

PORT PHILLIP BAY
BEACH LITTER SURVEY
2004-05

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A report for EPA Victoria

Prepared by Keep Australia Beautiful Victoria

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1. METHODOLOGY

In the 2004–05 season, litter surveys were conducted at Eastern, Mordialloc, Mt Martha, Port Melbourne, Queenscliff, Rye, Sandringham, Seaford, Sorrento, St Kilda, Werribee South and Williamstown beaches. Ten surveys were conducted at each of these beaches, between 1 December 2004 and 31 March 2005. The survey dates are listed in table 1.

Survey number	Survey date
1	21/12/2004
2	29/12/2004
3	4/1/2005
4	10/1/2005
5	17/1/2005
6	24/1/2005
7	27/1/2005
8	7/2/2005
9	21/2/2005
10	7/3/2005

Table 1: Survey dates 2004–05

There are some differences in litter counts for the visible and full-scale surveys: the surveys are undertaken in different areas of the beach; and also the litter removal component associated with the full-scale surveys is thought to affect results.

Full-scale survey. A 48 m² survey area is measured, and then all litter in the area is counted, removed and weighed. The litter is removed to enable the surveyors to calculate the regeneration rate (litter accumulation between surveys).

Visible litter survey. A 48 m² survey area is measured, and then all litter in the area is counted

but not removed. The litter remains on the survey area to observe the effectiveness of beach cleaning.

Visual ratings survey. A 50 m length of beach is viewed and a visual rating is allocated. Visual ratings are between zero and ten; with a score of zero representing a site with no litter and a score of ten representing a site covered with litter.

The litter survey data is recorded on KABV survey sheets and then analysed by product and material type (see Appendix B for examples of the type of products in each material group)

In 2002–03 KABV also introduced the weighing of all litter in the full-scale surveys. This is designed to assist in measuring the volume of litter found across the 12 Port Phillip Bay beaches surveyed.

The diagram in Figure 1 illustrates a typical Beach Report litter survey site layout.

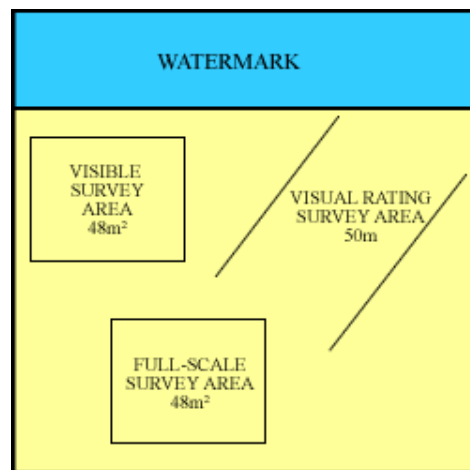


Figure 1: Typical Beach Report survey site layout

The survey methods remain constant every year to ensure data consistency. Appendix A lists a full explanation of the beach survey litter methodology.

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Quality assurance

Quality assurance is undertaken by the survey team leader replicating the visible and visual rating surveys at three beaches on three separate occasions. The results obtained by the team leader were then compared with the results obtained by the survey teams, to ensure consistency in data collection.

Appendix C lists the 2005 Beach Litter Report quality assurance results.

2. SUMMARY OF RESULTS

Data collection for the 2004–05 period took place between December 2004 and March 2005. Litter was counted and, in the case of the full-scale surveys, was weighed.

The results from the 12 surveyed beaches are given in detail below, in the following categories: litter count, product types, material groups and visual site ratings.

It should be noted that weather, rainfall, the number of people visiting a beach and/or the timing of beach cleaning all affect survey results.

The litter surveys are conducted over summer and a 48 m² area is surveyed for the visible and full-scale surveys. There are 10 survey days in the period and the results of the litter counts are as follows.

Visible survey results

The total amount of litter counted in the visible surveys across all beaches in Port Philip Bay for the 2004–05 period was 3820 litter items. The amount of litter surveyed in 2004–05 shows an increase of 14.2 per cent when comparing these results to 2003–04, when 3346 items were found.

Site Name	Average number of litter items per survey area - Visible survey						Change between 03–04 and 04–05	Six-year litter average per beach
	1999–2000	2000–01	2001–02	2002–03	2003–04	2004–05		
Eastern	20.4	29.1	21.8	22.0	32.2	33.9	+ 5.3%	26.6
Mordialloc	24.9	34.1	27.4	76.0	54.0	46.0	- 14.8%	43.7
Mt Martha	14.4	18.3	14.1	10.4	14.4	19.0	+ 31.9%	15.1
Port Melbourne	18.6	26.3	16.9	25.2	36.6	34.9	- 4.6%	26.4
Queenscliff	5.9	12.7	7.9	3.1	2.7	0.7	- 74.1%	5.5
Rye	21.3	34.1	17.2	21.8	30.8	26.6	- 13.6%	25.3
Sandringham	61.5	76.7	38.4	28.1	56.2	65.0	+ 15.7%	54.3
Seaford	33.9	42.9	23.9	28.3	36.5	56.7	+ 55.3%	37.0
Sorrento	7.5	13.3	33.2	20.5	28.1	26.0	- 7.5%	21.4
St Kilda	57.8	63.4	23.6	35.1	27.2	39.3	+ 44.5%	41.1
Werribee South	1.7	6.1	7.8	3.8	0.6	1.0	+ 66.7%	3.5
Williamstown	50.6	61.7	93.7	152.2	15.3	32.9	+ 115.0%	67.7
12-beach average	26.6	34.9	27.2	35.5	27.9	31.8	+ 14.2%	30.6

Table 2: Average number of litter items per beach in the visible survey, 1999 to 2005

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The 2004-05 results were comparable with the average amount of litter found over the past six years. The visible survey shows an average 3,800 items per year, or an average of 317 items per beach.

The highest amount of litter was found at Sandringham beach, where a litter count of 650 items over the 10 surveys was recorded. This result shows an increase of 15.7 per cent when compared to the 2003-04 period (see Appendix J for further details). Sandringham was the beach with the most litter recorded in the visible surveys for the second year in a row.

Table 2 shows the average number of litter items per visible survey for each beach from 1999 to 2005.

The beach that showed the most improvement in the visible surveys when compared to the 2003-04 season was Queenscliff with a decrease of 74.1 per cent. The least amount of litter in 2004-05 was also recorded at Queenscliff beach, where a total of seven items were found over the summer period. This is thought to be largely due to the relatively low level of beach usage.

The beach with the highest increase was Williamstown with a 115 per cent increase from 2003-04. This result was still well below the previous year's figure, as well as the six-year average shown in Table 2.

A total of 22,800 litter items have been recorded in the visible litter survey (48 m² area) over the past six years. Visible survey litter is recorded but not removed to measure the effectiveness of beach cleaning and beach usage.

Full-scale survey results

Across all beaches surveyed in Port Phillip Bay, a total of 3724 litter items were found over 10 surveys (48 m² area on each beach) in the full-scale survey. Overall, the amount of litter surveyed increased by four per cent when compared with results from 2003-04, when a total of 3585 items were found.

Over the past six years the average total amount of litter counted across all beaches was 3652 items per year – an average of 304 litter items per beach per year.

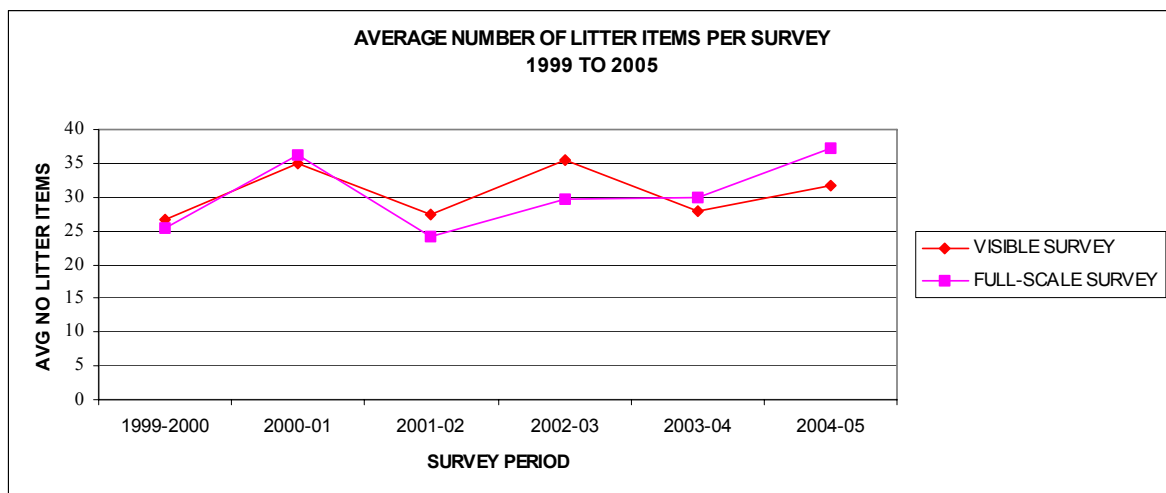


Figure 2: Average number of litter items at 12 Port Phillip Bay beaches, 1999 to 2005

PORT PHILLIP BAY BEACH LITTER SURVEY 2004–05

The highest litter count in the past six years was recorded at Williamstown in the 2002–03 period, when a total of 1522 litter items were found.

The survey date when the most litter was recorded was 29 December: a total of 643 items were counted on this day, an increase of 131.3 per cent when compared to 2003–04. This survey took place after heavy rains, which are likely to have affected the amount of litter found on the beach.

Sandringham was the most littered beach using the full-scale method, accounting for 587 items. This result shows an increase of 7.5 per cent when compared to the 2003–04 season.

Queenscliff recorded the least litter in 2004–05 – only 11 items were found in the full-scale surveys, which was a decrease of 38.9 per cent when

compared to the results for 2003–04. Queenscliff was also the most improved beach.

A total of 21,913 litter items have been removed over the past six years in the full-scale surveys.

Werribee South had the largest increase (450 per cent) from 2003–04 in the full-scale litter count. This was due to the survey area having to be relocated as the areas used in previous years are now covered with vegetation and no longer used as a beach. Werribee South beach has been, on average, the least littered beach in Port Phillip Bay surveyed over the past six years.

Table 3 shows the average number of litter items per survey using the full-scale method from 1999 through to 2005.

The highest litter count per beach, over the past six years, was recorded at St Kilda beach in 2000–01,

Site Name	Average number of litter items per survey area - Full-scale survey						Change between 03–04 and 04–05	Six-year litter average per beach
	1999–2000	2000–01	2001–02	2002–03	2003–04	2004–05		
Eastern	13.7	29.0	28.0	22.6	34.0	31.3	-8%	26.4
Mordialloc	29.4	38.3	26.1	67.3	42.0	44.9	7%	41.3
Mt Martha	13.6	14.4	12.0	11.8	17.8	19.0	7%	14.8
Port Melbourne	16.6	39.2	20.1	24.6	45.7	37.7	-18%	30.7
Queenscliff	6.3	15.5	6.6	2.9	1.8	1.1	-39%	5.7
Rye	21.5	41.1	20.4	28.2	31.5	27.4	-13%	28.4
Sandringham	56.4	56.9	32.8	40.5	54.6	58.7	8%	50.0
Seaford	48.0	43.7	24.3	35.2	28.6	45.1	58%	37.5
Sorrento	7.4	13.8	38.5	30.9	42.6	26.7	-37%	26.6
St Kilda	53.0	79.5	25.9	32.6	25.9	44.6	72%	43.6
Werribee South	2.5	4.2	5.9	2.8	0.4	2.2	450%	3.0
Williamstown	37.4	59.5	49.2	56.3	33.6	33.7	0%	44.9
12-beach average	25.5	36.3	24.2	29.6	29.9	31.0	4%	29.4

Table 3: Average number of litter items per beach in the full-scale survey, 1999 to 2005

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when a total of 875 litter items were removed.

The survey which had the highest litter count in 2004-05 was the second survey (29/12/2004) at 553 items across all twelve port Phillip bay beaches. This is the second highest survey litter count in the past six years. The highest was recorded in 2000-01 when, in the sixth survey, 559 items were counted in the full-scale surveys.

The average weight of litter removed from each beach per survey in 2004-05 was 2.6 kg, a decrease of 16 per cent when compared to 2003-04. This decrease was due to larger items of litter being found in the 2003-04 period, even though fewer litter items were counted.

Visual site ratings

(beach is viewed and a visual between 0 and 10 is allocated)

Site rating represents a visual overview of a 50 m area of the beach, with the survey team giving a rating out of 10.

The average site rating for 2004-05 was a rating of 1.2 per beach, showing a decrease (improvement) of eight per cent when compared to the average rating of 1.3 in 2003-04.

St Kilda beach had the highest (worst) average site rating with an average of 2.1 per survey. This rating has decreased from 2003-04, when St Kilda beach rated an average of 2.2 per survey.

Sandringham had the second highest site rating in 2004-05, when it rated an average of 1.9 per survey. This rate has decreased by 27 per cent when compared to 2003-04, when Sandringham had the highest rating.

The beach rating can vary from year to year due to changing weather, different survey teams rating the beaches and the timing of beach cleaning.

The lowest (best) rating was recorded at Werribee South beach, which had a zero rating in each survey. Werribee South also had the best site rating in 2003-04 when it also had a zero rating in each survey.

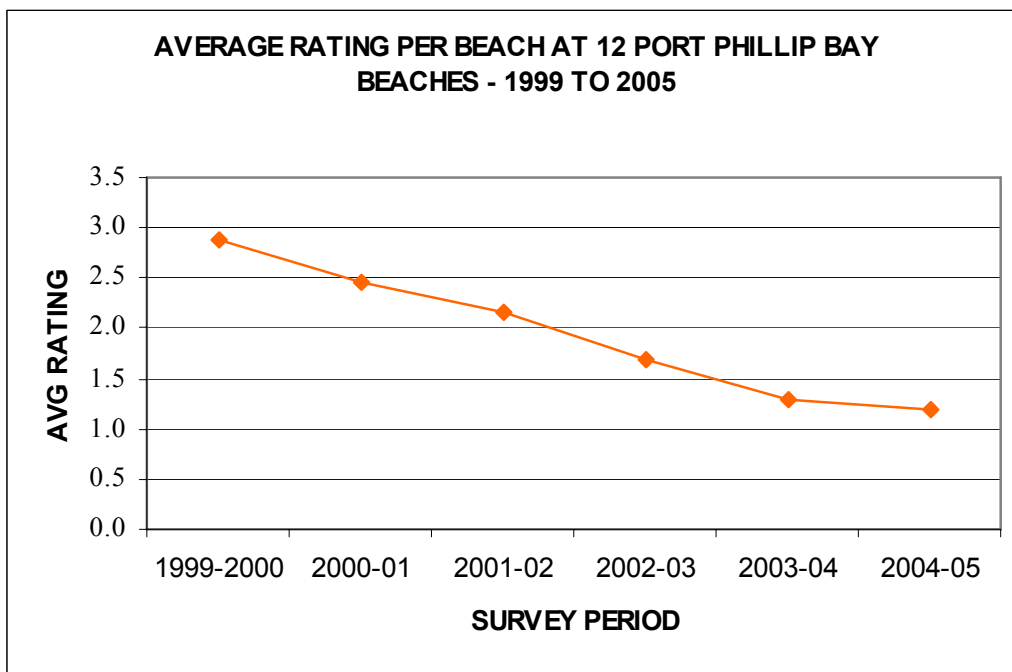


Figure 3: Average site rating from 1999 to 2005

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The highest increase was Seaford with a 36 per cent increase; the biggest decrease was recorded at Queenscliff beach with a decrease of 88 per cent.

The average site rating for the past six years is 1.9 per beach and, as shown in Figure 3, the site ratings have improved each year.

3. PRODUCTS

In the beach surveys, product types are recorded in the visible and full-scale surveys. The results vary due to weather, the timing of beach cleaning and statistical variation.

Visible survey results

Cigarette butts were again the most littered product for the sixth consecutive year. This year, the total number of cigarette butts counted was 1891 items, a six per cent increase from 2003-04. The average for the past six years is 2176 items per year.

The results for cigarette butts are broadly consistent with other studies showing that cigarette butts

account for around 50% of the litter stream.

Over the past six years the highest litter count of any single product was recorded in 2002-03, when a total of 2932 cigarette butts were counted.

Williamston beach recorded 42.6 per cent of the total: 1250 butts were recorded at Williamstown beach in 2002-03.

A total of 13,061 cigarette butts have been counted in the visible surveys over the past six years (in a 48 m² area).

The second most littered product in 2004-05 was 'other plastic', with a total of 258 items counted in the visible surveys. This was an increase of 16 per cent when compared to 2003-04. Other plastic has been the second most littered product over the past six years, with an average of 292 items per year.

Figure 4 show that cigarette butts and other plastic items have been the most littered products over the past six years.

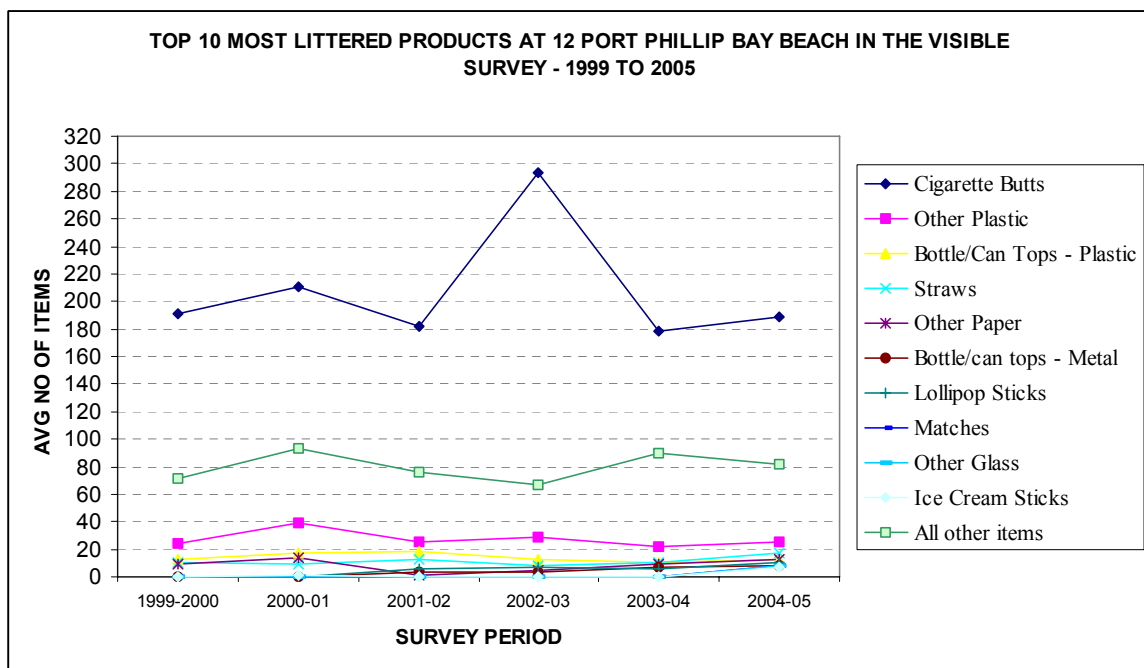


Figure 4: Most littered products in the visible surveys, 1999 to 2005

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Full-scale survey results

As in previous years, the most littered item was cigarette butts, which accounted for just over half of all products counted in 2004-05 (51.8 per cent). The total number of cigarette butts found in the full-scale surveys was 1929 butts; this shows a decrease of one per cent when compared to 2003-04, when 1943 cigarette butts were counted. There has been a decrease of three per cent when compared to the six-year average of 1989 cigarette butts.

The results for cigarette butts are broadly consistent with other studies showing that cigarette butts account for over 50% of the litter stream.

A total of 11,935 butts have been removed from the 12 Port Phillip Bay beaches using the full-scale survey method (48 m²) over a six-year period.

Other plastic was the second most littered items in the full-scale surveys, accounting for 7.1 per cent (26.5 average items) of all litter found. This was an increase of 24 per cent when compared to 2003-04 results (21.3 items). This year's results are 16 per cent less than the six-year average.

Cigarette butts and other plastic items have been the most littered products for each of the six survey years, as shown in Figure 5.

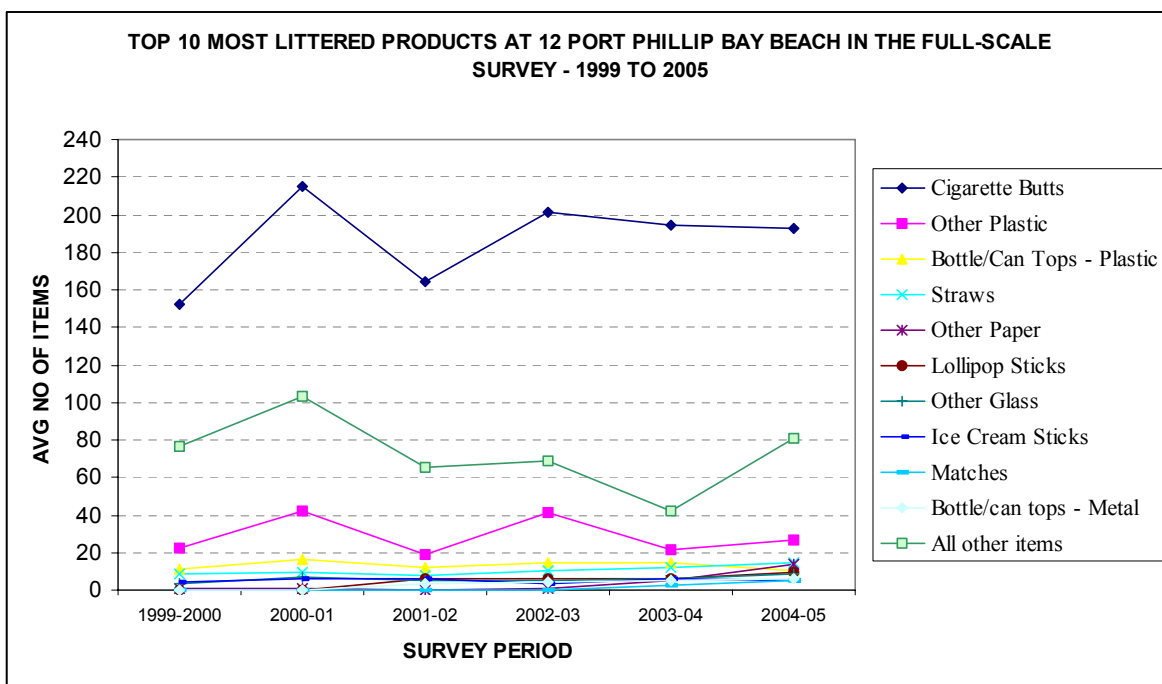


Figure 5: Most littered products in the full-scale surveys, 1999 to 2005

4. MATERIALS

Material groups are sorted according to what the product is made from. For example, newspaper belongs to the paper group and plastic bottles are part of the plastic group.

Visible survey results

In the visible survey, cigarette butts were the most littered group with an average of 189.1 items per survey. There was only a slight increase compared to 2003-04, of 5.9 per cent. The six-year average for the cigarette butts group is 217.67 items per survey.

Plastic items were the second most littered item with an average of 90.9 items per survey. This has increased by 20.1 per cent when compared to the figures from 2003-04 (75.7 items per survey). The plastic group's six-year average is 86.5 items per survey; this year saw an increase from the six-year average of 5.1 per cent.

