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 1999/2000 SEASONAL WORK PROGRAM

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Introduction

Further reduction in project capacity (dependent on maintenance of project core group support function, the securing of funds necessary to cover field operations, and deployment of requisite skilled field team leaders and workers on site) prior to season 1999/2000 almost prevented implementation of any of the otherwise desirable continuation of the field work program being 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, 1999). A short-term monitoring exercise for the mainland Jurabi coast area only was made possible through the dedicated effort offered by a small party of previous competent program volunteers, with some help from CALM Exmouth office. This work was undertaken from late December 1999 through early-January 2000.

This report covers work undertaken by the above-mentioned group during the 1999/2000 nesting season, supplemented by some casual observations reported by other parties from outside this period, and includes information gleaned from reports of captures and/or recoveries of previously tagged turtles from among those handled in previous seasons.

Work Program

Unlike season 1998/99, when preliminary beach-use assessments provided to mid-November 1998 by local nature-based tour operators (also checking their prospects for conduct of mid-season turtle watch tours) clearly foreshadowed the very low intensity green turtle nesting effort later observed over summer 1998/99, as had been documented once before through season 1990/91, the prospects for season 1999/2000 suggested green turtles would again be nesting in abundance. Failure to record any of turtles nesting through this 1999/2000 season event would represent a serious omission, having regard to previous investment in the tag and release program aimed at providing requisite data for the North West Cape and Muiron Islands nesting green turtle population study launched in 1988/89. This circumstance would already have arisen here over season 1998/99, but for the fortuitous occurrence of our second minimal intensity green turtle nesting event (Prince 1999).

The limited resources able to be harnessed for the season 1998/99 North West Cape and Muiron Islands work were thus allocated to addressing the parallel problem of servicing the main part of the local loggerhead turtle nesting population study concentrated on South Muiron Island (see Prince 1993, 1994, 1998, 1999). This clear choice was available because the expected interseasonal variation in nesting abundance for the carnivorous loggerhead conforms to a pattern differing from that for the green turtle. The green turtle and loggerhead turtle population studies are complementary, however, not interchangeable, so exercising of the latter choice simply postponed the impending/incipient further collapse of this nesting turtle population study

segment within scope of the Western Australian Marine Turtle Project (WAMTP; Prince 1993).

The prospect of complete collapse of the North West Cape and Muiron Islands segment of the WAMTP for season 1999/2000 that was still being driven by the interaction of the inadequate and insecure operations funding availability and the concurrent process of loss of previously skilled volunteer personnel and program management capacity was only narrowly averted. An offer was made by one former program team leader to undertake a short period of largely self-funded field work with the help of a small group of associates if the necessary materials and logistic support on-site could be provided. A suitable arrangement for support of a short-term low intensity work program focussed on the Jurabi coast nesting beaches of North West Cape was able to be made with the help of CALM Exmouth District, so this offer was accepted. Servicing of a Muiron Islands work program could not be accommodated so the needed work there was abandoned.

Effectively, a single primary work party only was engaged for the season 1999/2000 North West Cape work, although the four persons initially engaged were able to safely split and work as separate pairs if necessary. 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 1999/2000 tagged turtles). Casual observations of tagged turtles on beaches being made by a variety of other people were also reported.

Results

In total, 213 new nesting female turtles were tagged and released from the North West Cape beaches sampled for season 1999/2000. These female turtles comprised 205 greens, 7 loggerheads and one hawksbill. Female flatback turtles were not found.

Another 52 previously tagged interseasonal remigrant (ISR) turtles were encountered on their apparent first time return during season 1999/2000 work. These comprised 50 green turtles and 2 loggerheads.

In addition to the first time remigrants, another 11 green turtles with previous remigrant histories were intercepted. All were being recorded for their apparent second returns.

