

Marine aggregate dredging 1998-2017

a twenty-year review

THE CROWN
ESTATE

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Executive summary

This publication provides a twenty-year overview of an initiative launched in 1999 as a means of reporting the dredging footprint of the UK marine aggregate industry. It reflects the commitment by members of the British Marine Aggregate Producers Association and The Crown Estate to review both dredging activity and licence areas on an annual basis, and to surrender those areas no longer containing economic sand and gravel resources.

Over two decades, the 'Area Involved' initiative has generated high-quality, high resolution data analysis 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 GB licensed areas.

The review reports data and highlights trends across three key indicators:

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

Technological advances have enabled the industry to develop a better understanding of its licensed resources which in turn has allowed the spatial footprint of its activities to be managed more efficiently.

As a consequence, the overall reduction in both the area of seabed licensed and the area of seabed dredged over the period 1998-2017 has helped to minimise the environmental footprint of the sector's operations.

This approach has also allowed the industry to limit the potential for spatial conflicts with other marine users, providing valuable evidence to help inform the development and implementation of marine planning.

Summary information

- A total of 403 million tonnes were dredged from Crown Estate licences during the 20 year period (1998 to 2017)
- The industry has reduced its licensed footprint by 401km² between 1998 and 2017. During the 20 years:
 - dredging licences have been granted for over 1,013km² of additional seabed
 - 1,414km² of licensed seabed has been surrendered
- The annual area of seabed dredged over the 20 years has reduced by 60% from 223km² in 1998 to 91km² in 2017
- The cumulative dredge footprint over the 20 year period is 551km², of which 223km² occurred within licensed area that has now been surrendered.



Area of seabed licensed

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 licensing regime under which marine aggregate extraction may take place. The most significant of these has been the Marine and Coastal Access Act 2009 (MCAA) which introduced a new marine licensing system from 6 April 2011.

To ensure those areas licensed prior to the mid-1990's were fully compliant with the new Marine Licensing regime, Short Term Marine Licence (STML) applications supported by Environmental Impact Assessments were necessary to ensure the continuation of dredging operations. As part of this process, many licensed dredging operations were limited to the historic dredge footprint (since 1993), resulting in a temporary reduction of the permitted area.

The reduced licensed area described in this report between 2012 and 2014 reflects these arrangements, and the increase in licensed area thereafter largely reflects the award of new full-term marine licences for historic dredging areas.



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 second intervals, and automatically transmits this information back to The Crown Estate's managing agents.

The area of seabed dredged is calculated using 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.

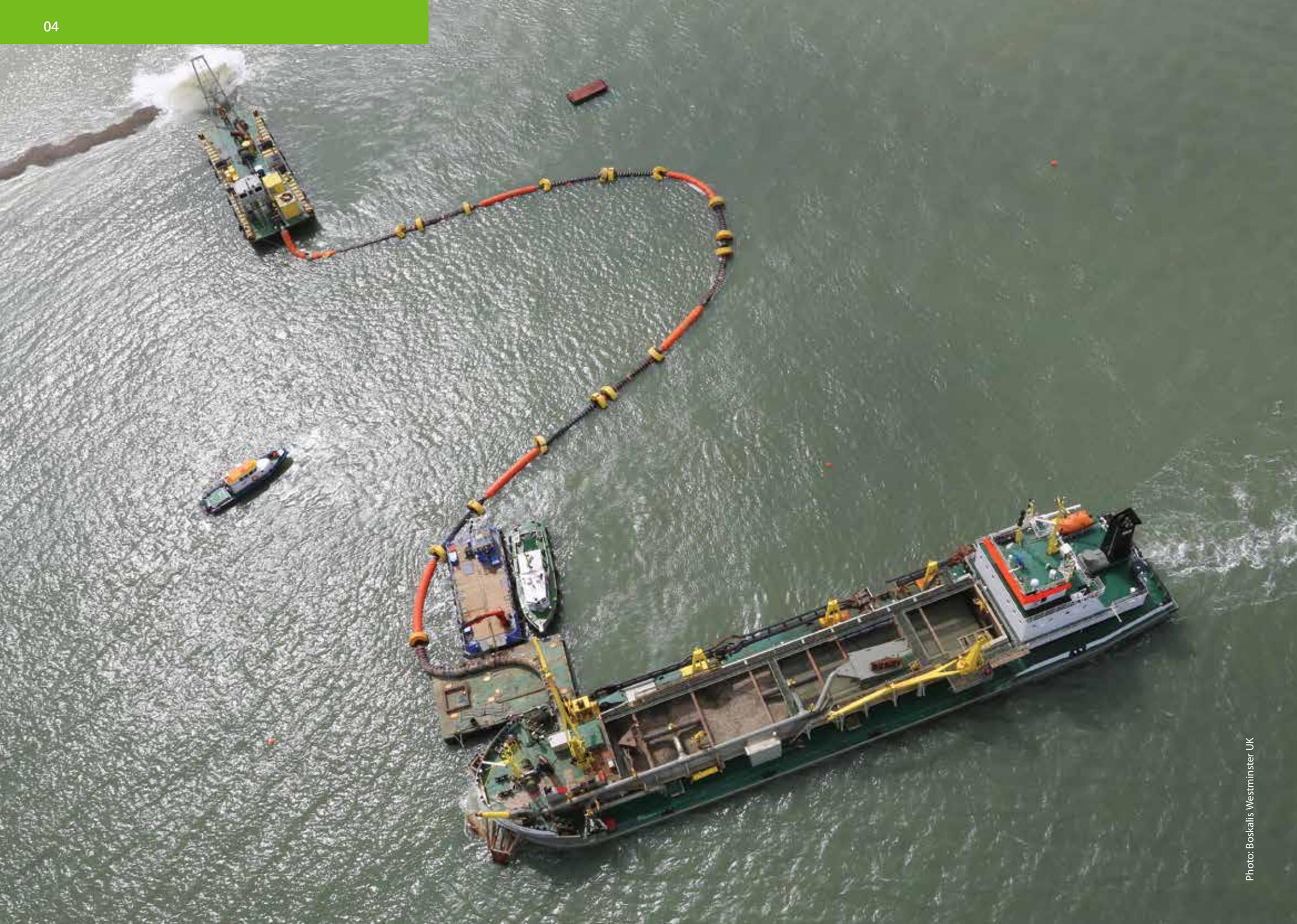
Cumulative dredge footprint

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 affected 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 enable the cumulative dredge footprint to be presented, based on the frequency of year-on-year dredging activity.
- 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 1998-2017

Tonnage

- A total of 403 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.

Area licensed

- Between 1998 and 2017, the area of seabed licensed decreased by 401km².
- The area licensed within six nautical miles from the coast and between six and 12 nautical miles decreased. The greatest decrease occurred between six and 12 nautical miles. There was an increase in the area licensed beyond 12 nautical miles.
- 1,414km² of licensed area was surrendered (this includes STML areas).
- 1,013km² of new area was licensed (this includes STML areas).

Area dredged

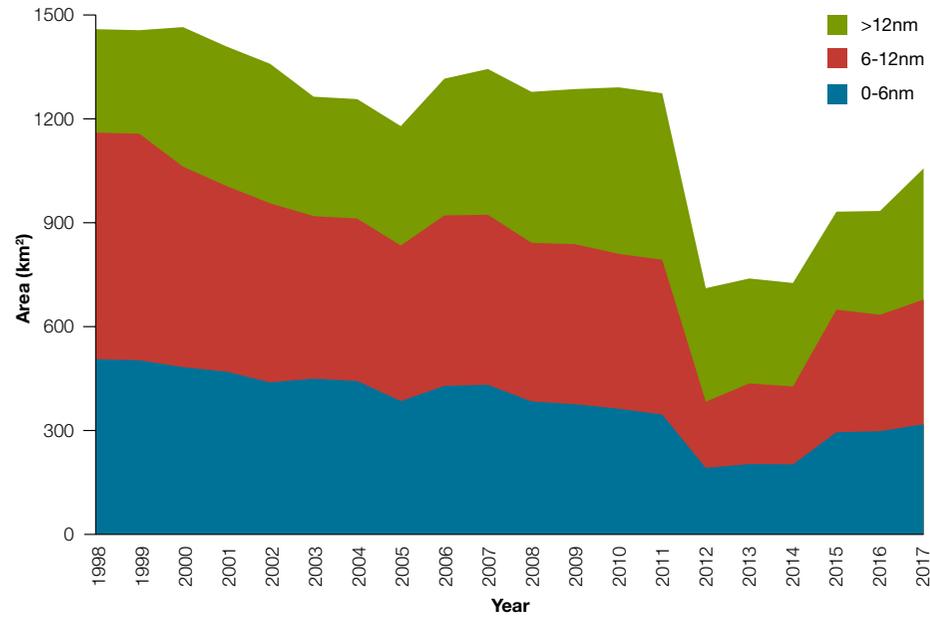
- Between 1998 and 2017, the area of seabed dredged decreased by 132km².
- The area of seabed dredged per year ranged from 223km² in 1998 to 83km² in 2015.
- The area dredged within six nautical miles from the coast, between six and 12 nautical miles and beyond 12 nautical miles all decreased. The greatest decrease occurred between six and 12 nautical miles.

Cumulative footprint

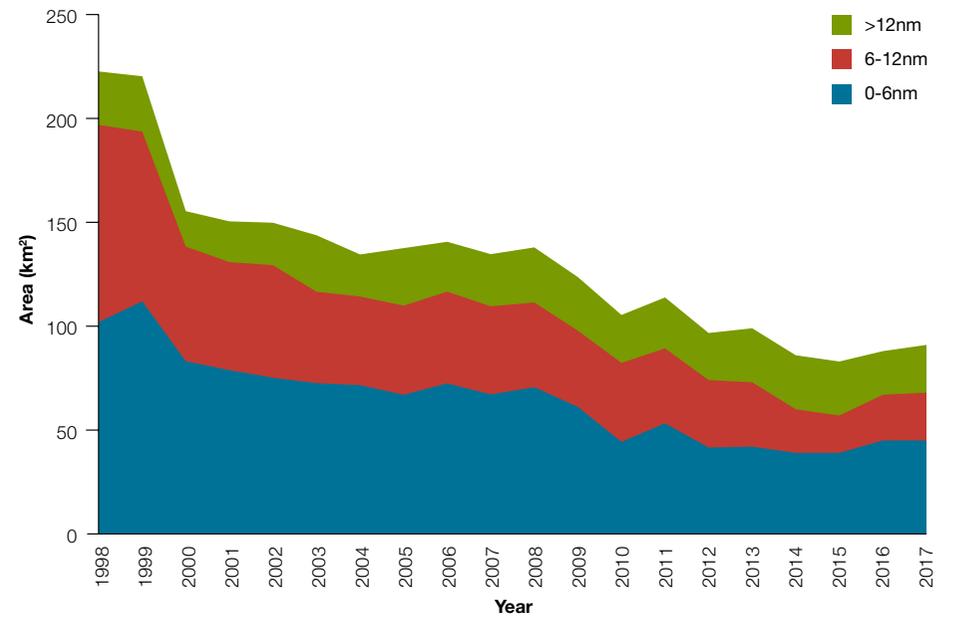
- The cumulative area of seabed dredged between 1998 and 2017 amounted to 551km². Of this total, 328km² (60%) is within current licence areas and the remaining 223km² (40%) is within areas which have now been relinquished.
- The area of new seabed dredged annually decreased significantly to only 11.06km² a year in 2017. In 2002, this figure was 24.77km². In 2007, it was 11.90km² and, in 2012, it was 6.06km².

Region	Cumulative dredging footprint (km ²)	Cumulative footprint within current licence areas (km ²)	Cumulative footprint within areas of relinquished seabed (km ²)
Humber	122.38	74.63	47.75
East Coast	195.73	131.65	64.08
Thames Estuary	63.18	42.11	21.07
East English Channel	31.34	25.75	5.59
South Coast	87.80	37.66	50.14
South West	38.02	9.46	28.56
North West	12.44	6.81	5.63
UK total	550.89	328.07	222.82

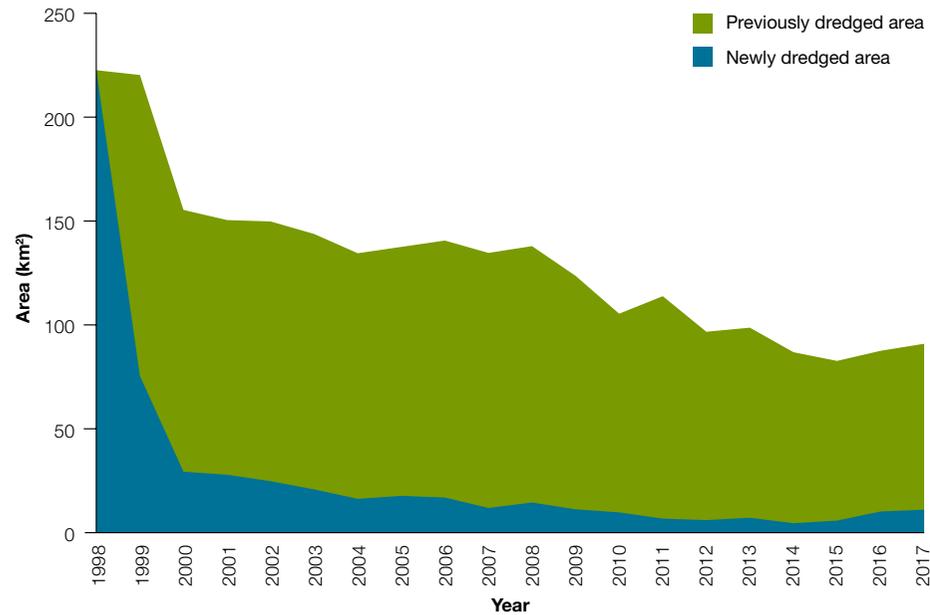
UK licensed area 1998-2017



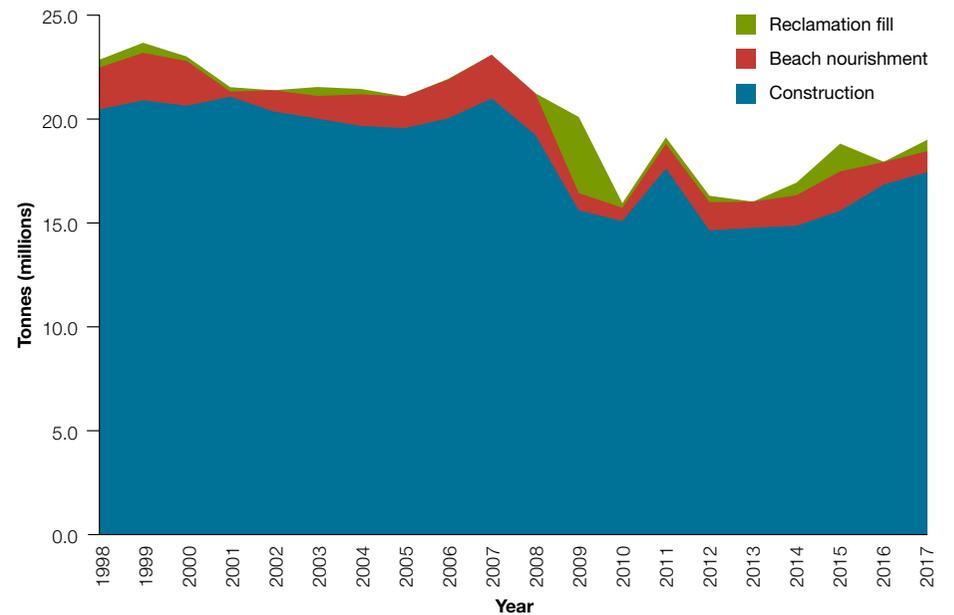
UK dredged area 1998-2017



UK newly dredged area and previously dredged area 1998-2017



UK tonnages 1998-2017



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 twenty-year period from 1998 to 2017, 403 million tonnes of marine sand and gravel was extracted from The Crown Estate licence areas for use as construction aggregate (in the UK and overseas), for beach nourishment and for reclamation fill.

