

# Marine aggregate dredging 1998-2012

## A FIFTEEN-YEAR REVIEW

THE CROWN  
ESTATE

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## Executive summary

This report provides a fifteen-year overview of an initiative launched in 1999 to assess the dredging footprint of the UK marine aggregate industry. It reflects the commitment made by both the industry and The Crown Estate to review on an annual basis both dredging activity and licence areas and to surrender those areas no longer containing economic sand and gravel resources.

Over fifteen years, the 'Area Involved' initiative has generated high-quality, high resolution data, analysis of which provides valuable environmental performance indicators for the marine aggregate sector. The reporting of dredging activity is made possible by an Electronic Monitoring System, developed by The Crown Estate and industry, and required on all vessels dredging in licensed areas.

This review provides figures, and demonstrates trends, across three key indicators:

- Area of seabed licensed – focusing not just on changes to the area but also on the location of licenses.
- Area of seabed dredged – assessing the area actually dredged and the location of dredging.
- Cumulative dredge footprint – the overall footprint gives an indication of the scale and impact over a long term period.

New technology and better understanding of its licensed resources has enabled the industry's operations to become more focused and so reduce its footprint.

The overall reduction in both footprints over this fifteen year period has reduced the environmental footprint of the sector's activities, and also limits the potential for spatial conflicts with other marine users.



## Area of seabed licenced

The area of seabed licensed for marine aggregate extraction continues to form a cornerstone of the 'Area Involved' initiative. The period covered by this report has seen various changes to the licencing regime under which marine aggregate extraction may take place. The most significant of these changes has been The Marine and Coastal Access Act of 2009 (MCAA) which introduced a new marine licensing system from 6 April 2011.

Dredging operators were required to be fully compliant with the new Marine Licensing regime by 2012, and this had a direct impact on the licenced area figures for 2012, and the effects will likely still be visible up to 2015. For areas which were licensed prior to the mid-1990s Short Term Marine Licence Applications, supported by Environmental Impact Assessments were required to ensure the continuation of dredging operations. Among the conditions of these licences was the limitation of operations to no greater than the maximum historic dredge footprint (since 1993), resulting in a temporary reduction of the permitted extent. It should be noted that the large reduction in the area of seabed licenced during 2012 is largely the result of this condition being imposed on the older dredging areas, and is likely to be mostly reversed following successful applications for 15 year full term renewals during 2014.

## Area of seabed dredged

Accurate information on the extent and intensity of dredging operations on The Crown Estate licence areas is possible through analysis of data recorded through the Electronic Monitoring System (EMS). Since 1993, The Crown Estate has required all vessels dredging on their licence areas to be fitted with such systems.

The EMS automatically records the date, time and position of all dredging activity at thirty seconds intervals, and automatically transmits this information back to The Crown Estate's managing agents.

The area of seabed dredged is calculated by the use of a Geographic Information System, which overlays the data points onto a standardised grid of 50m x 50m cells. Relative dredging intensity can be established by calculating the total number of data points which fall within each cell. Such dredging intensity information is made available by The Crown Estate and BMAPA in the annual 'Area of Seabed Dredged' Reports.

## Cumulative dredge of footprint

The cumulative dredge footprints shown in this report are generated by layering each year's complete dredging grid cells on top of one another in a Geographic Information System. By analysing the annual dredge data in this way, it is possible to identify the total area of seabed impacted by marine aggregate extraction since 1998.

### Using this overlaying method it is also possible to calculate:

- The number of years in which each grid cell has been dredged. The charts included in this report show the results of this analysis and classify the dredge footprint in a number of categories to give a sense of the varying scale of impact on the seabed.
- The area of seabed which was dredged for the first time in any given year. For the purposes of this review, a 1998 baseline was adopted from which point onwards all area dredged was assumed to be newly dredged. (The majority of licence areas will have been dredged for a number of years prior to this date however).







## Key figures 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed decreased by 748km<sup>2</sup>.
- 1,237 km<sup>2</sup> of licensed area was surrendered.
- 489 km<sup>2</sup> of new area was licensed.
- The area licensed within 6 nautical miles from the coast and between 6 and 12 nautical miles decreased. The greatest decrease occurred between 6 and 12 nautical miles. There was a small increase in the area licensed beyond 12 nautical miles.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged decreased by 126km<sup>2</sup>.
- The area of seabed dredged per year ranged from 223km<sup>2</sup> in 1998 to 97km<sup>2</sup> in 2012.
- The area dredged within 6 nautical miles from the coast, between 6 and 12 nautical miles and beyond 12 nautical miles all decreased. The greatest decrease occurred between 6 and 12 nautical miles.



### Cumulative footprint

- The cumulative area of seabed dredged between 1998 and 2012 amounted to 512km<sup>2</sup>.
- The area of new seabed dredged annually decreased significantly to only 6.1km<sup>2</sup> a year in 2012. In 2004 this figure was 16.3km<sup>2</sup> and in 2008 it was 14.5km<sup>2</sup>.

### Extraction

- A total of 314 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.



## Extraction depths across the cumulative dredge footprint

An indication of the intensity of marine aggregate dredging activity can be derived from analysing the total tonnage of sand and gravel that has been removed from the dredged area.

Over the fifteen-year period from 1998 to 2012 314 million tonnes of marine sand and gravel was extracted from The Crown Estate licence areas for use as construction aggregate (in UK and overseas), for beach nourishment and for contract fill.

By converting this tonnage to cubic metres (1m<sup>3</sup> being equivalent to 1.66 tonnes of sand and gravel or 1.5 tonnes of sand), the volume of sediment removed

can be averaged across the cumulative dredge footprint for the same period, providing a useful estimate of seabed lowering across the dredging areas. On this basis, across all regions, the average volume of sediment extracted was 373,514 m<sup>3</sup> per square kilometre dredged, which represents the removal of 37cm of sea bed sediment across the entire area dredged, the equivalent to a single pass of a drag head.

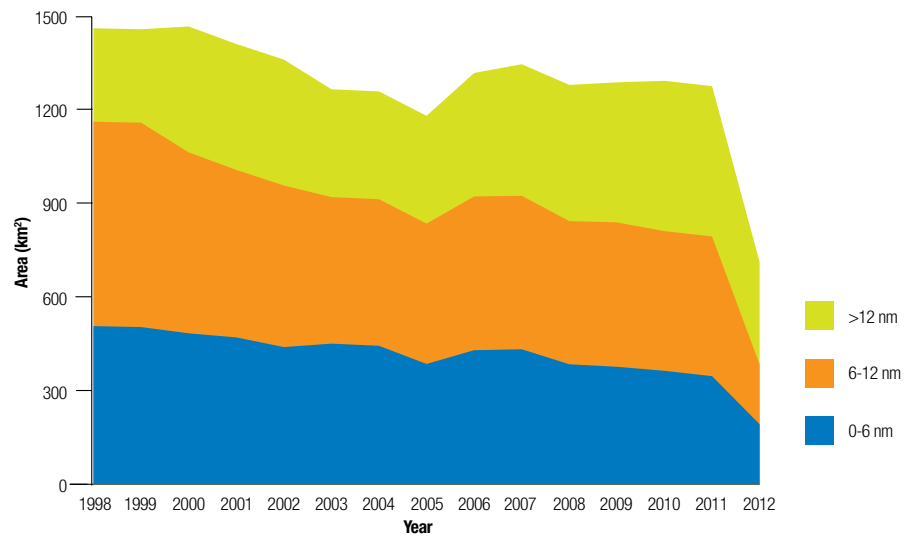
In reality, of course, the extraction activity will not be spread evenly across the dredged area and some areas of seabed will not be dredged at all. Consequently, the thicknesses of sediment removed per given unit area will vary according to the intensity of dredging operations and the depth limits of the sand and gravel deposits being targeted. Nevertheless, the relationship between dredged area and extraction tonnage provides a further indicator of the relative scale of dredging intensity, both over time and between regions.

	Tonnage (million tonnes)	Volume* (million m <sup>3</sup> )	Cumulative footprint (km <sup>2</sup> )	Volume extracted (m <sup>3</sup> ) per km <sup>2</sup>	Approximate depth removed (m) across cumulative footprint
Humber	52.2	31.4	112	280,357	0.28
East	116.4	70.1	193	363,212	0.36
Thames	18.5	11.1	56	198,214	0.20
Channel	29.1	17.5	23	760,870	0.76
South	68.5	41.3	85	485,882	0.49
South West	22.5	15.0	35	428,571	0.43
North West	7.1	4.7	8	587,500	0.59
UK	314.3	191.1	512	373,242	0.37

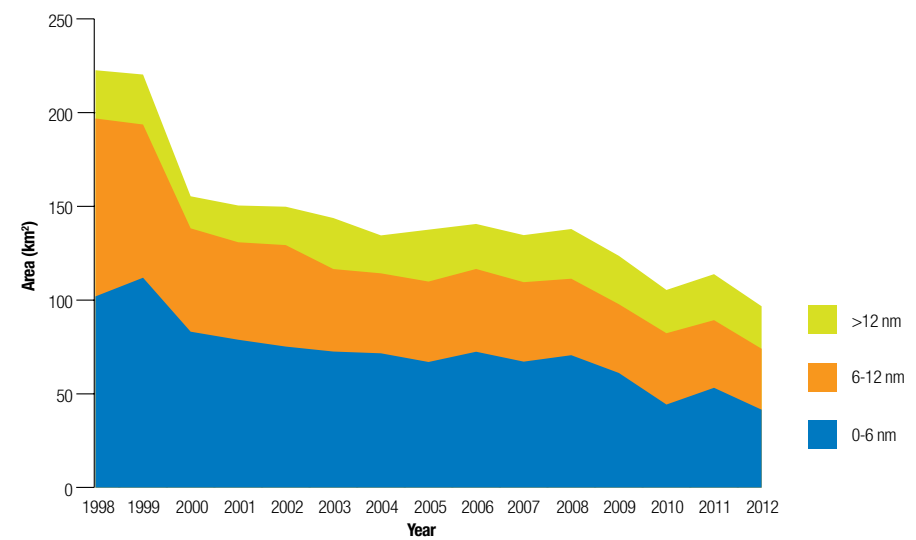
\* Volume conversion based on 1.66 tonnes/m<sup>3</sup> for all regions except South West and North West, where 1.5 tonnes/m<sup>3</sup> is used to reflect the sand resource extracted



