

Marine aggregate dredging five year review

The area involved 1998–2002



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In 1999 the British Marine Aggregate Producers Association (BMAPA) and The Crown Estate made a public statement with the aim of demonstrating effective and responsible management of marine aggregate committing to:

- The Industry (licence holders) will review all licences over a rolling five year period and surrender areas that no longer contain useful resources for sand and gravel. Companies will advise The Crown Estate at the end of each year of any areas no longer needed.
- The Crown Estate will surrender the Government Views on any areas with no proven commercial reserves
- The Crown Estate will encourage licence holders to combine dredging in fewer licences subject to an agreed management plan
- The Industry will confirm annually to The Crown Estate areas within licences that will not be dredged in the following year, whether as a condition of dredging consents or a voluntary agreement
- The Crown Estate and BMAPA will produce an annual report detailing the extent of dredging and licence areas. They will continue to support the work of the Fishing Liaison Committees on the East and South coasts

Each report, the seventh of which was published in 2005, has had a common format but as the series has developed new features associated with developments in the analysis of the Electronic Monitoring System (EMS) data have been introduced, along with explanations of technical and management approaches being employed.

This five year review provides some background to 'the area involved' initiative, and explains how the area of seabed licensed and dredged has changed. Additionally, the concept of the cumulative dredge footprint is introduced and applied to the data collected between 1998 and 2002 at both national and regional scales.

History

The extraction of marine sand and gravel to supply the construction industry started in earnest in the early 1960s with small vessels dredging relatively close to the markets they supplied. As the business expanded in the 1990s the companies introduced larger, more powerful and more sophisticated vessels capable of dredging in deeper water and delivering their cargoes to more distant markets.

Research and understanding, together with the regulatory framework, monitoring, control and reporting have developed alongside the technology as has the need to understand, maintain and enhance the marine environment where appropriate.

Electronic monitoring system

The introduction of satellite navigation systems and the development of computers capable of working reliably on board ships enabled The Crown Estate in 1993 to require that all vessels dredging on their licences be fitted with an Electronic Monitoring System (EMS). The EMS automatically records the date, time and position of all dredging like activity and every month this information is supplied to The Crown Estate.

Since 1993 about 300,000 hours of dredging tracks comprising 35 million individual dredging records have been stored and checked against licence conditions.

Five year summary 1998 – 2002

- 525.32 km² of licensed area was surrendered between 1/1/1998 and 31/12/2002
- 153.06 km² of new licensed area has been issued by The Crown Estate following the award of positive Government Views over the same period
- Overall, the area of seabed licensed has decreased by a net 372.26 km², with reductions occurring between 0–6 nm and 6–12 nm from the coast
- The total area of seabed dredged has reduced from a maximum of 222.59 km² in 1998 to 149.8 km² in 2002
- The total area of seabed dredged between 1998 and 2002 – the five year cumulative footprint – amounted to 380.4975 km²



Area of seabed licensed

The area of seabed licensed has always been regarded as an indicator of the industry's overall commitment to a sustainable approach to management. As such, the area licensed has formed a cornerstone of the area involved initiative, with operators undertaking reviews of existing production licence areas and surrendering those areas (or part of licence areas) which no longer contain commercially viable sand and gravel resources.

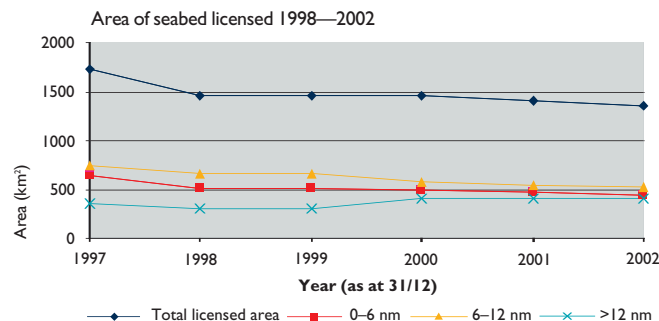
Annual reporting has focussed on two main themes; changes to the total area of seabed licensed, and the relationship between licensed area and distance offshore.

At the end of this initial five year period, the area of seabed licensed has decreased by a net 372.26 km², totalling 1359 km² at the end of 2002. A total of 525.32 km² of licensed area was relinquished by marine aggregate operators, largely concentrated in three dredging regions; the East coast, the Thames Estuary and the South coast, where over 465 km² of area was returned. The surrendered areas from these regions represent older licences which were located closer to the shore (within 12 nm).



Over the same five year period, a total of 153.06 km² of new licensed area was issued by The Crown Estate, following positive Government Views issued by the Office of the Deputy Prime Minister. With the developments in survey technology and geological understanding, together with a greater awareness of the environmental issues surrounding marine aggregate extraction, new licence areas are smaller, with their limits corresponding more closely to the limits of the sand and gravel resource.

As the majority of near-shore sand and gravel resources have already been licensed many of the new areas being developed are located further offshore. The licensing of offshore areas is reflected in the increase in licensed area beyond 12 nm. This trend offshore has continued, and is being balanced by a continuing reduction in licensed area within 12 nm.