Cumulatively, 5 807 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 3 899 greens, 38 hawksbills and 123 loggerheads from North West Cape, and 964 greens, 10 hawksbills and 771 loggerheads plus two flatbacks from South Muiron Island: Total all sites: 4 863 greens, 48 hawksbills, and 894 loggerheads, plus two (2) flatbacks.

Four hundred and thirty turtles (430) 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 270 from the mainland North West Cape beaches. The most recent ISR green turtle records are for nesting turtles originally dealt with during season 1996/97. The two new loggerhead turtle ISR records are for turtles tagged and released in seasons 1996/97 and 1997/98. By species group, these remigrant turtles comprise 279 greens, 5 hawksbills, and 146 loggerheads. Most green turtle remigrants (246/279) have initial mainland records, while most loggerheads (126/146) have initial island records. All five (5) hawksbills were tagged and released 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 50 first-time remigrant green turtles recorded over the 1999/2000 season comprised: 13 at 11 years from first encounter, 3 at 10 years, 20 at 8 years, 8 at 7 years, 4 at 6 years, and 2 at 3 years. One of the 6 year ISR interval turtles recorded on North West Cape was originally tagged and released at South Muiron Island. One other initial North West Cape tagged and released green turtle with an apparent 7 year ISR interval was reported from a Barrow Island nesting beach in season 1999/2000.

The ISR intervals for the two first time remigrant loggerhead turtles recorded over the 1999/2000 season were at 2 years and 3 years from first encounter. Both turtles were tagged and released from North West Cape beaches.

Multiple remigration interval combinations were recorded for green turtles only. No loggerheads were found, no doubt due largely to the fact that South Muiron Island beaches were not able to be included in the 1999/2000 work program. Among the 11 green turtles being seen for the second time after their first seasonal tag and release were: one previous 'lost tag' individual of unknown first + 8 years, one at 7 years + 4 years, one at 6 years + 4 years, one at 3 years + 7 years, one at 4 years + 6 years, three at 4 years + 4 years, two at 5 years + 3 years, and one at 5 years + 2 years.

Two new records for loggerhead turtles were added through season 1999/2000 to the seven previous case histories of at-sea captures of nesting turtles first tagged and released from North West Cape or South Muiron Island beaches. Unlike six of the first seven turtles, which were reported from trawl (5) or other commercial net fishery operations (1; and the seventh from indigenous hunting for customary use), these two individuals were captured by other means – one from entanglement in a rock lobster potline off the Western Australian south coast, the other by 'rodeo' capture near Monkey Mia in the eastern gulf region of Shark Bay. Both were released alive. No further observations were reported through the 1999/2000 nesting season, and to the date of this reporting, for either of these last two turtles, or for any of the previous five trawl captured turtles which may have survived on release.

There was one further (1999/2000 season) capture reported from the Exmouth Gulf trawl fishery of a tagged flatback turtle. This turtle was from the Barrow Island nesting population season 1993/94 group. There were no other species captures reported from along the Ningaloo coast or within Exmouth Gulf for turtles comprising other WAMTP study nesting groups. There were no subsequent records for any of the turtles previously reported trawled and released by the Exmouth Gulf fishery.

Two further green turtle egg clutch counts at laying were reported – one at 75 eggs, the other at 150 eggs.

Progressive summaries of results from parts of the tagged nesting turtle work focused in the North West Cape area are presented in Figures 1 - 7.

Discussion

The 1999/2000 seasonal records for the North West Cape and Muiron Islands population studies are limited by two factors: the very restricted works program that could finally be mounted being focused only on the Jurabi coast mainland beaches of North West Cape, and the inability to cover the loggerhead turtle nestings occurring at South Muiron Island.

The second recent seasonal minimum attendance of nesting green turtles observed over season 1998/99 on the North West Cape beaches (Prince 1999) was followed by an abundance of nesting green turtles, so the limited sampling of this through season 1999/2000 certainly precluded interception of many probable interseasonal remigrants then expected to be attending. Information otherwise available based on previous seasons investment in this longitudinal population study was thus wasted. Likewise, the loggerhead turtle population data dependent on the South Muiron Island work program being serviced was lost.