Figure 6 shows the percentage of litter items by material group for the visible survey in 2004-05.

Ceramics was the least littered group, recording just four items in 2004-05. The average for the past six years is 0.5 items per survey.

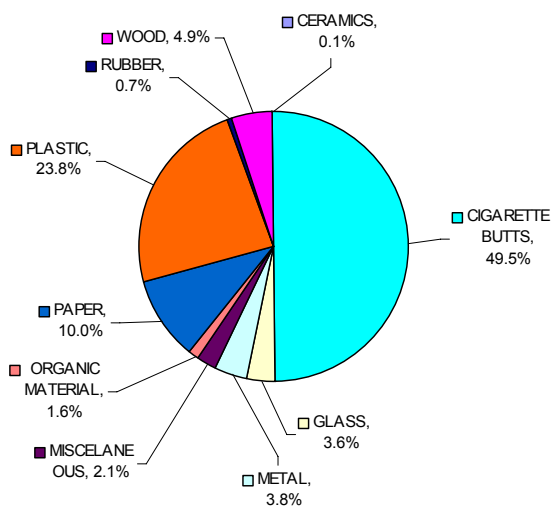


Figure 6: Material type found per survey for 12 Port Phillip Bay beaches in the visible survey, 2004-05

Cigarette butts are in their own category. Appendix B has examples of the types of products in each material group.

Full-scale survey results

In the full-scale survey, the most littered material type was cigarette butts, with an average of 192.9 items per survey. Cigarette butts accounted for 51.8 per cent of all full-scale survey items. The average number of litter items found over the past six years was 198.9 cigarette butts per survey.

Plastic items (such as straws, confectionery wrappers and bottle tops) accounted for 22.9 per cent (85.4 items) of the full-scale survey. Plastic items were the second most littered product group in 2004-05. An average of 88.3 plastic items were found per survey over the past six years.

The ceramics group was the least littered material group, recording nine items in the full-scale survey for all beaches surveyed in 2004-05.

Figure 7 shows the percentage of litter items by material group for the full-scale survey in 2004-05.

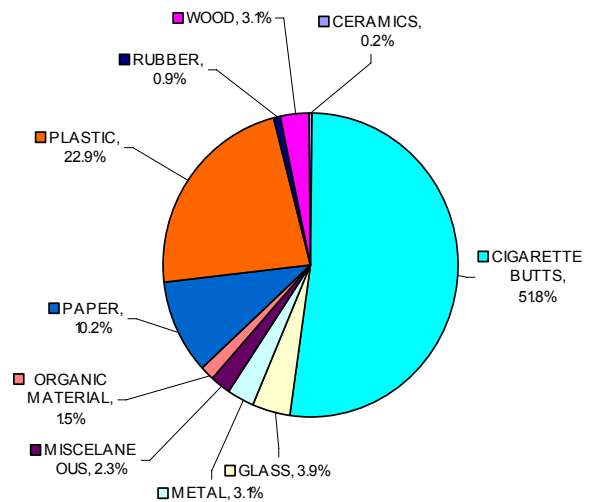


Figure 7: Material type found per survey for 12 Port Phillip Bay beaches in the full-scale survey, 2004-05

5. OBSERVATIONS

The litter survey teams made a number of observations during the 2004-05 summer surveys.

There was a 38 per cent increase in rainfall from 2003-04 to 2004-05. Unlike previous years, when the litter decreased with heavy rain, in 2004-05 the litter count increased in both surveys.

Port Phillip Bay experienced heavy rains in late December and early February. The highest litter count was on 29 December – which followed a week of heavy rain.

The impact on the litter count was a little less after the storms on 2 February, as the survey didn't take place till the 7th. This could have been due to the level of beach usage and the water quality warning issued by the EPA. Other factors to consider are

beach cleaning and the effect of the rain washing any litter into the water.

Although stormwater drains are not part of the survey areas, there was an increased amount of litter surrounding these areas on the surveyed beaches.

The effectiveness of beach cleaning still appears to be an issue at the surveyed beaches. When the survey teams varied their survey times it was noted that Williamstown beach, in particular, had an increase in the amount of litter that was counted. Other beaches that are not mechanically cleaned as frequently during summer experience litter build-up.

A lack of bins also seems to have an effect on the amount of litter at certain beaches such as Sandringham, Mt Martha, Rye and Sorrento. The few bins that are present are often overflowing, resulting in items blowing back onto the beach.

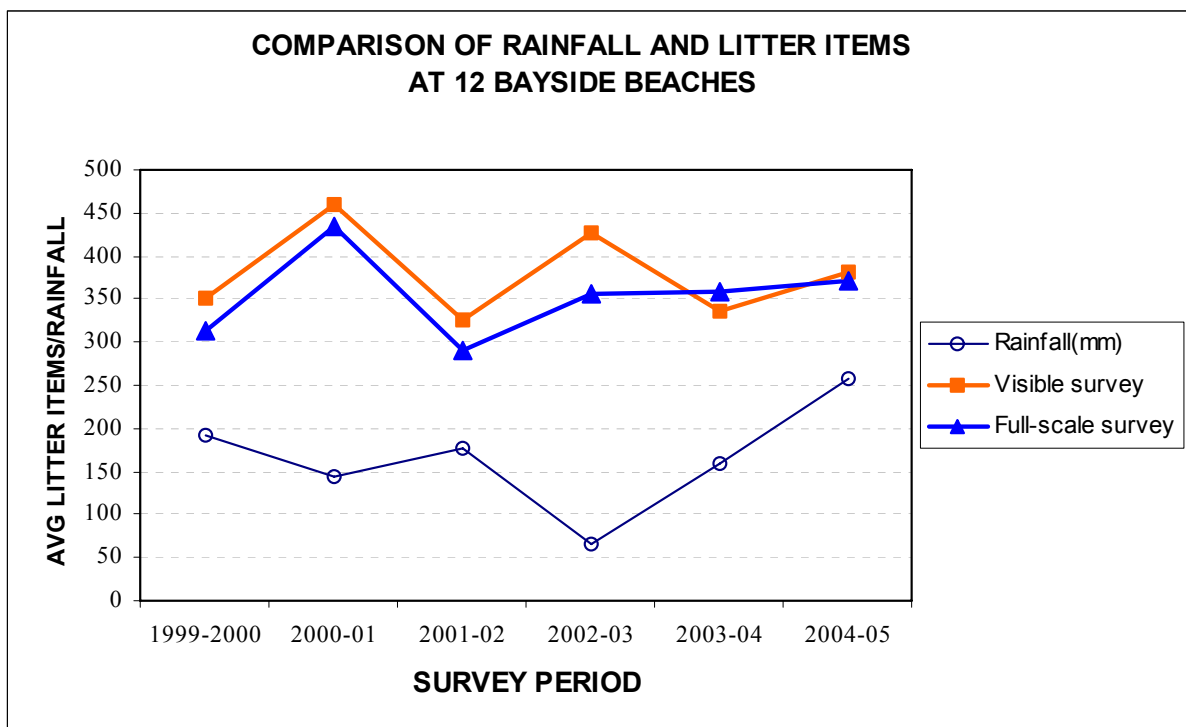


Figure 8: Rainfall from 1 December to 31 March compared to the litter averages for the past six years
(rainfall from Bureau of Meteorology)

6. BEACH SUMMARY

Eastern beach

Eastern beach is located on the waterfront of Geelong and is in the Greater Geelong City Council. Located nearby are the art deco swimming pool and park complex off Ritchie Boulevard and Eastern Beach Road.

Eastern beach is often host to many festivals over the summer period. The events do not appear to have an impact on the amount of litter counted over summer, with a sufficient number of bins along the foreshore and regular cleaning of the beach and surrounding areas. Car park and parkland seating are directly adjoining the Eastern beach.

Summary

Using the visible survey method, an average of 33.9 items were counted per survey in 2004–05, an increase of 5.3 per cent when compared to 2003–04 results. The six-year average for Eastern beach was 26.2 items per survey.

There was a decrease of 7.9 per cent in the full-scale surveys in 2004–05 when compared to 2003–04. An average of 31.3 items was counted in 2004–05. The average for the past six years is 26.5 items per survey (see Figure D1, Appendix D for the average number of litter items found per year).

The highest litter count was recorded in the second survey (29 December) for both the visible survey (58 items) and the full-scale survey (45 items).

The highest regeneration rate in 2004–05 was 6.7 items between surveys 6 and 7 (see table D1 in Appendix D).

Products

Cigarette butts were the most common litter item for the sixth consecutive year with an average of 17.9 items per survey. The number of butts found decreased by 11.4 per cent from the 2003–04 visible surveys. An average of 17.5 cigarette butts were found in the full-scale surveys, a 6.4 per cent decrease when compare to results from 2003–04.

Other plastic was the second most littered product, accounting for eight per cent of all litter surveyed in the visible surveys and 7.7 per cent in the full-scale surveys. Appendix D (Figure D2) shows the top 10 products surveyed using the visible survey method.

Material

Cigarette butts were the most littered material group, accounting for 52.8 per cent of the 10 material groups in the visible surveys and 55.9 per cent in the full-scale survey. Figure D3 in Appendix D details the percentages of the 10 material groups for the 2004–05 surveys.

Plastic items were the second most prevalent material group, with 24.5 per cent in the visible and 20.8 per cent of all materials in the full-scale surveys.

Visual site ratings

The average visual site ratings for the Eastern beach increased from the 2003–04 surveys from 1.2 to 1.3. Figure D4 in Appendix D provides the average ratings at Eastern beach since 1999.

The highest rating was recorded on 7 February (survey 8) when the beach was rated 3 out of 10; this survey followed heavy rain. This rating was due to the high amount of small litter items scattered on the beach.

Eastern beach 2004–05 quick stats

Visible survey

Ave no of items found: 33.9 per survey
Most littered item: Cigarette butts

Full-scale survey

Ave no of items found: 31.3 per survey
Most littered item: Cigarette butts
Weight of litter: 189 grams

Site rating survey

Highest rating: 3 (Survey 8)

Beach rank

(1=most littered, 12=least littered)

Visible survey: 6th out of 12

Full-scale survey: 7th out of 12

Mordialloc beach

Mordialloc beach is located along the south-eastern shore of Port Phillip Bay in Kingston City Council.

A promenade is located alongside the beach and is heavily used during summer by walkers, cyclists and rollerbladers. The use of the walkway contributes to the amount of litter found on the beach close to the promenade.

The beach is mechanically cleaned on a regular basis. It was noted that these machines tend to miss the smaller objects like plastics and cigarette butts.

Summary

In 2004–05, a total of 460 items were counted in the visible surveys and 449 in the full-scale surveys. This was a decrease of 14.9 per cent in the visible surveys and an increase of 6.9 per cent in the full-scale surveys.

The six-year average is 438.5 per year in the visible survey and 412.8 per year in the full-scale surveys as shown in figure E1 (Appendix E).

The highest amount of litter was counted in the second survey in the visible and full-scale surveys, the least amount on the ten survey (7/3/05).

The highest regeneration rate was recorded between surveys 6 and 7 when 18.7 items were regenerated. A

table with the regeneration rates for 2004–05 is included in Appendix E (see Table E1).

Products

Cigarette butts were again the most littered product, accounting for 59.1 per cent in the visible litter count and 60.4 in the full-scale count. There was a decrease of 18.3 per cent in the visible survey when compared to 2003–04 and an increase of 4.2 per cent in the full-scale surveys.

The top 10 most littered items are shown in Figure E2 (Appendix E).

The second most littered product in the visible and full-scale surveys was other plastic items, accounting for 6.5 per cent and 8.9 per cent respectively.

Material

Cigarette butts were the most common material item in the visible and full-scale surveys, with 272 items in the visible and 271 litter items in the full-scale survey. The six-year average count of cigarette butts is 272 items per year in the visible survey and 234.7 items in the full-scale surveys. Figure E3 in appendix E shows the material types counted in this year’s litter survey.

Plastic items were the second most littered material group, with 80 litter items recorded in the visible survey and 82 items in the full-scale survey.

An average of 112.3 plastic items were counted per year over the past six years in the visible survey and 124.3 items per year in the full-scale surveys.

Visual site ratings

The average visual site rating for Mordialloc beach was 1.6 per survey; the highest rating in 2004–05 was 2. The six-year average was a rating of 1.6.

Figure E4 (Appendix E) shows the site ratings from 1999 to 2005.

Mordialloc beach 2004-05 quick stats

Visible survey

Ave no of items found: 46 per survey
 Most littered item: Cigarette butts

Full-scale survey

Ave no of items found: 44.9 per survey
 Most littered item: Cigarette butts
 Weight of litter: 330 grams

Site rating survey

Highest rating: 2 (Surveys 2, 4-6, 8 & 9)

Beach rank

(1=most littered, 12=least littered)

Visible survey: 3rd out of 12
 Full-scale survey: 3rd out of 12

Mt Martha beach

Mt Martha beach is one of three surveyed beaches located in Mornington Peninsula Shire. An hour's drive from Melbourne, Mt Martha beach has bathing boxes lining the beach whose owners tend to keep the areas around their boxes clean.

Mt Martha beach does not tend to attract a lot of litter, although the bins in the car park are often overflowing after a hot day.

The beach has been one of the least littered beaches over the past six years.

Summary

The amount of litter counted in the visible surveys has increased by 31.9 per cent when compared to 2003-04. The visible litter count average was 19 items per survey, compared to the six-year average of 15.2 items (see Figure F1, Appendix F for the average number of litter items found per year).

In the full-scale survey – where items are removed – litter items increased by 6.7 per cent when compared to 2003-04. The average count for 2004-05 was 19 items per survey, 22 per cent higher than the six-year average for Mt Martha of 14.8 items per survey.

The highest amount of litter in the visible surveys was the second survey (29/12/04) with 37 items and, for the full-scale surveys, was 32 items in the fourth survey (10/1/05).

The highest regeneration was recorded between surveys 3 and 4, when 5.3 items were regenerated. A table with the regeneration rates for 2004-05 is included in Appendix F (see Table F1).

Products

Using the visible survey method, cigarette butts were the most littered item with an average of 6.8 items counted per survey. This result is an increase of 36 per cent from 2003-04 (which had an average of five items per survey).

Cigarette butts were also the most littered product in the full-scale surveys at an average of 7.9 items per survey, an increase of 23.4 per cent from 2003-04.

Other plastic was the second most littered product for the fifth year in a row, accounting for 14.7 per cent of all littered products in the visible survey and 15.3 per cent using the full-scale method.

Material

Cigarette butts were the most littered material group, accounting for 35.8 per cent (6.8 items per survey) of the ten material groups in the visible survey and 41.6 per cent (7.9 items) in the full-scale survey (see Figure F3 in Appendix F). The six-year average is 4.3 items per visible survey and 4.9 items using the full-scale method.

Plastic materials accounted for 32.1 per cent (6.1 items per survey) in the visible litter count and 30 per cent (5.7 average items) in the full-scale survey. The six-year average for plastic is 5.7 items per survey using the visible method and 5.5 for full-scale survey.

Visual site ratings

The average site rating for 2004-05 is a rating of 1 per survey. This is a decrease from 2003-04 when the average rating was 0.8. The six-year average is a rating of 1.3 per survey.

Figure F4 in Appendix F illustrates the average site rating for the past six years.

Mt Martha beach 2004-05 quick stats	
Visible survey	
Ave no of items found:	19 per survey
Most littered item:	Cigarette butts
Full-scale survey	
Ave no of items found:	19 per survey
Most littered item:	Cigarette butts
Weight of litter:	192 grams
Site rating survey	
Highest rating:	1 (Surveys 1 to 10)
Beach rank	
<i>(1=most littered, 12=least littered)</i>	
Visible survey:	10th out of 12
Full-scale survey:	10th out of 12

Port Melbourne beach

Port Melbourne beach is located in Port Phillip Council. A lifesaving club, which houses a small kiosk, is located a few metres from the beach. Toilets are nearby, with showers for the bathers also located near the lifesaving club.

A number of bins are placed on the promenade and there is also a bin on the beach. These appear to be emptied on a regular basis.

There was a build-up of litter along the concrete edges of the lifesaving club, kiosk and showers; it appeared to be blown from the beach and promenade.

Summary

The amount of litter found at Port Melbourne in 2004-05 has decreased from 2003-04 in both the visible and full-scale surveys. The average amount of

litter items found in 2004-05 using the visible survey method was 34.9 items per survey, a 4.6 per cent decrease from 2003-04. Using the full-scale method an average of 37.7 items was counted per survey.

The six-year average for the visible survey is 27.9 items per survey and 30.8 items using the full-scale method.

A total of 1846 litter items have been removed from the Port Melbourne beach full-scale site (48 m² area) over the past six years (see Figure G1, Appendix G for the average number of litter items found per year).

The highest regeneration rate was recorded between surveys 6 and 7, when eight items were regenerated. A table with the regeneration rates for 2004-05 is included in Appendix G (see Table G1).

Products

Cigarette butts were the most common litter item counted in both the visible and full-scale surveys. There was a decrease of 32.4 per cent from the 2003-04 survey (17.9 items) when compared to this year's average of 12.1 cigarette butts per survey.

Using the full-scale survey method, cigarette butts averaged 14.5 items per survey, a decrease of 7.6 per cent from 2003-04.

Straws were the second most littered item at an average of 3.8 items per survey, an increase of 26.7 per cent when compared to the 2003-04 average (three items).

Using the full-scale method, straws were the second most littered product accounting for nine per cent of all products with an average count of 3.4 items per survey.

Material

Cigarette butts were the most littered material group in 2004-05, accounting for 34.7 per cent in the visible surveys and 38.5 per cent in the full-scale surveys.

Plastic material was the second most common material, with 33.8 per cent of material being plastic in the visible survey and 35 per cent plastic materials using the full-scale method (see Figure G3, Appendix G).

An average of 10.6 cigarette butts per survey was found over the past six years and an average of 10 plastic items were counted using the visible method.

Visual site ratings

The average site rating for Port Melbourne beach in 2004-05 was a rating of 1.8. The six-year average is 2.6 per survey. Figure G4 in Appendix G, shows the average ratings at Port Melbourne beach since 1999.

Port Melbourne beach 2004-05 quick stats	
Visible survey	
Ave no of items found:	34.9 per survey
Most littered item:	Cigarette butts
Full-scale survey	
Ave no of items found:	37.7 per survey
Most littered item:	Cigarette butts
Weight of litter:	250 grams
Site rating survey	
Highest rating:	3 (Surveys 5 & 8)
Beach rank	
<i>(1=most littered, 12=least littered)</i>	
Visible survey:	5th out of 12
Full-scale survey:	5th out of 12

Queenscliff beach

Queenscliff beach is the southernmost surveyed beach on the western side of Port Phillip Bay. The beach is located in the Borough of Queenscliffe.

The litter count for Queenscliff beach is one of the lowest each year. Dog walkers appear to be the main

users of this beach, with some BBQ facilities close by. Rubbish bins are located near the picnic facilities but not on the beach.

Summary

Using the visible survey method, the total number of products counted at Queenscliff beach was seven items, a decrease of 74.1 per cent when compared to 2003-04. The litter count for the full-scale method was 11 items in 2004-05, a decrease of 38.9 per cent from the results in 2003-04.

The average litter count for the past six years using the visible survey method is 5.5 items per survey. With the full-scale method the six-year average was 5.7 items per survey (see Figure H1 in Appendix H for the average number of litter items found per year).

The highest regeneration rate for 2004-05 was found between surveys 4 and 5, a rate of 0.4 items. A table with the regeneration rates for 2004-05 is included in Appendix H (see Table H1).

Products

In 2004-05 the most common litter item using the visible survey method was plastic bags, with two bags found over the summer period. One of each of matches, dog faeces, tissues/serviettes, other paper and cigarette butts items was counted over the summer survey period in 2004-05.

Using the full-scale method the most littered product was cigarette butts, with four butts found in 2004-05. This result is a decrease of 55.6 per cent compared to 2003-04.

The second most common litter item was tissues/serviettes and plastic bags, with two of each of these items being found across the 10 surveys.

Material

Paper and plastic were the most littered material groups in 2004–05 in the visible surveys, each accounting for 28.6 per cent of the material group. Organic items, wood and cigarette butts were the second most common material group, each accounting for 14.3 per cent of the groups (see Figure H3, Appendix H).

Using the full-scale method, cigarette butts were the most common material group, accounting for 36.4 per cent of the groups. Paper and plastic were the second highest product groups, each accounting for 27.3 per cent of the materials found.

Visual site ratings

The average site rating for Queenscliff beach in 2004–05 was 0.1 per survey. The highest and only rating above zero was recorded on 29 December, when the beach rated 1 out of 10.

The six-year average site rating is 2.1 per survey. Figure H4 in Appendix H shows the average ratings at Queenscliff beach since 1999.

Queenscliff beach 2004–05 quick stats

Visible survey

Ave no of items found: 0.7 per survey

Most littered item: Plastic bags

Full-scale survey

Ave no of items found: 1.1 per survey

Most littered item: Cigarette butts

Weight of litter: 18 grams

Site rating survey

Highest rating: 1 (Survey 2)

Beach rank

(1=most littered, 12=least littered)

Visible survey: 12th out of 12

Full-scale survey: 12th out of 12

Rye beach

Rye beach is located in Mornington Peninsula Shire and is one of three surveyed in the Shire. This year,

the size of the barricades has increased, with fewer open passages located along the beach, making it more difficult for beach users to remove rubbish from the beach: the bins are located on the other side of the barricade.

Rye beach is in a high-use area, with a car park, playground, picnic areas and a caravan park in the vicinity.

Summary

Using the visible survey method, an average of 26.6 items was counted in 2004–05, a decrease of 13.6 per cent when compared to the results in 2003–04. The six-year average is 24.7 items per survey.

The full-scale method produced similar results to the visible surveys: an average of 27.4 litter items were found in 2004–05, a decrease of 13.6 per cent compared to 2003–04 survey results. The six-year average in the full-scale surveys is 28.6 items per survey (see Figure I1, Appendix I for the average number of litter items found per year).

The highest regeneration rate occurred between surveys 6 and 7, with a rate of 9.7 items. A table with the regeneration rates for 2004–05 is included in Appendix I (see Table I1).

Products

The most commonly littered product item in 2004–05 was cigarette butts, accounting for 48.9 per cent of all products in the visible surveys. Using the full-scale method, cigarette butts were also the most common litter item accounting for 54 per cent. There was a decrease of 10.3 per cent when compared to the visible survey in 2003–04; the full-scale product count in 2004–05 was the same as in 2003–04.

The second most littered product was other plastic items, accounting for 6.8 per cent using the visible survey method and 6.6 per cent using the full-scale survey method. There was an increase of 200 per cent using the visible survey method when compared to 2003-04 and a 50 per cent increase for the full-scale method.

Material

The most common material item was cigarette butts using both the visible and full-scale survey methods. Cigarette butts accounted for 48.9 per cent for the visible and 54 per cent for the full-scale survey (see Figure I2 in Appendix I for the top 10 products). The six-year average for the visible surveys is 12.5 items per survey, compared to 13 items in 2004-05. Using the full-scale method the average per survey in 2004-05 was 14.8 items; the six-year average is 15 items per survey.

The second most common material was plastic items, accounting for 19.5 per cent using the visible and 21.5 per cent using the full-scale method. The visible survey average in 2004-05 is 5.2 items per survey. The six-year average for plastic materials is 4.2 items per survey. The full-scale survey method shows an average 5.9 items per survey in 2004-05. The six-year average was also 5.9 items per survey.