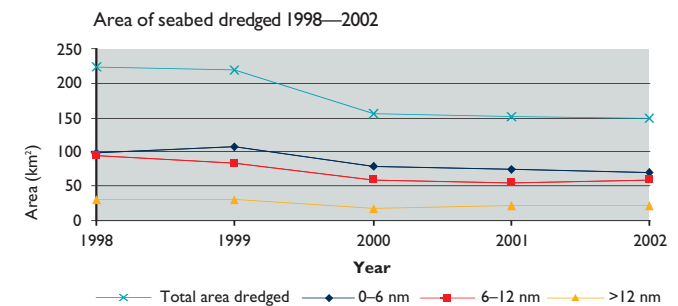
Area of seabed dredged

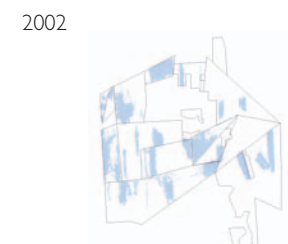
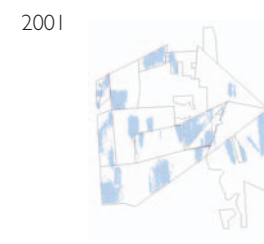
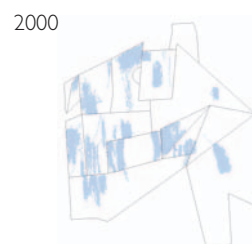
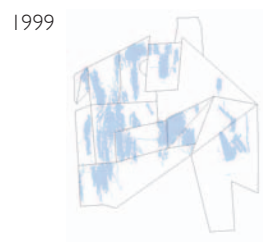
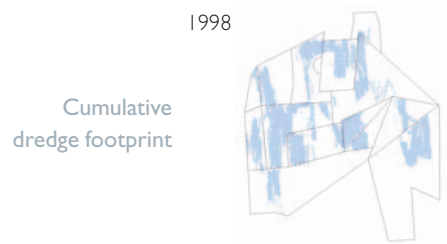
Another indicator of the industry's performance over the five years covered by this review is the area of seabed actually dredged. This has been reported on an annual basis in terms of both the total extent and the distance offshore, with information derived from analysis of the Electronic Monitoring System data.

The total area of seabed dredged has fallen from 222.59 km² in 1998, to 149.8 km² in 2002. This reduction has been relatively evenly spread between the three zones (0-6 nm, 6-12 nm and >12 nm).

Over this period, the majority of dredging activity (85% by area) has taken place within 12 nm of the shore. This correlates well with the distribution of production licence areas, the majority of which (74% by area) are also located within the 12 nm zone.

The evolution of EMS analysis has allowed the amount of dredging (measured in hours dredged per 50 m by 50 m unit area) to be calculated on an annual basis, and related to the extent of activity (intensity). This has shown that over the 5 years of the review, 90% of total annual dredging activity (hours dredged) has been restricted to between 32 and 35% of the total area dredged.





Discussion

There have been marked changes in the extent and distribution of both the area of seabed licensed and the area of seabed dredged, driven by a number of factors.

In terms of resource management, the use of more accurate navigation and communication technologies, coupled with a greater knowledge about the quality and distribution of licensed sand and gravel resources has enabled the industry to control dredging operations far more effectively. This has resulted in dredging operations becoming more focussed and a reduction in the overall area of seabed dredged.

By reducing its spatial footprint both in terms of the area licensed and dredged, the industry has effectively reduced its potential impact on other marine users, such as the fishing industry, shipping and latterly offshore renewable energy.

There is also a relationship between the extent of dredging activity and wider environmental impact. The reduction and reporting of both licensed and dredged area, together with the introduction of the new 'Active Dredge Area' charts, has gone a significant way to improving the transparency of the industry's operations.

Environmental policy, management and control has had a significant influence on the way that new licence areas have been issued and are allowed to operate. Marine Minerals Guidance 1 in English waters and the Interim Marine Aggregate Dredging Policy in Welsh waters have defined the boundaries within which the marine aggregate industry will operate for the foreseeable future. As well as greater site specific controls, such as the extent of the permitted area (within which dredging is allowed to take place), other more general policy objectives have been defined which apply to all new licensed interests and dredging operations, aimed at minimising the overall area of seabed licensed and dredged.

The concept of the cumulative footprint

While the area involved initiative has reported on the area of seabed dredged annually, it does not make it easy to compare year on year or even longer term changes. Between 2000 and 2002 for example, around 150 km² of seabed was dredged in each year – but the format of the information has not previously allowed any quantification of the year-on-year changes that may take place i.e. how much of this area has been previously dredged, and how much represents 'new' area? This has obvious implications for the industry's overall environmental footprint over a period of time.

A cumulative footprint is generated by layering each years complete dredging records on top of one another in a Geographic Information System. By analysing the annual dredge data in this way, it is possible to identify which areas have been repeatedly dredged, and which dredged for a single year.

The resultant footprint therefore provides an illustration, of the overall five-year pattern of dredging activity based on the spatial extent of operations year-on-year.

National cumulative footprint

At a national scale, some headline statistics can be drawn from the cumulative footprint analysis:

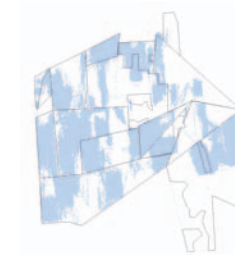
The total cumulative dredge footprint over the period 1998–2002 was 380.4975 km².

Of this total, over the five year period covered by this review 143.9475 km² (38%) was dredged for a single year; while 42.935 km² (11%) was repeatedly dredged in each of the five years.

When looking at the data on a year-to-year basis (see table 4 in the national summary statistics), the analysis demonstrates that for the most recent three years of the analysis (2000–2002), over 80% of the annual area had been previously dredged.

However, the regional nature of the marine aggregate industry – in terms of production, licences and markets, is such that any subtle trends tend to get lost when looking at a national scale.

1998–2002



Regional cumulative footprint

Comparison of the regional cumulative footprints show some interesting similarities and differences which can be related to regional controls – whether these be market or resource led.

In simple terms, there is a broad relationship between regional cumulative footprints and the annual offtake of marine sand and gravel. The largest spatial footprint corresponds to the greatest level of production (the East coast), and vice versa, for the smallest footprint (North West).

There are though several exceptions to this pattern, which serve to highlight the complexity and variability within the UK marine aggregate industry.

The Humber has the second largest cumulative footprint of the six regions, at 84.8125 km² even though production for construction aggregate has been relatively low over the period of this review. This apparent discrepancy between offtake and area dredged results from the large scale beach replenishment projects using marine aggregate from licences in the region. The resources targeted for beach replenishment are different from those routinely dredged for construction aggregate, hence the larger cumulative footprint.

The Thames region also has a similarly large cumulative footprint, at over 40 km², but a low rate of annual production. In this case, the licence areas in this region are among the oldest, and this is reflected in the area that has been returned to date as part of this initiative. With the resources on many of these areas nearing economic exhaustion, dredging vessels have to work harder to obtain a cargo – often screening, and covering a greater area for each load. Over time, this effectively increases the total area dredged.

By contrast, the South coast region has a relatively high rate of annual production from a comparatively small area (compared to the East coast for example). This reflects the sand and gravel resources in this region – discrete palaeochannel infills and localised terrace deposits associated with ancient river systems. Dredging activity has to be far more targeted, which results in a much smaller area of seabed being dredged.