The high numbers of green turtles attending the North West Cape beaches over summer 1999/2000 did however permit the interception and recording of 266 individuals being tagged and released from and/or further observed on these beaches with the limited effort deployed. The small number of loggerhead and hawksbill turtles recorded was expected.

The nesting green turtle data shown in Figure 1 indicate, firstly, the cumulative interaction of seasonal field sampling intensity with the expected environmentally mediated swings in nesting abundances. The new tagged turtles low points for seasons 86/87, 87/88, and 94/95 primarily represent minimal sampling effort in the absence of a supported field program. The other two minima for seasons 90/91 and 98/99 more closely reflect the scarcity of nesting green turtles at North West Cape in those seasons.

However, the 90/91 minimum was obtained from a sustained beach sampling program comparable to other seasons (particularly from 88/89 through 95/96, as excepted above). In contrast, the 98/99 result is the product of a forced but considered acceptable deletion of any extended Cape beach sampling program that season in light of the obvious scarcity of nesting green turtles in the field and our previous experience coupled with minimum resources for sustaining any local field work (see Introduction). Nevertheless, these two minima are considered reliable indicators. Season 93/94 also represents another, but less severe low.

Other seasons' green turtle data show the additional range of variation in nesting abundance in better seasons. These data are more directly comparable when compensated for the differences due to problems in maintaining the desired seasonal work programs, especially post-95/96 (Figure 2).

Figures 1 and 2 also show the expected gradual increase with sustained sampling in the number and proportion of interseasonal remigrants among the nesting green turtles visiting North West Cape. These data require further interpretation (below).

Figures 3 and 4 show the cumulative seasonal data for North West Cape nesting loggerhead turtles. The same caveats re sampling programs work noted for the green turtles data in Figures 1 and 2 apply here. Nesting loggerhead turtles are scarce on the beaches most frequented by the North West Cape nesting green turtles, but their apparent seasonal variations in nesting abundance are not conforming to the same patterns as the greens. The increases in the interseasonal remigrants indicators for the loggerheads differ as well.

The nesting loggerheads are generally few, and most usually intermingled with many more nesting green turtles. The possibility of sampling saturation effects also influencing the numbers of loggerheads being recorded seasonally must be considered. Data in Figure 7 suggest that this factor must be taken into account, but behavioural differences in nesting could also be important.

Taken together, the cumulative green and loggerhead nesting turtle data presented in Figures 1 through 4 show no particular trends in recent abundance of these two species of nesting turtles visiting North West Cape beaches.

Nesting hawksbill turtles are also regular visitors to this same stretch of North West Cape beaches, but even less commonly recorded than the loggerheads. Observations are too few for any more detailed analysis.

The pattern of increase in interseasonal remigrant(ISR) nestings for the green turtles suggests few turtles returning to nest again within periods of three years or less from their previous visit, and that relatively few of the turtles are doing so. This matter is explored further via Figures 5 and 6, which combine data from both South Muiron Island and North West Cape tagged groups.

The first point to be emphasized is that there is no obvious regularity in the ISR patterns recorded for green turtles from the different seasonal tagged groups. Conditions inducing the irregular but apparently reasonably frequent seasonal low nesting attendances help confuse the emerging picture. Very long periods of apparent inactivity between successive seasonal breeding attempts

also seem typical of many turtles in these groups. The possibility of sampling problems further complicating this matter has been considered. The data in Figure 6 support the view that inability to maintain the same standard sampling program across seasons has variably affected the absolute numbers of ISR green turtles being detected, but the indicated individual span of times between separate seasonal nesting events by different turtles is considered reliable. Similar ISR interval observations have been recorded in parallel from green turtles nesting at Barrow Island (WAMTP, unpublished data).