By converting this tonnage to cubic metres (1m³ 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 445,194m³ per square kilometre dredged, which is the equivalent of the seabed level being lowered by an average of 45cm across the entire area dredged.

In reality, of course, the extraction activity will not be spread evenly across the dredged area given the 50m x 50m resolution of the grid analysis.

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.

Region	Tonnage (million tonnes)	Volume* (million m ³)	Cumulative footprint (km ²)	Volume extracted (m ³) per km ²	Approximate depth removed (m) across cumulative footprint
Humber	62.85	37.9	122.38	309,376	0.31
East Coast	138.39	83.4	195.73	425,931	0.43
Thames Estuary	27.78	16.7	63.18	264,877	0.26
East English Channel	48.70	29.3	31.34	936,099	0.94
South Coast	86.31	52.0	87.80	592,187	0.59
South West	28.29	18.9	38.02	496,055	0.50
North West	10.72	7.1	12.44	574,491	0.57
UK	403.04	245.3	550.89	445,194**	0.45**

* Volume conversion based on 1.66 tonnes/m³ for all regions except South West and North West, where 1.5 tonnes/m³ is used to reflect the sand resource extracted

** Derived from a UK analysis, rather than the summed total of the regions

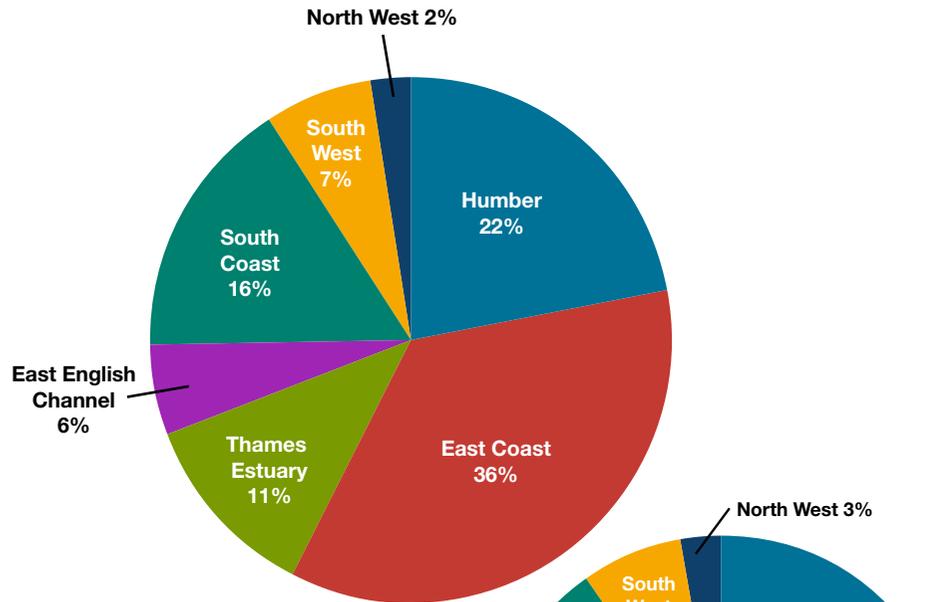
Breaking down the national picture

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 dredging industry. In total, the licences cover only about 0.14 per cent of the UK Exclusive Economic Zone, and of that area only about 10 per cent is dredged in any year.

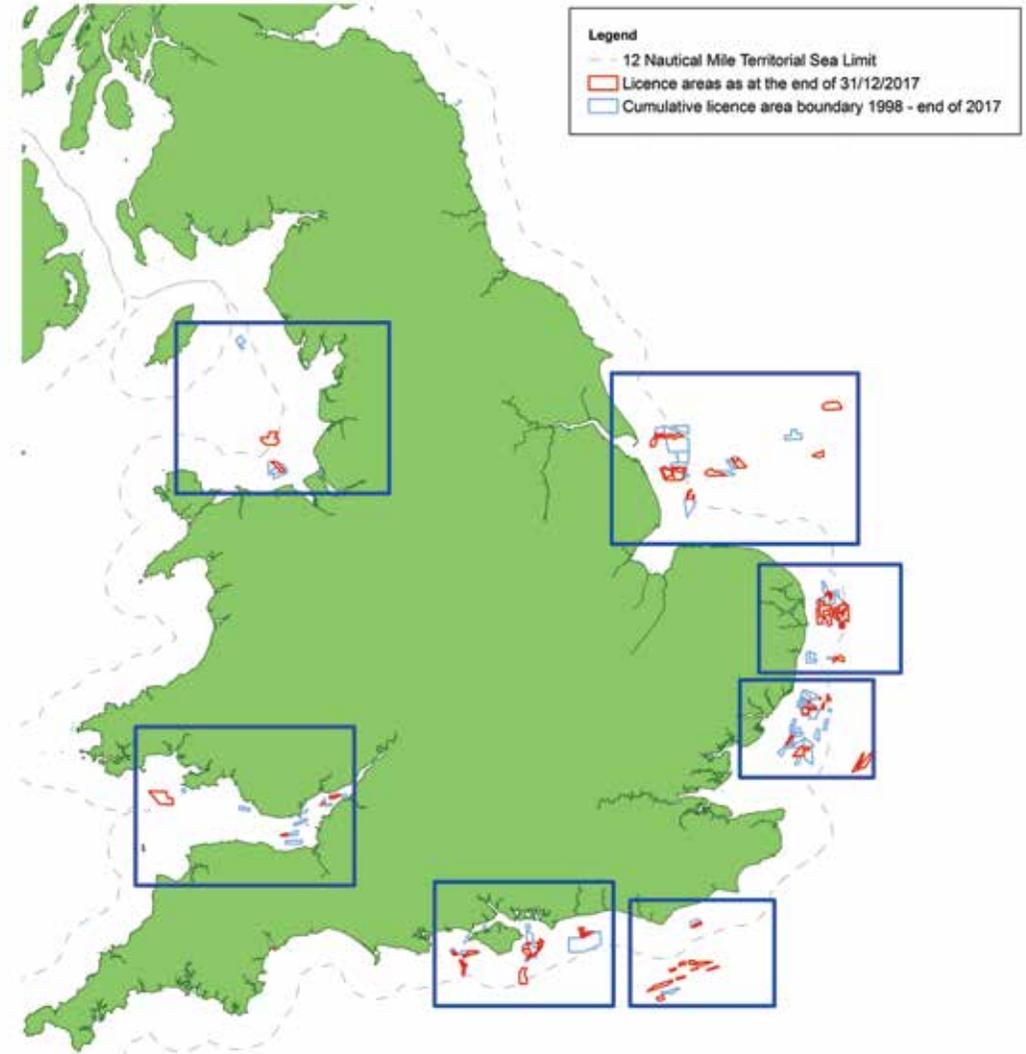
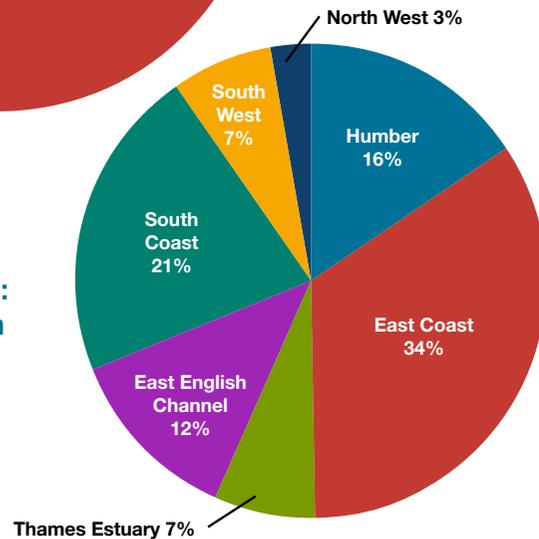
In this section of our review, we break the national statistics down by region.

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

Total dredge footprint 1998-2017: geographical distribution



Total tonnage 1998-2017: geographical distribution





Humber region summary 1998-2017

Area licensed

- Between 1998 and 2017, the area of seabed licensed decreased by 167km². The area licensed within six nautical miles of the coast has increased, whilst between six and 12 nautical miles and beyond 12 nautical miles have both decreased. The greatest decrease occurred between six and 12 nautical miles.
- 447.7km² of licensed area was surrendered.
- 280.3km² of new area was licensed.

Area dredged

- Between 1998 and 2017, the area of seabed dredged decreased by 35km².
- The area of seabed dredged per year ranged from 53.1km² in 1999 to 9.4km² in 2015.
- The area dredged within six nautical miles of the coast marginally increased. The area dredged between six and 12 nautical miles and beyond 12 nautical miles both decreased. The greatest decrease occurred between six and 12 nautical miles.

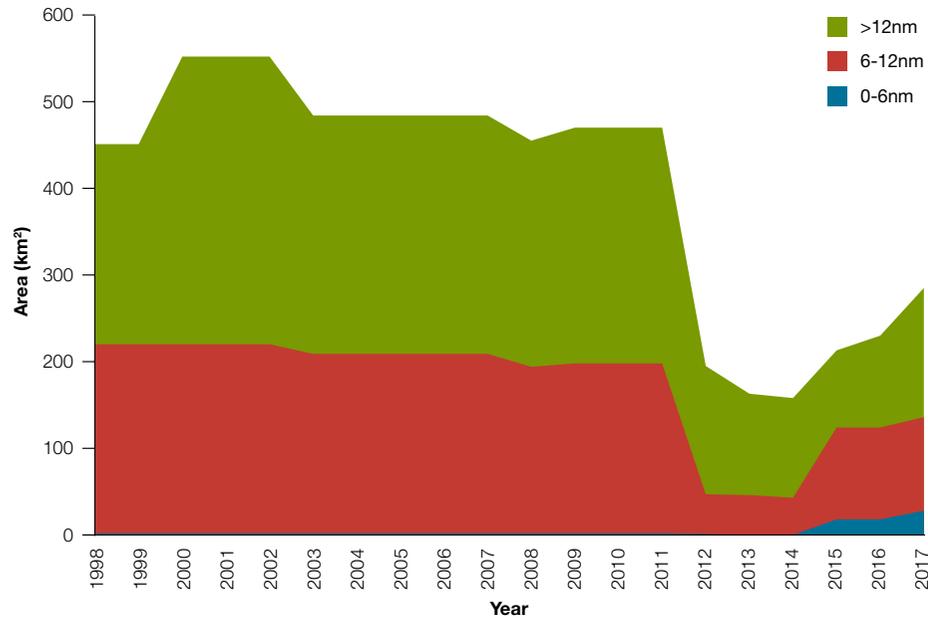
Cumulative footprint

- The cumulative area of seabed dredged between 1998 and 2017 amounted to 122km². Of this total, 74km² (61%) is within current licence areas and the remaining 48km² (39%) is within areas which have now been relinquished.
- The area of new seabed dredged annually decreased to only 2.9km² a year in 2017. In 1999 this figure was 19.0km², in 2004 it was 2.5km², in 2008 it was 1.3km² and in 2012 it was 0.8km².

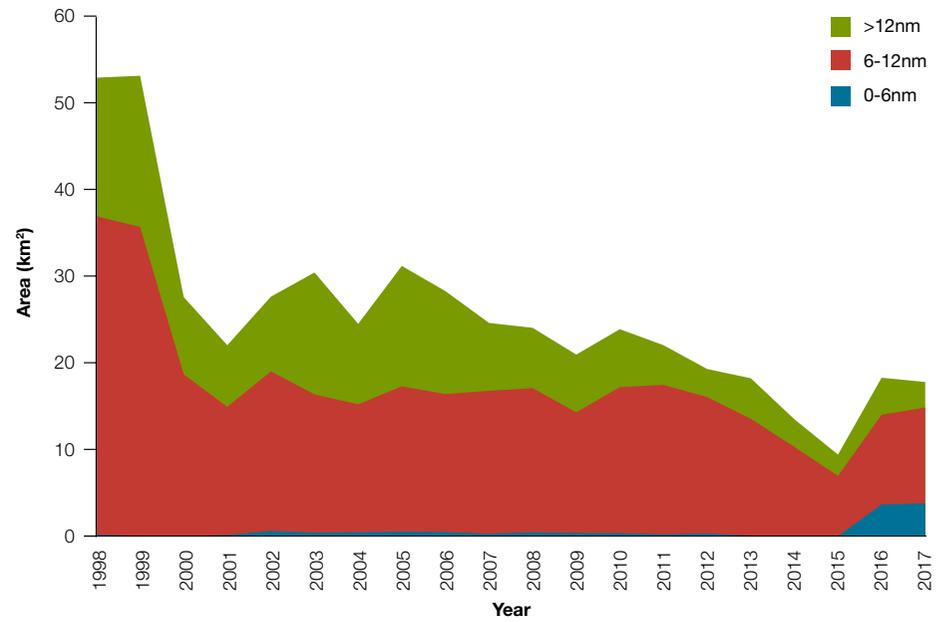
Tonnage

- A total of 62.9 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.