Further information on each of the regions, together with a chart showing the extent of the cumulative dredged footprint, is presented at the end of this report.



Conclusion

This report is a clear demonstration of the efforts made by both the marine aggregate industry and The Crown Estate to meet their commitment to review licence areas and to surrender areas no longer containing economic sand and gravel resources.

The changes that have taken place over the five years of this review have had a number of inter-related influences. The greatest changes have come from voluntary 'good practice' initiatives, applied by operators to existing production licence areas and driven by the industry's desire to minimise the potential for impact and to improve the efficiency of operations. However, as existing production licence areas are renewed or new consents issued, the role of more formal regulation and control will become increasingly influential.

Both the industry and The Crown Estate are committed to sustainable management of marine aggregate resources as demonstrated by the continual development of the area involved initiative and the introduction of the cumulative dredge footprint in this report. We will continue to issue annual reports which will culminate in a ten year review in 2008, when the cumulative footprint will be revisited.



National summary statistics 1998–2002

five year review 1998–2002

Year*	Area of seabed licensed (km ²) 1998–2002					
	1/1/1998	1998	1999	2000	2001	2002
0–6 nm	641	505	502	484	470	439
6–12 nm	739	653	653	578	535	517
>12 nm	351	300	300	402	403	403
total area licensed (km²)	1731	1458	1455	1464	1408	1359

* Annual figures are calculated as of the 31 December, and therefore incorporate any changes that may have occurred through the year

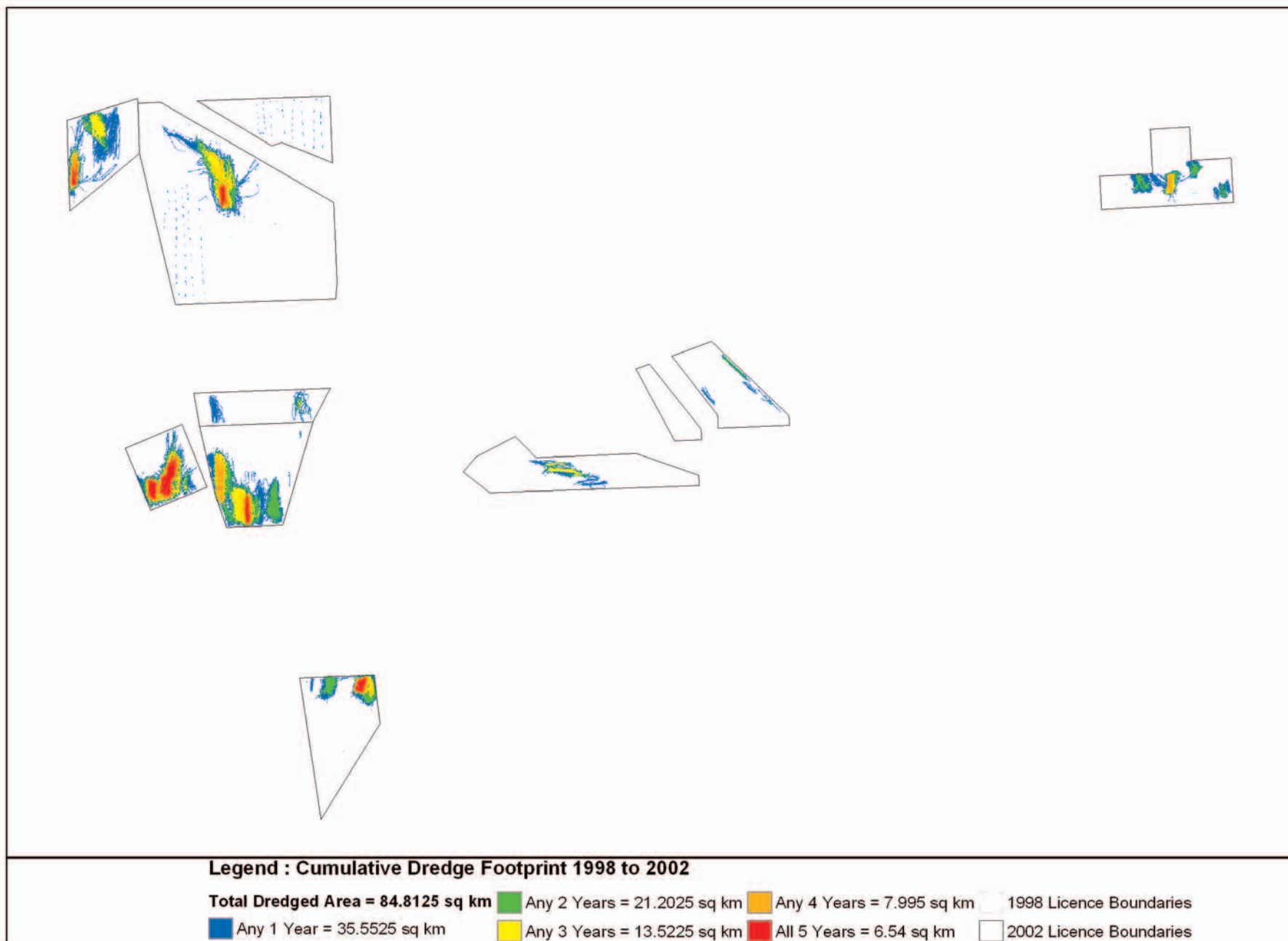
	Cumulative area dredged (km ²) 1998–2002					total area dredged
	1998	1999	2000	2001	2002	
newly dredged area	222.59	75.44	29.365	28.515	24.5875	380.4975
previously dredged area		144.8525	125.995	122.075	125.2125	
annual total	222.59	220.2925	155.36	150.59	149.80	

	Changes in area of seabed licensed (km ²) 1998–2002					total area
	1998	1999	2000	2001	2002	
new area licensed	0	3.25	141.03	8.78	0	153.06
surrendered licensed area	273.1	6.52	131.69	64.63	49.42	525.32

	Dredge frequency (km ²) 1998–2002					total area dredged
	a single year	any two years	any three years	any four years	all five years	
dredged area (km²)	143.9475	85.9875	62.6125	45.015	42.935	380.4975