The ISR interval data for the few loggerhead turtles nesting on the North West Cape beaches are not detailed here. However, the 'Remigrants%' data in Figure 4 are suggesting that remigration behaviour for the loggerheads is not exactly the same as for the green turtles. Previous seasons data from the more numerous nesting loggerheads using South Muiron Island beaches also suggest that remigration intervals of 2 or 3 years are much more frequent for this species in comparison with the greens. This observation of a greater frequency of short term remigration intervals for the regional nesting loggerheads population is supported by the more consistent data set for the large Dirk Hartog Island nesting group (Prince 1999, Figure 2; 2000 in prep.). Apart from the obvious possibility of a carnivore versus herbivore influence on this difference, the fact that the North West Cape nesting green turtles are near the southern limit of the species' breeding range in Western Australian waters warrants further consideration later with a more comprehensive data set.

No further information on at sea locations for North West Cape area nesting green turtles was received this year, but the two additional loggerhead turtle locations reinforce previous observations of their wide dispersal at sea to feeding grounds. The south coast location of capture for one of these is the most southerly recorded for a Western Australian nesting loggerhead. This information is incorporated in Baldwin *et al.* (in press; Fig 7).

The capture of another tagged adult female flatback turtle (ex Barrow Island nesting) in Exmouth Gulf reinforces the view that Exmouth Gulf waters are included in the normal feeding ground range of the Western Australian nesting flatback turtles. One other flatback turtle from the Rosemary Island nesting group of 1994/95 was reported previously.

We have still no at sea capture data for any of the tagged hawksbill turtles nesting here, in common with other Western Australian nesting hawksbills tagged and released from other WAMTP nesting population study locations. As mentioned in previous reports, this gap in necessary knowledge of feeding ground associations will only be filled by direct investigation of the whereabouts of these turtles at sea.

Likewise, discovery of the locations of internesting habitats and determination of their relative importance to the North West Cape and the Muiron Islands breeding green, loggerhead and hawksbill turtle females, and mapping of the associated locations of their mating grounds requires work at sea. This need is still to be addressed.

As mentioned in regard to the compounding difficulties of maintaining this particular nesting populations sampling program segment of the WAMTP work coming into season 1999/2000, the main investment in the loggerhead turtle focus on the South Muiron Island beaches has been rendered largely ineffectual. The North West Cape nesting green turtle study also has now practically been collapsed. Both of these unfortunate intercessions have occurred well before the time needed to obtain the information required to gain adequate understanding of the dynamics of these populations.

On top of this, further sampling has been impossible over the past 2 years^{+} of the growing juvenile and other turtles from among the large multi-species tagged feeding ground group established over the period 1989/90 - May 1998 with the help of volunteer colleagues previously working from the Sandalwood Peninsula location at the bottom of Exmouth Gulf. These participants retired from their commercial fishery work late-1998. Substitute measures to replace that community effort, and to also build on the foundation laid have not been

practically achievable since then. This mid-range located tagged group is the only one previously able to have been set-up and maintained as part of the WAMTP to provide a focus on growth and development of some of the Western Australian resident juvenile turtles.

Other aspects of the particular North West Cape – Muiron Islands – Ningaloo coast and Exmouth Gulf WAMTP segment being discussed here that are relevant to better environmental management and sustainable commercial fisheries and tourism are gradually being better acknowledged. Generally slowly, but also still variably across the particular local associated bodies, the lessons and information being generated from this work are being taken into consideration in linked coastal planning matters, and in the day to day business, work, and other activities conducted along the coast and in the water.

It is to be hoped that the unfinished work of the contributors to previous successes of this WAMTP program can now be properly recognized for its intrinsic worth, and moved ahead as intended once again before it is too late.

Acknowledgments

The dedicated efforts of Tim, Paul, and Traci Gamblin, and Justine Coulson in first getting themselves on-site to provide a sampling presence on the North West Cape beaches for season 1999/2000 and then doing the work possible is gratefully acknowledged. Carolyn Williams (CALM Exmouth) helped make this contribution effective. Incidental field operations expenses were covered by CALM Exmouth.