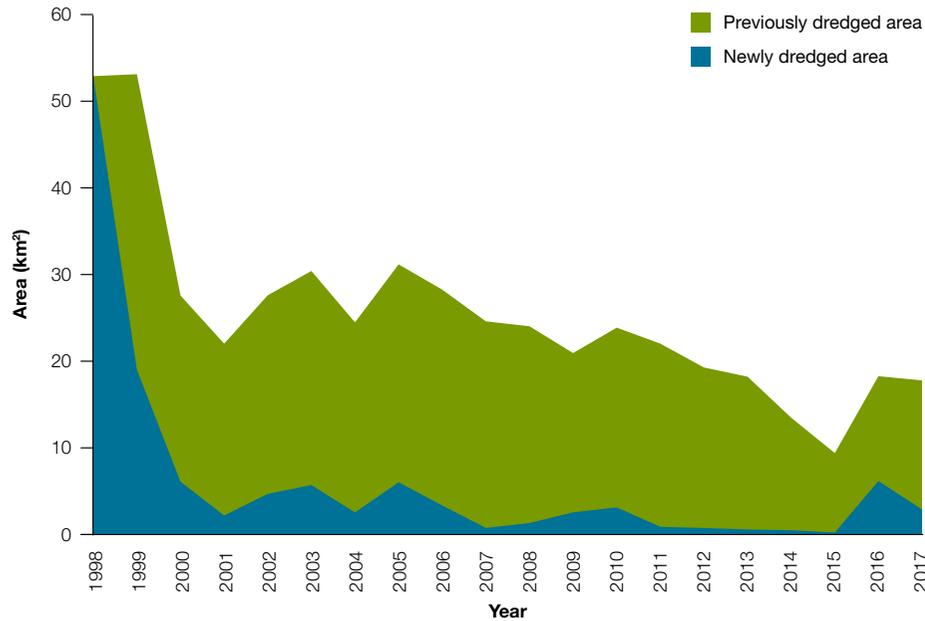
Humber licensed area 1998-2017



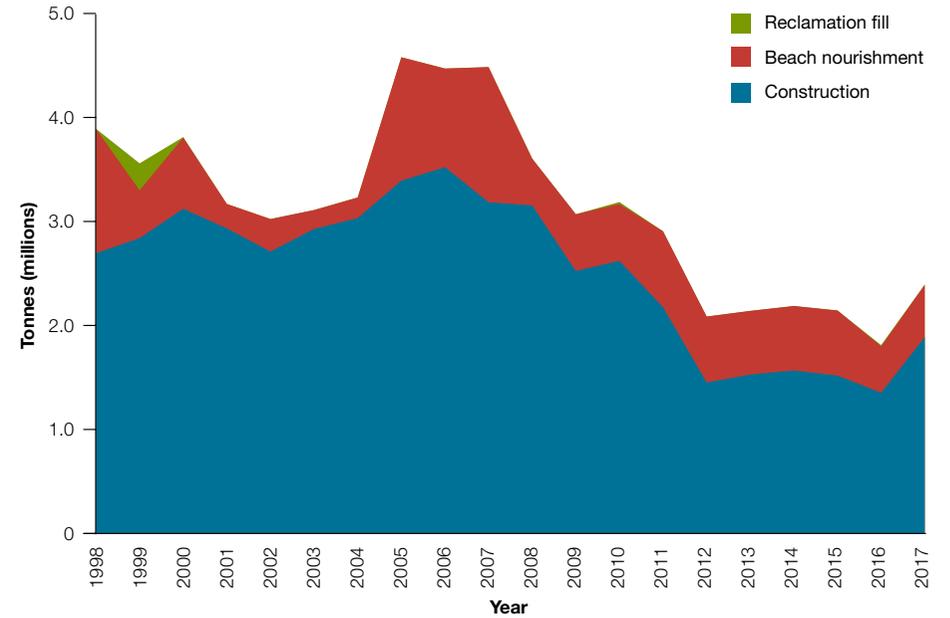
Humber dredged area 1998-2017

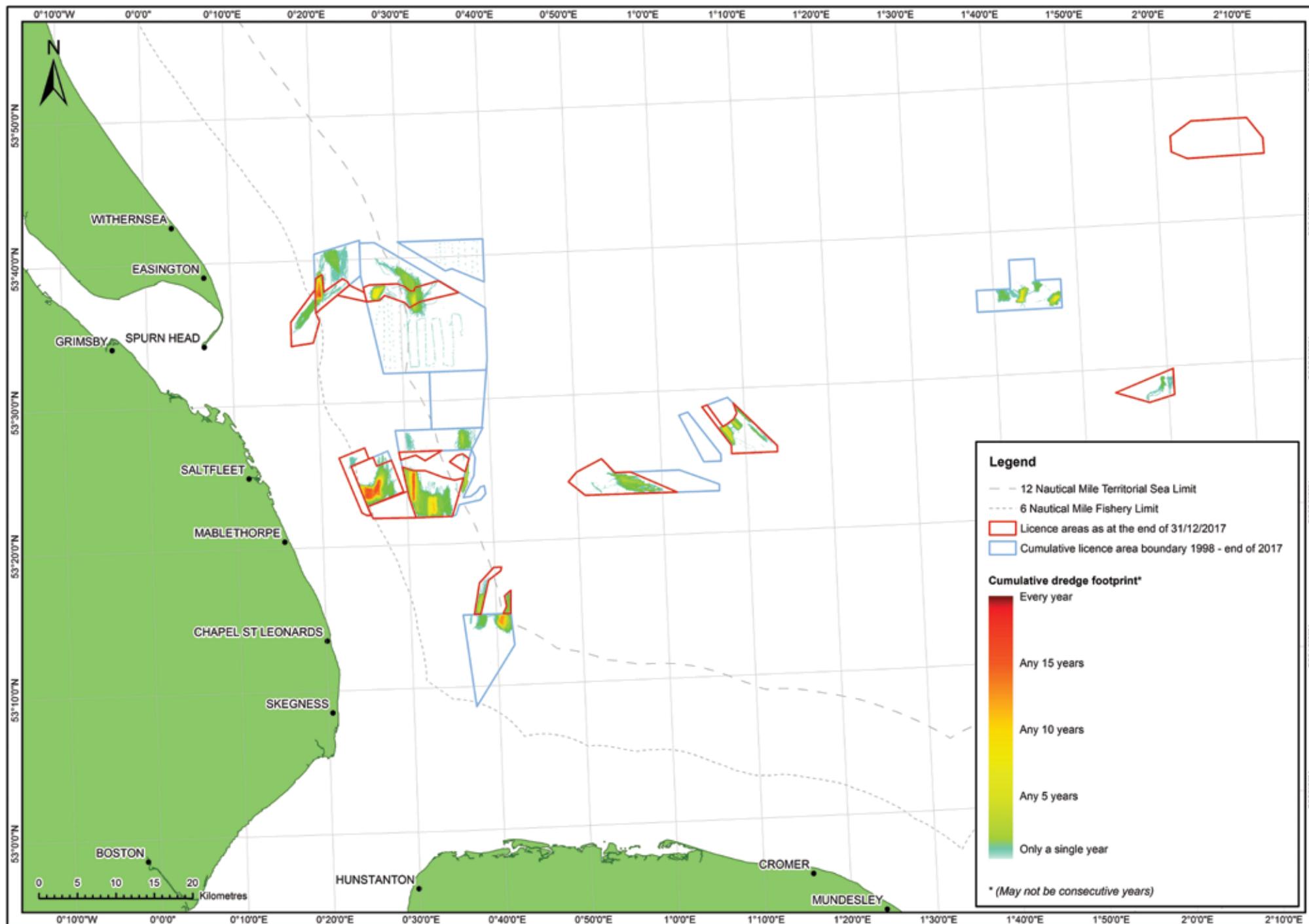


Humber newly dredged area and previously dredged area 1998-2017



Humber tonnages 1998-2017







East Coast region summary 1998-2017

Area licensed

- Between 1998 and 2017, the area of seabed licensed decreased by 142km². The area licensed within six nautical miles of the coast and between six and 12 nautical miles both decreased with no change beyond 12 nautical miles. The largest decrease occurred between six and 12 nautical miles.
- 248.6km² of licensed area was surrendered.
- 106.5km² of new area was licensed.

Area dredged

- Between 1998 and 2017, the area of seabed dredged decreased by 71km².
- The area of seabed dredged per year ranged from 96.7km² in 1998 to 23.0km² in 2016.
- The area of seabed dredged within six nautical miles of the coast, between six and 12 nautical miles and beyond 12 nautical miles all decreased. The largest decrease occurred between six and 12 nautical miles.

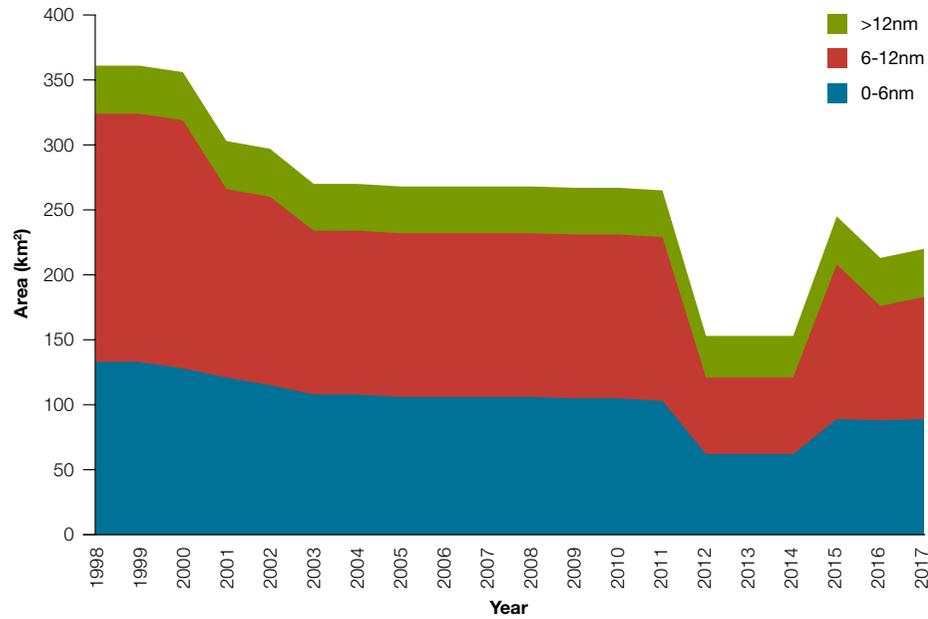
Cumulative footprint

- The cumulative area of seabed dredged between 1998 and 2017 amounted to 196km². Of this total, 132km² (67%) is within current licence areas and the remaining 64km² (33%) is within areas which have now been relinquished.
- The area of new seabed dredged annually decreased significantly to only 1.5km² a year in 2017 from 26.8km² in 1999. In 2004 this figure was 4.1km², in 2008 it was 3.5km² and in 2012 it was 0.3km².

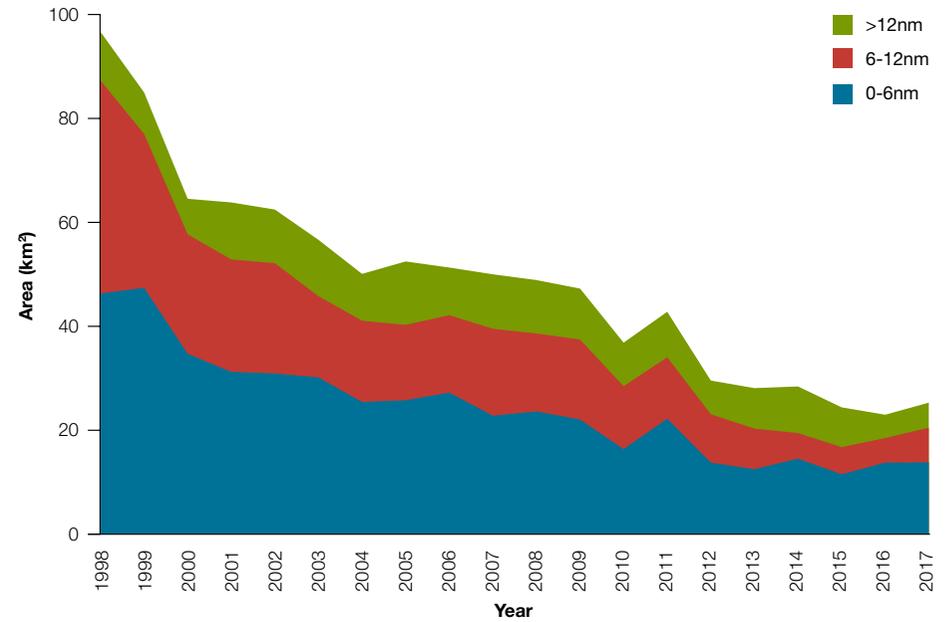
Tonnage

- A total of 138.4 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.

