# A SURVEY OF BEACH LITTER IN MARMION MARINE PARK
# JULY 2002

**DON POYNTON** (FOMMP)[1]
**LYNDA ARNOLD** (FOMMP)
**CHRIS MATHER** (CALM)[2]
**JEREMY PAYET** (CALM WORK EXPERIENCE)
**DAWN CHIVERS** (FOMMP)
**BRENDA ROBERTS** (FOMMP)
**VICKI GOUTEFF** (FOMMP)
**JILL ROBERTS** (FOMMP)
**ALAN COATES** (FOMMP)
**DONNA BIRCH** (FOMMP)
With assistance from
**1st NORTH SCARBOROUGH SCOUT GROUP**
**LEADER ENID TYLER**
**SCOUTS: KIM P, AMY P, RYAN D, ALEX T, JAROME O, RODNEY D, PETER D, SELBY W.**

[1]FOMMP – Friends of Marmion Marine Park
[2]CALM – Dept of Conservation & Land Management

## ABSTRACT

In July 1985 a study was conducted by the Environmental Protection Authority to ascertain the amount, composition and source of litter on eight 100 metre transects within the then proposed Marmion Marine Park. This survey was repeated at the same time of year, in 1992 and again in 2002 by The Friends of Marmion Marine Park.

A total of 108 Kg of litter was gathered from a total area of 20,000 square metres. Of the total, 63.9 Kg (59%) was attributed to Beach Users and 44.3 Kg (41%) to Marine Users. Based on the survey results it is estimated that a total of 1.75 tonnes of litter would have been on the beaches of the park.

A comparison of the results from the 2002 survey with the previous surveys shows a 10% increase in the amount of litter collected overall but a significant decrease in the amount attributed to the rock lobster industry.

FRIENDS OF MARMION MARINE PARK

CALM

# INTRODUCTION

The Marmion Marine Park was established in 1987. The shoreline boundary of the park comprises about 18.5 km of coastline between Trigg Island and Burns Beach. Approximately 6 km or 70% consists of rocky shoreline and reef, the rest is sandy beach. Because of the park's proximity to Perth's expanding northern suburbs, the beaches, reefs and limestone headlands are being increasingly patronised by the community in a variety of recreational, educational and commercial activities. Figures for recreational boating have also escalated from those of 1985 and with the construction of modern launching facilities at Hillarys Marina and Ocean Reef, the community has ready access to the 9,500 hectares of the marine park.

In July 1985 the Department of Conservation and Environment and the Centre for Water Research conducted a baseline litter survey at 8 beach sites within the then proposed boundaries of the Marmion Marine Park. The sites covered the area between Trigg Island in the south, to Ocean Reef Marina in the north. Table 1 lists the sites and their approximate locations. A detailed description of each site is given in Appendix 1. The survey consisted of gathering all the litter between the waters edge and the vegetation line along a 100 metre transects. The results were written up in a unpublished report by Cary et al (1985).

Prior to the declaration of the marine park the northern boundary was redefined to extend to the northern end of Burns Rocks.

The litter survey was repeated again in 1992, five years after the establishment of the park. This survey was conducted by members of The Friends of Marmion Marine Park. The results were written up in an unpublished report by Edwards et al (1992).

The original 100 metre transects of the eight survey sites were sampled again on Saturday 6 July 2002 by members of Friends of Marmion Marine Park with the assistance of staff from CALM and the 1st North Scarborough Scout group. The survey was conducted in keeping with the original survey dates - immediately after the close of the rock lobster fishing season and at a time of minimum beach usage by the public.

Again, the same methods were used by the survey team, although a more thorough breakdown of items in the two categories; beach users and marine users, was considered useful to determine the origin of the refuse.

# METHODOLOGY

The 2002 survey utilised Geographical Positioning Survey (GPS) for the first time. The co-ordinates of the starting point of each transect was recorded using a handheld GPS recorder ( refer to Table 1). A 100 metre transect was marked out approximately parallel to the shoreline using a pedometer. The co-ordinates of the end point were then recorded with the GPS recorder.

The same collecting methods were used as in the original 1985 survey, with a number of people physically collecting all the visible litter into bags with the site number on them. The bags were sealed and stored until they could be sorted and weighed.