Visual site ratings

The average site rating for Rye beach is 1.1 per survey. This result was the same as the 2003-04 period. The six-year average is a rating of 2.3 per survey. Figure I4 in Appendix I, shows the average ratings at Rye beach since 1999.

Rye beach 2004-05 quick stats

Visible survey

Ave no of items found: 26.6 per survey
Most littered item: Cigarette butts

Full-scale survey

Ave no of items found: 27.4 per survey
Most littered item: Cigarette butts
Weight of litter: 150 grams

Site rating survey

Highest rating: 2 (Surveys 4 & 5)

Beach rank

(1=most littered, 12=least littered)

Visible survey: 8th out of 12

Full-scale survey: 8th out of 12

Sandringham beach

Sandringham beach is located in Bayside City Council. A walkway/promenade and a lifesaving club are located near the survey areas. Construction of toilets is taking place nearby and this area is blocked off.

Only one bin is located on the beach, which was overflowing on several occasions during the hotter periods over summer. Rubbish accumulated around the promenade wall, shrubbery and lifesaving club. The stormwater drain was also heavily littered after the rain in late December and early February.

Sandringham beach is the most littered beach for the second year in a row.

Summary

The average amount of litter items counted using the visible survey method was 65 items per survey, which is 24 per cent lower than the six-year average of 52.4 items per survey. There was an increase of 15.7 per cent when compared to the results from 2003-04.

Using the full-scale survey method, the average amount of litter found per survey was 58.7 items per survey, an increase of 7.5 per cent when compared to the results from 2003-04. The six-year average is

49.8 items per survey (see Figure J1, Appendix J for the average number of litter items found per year).

The highest regeneration rate occurred between surveys 6 and 7, with 20.7 items regenerated. A table with the regeneration rates for 2004–05 is included in Appendix J (see Table J1).

Products

The most common litter item in 2004–05 was cigarette butts – for the sixth year in a row. Using the visible survey method, an average of 33.3 butts was counted, an increase of 9.5 per cent from the 2003–04 results. Using the full-scale survey method, cigarette butts were also the most littered item with an average of 30.2 items per survey, an increase of 0.3 per cent when compared to the 2003–04 results.

Other plastic items were the second most common litter items counted in the visible and full-scale surveys. Using the visible method an average of 3.6 items was counted and using the full-scale method an average of 3.3 items was counted per survey.

Material

The most common material group was cigarette butts, accounting for 51.2 per cent using the visible method and 51.4 per cent using the full-scale method. The average litter count was 33.3 items per survey using the visible survey method. The six-year average using the full-scale method is 24.4 items per survey; this year the results were slightly higher at 30.2 items per survey.

Plastic was the second most common material, accounting for 23.2 per cent of the visible surveys and 23.5 per cent of the full-scale surveys. The six-year average was 15.4 items using the visible method; in 2004–05 the average was 15.1 items per survey. Using the full-scale method, an average of

13.8 items were counted per survey, slightly below the six-year average of 14.6 items per survey.

Visual site ratings

The average site rating for Sandringham beach for 2004–05 was 1.9 per survey. The six-year average is 2.6 per survey (Figure J4 (Appendix J) shows the site ratings from 1999 to 2005). The highest rating given in 2004–05 was 3, in survey 8 (7/2/05). This survey followed very heavy rains.

Sandringham beach 2004–05 quick stats

Visible survey

Ave no of items found: 65 per survey
Most littered item: Cigarette butts

Full-scale survey

Ave no of items found: 58.7 per survey
Most littered item: Cigarette butts
Weight of litter: 495 grams

Site rating survey

Highest rating: 3 (Survey 8)

Beach rank

(1=most littered, 12=least littered)

Visible survey: 1st out of 12
Full-scale survey: 1st out of 12

Seaford beach

Seaford beach is located in Frankston City Council. The beach is located near a lifesaving club and pier. The lifesaving club has been out of use for quite some time and has become fairly run down, with rubble falling onto the beach from the concrete steps.

Bins are located near the access paths to the beach and there are also facilities for dog litter bags.

Summary

There was an increase in litter of 55.3 per cent recorded in 2004–05 visible surveys when compared to the results from 2003–04. An average of 56.7 litter items were found in 2004–05, compared to 36.5 items in 2003–04. The six-year litter average is 37.2

items per survey (see Figure K1, Appendix K for the average number of litter items found per year).

Using the full-scale method, an average of 45.1 items were recorded in 2004–05, an increase of 57.7 per cent when compared to the 28.6 items recorded in 2003–04. The six-year average is 38 items per survey. A total of 2277 litter items have been removed from the full-scale survey area of Seaford beach (48 m² area) since 1999.

The highest regeneration rate was recorded between surveys 6 and 7 of 15.7 items. A table with the regeneration rates for 2004–05 is included in Appendix K (see Table K1).

Products

The most common litter product in 2004–05 was cigarette butts, accounting for 48.1 per cent of all items counted using the visible survey method. This was an increase of 33.2 per cent when compared to the results from 2003–04. Using the full-scale removal method, cigarette butts accounted for 53.4 per cent of all items. When compared to the results from 2003–04, this was an increase of 58.6 per cent.

Other plastic was the second most littered item in 2004–05. Using the visible survey method, other plastic items accounted for 5.5 per cent of all products, an increase of 72.2 per cent when compared to 2003–04.

Other plastic items accounted for 6.2 per cent using the full-scale method, an increase of 86.7 per cent when compared to results from 2003–04.

Material

The most common material was cigarette butts, using both the visible and full-scale methods. The average number of cigarette items recorded in the visible

survey was 27.3 items per survey. The six-year average is 19.2 items per survey. Using the full-scale method, an average of 24.1 cigarette items was found. The six-year average is 19.4 items per survey.

The second most littered material group was plastic items, accounting for 21.7 per cent using the visible and 20.4 per cent using the full-scale method.

The six-year average for the visible items is 8.9 items. In 2004–05 an average of 12.3 items was recorded. The six-year average for the full-scale method is 9.8 items per survey. In 2004–05 an average of 9.2 items was recorded.

Visual site ratings

The average site rating per survey for Seaford beach in 2004–05 was 1.5, with the highest rating (4) recorded on the fifth and eighth surveys. The six-year average is a rating of 2 per survey. Figure K4 (Appendix K) shows the site ratings from 1999 to 2005.

Seaford beach 2004–05 quick stats	
Visible survey	
Ave no of items found:	56.7 per survey
Most littered item:	Cigarette butts
Full-scale survey	
Ave no of items found:	45.1 per survey
Most littered item:	Cigarette butts
Weight of litter:	421 grams
Site rating survey	
Highest rating:	4 (Surveys 5 & 8)
Beach rank	
<i>(1=most littered, 12=least littered)</i>	
Visible survey:	2nd out of 12
Full-scale survey:	2nd out of 12

Sorrento beach

Sorrento beach is one of three located in Mornington Peninsula Shire. The survey areas are located near access points from a caravan park whose visitors

appear to be the main users of Sorrento beach. Foot traffic is also quite common along the beach.

A few dinghies are kept on the grass area, where bottles and cigarette butts are frequently found.

While there are no bins located on the beach, there is one bin in the caravan park.

Summary

An average of 26 items per survey were counted using the visible survey method, a decrease of 7.5 per cent when compared to the results from 2003–04. The six-year average is 21.5 items per survey. With the full-scale survey method, an average of 26.7 items was found, a decrease of 37.3 per cent from the 2003–04 results. The six-year average is 26.7 items per survey (see Figure L1, Appendix L for the average number of litter items found per year).

A total of 1602 items have been removed from the 48 m² full-scale survey area at Sorrento beach over the past six years.

The highest regeneration rate was found between surveys 6 and 7, when there were 12 items regenerated. A table with the regeneration rates for 2004–05 is included in Appendix L (see Table L1).

Products

The most common litter item found at Sorrento beach in 2004–05 was cigarette butts. Using the visible survey method, an average of 13.5 butts was found per survey, a decrease of 12.3 per cent from the 2003–04 results. Using the full-scale method an average of 14.7 cigarette butts was counted, a decrease of 43 per cent when compared to the results in 2003–04.

The second most littered product in 2004–05 was other plastic using the visible survey, an average of

two items per survey, which was 7.7 per cent of all litter found. This was an increase of 42.9 per cent from 2003–04 when an average of 1.4 other plastic items were found per survey. Using the full-scale method, other paper was the second most common litter item, accounting for 4.1 per cent of all products counted. An average of 1.1 other paper items were found per survey in 2004–05.

Material

The most common material group was cigarette butts, which accounted for 51.9 per cent of all litter groups in the visible survey and 55.1 per cent using the full-scale method. The average number of cigarette butts found in 2004–05 was 13.5 items per survey. The six-year average is 13.4 items per survey. Using the full-scale method an average of 14.7 items were found this year, which is below the six-year average of 17.1 items per survey.

The second most common material group in 2004–05 was the plastic group, accounting for 24.2 per cent of all litter groups in the visible survey and 18.4 per cent using the full-scale method. The average plastic litter count in 2004–05 was 6.3 items using the visible method, which was higher than the six-year average of 3.3 plastic items per survey. Using the full-scale method an average of 4.9 plastic items were found per survey. The six-year average is 3.5 plastic items.

Visual site ratings

The average visual site rating for Sorrento beach in 2004–05 was 1.2 per survey. The highest rating was on the fifth survey (17/1/05), when the beach was rated 3 out of 10. The average rating for the past six years is 1.4 per survey. Figure L4 (Appendix L) shows the site ratings from 1999 to 2005.

Sorrento beach 2004–05 quick stats

Visible survey

Ave no of items found: 26 per survey

Most littered item: Cigarette butts

Full-scale survey

Ave no of items found: 26.7 per survey

Most littered item: Cigarette butts

Weight of litter: 161 grams

Site rating survey

Highest rating: 3 (Survey 5)

Beach rank

(1=most littered, 12=least littered)

Visible survey: 9th out of 12

Full-scale survey: 9th out of 12

St Kilda beach

St Kilda beach is one of two surveyed beaches located in Port Phillip City Council.

St Kilda beach is in a high-use area and adjoins a number of restaurants along the boardwalk. The beach is mechanically cleaned on a regular basis as well as being manually cleaned daily during summer.

On a number of occasions there was a build-up of rubbish along the esplanade wall and around the stormwater drain.

Summary

The average amount of litter counted per survey using the visible survey method was 39.3 items, an increase of 44.5 per cent when compared to the results from 2003–04 (27.2 items). The six-year average is 43.7 items per survey (see Figure M1, Appendix M for the average number of litter items found per year).

Using the full-scale method, the average amount of litter removed from St Kilda beach was 44.6 items per survey, an increase of 72.2 per cent when compared with the results from 2003–04. The average litter count over the past six years is 44 items per survey. A total of 2641 litter items have been removed from the 48 m² area since 1999.

The highest regeneration occurred between surveys 4 and 5, when 8.9 items were regenerated. A table with the regeneration rates for 2004–05 is included in Appendix M (see Table M1).

Products

Cigarette butts were the most littered product in 2004–05 for the sixth year in a row, with an average of 19.8 butts counted per survey using the visible method. This result was an increase of 62.3 per cent when compared to 2003–04 results (12.2 items). Using the full-scale method an average of 22.1 butts was counted per survey, an increase of 102.8 per cent when compared to 2003–04 results (10.9 items).

The second most commonly littered product using the visible survey method was plastic straws, accounting for 6.1 per cent of all products. An average of 2.4 straws was counted per survey, an increase of 140 per cent when compared to the 2003–04 results.

Using the full-scale survey method, the second most littered products was other plastic items, accounting for 6.3 per cent of products. An average of 2.8 items per survey was counted, an increase of 75 per cent when compared to the 2003–04 results.

Material

Cigarette butts were the most littered material group, accounting for 50.4 per cent of all litter counted in the visible survey. The average number of cigarette butts found per survey in 2004–05 was 19.8 items – the six-year average is 25.7 items per survey. Using the full-scale method, an average of 22.1 items was found per survey – the six-year average is 24.2 items per survey.

In the visible survey the second most littered material group in 2004–05 was the plastic group, accounting

for 27 per cent of all litter. An average of 10.6 items was counted per survey. Plastic items were also the second most littered group in the full-scale survey, accounting for 24.9 per cent of all litter counted. Plastic materials had an average of 11.1 items per survey – the six-year average is 9.1 items per survey.

Visual site ratings

The average visual site rating in 2004–05 was 2 out of 10 per survey. The highest rating was on the eighth survey (7/2/05) when the beach was rated 4 out of 10. The six-year average is 5.5 per survey. Figure M4 (Appendix M) shows the site ratings from 1999 to 2005.

St Kilda beach 2004–05 quick stats	
Visible survey	
Ave no of items found:	39.3 per survey
Most littered item:	Cigarette butts
Full-scale survey	
Ave no of items found:	44.6 per survey
Most littered item:	Cigarette butts
Weight of litter:	312grams
Site rating survey	
Highest rating:	4 (Survey 8)
Beach rank	
<i>(1=most littered, 12=least littered)</i>	
Visible survey:	4th out of 12
Full-scale survey:	4th out of 12

Werribee South beach

Werribee South beach is located in Wyndham City Council, on the north-west shore of Port Phillip Bay. The beach is surrounded by farmland and is not heavily used.

In 2003–04 it was found that vegetation had taken over former survey sites, which were no longer usable for the survey. The survey team was forced to move the survey areas further down the beach to a similar usage area. It is likely that this shift of location accounts for the increased litter observed in 2004–05.

Summary

The average amount of litter found per survey in 2004–05 was one item in the visible survey. This result was an increase of 66.7 per cent when compared to the 2003–04 results (average of 0.6 items). The six-year average is 3.5 items per survey.

Using the full-scale method, an average of 2.2 items was found per survey, an increase of 450 per cent when compared to the result in 2003–04. The six-year average is 3 items per survey (see Figure N1, Appendix N for the average number of litter items found per year).

The highest regeneration rate occurred between surveys 4 and 5, when 0.9 items were regenerated. A table with the regeneration rates for 2004–05 is included in Appendix N (see Table N1).

Products

Matches and cigarette butts were the most littered products in the visible surveys in 2004–05, with an average of 0.2 items each per survey. Only one type of product was found in the 2003–04 visible surveys – clothing and material.

In the full-scale survey, cigarette butts were the most common litter item, with an average of 0.6 items per survey. This result was an increase of 500 per cent when compared to the 2003–04 results (0.1 per survey).

Material

In 2004–05 the most common material groups were cigarette butts, glass and wood. These material groups accounted for 20 per cent each of all the litter items.

The most common material group using the full-scale method was cigarette butts, accounting for 27.3 per

cent. Paper was the second most littered material group with 22.7 per cent of all litter. Figure N3 in Appendix N shows the average number of material found in 2004-05.

Visual site ratings

Werribee South rated 0 out of 10 each survey in 2004-05. In 2003-04, Werribee South also rated 0 per survey.

The average site rating for the past six years is 0.9 per survey. Figure N4 (Appendix N) shows the site ratings from 1999 to 2005

Werribee South beach 2004-05 quick stats	
Visible survey	
Ave no of items found:	1 per survey
Most littered item:	Matches
Full-scale survey	
Ave no of items found:	2.2 per survey
Most littered item:	Cigarette butts
Weight of litter:	23 grams
Site rating survey	
Highest rating:	0 (All surveys)
Beach rank	
<i>(1=most littered, 12=least littered)</i>	
Visible survey:	11th out of 12
Full-scale survey:	11th out of 12

Williamstown beach

Williamstown is located in Hobson Bay City Council. A restaurant and toilets are located near the beach. Williamstown beach is in a small cove and has a restaurant, kiosk and lifesaving buildings close to the survey area.

A promenade is located along the length of the beach. A large amount of litter was found on the beach at the base of the promenade.

Williamstown beach saw a major decrease in litter last year due to the purchase of a new beach cleaner, which dramatically decreased the amount of litter found.

Summary

The average amount of litter found in the visible surveys was 32.9 items per survey, an increase of 115 per cent from the 2003-04 surveys. However, the litter survey results in 2004-05 were the second lowest for Williamstown beach over the past six years. The six-year average is 68 items per survey.

Using the full-scale method, the average amount of litter found per survey was 33.7 items, an increase of just 0.3 per cent when compared to the results from 2003-04. The six-year average is 44.8 items per survey (see Figure O1, Appendix O for the average number of litter items found per year).

The highest regeneration occurred between surveys 6 and 7, with a regeneration rate of 7.3 items. A table with the regeneration rates for 2004-05 is included in Appendix O (see Table O1).

Products

The most common litter item in 2004-05 was cigarette butts, accounting for 54.4 per cent of all products surveyed in the visible surveys. The average amount of cigarette butts found was 17.9 items per survey, an increase of 62.7 per cent when compared to 2003-04 results.

The most littered product in the full-scale survey was cigarette butts which accounted for 56.4 per cent of litter items. An average of 19 items was counted per survey, a decrease of 26.4 per cent when compared to the results in 2003-04.

The second most common litter item in the full-scale and visible surveys was other plastic items. The average amount of litter items in the visible surveys was two items per survey, an increase of 122.2 per cent when compared to the 2003-04 results. The full-scale survey also shows an increase from 2003-04 of

10 per cent, with an average litter count of 2.2 items per survey.

Material

The highest material group in the visible survey was cigarette butts with an average of 17.9 items per survey. The six-year average is 47.5 items per survey. Using the full-scale method, cigarette butt litter was also the highest material group with an average of 19 items per survey, well below the six-year average of 28 items per survey.

The second most common material group is plastic, accounting for 20.4 per cent of all groups in the visible survey and 18.1 per cent in the full-scale surveys.

Visual site ratings

The average site rating for 2004-05 was 0.3 per survey. The six-year average site rating was 5.5 per survey. Figure O4 (Appendix O) shows the site ratings from 1999 to 2005.

Williamstown beach 2004-05 quick stats	
Visible survey	
Ave no of items found:	32.9 per survey
Most littered item:	Cigarette butts
Full-scale survey	
Ave no of items found:	33.7 per survey
Most littered item:	Cigarette butts
Weight of litter:	98 grams
Site rating survey	
Highest rating:	1 (Surveys 1 to 3)
Beach rank (1=most littered, 12=least littered)	
Visible survey:	7th out of 12
Full-scale survey:	6th out of 12

PORT PHILLIP BAY
BEACH LITTER SURVEY
2004-05

APPENDICES

APPENDIX A – METHODOLOGY

The survey sites were chosen to ensure that there was at least one site from each of the municipalities that surround Port Phillip Bay. The beaches used in this report were high usage areas for their municipalities and where possible were close to a Life Saving Club. The beaches are: Eastern beach, Mt Martha beach, Rye beach, Seaford beach, St Kilda beach, Williamstown Beach, Mordialloc beach, Port Melbourne, Queenscliff, Sandringham, Sorrento and Werribee South.

A diagram of the beaches surveyed is below.

Three types of litter survey methodologies were used at each of the twelve sites over the 10 surveys.

1. Full-scale survey: a 48 m² survey area is measured and then all litter in the area is counted, removed and weighed. The litter is removed to enable the surveyors to calculate the regeneration rate (the litter accumulation between surveys).

Full-scale surveys, step-by-step

1. A site survey is undertaken and a permanent mark is chosen as the survey marker. This area is photographed so future surveys can be conducted at the same location.
2. A distance from the permanent marker is measured for the first marker of the survey area. This is then included on the KABV site information sheet.



Figure A1: Beaches (underlined) surveyed for Beach Report

3. A 48 m² site is measured and witches hats are placed at the corners. The site is photographed and included on the KABV site information sheet for future survey information.
4. All litter in the survey area is counted and removed, with the litter survey data being entered onto a KABV litter survey form.
5. Sites are revisited over the summer period and on each visit, litter is counted and removed.

2. Visible litter survey: a 48m² survey area is measured, and then all litter in the area is counted but not removed. The litter remains on the survey area to observe the effectiveness of beach cleaning.

Visible litter surveys, step-by-step

1. A site survey is undertaken and a permanent mark is chosen as the survey marker. This area is photographed so future surveys can be conducted at the same location.
2. A distance from the permanent marker is measured for the first marker of the survey area. This is then included on the KABV site information sheet.
3. A 48 m² site is measured and witches hats are placed at the corners. The site is photographed and included on the KABV site information sheet for future survey information.
4. All litter in the survey area is counted, but not removed, with the litter survey data being entered onto a KABV litter survey form.
5. Sites are revisited over the summer period and on each visit, litter is counted but not removed.

3. Visual ratings survey: a 50 m length of beach is viewed and a visual rating is allocated. Visual ratings are between zero and ten; with zero representing a site with no litter and ten representing a site covered with litter. Visual ratings provide a quick snapshot of the visual presence of litter on each surveyed beach.

Visual ratings surveys, step-by-step

1. A site survey is undertaken and a permanent mark is chosen as the survey marker. This area is photographed so future surveys can be conducted at the same location.
2. A distance from the permanent marker is measured for the first marker of the survey area. This is then included on the KABV site information sheet.
3. A 50 m site is measured and witches hats are placed in the middle and at the corners. The site is photographed and included on the KABV site information sheet for future information.
4. All litter in the survey area is viewed but not removed, with the litter rating being entered onto the KABV litter site rating survey form.
5. Sites are rated zero through to ten, with zero representing no litter and ten representing litter covering the entire site.
6. Sites are revisited over the summer period and on each visit, a rating is given.

Please note: Where a single container had been dumped with a number of pieces of litter inside the container, this is included as only one item. Where the contents of that container have begun to spill out, the individual pieces are counted.

Data analysis

Data analysis is broken up into products, materials, regeneration rates and weight. The results may vary between surveys due to weather, rainfall, the number of people visiting the beach and timing of beach cleaning.

Material type: Where litter is identified according to its constituent element. This allows the manufacturers of the raw materials to see the impact of their materials on the litter stream. Appendix B provides an example of which products are categorised into which material groups.

Product type: Where the litter is identified according to the nature of the item.

Regeneration rates: Regeneration rates can only be obtained from the full-scale litter count as the litter is removed after each survey. The number of litter items that accumulate between each survey date defines regeneration. The number of items that regenerate per day measures the rate.

Weight: All litter from the full-scale survey is taken away and weighed.

APPENDIX B – MATERIAL GROUPS

Below are some examples of the type of products in each material group.

METAL	CERAMICS
Confectionery foil	Cement
Spirit cans	Bricks
Wire	Tiles
MISCELLANEOUS	PAPER
String & rope	Takeaway wrappers
Adhesive bandages	Business cards
Pens & pencils	Milk cartons
WOOD	PLASTIC
Ice cream sticks	Cling wrap
Matches	Lollipop stick
Construction material	Plastic bags
RUBBER	GLASS
Balloons/water bombs	Soft drink bottles
Rubber bands	Beer bottles
Tyres and tyre pieces	Wine bottles
ORGANIC MATERIAL	CIGARETTE BUTTS
Cork	Cigarette butts
Fruit & vegetables	
Dog faeces	

Table B1: Types of products in each material group

APPENDIX C – QUALITY ASSURANCE

To improve the accuracy of the surveys, quality assurance was undertaken. All surveyors completed a full day of training to ensure accuracy of the data they collected. During the survey period, a number of quality assurance checks were performed by the litter survey team leader.

Visual rating survey

The results obtained by the surveyors for the visual rating surveys are compared with the results obtained by the survey team leader. The correlations were very close with only one discrepancy. Table 7 below shows the results between the actual survey and the quality assurance figures.