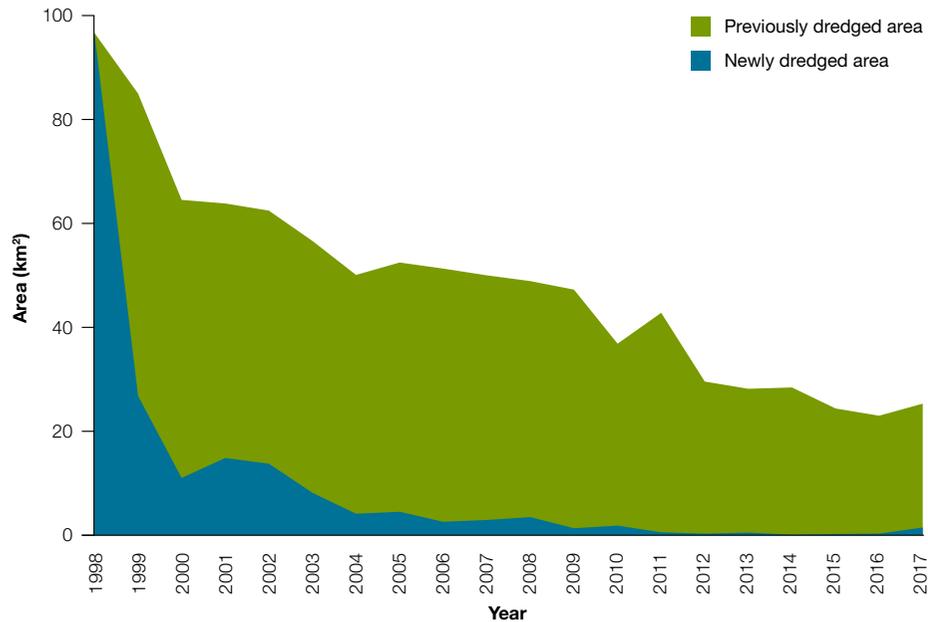
East Coast licensed area 1998-2017



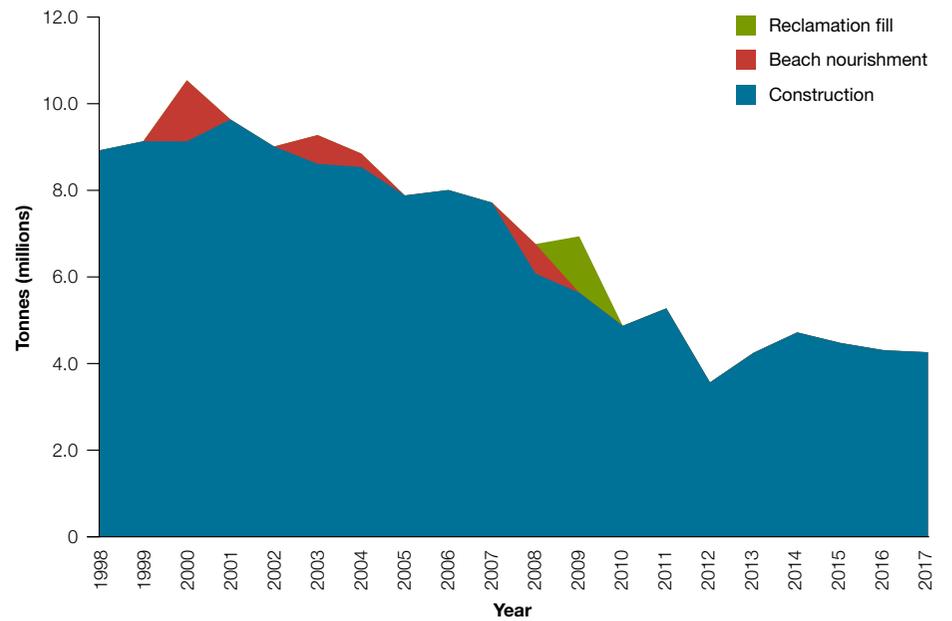
East Coast dredged area 1998-2017

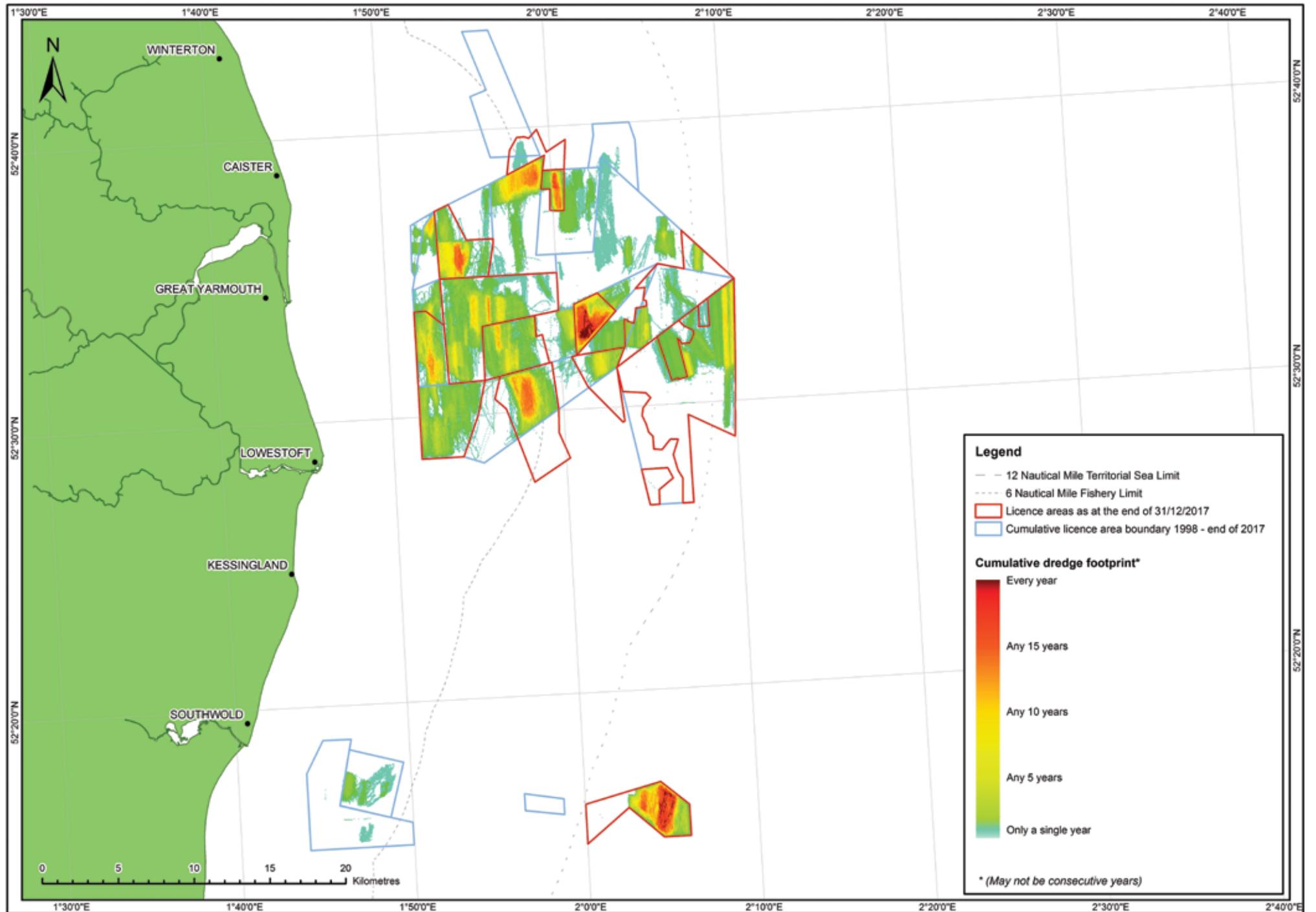


East Coast newly dredged area and previous dredged area 1998-2017



East Coast tonnages 1998-2017







Thames Estuary region summary 1998-2017

Area licensed

- Between 1998 and 2017, the area of seabed licensed decreased by 75km². The area licensed within six nautical miles of the coast and between six and 12 nautical miles decreased. The greatest decrease occurred within six nautical miles. The area licensed beyond 12 nautical miles increased.
- 214.6km² of licensed area was surrendered.
- 139.5km² of new area was licensed.

Area dredged

- Between 1998 and 2017, the area of seabed dredged decreased by 7km².
- The area of seabed dredged per year ranged from 24.6km² in 1999 to 3.3km² in 2012.
- The area of seabed dredged within six nautical miles of the coast and between 6 and 12 nautical miles both decreased. The greatest decrease occurred within six nautical miles. There was a small increase beyond 12 nautical miles.

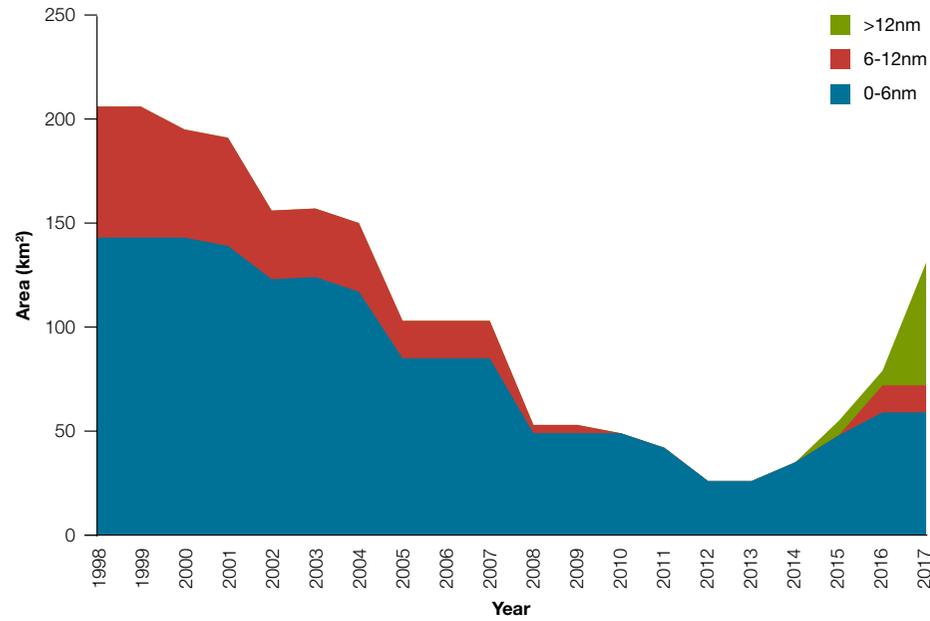
Cumulative footprint

- The cumulative area of seabed dredged between 1998 and 2017 amounted to 63km². Of this total, 42km² (67%) is within current licence areas and the remaining 21km² (33%) is within areas which have now been relinquished.
- The area of new seabed dredged annually decreased to only 3.7km² a year in 2017 from 11.2km² in 1999. In 2004 this figure was 2.7km² and 2008 this figure was 2.9km² and in 2012 it was 1km².

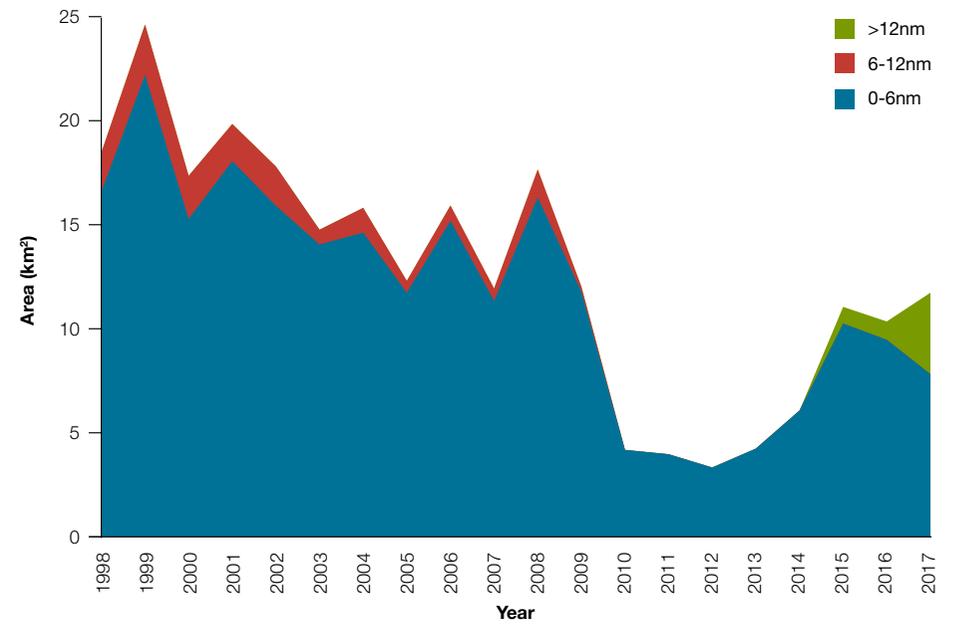
Tonnage

- A total of 27.8 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.

