meat (Teariki pers. comm., Ioane 12/08/2008). The turtle species suspected was not the green turtle. Sources from the Ministry of Health could not verify the species involved. However, it was confirmed that the turtle species involved was definitely not the green turtle.

6. POPULATION STATUS

6.1 GLOBALLY

Marine turtles are recognized internationally as species of conservation concern. Of the seven species known in the world, six species occur in the Pacific. The six marine turtle species occurring in the Pacific are listed on the 2008 IUCN Red List of Threatened Animals as follows:

- Leatherback turtle: Critically endangered
- Hawksbill turtle: Critically endangered
- Green turtle:

•

- Endangered Olive ridley turtle: Endangered
- Loggerhead turtle: Endangered
- Flatback turtle: Data deficient

The seventh marine turtle, Kemp's ridley turtle, not found in the Pacific, is also listed as critically endangered.

All of the marine turtle species are listed on Appendix I⁷ of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). The Convention on the Conservation of Migratory Species of Wild Animals (CMS) lists sea turtle species on its Appendix I⁸ and Appendix II⁹.

The status of marine turtles in the Pacific Islands Region is generally unknown.

6.2 IN KIRIBATI

(i) Foraging turtle population

Bailey (1977, quoted in Onorio 1979) reported that Captain Cook's successful turtle hunting during his stay in 1777 on Christmas Island may have attracted many other ships to Christmas since turtles were then rarely seen.

Balazs (1982) documented the following concerning information on turtles in the Line and Phoenix islands:

- *Fanning:* Turtles were reported to abound at Fanning in 1850s but the atoll had been continuously inhabited since 1852. A small number of turtles were regularly sighted in the lagoons (presumably around the 1980s).
- Christmas: In 1777, when Captain Cook discovered Christmas Island, 200 to 300 green turtles were taken, from both the shallow waters and on the beaches, during an 8-day visit. Publicity resulting from Captain Cook's visit caused numerous whaling vessels to stop at the atoll for provisions. Green turtles were still abundant in 1838. In 1975 some nesting was reportedly still taking place.

The March/April 2010 turtle nesting survey in the south Line Islands reported sighting of two green turtles swimming close to Starbuck Island shore. A sub-adult green turtle was caught in October 2008 by a fisherman in Tabwakea village on Kiritimati Island and was tagged and released.

During biological surveys in 2000 in the Phoenix Islands, 86 green and 3 hawksbill turtles were recorded during 38 dives. Again in 2002, 66 green and 5 hawksbill turtles were recorded during 43 dives during surveys of the Phoenix Islands.

Anecdotal information indicates a decline in the number of turtles seen foraging as well as a decline in distribution within Kiribati waters.

(ii) Nesting turtle population

Limited surveys have been conducted in Kiribati to obtain an accurate estimate of annual turtle nesting populations.

The following are results of surveys conducted that provide some information on the extent of turtle nesting on some islands in Kiribati:

⁷ This means all sea turtle species are listed as threatened with extinction under this convention and CITES generally prohibits commercial international trade in specimens of these species.

⁸ Migratory species that have been categorized as being in danger of extinction through-out all or a significant proportion of their range.

⁹ Migratory species that have an unfavourable conservation status or would benefit significantly from international co-operation organised by tailored agreements.

- *Phoenix Group:* A 7-day preliminary survey of marine turtle nesting populations conducted in February in 1973 on Canton Island by Balazs (1975) identified four main nesting locations on the island as follows:
 - North coast: 2 turtles nesting at 2300 hour on 18th and two fresh sets of tracks observed on 20th. It was also reported that 13 sets of fresh tracks were seen in the last week of June of the same year;
 - North-east coast: more than 100 pits were observed, estimated to be not more than 2-3 months old;
 - East coast: 1 fresh set of tracks and more than 30 pits were observed similar in age as those observed in the north-east coast;
 - South coast: More than 40 pits and 4 fresh tracks were observed.