Visible survey

Quality assurance for the visible survey is undertaken by two of the survey teams separately counting the same 48m² site. The results are then directly compared with each other to ensure that results are not due to extraneous variables such as surveying technique. Table 8 below shows the results of this quality assurance, with an average discrepancy of 4.3 items per survey.

The main reason for this discrepancy between the survey data is that there is the possibility of the first surveyor burying items underneath the sand when walking the length of the survey area. This can especially affect the data count when smaller litter items are buried in the site after the first surveyor has counted.

Beach	Date	Survey	Quality assurance	Difference
		Site rating	Site rating	
Williamstown	4/1/2005	1	1	0
Williamstown	17/1/2005	0	0	0
Williamstown	21/2/2005	0	0	0
Port Melbourne	29/12/2004	0	0	0
Port Melbourne	10/1/2005	2	2	0
Port Melbourne	7/2/2005	3	4	1
Mt Martha	21/12/2004	1	1	0
Mt Martha	27/1/2005	1	1	0
Mt Martha	7/3/2005	1	1	0

Table C1: Quality assurance data for the visual site ratings survey

PORT PHILLIP BAY BEACH LITTER SURVEY 2004-05

Beach	Date	Survey #	Visible	Quality assurance	Difference
			Items per survey	Items per survey	
Williamstown	4/1/2005	3	34	32	2
Williamstown	17/1/2005	5	45	40	5
Williamstown	21/2/2005	9	22	23	1
Port Melbourne	29/12/2004	2	56	50	6
Port Melbourne	10/1/2005	4	34	38	4
Port Melbourne	7/2/2005	8	54	52	6
Mt Martha	21/12/2004	1	11	11	0
Mt Martha	27/1/2005	7	25	28	3
Mt Martha	7/3/2005	10	11	10	1

Table C2: Quality assurance data for the visible surveys

APPENDIX D – EASTERN BEACH

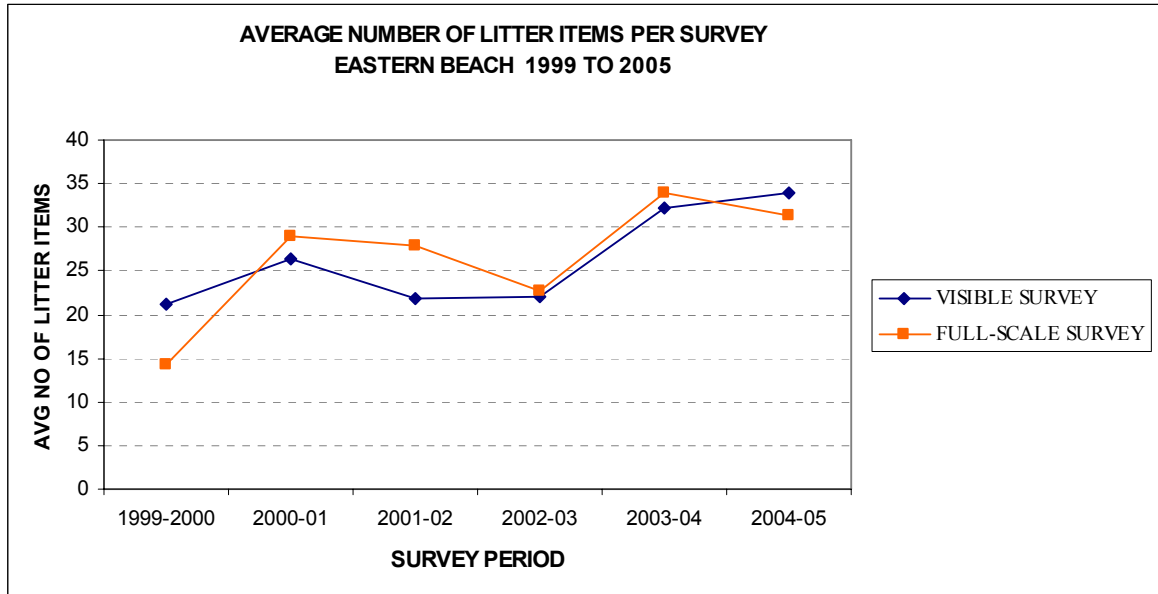


Figure D1: Average number of litter items counted in each survey at Eastern beach

Survey	Regeneration rate per day
Survey 1-2	5.6
Survey 2-3	6.3
Survey 3-4	4.8
Survey 4-5	5.9
Survey 5-6	4.9
Survey 6-7	6.7
Survey 7-8	3.2
Survey 8-9	1.8
Survey 9-10	1.5

Table D1: Regeneration rates at Eastern beach

PORT PHILLIP BAY BEACH LITTER SURVEY 2004-05

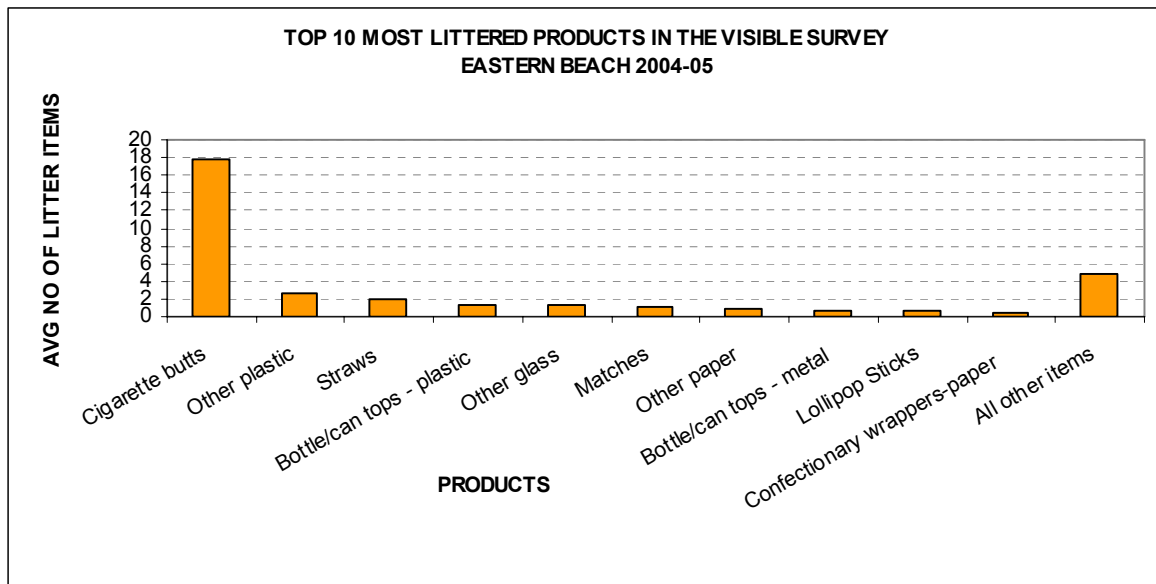


Figure D2: Top 10 most littered items, visible survey at Eastern beach

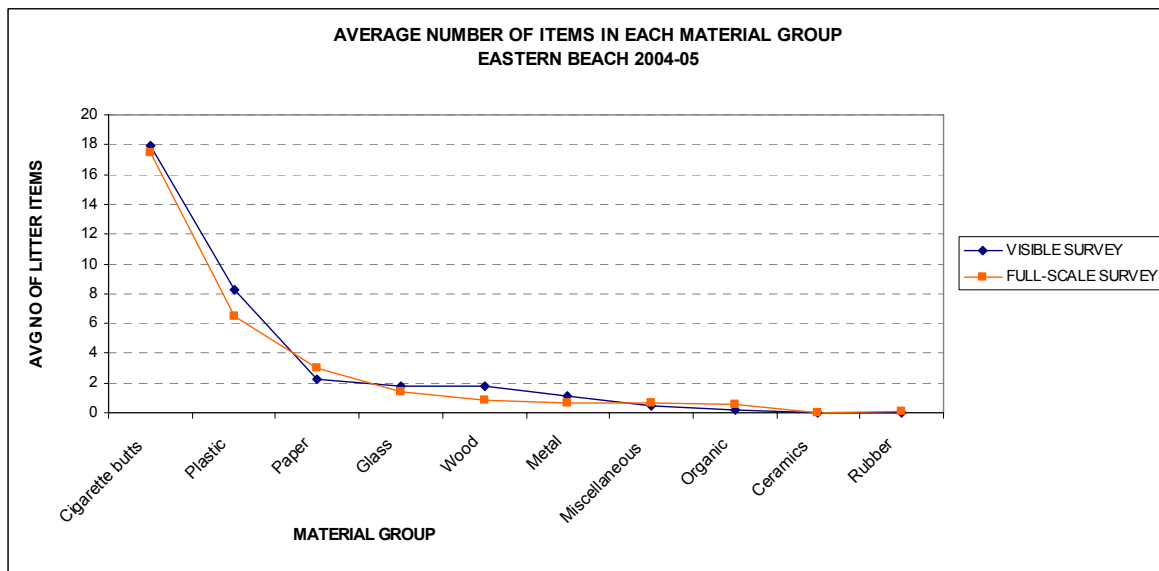


Figure D3: Material type found per survey at Eastern beach

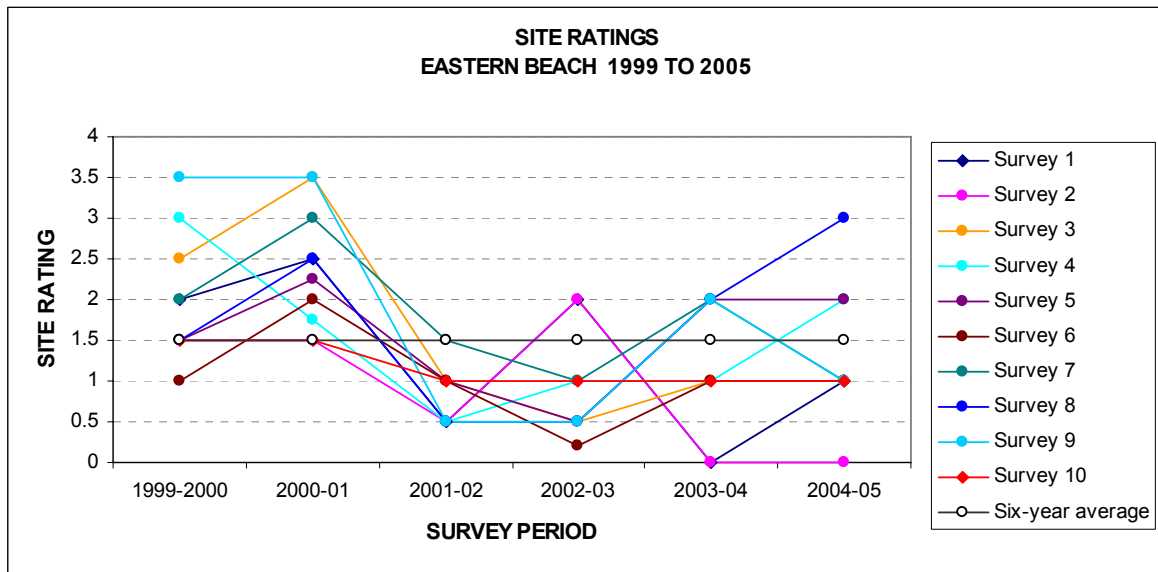


Figure D4: Visual site ratings at Eastern beach

APPENDIX E – MORDIALLOC

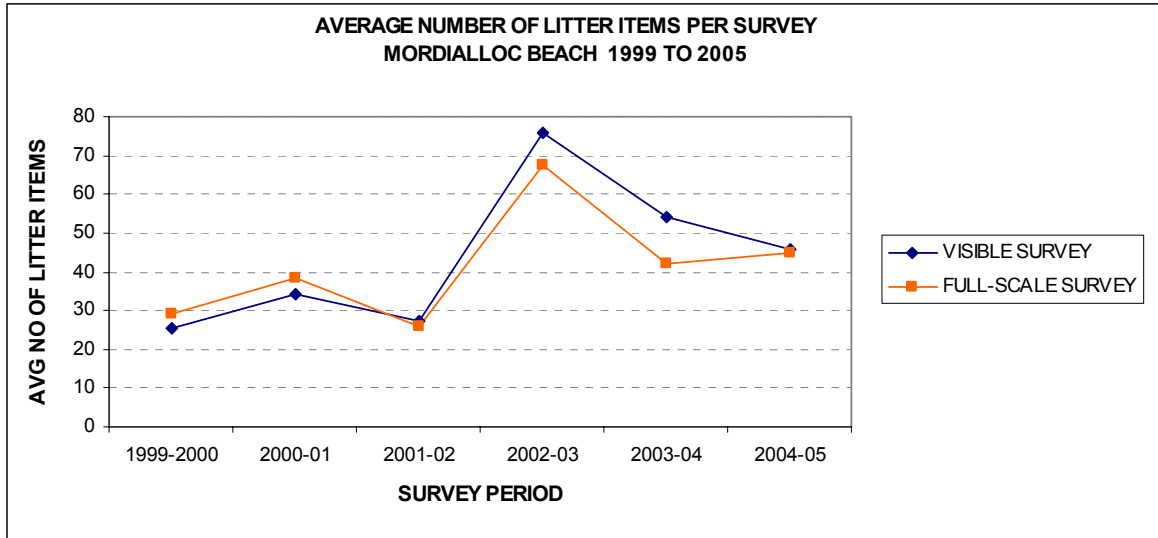


Figure E1: Average number of litter items counted in each survey at Mordialloc beach

Survey	Regeneration rate per day
Survey 1-2	7.4
Survey 2-3	7.5
Survey 3-4	9.7
Survey 4-5	6.7
Survey 5-6	7.1
Survey 6-7	18.7
Survey 7-8	3.4
Survey 8-9	2.6
Survey 9-10	1.8

Table E1: Regeneration rates at Mordialloc beach

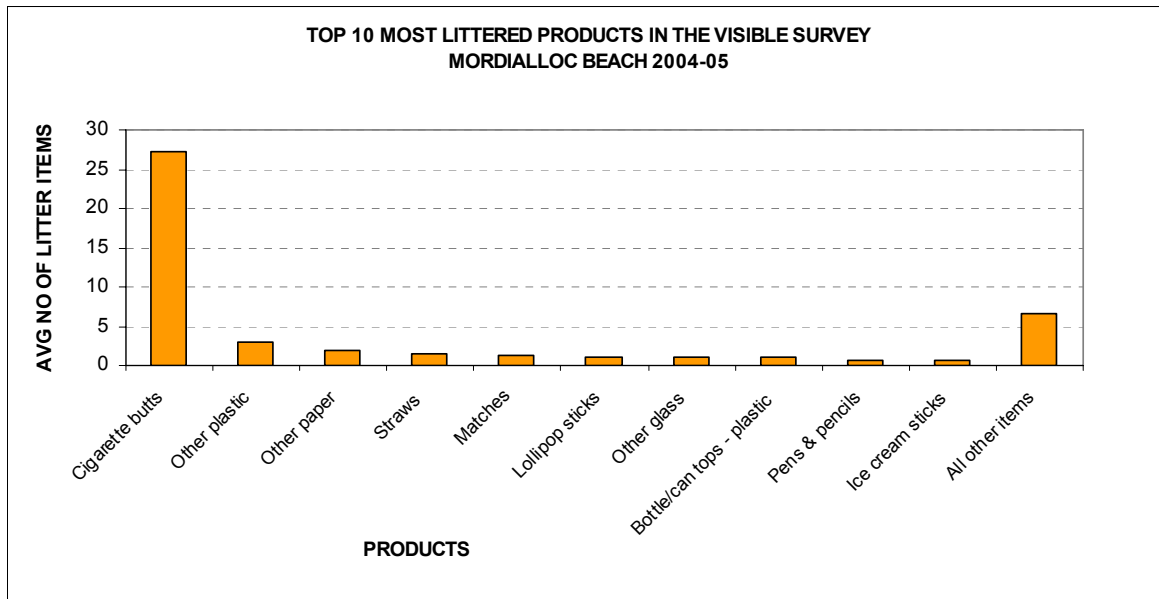


Figure E2: Top 10 most littered items, visible survey at Mordialloc beach

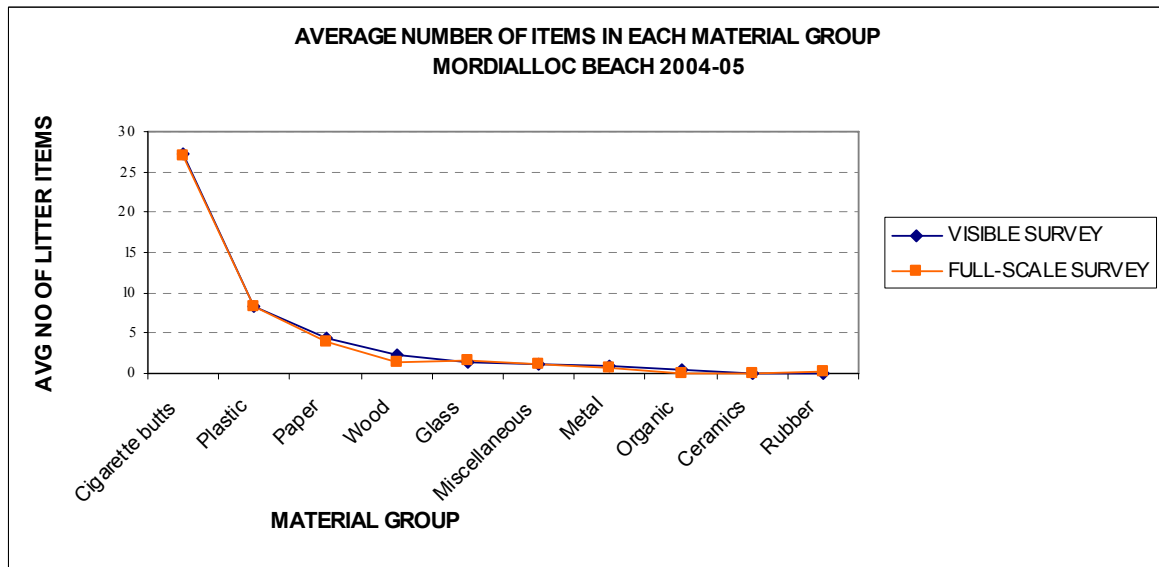


Figure E3: Material type found per survey at Mordialloc beach

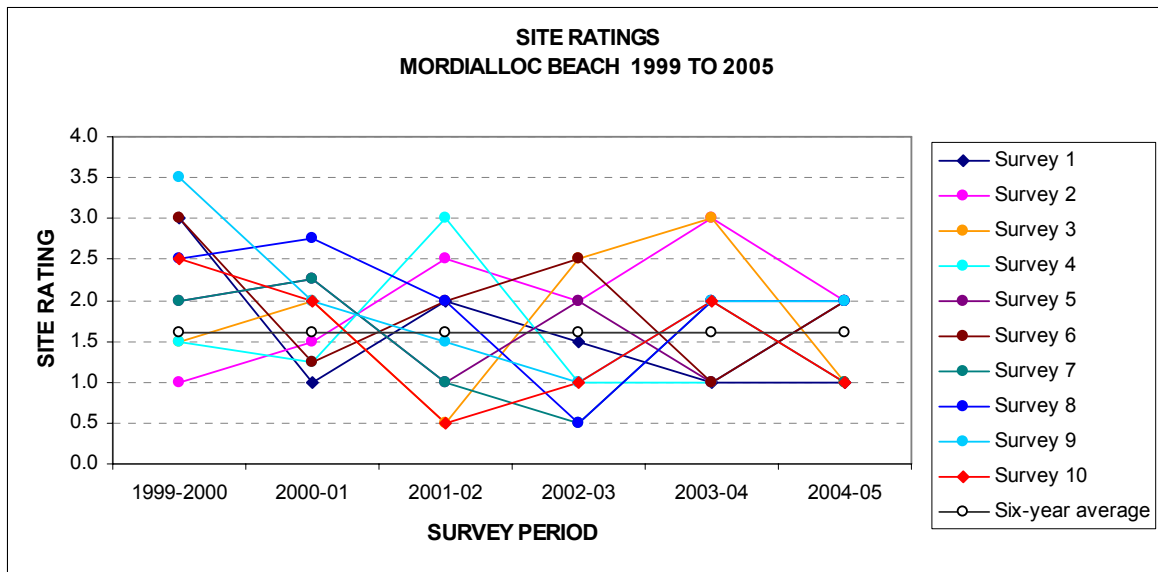


Figure E4: Visual site ratings at Mordialloc beach

APPENDIX F – MT MARTHA

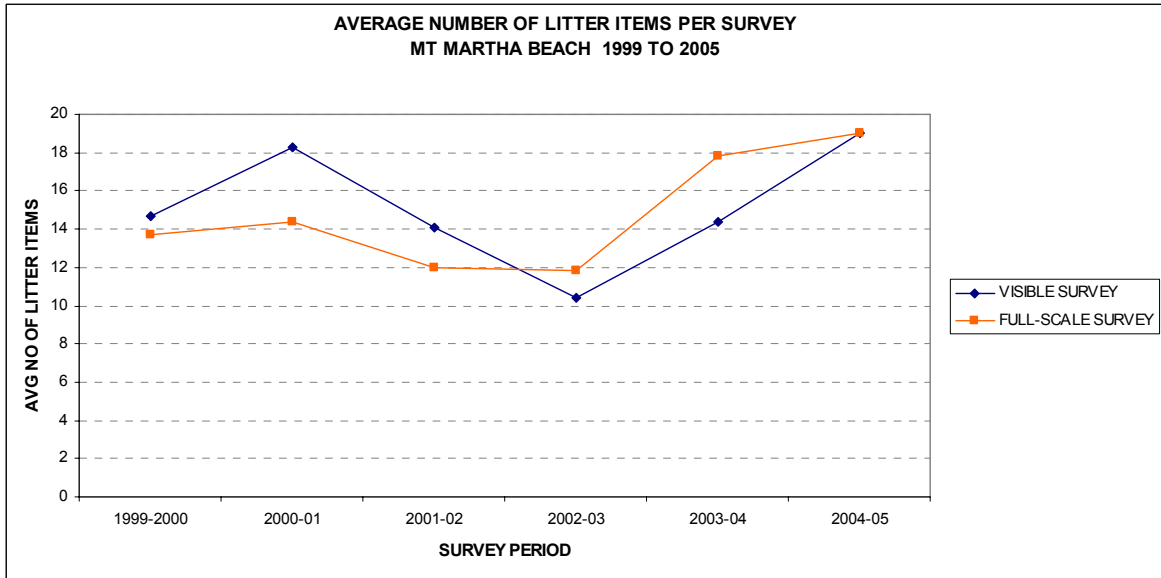


Figure F1: Average number of litter items counted in each survey at Mt Martha beach

Survey	Regeneration rate per day
Survey 1-2	3.9
Survey 2-3	3.5
Survey 3-4	5.3
Survey 4-5	3.3
Survey 5-6	2.7
Survey 6-7	2.7
Survey 7-8	1.3
Survey 8-9	1.2
Survey 9-10	1.1