**Table 1. Location of Sites**

| SITE NUMBER | LOCATION | CO-ORDINATES (Starting Point) | DIRECTION OF TRAVERSE |
|---|---|---|---|
| Site 1 | Bennion Street - beach at bottom of steps | S 31deg 52min 21sec<br>E 115deg 45min 07sec | South |
| Site 2. | Sorrento Street – south of carpark | S 31deg 51min 34 sec<br>E 115deg 45min 07sec | South |
| Site 3. | Marmion Angling and Aquatic Club - north of clubrooms | S 31deg 50min 19sec<br>E 115deg 45min 00sec | North |
| Site 4. | Hillarys Boat Harbour - northern side of North groyne | S 31deg 49min 13sec<br>E 115deg 44min 14sec | North |
| Site 5. | Pinnaroo Point - 100m south of pathway | S 31deg 48min 18sec<br>E 115deg 43min 41sec | South |
| Site 6. | Whitfords Beach -100m south from pathway | S 31deg 47min 51sec<br>E 115deg 43min 52sec | South |
| Site 7. | Mullaloo Beach - 100m north from surf club rooms | S 31deg 47min 05sec<br>E 115deg 44min 00sec | North |
| Site 8. | Ocean Reef Marina - the small section of sand inside the marina | Not Recorded | South |

The sorting was undertaken on a tray top truck where each bag was weighed then the litter was sorted into Beach Users (again broken down into cans, bottles, plastic) and Marine Users. Each class was again weighed and recorded, the bags were then refilled to be disposed of by CALM.

## RESULTS

Table 2 shows the area surveyed, the weight of litter collected and the density (weight per unit area) for each of the surveyed sites. The total weight of litter collected was 108.2 kg.

**Table 2. Litter Weight and Litter Density**

| Beach | | Site 1 Bennion Street | Site 2 Sorrento Street | Site 3 Marmion AAC | Site 3a Marmion AAC | Site 4 Hillarys Beach | Site 5 Pinaroo Point | Site 6 Whitfords Beach | Site 7 Mullaloo Beach | Site 8 Ocean Reef | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Area Surveyed** | ($m^2$) | 3000 | 2000 | 2000 | 2000 | 3700 | 1900 | 2300 | 2100 | 1000 | 20000 |
| **Litter Weight** | (Kg) | 10.30 | 2.35 | 16.95 | 9.75 | 14.60 | 1.20 | 24.03 | 18.55 | 10.50 | 108.23 |
| **Litter Density** | ($Kg/m^2$) | 0.003 | 0.001 | 0.008 | 0.005 | 0.004 | 0.001 | 0.010 | 0.009 | 0.011 | 0.005 |
| | ($gm/m^2$) | 3.433 | 1.175 | 8.475 | 4.875 | 3.946 | 0.632 | 10.448 | 8.833 | 10.500 | 5.412 |

The site with the greatest amount of litter was Whitfords Beach where 24.03 kg of litter was collected. However it is not known if all this litter was collected from within the survey area (see Discussion for details).

The second and third highest amounts of rubbish were collected from Mullaloo Beach (18.55 kg) and Marmion AAC (16.95 kg).

The sites with the least litter were Pinaroo Point (1.20 kg) and Sorrento Street (2.35 kg).

The calculation of the weight of litter per unit area e.g. grams per square metre ($gm/m^2$) is a more accurate indicator for comparing the sites as not all sites were of equal area.

Four sites stood out as being "dirty" - Ocean Reef Marina (10.5 $gm/m^2$), Whitfords Beach (10.4 $gm/m^2$), Mullaloo Beach (8.8 $gm/m^2$) and Marmion AAC (8.5 $gm/m^2$).

Two sites were "very clean" – Pinaroo Point (0.6 $gm/m^2$) and Sorrento Beach (1.2 $gm/m^2$).

The average litter density was 5.4 $gm/m^2$. The total length of the Marion Marine Park is 18.5 km. Approximately 70% is beach (or other areas on which litter could accumulate). Assuming an average width of 25 metres, then the theoretical total weight of litter on the foreshore of Marmion Marine Park was 1748250 gm ( 18.5 x 1000 x 70% x 25 x 5.4) or 1748 Kg or 1.748 tonnes.