	Area of seabed dredged (km ²) 1998–2002 (from EMS variable grid-cell analysis)				
	1998	1999	2000	2001	2002
0–6 nm	98.5775	107.3925	79.4225	74.8125	70.455
6–12 nm	93.855	82.7475	58.885	54.7795	58.215
>12 nm	30.1575	30.1525	17.0525	20.998	21.13
total (km²)	222.59	220.2925	155.36	150.59	149.8

Humber region summary statistics 1998–2002



five year review 1998–2002

Year*	Regional area of seabed licensed (km ²) 1998–2002					
	1/1/1998	1998	1999	2000	2001	2002
0–6 nm	2	2	2	2	2	2
6–12 nm	218	218	218	218	218	218
>12 nm	282	231	231	332	332	332
total area licensed (km²)	502	451	451	552	552	552

* Annual figures are calculated as of the 31 December, and therefore incorporate any changes that may have occurred through the year

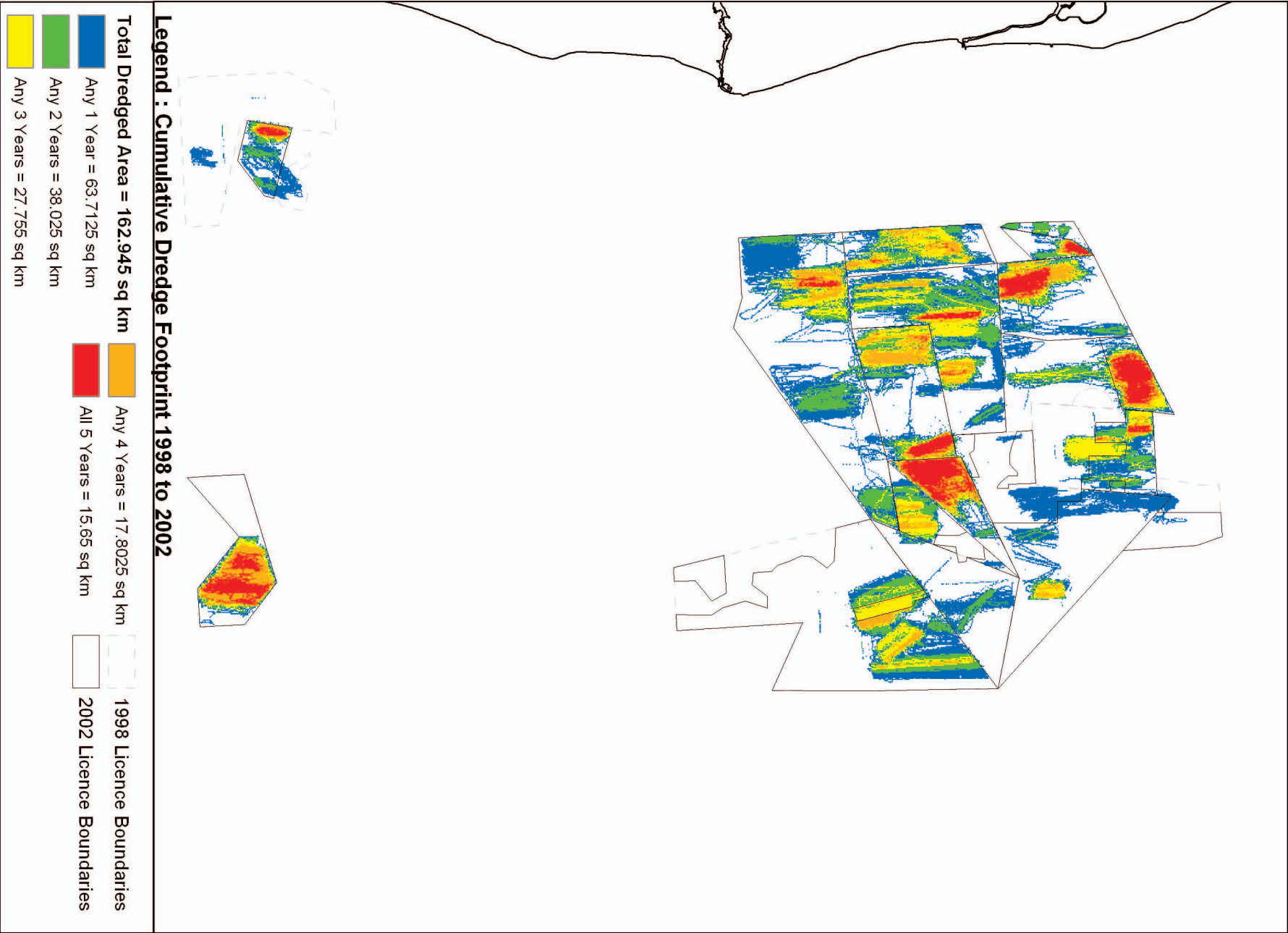
	Regional cumulative area dredged (km ²) 1998–2002					total area dredged
	1998	1999	2000	2001	2002	
newly dredged area	52.885	19.0175	6.0925	2.15	4.6675	84.8125
previously dredged area	0	34.0975	21.4875	19.81	22.94	
annual total	52.885	53.115	27.58	21.96	27.6075	

	Changes in area of seabed licensed (km ²) 1998–2002					total area
	1998	1999	2000	2001	2002	
new area licensed	0	0	100.53	0	0	100.53
surrendered licensed area	51.49	0	0	0	0	51.49

	Regional dredge frequency (km ²) 1998–2002					total area dredged
	a single year	any two years	any three years	any four years	all five years	
dredged area (km²)	35.5525	21.2025	13.5225	7.995	6.54	84.8125

	Area of seabed dredged (km ²) 1998–2002 (from EMS variable grid-cell analysis)				
	1998	1999	2000	2001	2002
0–6 nm	0.0875	0	0	0.0225	0.3575
6–12 nm	35.79	34.7225	18.71	14.552	18.3625
>12 nm	17.0075	18.3925	8.87	7.3855	8.8875
total (km²)	52.885	53.115	27.58	21.96	27.6075

East coast region summary statistics | 1998–2002



five year review 1998–2002

Year*	Regional area of seabed licensed (km ²) 1998–2002					
	1/1/1998	1998	1999	2000	2001	2002
0–6 nm	164	134	134	128	121	115
6–12 nm	209	191	191	191	145	145
>12 nm	37	37	37	37	37	38
total area licensed (km²)	410	362	362	356	303	298