Table F1: Regeneration rates at Mt Martha beach

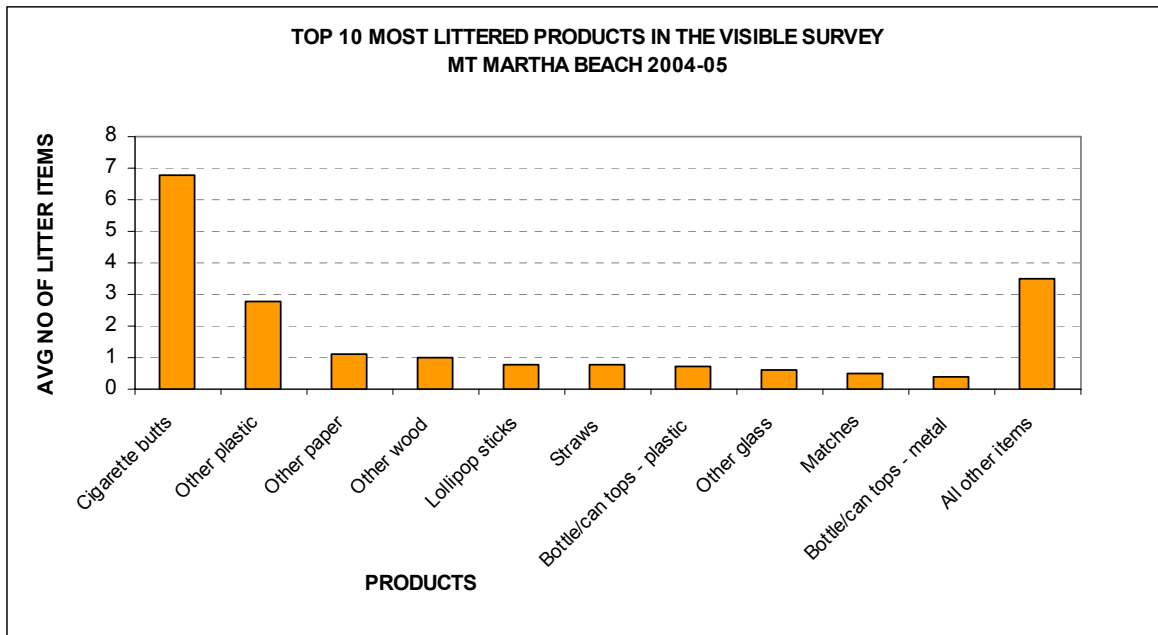


Figure F2: Top 10 most littered items, visible survey at Mt Martha beach

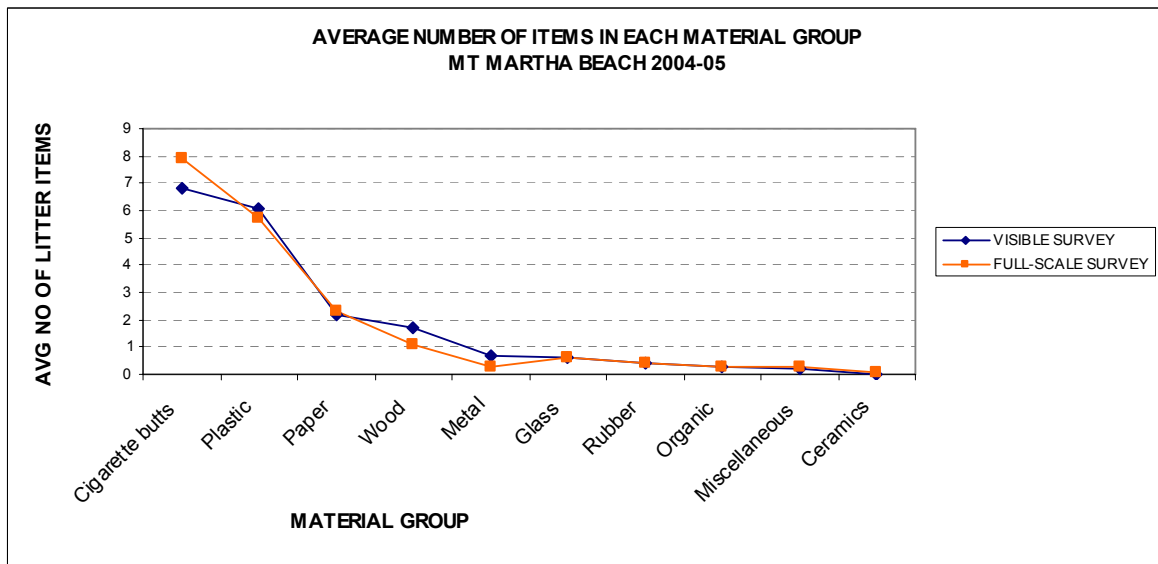


Figure F3: Material type found per survey at Mt Martha beach

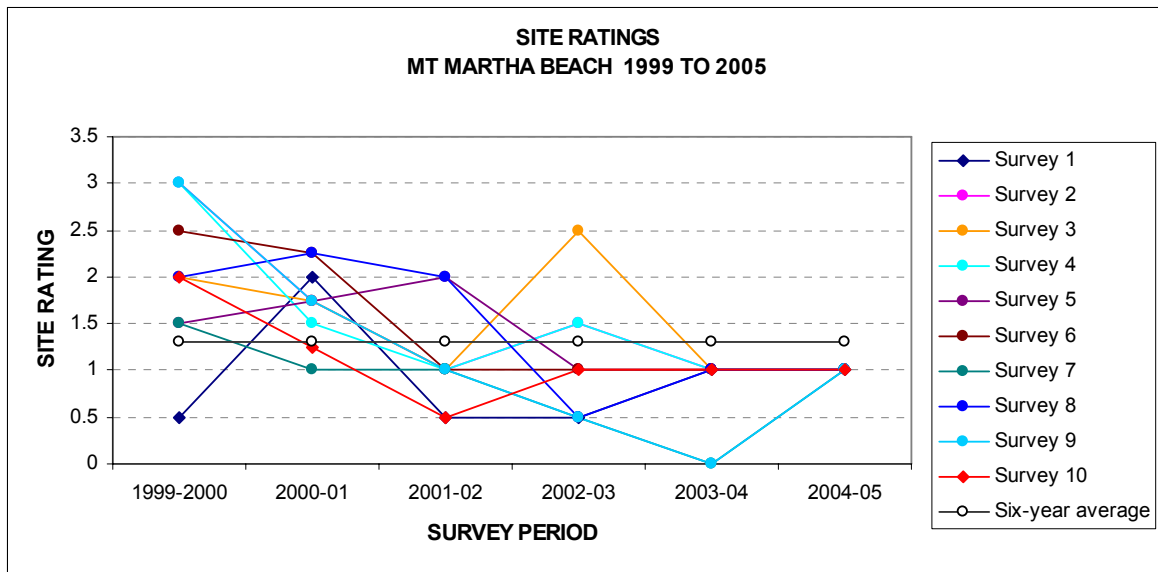


Figure F4: Visual site ratings at Mt Martha beach

APPENDIX G – PORT MELBOURNE

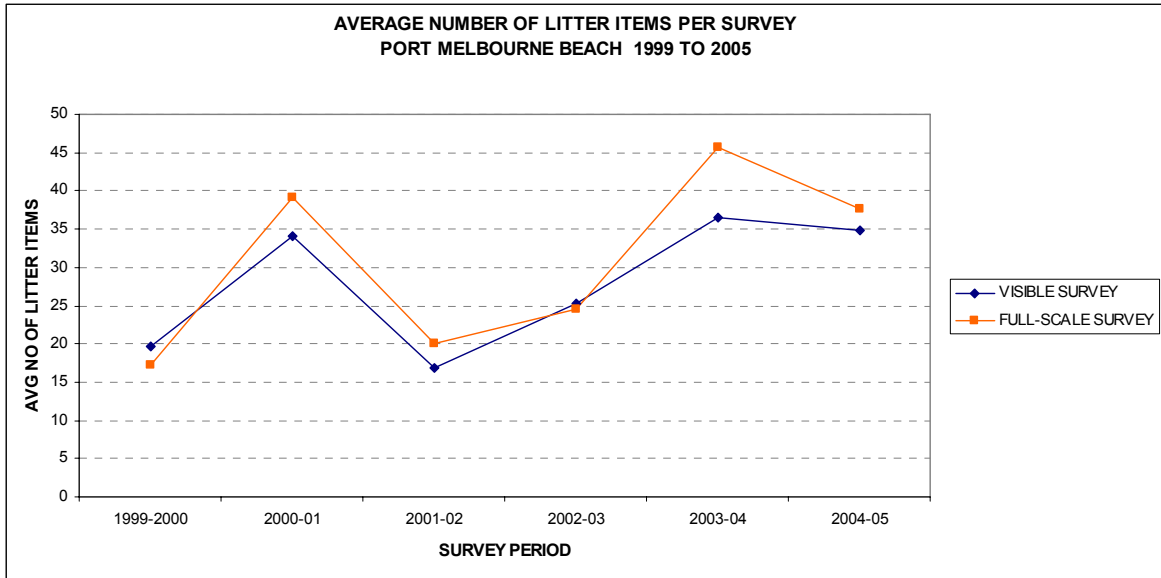


Figure G1: Average number of litter items counted in each survey at Port Melbourne beach

Survey	Regeneration rate per day
Survey 1-2	7.9
Survey 2-3	6.5
Survey 3-4	6.3
Survey 4-5	7.7
Survey 5-6	5.9
Survey 6-7	8.0
Survey 7-8	5.0
Survey 8-9	1.9
Survey 9-10	1.1

Table G1: Regeneration rates at Port Melbourne beach

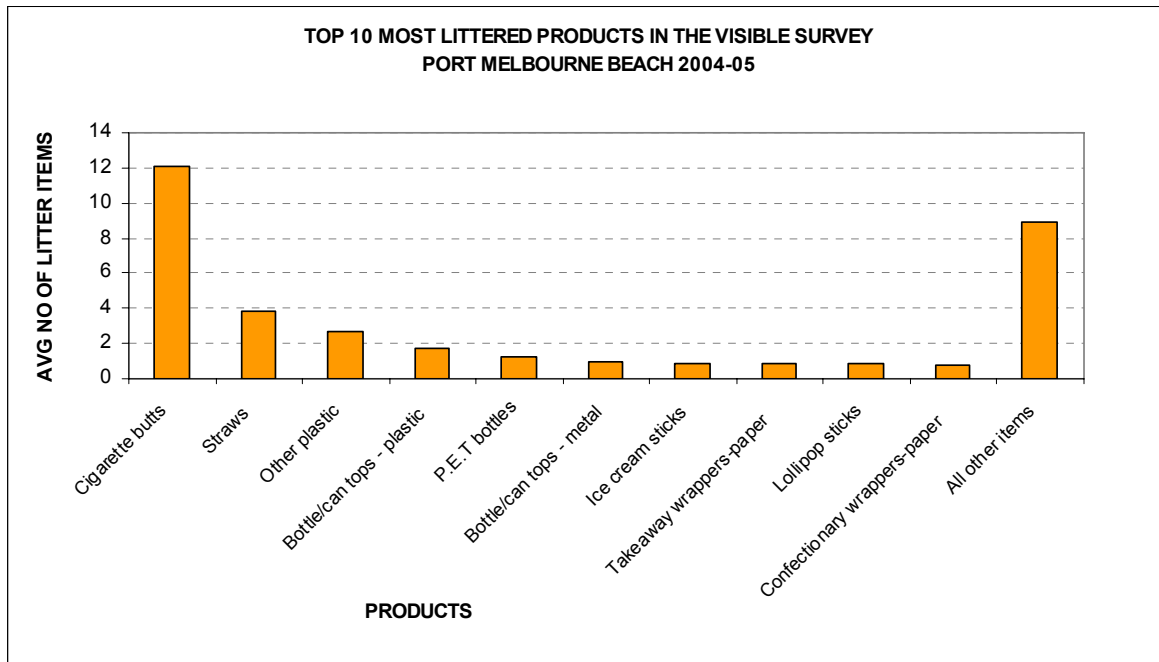


Figure G2: Top 10 most littered items, visible survey at Port Melbourne beach

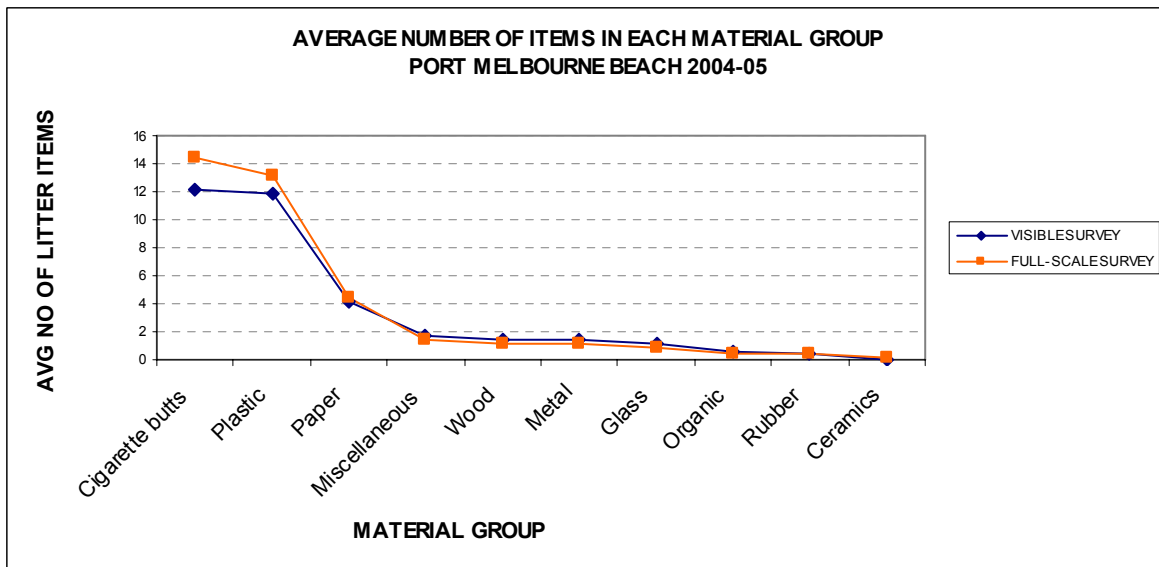


Figure G3: Material type found per survey at Port Melbourne beach

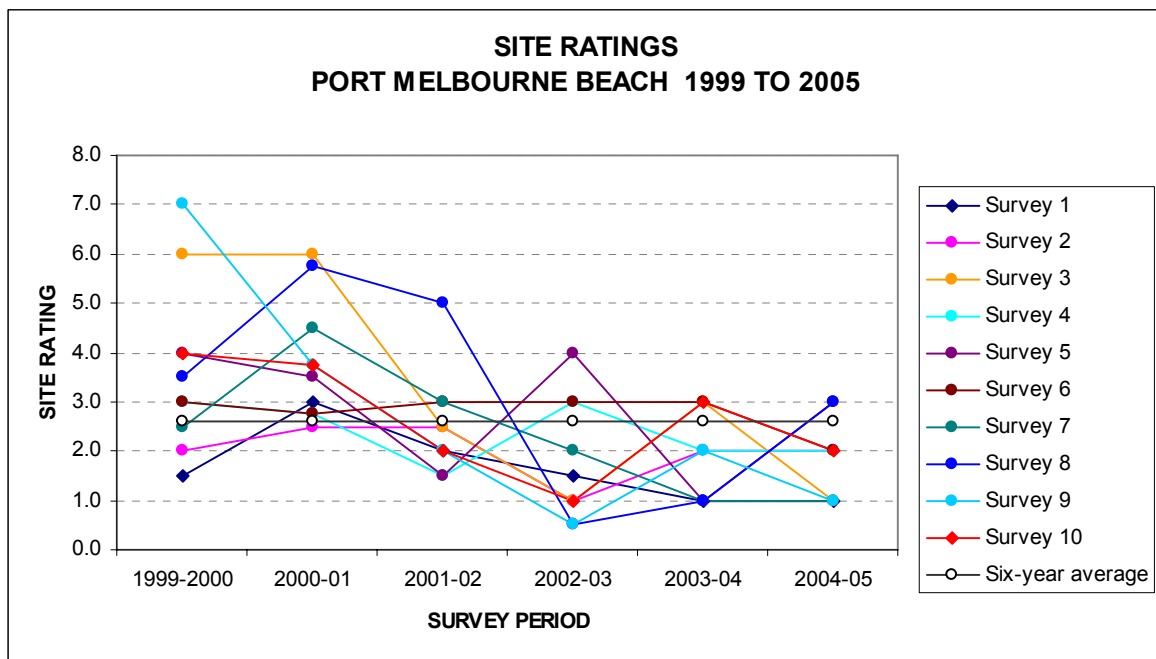


Figure G4: Visual site ratings at Port Melbourne beach

APPENDIX H – QUEENSLIFF

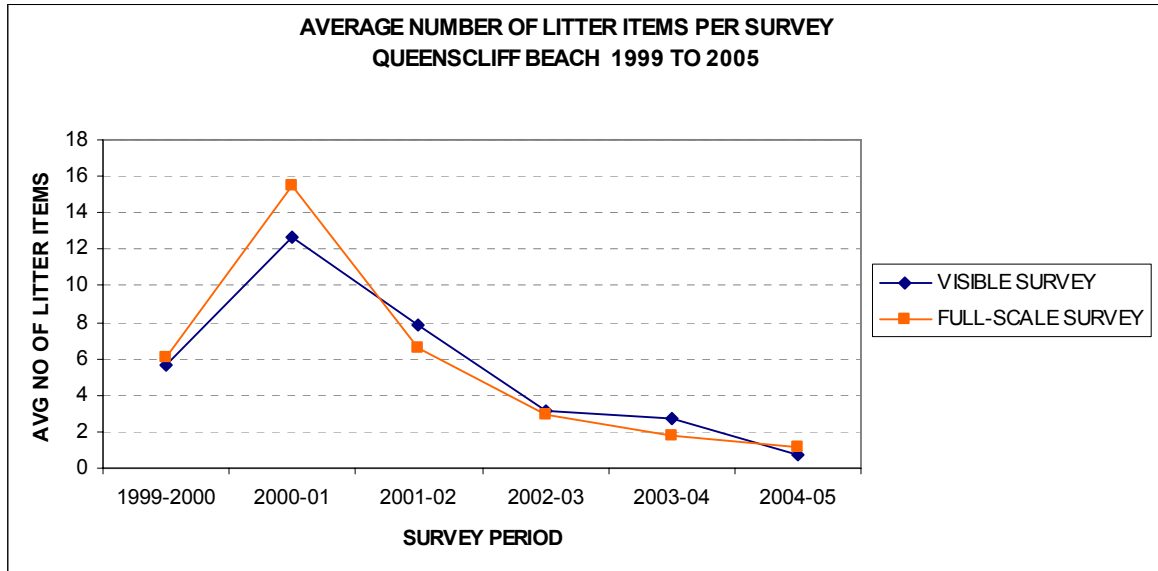


Figure H1: Average number of litter items counted in each survey at Queenscliff beach

Survey	Regeneration rate per day
Survey 1-2	0.3
Survey 2-3	0.0
Survey 3-4	0.0
Survey 4-5	0.4
Survey 5-6	0.1
Survey 6-7	0.0
Survey 7-8	0.3
Survey 8-9	0.1
Survey 9-10	0.0