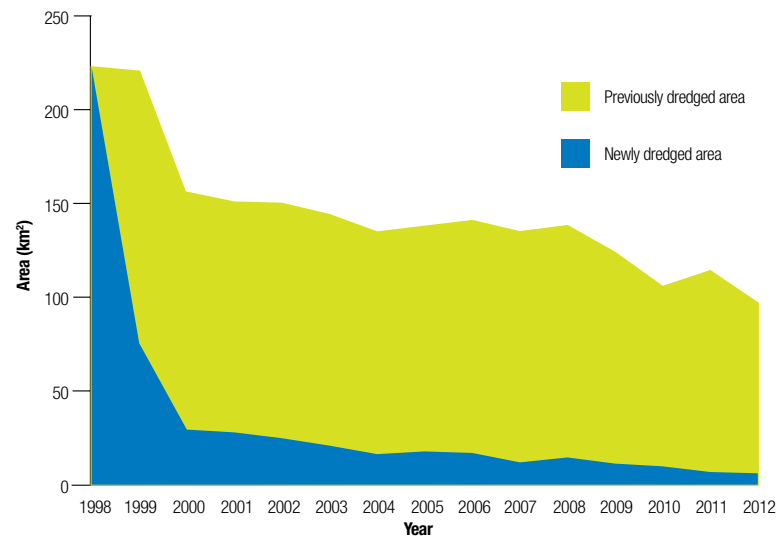
### UK licensed area 1998-2012



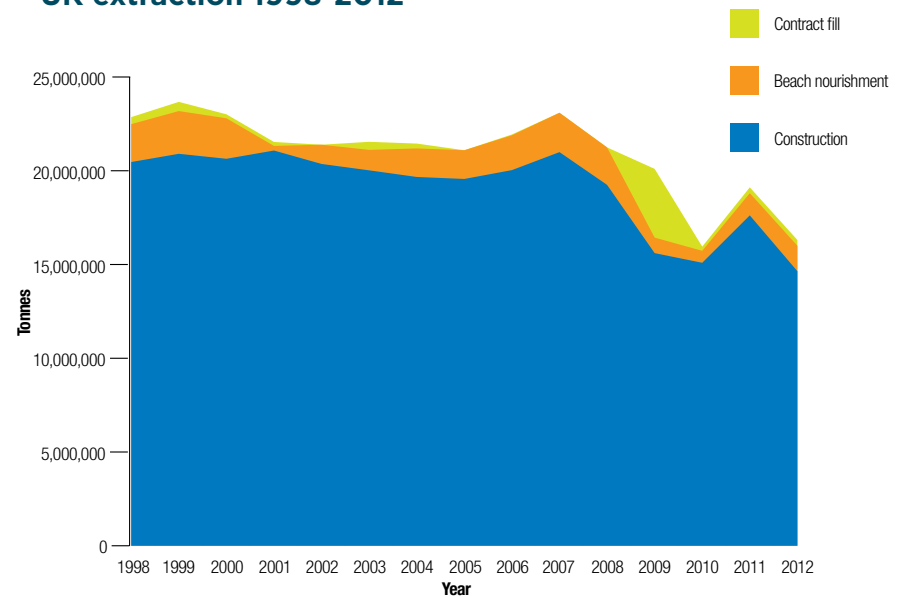
### UK dredged area 1998-2012




### UK newly dredged area and previous dredged area 1998-2012



### UK extraction 1998-2012



# Breaking down the national picture

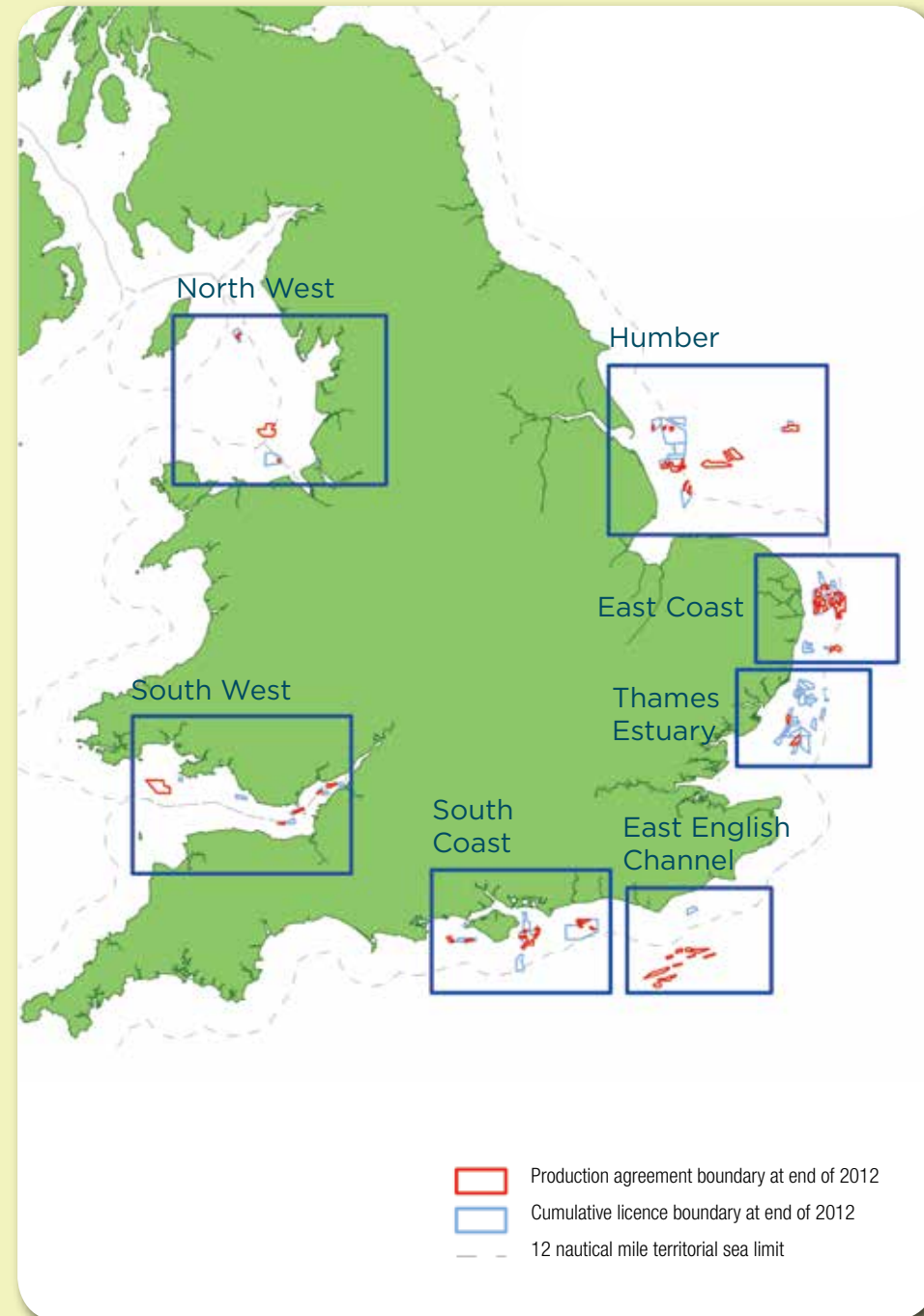
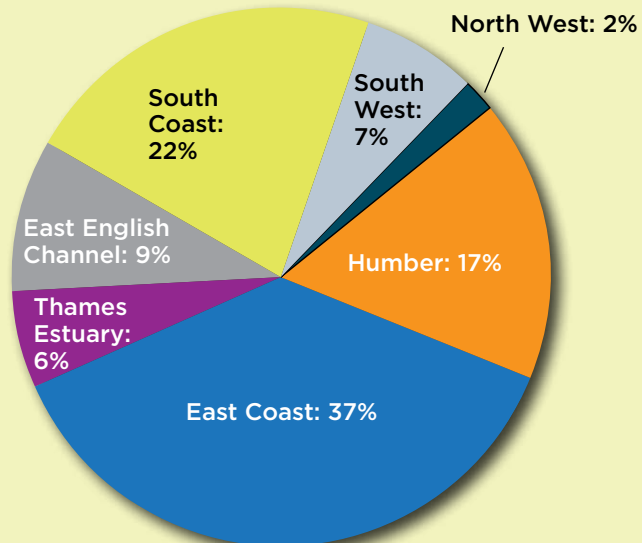
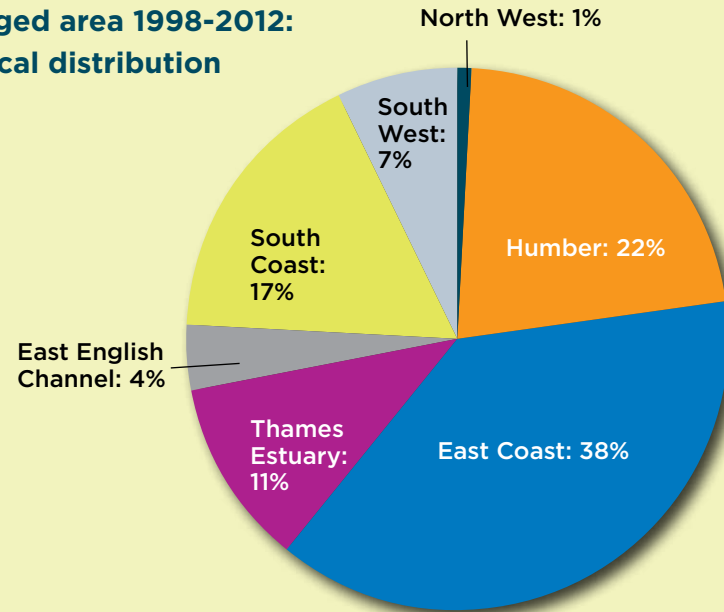


The location of production licences around England and Wales and their grouping into seven distinct geographical regions reflects the discrete distribution of the sand and gravel deposits that are targeted by the industry. In total, the licences cover around 0.1 per cent of the UK continental shelf, and of that area only about 10 per cent is dredged in any year.

In this section of our review, we break the national statistics down by region.

Within each region we reference the area dredged, licensed and cumulative footprint. Changes in area dredged and licenced are also considered in relation to standardised 6 and 12 nautical mile limits (based on 2005 extent).

# Total dredged area 1998-2012: Geographical distribution





## Humber region summary 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed decreased by 256km<sup>2</sup>. The area licensed within 6 nautical miles of the coast, between 6 and 12 nautical miles and beyond 12 nautical miles all decreased. The greatest decrease occurred between 6 and 12 nautical miles.
- 375km<sup>2</sup> of licensed area was surrendered.
- 119km<sup>2</sup> of new area was licensed.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged decreased by 34km<sup>2</sup>.
- The area of seabed dredged per year ranged from 53km<sup>2</sup> in 1999 to 19km<sup>2</sup> in 2012.
- The area dredged within 6 nautical miles of the coast marginally increased. The area dredged between 6 and 12 nautical miles and beyond 12 nautical miles both decreased. The greatest decrease occurred between 6 and 12 nautical miles.

### Cumulative footprint

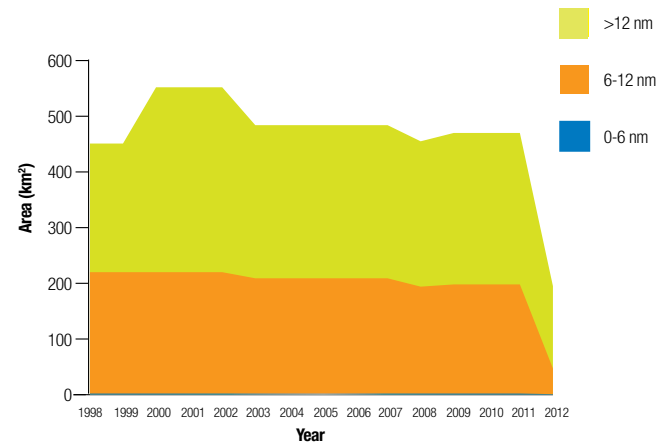
- The cumulative area of seabed dredged between 1998 and 2012 amounted to 112km<sup>2</sup>.