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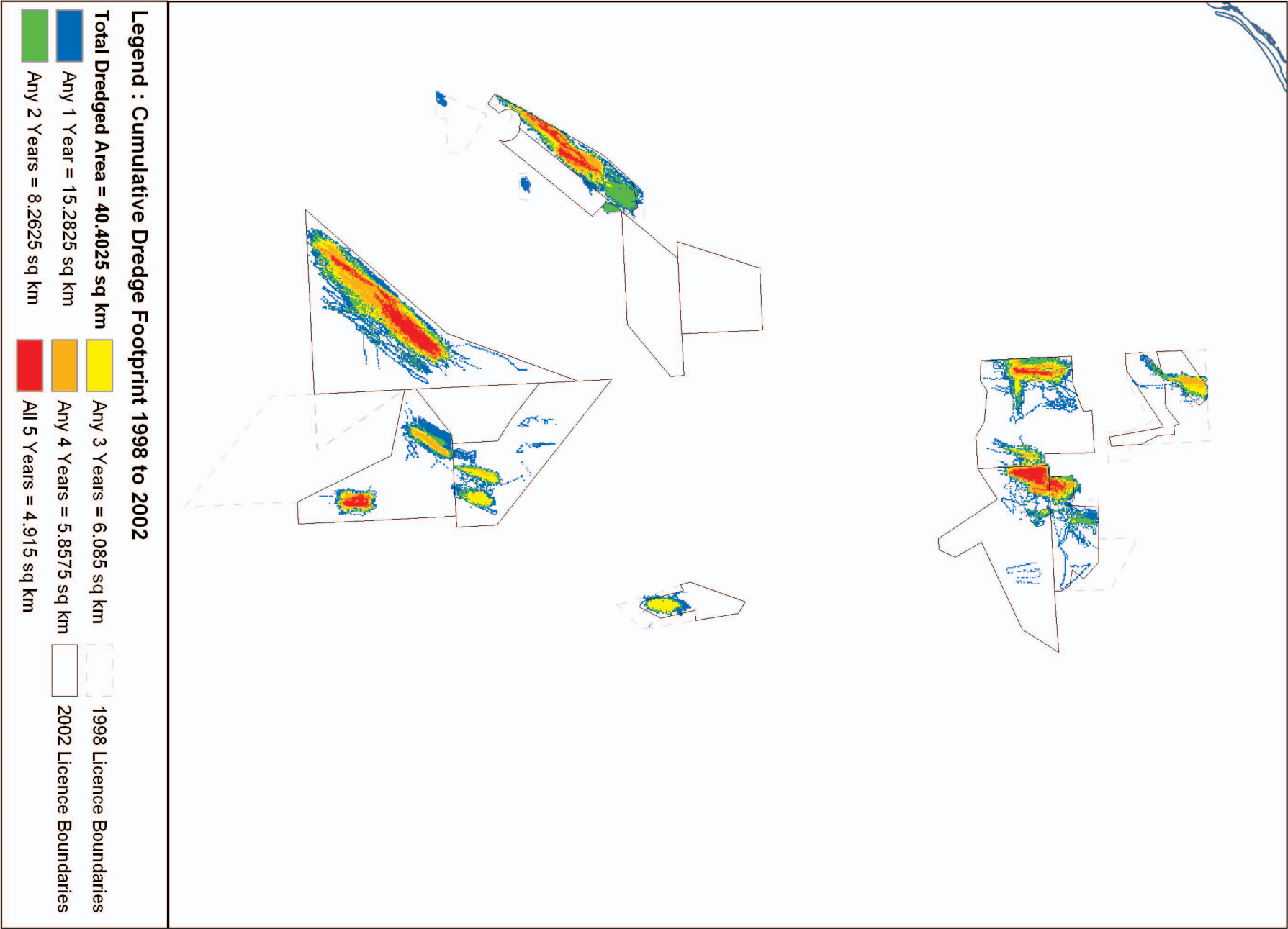
	Regional cumulative area dredged (km ²) 1998–2002					total area dredged
	1998	1999	2000	2001	2002	
newly dredged area	96.6625	26.8325	11.025	14.7625	13.6625	162.945
previously dredged area	0	58.1625	53.5025	48.8675	48.78	
annual total	96.6625	84.995	64.5275	63.63	62.4425	

	Changes in area of seabed licensed (km ²) 1998–2002					total area
	1998	1999	2000	2001	2002	
new area licensed	0	0	0	5.23	0	5.23
surrendered licensed area	47.99	0	5.18	58.34	5.54	117.05

	Regional dredge frequency (km ²) 1998–2002					total area dredged
	a single year	any two years	any three years	any four years	all five years	
dredged area (km²)	63.7125	38.025	27.755	17.8025	15.65	162.945

	Area of seabed dredged (km ²) 1998–2002 (from EMS variable grid-cell analysis)				
	1998	1999	2000	2001	2002
0–6 nm	43.69	43.595	31.2725	26.83	27.55
6–12 nm	40.1975	30.8575	26.3975	24.665	24.16
>12 nm	12.775	10.5425	6.8575	12.135	10.7325
total (km²)	96.6625	84.995	64.5275	63.63	62.4425

Thames region summary statistics 1998–2002



five year review 1998–2002

Year*	Regional area of seabed licensed (km ²) 1998–2002					
	1/1/1998	1998	1999	2000	2001	2002
0–6 nm	241	143	143	143	139	124
6–12 nm	82	63	63	52	52	33
>12 nm	2	0	0	0	0	0
total area licensed (km²)	325	206	206	195	191	157

* Annual figures are calculated as of the 31 December, and therefore incorporate any changes that may have occurred through the year