Table 3 shows the type of litter collected at each site. The litter was separated into Beach Users (cans, bottles, fishing line, plastic items associated with beach fishing, plastic items associated with other beach users, and other litter) and Marine Users (wood, rope, material from lobster pots, bait boxes). This division is considered reasonable although it is recognized a small amount of material would have been wrongly assigned .

Since the original survey in 1985, there has been a tremendous increase in the number of boats using the park for recreational purposes including recreational fishing. Therefore the general term Marine Users is considered a more appropriate term than the previously used Rock Lobster Fishermen.

Table 3. Type of litter

| **Beach** | Site 1 Bennion Street | | Site 2 Sorrento Street | | Site 3 Marmion AAC | | Site 3a* Marmion AAC | | Site 4 Hillarys Beach | | Site 5 Pinaroo Point | | Site 6 Whitfords Beach | | Site 7 Mullaloo Beach | | Site 8 Ocean Reef | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Litter Type** | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % |
| BEACH USERS | | | | | | | | | | | | | | | | | | | | |
| *Plastic Misc.Fisherman* | 0.20 | 6.06 | 0.00 | 0.00 | 0.10 | 1.48 | 1.25 | 34.25 | 0.00 | 0.00 | 0.20 | 36.36 | 1.75 | 8.53 | 4.20 | 50.60 | 0.10 | 1.54 | 7.80 | 12.20 |
| *Plastic Misc Beach Users* | 2.50 | 75.76 | 1.00 | 44.44 | 2.00 | 29.63 | 0.00 | 0.00 | 2.75 | 22.73 | 0.20 | 36.36 | 5.00 | 24.36 | 1.25 | 15.06 | 4.25 | 65.38 | 18.95 | 29.64 |
| *Fishing Line* | 0.20 | 6.06 | 0.00 | 0.00 | 0.15 | 2.22 | 0.40 | 10.96 | 0.10 | 0.83 | 0.05 | 9.09 | 0.03 | 0.12 | 1.50 | 18.07 | 0.20 | 3.08 | 2.63 | 4.11 |
| *Bottles* | 0.00 | 0.00 | 0.25 | 11.11 | 0.50 | 7.41 | 0.00 | 0.00 | 3.25 | 26.86 | 0.00 | 0.00 | 8.50 | 41.41 | 0.00 | 0.00 | 1.75 | 26.92 | 14.25 | 22.29 |
| *Cans* | 0.00 | 0.00 | 0.00 | 0.00 | 3.50 | 51.85 | 1.75 | 47.95 | 2.00 | 16.53 | 0.08 | 14.55 | 3.75 | 18.27 | 1.35 | 16.27 | 0.20 | 3.08 | 12.63 | 19.76 |
| *Other* | 0.40 | 12.12 | 1.00 | 44.44 | 0.50 | 7.41 | 0.25 | 6.85 | 4.00 | 33.06 | 0.02 | 3.64 | 1.50 | 7.31 | 0.00 | 0.00 | 0.00 | 0.00 | 7.67 | 12.00 |
| ***Total*** | 3.30 | 100.00 | 2.25 | 100.00 | 6.75 | 100.00 | 3.65 | 100.00 | 12.10 | 100.00 | 0.55 | 100.00 | 20.53 | 100.00 | 8.30 | 100.00 | 6.50 | 100.00 | 63.93 | 100.00 |
| MARINE USERS | | | | | | | | | | | | | | | | | | | | |
| *Wood* | 4.00 | 57.14 | 0.00 | 0.00 | 10.00 | 98.04 | 5.50 | 90.16 | 0.00 | 0.00 | 0.35 | 53.85 | 0.50 | 14.29 | 0.00 | 0.00 | 0.00 | 0.00 | 20.35 | 45.94 |
| *Rope* | 2.00 | 28.57 | 0.10 | 100.00 | 0.20 | 1.96 | 0.60 | 9.84 | 1.50 | 60.00 | 0.30 | 46.15 | 1.25 | 35.71 | 10.25 | 100.00 | 1.50 | 37.50 | 17.70 | 39.95 |
| *Lobster Pots* | 1.00 | 14.29 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 1.00 | 40.00 | 0.00 | 0.00 | 1.75 | 50.00 | 0.00 | 0.00 | 2.50 | 62.50 | 6.25 | 14.11 |
| *Bait Boxes* | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| ***Total*** | 7.00 | 100.00 | 0.10 | 100.00 | 10.20 | 100.00 | 6.10 | 100.00 | 2.50 | 100.00 | 0.65 | 100.00 | 3.50 | 100.00 | 10.25 | 100.00 | 4.00 | 100.00 | 44.30 | 100.00 |
| TOTAL | 10.30 | 100.00 | 2.35 | 100.00 | 16.95 | 100.00 | 9.75 | 100.00 | 14.60 | 100.00 | 1.20 | 100.00 | 24.03 | 100.00 | 18.55 | 100.00 | 10.50 | 100.00 | 108.23 | 100.00 |

