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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 1998/99 SEASONAL WORK PROGRAM

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Introduction

Arrangements necessary 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, 1998) required further readjustment due to dwindling resources.

The desirable full seasonal sampling program of previous years could not be sustained, but continuing support from M G Kailis Gulf Fisheries Pty Ltd provided a foundation for planning the necessary seasonal work program. Supplementary support gained from other sources then permitted the implementation of a reduced sampling program. This work was undertaken from early December 1998 through mid-January 1999. Fortuitously, the very low seasonal attendance of nesting green turtles using the mainland Jurabi coast beaches of North West Cape partially compensated for the minimal effort able to be devoted to working there. This allowed the main work program to be focused on the South Muiron Island beaches to cover the expected concentrated use of these by nesting loggerheads.

This report covers work undertaken during the 1998/99 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

Preliminary beach-use assessments provided to mid-November 1998 by local nature-based tour operators also checking their prospects for conduct of turtle watch tours clearly suggested a very low intensity green turtle nesting effort for summer 1998/99, similar to the previously observed occurrence over summer 1990/91. Following from securing of the necessary services of an experienced team leader, a primary field team with equipment necessary to establish and support a field works program was despatched to Exmouth on 3 December 1998. Team arrival coincided with the final phases of activity of TC 'Billy' off the Pilbara coast, but work to document then current use by nesting turtles of the mainland Jurabi coast beaches was able to be started on 7 December 1998.

Confirmation of the earlier indications of minimal green turtle activity there aided the decision to concentrate the limited field sampling and monitoring effort likely to be made available for that purpose through the remainder of the season at South Muiron Island beaches over summer 1998/99, in view of their previously recognized and anticipated continuing importance for nesting by loggerhead turtles. Fortunately, effects of the next following Category 5 TC 'Thelma', which posed further major problems for planned parallel West Kimberley work pre-Christmas 1998, did not interrupt this work plan. Field work at South Muiron Island was conducted over the period 10 December 1998 through 17 January 1999, with some unavoidable forced interruptions over the

Christmas and New Year breaks. Some limited additional data were also obtained from the mainland beaches over this same period, and to termination of the field works program on 20 January 1999.

Management of operational logistics for establishment of the 1998/99 program base, and initial necessary volunteer training and team management in the field was undertaken on short term reassignment by a senior field technician previously engaged in this program. Because of anticipated further difficulties in later carriage of this seasonal program, all other volunteer participants being sought were targeted as mature-age, preferably technically qualified, and having extensive experience in marine turtle, or other related biological field work. These selection criteria were necessarily more rigorous than could be applied in previous years with a more secure program management structure for support and management of community volunteers (eg, generally with some significant undergraduate biological science or environmental management background only).

Single primary work parties only could be engaged through season 1998/99 for the North West Cape and Muiron Islands work, although any groups comprising four persons could safely split to work as separate pairs if necessary. Effectively, this resulted in the South Muiron Island beach work being dealt with by deployment on the island of similar working groups as in most previous years, whereas, by force of circumstance, the mainland Jurabi coast beaches of North West Cape were largely unserviced, as noted above. Each working night, the participants 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 beaches being sampled. These latter turtles included remigrant turtles (first tagged in previous nesting seasons), as well as any further on beach encounters with 1998/99 tagged turtles).

Volunteers working on South Muiron Island were changed over at different times through the season, dependent on practical matters of transport arrangements and required assistance with this, and availability of particular personnel. Some overlap generally occurred when changes were being made.

Results

In total, 9 new nesting female turtles only were tagged and released from the North West Cape beaches, and another 64 from the South Muiron Island location. These female turtles comprised 2 greens and 7 loggerheads from North West Cape, and 64 loggerheads from South Muiron Island: Total all sites: 2 greens and 71 loggerheads. No new nesting hawksbills nor female flatback turtles were seen through season 1998/99.

Another 30 previously tagged remigrant turtles were encountered on their apparent first time return during season 1998/99 work. These comprised 1 green turtle, 2 hawksbills and 27 loggerheads. The single green turtle, and most loggerheads (25/27) were recorded from the South Muiron Island beaches. Both remigrant hawksbills were found on mainland North West Cape beaches.

In addition to the first time remigrants, another 8 turtles with previous remigrant histories were intercepted. These 8 loggerheads were all found on South Muiron Island, and being recorded for their apparent second return.