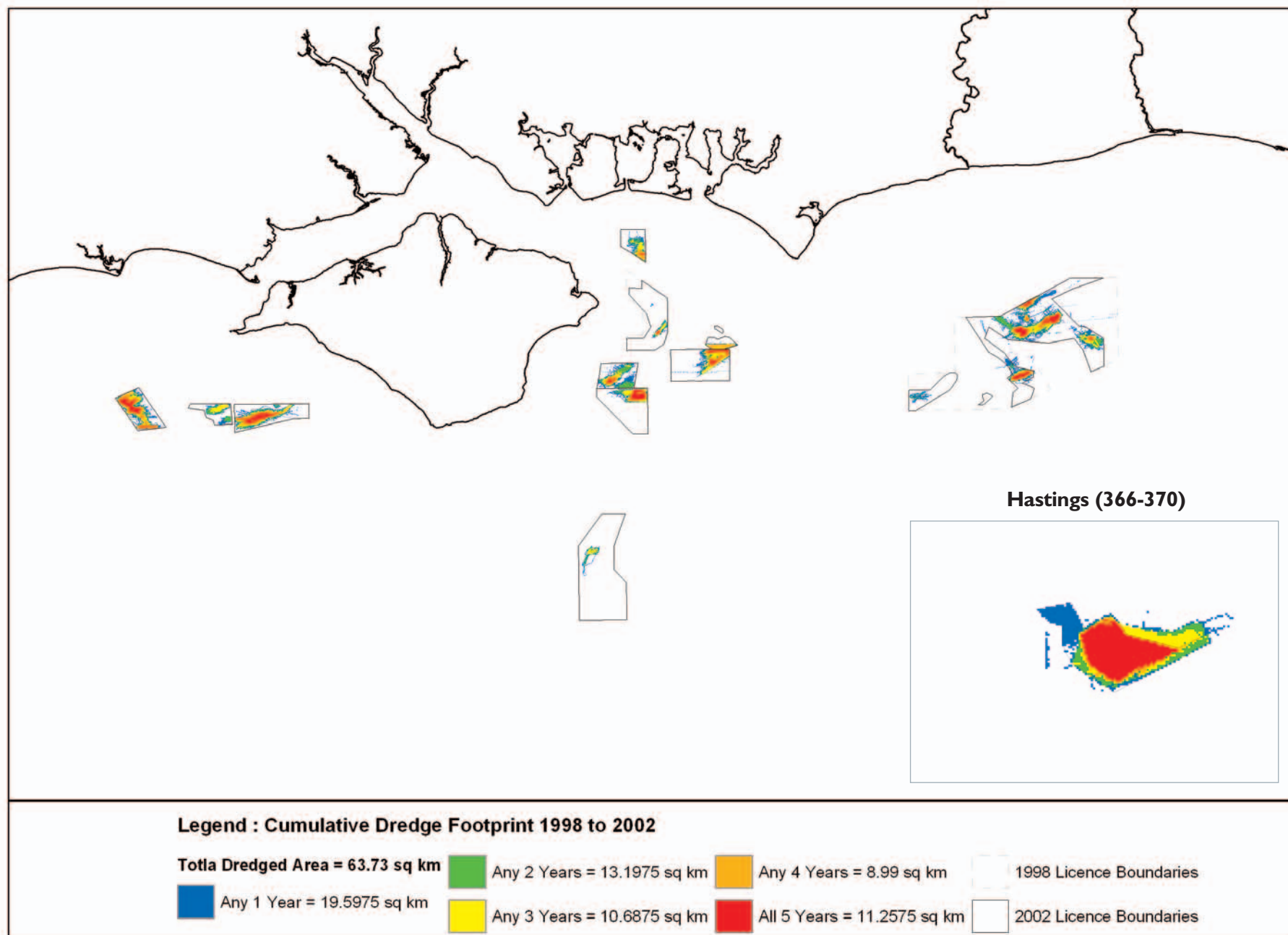
	Regional cumulative area dredged (km ²) 1998–2002					total area dredged
	1998	1999	2000	2001	2002	
newly dredged area	18.465	11.225	4.33	3.9325	2.45	40.4025
previously dredged area	0	13.39	13.0175	15.9675	15.3675	
annual total	18.465	24.615	17.3475	19.9	17.8175	

	Changes in area of seabed licensed (km ²) 1998–2002					total area
	1998	1999	2000	2001	2002	
new area licensed	0	0	0	0	0	0
surrendered licensed area	118.62	0	11.04	3.65	34.59	167.9

	Regional dredge frequency (km ²) 1998–2002					total area dredged
	a single year	any two years	any three years	any four years	all five years	
dredged area (km²)	15.2825	8.2625	6.085	5.8575	4.915	40.4025

	Area of seabed dredged (km ²) 1998–2002 (from EMS variable grid-cell analysis)				
	1998	1999	2000	2001	2002
0–6 nm	15.905	21.5075	14.9975	18.1775	14.68755
6–12 nm	2.56	3.1075	2.35	1.7225	3.13
>12 nm	0	0	0	0	0
total (km²)	18.465	24.615	17.3475	19.9	17.8175

South coast region summary statistics 1998–2002



five year review 1998–2002

Year*	Regional area of seabed licensed (km ²) 1998–2002					
	1/1/1998	1998	1999	2000	2001	2002
0–6 nm	120	115	112	102	102	92
6–12 nm	207	158	158	94	98	98
>12 nm	5	5	5	8	8	8
total area licensed (km²)	332	278	275	204	208	198

* Annual figures are calculated as of the 31 December, and therefore incorporate any changes that may have occurred through the year