* Site 3a was added due to the large amount of rubbish located near site 3.

The amount of litter attributed to Beach Users was 63.9 Kg or 59.0% of the total. The most common items by weight were plastic items associated with beach users (29.6% by wt), bottles (22.3%) and cans (17.8%).

The amount of litter attributed to Marine Users was 44.3 kg or 41.0% of the total. Wood made up the largest proportion (45.9% by wt). Much of this was in the form of large pieces of marine plywood, suggesting it could have come from larger commercial ships that use Gage Roads. Rope was the other large item (39.9% by wt).

While large pieces of rope made up the majority of rope by weight, there was a very large number of small pieces of unravelled rope measuring between 5 and 10 cm. The origin of these pieces is unknown.

Items associated with rock lobster fishing were greatly reduced compared with the previous surveys. The number of lobster pots and pieces of plastic from lobster pots was less than a dozen compared with 45 in 1992. Only two bait straps were recorded compared with 506 in the 1992 survey.

Table 4 shows a comparison between the amounts of litter collected in the 1985, 1992 and 2002 surveys.

**Table 4. Comparison of Results 1985, 1992 and 2002**

| Beach | Site 1 Bennion Street | | Site 2 Sorrento Street | | Site 3 Marmion AAC | | Site 3a Marmion AAC | | Site 4 Hillarys Beach | | Site 5 Pinaroo Point | | Site 6 Whitfords Beach | | Site 7 Mullaloo Beach | | Site 8 Ocean Reef | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Litter Type** | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % | Kg | % |
| BEACH USERS | | | | | | | | | | | | | | | | | | | | |
| *1985* | 3.21 | 37.02 | 1.30 | 80.25 | 5.10 | 79.94 | 0.00 | 0.00 | 1.70 | 86.29 | 1.17 | 87.97 | 4.21 | 82.55 | 0.37 | 37.00 | 12.40 | 70.98 | 29.46 | 67.66 |
| *1992* | 3.50 | 37.63 | 1.85 | 82.22 | 4.60 | 59.74 | 0.00 | 0.00 | 21.00 | 76.50 | 0.70 | 66.67 | 4.20 | 26.42 | 6.00 | 53.10 | 16.20 | 68.94 | 58.05 | 58.96 |
| *2002* | 3.30 | 32.04 | 2.25 | 95.74 | 6.75 | 39.82 | 3.65 | 37.44 | 12.10 | 82.88 | 0.55 | 45.83 | 20.53 | 85.43 | 8.30 | 44.74 | 6.50 | 61.90 | 63.93 | 59.07 |
| MARINE USERS | | | | | | | | | | | | | | | | | | | | |
| *1985* | 5.46 | 62.98 | 0.32 | 19.75 | 1.28 | 20.06 | 0.00 | 0.00 | 0.27 | 13.71 | 0.16 | 12.03 | 0.89 | 17.45 | 0.63 | 63.00 | 5.07 | 29.02 | 14.08 | 32.34 |
| *1992* | 5.80 | 62.37 | 0.40 | 17.78 | 3.10 | 40.26 | 0.00 | 0.00 | 6.45 | 23.50 | 0.35 | 33.33 | 11.70 | 73.58 | 5.30 | 46.90 | 7.30 | 31.06 | 40.40 | 41.04 |
| *2002* | 7.00 | 67.96 | 0.10 | 4.26 | 10.20 | 60.18 | 6.10 | 62.56 | 2.50 | 17.12 | 0.65 | 54.17 | 3.50 | 14.57 | 10.25 | 55.26 | 4.00 | 38.10 | 44.30 | 40.93 |
| *TOTAL* | | | | | | | | | | | | | | | | | | | | |
| *1985* | 8.67 | 100.00 | 1.62 | 100.00 | 6.38 | 100.00 | 0.00 | 0.00 | 1.97 | 100.00 | 1.33 | 100.00 | 5.10 | 100.00 | 1.00 | 100.00 | 17.47 | 100.00 | 43.54 | 100.00 |
| *1992* | 9.30 | 100.00 | 2.25 | 100.00 | 7.70 | 100.00 | 0.00 | 0.00 | 27.45 | 100.00 | 1.05 | 100.00 | 15.90 | 100.00 | 11.30 | 100.00 | 23.50 | 100.00 | 98.45 | 100.00 |
| *2002* | 10.30 | 100.00 | 2.35 | 100.00 | 16.95 | 100.00 | 9.75 | 100.00 | 14.60 | 100.00 | 1.20 | 100.00 | 24.03 | 100.00 | 18.55 | 100.00 | 10.50 | 100.00 | 108.23 | 100.00 |