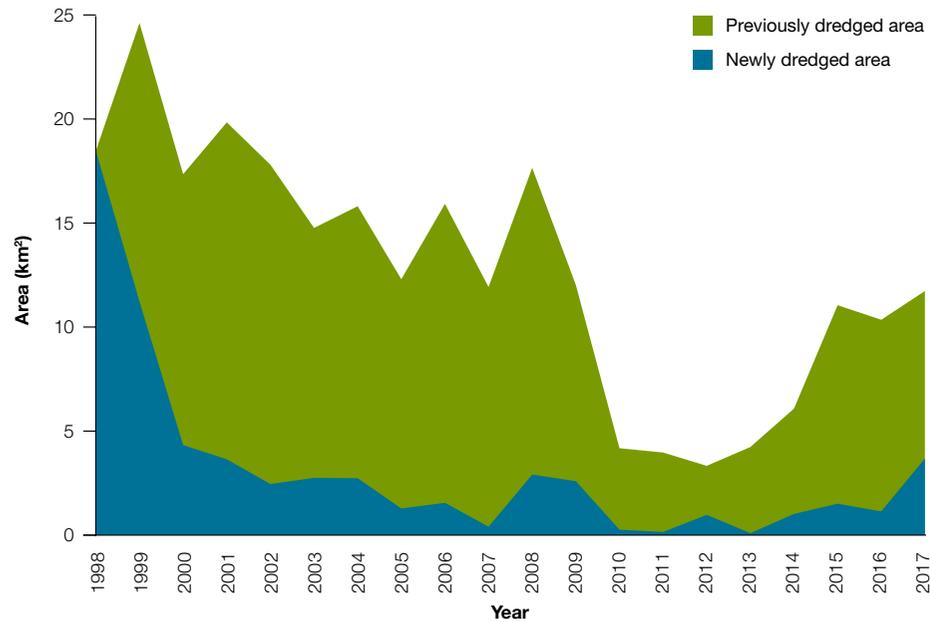
Thames Estuary licensed area 1998-2017



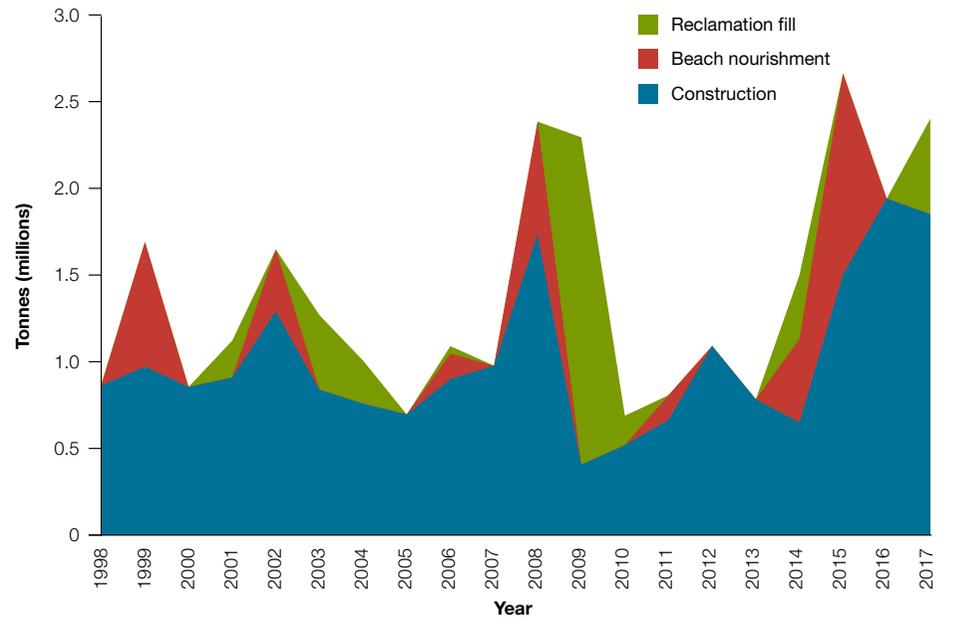
Thames Estuary dredged area 1998-2017

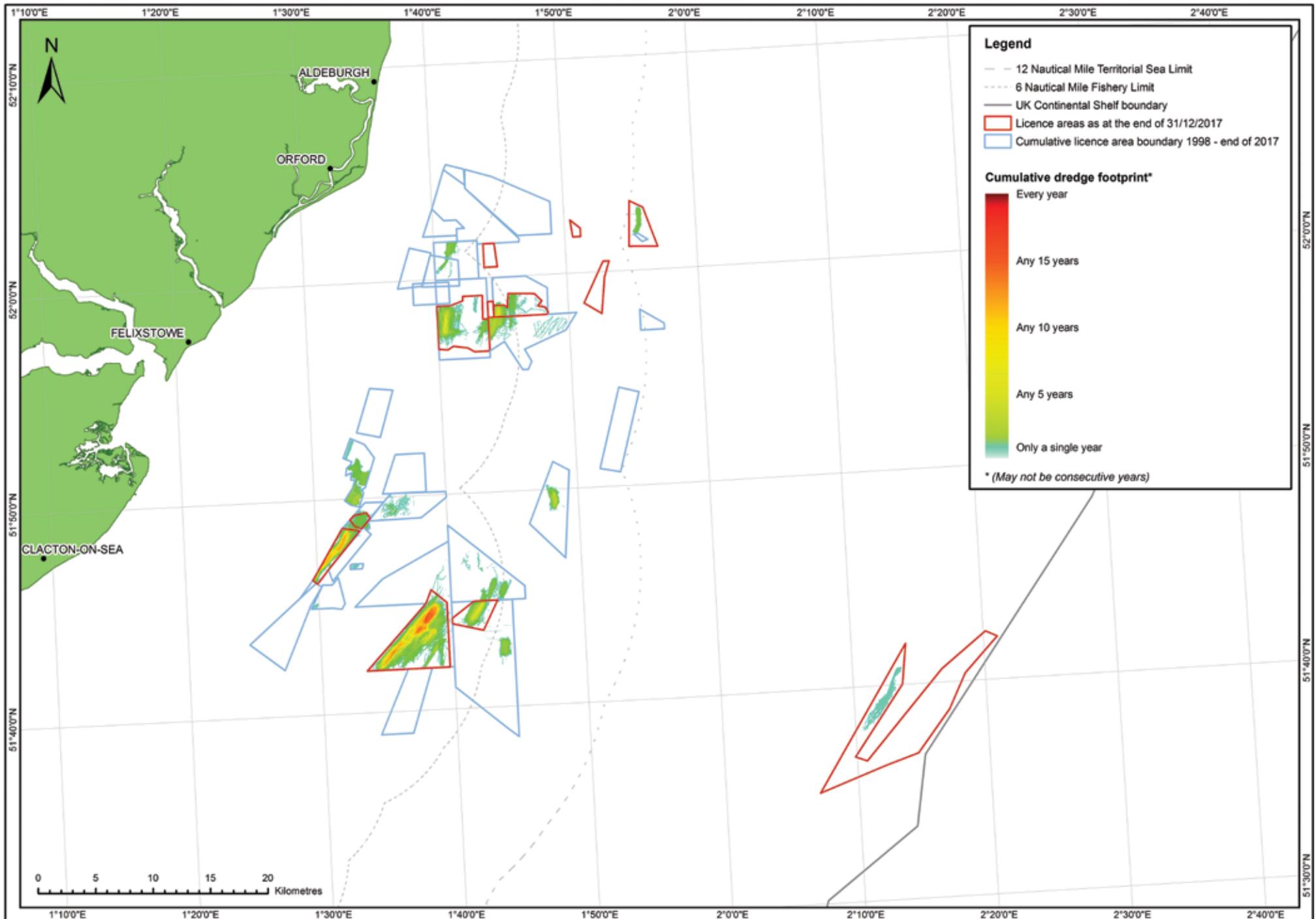


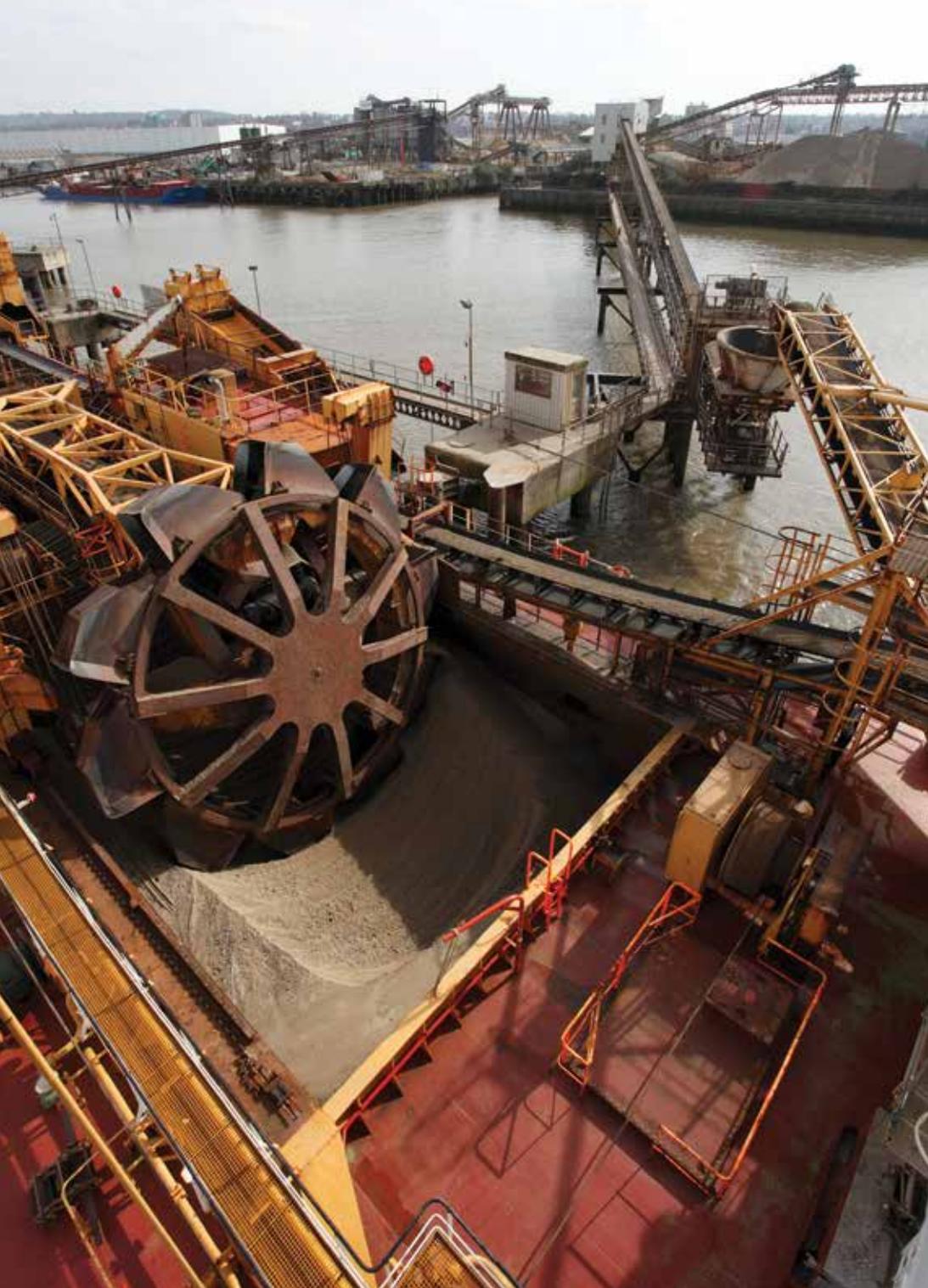
Thames Estuary newly dredged area and previous dredged area 1998-2017



Thames Estuary tonnages 1998-2017







East English Channel region summary 1998-2017

Area licensed

- Between 1998 and 2017, the area of seabed licensed increased by 78km². The area of seabed licensed within six nautical miles of the coast and between six and 12 nautical miles decreased. The largest decrease was between six and 12 nautical miles. There was a large increase beyond 12 nautical miles.
- 38.3km² of licensed area was surrendered.
- 117.1km² of new area was licensed.

Area dredged

- Between 1998 and 2017, the area of seabed dredged increased by 10km².
- The area of seabed dredged per year ranged from 2.2km² in 2005 to 15.5km² in 2015.
- The area of seabed dredged within six nautical miles of the coast and between six and 12 nautical miles has marginally decreased and there was an increase beyond 12 nautical miles.

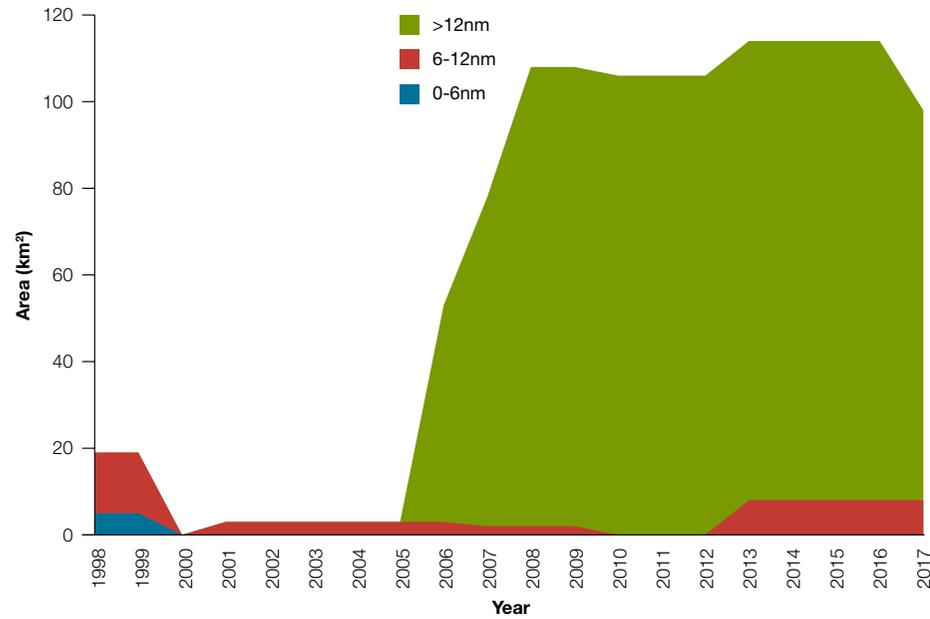
Cumulative footprint

- The cumulative area of seabed dredged between 1998 and 2017 amounted to 31km². Of this total, 26km² (84%) is within current licence areas and the remaining 5km² (16%) is within areas which have now been relinquished.
- The area of new seabed dredged annually has returned to its 1999 low level of 0.3km² in 2017. In 2004, this figure was 0.04km², in 2008 it was 4.1km² and in 2012 it was 0.3km².

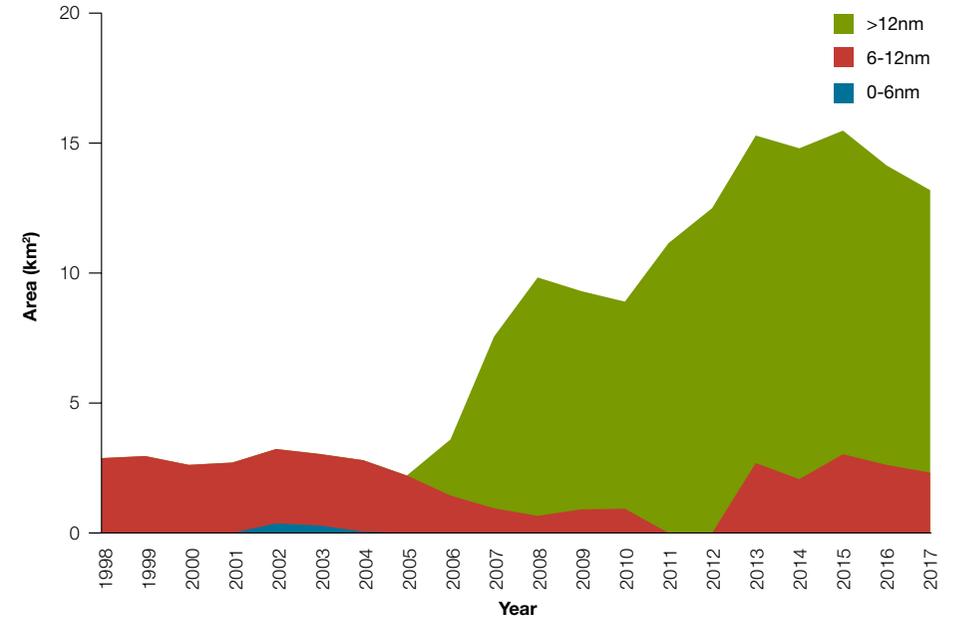
Tonnage

- A total of 48.7 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.

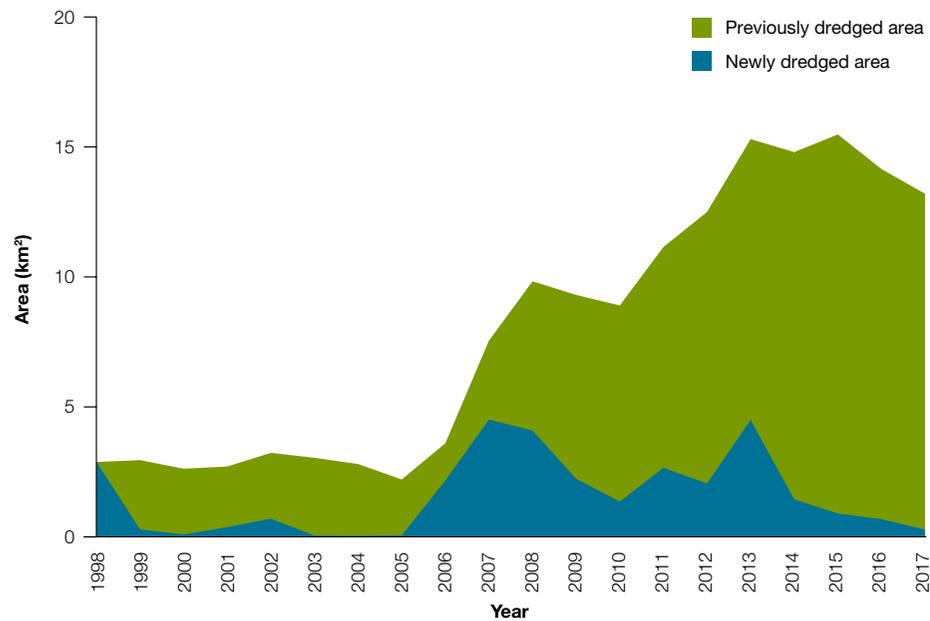
East English Channel licensed area 1998-2017