Table H1: Regeneration rates at Queenscliff beach

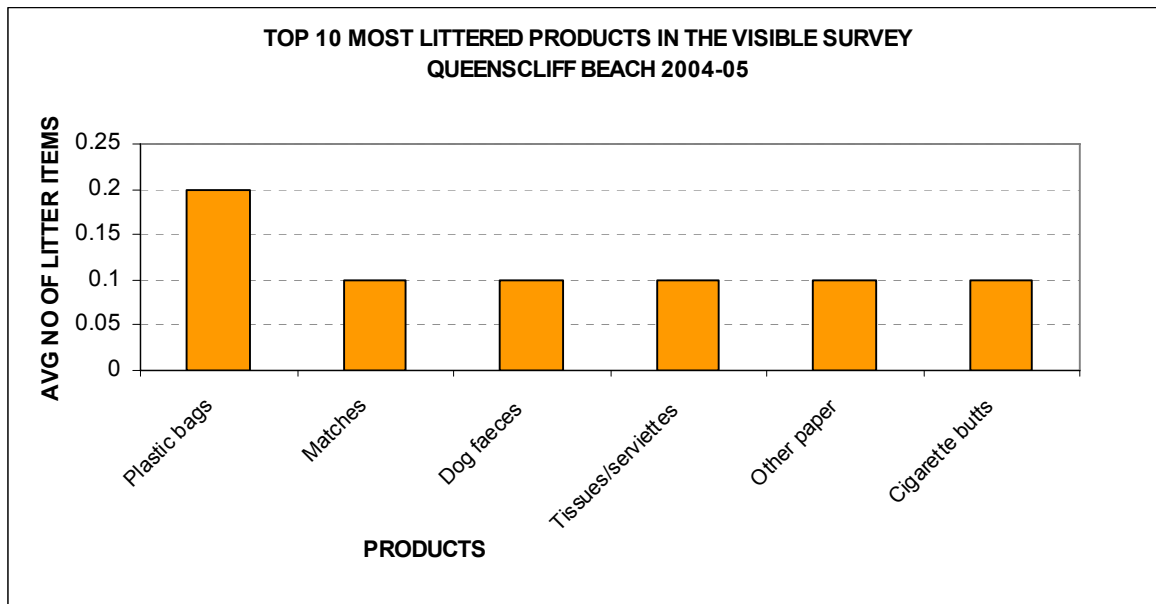


Figure H2: Top 10 most littered items, visible survey at Queenscliff beach

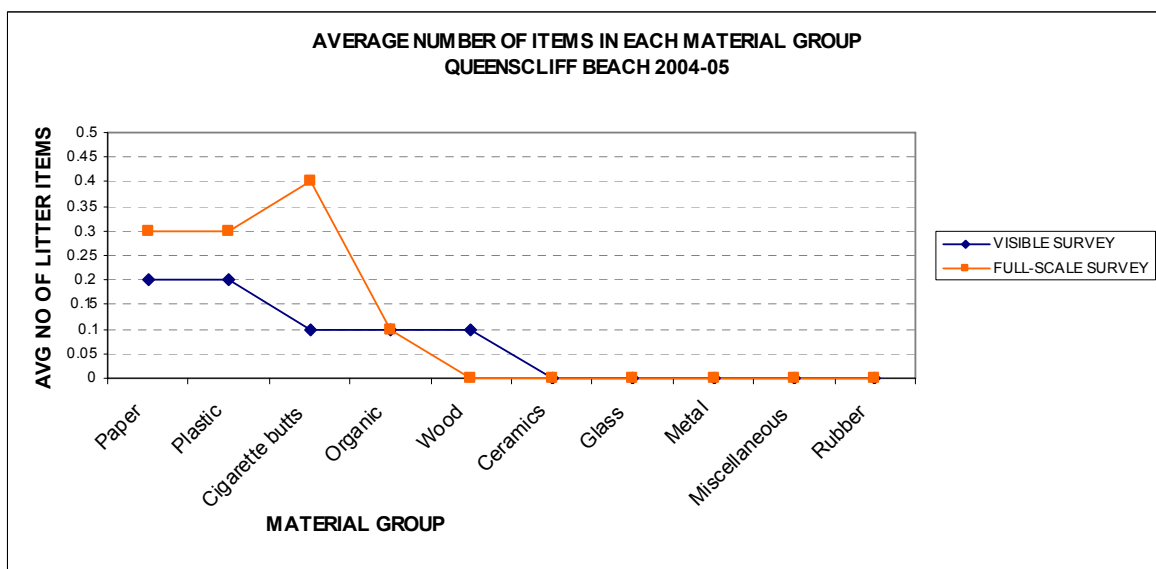


Figure H3: Material type found per survey at Queenscliff beach

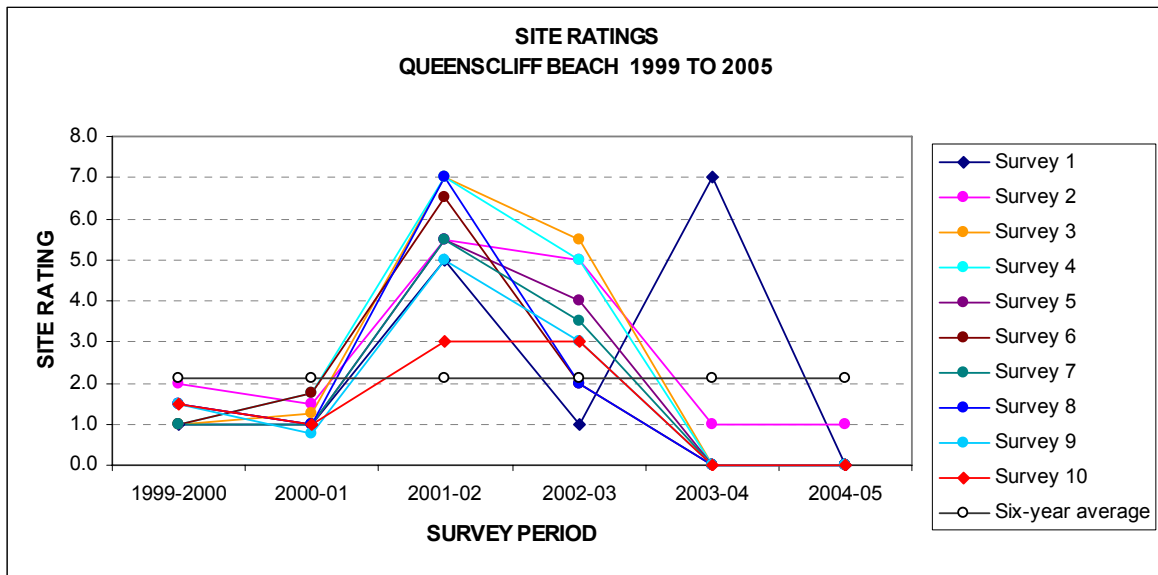


Figure H4: Visual site ratings at Queenscliff beach

APPENDIX I – RYE

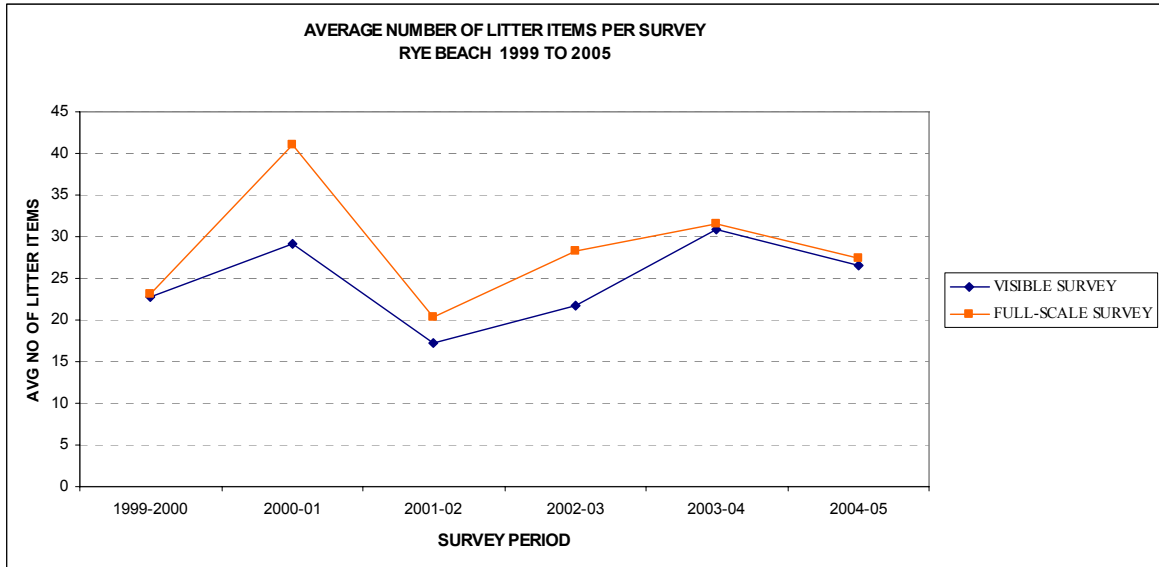


Figure I1: Average number of litter items counted in each survey at Rye beach

Survey	Regeneration rate per day
Survey 1-2	2.8
Survey 2-3	5.2
Survey 3-4	4.2
Survey 4-5	5.4
Survey 5-6	5.3
Survey 6-7	9.7
Survey 7-8	2.3
Survey 8-9	2.5
Survey 9-10	1.4

Table I1: Regeneration rates at Rye beach

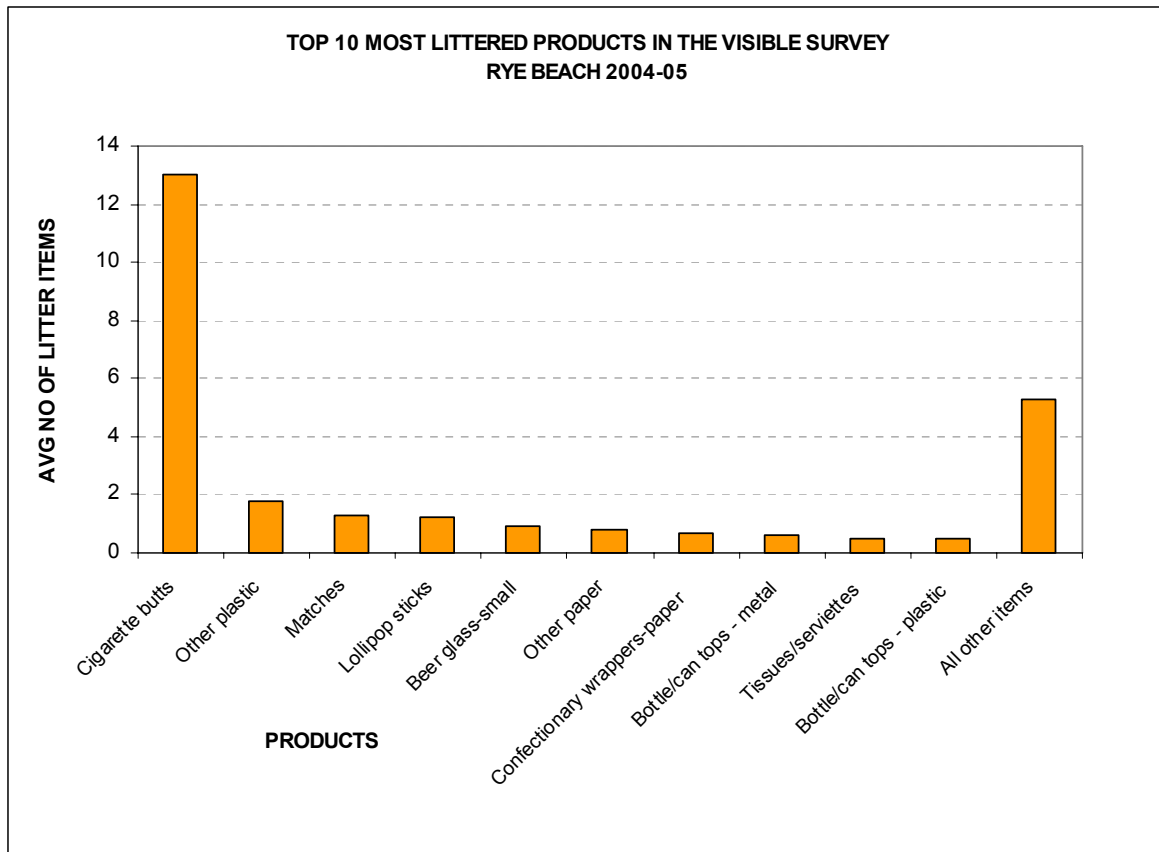


Figure 12: Top 10 most littered items, visible survey at Rye beach

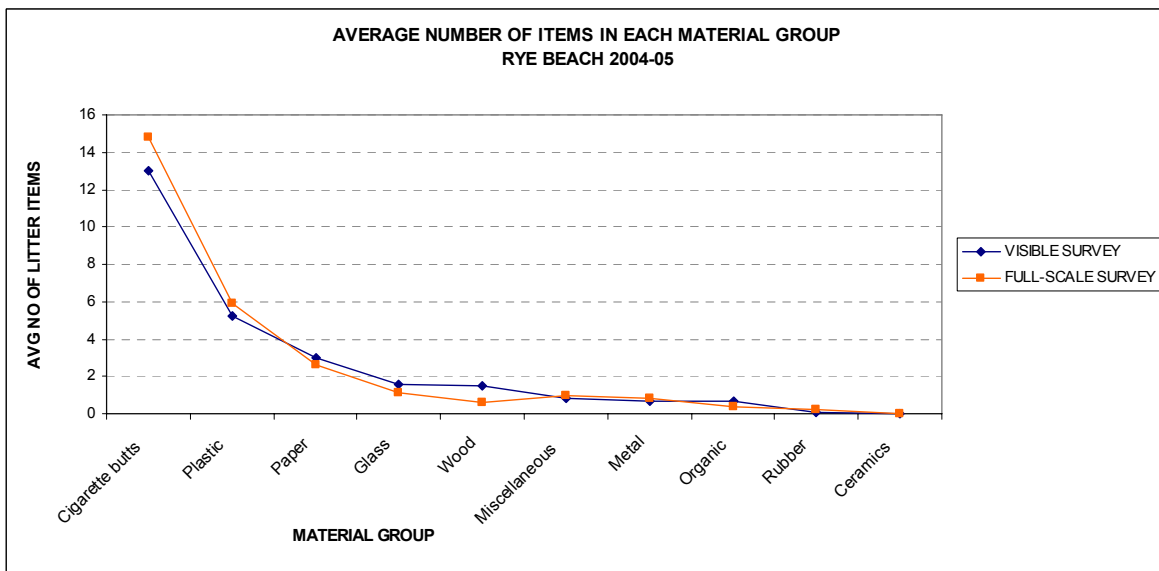


Figure 13: Material type found per survey at Rye beach

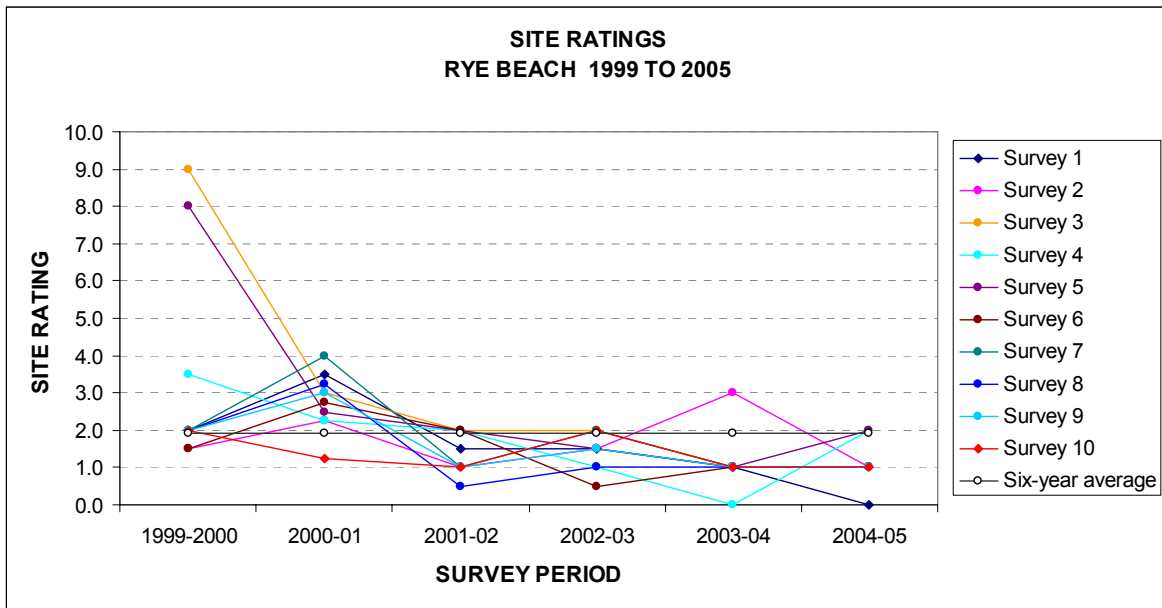


Figure 14: Visual site ratings at Rye beach

APPENDIX J – SANDRINGHAM

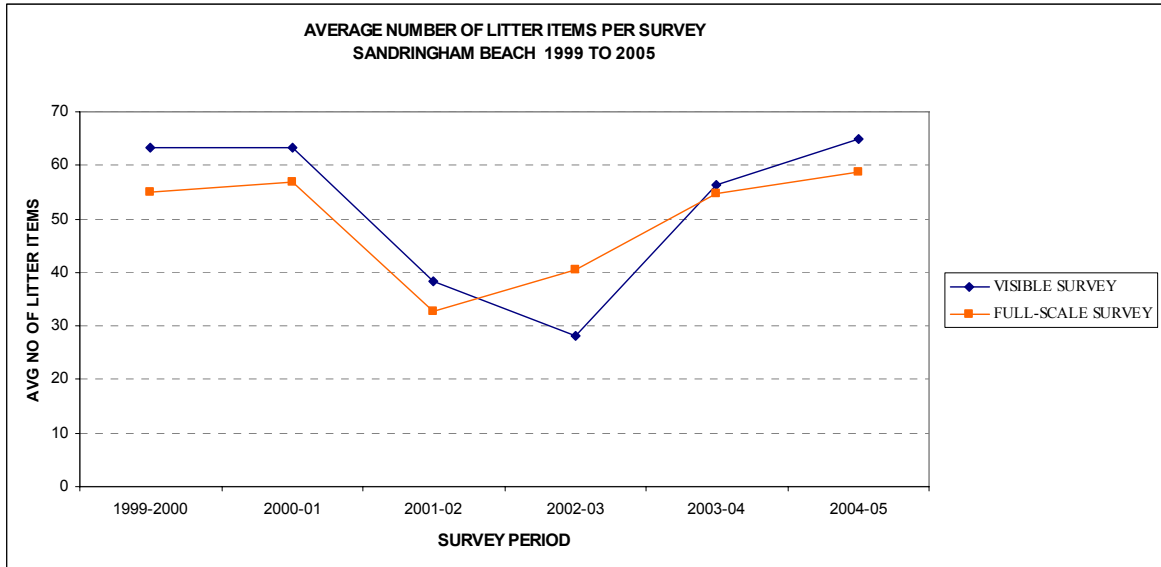


Figure J1: Average number of litter items counted in each survey at Sandringham beach

Survey	Regeneration rate per day
Survey 1-2	11.8
Survey 2-3	10.2
Survey 3-4	11.7
Survey 4-5	9.4
Survey 5-6	9.1
Survey 6-7	20.7
Survey 7-8	3.9
Survey 8-9	3.5
Survey 9-10	2.7

Table J1: Regeneration rates at Sandringham beach

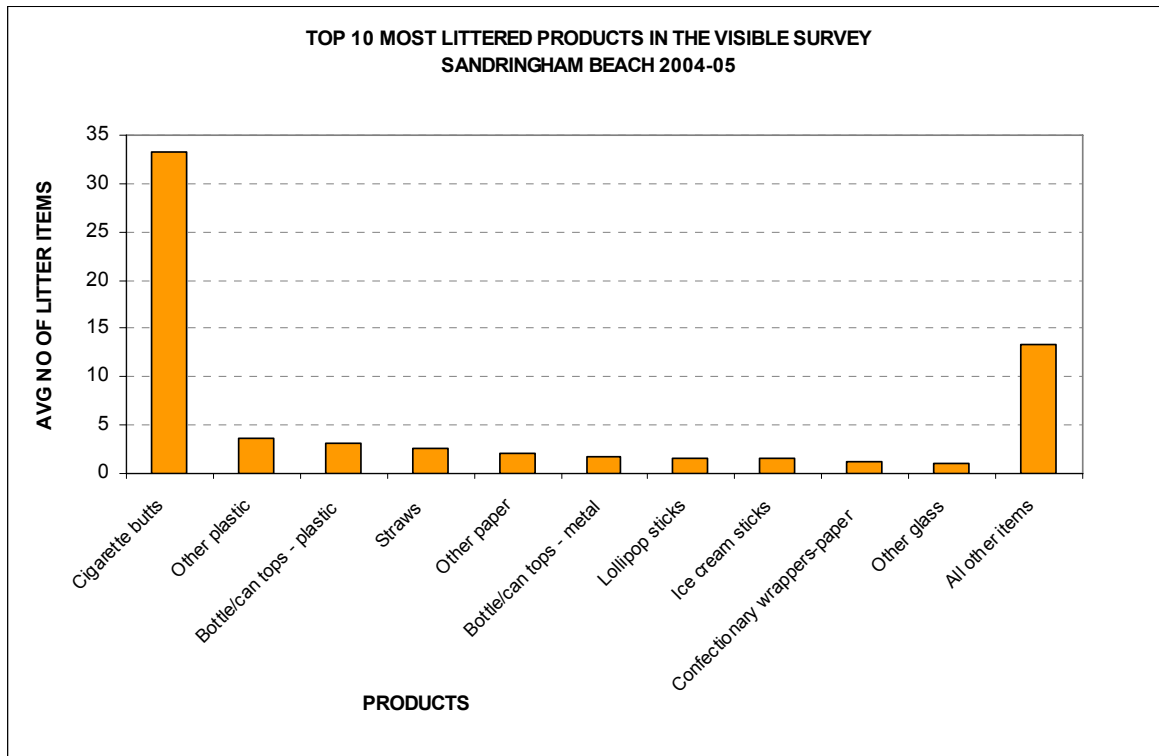


Figure J2: Top 10 most littered items, visible survey at Sandringham beach

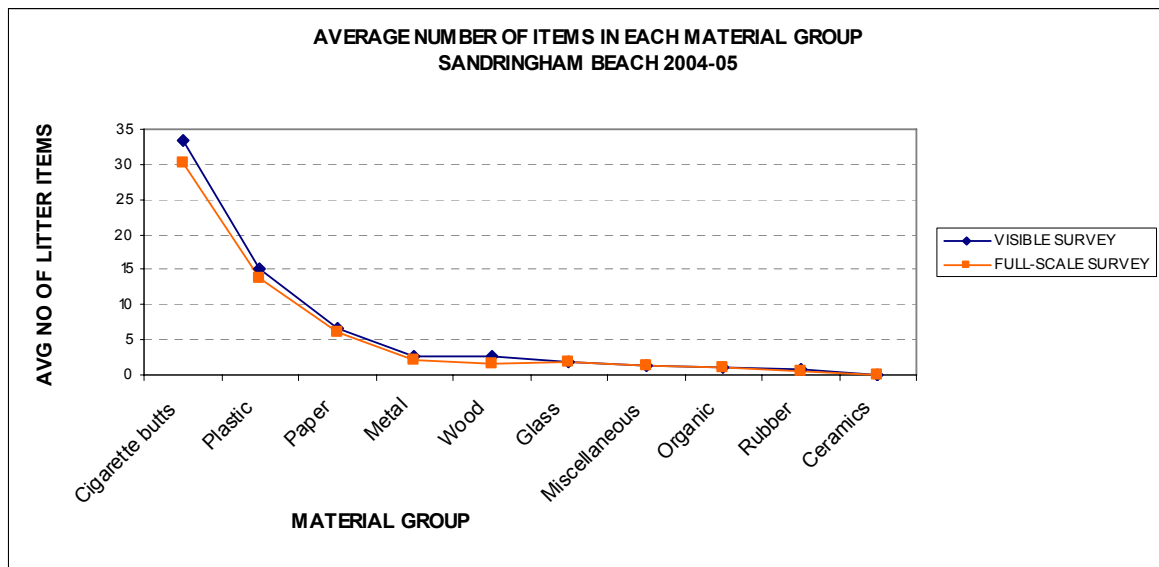


Figure J3: Material type found per survey at Sandringham beach

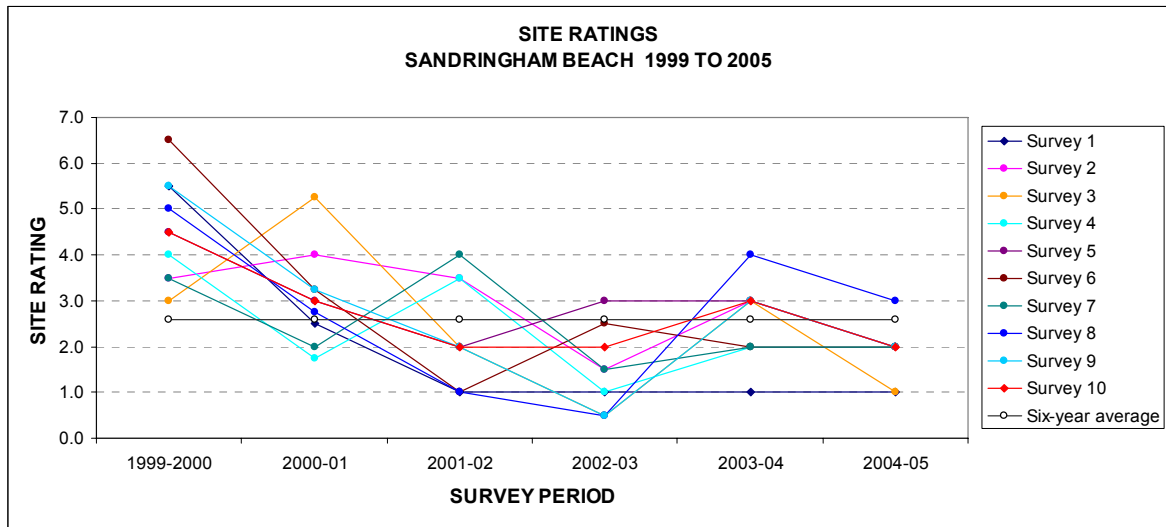


Figure J4: Visual site ratings at Sandringham beach

APPENDIX K – SEAFORD

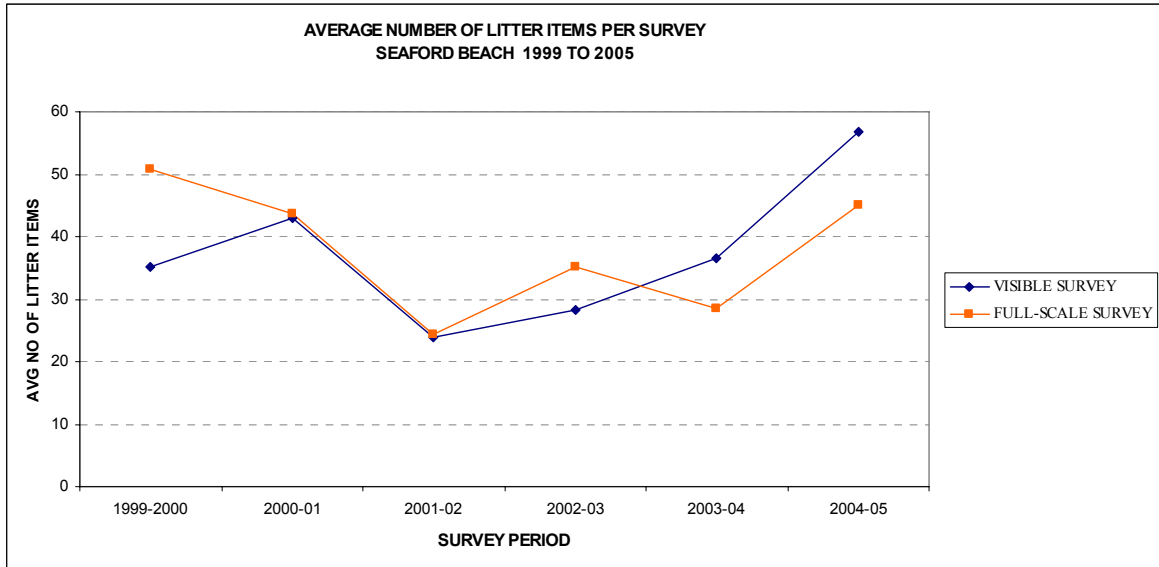


Figure K1: Average number of litter items counted in each survey at Seaford beach