It was estimated that a fairly large number of animals may be involved in nesting in the Phoenix Group. Results from surveys conducted in February 1973, April-August 1986, late June to mid-July in 2000 and early June to early July in 2002, are recorded in Table1. The results do not provide a clear picture on the likely size of green nesting population annually on Canton as well as other islands in the Phoenix group. On Canton Island, Balazs (1975) recorded more than 170 (2-3 months old nests) in February 1973 at 4 different sites while Teebaki (1986) recorded only 20-30 "suspected nests" during 1986 and nesting occurring only in one site. Mangubhai and Yoshinaga (2002) recorded 35 nests in June/July 2002. Similar results were observed for Enderbury where no signs of turtle nesting was observed during the survey in 2000 (Stone *et all* 2001) while 160 old nests were observed during the survey in 2002 (Mangubhai and Yoshinaga 2002). Of the six (of the eight) isles of the Phoenix Group surveyed in June/July in 2000, a total of 50 turtle nests were located on 4 isles, no signs observed on 1 isle (Enderbury) and 15-20 tracks were located on the southern beach of 1 isle (Nikumaroro). During the June/July 2002 survey of seven (of the eight) isles in the Group, a total of 275 nests were located. Figure 6 provides a map of turtle nesting in the group as recorded in surveys.



Figure 6: Records of turtle nests recorded in surveys of turtle nesting in the Phoenix Group.

Balazs (1979) estimated the total annual number of nesting females using the atoll (Canton) to be as many as 200 turtles. Recent data seems to indicate a decline from that estimate.

The big difference in the number of nests recorded in the initial survey in 1975 to the two later surveys could be attributed to a huge drop in the number of turtle nesting population, a reflection of the accuracy of those conducting the surveys or relative impacts of ENSO climate fluctuations on annual green turtle breeding rates.

North Tarawa: Two nesting turtles were reportedly caught in 1978 in Buariki, northern Tarawa (Onorio, 1979). Results of surveys conducted at the Noto village beach and Marenamuka village beach in north Tarawa during the 2007/2008 nesting season covering October 2007-May 2008 are recorded on Table 2 and Figure 7. The results confirmed occurrence of green turtle nesting at these two beaches but with very limited numbers. During the whole period, 19 nests were recorded at Noto including observation of a nester on two separate dates (in October and November). One of the nests was dug up in October and was confirmed as actual nests by the presence of eggs. Only one nest was recorded at Marenamuka during the same period from one green turtle nester that was caught, tagged and released in October. This indicates a very small green turtle nesting population (a few animals) utilizing north Tarawa for nesting.



Figure 7: Records of turtle nests recorded in surveys of turtle nesting in North Tarawa.

• *Line Group:* During the October 2008/May 2009 and October 2009/May 2010 surveys on Kiritimati Island, the following number of nests were recorded:

Season	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
2008/2009	2 old	2 new	0	2 new	2 new	7 new	3 new	3 new
	1 new					1 nester		1 nester
2009/2010	3 new	0	0	1 new	1 new	0	2 new	1 new

The October 2009/May 2010 survey was very much affected by heavy rainfall with strong wind and flooding of most of access roads on the island in early 2010. Thus the nests recorded may not reflect real nesting activities during this season. At the Banana NE beach, 1 new nest and 1 successfully hatched nest was observed in April 2010.

The March/April 2010 turtle monitoring on Malden, Flint, and Starbuck recorded a total of 9 old nests on Malden and 8 new nests with 10 new tracks on Flint.

The results of turtle nest monitoring surveys in the Line Group are recorded on Table 3 (Figure 8). The results indicate a small turtle nesting population (a few individuals) utilizing the Line Group.



Figure 8: Records of turtle nests recorded in surveys of turtle nesting in the Line Group.

(iii) Turtle Nesting season

Onorio (1979) reported that turtle nesting occurs through-out the year in Kiribati with two peak seasons, April/May and October/February. It is not clear how these peak seasons were arrived at. It has also been reported that during these peak months, the highest nesting activity occurs three days after each phase of the moon.

Table 4 lists the details of reported turtle nesting and times of nesting occurrences from surveys in an effort to estimate turtle nesting season in Kiribati, particularly the peak nesting period. These are summarised below in terms of estimated time of nesting.

Where the age of "old" nests found was not estimated, these were noted as nesting occurring before the date of the survey.