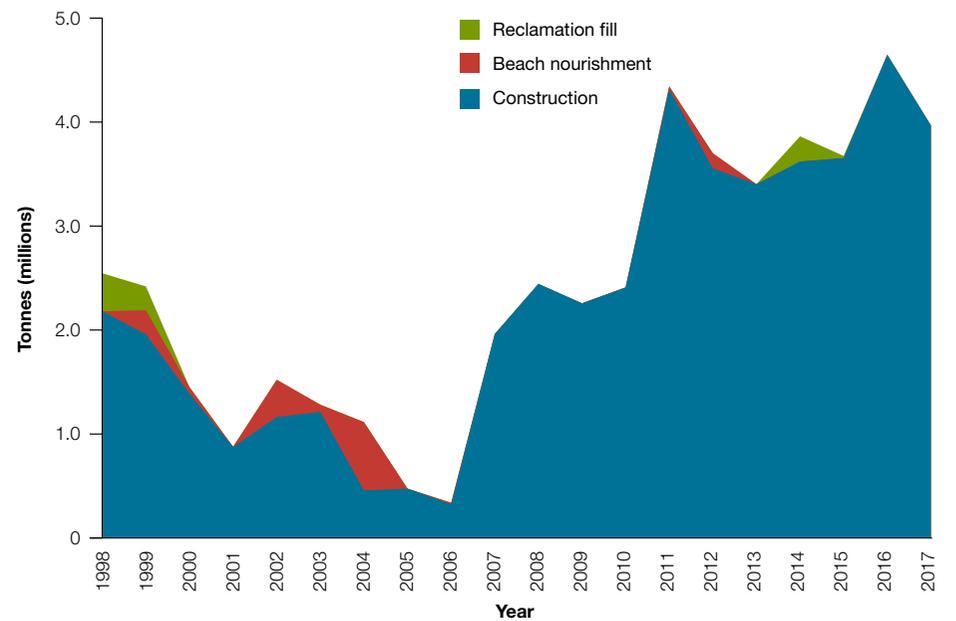
East English Channel dredged area 1998-2017

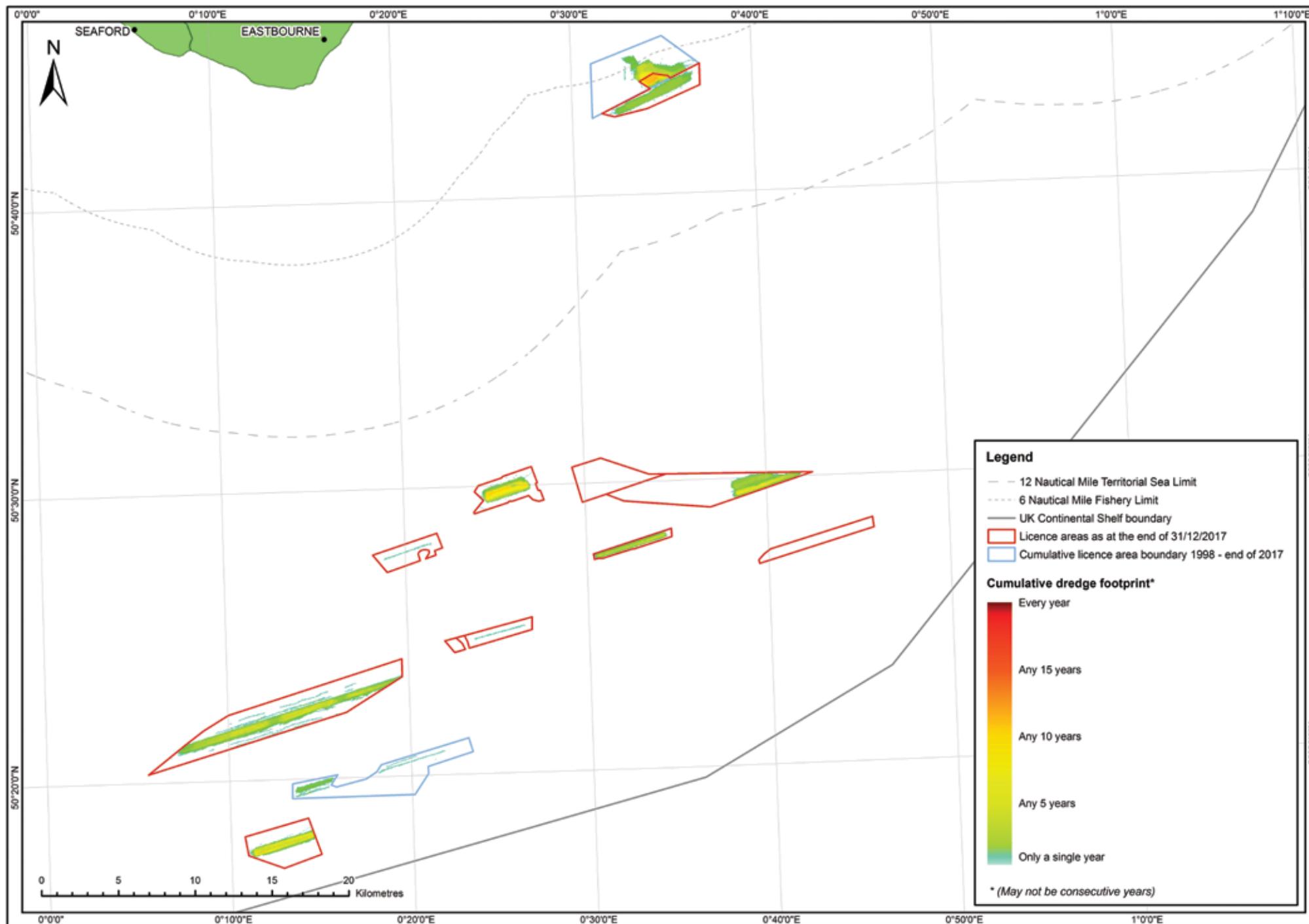


East English Channel newly dredged area and previous dredged area 1998-2017



East English Channel tonnages 1998-2017







South Coast region summary 1998-2017

Area licensed

- Between 1998 and 2017, the area of seabed licensed decreased by 122km². The area licensed within six nautical miles of the coast and between six and 12 nautical miles decreased, with a marginal increase beyond 12 nautical miles. The greatest decrease occurred between six and 12 nautical miles.
- 305.0km² of licensed area was surrendered.
- 183.5km² of new area was licensed.

Area dredged

- Between 1998 and 2017, the area of seabed dredged decreased by 21km².
- The area of seabed dredged per year ranged from 34.9km² in 1998 to 13.4km² in 2015.
- The area dredged within six nautical miles of the coast and between six and 12 nautical miles decreased. The greatest decrease was between six and 12 nautical miles. There was no change in the area beyond 12 nautical miles (no dredging occurred).

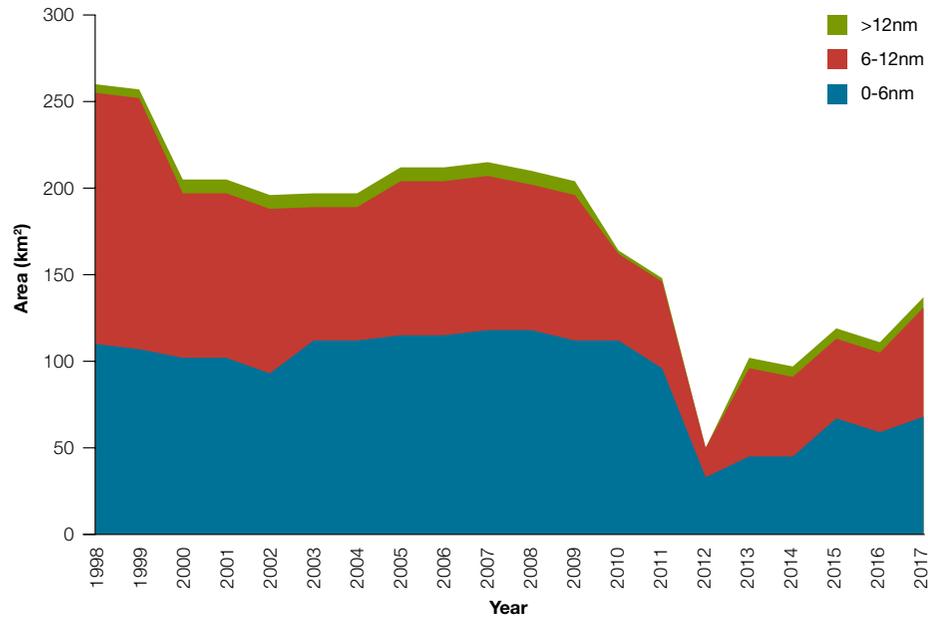
Cumulative footprint

- The cumulative area of seabed dredged between 1998 and 2017 amounted to 88km². Of this total, 38km² (43%) is within current licence areas and the remaining 50km² (57%) is within areas which have now been relinquished.
- The area of new seabed dredged annually decreased significantly from 10.9km² in 1999 to only 1.1km² a year in 2017. In 2004, this figure was 4.3km², in 2008 it was 2km² and in 2012 it was 0.4km².

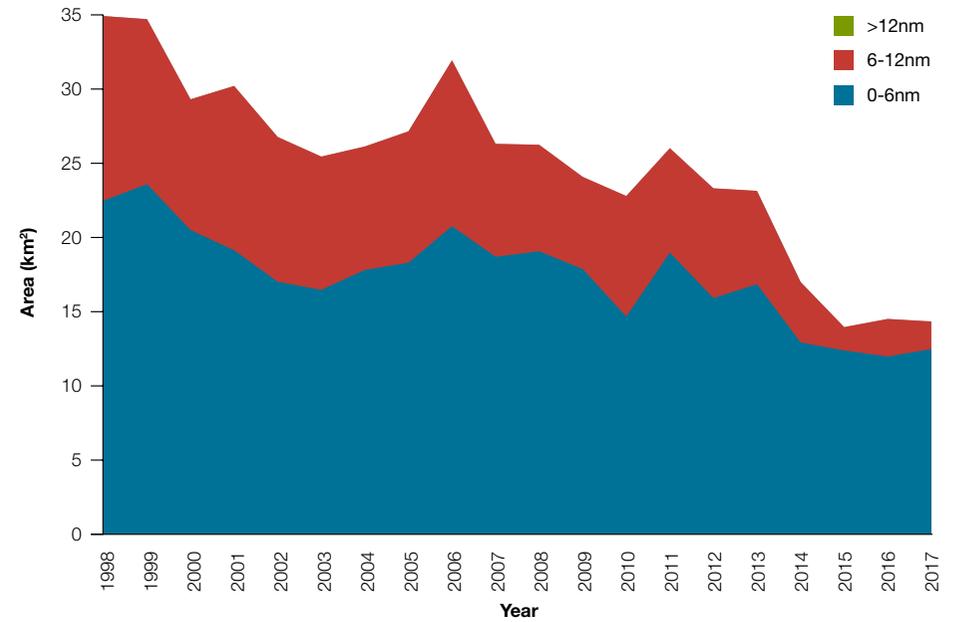
Tonnage

- A total of 86.3 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.