Survey	Regeneration rate per day
Survey 1-2	10.0
Survey 2-3	8.8
Survey 3-4	8.7
Survey 4-5	7.7
Survey 5-6	5.4
Survey 6-7	15.7
Survey 7-8	4.4
Survey 8-9	2.0
Survey 9-10	1.8

Table K1: Regeneration rates at Seaford beach

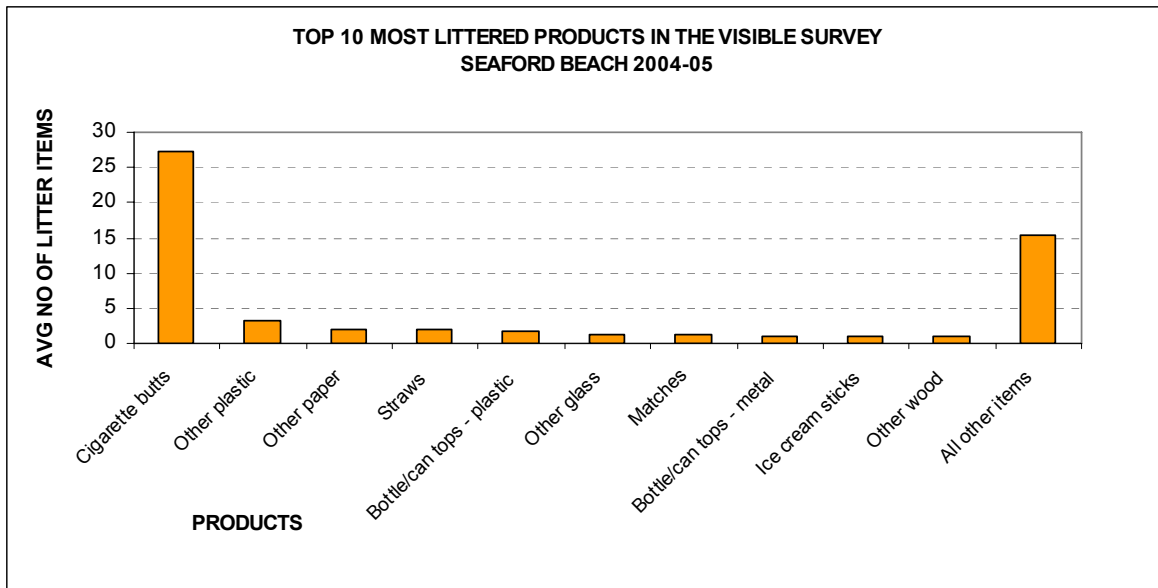


Figure K2: Top 10 most littered items, visible survey at Seaford beach

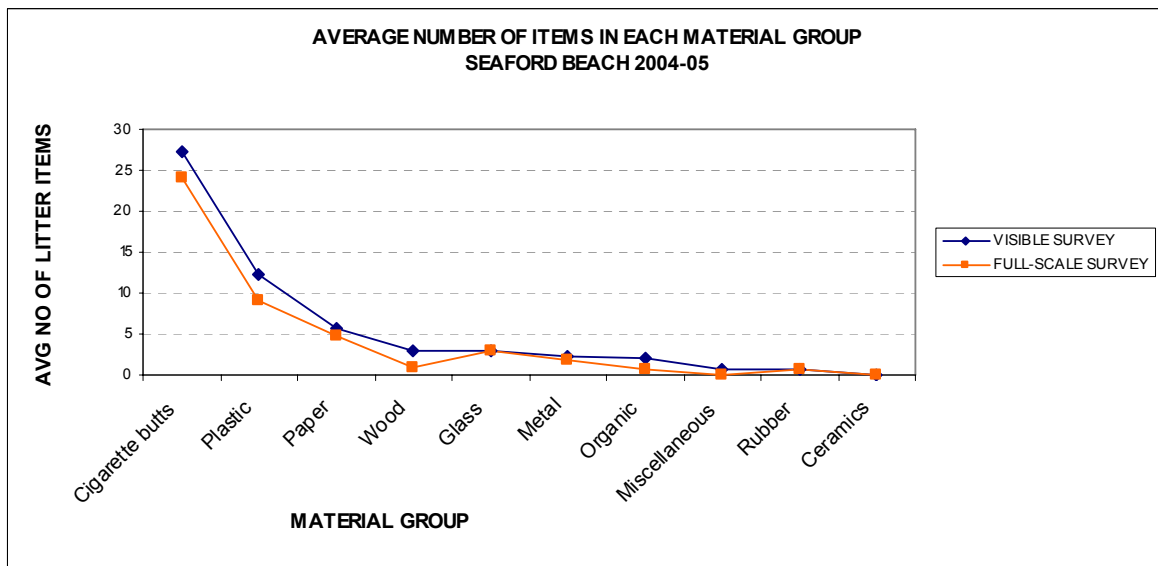


Figure K3: Material type found per survey at Seaford beach

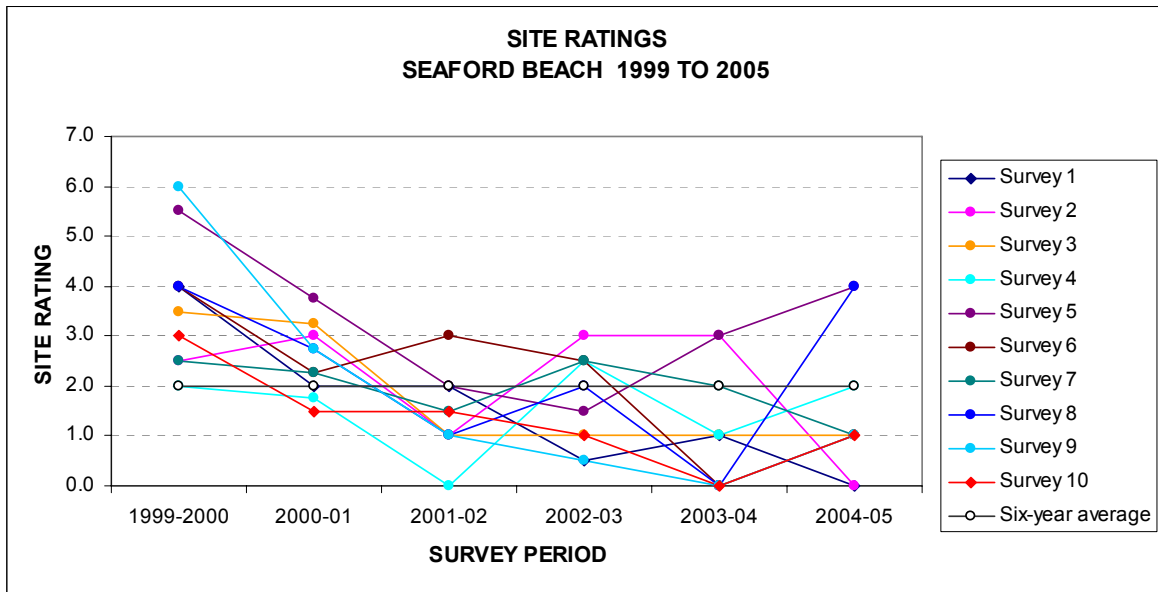


Figure K4: Visual site ratings at Seaford beach

APPENDIX L – SORRENTO

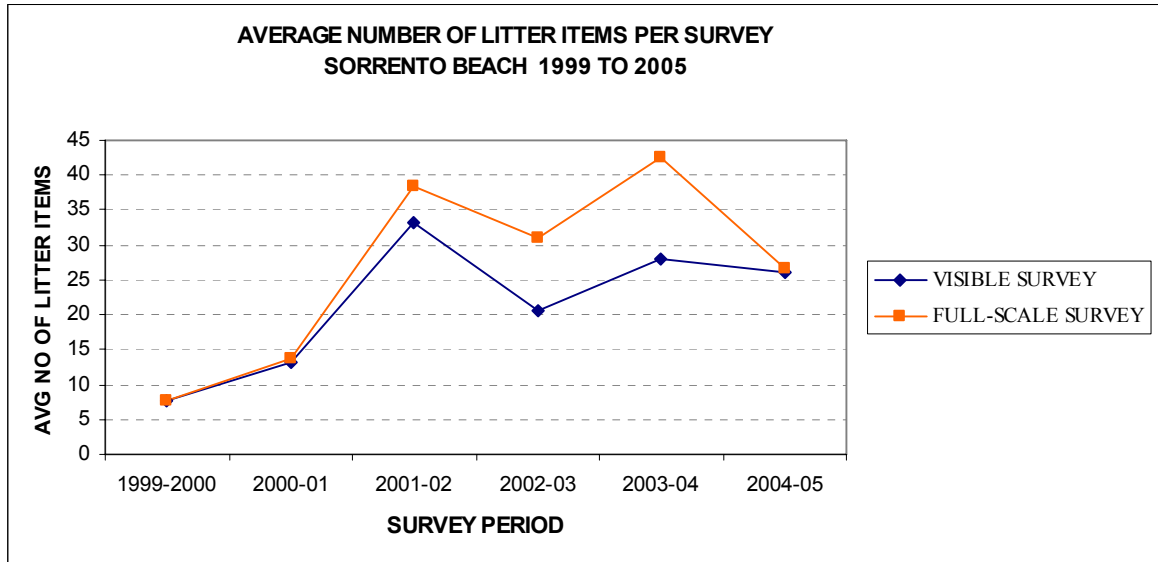


Figure L1: Average number of litter items counted in each survey at Sorrento beach

Survey	Regeneration rate per day
Survey 1-2	4.6
Survey 2-3	2.8
Survey 3-4	5.5
Survey 4-5	3.7
Survey 5-6	5.0
Survey 6-7	12.0
Survey 7-8	1.9
Survey 8-9	1.6
Survey 9-10	1.4

Table L1: Regeneration rates at Sorrento beach

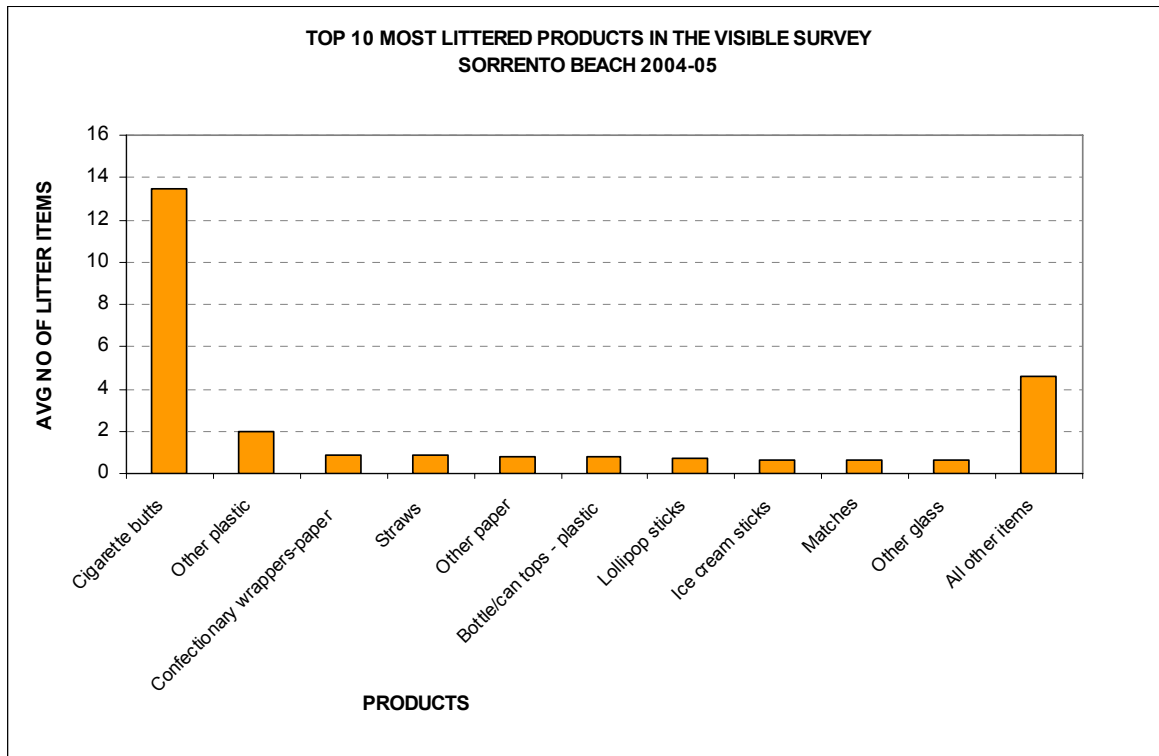


Figure L2: Top 10 most littered items, visible survey at Sorrento beach

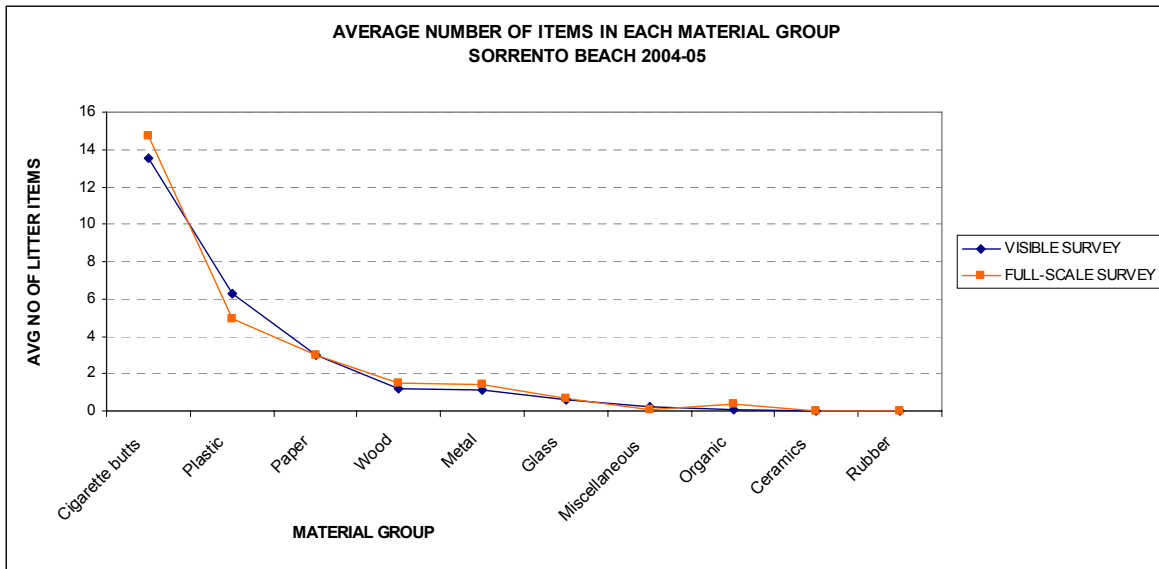


Figure L3: Material type found per survey at Sorrento beach

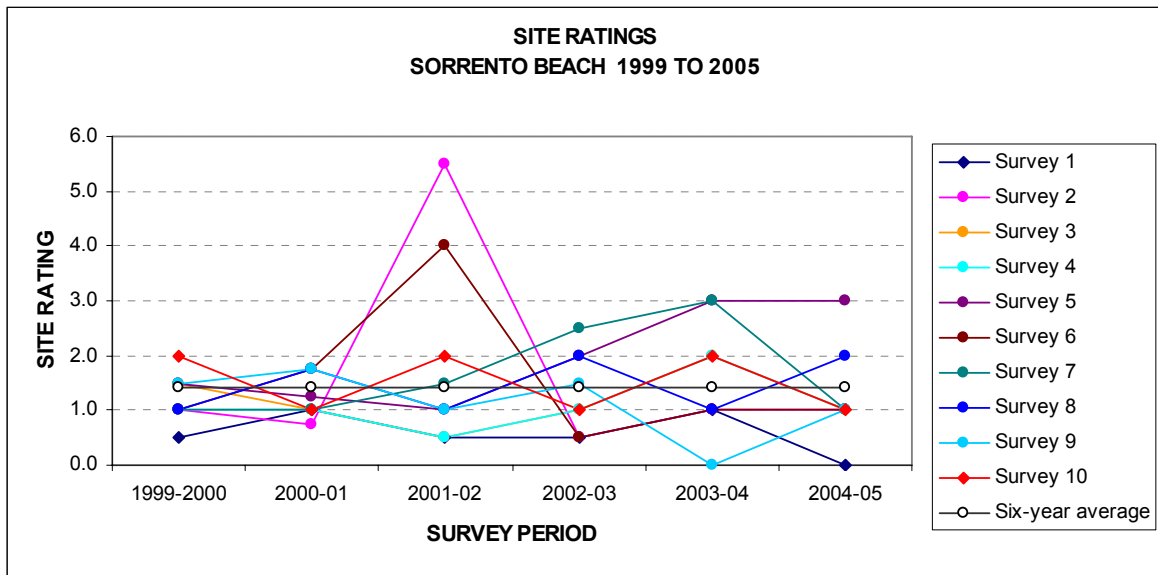


Figure L4: Visual site ratings at Sorrento beach

APPENDIX M – STKILDA

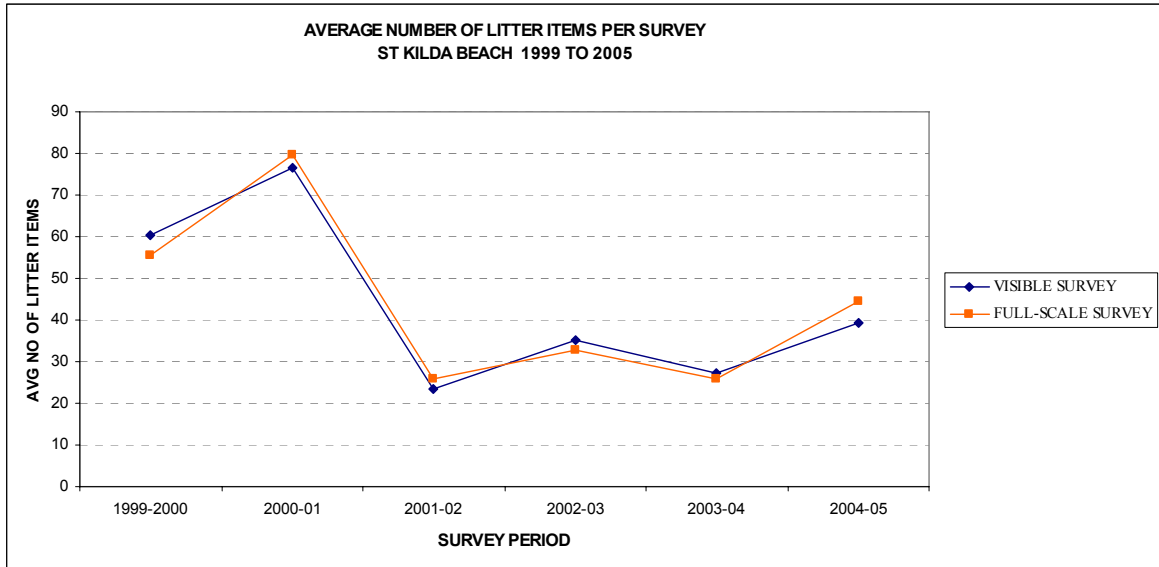


Figure M1: Average number of litter items counted in each survey at StKilda beach

Survey	Regeneration rate per day
Survey 1-2	8.6
Survey 2-3	6.8
Survey 3-4	7.0
Survey 4-5	8.9
Survey 5-6	8.7
Survey 6-7	8.7
Survey 7-8	5.3
Survey 8-9	2.8
Survey 9-10	2.0