- <u>Phoenix Group:</u>
 - o Kanton Island:
 - The survey in February 1973 indicated that most of the turtle nests observed on the island corresponded to nesting in November/December and confirmation of nesting in February.
 - The survey in early June to early July 2002, indicated that most of the nests recorded corresponded to nesting before June and confirmation of nesting in June/July.
 - o Enderbury Island:
 - The early June to early July 2002 survey, indicated that all of the nests recorded corresponded to nesting before June.
 - o <u>Orona (Hull) Island</u>:
 - Nesting turtles believed to be present along the western and southern coast throughout the year.
 - The late June to mid-July in 2000 survey recorded probable nests that would correspond to nesting before June.
 - All nests recorded during the early June to early July 2002 survey were from nesting within that period.
 - o Manra (Sydney) Island:
 - Confirmed nesting during February along the northwest coast.
 - All nests recorded during the June to mid-July in 2000 survey were from nesting in June/July or earlier.
 - The two nests recorded in the early June to early July 2002 survey were from nesting within the survey period.
 - o <u>Nikumaroro (Gardner) Island</u>:
 - Confirmed nesting in February on the southern coast.
 - The late June to mid-July 2000 survey recorded tracks indicating nesting in June on the south-western beach.
 - Most of the nests recorded in the early June to early July 2002 survey corresponded to nesting before June. Nests (about half the number of those recorded before June) were also recorded within the survey period confirming nesting in June/July.
 - o <u>Bernie Island</u>:
 - Believed nesting occasionally throughout the year.
 - The early June to early July 2002 survey located nests that corresponded to nesting before June as well as within June/July.
 - o <u>Rawaki (Phoenix) Island</u>:
 - All nests recorded in the late June to mid-July 2000 survey corresponded to nesting before June (March/April).
 - However, all nests recorded in the early June to early July 2002 survey corresponded to nesting in June/July.
 - o <u>McKean Island</u>:
 - The 2 nests recorded in the late June to mid-July 2000 survey were from nesting in June on the southern beach.

Line Group

- Kiritimati 0
 - The October 2008/May 2009 survey confirmed nesting from October to May except December, with the highest number of nests recorded in March.
- Malden
 - All of the 9 nests recorded in the 24 March 2010 visit on Malden were old nests thus corresponding to nesting in early March or before March.
- Flint 0
 - All of the nests recorded in the visit on 7 April 2010 were new (with 10 new tracks), corresponding to nesting within March/April.
- Starbuck
 - No turtle nests were found on the island during the visit there on 10 April 2010
- Gilbert Group
 - o North Tarawa
 - The survey between October 2007 and May 2008 confirmed turtle nesting in Nooto village in late September, October, November, December, February, and May, with the highest number of nests recorded in October. The only nesting recorded for Marenanuka village occurred in October or late September.

Due to the nature of most of the surveys, covering only a short period during a year, as well as the inconsistency in the conduct of the surveys, the peak nesting season cannot be clearly determined. Records from some surveys only recorded "old" nests without an estimate of how old these nests were. Nevertheless, the records indicate nesting occurring from late September to June/July and indication of peak nesting around October/November and May/June/July.

7. MANAGEMENT

The main challenges to effective conservation and management of marine turtles in the Pacific Islands region include the lack of data on populations, harvesting and interactions with fishing activities due to limited research and monitoring. A major constraint is limited resources, both financially and in terms of manpower (including skills) available for implementing management actions in the region. The absence of appropriate legislation and policies and the lack of enforcement where appropriate legislation exists are additional issues with the conservation of marine turtles.

Current legislation specifically addressing marine turtles in Kiribati include the following:

- Fisheries Ordinance 1977/ Fisheries Act 1978: "Fish" is defined to include turtles, their young and eggs. However there is no specific provision concerning the management/protection/conservation of turtles.
- Wildlife Conservation Ordinance 1975/1977: The Ordinance prohibits the hunting etc of wild turtles on land except under and in accordance with the terms of a valid written licence granted to that person by the Minister. Te On, Fonu, the green turtle, is also fully protected in certain areas:
 - Birnie Island
 - Caroline Island
 - Christmas Island
 - Flint Island
 - Gardner Island (Nikumaroro)
 - Hull Island (Orona)

- Malden Island
- McKean Island
- Phoenix Island
- Starbuck Island
- Sydney Island (Manra)
- Vostock Island

MELAD through ECD has been working towards repealing this ordinance since 2007 when the Environment Amendment Act 2007 was passed in Parliament. Some of the Act provisions can substitute all of matters covered under the Ordinance. Government plans to complete this work before the end of 2010 or in 2011.