- The area of new seabed dredged annually decreased significantly to only 0.8km<sup>2</sup> a year in 2012. In 2004 this figure was 2.5km<sup>2</sup> and in 2008 it was 1.3km<sup>2</sup>.

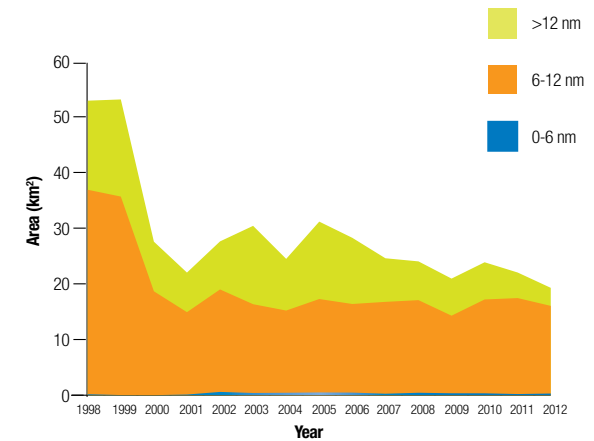
### Extraction

- A total of 52 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.

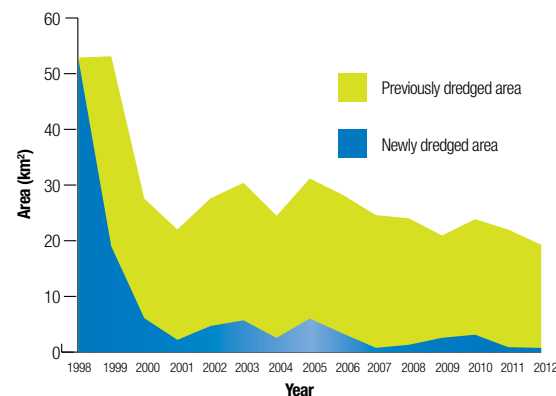
Humber licensed area 1998-2012



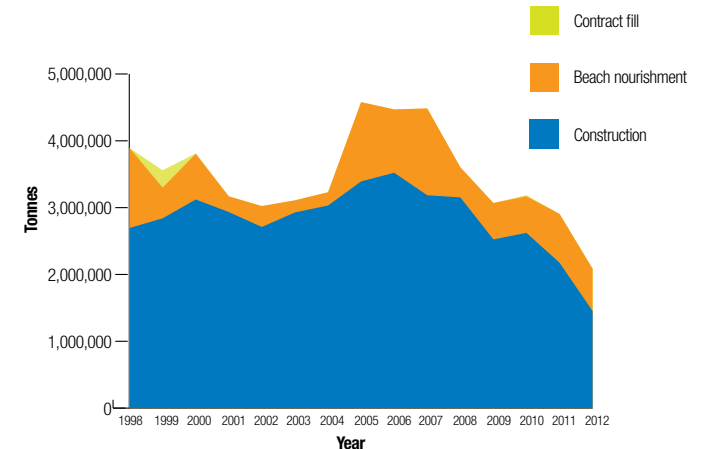
Humber dredged area 1998-2012

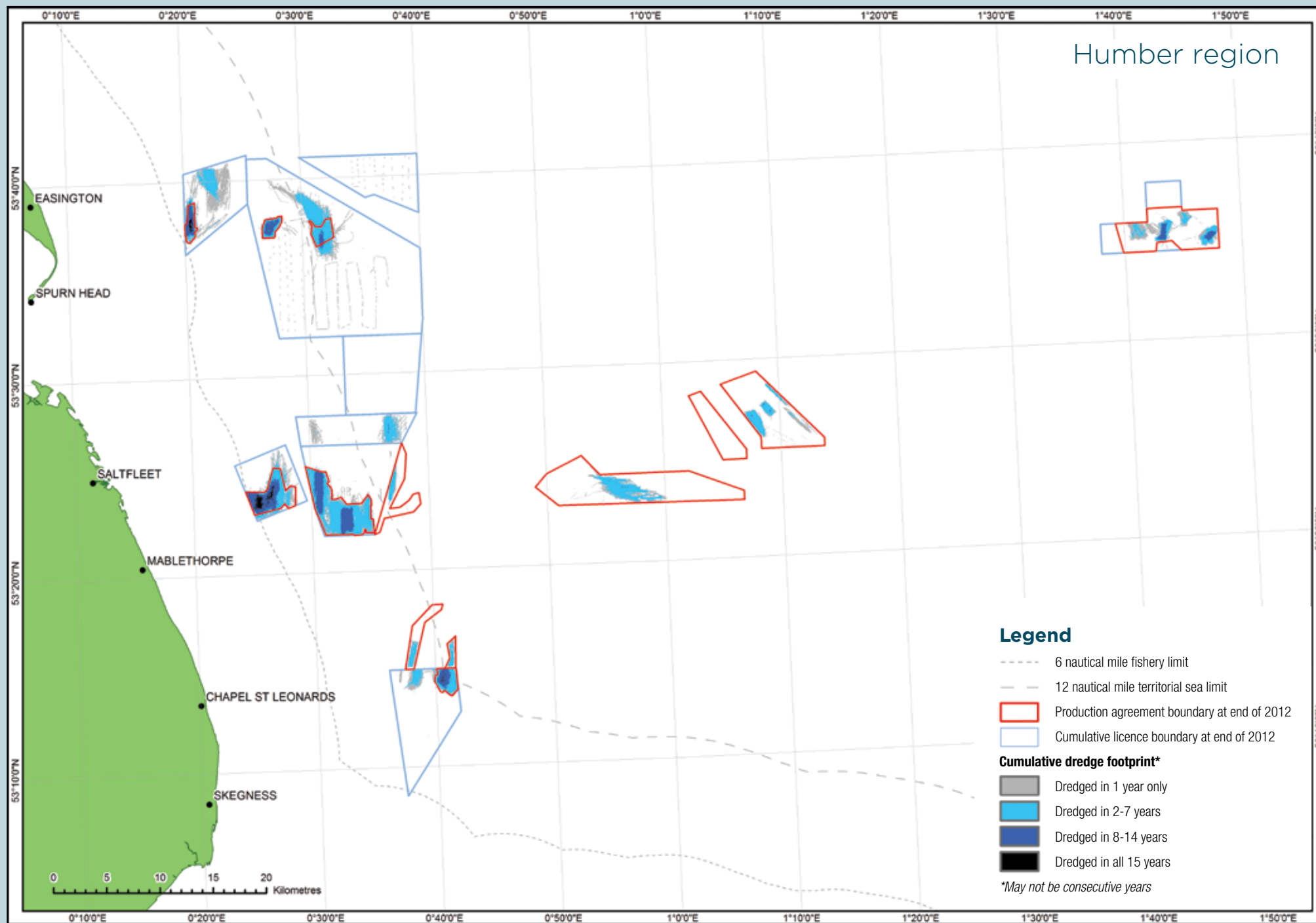


Humber newly dredged area and previous dredged area 1998-2012



Humber extraction 1998-2012





## East Coast region summary 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed decreased by 208km<sup>2</sup>. The area licensed within 6 nautical miles of the coast, between 6 and 12 nautical miles and beyond 12 nautical miles all decreased. The largest decrease occurred between 6 and 12 nautical miles.
- 213km<sup>2</sup> of licensed area was surrendered.
- 5km<sup>2</sup> of new area was licensed.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged decreased by 67km<sup>2</sup>.
- The area of seabed dredged per year ranged from 97km<sup>2</sup> in 1998 to 30km<sup>2</sup> in 2012.
- The area of seabed dredged within 6 nautical miles of the coast, between 6 and 12 nautical miles and beyond 12 nautical miles all decreased. The largest decrease occurred within 6 nautical miles.

### Cumulative footprint

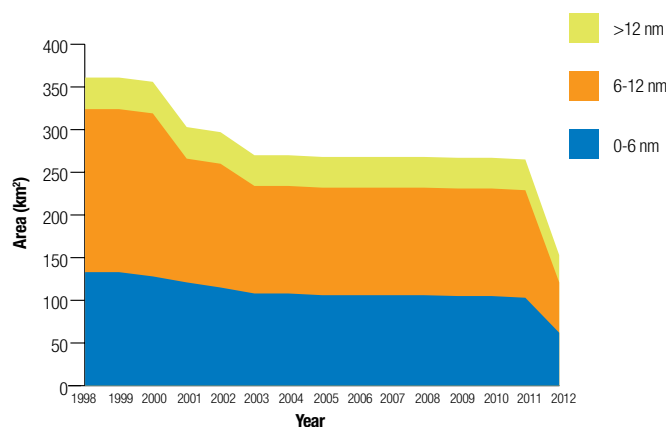
- The cumulative area of seabed dredged between 1998 and 2012 amounted to 193km<sup>2</sup>.

- The area of new seabed dredged annually decreased significantly to only 0.3km<sup>2</sup> a year in 2012. In 2004 this figure was 4.1km<sup>2</sup> and in 2008 it was 3.5km<sup>2</sup>.

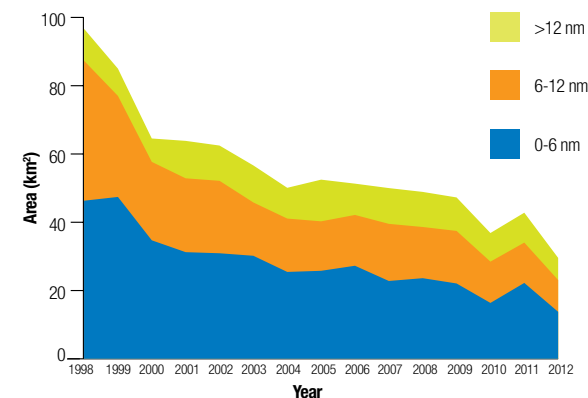
### Extraction

- A total of 116 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.