Table M1: Regeneration rates at StKilda beach

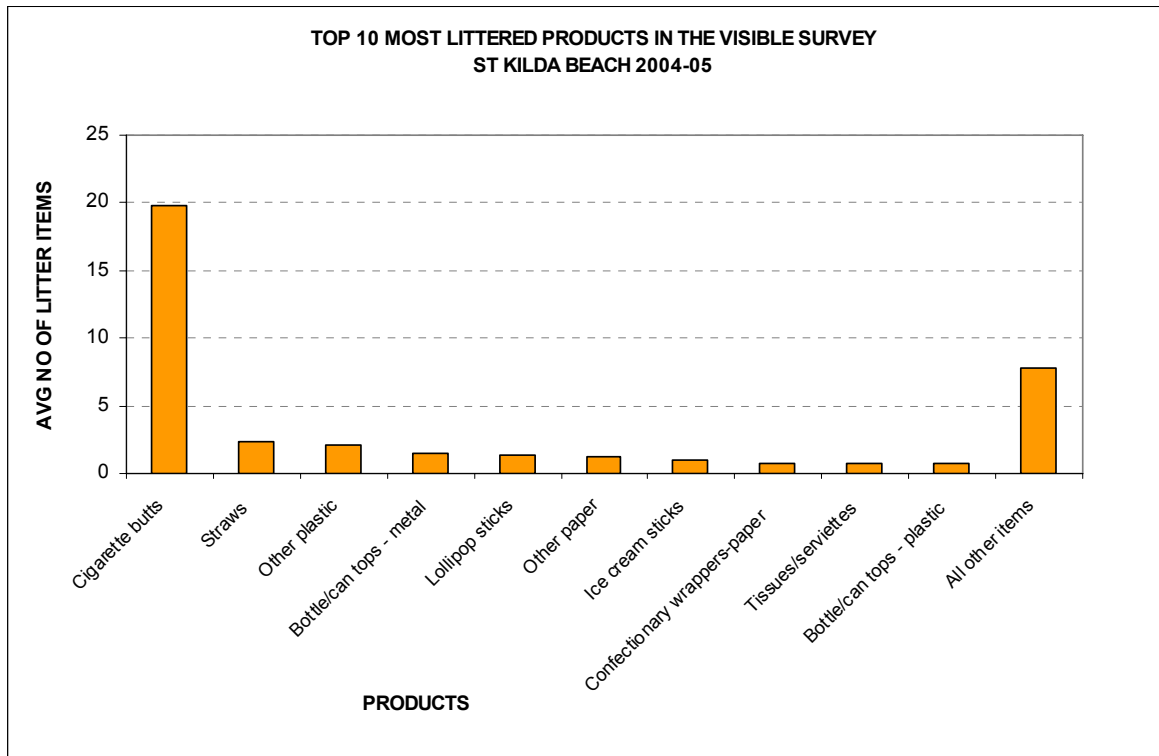


Figure M2: Top 10 most littered items, visible survey at StKilda beach

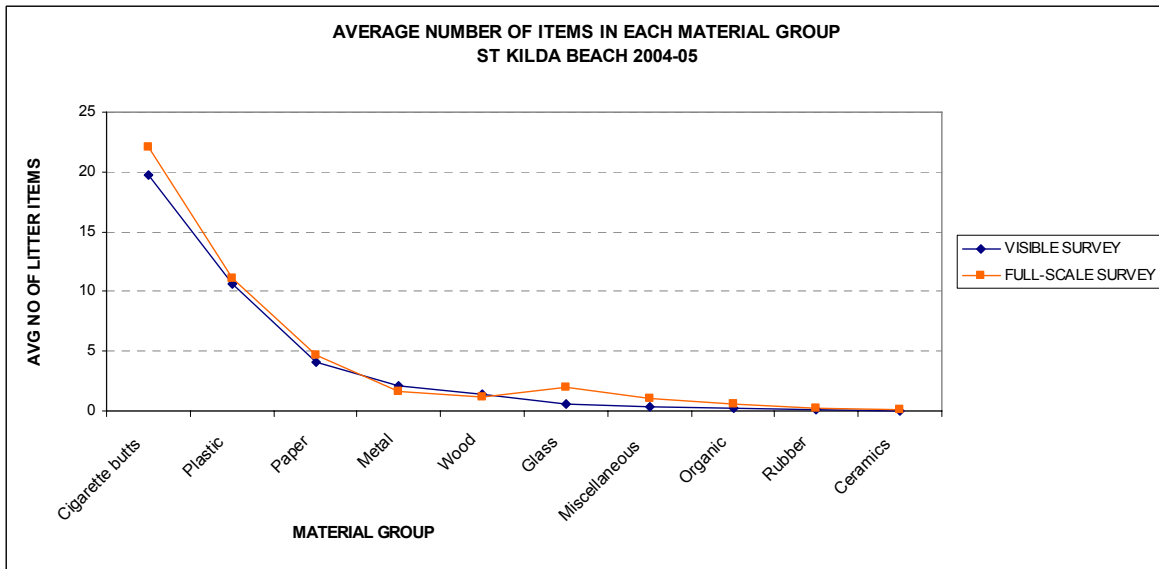


Figure M3: Material type found per survey at StKilda beach

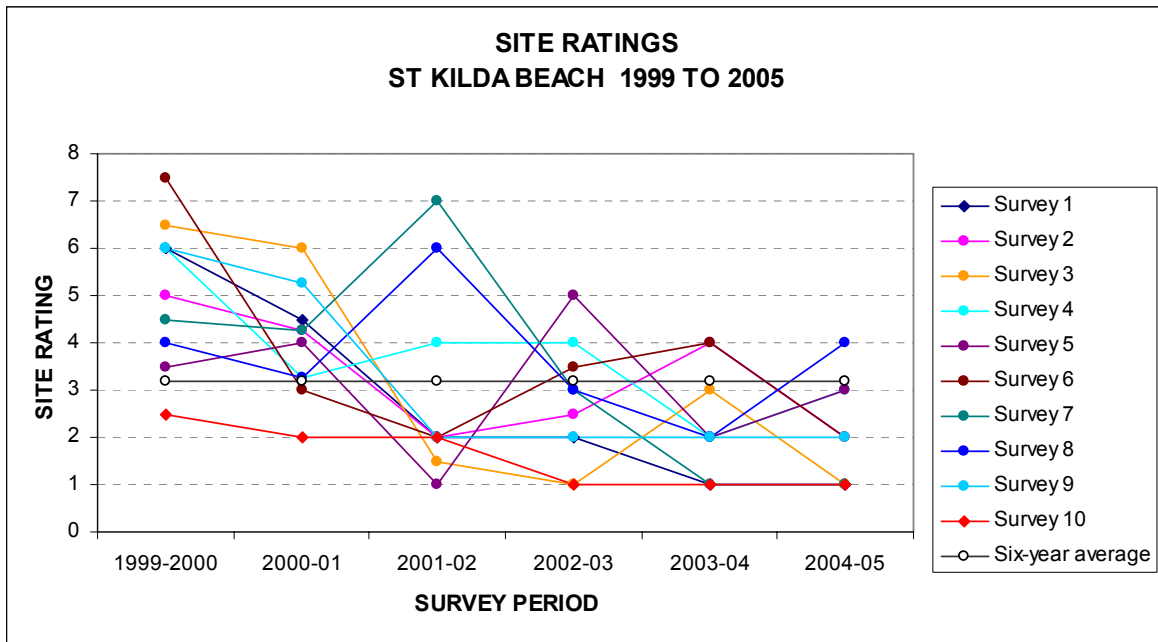


Figure M4: Visual site ratings at StKilda beach

APPENDIX N – WERRIBEE STH

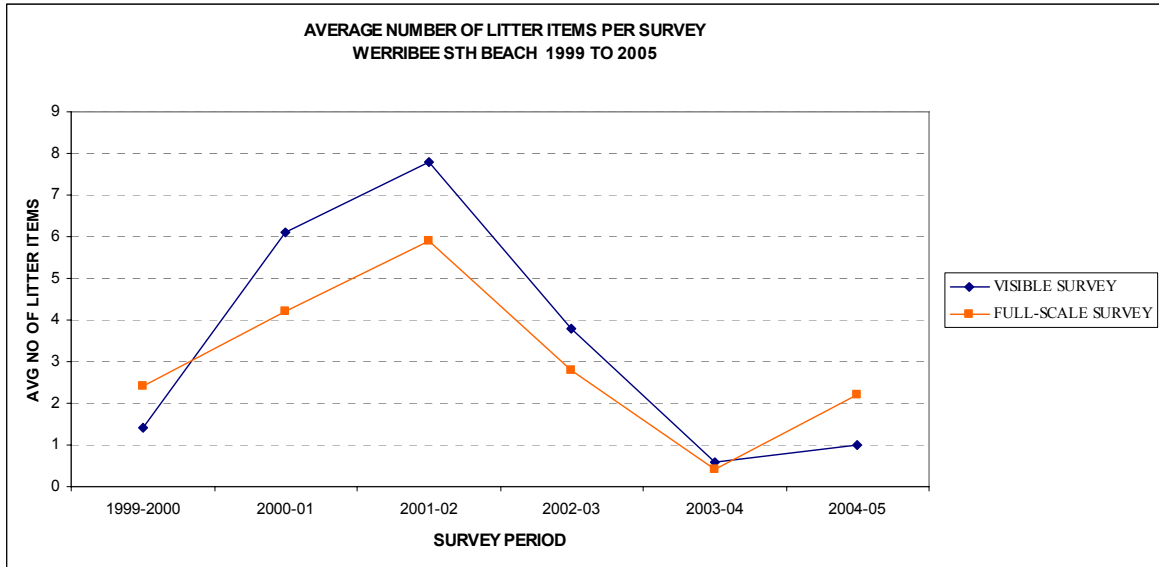


Figure N1: Average number of litter items counted in each survey at Werribee South beach

Survey	Regeneration rate per day
Survey 1-2	0.1
Survey 2-3	0.2
Survey 3-4	0.8
Survey 4-5	0.4
Survey 5-6	0.9
Survey 6-7	0.7
Survey 7-8	0.1
Survey 8-9	0.1
Survey 9-10	0.0

Table N1: Regeneration rates at Werribee South beach

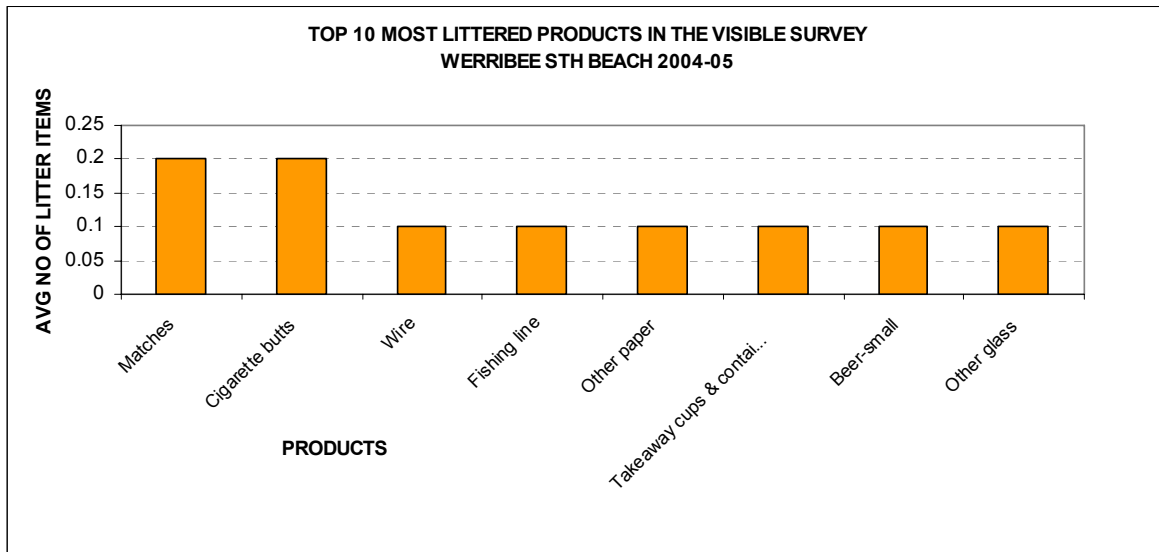


Figure N2: Top 10 most littered items, visible survey at Werribee South beach

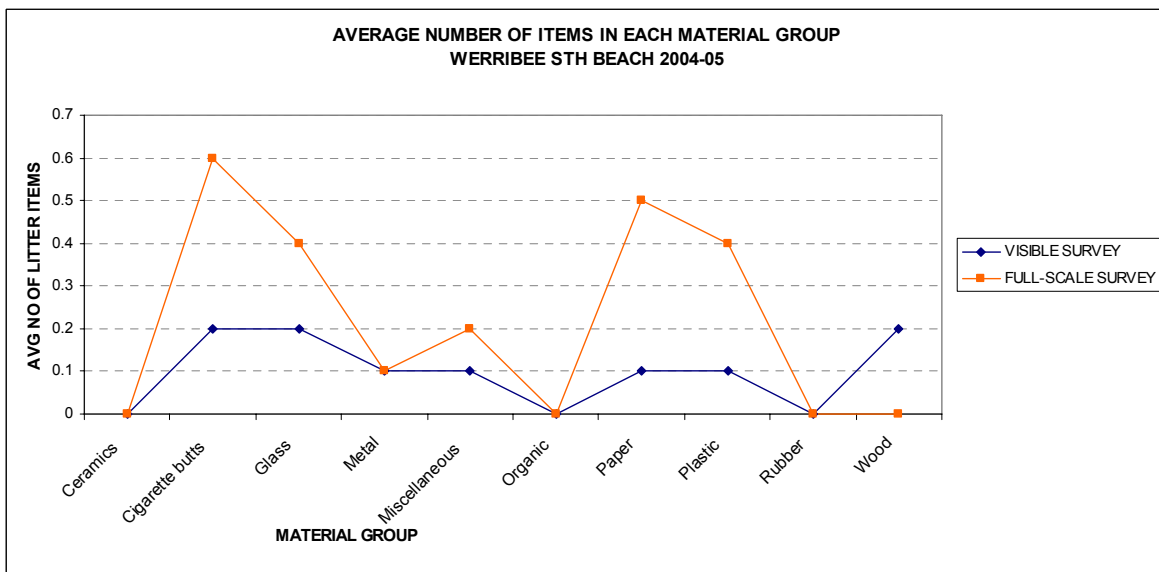


Figure N3: Material type found per survey at Werribee South beach

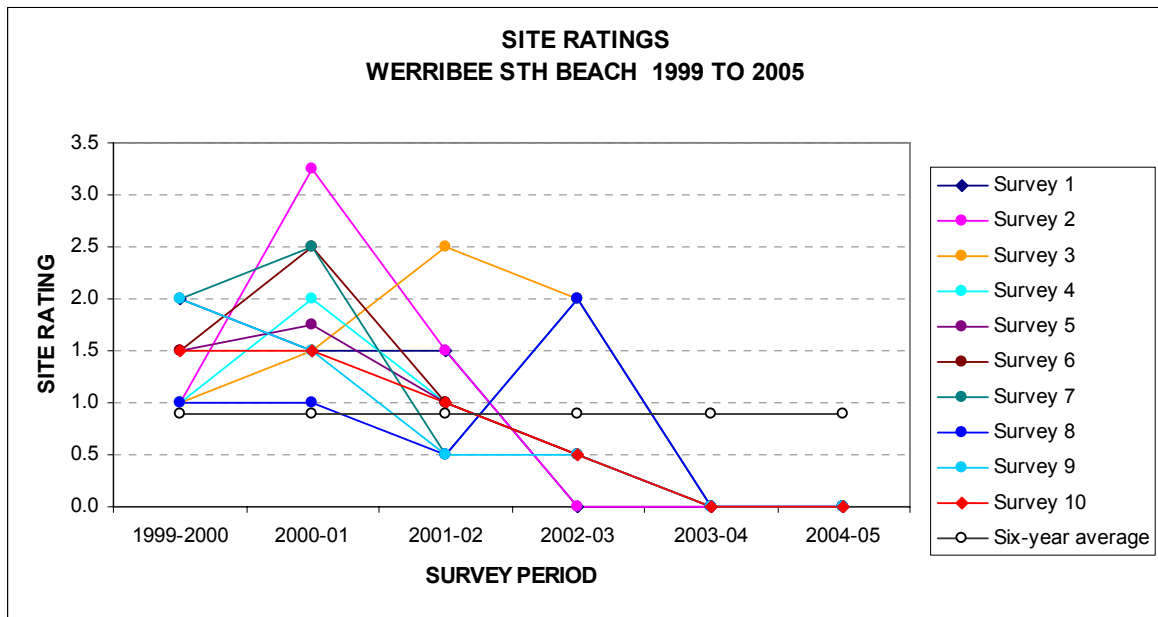


Figure N4: Visual site ratings at Werribee South beach

APPENDIX O – WILLIAMSTOWN

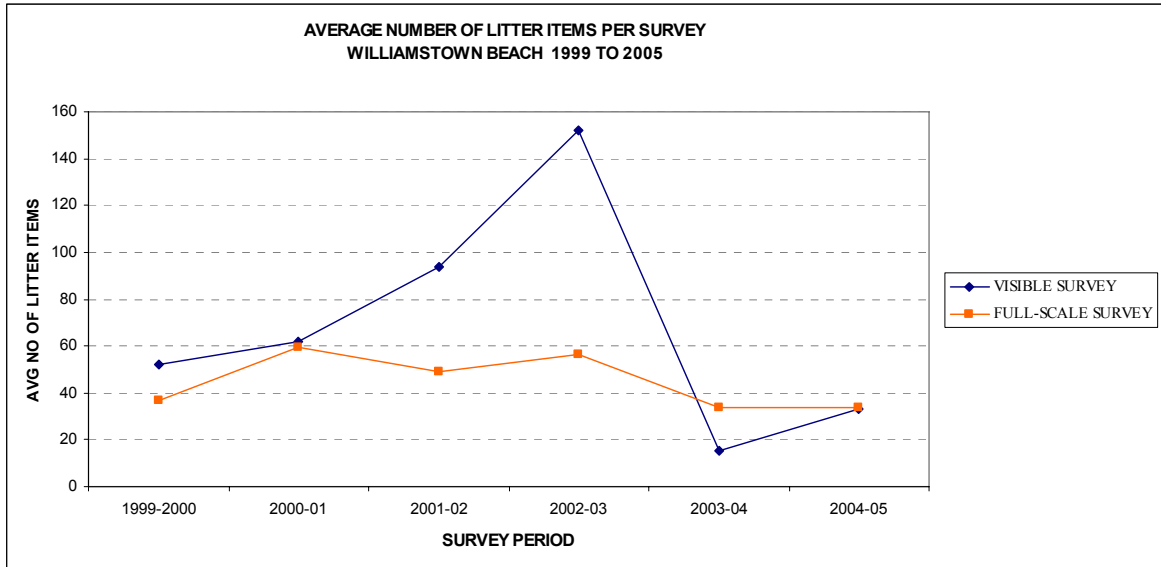


Figure O1: Average number of litter items counted in each survey at Williamstown beach

Survey	Regeneration rate per day
Survey 1-2	6.3
Survey 2-3	5.5
Survey 3-4	6.8
Survey 4-5	6.4
Survey 5-6	5.7
Survey 6-7	7.3
Survey 7-8	2.6
Survey 8-9	1.9
Survey 9-10	0.9

Table O1: Regeneration rates at Williamstown beach

PORT PHILLIP BAY BEACH LITTER SURVEY 2004-05

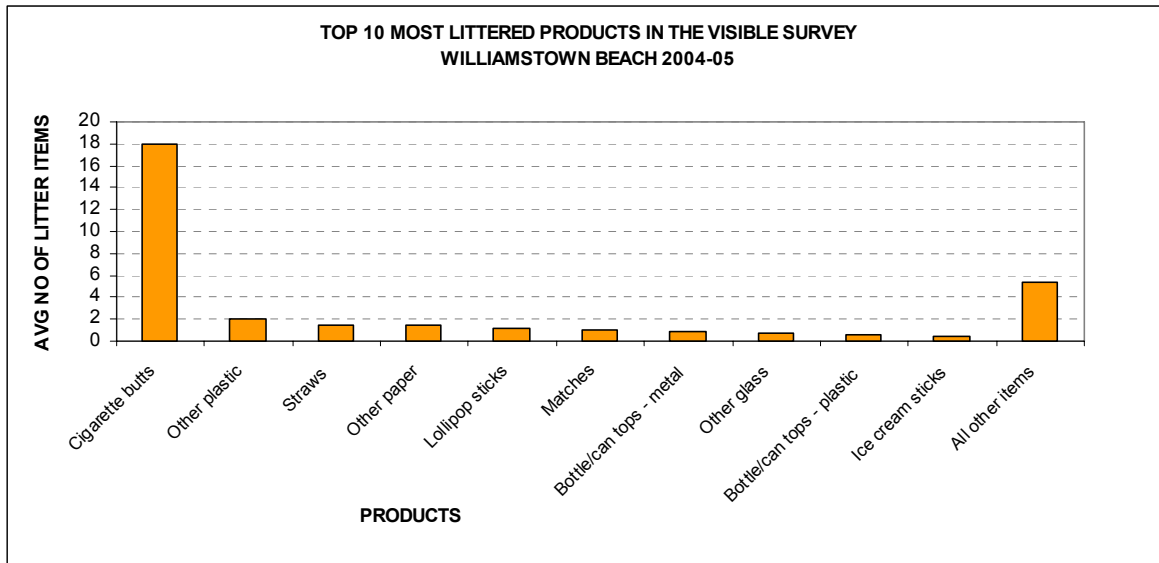


Figure O2: Top 10 most littered items, visible survey at Williamstown beach

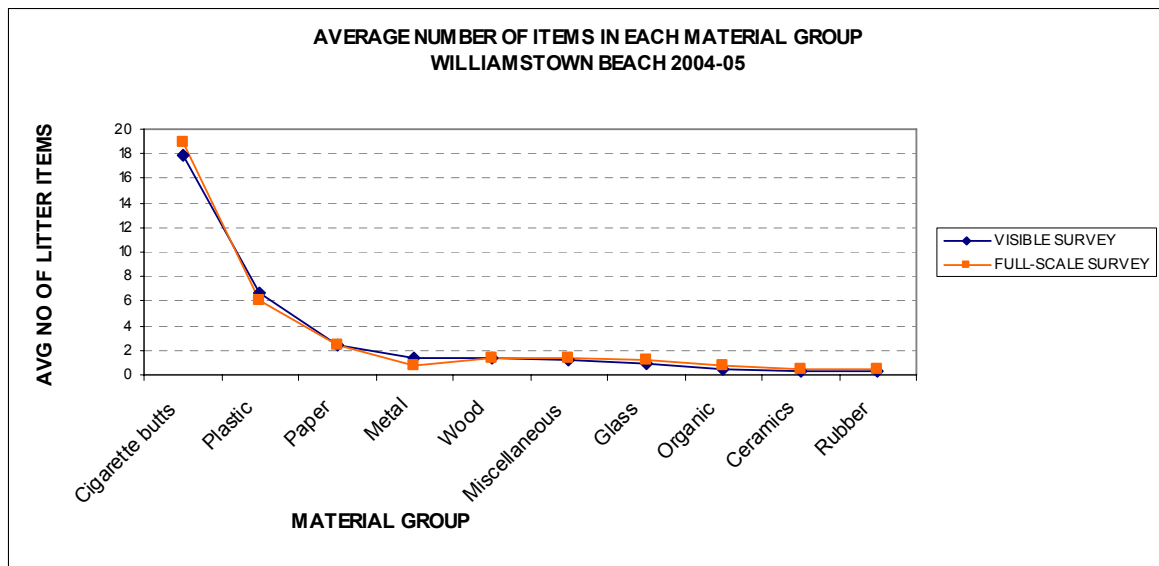


Figure O3: Material type found per survey at Williamstown beach

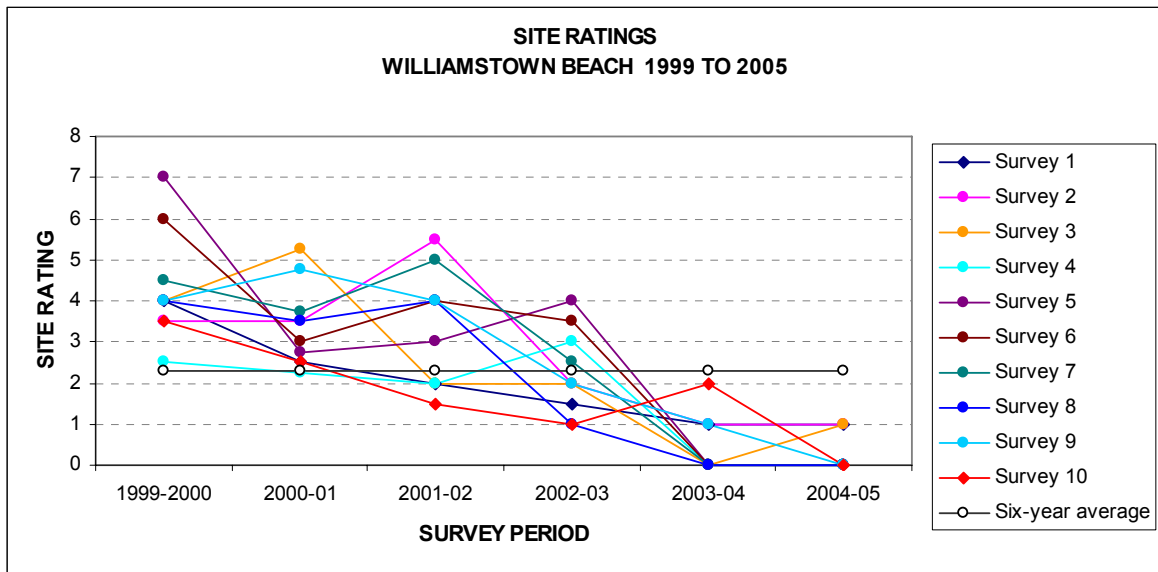


Figure O4: Visual site ratings at Williamstown beach