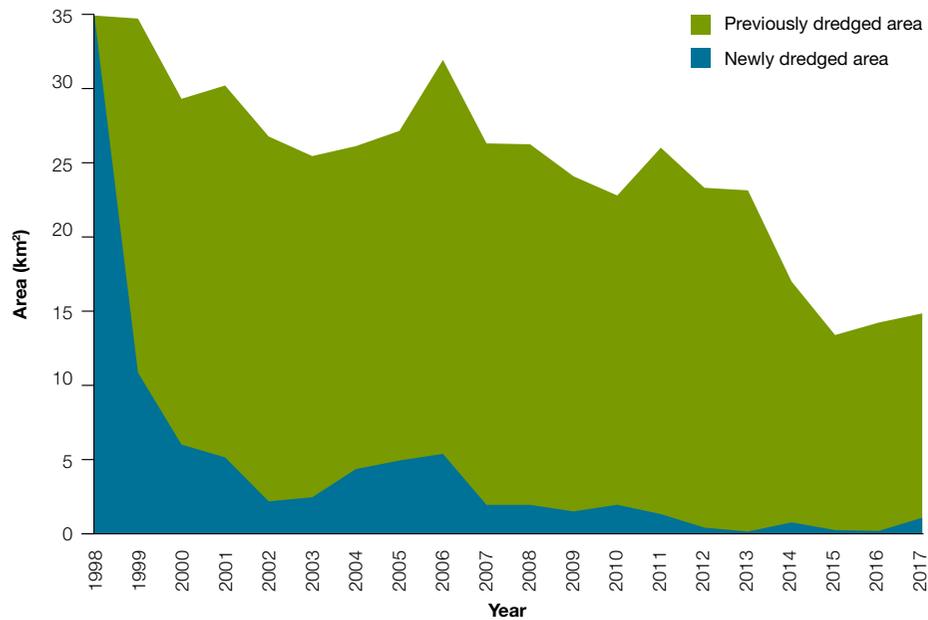
South Coast licensed area 1998-2017



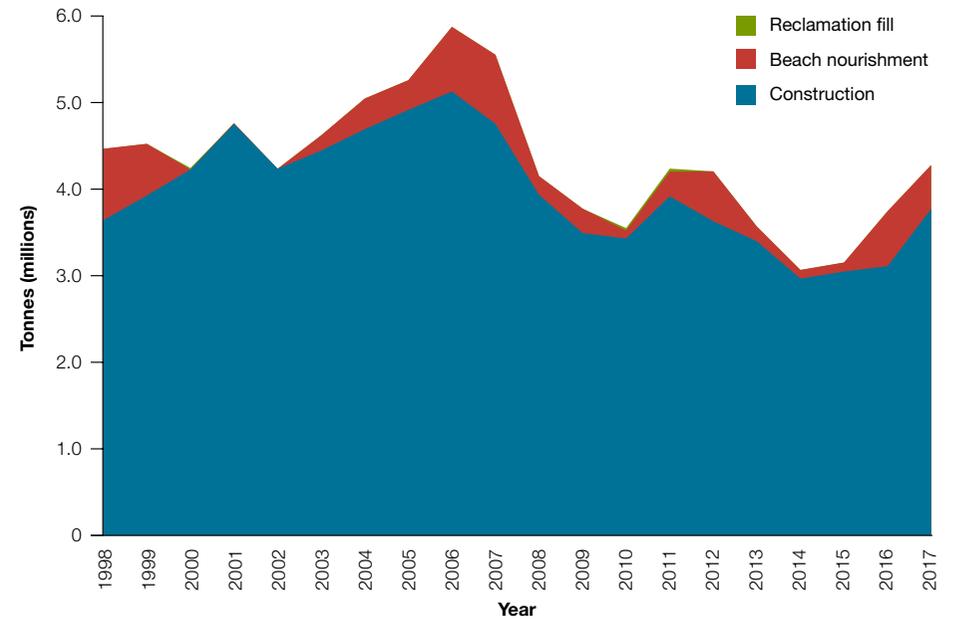
South Coast dredged area 1998-2017

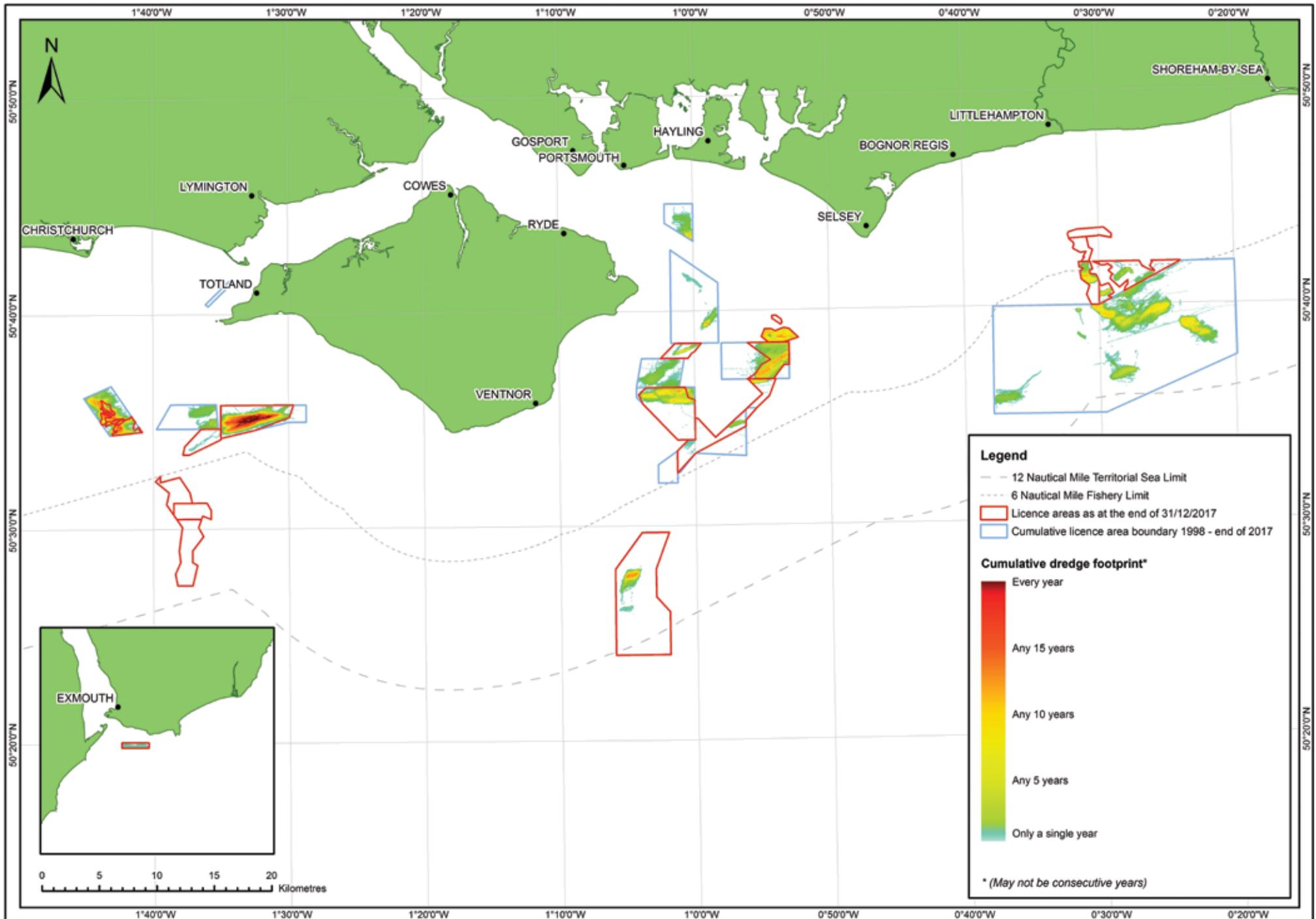


South Coast newly dredged area and previously dredged area 1998-2017



South Coast tonnages 1998-2017







South West region summary 1998-2017

Area licensed

- Between 1998 and 2017, the area of seabed licensed increased by 38km². The area of seabed licensed within six nautical miles of the coast decreased and increased between six and 12 nautical miles. There was no change in the area beyond 12 nautical miles (no area was licensed).
- 63.1km² of licensed area was surrendered.
- 101.5km² of new area was licensed.

Area dredged

- Between 1998 and 2017, the area of seabed dredged decreased by 9km².
- The area of seabed dredged per year ranged from 17.8km² in 1999 to 5.0km² in 2015.
- The area dredged within six nautical miles of the coast decreased. There was a minor increase between six and 12 nautical miles and no change beyond 12 nautical miles (no area was dredged).

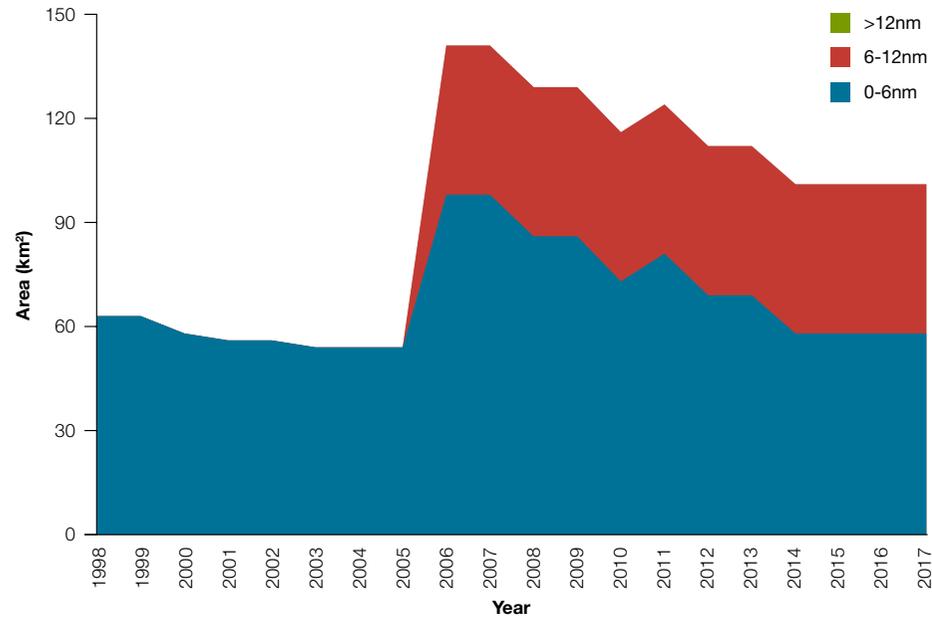
Cumulative footprint

- The cumulative area of seabed dredged between 1998 and 2017 amounted to 38km². Of this total, 9km² (24%) is within currently licensed areas and the remaining 29km² (76%) is within areas which have now been relinquished.
- The area of new seabed dredged annually decreased from 5.5km² in 1999 to 1.4km² a year in 2017. In 2004, this figure was 1.7km², in 2008 it was 0.7km² and in 2012 it was 1km².

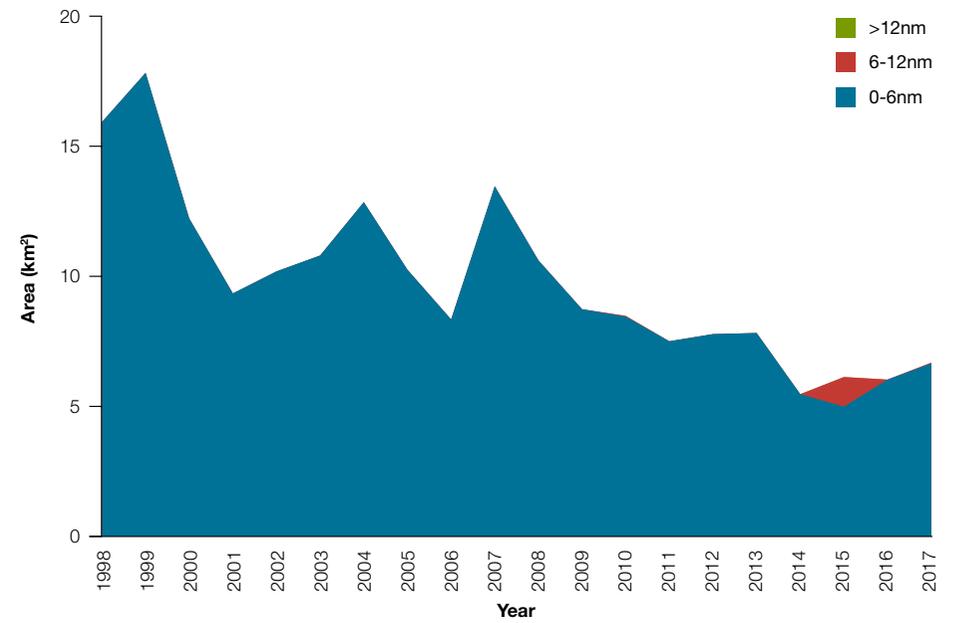
Tonnage

- A total of 28.3 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.

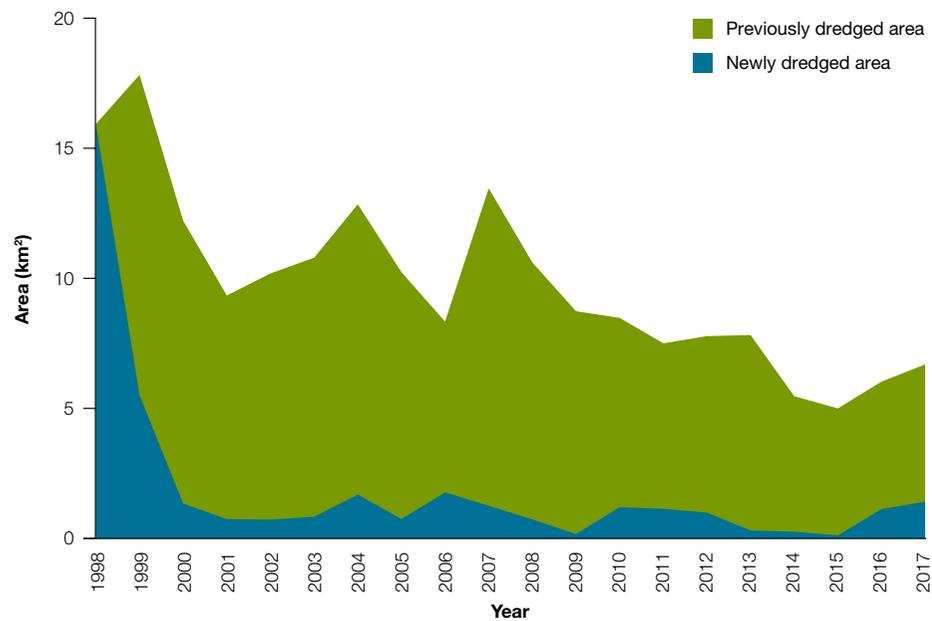
South West licensed area 1998-2017



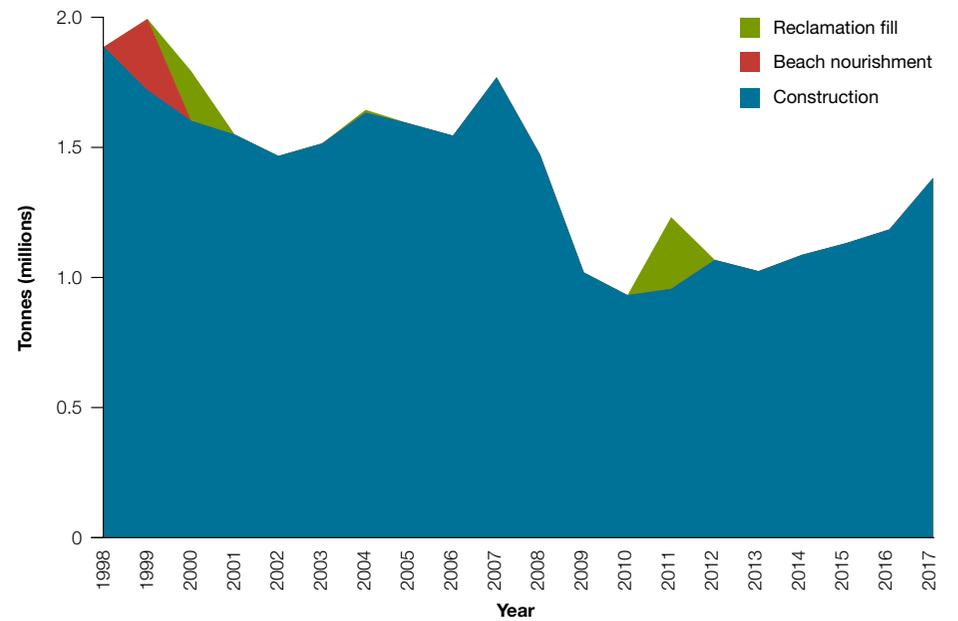
South West dredged area 1998-2017

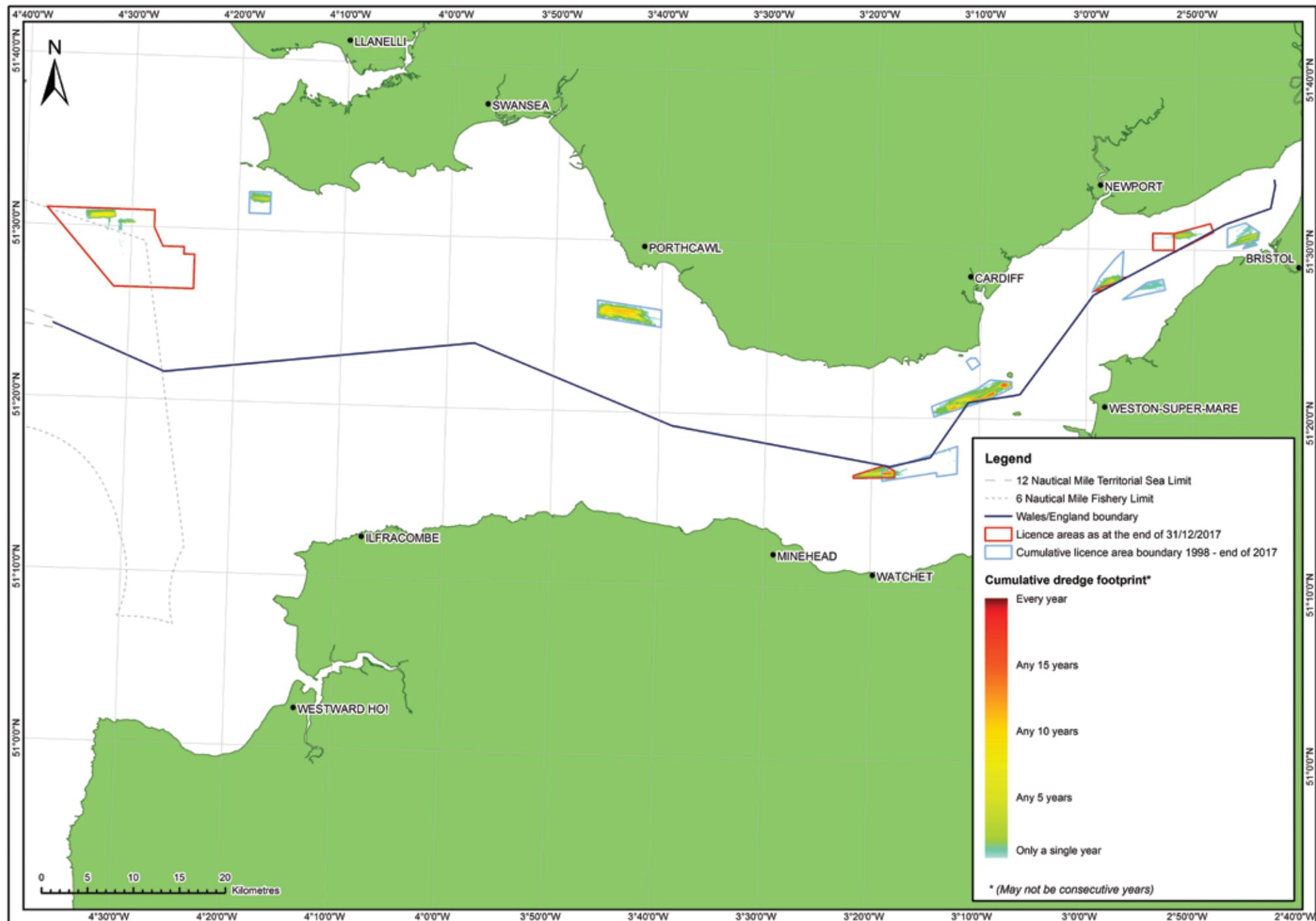


South West newly dredged area and previous dredged area 1998-2017



South West tonnages 1998-2017





North West region summary 1998-2017

Area licensed

- Between 1998 and 2017, the area of seabed licensed decreased by 11km². The area of seabed licensed within six nautical miles of the coast decreased. The area between six and 12 nautical miles and beyond 12 miles increased. The largest increase was beyond 12 nautical miles.
- 96.2km² of licensed area was surrendered.
- 84.9km² of new area was licensed.