- Environment (Amendment) Act 2007: **Te On**, Green Turtle (Chelonia mydas), is recommended as a protected species. This means it may (1) be prescribed by regulation; (2) be categorised according to international or national standards; (3) be subject to any conditions, including that it is protected only in certain areas, or during certain times; or the taking of a certain quota of the species is allowed.
- *Protected Species and Protected Areas Regulations*: These are to be established under the Environment Act (as amended 2007). They are in draft and currently undergoing procedures for endorsement by the Kiribati Cabinet. Once these are formally established, turtle management, especially in the Gilbert group, will be effective.

8. RECOMMENDATIONS

Marine turtle species through-out the world are considered threatened, and within Kiribati, available information indicates declining stocks from unsustainable harvesting practices. The information available on marine turtle nesting presents a very sad situation that requires urgent, vigorous and concerted conservation/protection effort. For example, twenty nests, which is being recorded as high, probably only represents four turtles. Most other nesting areas had fewer nests reported, corresponding to fewer nesters.

Current legislation concerning the protection of marine turtles in Kiribati is believed to be insufficient to effectively contribute to rebuilding stocks. The information on turtles is very limited but is necessary for informed decision making. The recommendations made below address these issues to improve information, awareness, and protection of marine turtles in Kiribati.

8.1 LEGISLATION/POLICY

Table 5 provides a listing of regulations that can be applied where relevant and practical and under an appropriate Act. The table only provides a guideline and the choice of regulations is up to the relevant Government Department(s). Given the importance of marine turtles in local traditions, these need to be accommodated in national legislation so that traditions are maintained but utilization is managed based on scientific information. It is important that while size limits are important, excessive harvest at any size can cause loss of a population. The most important legislation suggested as priority at this stage include the following:

- Harvest / Direct take
 - Current population models for marine turtles do not support the applicability of a minimum size limit;
 - Application of a maximum size limit to protect nesting females;
 - Prohibition of turtle egg taking anywhere all the time;
 - Prohibition of the taking of any turtle coming up or nesting or going out after nesting anywhere;
 - Prohibition of the taking of turtles from within management areas;
 - Prohibition of the taking of turtles during nesting season (closed season);

- Application of a permitting system and a maximum number allowed for certain traditional ceremonies or any occasion where more than one turtle will be needed.
- Fishing Gear (specifically for catching turtles where catching is allowed)
 - Prohibition of the use of spears and nets to catch turtles as a means of managing the size limits.
- Tagged Turtle
 - Releasing of turtles with any tag(s) on them when caught;
 - Reporting to the authorities on information on tag(s) when caught/seen.
- <u>Keeping Turtles in Captivity</u>
 - Not allowed except via permit (for research, educational, income generating, hobby, rehabilitation), with guidelines;
 - Minimum/maximum size of a turtle allowed to be kept.
- <u>Trade</u>
 - Prohibition of the sales of turtles or application of a permitting system for those who sell turtles including products derived from turtles. This controls the numbers harvested;
 - Prohibition of the sales of turtle eggs;
 - Prohibition of the export of turtles and eggs.
- Habitat Protection
 - Protection of turtle nesting beaches;
 - Consideration of turtle nesting beaches in coastal development plans and EIAs.
- <u>Community/Customary Tenure</u>
 - Incorporation of relevant traditional knowledge, customary marine tenure and practices that promote conservation on marine turtles.
- Agreement/Convention affiliations
 - Kiribati might like to consider becoming a party to the CMS and CITES.

8.2 AWARENESS

Even though there is a lack of national data on turtle trends, it is necessary to promote awareness on the status of turtles globally and the nature of these animals as well as the principles of good resource management. Awareness is also needed to explain the value of protected areas.

Public awareness workshops including those at schools can be conducted, initially for the Tarawa area and gradually expanding to other groups of islands. This can include radio talks and discussion over the national TV involving the different stakeholders and information sheets translated into the local language.