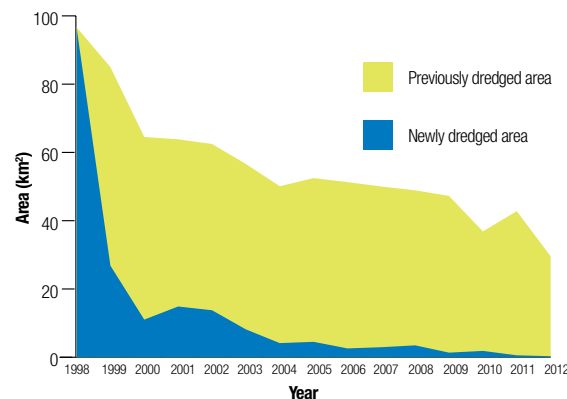
East Coast licensed area 1998-2012



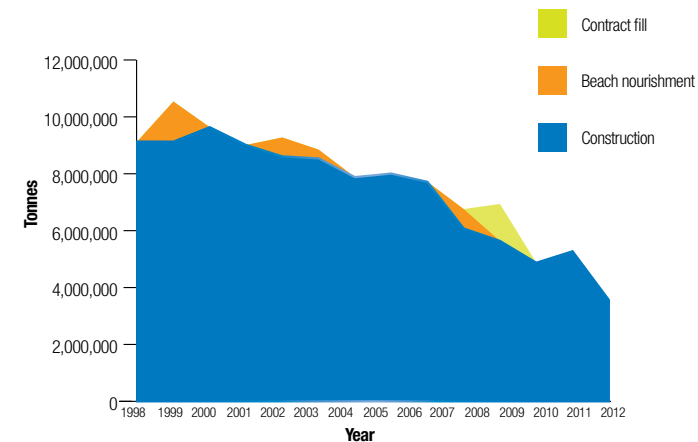
East Coast dredged area 1998-2012



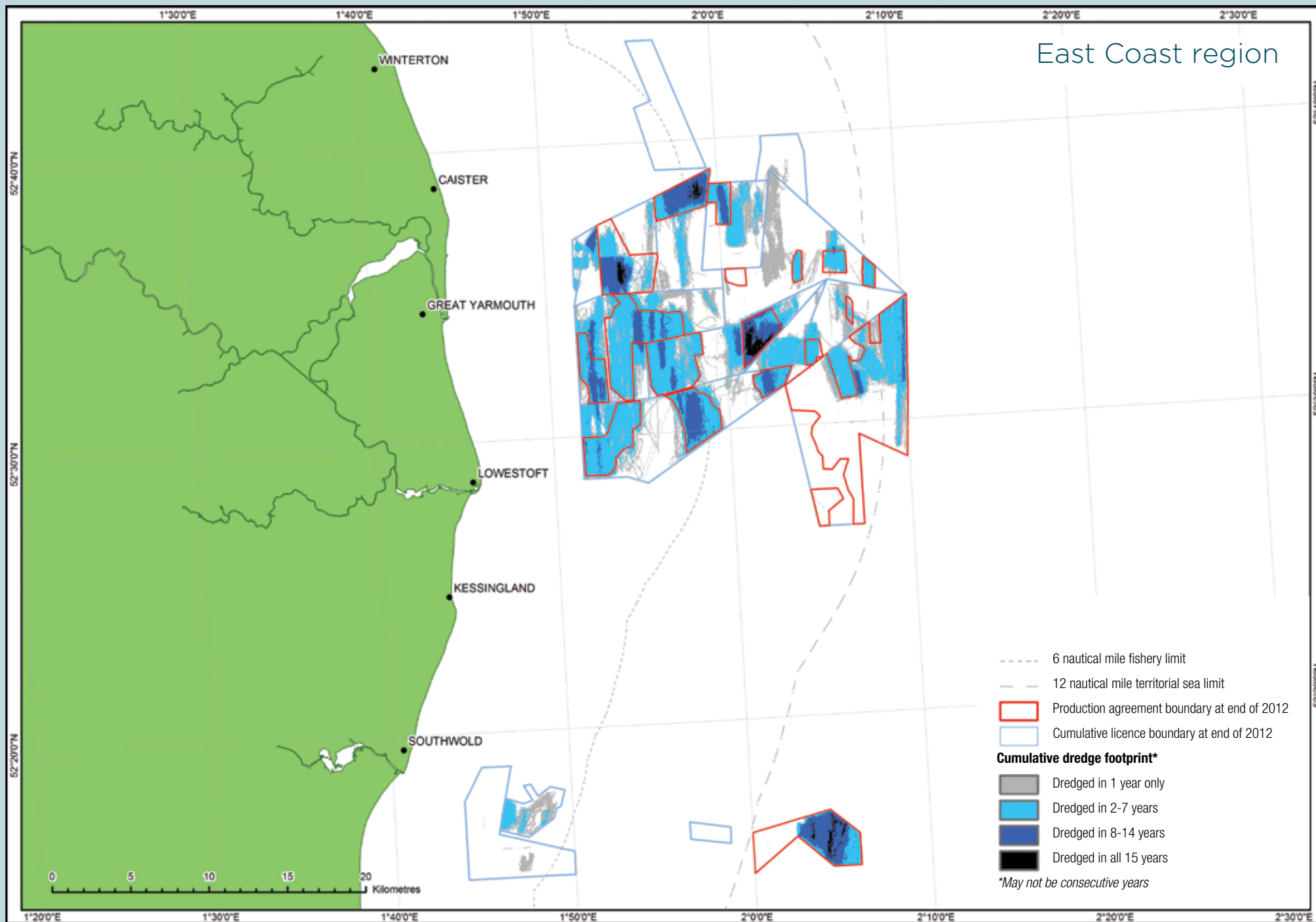
East Coast newly dredged area and previous dredged area 1998-2012



East Coast extraction 1998-2012







## Thames Estuary region summary 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed decreased by 180km<sup>2</sup>. The area licensed within 6 nautical miles of the coast and between 6 and 12 nautical miles decreased. The greatest decrease occurred within 6 nautical miles. The area licensed beyond 12 nautical miles remained unchanged (no area was licensed).
- 189km<sup>2</sup> of licensed area was surrendered.
- 9km<sup>2</sup> of new area was licensed.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged decreased by 15km<sup>2</sup>.
- The area of seabed dredged per year ranged from 25km<sup>2</sup> in 1999 to 3km<sup>2</sup> in 2012.
- The area of seabed dredged within 6 nautical miles of the coast and between 6 and 12 nautical miles both decreased. The greatest decrease occurred within 6 nautical miles. There was no change beyond 12 nautical miles (no dredging occurred).

### Cumulative footprint

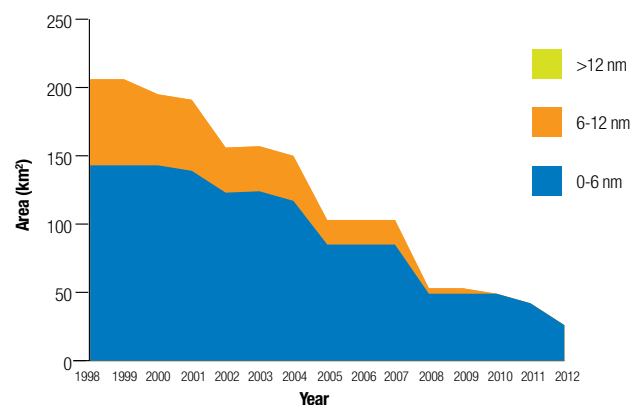
- The cumulative area of seabed dredged between 1998 and 2012 amounted to 56km<sup>2</sup>.

- The area of new seabed dredged annually decreased significantly to only 1km<sup>2</sup> a year in 2012. In 2004 this figure was 2.7km<sup>2</sup> and 2008 this figure was 2.9km<sup>2</sup>.

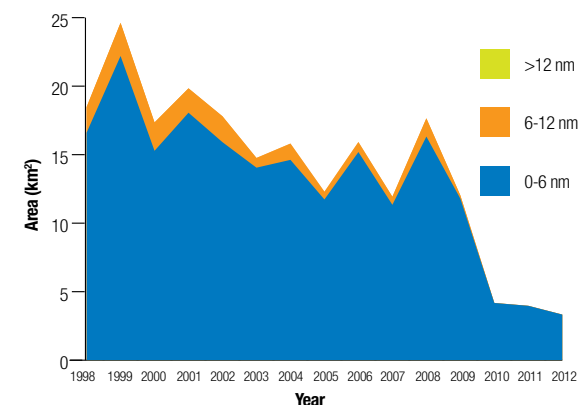
### Extraction

- A total of 18 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.