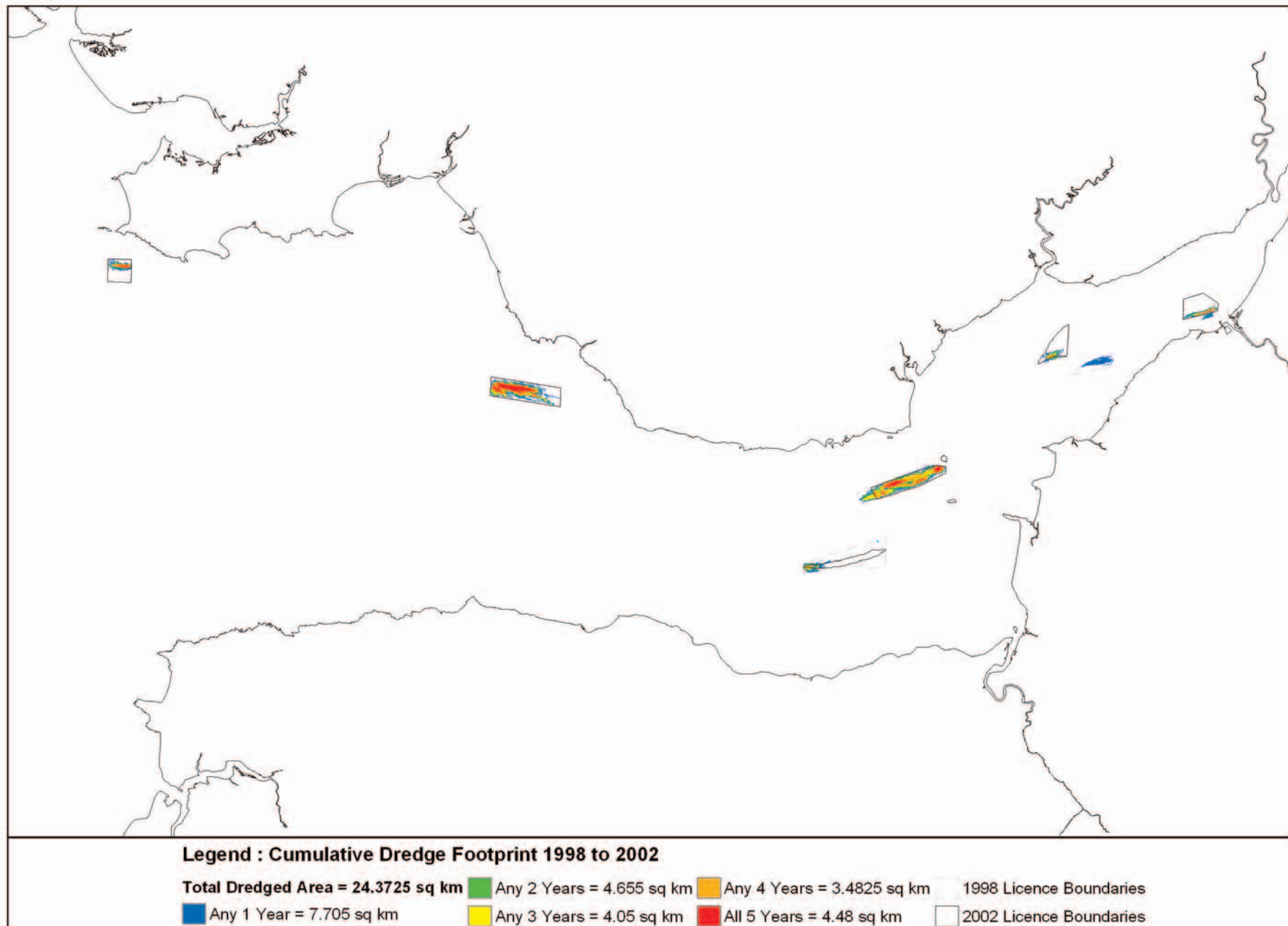
	Regional cumulative area dredged (km ²) 1998–2002					total area dredged
	1998	1999	2000	2001	2002	
newly dredged area	37.795	11.1475	6.1025	5.885	2.8	63.73
previously dredged area	0	26.52	25.825	27.395	27.21	
annual total	37.795	37.6675	31.9275	33.28	30.01	

	Changes in area of seabed licensed (km ²) 1998–2002					total area
	1998	1999	2000	2001	2002	
new area licensed	0	3.25	40.5	3.55	0	47.3
surrendered licensed area	53.83	5.93	111.59	0	9.29	180.64

	Regional dredge frequency (km ²) 1998–2002					total area dredged
	a single year	any two years	any three years	any four years	all five years	
dredged area (km²)	19.5975	13.1975	10.6875	8.99	11.2575	63.73

	Area of seabed dredged (km ²) 1998–2002 (from EMS variable grid-cell analysis)				
	1998	1999	2000	2001	2002
0–6 nm	22.4875	23.6075	20.5	19.44	17.4475
6–12 nm	15.3075	14.06	11.4275	13.84	12.5625
>12 nm	0	0	0	0	0
total (km²)	37.795	37.6675	31.9275	33.28	30.01

South west region summary statistics 1998–2002



five year review 1998–2002

Year*	Regional area of seabed licensed (km ²) 1998–2002					
	1/1/1998	1998	1999	2000	2001	2002
0–6 nm	64	63	63	59	56	56
6–12 nm	0	0	0	0	0	0
>12 nm	0	0	0	0	0	0
total area licensed (km²)	64	63	63	59	56	56

* Annual figures are calculated as of the 31 December, and therefore incorporate any changes that may have occurred through the year