Area dredged

- Between 1998 and 2017, the area of seabed dredged increased by 1km².
- The area of seabed dredged per year ranged from 4.0km² in 2015 to 0.32km² in 2010.
- There were minor decreases in the area dredged within six nautical miles of the coast and beyond 12 nautical miles. The area between six and 12 nautical miles marginally increased.

Cumulative footprint

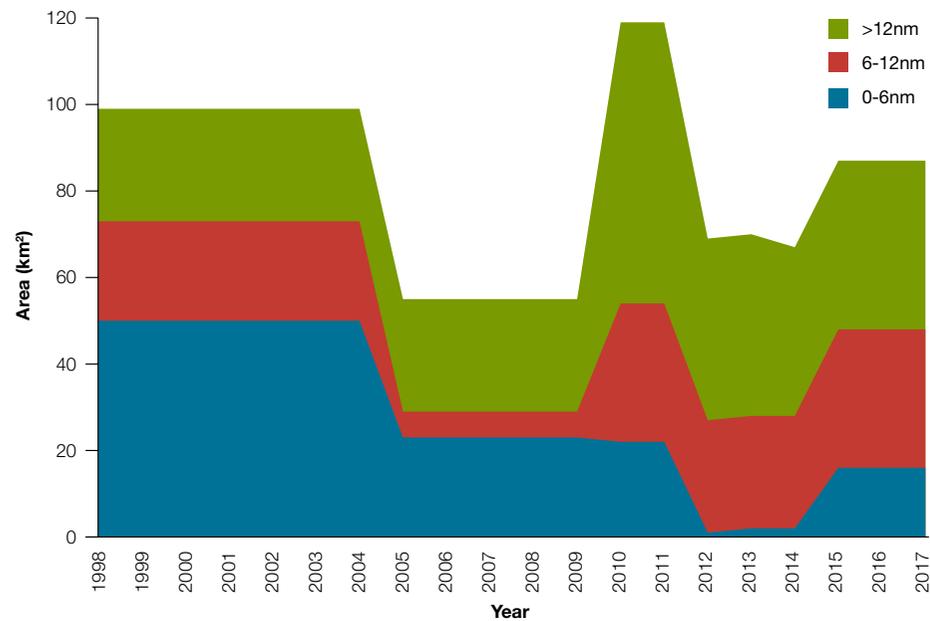
- The cumulative area of seabed dredged between 1998 and 2017 amounted to 12km². Of this total, 7km² (58%) is within current licence areas and the remaining 5km² (42%) is within areas which have now been relinquished.
- The area of new seabed dredged annually decreased to only 0.2km² a year in 2017 from a 1999 figure of 1.7km². In 2004, this figure was 0.8km², in 2008 it was 0.04km² and in 2012 it was 0.6km².

Tonnage

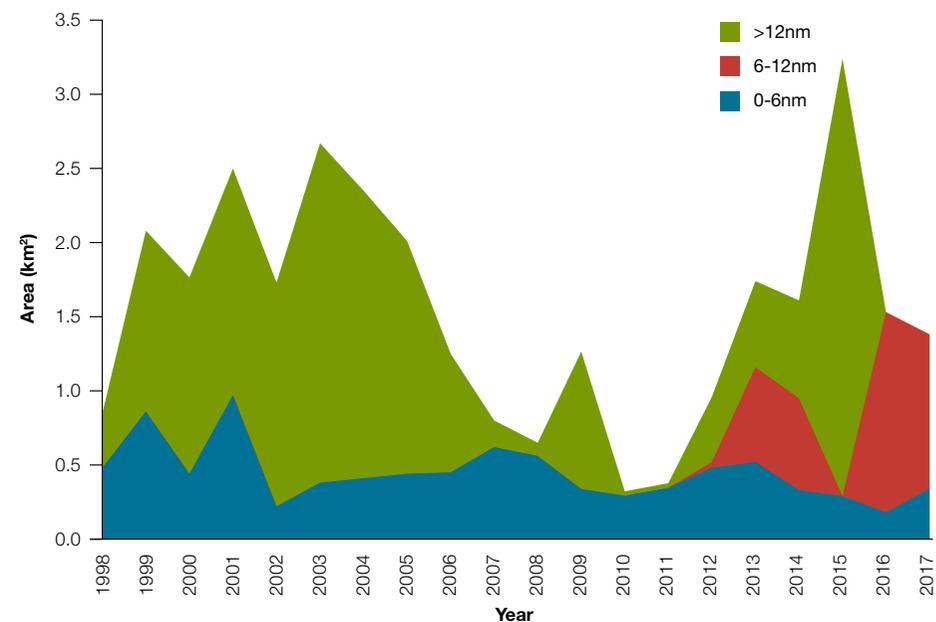
- A total of 10.7 million tonnes of marine sand and gravel was dredged from The Crown Estate licence areas between 1998 and 2017.



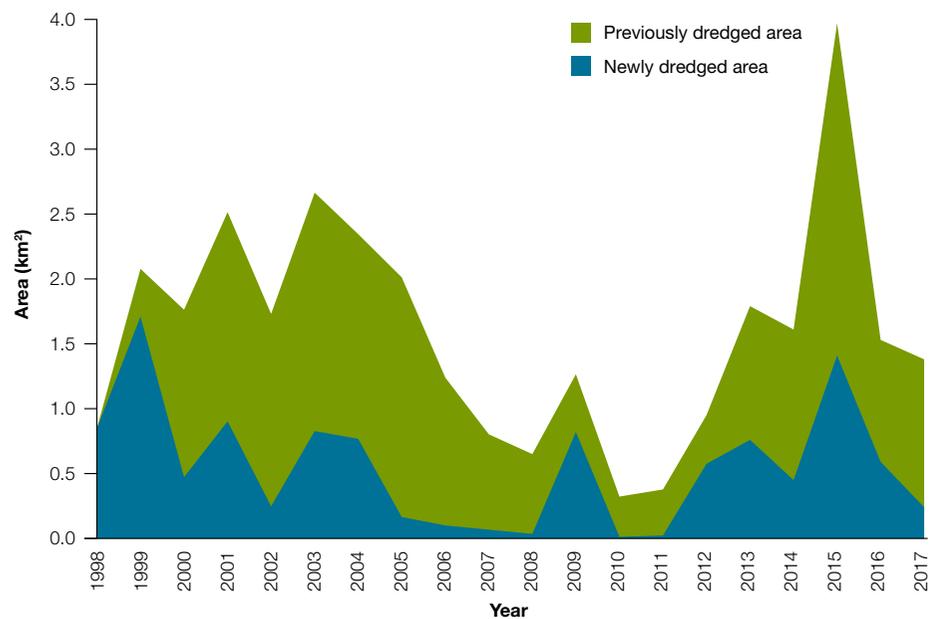
North West licensed area 1998-2017



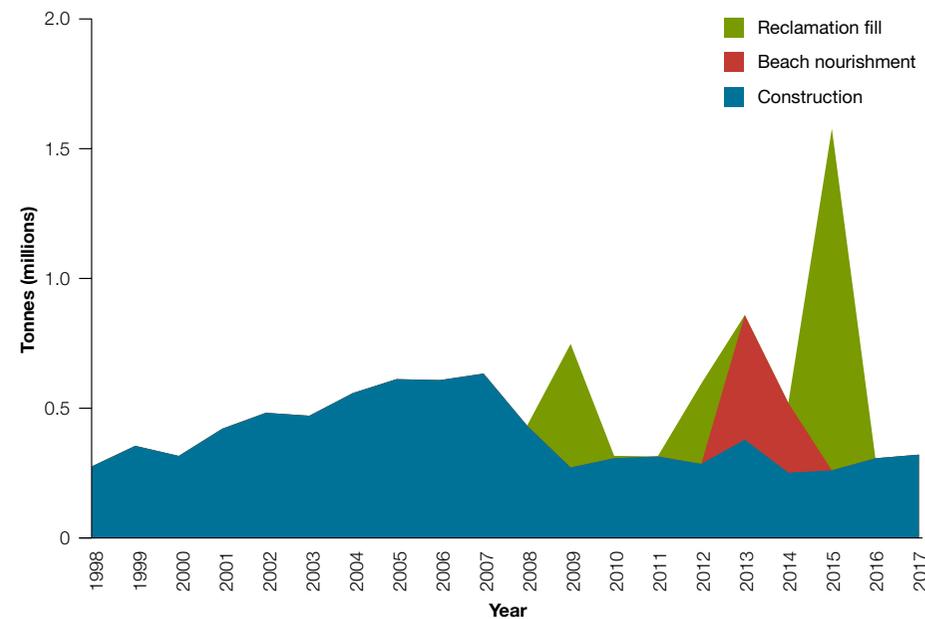
North West dredged area 1998-2017

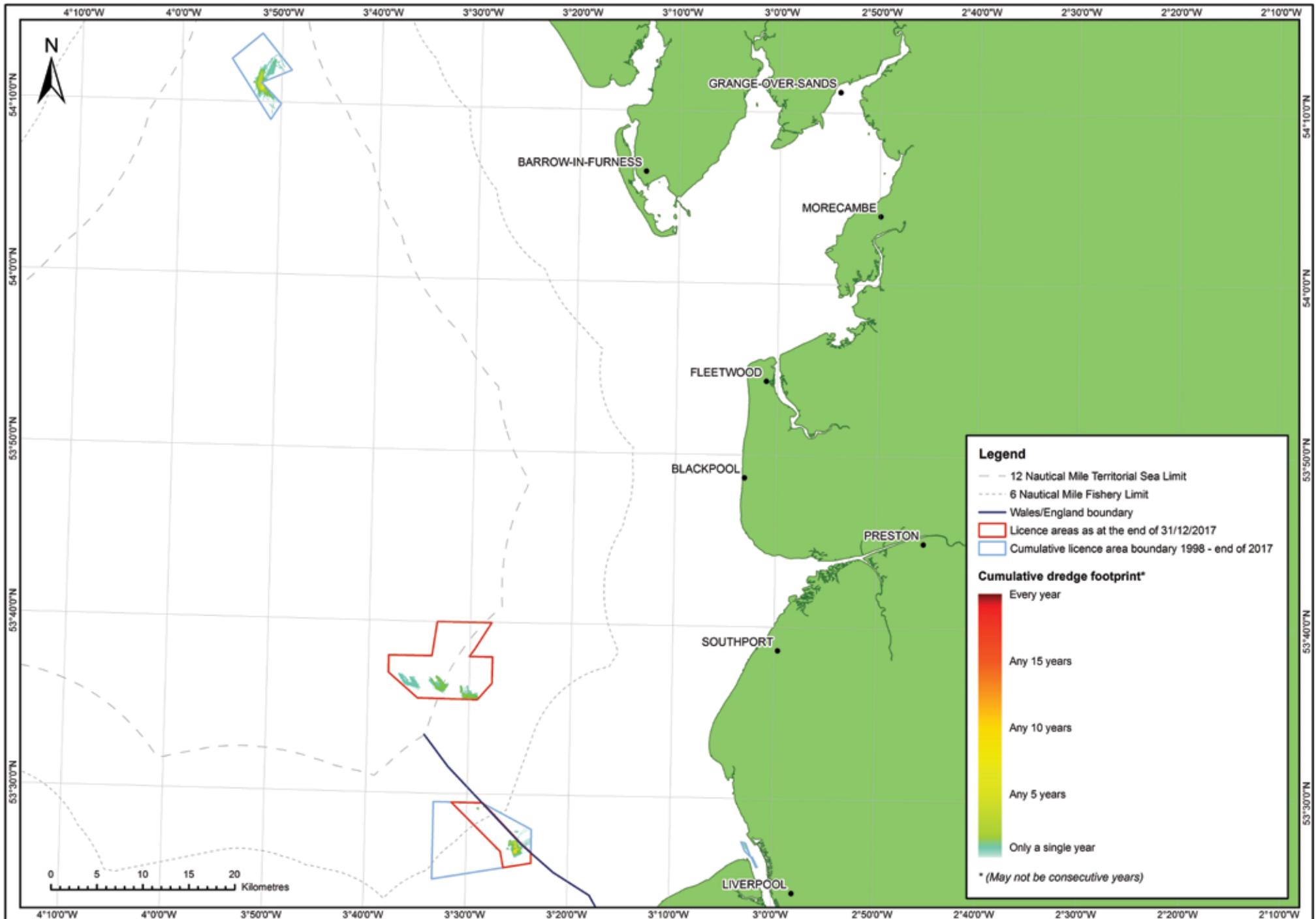


North West newly dredged area and previous dredged area 1998-2017



North West tonnages 1998-2017





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

The Crown Estate manages almost all of the seabed around England and Wales, and the sand and gravel resources in these waters. We take an active approach to managing this natural asset effectively and sustainably to deliver value over the long-term, including awarding and managing 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.

BMAPA

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 25 vessels on 66 production licences around the UK as of November 2018.

BMAPA membership (as of November 2018) is comprised of: Aggregate Industries, Brett Group, Britannia Aggregates, CEMEX UK Marine, DEME Building Materials, Hanson Aggregates Marine, Norwest Sand & Ballast Co, Sea Aggregates, Tarmac Marine and Volker Dredging.



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