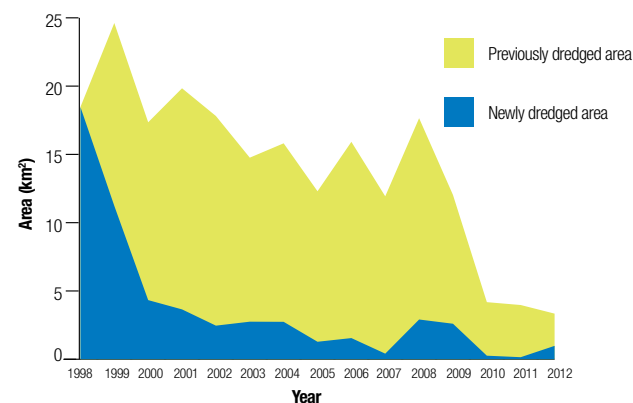
Thames Estuary licensed area 1998-2012



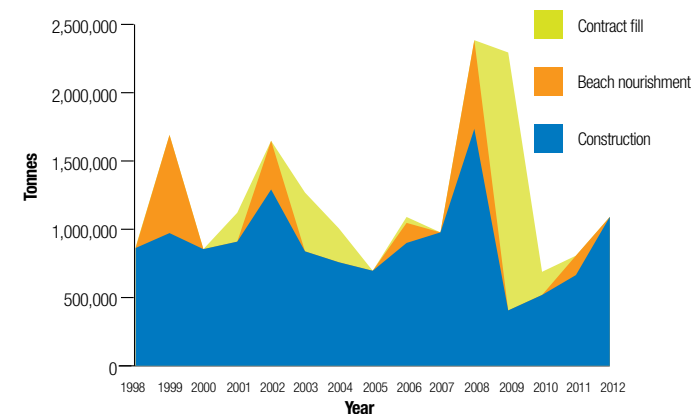
Thames Estuary dredged area 1998-2012

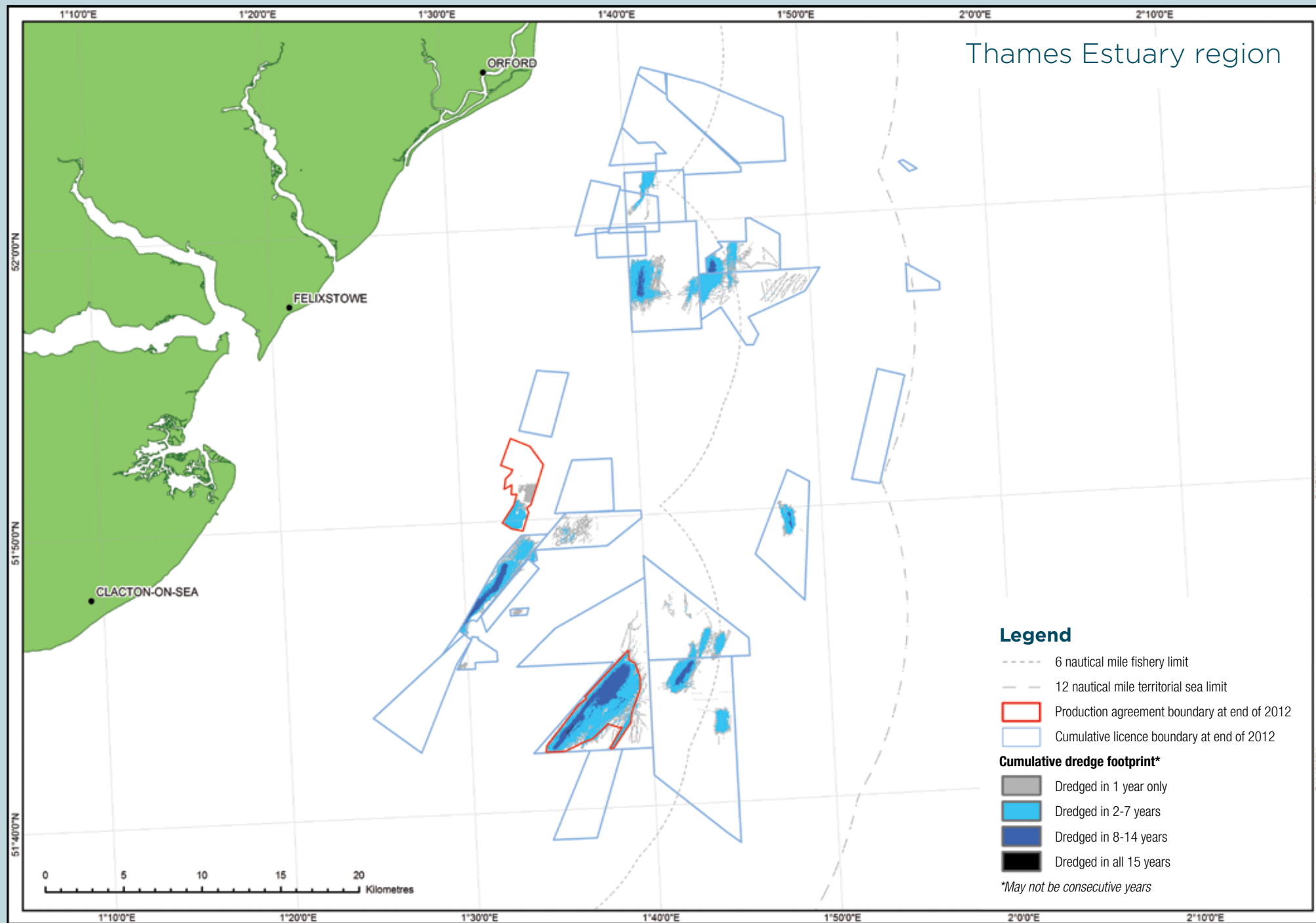


Thames Estuary newly dredged area and previously dredged area 1998-2012



Thames Estuary extraction 1998-2012







## East English Channel region summary 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed increased by 87km<sup>2</sup>. The area of seabed licensed within 6 nautical miles of the coast and between 6 and 12 nautical miles decreased. The largest decrease was between 6 and 12 nautical miles. There was a large increase beyond 12 nautical miles.
- 23km<sup>2</sup> of licensed area was surrendered.
- 110km<sup>2</sup> of new area was licensed.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged increased by 10km<sup>2</sup>.
- The area of seabed dredged per year ranged from 2km<sup>2</sup> in 2005 to 13km<sup>2</sup> in 2012.
- The area of seabed dredged within 6 nautical miles of the coast remained unchanged. The area between 6 and 12 nautical miles decreased. There was an increase beyond 12 nautical miles.

### Cumulative footprint

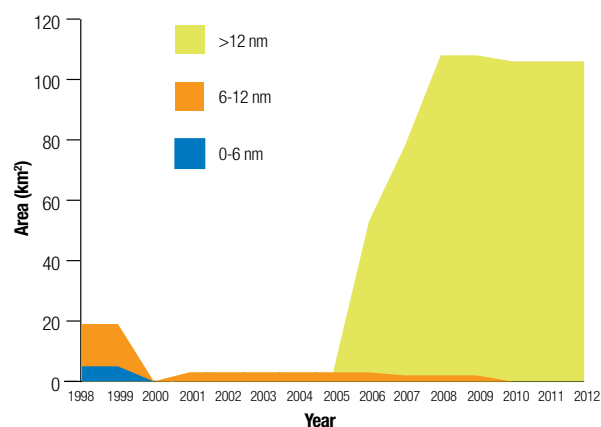
- The cumulative area of seabed dredged between 1998 and 2012 amounted to 23km<sup>2</sup>.

- The area of new seabed dredged annually increased from 0.3km<sup>2</sup> in 1999 to 2km<sup>2</sup> in 2012. In 2004 this figure was 0.04km<sup>2</sup> and in 2008 it was 4.1km<sup>2</sup>.

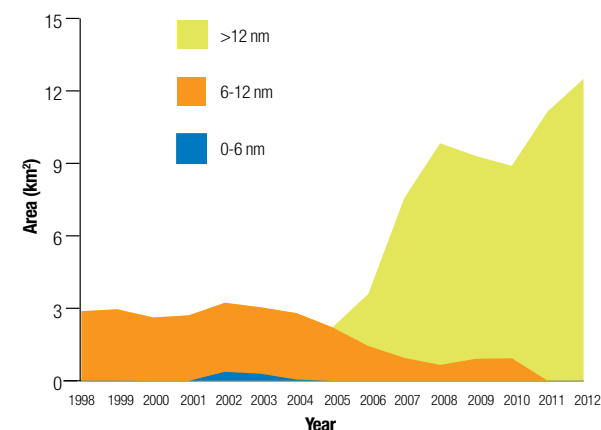
### Extraction

- A total of 29 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.

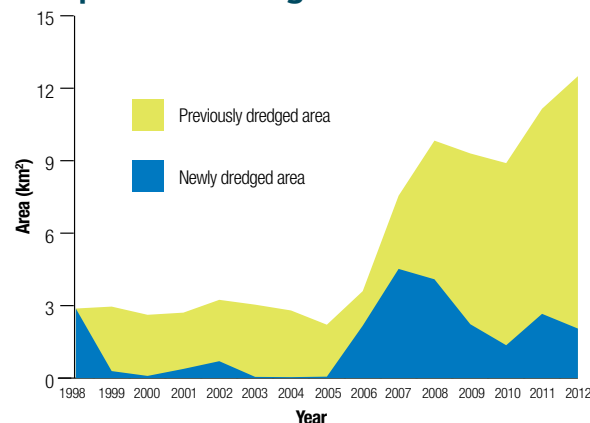
East English Channel licensed area 1998-2012



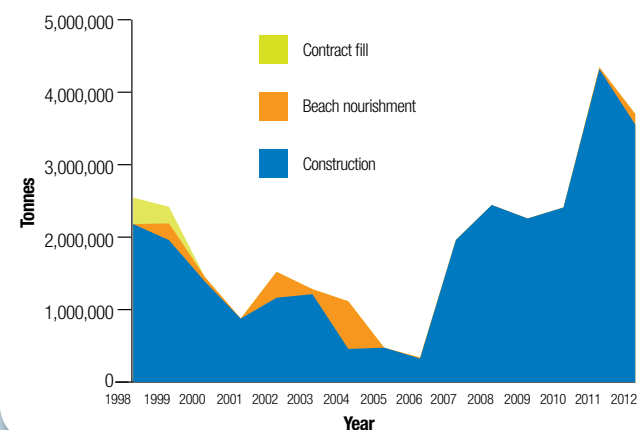
East English Channel dredged area 1998-2012

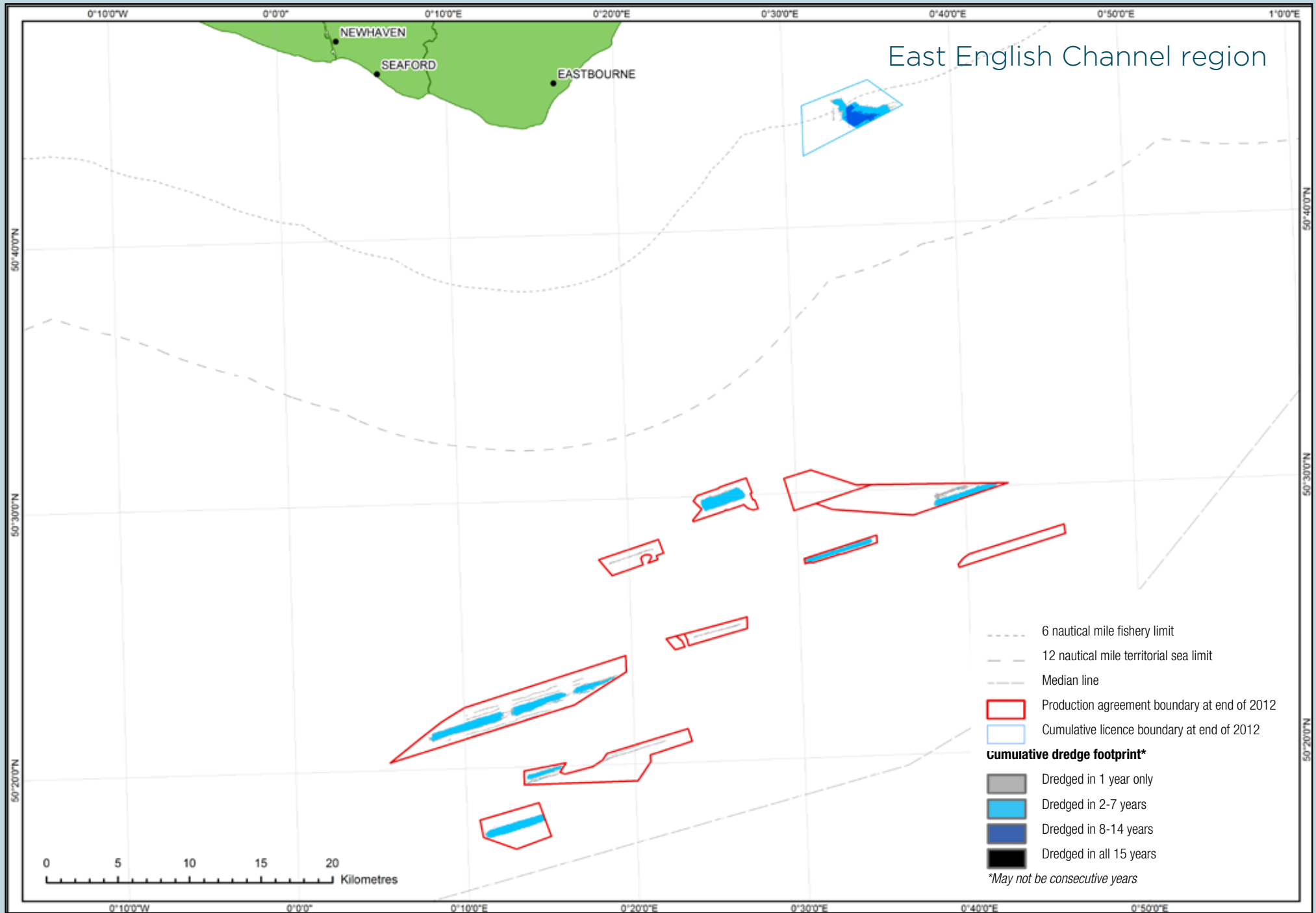


East English Channel newly dredged area and previous dredged area 1998-2012



East English Channel tonnages 1998-2012





## South Coast region summary 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed decreased by 210km<sup>2</sup>. The area licensed within 6 nautical miles of the coast, between 6 and 12 nautical miles and beyond 12 nautical miles decreased. The greatest decrease occurred between 6 and 12 nautical miles.
- 291km<sup>2</sup> of licensed area was surrendered.
- 81km<sup>2</sup> of new area was licensed.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged decreased by 12km<sup>2</sup>.
- The area of seabed dredged per year ranged from 35km<sup>2</sup> in 1998 to 23km<sup>2</sup> in 2010.
- The area dredged within 6 nautical miles of the coast and between 6 and 12 nautical miles decreased. The greatest decrease was within 6 nautical miles. There was no change in the area beyond 12 nautical miles (no dredging occurred).