Funding sufficient to cover part of a more comprehensive 1999/2000 field works program for the North West Cape and Muiron Islands area similar to previous years was again offered by M G Kailis Gulf Fisheries Pty Ltd. Funds from this source were not called on because of the inability to adequately staff and support, and fully fund, such effort. This offer of support is much appreciated. It is hoped that a mutually satisfactory and productive relationship might be resumed soon.

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 to date with additional assistance in differing modes, etc, being provided from industry by: West Australian Petroleum Pty. Ltd., and its recent successor Chevron Australia 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; M G Kailis Gulf Fisheries Pty Ltd; 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, the Wanns, and many others.

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Figures

Figure 1. Comparison Between Seasons in Numbers of Green Turtles Beaching to Nest on North West Cape.

Figure 2. Comparison Between Seasons of Average Numbers of Green Turtles Handled per Work Team Night.

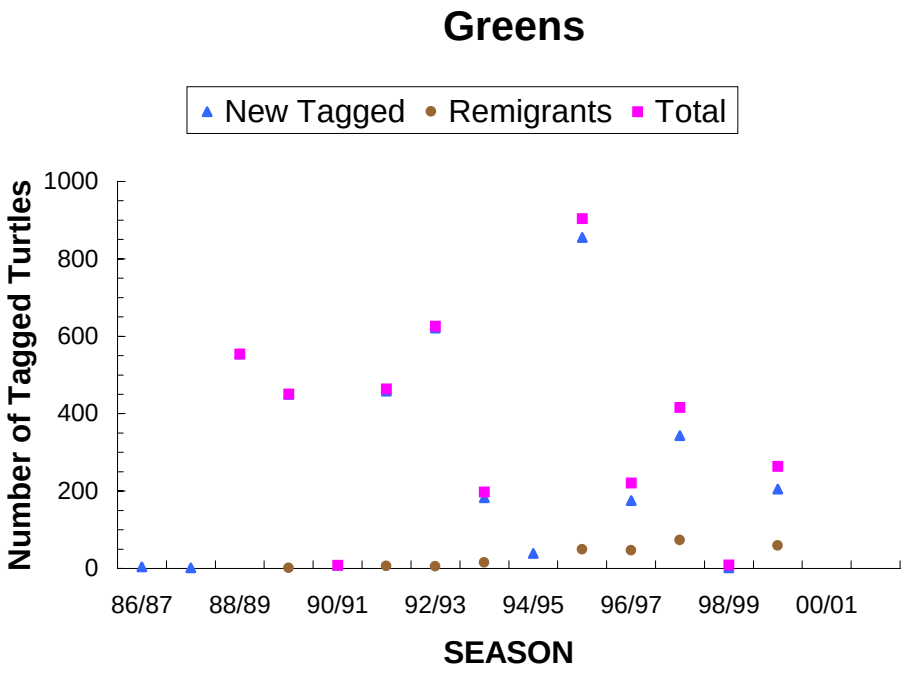
Figure 3. Comparison Between Seasons in Numbers of Loggerhead Turtles Beaching to Nest on North West Cape.

Figure 4. Comparison Between Seasons of Average Numbers of Loggerhead Turtles Handled per Work Team Night.

Figure 5. Comparison of Fraction of Green Turtle Year Groups at Observed First Remigrant Intervals.

Figure 6. Cumulative Fraction of Green Turtle Year Groups Observed to Maximum First Remigrant Time.

Figure 7. Comparison of Number of Nesting Loggerhead Turtles Handled by Season versus the Number of Nesting Green Turtles.