* Site 3a was added due to the large amount of rubbish located near site 3.

The total amount of litter collected (108.2 kg) was only 10% greater than in 1992 (98.4 kg) but 245% greater than the original survey in 1985 (43.5 kg). It is not possible to say whether the very large difference between the 1985 and the 2002 surveys reflect the prevailing weather conditions at the time or is due to the much larger population now using the beaches and adjacent waters. However, the latter would not be unexpected.

Three sites have shown little increase over the three surveys. These are Bennion Street, Sorrento Street and Pinaroo Point.

Two sites have shown a pattern of large increases in each survey. These are Whitfords Beach and Mullaloo Beach.

Hillarys Beach and Ocean Reef Marina were the only two sites to show a decrease in litter from the previous survey.

## DISCUSSION

The eight survey sites totalled 800 metres of beach within a total of 18.5km of coastline. This represents 4.3% of the total coastline within the Marmion Marine Park. However the survey did not include any sites north of Ocean Reef Marina as this area was not included in the 1985 or 1992

surveys. This area consists of mainly reef platform with only a couple of sandy beaches that could be surveyed safely.

The 2002 survey was conducted in fine weather in just one day, however the areas had been subjected to large swells and rough weather before the survey. Much of the litter had been broken up into small pieces especially the plastics and it is presumed many of the larger items had been taken back out to sea.

Although this weather pattern may have influenced the results of the survey, this onshore frontal activity is normal for this time of year. Due to the El Nino, the effects of groynes, Hillarys Marina, and other coastal changes during the last 10 years, some sites were significantly affected.

The results from site 6 (Whitfords Beach) may be misleading as a large proportion of it was collected from a single pile that had been placed at the end of the pathway leading from the beach. (This was presumably done by beach users in an effort to keep the beach clean - there are no bins on the beach at this site). Therefore there is no way of knowing over what area the litter was actually collected. However this beach also contained a large amount of litter in the 1992 survey (see Table 3).

Of the three sites that have shown little increase over the three sites, two (Bennion Street and Sorrento Street) are in the most southern portion of the park and it its speculated that they would have seen the least increase in use. The contrary is true for the beaches that showed the greatest increase in litter. These beaches (Whitfords and Mullaloo) are located close to the population growth areas and therefore are likely to have seen a much larger increase in the number of people using the beaches.

It would not have been unreasonable to have also expected the greatest increase in Marine Users litter, to have occurred in the northern sites as most recreational users tend to fish or pursue other leisure activities in the area where most of the reefs and islands are located i.e. between Hillarys Marina and Burns Beach. However the results do not support this expectation.

The significant decrease in litter that can be attributed to rock lobster fishing suggests the requirement to remove bait bands before leaving harbour has been extremely effective.

The large amount of rope is still a concern. The origin of the numerous 5-10 cm lengths needs to be investigated. These pieces may appear as tasty morsels to some of the larger fish and mammals in the park and if so could gradually build up in their stomachs with fatal results.

## RECOMMENDATIONS

As the 1985 survey was completed when the boundary for the park was to be Ocean Reef, the addition of another two sites to take the survey to the current boundary would be of benefit for the overall statistics.

A lot of litter is washed up onshore with the first high tides and large swells in autumn. As the weather becomes rougher with strong winds and larger swells the litter is broken up and dispersed over a larger area. A survey conducted in early autumn, before the wild weather, would indicate how much litter is dropped by beach users during the summer months.