These 1998/99 seasonal observations are expected to be biased to some extent by the previous pattern of tag and release of marked turtles by species and relative numbers from the North West Cape and South Muiron Island nesting beaches, but the particular result obtained is also reflective of the fact that the 1998/99 sampling effort was concentrated primarily on South Muiron Island, and further in light of the minor green turtle nesting attendance throughout season 1998/99.

Cumulatively, 5 590 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 3 693 greens, 37 hawksbills and 115 loggerheads

from North West Cape, and 961 greens, 10 hawksbills and 772 loggerheads plus two flatbacks from South Muiron Island: Total all sites: 4 654 greens, 47 hawksbills, and 887 loggerheads, plus two (2) flatbacks.

Three hundred and seventy-eight turtles (378) in total, able to be assigned to their first encounter nesting season groups, have now been recorded as remigrants: 160 from among those first tagged and released from South Muiron Island, and 218 from the mainland North West Cape beaches. The most recent remigrant records are for nesting turtles originally dealt with during season 1996/97. These remigrant turtles comprise 228 greens, 5 hawksbills, and 145 loggerheads. Most green turtle remigrants (195/228) have initial mainland records, while most loggerheads (127/145) have initial island records. All five (5) 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).

The single remigrant green turtle recorded over the 1998/99 season appeared to be a first record at 12 years from first encounter.

Of the remigrant loggerhead turtles recorded over the 1998/99 season, 1 was a first record at 7 years from first encounter, 14 were at 6 years, 10 were at 5 years, and 1 was at 2 years from first encounter. There were no records of any first time >7 years, nor any 4 year, 3 year, or 1 year remigrant loggerhead turtles through season 1998/99.

Initial remigration intervals for the two hawksbills recorded were 7 years and 3 years from first encounter on North West Cape.

Multiple remigration interval combinations recorded for the 8 loggerheads being seen for the second time after their first seasonal tag and release were: one at 2 years + 6 years, two at 2 years + 5 years, one at 5 years + 2 years, one at 4 years + 2 years, one at 2 years + 3 years, and 2 at 3 years + 2 years.

No new records to add to the six previous case histories of trawl captures of nesting turtles first tagged and released from North West Cape or South Muiron Island beaches were obtained through season 1998/99, and no further observations were reported for these first six turtles, either as remigrants on nesting beaches to the end of the 1998/99 nesting season, or as repeat trawl captures elsewhere.

There were also no further reports from the Exmouth Gulf trawl fishery of any observations of tagged turtles from among those comprising other WAMTP study nesting groups. Again, there were no subsequent records for either of the two turtles previously reported trawled and released by this fishery. However, one loggerhead turtle of previously undetermined sex, but of medium adult size for this species Western Australian nesting populations, first tagged and released at sea after temporarily stranding in an inter-tidal pool in the southern part of Exmouth Gulf late-October 1994, was discovered among the nesting females at Dirk Hartog Island late-January 1999.

Further egg clutch counts were done at different times through the season. Twenty-two loggerhead turtle clutches were counted at laying on South Muiron Island. These included clutches from 16 new tagged turtles and another 6 from remigrant turtles. One green turtle clutch and two loggerhead clutch counts were attempted on the North West Cape beaches.

The clutch egg counts for South Muiron new tagged loggerhead turtles averaged 100.6 $\pm$ 5.63 (s.e.) eggs [n=16, range of full size eggs per clutch 68 - 148 eggs]. The clutch counts from the remigrant loggerheads averaged 114.3 $\pm$ 9.12 (s.e.) eggs [n= 6, range of full size eggs per clutch 80 - 144 eggs].

The two loggerhead clutch counts from new tagged turtles on North West Cape were at the low end of the range observed at South Muiron (83 and 95 eggs). The single green turtle clutch counted was also relatively low (65 eggs).

Discussion

The North West Cape and Muiron Islands 1998/99 seasonal records are dominated by two factors: the very restricted works program that could finally be mounted being South Muiron Island focused, because of the greater expectation of loggerhead turtle nesting there, and the obvious seasonal minimum attendance of nesting green turtles, especially relevant to the North West Cape mainland beaches. Consequently, further observations of any possible within or between season relocations between mainland and offshore island nesting beaches of any nesting adult green or loggerhead turtles were thus pre-empted. Such occurrences have been observed previously, with the information being of importance in understanding patterns of gene flow and maintenance of regional population structure.