Technical capacity to approach and engage interest and participation of grass-root communities and other sectors of society on a long term and sustainable basis is vitally important.

8.3 RESEARCH AND MONITORING

Turtle Nesting: There is urgency in having monitoring of turtle nesting at key index beaches indentified below which can be done via track/nests counts and including

flipper tagging. It is vitally important to obtain data on turtle nesting populations on the different islands for assessment of the nesting turtle stock in Kiribati and to establish the more important turtle nesting beaches for long-term monitoring to observe trends. Even though past surveys have indicated important turtle nesting islands, it is important to assess what the current situation is. It has not been possible to clearly illustrate the peak turtle nesting months due to the inconsistency in the conduct of monitoring surveys on isles where turtle nesting occurs. Thus it is important to establish on-going turtle nesting monitoring programmes on isles with good turtle nesting occurring as listed below under *Turtle Nesting Key Areas*. This information provides the basis for legislation.

Turtle Nesting Key Areas: The limited information available due to the limited effort in monitoring turtle nesting in Kiribati makes it difficult to assess the value of each isle in terms of the nesting population that nest annually. Nevertheless, the results of surveys conducted found twenty or more nests at the following sites: Kanton Is, Nikumaroro Is, Enderbury Is, Kiritimati Is, Manra (Sydney) Is, Kiritimati Is (Bay of Wrecks) and Noto Village (North Tarawa). It must be noted that twenty nests may correspond to only four nesters. It is recommended that on-going nesting monitoring be established with these sites.

Turtle Utilization (Use): Given the importance of turtle meat traditionally, assessment of the level of turtle consumption is also important in the effort to improve management of this resource. This can be incorporated in current Fisheries surveys. However, if none exists, initiating one is necessary. Data necessary from harvested turtles include species, size, and sex where possible.

Flipper Tagging: A few officials of the Environment and Conservation Division have had a hands-on turtle tagging experience. To facilitate easier flow of information with one national contact/focal point, it will be preferred that tags and applicators are provided to one focal contact (Environment and Conservation Division). The Environment and Conservation Division, as part of its coordination role, will be responsible for the dissemination of tags to the local turtle team as well as compiling turtle tagging information to be provided for the regional database.

Genetic Samples: Sampling tissues for genetic analysis for stock identification is very important and can be easily accommodated in the monitoring programme.

Satellite Tag: An officer of the Environment and Conservation Division has undergone training in the attachment of satellite tags on marine turtles. A satellite tag and the necessary equipment were also provided. Effort should be made to mount the satellite tag on a nester. Kiribati forms a gap in satellite tagging data in the Pacific and information from such an activity would be very useful.

Turtle Database: The SPREP regional Turtle Database (TREDS) has been installed and two officers trained in its operation. The database should be used for the recording of data and copies sent to SPREP.

8.4 CAPACITY BUILDING

A few staff from ECD have received training and gained experience in turtle flipper tagging. One staff has had turtle satellite tagging training and in the operation of the turtle database (TREDS). However, given recent development of the turtle database and the need to have more than one staff familiar with its operation, in-country training on TREDS is necessary.

Further training on planning and conducting turtle nesting monitoring programmes to enhance local capacity is necessary. Due to limited resources (finance and manpower) it would be necessary to involve communities in the monitoring where possible. This would mean training for community representatives. Other areas for capacity building include turtle species identification, nest identification, record keeping, compilation and analysis of data. With the increasing impacts of climate change on turtle nesting areas, capacity building in relocation of turtle eggs to suitable sites is of high importance.

8.5 COLLABORATION

Similar to other island countries in the Pacific Islands region, resources (personnel, equipment and finance) are limited. In addition, due to the turtles status as part of the local fishery and at the same time a species of conservation concern (nationally, regionally and globally), their management and conservation becomes the responsibility of more than one national agency. Given this, collaboration and formation of a national turtle monitoring network amongst the following Agencies in Kiribati is necessary:

- Environment and Conservation Division, Ministry of Environment, Lands and Agricultural Development;
- Fisheries Division, Ministry of Fisheries and Marine Resources Development;
- NGOs involved in conservation locally;
- Environment Youth Club.