The origin of the numerous 5-10 cm lengths of rope needs to be investigated and if a single source is identified, an education program needs to be put in place to eliminate the problem.

## CONCLUSION

The 2002 litter survey showed a ten percent increase in the total amount of litter over the 1992 survey.

The beaches showing the greatest increase in litter are those located closest to the largest areas of population increase.

If the 5.4 $gm/m^2$ is representative of the whole shoreline within the park, then the total weight of litter on the beaches would be about 1.75 tonnes.

The changes to the professional rock lobster industry's methods appear to have been extremely effective in reducing the amount of litter created by the industry.

## APPENDIX 1

## DESCRIPTION OF SURVEY SITES

**Site 1. Bennion Street** (northern end of Trigg beach) Surveyed area approximately 3000 $m^2$.
The amount of rubbish was moderate and most of the rubbish had been fragmented from the heavy seas. A few weeks earlier, before the big swells, this site was loaded with rubbish

**Site 2. North Beach** (opposite Sorrento Street). Surveyed area approximately 2000 $m^2$.

**Site 3. Marmion** (200m North of Marmion Angling & Aquatic Club). Gently dipping, straight, sandy beach. Surveyed area approximately 2000 $m^2$.

**Site 3A: Marmion** (directly in front of MAAC). Flat, straight, mixed sand and concrete. Surveyed area approximately 2000 $m^2$.

This site was added in due to the large amount of litter directly in front and towards the south of the clubs building. The results are not included in the totals but we thought that it would be beneficial to show them on the chart. Most of the litter was bottles and cans, and tangled masses of fishing line.

**Site 4 Sorrento** ( The original site was 1km north of the Sorrento Surf Lifesaving Club. Because of the construction of the Hillarys Marina, the area surveyed in 1992 and 2002 was just north of the North groyne of the marina). Normally gently dipping, curving, sandy beach. Surveyed area approximately 3700 $m^2$ (artificially increased by buildup of seaweed).

The North groyne influences this site by acting as a catchment during and after Northwesterly and Westerly winds. The section of beach adjacent to the groyne was metres deep in washed up seagrass and seaweed. Litter was spread throughout the deep piles of weed and no beach could be seen for about 300m north. Recreational fishing from the groyne may affect the amount of litter trapped here, as may the commercial and recreational boating activity entering and leaving the marina.

**Site 5. Mullaloo** (Pinaroo Point). Flat, curved, sandy beach, wide. Surveyed area approximately 1900 $m^2$.

This beach is used to launch small sailing craft and an adjacent area is used semi-permanently as an anchoring site for 2-3 crayfishing boats.