### Cumulative footprint

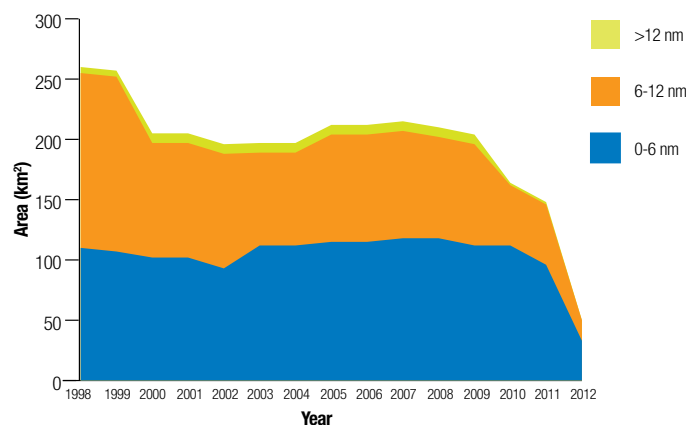
- The cumulative area of seabed dredged between 1998 and 2012 amounted to 85km<sup>2</sup>.

- The area of new seabed dredged annually decreased significantly to only 0.4km<sup>2</sup> a year in 2012. In 2004 this figure was 4.3km<sup>2</sup> and in 2008 it was 2km<sup>2</sup>.

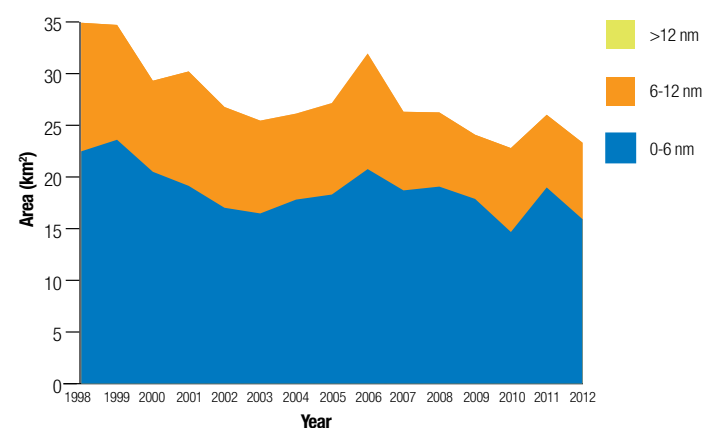
### Extraction

- A total of 69 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.

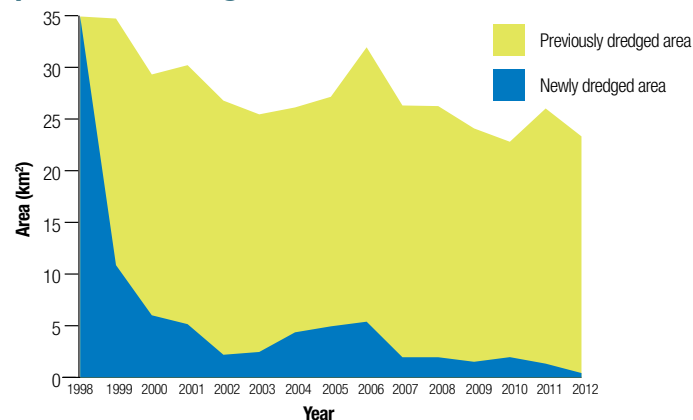
South Coast licensed area 1998-2012



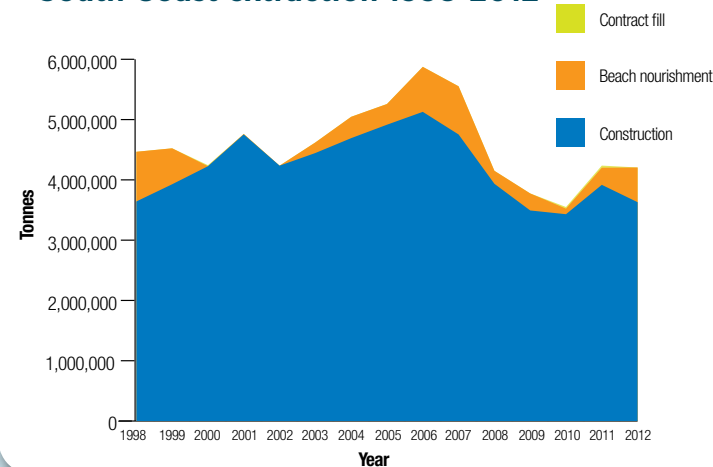
South Coast dredged area 1998-2012



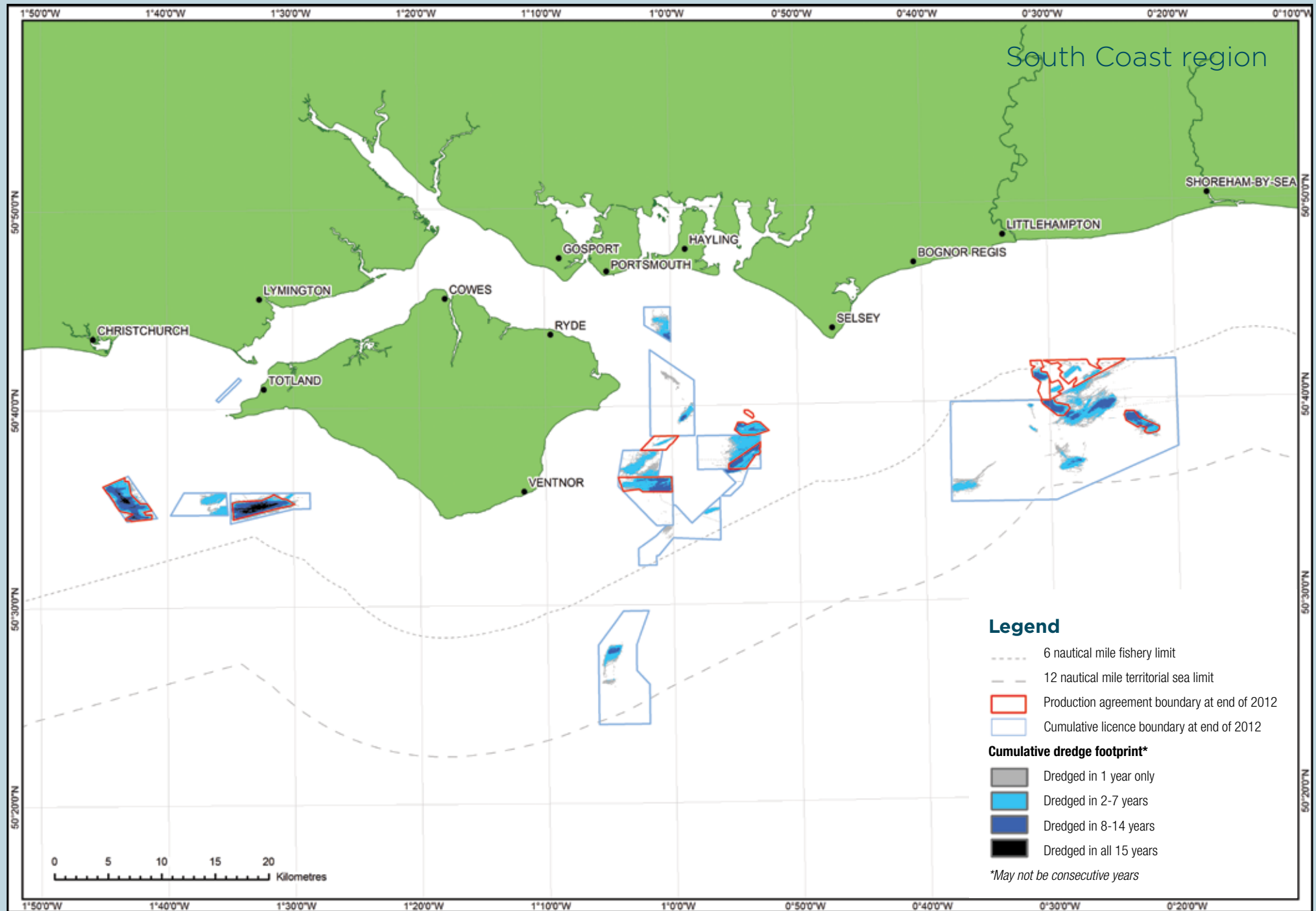
South Coast newly dredged area and previous dredged area 1998-2012



South Coast extraction 1998-2012







## South West region summary 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed increased by 49km<sup>2</sup>. The area of seabed licensed within 6 nautical miles of the coast and between 6 and 12 nautical miles increased. The greatest increase occurred between 6 and 12 nautical miles. No change in the area occurred beyond 12 nautical miles (no area was licenced).
- 52km<sup>2</sup> of licensed area was surrendered.
- 101km<sup>2</sup> of new area was licensed.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged decreased by 8km<sup>2</sup>.
- The area of seabed dredged per year ranged from 18km<sup>2</sup> in 1999 to 8km<sup>2</sup> in 2011.
- The area dredged within 6 nautical miles of the coast decreased. There was no change in the area between 6 and 12 nautical miles and beyond 12 nautical miles (no area was dredged).

### Cumulative footprint

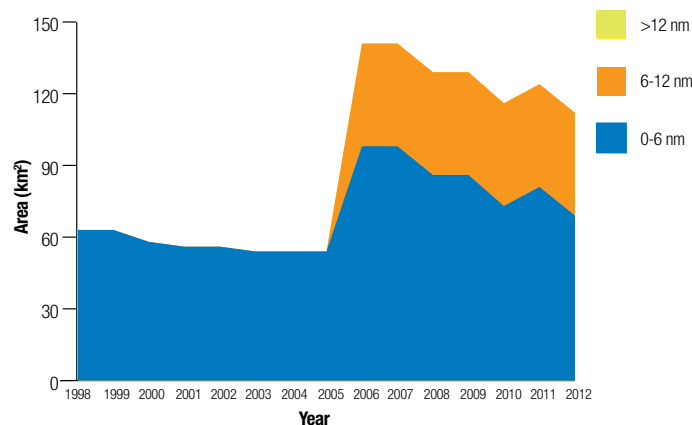
- The cumulative area of seabed dredged between 1998 and 2012 amounted to 35km<sup>2</sup>.

- The area of new seabed dredged annually decreased significantly to only 1km<sup>2</sup> a year in 2012. In 2004 this figure was 1.7km<sup>2</sup> and in 2008 it was 0.7km<sup>2</sup>.