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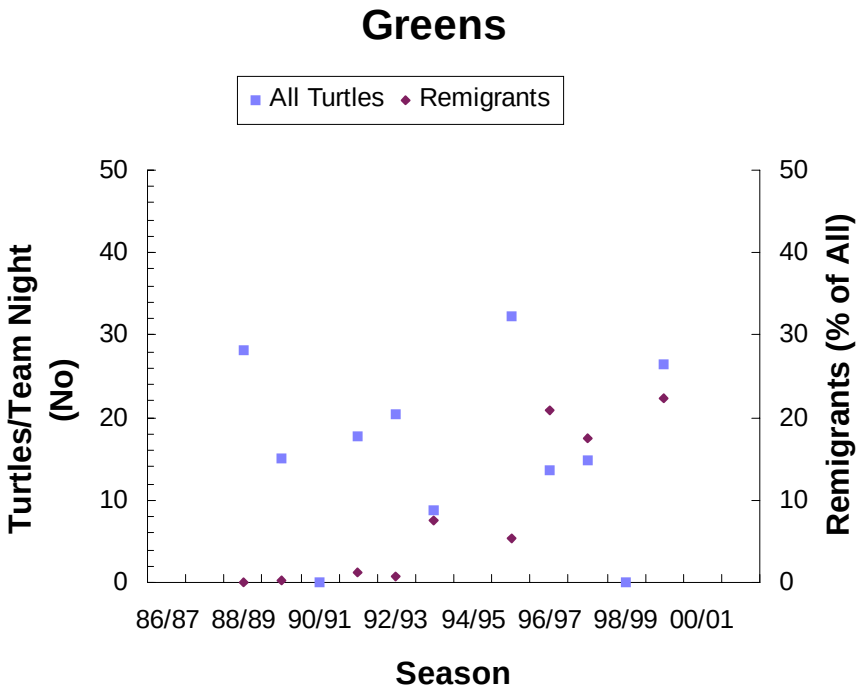

Figure 2. Comparison Between Seasons of Average Numbers of Green Turtles Handled per Work Team Night.

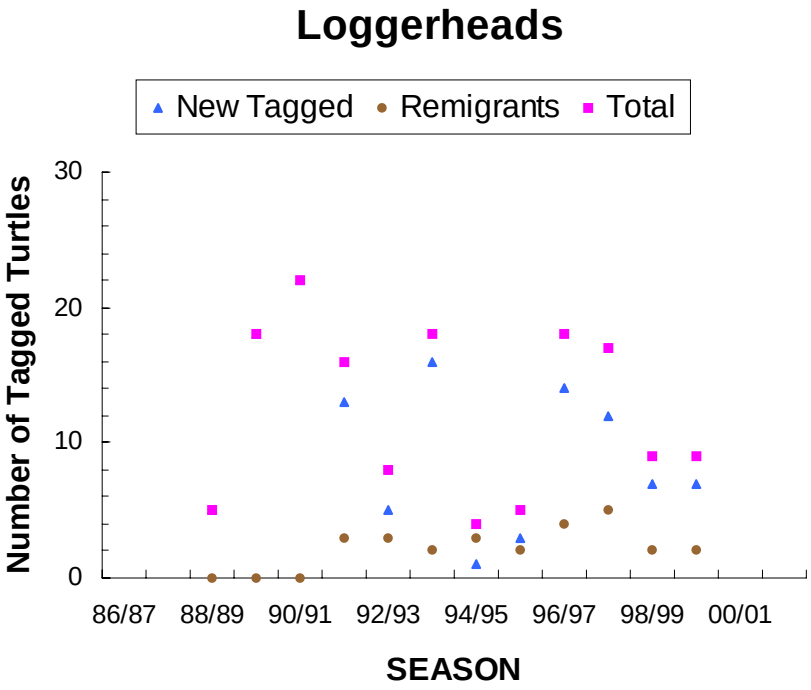

Figure 3. Comparison Between Seasons in Numbers of Loggerhead Turtles Beaching to Nest on North West Cape.