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TABLES

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		1	13-20 Feb 73 April-Aug 1986			24 June-15 July 2000					5 June-10 July 2002									
		(E	Balazs, 19	75)			(Tee	ebaki, 1986	?)			(Stor	ne <i>et al,</i> 20	001)		(N	/langubha	i and Yos	hinaga 200	02)
	#	# New	# Old	#	Total #	#	# New	# Old	#	Total #	#	# New	# Old	#	Total #	#	# New	# Old	#	Total #
Island	Nesters	Nests	Nests	Tracks	Nests	Nesters	Nests	Nests	Track	Nests	Nesters	Nests	Nests	Tracks	Nests	Nesters	Nests	Nests	Tracks	Nests
Kanton Is	2	2	>170	36* sets	>170	0	0	20- 30?*		20-30	ns	ns	ns	ns	ns	0	5	30	5 sets	35
Nikumaroro Is														15-20			18	41		59
McKean Is												2		2	2	ns	ns	ns	ns	ns
Enderbury Is											0	0	0	0	0			160		160
Phoenix Is													5		5		6			6
Manra (Sydney) Is													31		31		2			2
Orona (Hull) Is													12?**		12		8			8
Birnie Is											ns	ns	ns	ns	ns		3	2		5
Total nests observed					>170					20-30					50					275

Table 1: Results of various turtle nesting surveys conducted in the Phoenix Group.

includes 2 new sets of tracks, 21 fresh (~10days old) and 13 sets of tracks reported to occur in June of same year. ? "suspected nests", i.e. it wasn't certain if they were actual turtle nests.

?**possible nests

Table 2: Results of turtle nesting monitoring in North Tarav	va during
the 2007/2008 nesting season.	-

	20	2007 - # Nests			2008 - # Nests						
Village	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Season		
Noto Village	7*	3	4*	0	3	0	0	2	19		
Marenanuka Village	1**						0		1		

*A nester was also observed and includes 2 x 2-week old nests recorded on the first week

of October, thus nesting in the last week of September. ** Nester caught, tagged and released.

		2008/2009 - # Nests									2009/2010 - # Nests							
Island/Nesting site	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Total
Kiritimati	2 old	2 new	0	2 new	2 new	7 new	3 new	3 new	22	3 new	0	0	1 new	1 new	0	2 new	1 new	8
Bay of Wrecks	1 new					(1 nester)		(1 nester)										
Banana NE beach																1 new	0	1
																1 successfully hatched		
	1	1		1	1					1		1			1	•		1
															Mar	rch/April 2010		
Malden															9 old nests			9
															8 new			8
Flint																(10 tracks)		
Starbuck																0		0

Table 3: Results of turtle nesting monitoring conducted in the Line Group during the 2008/2009 and 2009/2010 nesting seasons

Note: During the October 2009 to May 2010 period heavy rainfall with strong wind and flooding of most of access roads on Kiritimati island (December 2009 to March 2010) affected monitoring activities there.