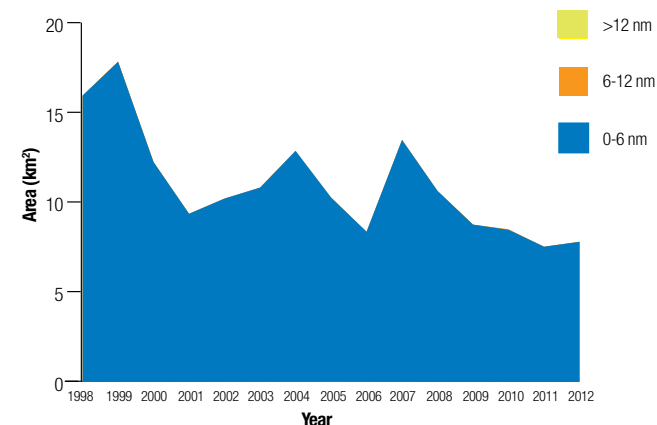
### Extraction

- A total of 23 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.

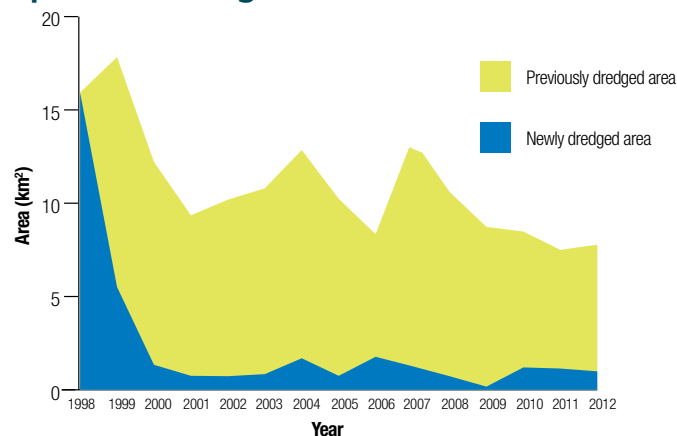
South West licensed area 1998-2012



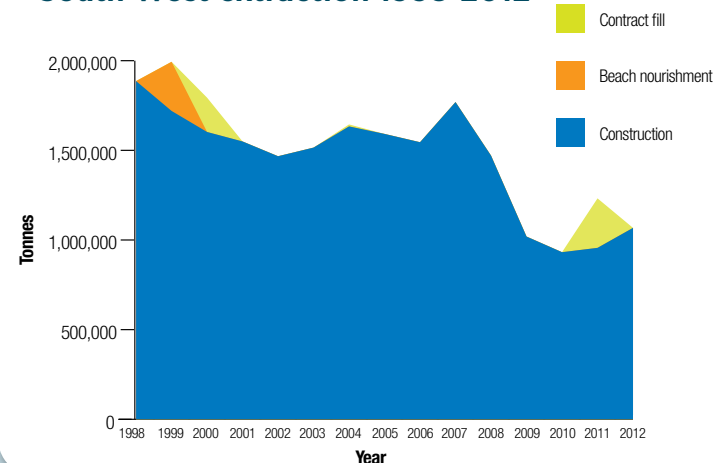
South West dredged area 1998-2012

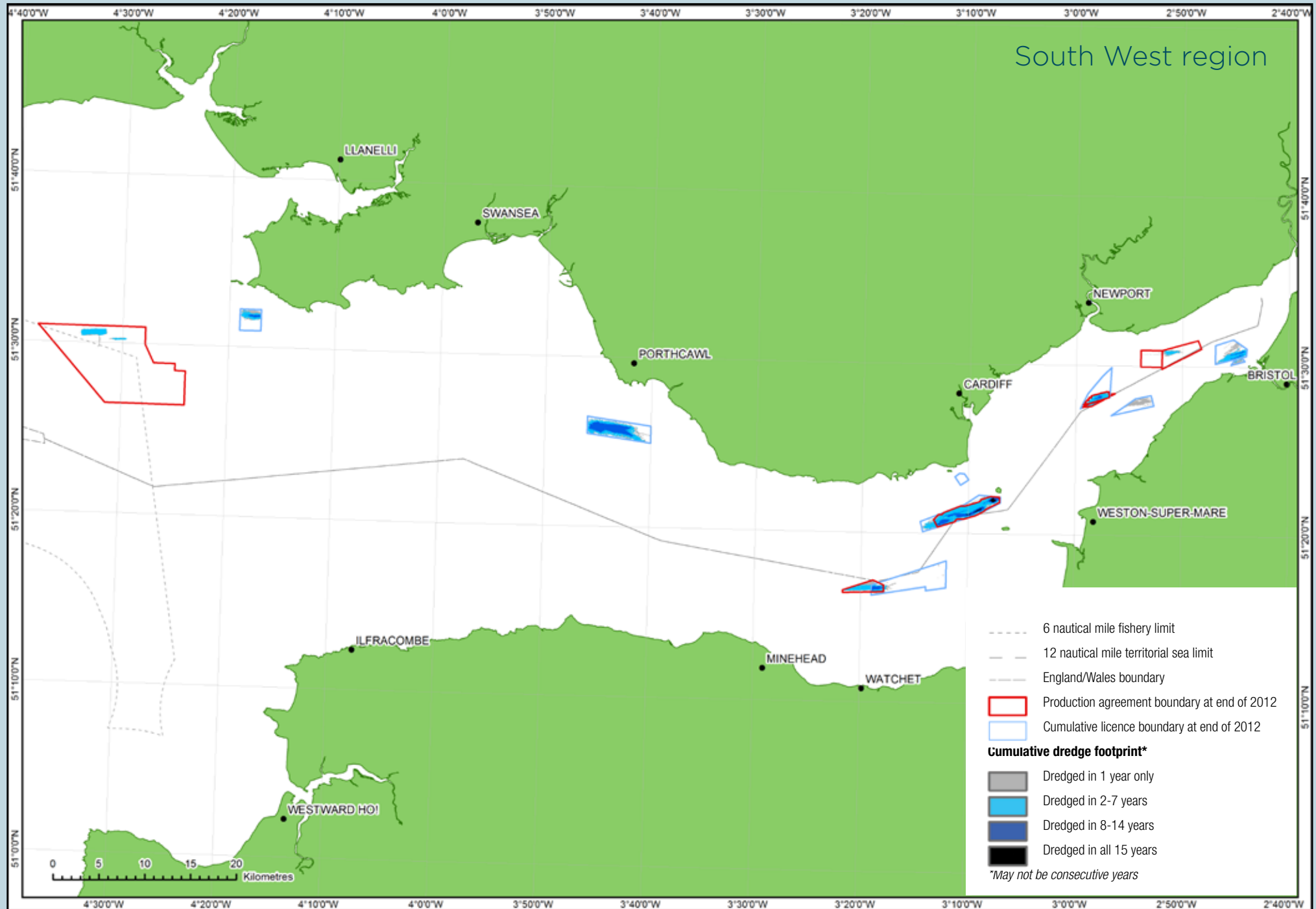


South West newly dredged area and previous dredged area 1998-2012



South West extraction 1998-2012





## North West region summary 1998-2012

### Area licensed

- Between 1998 and 2012 the area of seabed licensed decreased by 30km<sup>2</sup>. The area of seabed licensed within 6 nautical miles of the coast decreased. The area between 6 and 12 nautical miles and beyond 12 miles increased. The largest increase was beyond 12 nautical miles.
- 93km<sup>2</sup> of licensed area was surrendered
- 64km<sup>2</sup> of new area was licensed.

### Area dredged

- Between 1998 and 2012 the area of seabed dredged increased by 0.1km<sup>2</sup>.
- The area of seabed dredged per year ranged from 2.7km<sup>2</sup> in 2003 to 0.3km<sup>2</sup> in 2010.
- There was no change in the area dredged within 6 nautical miles of the coast. The area between 6 and 12 nautical miles and beyond 12 nautical miles marginally increased. The largest increase was beyond 12 nautical miles.

### Cumulative footprint

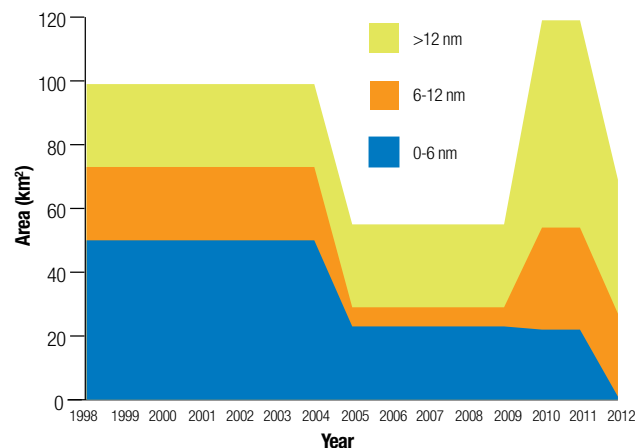
- The cumulative area of seabed dredged between 1998 and 2012 amounted to 8km<sup>2</sup>.

- The area of new seabed dredged annually decreased significantly to only 0.6km<sup>2</sup> a year in 2012. In 2004 this figure was 0.8km<sup>2</sup> and in 2008 it was 0.04km<sup>2</sup>.

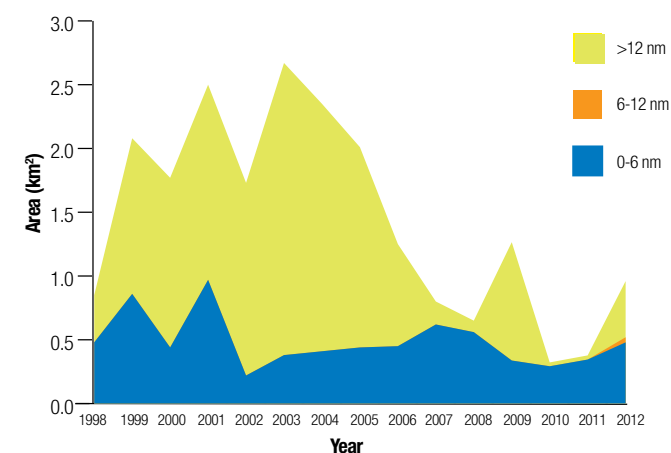
### Extraction

- A total of 7 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2012.

