NORTH WEST CAPE AND MUIRON ISLANDS MARINE TURTLE NESTING POPULATION STUDY

A FOCAL MARINE WILDLIFE MANAGEMENT PROGRAM SEGMENT
being part of the Western Australian Marine Turtle Project

REPORT on the 1997/98 SEASONAL WORK PROGRAM

Dr R I T Prince, DCALM, Wildlife Research Centre, PO Box 51, WANNEROO, WA 6065.

Introduction

New arrangements were required to support continuation of the seasonal field work program focussed on the marine turtle populations using nesting beaches of the mainland Jurabi coast adjacent to the Ningaloo Marine Park around North West Cape, and for the complementary work based on South Muiron Island (see Prince 1993, 1994). Work necessary to ensure that the 1997/98 season field program could be implemented was undertaken to early November 1997. Substantial support gained from M G Kailis Gulf Fisheries Pty Ltd provided the required foundation for commencing the necessary seasonal work program. Supplementary support obtained from other sources permitted the full seasonal sampling program to proceed. This report covers work undertaken during the 1997/98 nesting season, and includes information gleaned from reports of captures and/or recoveries of previously tagged turtles from among those handled in previous seasons.

Work Program

The main field sampling and monitoring of the adult female marine turtles nesting on the Jurabi coast beaches of North West Cape, and at South Muiron Island through summer 1997/98 was conducted over the period 30 November 1997 through 25 January 1998. Some additional data were provided by local nature-based tour operators conducting turtle watch tours, and from preliminary beach use assessments mid-November 1997.

Supervision of operational logistics and volunteer team management in the field was assigned by contract to a temporary field technician. The primary on-beach work parties comprised community volunteers, generally with some significant undergraduate biological science or environmental management background as in previous years. Two or three member work parties, depending on expected turtle contacts each night were primarily responsible for the interception, tag and release of new nesting turtles, and the monitoring and appropriate action required to deal with previously tagged turtles when found on the mainland beaches being sampled each night. These latter turtles included remigrant turtles (first tagged in previous nesting seasons), as well as further on beach encounters with 1997/98 tagged turtles. The less extensive but similarly focussed complementary work program attempted at South Muiron Island was dealt with by deployment of a 3 or 4 member work party on the island for that purpose.

Volunteer personnel engaged were changed over at different times through the season, with planned overlap when changes were being made of 1-2 days for replacements to succeed their predecessors on the mainland sites. Work parties assigned to South Muiron Island were generally required to have worked on the mainland beaches program before posting to the island.

Results

In total, 356 new nesting female turtles were tagged and released from the North West Cape beaches, and another 291 from the South Muiron Island location. These female turtles comprised 343 greens, 2 hawksbills and 11 loggerheads from North West Cape, and 220 greens, 2 hawksbills and 69 loggerheads from South Muiron Island: Total all sites: 563 greens, 4 hawksbills, and 80 loggerheads. No female flatback turtles were seen over 1997/98.

Another 137 previously tagged remigrant turtles were encountered on their apparent first time return during season 1997/98 work. These comprised 95 greens, 2 hawksbills and 42 loggerheads. The majority (76/93) of the green turtles were recorded from the mainland beaches, while most loggerheads (38/42) were recorded from the island site. Both remigrant hawksbills were found on the mainland.

In addition to the first time remigrants, another 12 turtles with previous remigrant histories were intercepted. These comprised 2 green and 6 loggerheads from South Muiron Island, and another 2 greens and 2 loggerheads from mainland North West Cape. One of the mainland loggerheads was recorded for the third time; all other turtles were being recorded for their apparent second return.

Additional to the 137 remigrant turtles generally returning in season 1997/98 to beaches in the North West Cape and South Muiron Island area from which they were originally tagged and released, another two green turtles first tagged and released on mainland North West Cape beaches (one each from seasons 1988/89 and 1989/90) were discovered as apparent first time remigrants on Barrow Island in December 1997. Lesser local area crossovers involving North West Cape-South Muiron Island remigrant site relocations were observed for 6 green turtles and 3 loggerheads: five of the six green turtles had moved from mainland to island, as had one of the three loggerheads.