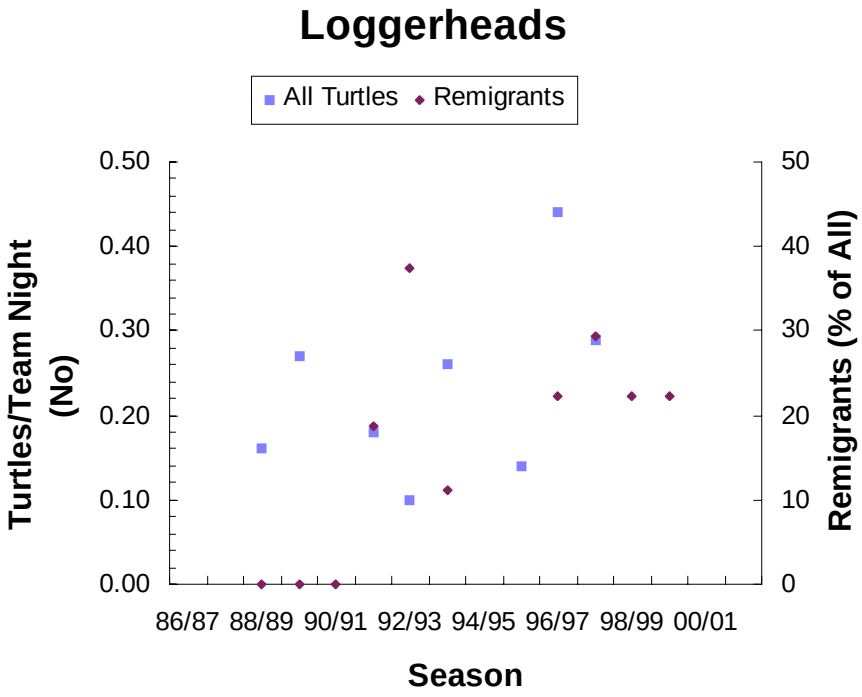

Figure 4. Comparison Between Seasons of Average Numbers of Loggerhead Turtles Handled per Work Team Night.

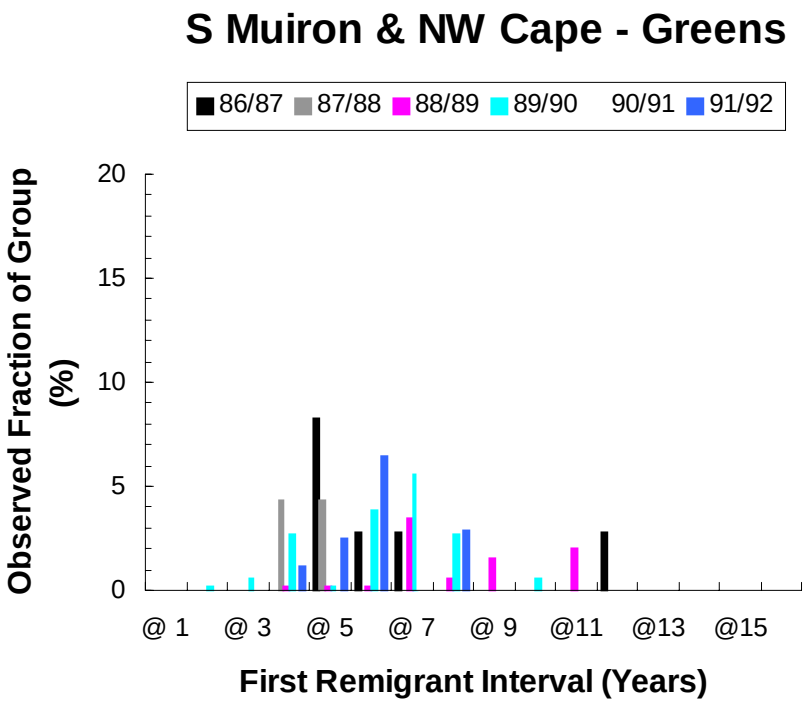

Figure 5. Comparison of Fraction of Green Turtle Year Groups at Observed First Remigrant Intervals.