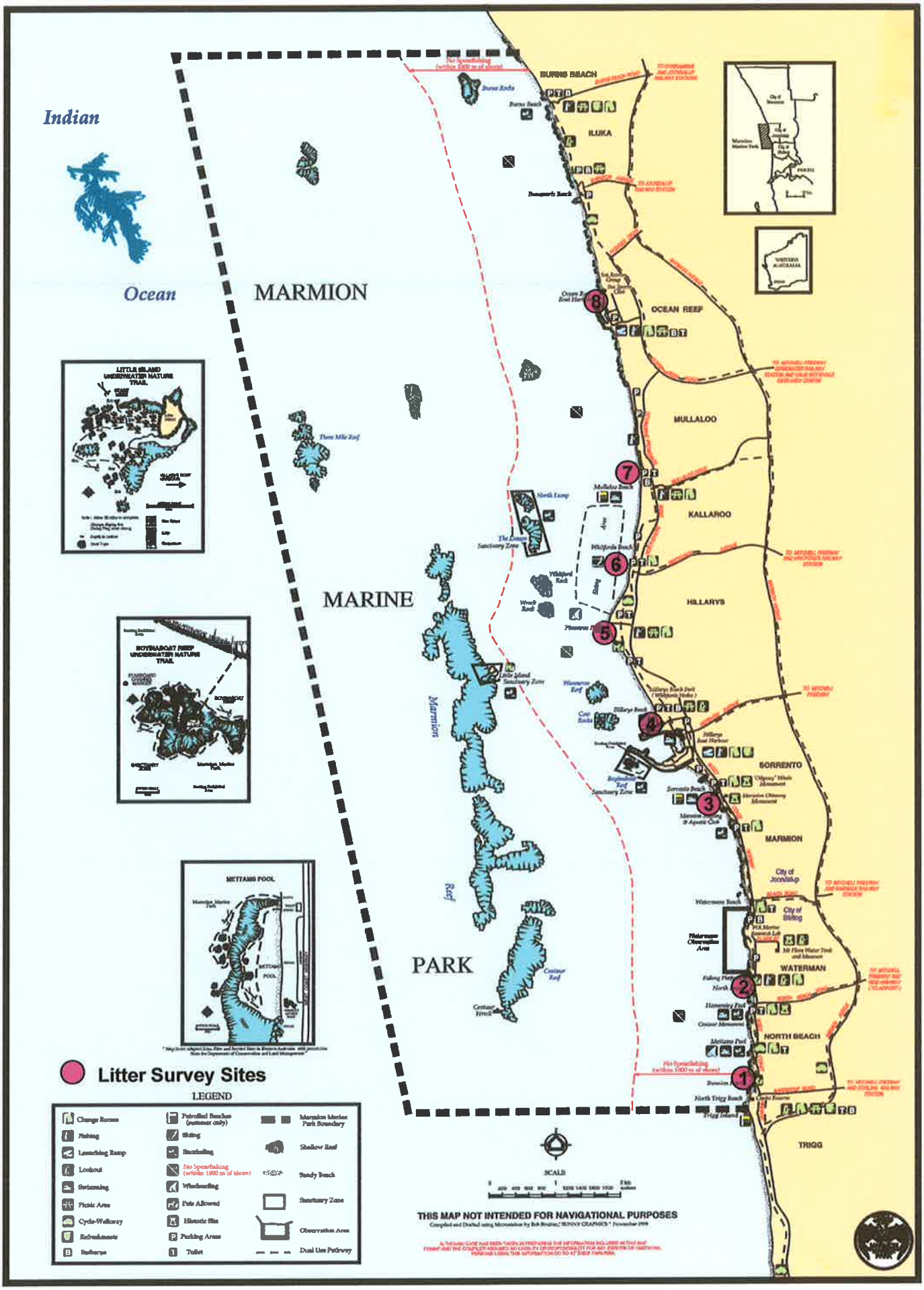
**Site 6 Whitford Beach** (opposite Whitford Ave). Gently dipping, sandy, curved. Surveyed area approximately 2300 $m^2$.

This beach is mainly used by beach fishermen

**Site 7 Mullaloo Beach** (approximately 100 metres north of the Life Saving Club). Gently dipping, sandy, straight. Surveyed area approximately 2100 $m^2$.

This is a very popular swimming beach in summer.

**Site 8. Ocean Reef** (inside the harbour, south of the boat launching ramps). Undulating, mixed sand and grass covered at high tide, irregular. Surveyed area approximately 1000 $m^2$.


Indian
Ocean
MARMION
MARINE
PARK
BURNS BEACH
ILUKA
OCEAN REEF
MULLALOO
KALLAROO
HILLARYS
SORRENTO
MARMION
WATERMAN
NORTH BEACH
TRIGG
Burns Rocks
Three Mile Reef
Marmion
Reef
LITTLE ISLAND UNDERWATER NATURE TRAIL
BOYINABOUT REEF UNDERWATER NATURE TRAIL
METTAMS POOL
Litter Survey Sites
LEGEND
Change Rooms
Fishing
Launching Ramp
Lookout
Swimming
Picnic Area
Cycle-Walkway
Refreshments
Barbeque
Patrolled Beaches (summer only)
Diving
Snorkelling
No Spearfishing (within 1800 m of shore)
Windsurfing
Pets Allowed
Historic Site
Parking Areas
Toilet
Marmion Marine Park Boundary
Shallow Reef
Sandy Beach
Sanctuary Zone
Observation Area
Dual Use Pathway
SCALE
THIS MAP NOT INTENDED FOR NAVIGATIONAL PURPOSES

LITTER COLLECTION, MARMION MARINE PARK
F.O.M.M.P. 6. 7.2002

LITTER SORTING, MARMION MARINE PARK
F.O.M.M.P. 20. 7.2002