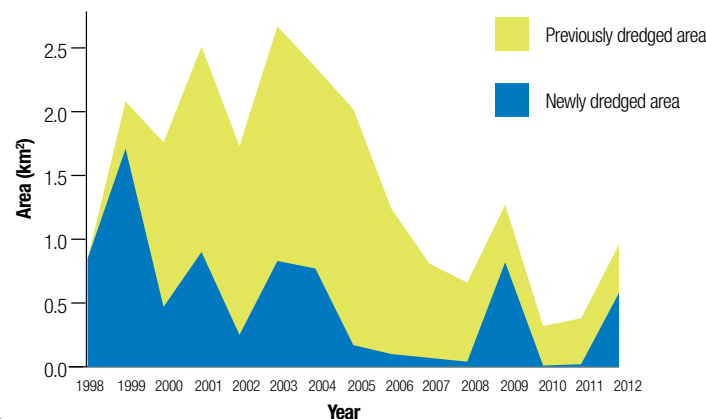
North West licensed area 1998-2012



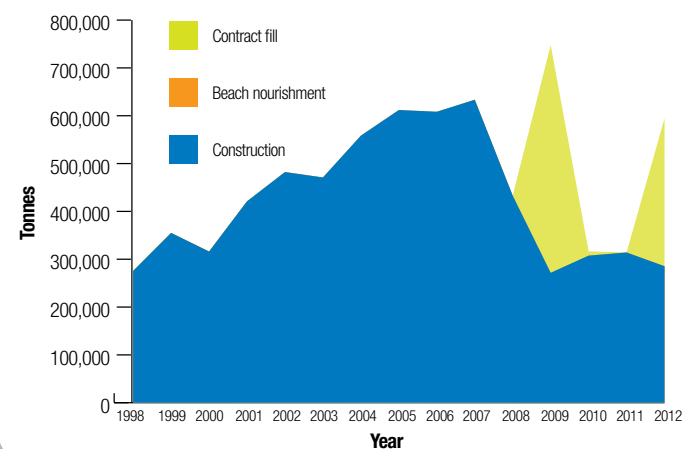
North West dredged area 1998-2012



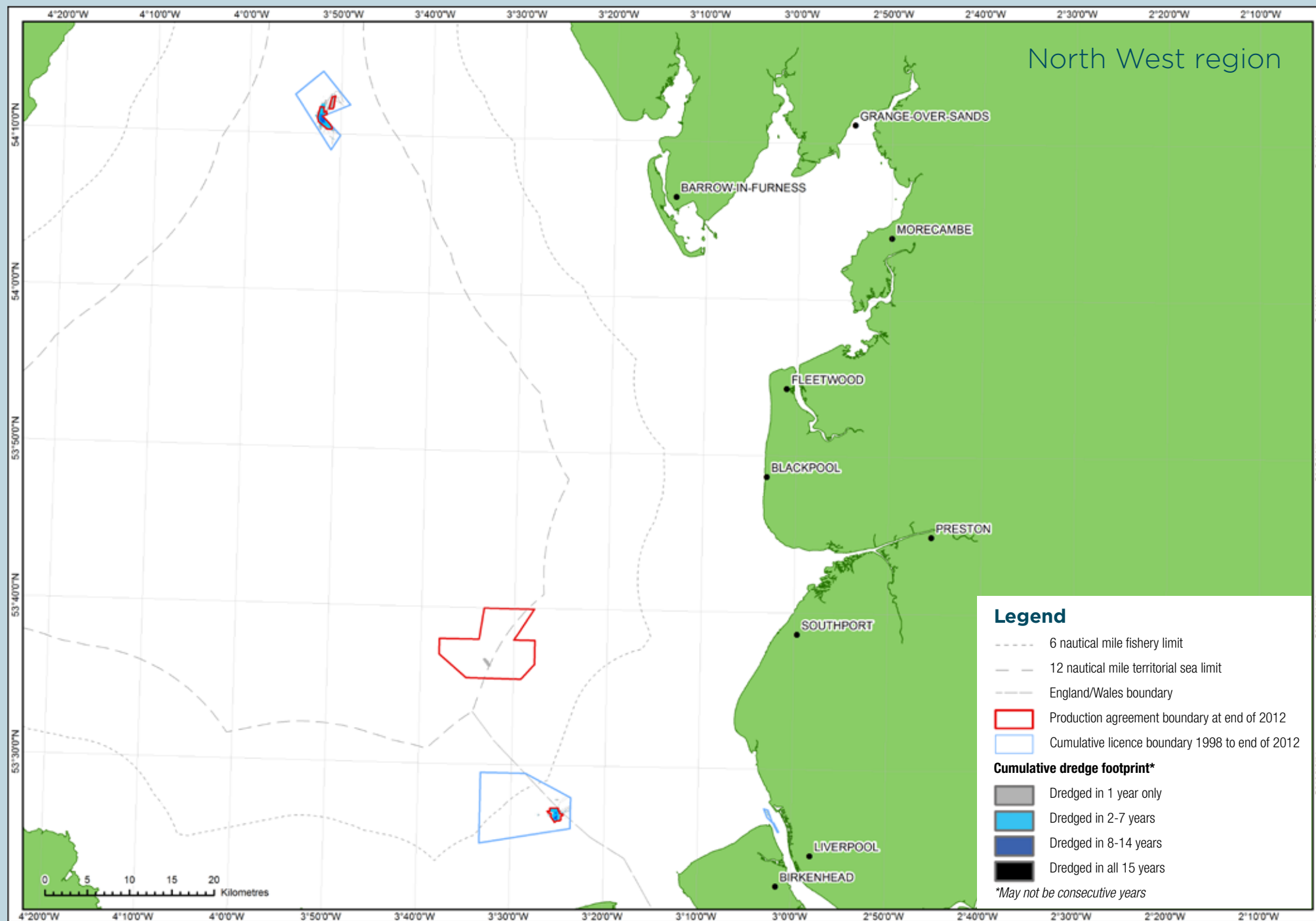
North West newly dredged area and previous dredged area 1998-2012



North West tonnages 1998-2012









England and Wales have one of the largest and most efficient dredging industries in the world, extracting 15 to 20 million tonnes of sand and gravel from the seabed each year for a range of uses, from building homes, to major projects such as construction of the “Shard” and the London Aquatics centre, port developments and coastal adaptation.

The Crown Estate owns almost all of the sand and gravel resources lying off the coast of the UK and we award and manage commercial agreements for extraction. We also award and manage leases for the extraction of other minerals such as potash from undersea deposits that extend several kilometres offshore.

Marine aggregates have been playing an increasingly important role in the building industry since the 1960s and today meet about 20 per cent of sand and gravel demand in England and Wales.



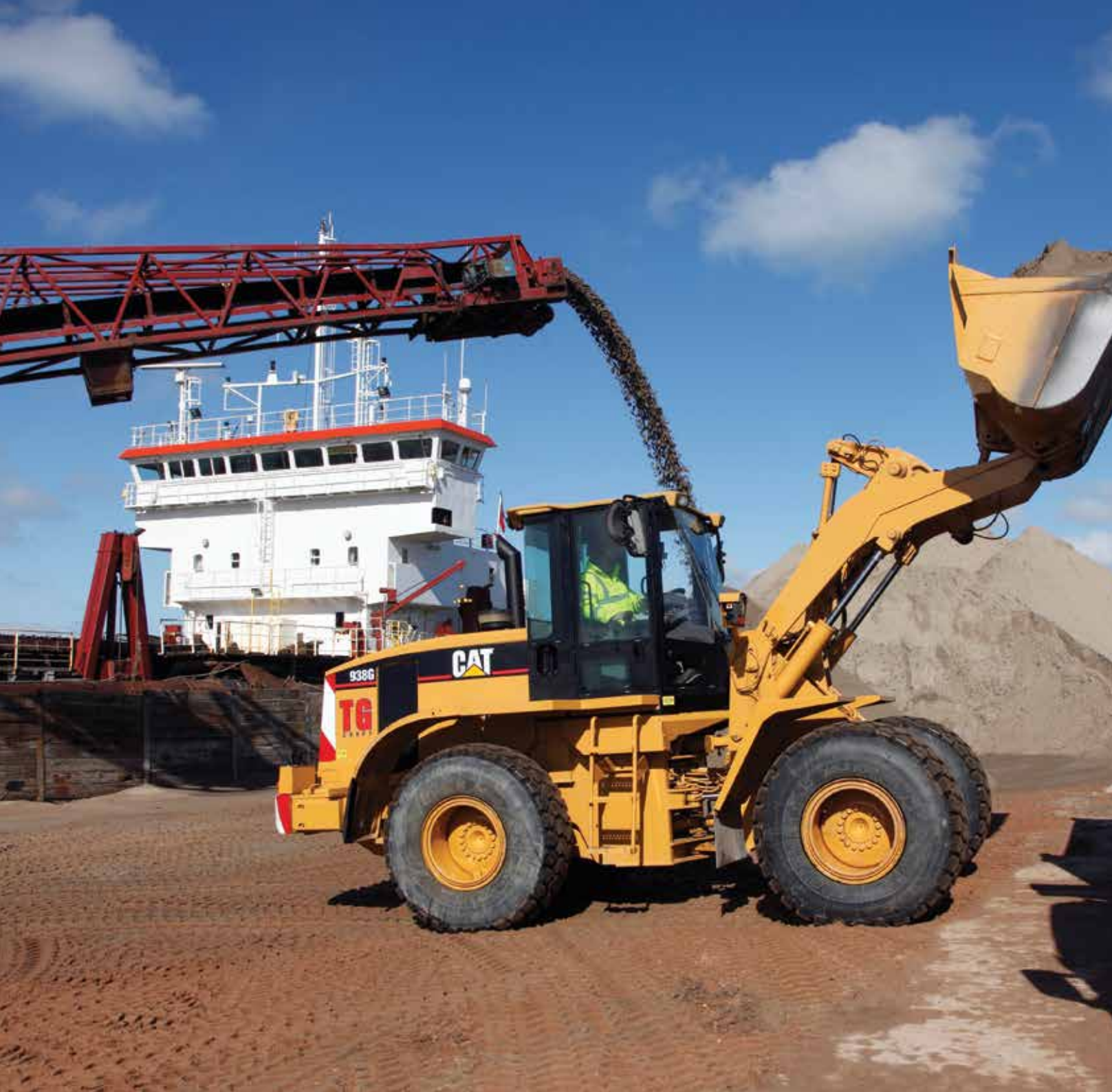
The British Marine Aggregate Producers Association (BMAPA) was formed in 1992 and comprises members of the Mineral Products Association with a marine interest. Marine sand and gravel is supplied to home markets, as well as contributing to the balance of payments through exports to Continental Europe. In addition, marine aggregates are fulfilling an increasingly important role by supporting beach replenishment schemes. The marine aggregate industry operates an average of 23 vessels on 62 production licences around the UK as of July 2014.

BMAPA membership (as of July 2014) is comprised of: Brett Group Ltd, Britannia Aggregates Ltd, CEMEX UK Marine Ltd, DEME Building Materials Ltd, Hanson Aggregates Marine Ltd, Kendall Bros. (Portsmouth) Ltd, Lafarge Tarmac Marine Ltd, Northwood (Fareham) Ltd, Sea Aggregates Ltd and Volker Dredging Ltd.









## THE CROWN ESTATE

### The Crown Estate

16 New Burlington Place  
London  
W1S 2HX

**T** 020 7851 5000

**W** [www.thecrownestate.co.uk](http://www.thecrownestate.co.uk)

**E** [marineminerals@thecrownestate.co.uk](mailto:marineminerals@thecrownestate.co.uk)

**TW** @TheCrownEstate



### British Marine Aggregate Producers Association

Gillingham House  
38-44 Gillingham Street  
London  
SW1V 1HU

**T** 020 7963 8000

**E** [bmapa@mineralproducts.org](mailto:bmapa@mineralproducts.org)

**W** [www.bmapa.org](http://www.bmapa.org)

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