Cumulatively, 5 517 adult female nesting turtles have now been tagged and released from among those nesting at North West Cape and South Muiron Island. These female turtles comprise 3 691 greens, 37 hawksbills and 108 loggerheads from North West Cape, and 961 greens, 10 hawksbills and 708 loggerheads plus two flatbacks from South Muiron Island: Total all sites: 4 652 greens, 47 hawksbills, and 816 loggerheads, plus two (2) flatbacks.

Three hundred and forty-eight turtles (348) in total, able to be assigned to their first encounter nesting season groups, have now been recorded as remigrants: 134 from among those first tagged and released from South Muiron Island, and 214 from the mainland North West Cape beaches. The most recent remigrant records are for nesting turtles originally dealt with during season 1993/94. These remigrant turtles comprise 227 greens, 3 hawksbills, and 118 loggerheads. Most green turtle remigrants (195/227) have initial mainland records, while most loggerheads (102/118) have initial island records. All three (3) hawksbills were from mainland beaches. An additional small number of remigrant turtles have been identified from lost tags scars only, so cannot be assigned to their original encounter group(s).

Among the 95 remigrant green turtles recorded over the 1997/98 season, 11 were first records at 9 years from first encounter, 14 were at 8 years, 1 only was at 7 years, 44 were at 6 years, 18 were at 5 years, and 7 were at 4 years from first encounter. There were no records of any first time 3 year, 2 year, or 1 year remigrant green turtles.

Another three remigrant green turtles, having lost their tags, and identified from tag scars only, could not be assigned any interval.

Of the remigrant loggerhead turtles recorded over the 1997/98 season, 1 was a first record at 8 years from first encounter, 1 other was at 7 years, 7 were at 6 years, 23 were at 5 years, and 10 were at 4 years from first encounter.

Again, there were no records of any first time 3 year, 2 year, or 1 year remigrant loggerhead turtles.

Initial remigration intervals for the two hawksbills recorded were 6 years and 5 years from first encounter on North West Cape.

Multiple remigration interval combinations recorded for the four green turtles seen for the second time were: two at 5 years + 6 years, and two at 4 years + 4 years after their first seasonal tag and release. One of the 8 loggerheads was recorded for the third time, with the remigrant interval combination of 4 years + 2 years + 2 years. The other 7 loggerhead remigrant interval combinations comprised: one at 5 years + 4 years, one at 3 years + 3 years, and 5 at 2 years + 4 years.

Six adult female turtles originally tagged and released from nesting beaches on North West Cape (1 green ex 1988/89 season) or South Muiron Island (1 green - <1991/92 season, and 4 loggerheads - 1 ex 1992/93 season, 3 ex 1993/94 season) had been reported as captured and released from a boat working in a Western Australian trawl fishery (1 North West Cape nesting green from Pilbara, 1 green plus 4 loggerheads from Muiron Island beaches in Shark Bay) prior to the 1997/98 nesting season. None of these six turtles have been recorded since, either as remigrants on nesting beaches to the end of the 1997/98 nesting season, or as repeat trawl captures.

Trawl capture and release of two tagged turtles only (1 flatback ex Rosemary Island 1994/95 season; 1 green ex Lacepede Islands 1988/89 season) has been reported from the Exmouth Gulf trawl fishery to date. Again, we have no subsequent records for either of these turtles.

Further egg clutch counts were done at different times through the season. Nineteen green turtle and four loggerhead turtle clutches were counted at laying on South Muiron Island. Another 13 green turtle clutch counts were attempted on the North West Cape beaches.

An average count of 71.1 $\pm$ 4.82 (s.e.) eggs per clutch was obtained from South Muiron Island green turtle nests [n=19, range of full size eggs per clutch 26 - 101 eggs]. North West Cape green turtle nests counted averaged 89.4 $\pm$ 8.24 (s.e.) eggs per clutch overall [n=13, range of full size eggs per clutch 8 - 120]. Values are changed for the North West Cape green turtle sample, with exclusion of the very low “8” clutch count from this data-set, as follows: Average 96.2 $\pm$ 5.07 (s.e.), n=12, range 63 - 120 eggs.