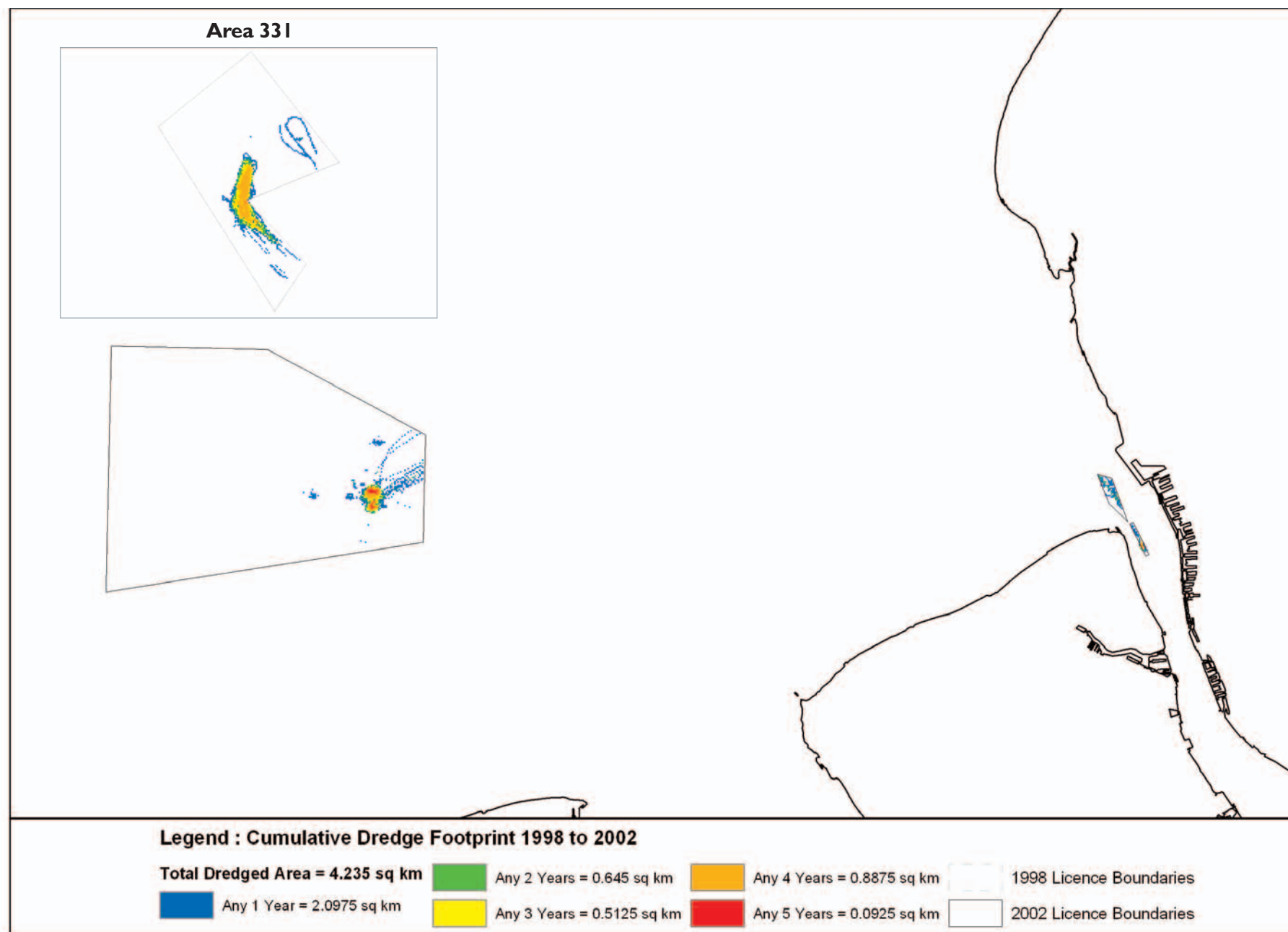
	Regional cumulative area dredged (km ²) 1998–2002					total area dredged
	1998	1999	2000	2001	2002	
newly dredged area	15.93	5.5075	1.3425	0.83	0.7625	24.3725
previously dredged area	0	12.315	10.8725	8.92	9.4225	
annual total	15.93	17.8225	12.215	9.75	10.185	

	Changes in area of seabed licensed (km ²) 1998–2002					total area
	1998	1999	2000	2001	2002	
new area licensed	0	0	0	0	0	0
surrendered licensed area	1.13	0.59	3.88	2.64	0	8.24

	Regional dredge frequency (km ²) 1998–2002					total area dredged
	a single year	any two years	any three years	any four years	all five years	
dredged area (km²)	7.705	4.655	4.05	3.4825	4.48	24.3725

	Area of seabed dredged (km ²) 1998–2002 (from EMS variable grid-cell analysis)				
	1998	1999	2000	2001	2002
0–6 nm	15.93	17.8225	12.215	9.75	10.185
6–12 nm	0	0	0	0	0
>12 nm	0	0	0	0	0
total (km²)	15.93	17.8225	12.215	9.75	10.185

North west region summary statistics 1998–2002



five year review 1998–2002

Year*	Regional area of seabed licensed (km ²) 1998–2002					
	1/1/1998	1998	1999	2000	2001	2002
0–6 nm	50	50	50	50	50	50
6–12 nm	23	23	23	23	23	23
>12 nm	25	25	25	25	25	25
total area licensed (km²)	98	98	98	98	98	98

* Annual figures are calculated as of the 31 December, and therefore incorporate any changes that may have occurred through the year

	Regional cumulative area dredged (km ²) 1998–2002					total area dredged
	1998	1999	2000	2001	2002	
newly dredged area	0.8525	1.71	0.4725	0.955	0.245	4.235
previously dredged area	0	0.3675	1.29	1.115	1.4925	
annual total	0.8525	2.0775	1.7625	2.07	1.7375	

	Changes in area of seabed licensed (km ²) 1998–2002					total area
	1998	1999	2000	2001	2002	
new area licensed	0	0	0	0	0	0
surrendered licensed area	0	0	0	0	0	0

	Regional dredge frequency (km ²) 1998–2002					total area dredged
	a single year	any two years	any three years	any four years	all five years	
dredged area (km²)	2.0975	0.645	0.5125	0.8875	0.0925	4.235

	Area of seabed dredged (km ²) 1998–2002 (from EMS variable grid-cell analysis)				
	1998	1999	2000	2001	2002
0–6 nm	0.4775	0.86	0.4375	0.5925	0.2275
6–12 nm	0	0	0	0	0
>12 nm	0.375	1.2175	1.325	1.4775	1.51
total (km²)	0.8525	2.0775	1.7625	2.07	1.7375



The Crown Estate

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The Crown Estate

The Crown Estate is a landed estate including more than 120,000 hectares of agricultural land in England, Scotland and Wales, substantial blocks of commercial property (primarily in London) and an extensive marine estate covering 55% of the foreshore and all of the seabed out to the 12 mile territorial Limit. Its origins date back to the reign of King Edward the Confessor. The Crown Estate is part of the hereditary possessions of the Sovereign in right of the Crown managed under the provisions of the Crown Estate Act 1961 by the Crown Estate Commissioners who have a duty to maintain and enhance the value of the Estate and the income derived from it. The net revenue surplus is paid to the exchequer. In 2004/05 the capital value of the The Crown Estate was £5,090 million and the net revenue surplus was £184.8 million.

BMAPA

The British Marine Aggregate Producers Association (BMAPA) was formed in 1992 and comprises members of the Quarry Products Association with a marine interest. Marine sand and gravel is supplied to home markets, as well as contributing to the balance of payments through exports to Continental Europe. In addition, marine aggregates are fulfilling an increasingly important role by supporting beach replenishment schemes. The marine aggregates industry operates over 25 vessels on 72 production licences around the UK. The vessels are almost entirely British registered and carry predominantly British crew.

BMAPA membership is comprised of: Britannia Aggregates Ltd, British Dredging Ltd, DEME Building Materials Ltd, Hanson Aggregates Marine Ltd, Kendall Bros. (Portsmouth) Ltd, Northwood (Fareham) Ltd, Norwest Sand and Ballast Company, Cemex UK Marine Ltd, United Marine Dredging Ltd and Volker Dredging Ltd.