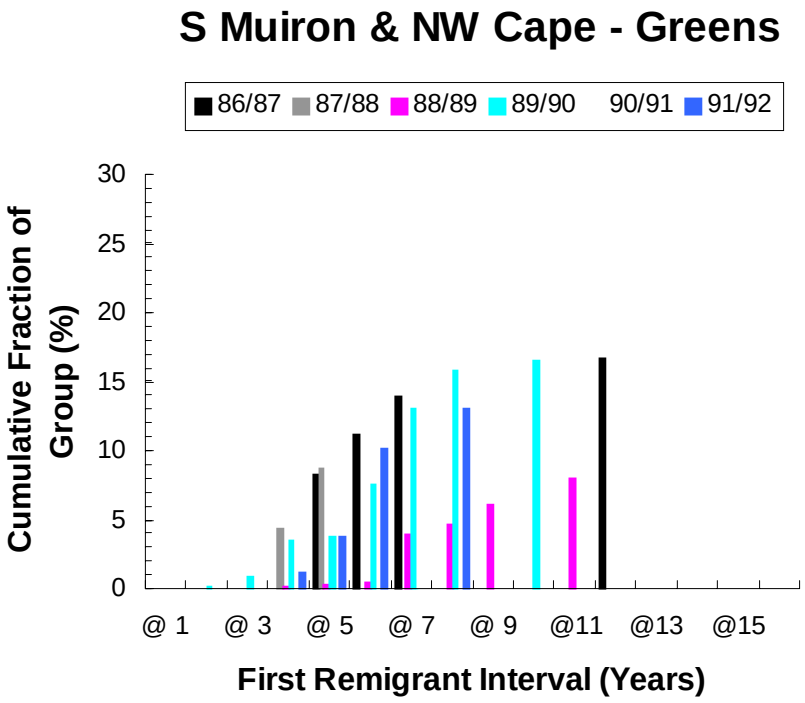

Figure 6. Cumulative Fraction of Green Turtle Year Groups Observed to Maximum First Remigrant Time.

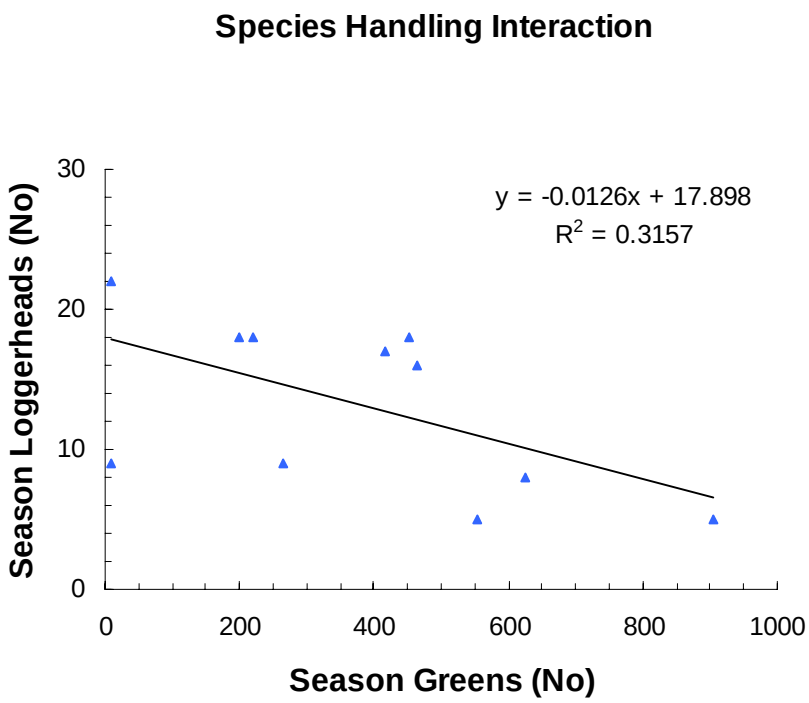

Figure 7. Comparison of Number of Nesting Loggerhead Turtles Handled by Season versus the Number of Nesting Green Turtles.