The South Muiron loggerhead turtle clutch counts averaged 108.8 $\pm$ 17.00 (s.e.) eggs [n=4, range of full size eggs per clutch 64 - 143 eggs].

Discussion

Within season relocations between mainland and offshore island nesting beaches of small numbers of nesting green turtles from among the much larger numbers of nesting turtles involved had been regularly observed in this study prior to the 1997/98 season. The fact that some from among the much smaller groups tagged loggerheads might similarly do so is indicated by the remigrant crossovers now recorded. This information is of importance in understanding patterns of gene flow and maintenance of regional population structure.

The number of new green turtles tagged and released from North West Cape beaches over summer 1997/98 is consistent with moderate intensity nesting attendance only for this site during the 1997/98 season. The relative increase in numbers of remigrant green turtles first recorded over 1997/98 is generally consistent with the hypothesis that green turtles nesting here may have more extended remigration periods than green turtles nesting at the more tropical Lacepede Islands site (west Kimberley, WA), but data available are confounded by the forced interruptions to the required seasonal sampling program in previous seasons. The relative frequencies of 1997/98 remigrant turtles being

associated with each of the primary tag an release sites are also generally consistent with the numbers of remigrant eligible turtles previously tagged and released from either island or mainland beaches.

Absence of any further relevant reports of remigrant nesting or capture of North West Cape and Muiron Island nesting turtles in trawl, or any other local fisheries, precludes much further comment on this interactions topic just now. It is of some interest to note that none of the few tagged turtles reported captured and released by operators in the Exmouth Gulf trawl fishery to date has association with local nesting beaches.

Dispersal data obtained from the available capture and release records, and other encounters reported, show that green turtle females nesting at North West Cape and Muiron Island beaches include some turtles having their home feeding grounds within the Shark Bay WHA to the south, while others have come from feeding grounds in north-west Kimberley coastal waters. Loggerhead turtle females nesting in the same area also include some turtles having their home feeding grounds within the Shark Bay WHA to the south, but others have travelled to feeding grounds as far afield as the Java Sea (Indonesia), and north-east Arnhemland and the Gulf of Carpentaria coast of the Northern Territory. There are, however, insufficient data as yet to adequately define the full range and location of all the feeding grounds occupied by green and loggerhead turtles breeding in the region of North West Cape and the Muiron Islands. We have no at sea capture data for any of the tagged hawksbill turtles nesting here.

The marked turtle population study in progress has not yet been run for long enough to provide adequate sampling of the nesting female turtles of each species likely to be dependent on breeding sites at North West Cape and the Muiron Islands, or to provide good indications of individual nesting frequencies in the long term.

We have no data available as yet on the location of internesting habitats of importance to the North West Cape and the Muiron Islands breeding green, loggerhead and hawksbill turtle females attending that rookery, or on the location of their mating grounds.

Egg clutch counts made at laying for green and loggerhead turtles nesting at mainland and island beaches as specified through the 1997/98 season are variable, with an apparent difference between green turtle average egg numbers for island and mainland nests as counted, and the few island loggerhead clutches counted averaging slightly greater egg numbers than the green turtle clutches. These particular data are not exceptional: Western Australian loggerhead turtles do generally lay larger numbers of eggs per clutch than local nesting green turtles (Prince, WAMTP unpubl. data).

The 1997/98 seasonal green turtle egg clutch data are also within the general range of data obtained in previous seasons from North West Cape and South Muiron Island nests when counts were made. A similar low average number of eggs per clutch was obtained for Muiron Islands nesting greens over the 1992/93 season, but greater numbers of eggs per clutch have been more commonly recorded. The small number of nest counts usually made on the island beaches limits much more comprehensive interpretation, but the island green turtle clutch averages for previous seasons are generally similar to those for the mainland beaches.