The very few green turtles tagged and released and/or further observed from the North West Cape and South Muiron Island beaches over summer 1998/99 is consistent with the minimum intensity nesting attendance only for this species and area during the 1998/99 season, but these numbers are probably much less than might otherwise have been recorded with a concurrent sustained mainland beach sampling effort. Direct comparison of these data with the previous 1990/91 season minimum green turtle nesting attendance records is thus limited, other than to note that the seasons 1990/91 and 1998/99 results do record the two most recent minima in nesting activity for adult female green turtles comprising this stock unit within the WAMTP data-set accumulated from field-work over the past twelve years. Prior data for further comparison and analysis are unavailable.

Numbers of nesting loggerhead turtles observed and recorded from the South Muiron Island beaches over season 1998/99 were more similar to past years WAMTP results for this species than was the case for the numbers of nesting green turtles (above). However, the total South Muiron Island loggerhead turtle numbers observed for season 1998/99 does fall among the middle-lower part of the previously accumulated range recorded since focal attention was directed to the nesting loggerheads attending that site in season 1991/92. The 1998/99 season loggerhead result is also well below the peak number of 248 turtles recorded from South Muiron Island over season 1992/93.

Relative between season variation in the numbers of nesting adult female loggerheads attending a preferred nesting site is expected to be less than for green turtles, in view of the primary carnivore/herbivore diet differences between these species as adults, but the longer term annual average nesting abundance for the carnivorous loggerheads might also be expected to differ in a predictable way from that for the greens. Expression of these anticipated between species populations trophic level differences at a shared nesting location will of course be influenced by a range of other factors. Apart from accounting for the obvious problems that have affected our attempts at achieving comparable beach sampling effort from season to season, other aspects related to the biological differences between species and the ecological processes influencing the actual and relative abundances of nesting turtles attending South Muiron Island each nesting season could ultimately warrant further detailed investigation.

The 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 has been noted. The movement of an apparent long term Exmouth Gulf resident loggerhead turtle to visit a nesting beach at Dirk Hartog Island over season 1998/99 raises another case for conjecture on the fact that this, and none of the few other tagged adult turtles reported from within Exmouth Gulf previously, has any demonstrated association with the local area nesting beaches.

No new dispersal data were obtained to add anything to the previously available capture and release records, and other encounters reported, showing 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 still, 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 also still lack at sea capture data for any of the tagged hawksbill turtles nesting here. This absence of necessary feeding ground information is common to other Western Australian nesting hawksbills tagged and released from other WAMTP nesting population study locations. Apart from the problems posed by relatively small numbers of adult female turtles being involved, it now appears likely that this gap in necessary knowledge will only be filled by direct investigation of the whereabouts of these turtles at sea.

The marked turtle population study in progress has not yet been run for long enough to provide opportunity for 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 the individual nesting frequencies in the long term. The higher proportion of remigrant turtles now being found among the nesting loggerheads in comparison to the greens does however suggest a difference between these species in average duration of their particular remigration intervals - the loggerheads are likely to prove much shorter. The data-set required for properly addressing these questions is in fact proving more difficult to acquire than it should because of the externalities that have already interrupted continuity of sampling across years and the associated problems affecting the sampling effort able to be deployed from season to season.

Discovery of the locations of internesting habitats and identification of their importance to the North West Cape and the Muiron Islands breeding green, loggerhead and hawksbill turtle females attending that rookery, and of the associated locations of their mating grounds is still yet to be addressed.

The additional egg clutch data obtained for season 1998/99 are generally consistent with the previous limited information obtained from the green and loggerhead turtles nesting in the North West Cape and South Muiron Island area.

Acknowledgments

Establishment and management of the limited beach work program possible for season 1998/99 in the North West Cape and Muiron Islands area proved a difficult task. Andy Williams' (CALMScience, Woodvale) experience and help in getting this work started in December 1998 was essential. The continuing effort of volunteer Carol Jadraque, from the beginning, and then in keeping the program functional, with necessary help from Carolyn Williams and Adam Meyer (CALM, Exmouth District), for the remainder of the season to late January 1999, is gratefully acknowledged. The results obtained would also not have been possible without the willing assistance provided once again by the group of other volunteer field workers involved - the special efforts put in at South Muiron Island by Tim Gamblin and his crew over the Christmas-New Year period, and, later into January 1999, by Roger van der Leley and partner, are noted.

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