Group/Island	Date Observation/Survey	Age of nests	Estimated nesting time	
Phoenix				
Kanton (Aba-Riringa) Island	February 1973 on Canton (Balazs 1975),	 170 two-three months' old pits Two nesters were observed nesting during the 1 week arrives. 	 This indicates a major nesting on the island in November/December confirming nesting in February 	
	- contra lung to contra luly 2002 (Mangubboi and	20 old posts (without trooks)	- Nexting before lune	
	• early June to early July 2002 (Mangubhai and Yoshinaga 2002).	 - 30 old nests (without tracks) - 5 new nests (with tracks). 	Nesting before June Nesting in May/June/July	
	• April-Aug 1986 (Teebaki, 1986?).	- 20-30 suspected nests	 Not clear when nests were found within the period and estimated age of nests. 	
Enderbury Island	 October and November, although nesting takes place throughout the year (Onorio, 1979). 	 reported relatively heavy nesting along the eastern and western shoreline 	 Indicating nesting in October/November but no data. 	
	Late June to mid-July in 2000 (Stone <i>et al</i> , 2001). All beaches surveyed	- no evidence of turtle nesting was observed.	•	
	• Early June to early July 2002 (Mangubhai and Yoshinaga 2002).	- 160 old nests (without tracks).	 Major nesting before June (actual age of nests not estimated). 	
Orona (Hull) Island	 nesting turtles were present along the western and southern coast throughout the year (Onorio, 1979). 	-	No data to support claim	
	• Late June to mid-July in 2000. Only a small portion of the beaches were surveyed (Stone <i>et al</i> , 2001).	- 12 probable nests were found.	 Nesting before June? (age of probable nests not estimated) 	
	• early June to early July 2002 (Mangubhai and Yoshinaga 2002).	- 8 new nests (with tracks).	Nesting in May/June/July	
Manra (Sydney) Island	?? February along the northwest coast.	 tracks of turtles were sighted along the northwest coast. 	Nesting in February	
	Late June to mid-July in 2000 (Stone <i>et al</i> , 2001). All beaches of island were surveyed	- 31 nests were found	 Major nesting in May/June/July or earlier (age of nests not estimated) 	
	early June to early July 2002 (Mangubhai and Yoshinaga 2002).	- 2 new nests (with tracks).	Nesting in May/June/July	
Nikumaroro (Gardner) Island	• during February on the southern coast.	- tracks of turtles were sighted	Nesting in February	
	• Late June to mid-July in 2000 (Stone <i>et al</i> , 2001). Only the southern of the island was surveyed.	 15-20 fresh tracks, believed to be nesting behaviour in the previous month, 	Nesting in May/June	
	• early June to early July 2002 (Mangubhai and Yoshinaga 2002)	- 41 old nests (without tracks)	 Major nesting before June (nest age not estimated) 	
		- 18 new nests (with tracks).	Nesting in June/July	

Table 4: Estir	nating Turtle Ne	esting Season in	1 Kiribati from 1	results of various su	rvevs.

Bernie Island	• tracks of turtles sighted occasionally throughout the year.	-	Nesting through-out year, but no data to support claim
	• early June to early July 2002 (Mangubhai and	- 2 old nests (without tracks)	Nesting before June
	Yoshinaga 2002)	- 3 new nests (with tracks).	Nesting in May/June/July
Phoenix (Rawaki) Island	Iate June to mid-July in 2000 (Stone <i>et al</i> , 2001). All beaches on island surveyed.	- 5 nests were found, with a desiccated baby green turtle carcass found at the top of one of the nests.	Nesting before June. The desiccated baby green seem to indicate nesting in March/April
	• early June to early July 2002 (Mangubhai and Yoshinaga 2002)	- 6 new nests (with tracks).	Nesting in May/June/July
McKean Island	• late June to mid-July in 2000 (Stone <i>et al</i> , 2001). All beaches of island surveyed.	- 2 recent tracks and nests, believed to be nesting behaviour in the previous month, were identified on the southern beach.	Nesting in May/June
Line Group			
<u>Kiritimati</u>	• Oct 2008/May 2009 survey	 1 old nest in Oct 2 new nests in Oct 2 new nest in Nov 2 new nest Jan 2 new Feb 7 new nests in Mar 3 new nest Apr 3 new nests in May 	Nesting before October and in October to May with highest in March
	•	-	•
Gilbert Group			
North Tarawa	Surveys conducted October 2007-May 2008 on beaches in Noto and Marenanuka villages	 2 nests in last week September 6 nests in Oct 3 nests in Nov 4 nests in Dec 3 nests in Feb 2 nests in May 	Seems to be same level of nesting through-out late Sep-May

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Moving of eggs for incubation under controlled conditions requires permit/approval	• Turtle eggs can be trans-located to suitable areas by suitably qualified biologist or trained personnel, upon approval, if the nest is on a high risk area
	Moving of eggs for incubation under controlled conditions requires permit/approval

Table 5: List of regulations that can be applied for improved protection of marine turtles.

11.	COMMUNITY/CUSTOMARY
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Incorporates relevant traditional knowledge, customary marine tenure and practices

Effective at the community level, using local community members

12. ENFORCEMENT

Enforcement provisions

Fine provisions

13. AGREEMENT/CONVENTION AFFILIATIONS

Party to CITES

Party to CMS

• Signatory to MoU for the conservation of marine turtles in the Pacific (hopefully in the next 10 years!!)