Averages for North West Cape green turtle nests counted in previous seasons have ranged from a minimum of c. 65 in 1988/89 to 88 in 1993/94, with observed eggs per clutch ranging from 11 - 159. The 1997/98 clutch count average (90.6 eggs) is the highest obtained so far, but not significantly different from the previous highest. Sampling variation in choice of clutches to count when done as a task secondary to tag and release and monitoring of nesting female turtles on beaches, and differences in the relative efficiency of ‘at lay’ clutch

counting by different observers, are quite probably the most important contributors to the variability of results obtained to date.

The majority of the local nesting loggerhead turtle egg clutch data have been obtained from Muiron Island beaches, consistent with relative numbers of nesting loggerhead turtles using these beaches in contrast with those on the adjacent mainland. Because nesting loggerhead turtles are generally much fewer in number than nesting green turtles on these beaches, the numbers of clutch counts obtained for the loggerheads are also commonly fewer. Seasonal averages previously obtained from Muiron Islands loggerhead nests where 10 or more clutches were counted are generally in the range c. 100 in 1991/92 and 1996/97 to around 120 in 1992/93 and 1993/94, with observed eggs per clutch ranging from 35 - 178.

The maximum of nine loggerhead nests previously counted on North West Cape beaches in 1990/91 averaged 118 eggs, with an observed range of 82 - 142 eggs per clutch. These, and some other but fewer North West Cape nest data from different seasons are considered consistent with the Muiron Islands loggerhead nest data.

The limited egg clutch data now obtained for Dirk Hartog Island nesting loggerhead turtles (Prince 1998) have indicated slightly higher clutch sizes (*eg* 135.9 $\pm$ 8.52 (se), n=15, 1996/97; 132.6 $\pm$ 5.20 (se), n=22, 1995/96) than suggested above for the North West Cape and Muiron Islands nesting turtles, but the range of full size eggs per clutch for Dirk Hartog Island nesting loggerheads (combined over both seasons = 61 - 181 eggs) is similar to the range (35 - 178 eggs) found at North West Cape and the Muiron Islands. Definitive answers to the questions being raised here of possible differences in relative fecundity of these two groups of Western Australian nesting loggerhead turtles require more detailed study.

Acknowledgments

Lea McQuillan's help in arranging the volunteer participation program and managing the North West Cape and Muiron Islands field work for season 1997/98 is gratefully acknowledged. This work would not have been possible without the willing assistance provided once again by a large group of volunteer field workers too numerous to mention here by name.

Core funding support for the field work program provided by M G Kailis Gulf Fisheries Pty Ltd was augmented by additional contributions from Coates Wildlife Tours, Yardie Creek Homestead Caravan Park, Exmouth Cape Tourist Village, Exmouth Dive Centre, and MV Gulf Explorer Marine Wildlife Tours.

The Western Australian Marine Turtle Project is a regional marine wildlife conservation and environmental management program initiated and developed by DCALM, Western Australia in partnership with the Australian Nature Conservation Agency (now incorporated into Environment Australia) and maintained with additional assistance provided from industry by: West Australian Petroleum Pty. Ltd.; Woodside Offshore Petroleum Pty. Ltd.; Apache Energy; Arrow Pearl Co. Pty. Ltd., Hamersley Iron Pty. Ltd.; Robe River Mining Co. Pty. Ltd.; BHP Iron Ore; and Coates' Wildlife Tours; and from the community by: the North West Cape conservation group CARE; the Kwinana-Rockingham-Mandurah Branch of the Western Australian Naturalists' Club; the Vitenbergs family, and others.

Reference

Prince, R.I.T. (1993). Western Australian Marine Turtle Conservation Project: An Outline of Scope and an Invitation to Participate. *Marine Turtle Newsletter*, **60**: 8-14.

Prince, R.I.T. (1994). Status of the Western Australian Marine Turtle Populations: The Western Australian Marine Turtle Project 1986-1990. In: R.

James (Comp.). 'Proceedings of the Australian Marine Turtle Conservation Workshop, November 1990'. Pp. 1-14. ANCA: Canberra.

Prince, R.I.T. (1998). Dirk Hartog Island Loggerhead Turtle Nesting Population Study. A Shark Bay World Heritage Area Management Project. Report on the 1997/98 Seasonal Work Program. Pp. 1-4. Dept CALM: Perth, WA.